Summer Foredune Biological Survey Report

BROAD BEACH
MALIBU, LOS ANGELES COUNTY, CALIFORNIA

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1.0 INTRODUCTION

This report describes the results of vegetation and wildlife surveys conducted by WRA, Inc. ("WRA") at the site of the Broad Beach Restoration Project located in Malibu, Los Angeles County, California ("Study Area"; Figure 1). The purpose of the surveys was to capture summertime vegetation- and wildlife-related conditions in foredune habitat at the Project Area. Although other habitats may have been included in the surveys, the primary focus of the surveys was on foredune habitat. Species composition and conditions within other habitats at the site are the focus of other survey efforts. The surveys reported on here compliment rare plant and Environmentally Sensitive Habitat Area ("ESHA") surveys of the site performed by WRA in 2010 and 2011 (WRA 2011a, 2011b); however, the current surveys incorporated a larger Study Area (Figure 1). The intent of using the larger Study Area was to capture habitat conditions in all areas that may be directly affected by the proposed project. The following sections describe the methods and results of the surveys.

2.0 METHODS

Prior to the site visit, background literature was reviewed to determine potential presence of sensitive vegetation types, suitable habitat for special-status plants or wildlife, and habitats potentially considered ESHAs by the Malibu Local Coastal Program (Quality Code Publishing 2002). Resources reviewed include aerial photography, the California Department of Fish and Wildlife's ("CDFW") California Natural Diversity Database ("CNDDB"), the Malibu U.S. Geological Survey ("USGS") 7.5-minute quadrangle map, and species' habitat requirements as noted in available literature. Following the initial background review, WRA biologists familiar with the habitats, plants, and wildlife of coastal southern California visited the Study Area on June 5 and 6, 2013. Specific methods used to assess the site for rare plants, vegetation, and wildlife are described in the following sections.

2.1 Vegetation and Rare Plants

During the site visit, WRA biologists surveyed the entire Study Area on foot to document vegetation types and to evaluate habitat conditions for special-status plants. Vegetation was documented using a combination of recent aerial imagery and hand-held global positioning system ("GPS") units with sub-meter accuracy. Plant nomenclature follows Baldwin et al. (2012), except where noted. For cases in which regulatory agencies or CNPS base rarity on older plant classification, precedence was given to the classification used by those entities.

Rare Plants

All habitats were visually surveyed for the presence of special-status plant species identified to have moderate or high potential to occur at the site (Appendix A). This determination was made based primarily on habitat conditions and proximity to previously documented occurrences. All plant species observed during the site survey were identified to the taxonomic level necessary to determine rarity.

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Malibu, California

Figure 1.

Study Area Location Map

N
W E
S

0 250 500 1,000

Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: ESRI Imagery & National Geographic

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Vegetation

To document community composition and other parameters such as vegetation density, vegetation was sampled at 11 representative locations using a modified relevé method (Mueller-Dombois and Ellenberg 1974). This method involves identifying discrete plant groupings ("communities") and recording the percent cover of each species within the grouping. Percent cover was collected as a cover class score and which was converted to the midpoint of the cover class for data analysis. As a comparison, WRA biologists conducted similar vegetation sampling at Ormond Beach, a reference site located in Oxnard, California. Ormond Beach contains naturally occurring foredune habitat along nearly 2 miles of coastline. WRA biologists visited the site on June 6, 2013 and sampled vegetation in four relevés at the site following the same methods used at Broad Beach.

To determine the sufficiency of the vegetation sampling effort for detecting new species, WRA assessed vegetation along 9 transects located in within a subset of the relevé sampling areas at Broad Beach. Between six and sixteen 0.25-square meter quadrats were located at even intervals along each transect and the plant species present within each quadrat were recorded. This data was used to create species area curves for each transect as well as for the entire site. The locations of relevés and transects at Broad Beach are shown on Figure 2. Transects and species area curves were not performed for the Ormond Beach site.

Observed plant communities were classified as either native dune mat (Sawyer et al. 2009), landscaping, and invasive communities. In many cases, invasive species such as iceplant (*Carpobrotus* spp.) or pampas grass (*Cortaderia* spp.) were intermingled with dune mat or landscape communities to such an extent that determining how to classify the community became somewhat subjective. In general, however, if a community contained more than one native species typically associated with dune mat vegetation was present and iceplant occupied less than 50 percent of the community, it was classified as dune mat. When only one or two species typically associated with dune mat vegetation were present and iceplant occupied more than 50 percent of the community, it was classified as invasive. Similarly, if iceplant or pampas occupied more than 50 percent of a community occupied by landscape species, the community was considered invasive. If iceplant or pampas grass occupied less than 50 percent of such communities, they were classified as landscaping.

2.2 Wildlife

During the site visit, WRA biologists surveyed the entire Study Area on foot to document wildlife species present and to assess habitat conditions for their suitability to host special-status wildlife. All encountered wildlife species were recorded. Special focus was given to portions of the Study Area with habitat conditions potentially suitable for hosting special-status species (i.e., relatively intact southern foredune habitat). Focused survey efforts were performed for foredune infauna, avian species, and El Segundo blue butterfly (*Euphilotes battoides allyni*); these included the use of pit-fall traps for dune infauna, point counts for avian species, and surveys for the host plant of El Segundo blue butterfly. The methods used for these focused survey efforts are described in more detail below.

Foredune Infauna

Four pit-fall trap arrays were deployed on June 5, 2013 in an attempt to detect silvery legless lizard (*Aniella pulchra*), globose dune beetle (*Coelus globosus*), and sandy beach tiger beetle (*Cicindela hirticollis gravida*). Pit-fall trap arrays consisted of two 2-gallon buckets buried approximately 4 inches below native grade. Buckets were installed approximately 9 feet apart and connected with a 10 foot-long linear drift fence buried 4 inches below grade. Pit-fall trap arrays were installed in representative dune habitats at approximately equidistant spacing. The locations of the arrays are depicted in Figure 3. The pit-fall traps were checked and removed on June 6, 2013. Representative specimens of captured adult arthropods were sacrificed and preserved for laboratory verification. No vertebrate species were captured.

Avian Species

Six ten-minute point counts were completed at approximately equidistant intervals throughout the Study Area. The locations of these point counts are depicted in Figure 3. During the observation period, avian species were detected both visually using binoculars and aurally. Species identification, method of detection, numbers of individuals, distance and direction, and any applicable behavioral information was recorded.

El Segundo Blue Butterfly

El Segundo blue butterfly is a federally endangered invertebrate which has recently been documented in dune habitat at the Ballona Wetlands Ecological Reserve located approximately 23 air miles from Broad Beach (Johnston et al. 2012). During the vegetation surveys, particular focus was given to determining whether the obligate host plant for the species, coast buckwheat (*Eriogonum parviflorum*), occurs within the Study Area.

3.0 RESULTS AND DISCUSSION

Results of the surveys conducted at Broad Beach and Ormond Beach on June 5 and 6, 2013, are presented in the following sections and in the attached appendices. The results of the surveys are based on conditions observed at the site on the dates that the surveys were performed.

3.1 Vegetation and Rare Plants

Rare Plants

The CNDDB does not contain records of any special-status plant species occurring in the Study Area. Of the 7 species identified to have moderate to high potential to occur at the site based on habitat conditions and proximity to previously documented occurrences, 6 of these species have blooming periods in June, when the surveys were conducted. In general, the remaining species, dune larkspur (*Delphinium parryi* ssp. *blochmaniae*) can be readily identified outside of their blooming period, at least to the level of genus. No *Delphinium* species were observed

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Figure 2.

Broad Beach
Vegetation Releve and
Transect Locations

N
W E
S

0 150 300 600
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: ESRI Imagery June 2010

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Transects.mxd

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Figure 3.

Broad Beach Wildlife Survey Locations

N
W E
S

0 200 400 800
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: ESRI Imagery June 2010

Path L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Wildlife Surveys.mxd

during the June 2013 site visit. With the exception of red sand verbena (*Abronia maritima*), no other special-status plant species were observed in the Study Area. Red sand verbena was identified in limited patches of native dune mat vegetation along the length of the Study Area, primarily in association with undeveloped parcels at the site. The locations of red sand verbena in the Study Area are shown on Figure 4.

Vegetation

A total of 84 plant taxa have been identified at the site during surveys conducted by WRA in 2010, 2011, and 2013. Plant species observed at in the Study Area are listed in Appendix B. Vegetation communities observed in the Study Area are shown in Figure 4; these vegetation communities should supersede those identified during vegetation mapping of the site conducted by WRA in 2011 (WRA 2011a, 2011b). Table 1 shows the acreages associated with each vegetation type observed in the Study Area. The Study Area was dominated by a mix of open sand, landscape communities, and invasive communities. Native dune mat vegetation was observed in approximately three discrete locations approximating 0.10 acre. Additional areas containing one or more species typical of native dune mat communities were observed at the site; however, these areas contained iceplant at greater than 50 percent cover, and as such, were identified as invasive communities. In general, the vegetation at the site is highly degraded, with a predominance of invasive iceplant and non-native ornamental species. The degraded nature of habitat at the site lessens the potential for special-status plant and wildlife species to occur there.

Table 1. Acreages for vegetation types, open sand, and developed portions of the Study Area

Community Type	**Acreage**
Developed (including revetment)	8.06
Dune mat	0.10
Invasive	2.89
Landscaped	4.27
Open sand	10.38
Total Study Area	25.70

Results of the relevé sampling for Broad Beach are shown in Figure 5; results for Ormond Beach are shown in Figure 6. Data collected during the relevé sampling at both Broad Beach and Ormond Beach are included in Appendix C. At Broad Beach, plant communities were dominated by non-native species including common landscape species as well as invasive species such as iceplant and pampas grass (both of which may have been introduced to the site as landscape material). Although it was not determined quantitatively, species richness at Broad Beach greatly exceeded that of Ormond Beach where only four species were observed in the relevé plots. Plant cover within the relevé plots at Broad Beach ranged from approximately

Study Area
MHTL - JAN 19-20, 2010
MHTL - OCT 15, 2009
Pre-2010 Shoreline Protection Structures
Remnant Foredune Habitat (10.07 acres)*
Developed (5.33 acres)
Dune Mat (0.10 acre)
Invasive (2.89 acres)
Landscaped (4.27 acre)
Open Sand (10.38 acres)
Revetment (2.73 acres)

*Remnant foredune habitat remaining after installation of Pre-2010 Shoreline Protection Structures and 2010 Emergency Rock Revetment

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Figure 4a.

Biological
Communities
Observed at Broad
Beach

N
E
W
S

0 50 100 200
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Existing Conditions.mxd

Study Area
MHTL - JAN 19-20, 2010
MHTL - OCT 15, 2009
Pre-2010 Shoreline Protection Structures
Remnant Foredune Habitat (10.07 acres)*
Developed (5.33 acres)
Dune Mat (0.10 acre)
Invasive (2.89 acres)
Landscaped (4.27 acre)
Open Sand (10.38 acres)
Revetment (2.73 acres)

*Remnant foredune habitat remaining after installation of Pre-2010 Shoreline Protection Structures and 2010 Emergency Rock Revetment

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Figure 4b.

Biological
Communities
Observed at Broad
Beach

N
E
S
W

0 50 100 200
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Existing Conditions.mxd

Study Area
MHTL - JAN 19-20, 2010
MHTL - OCT 15, 2009
Pre-2010 Shoreline Protection Structures
Remnant Foredune Habitat (10.07 acres)*
Developed (5.33 acres)
Dune Mat (0.10 acre)
Invasive (2.89 acres)
Landscaped (4.27 acre)
Open Sand (10.38 acres)
Revetment (2.73 acres)

*Remnant foredune habitat remaining after installation of Pre-2010 Shoreline Protection Structures and 2010 Emergency Rock Revetment

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Restoration Project

Malibu,
California

Figure 4c.

Biological
Communities
Observed at Broad
Beach

N
W
E
S

0 50 100 200
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Existing Conditions.mxd

Study Area
MHTL - JAN 19-20, 2010
MHTL - OCT 15, 2009
Pre-2010 Shoreline Protection Structures
Remnant Foredune Habitat (10.07 acres)*

Developed (5.33 acres)
Dune Mat (0.10 acre)
Invasive (2.89 acres)
Landscaped (4.27 acre)
Open Sand (10.38 acres)
Revetment (2.73 acres)

*Remnant foredune habitat remaining after installation of Pre-2010 Shoreline Protection Structures and 2010 Emergency Rock Revetment

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Restoration Project

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California

Figure 4d.

Biological
Communities
Observed at Broad
Beach

N
W E
S

0 50 100 200
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Existing Conditions.mxd

Study Area
MHTL - JAN 19-20, 2010
MHTL - OCT 15, 2009
Pre-2010 Shoreline Protection Structures
Remnant Foredune Habitat (10.07 acres)*

Developed (5.33 acres)
Dune Mat (0.10 acre)
Invasive (2.89 acres)
Landscaped (4.27 acre)
Open Sand (10.38 acres)
Revetment (2.73 acres)

*Remnant foredune habitat remaining after installation of Pre-2010 Shoreline Protection Structures and 2010 Emergency Rock Revetment

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Restoration Project

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California

Figure 4e.

Biological
Communities
Observed at Broad
Beach

N
W E
S

0 50 100 200
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\Existing Conditions.mxd

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Broad Beach
Restoration Project

Malibu,
California

Figure 5a.

Broad Beach

Vegetation Releves

N
E
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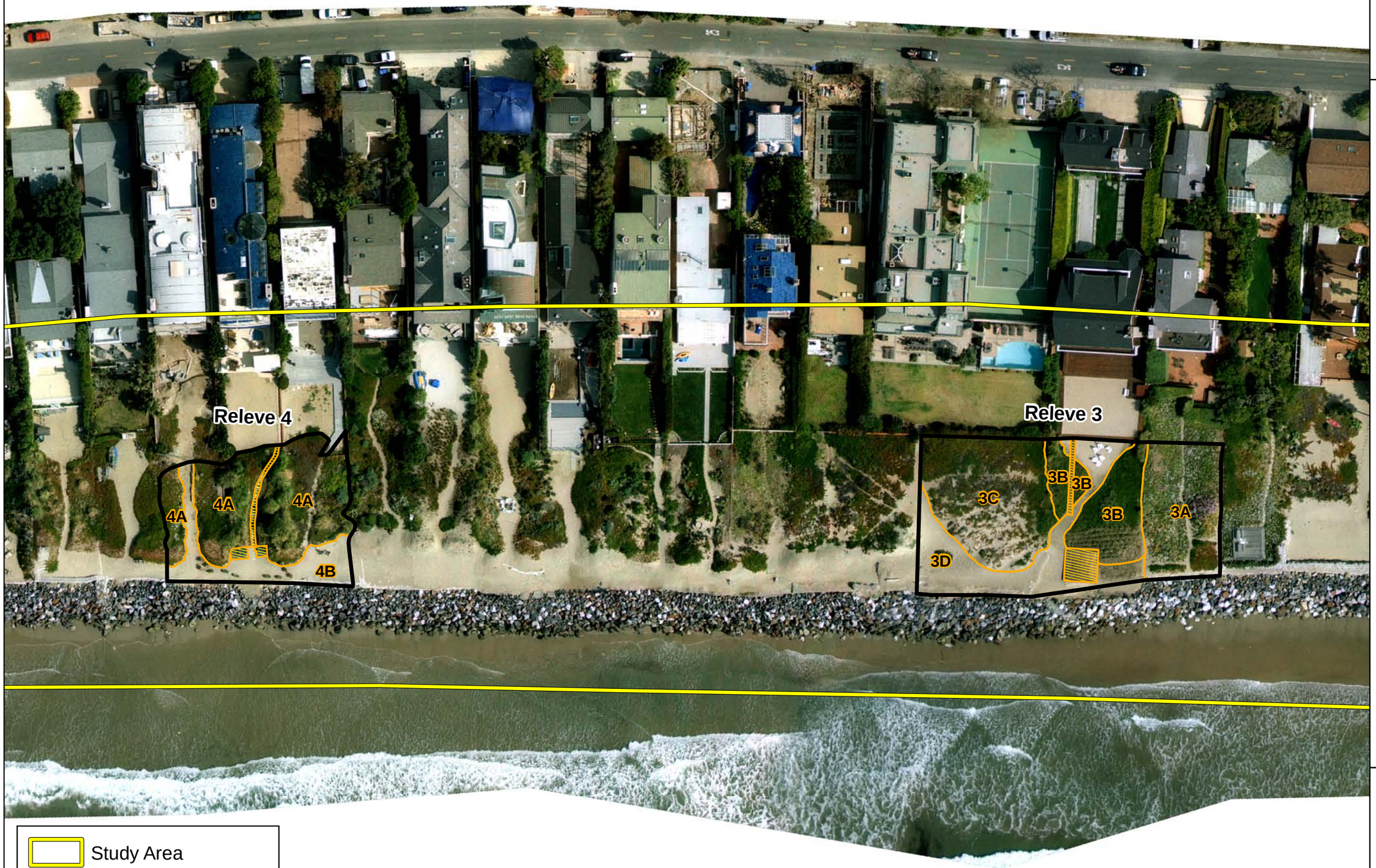
0 25 50 100

Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\BB Releves mxd



Study Area
Releve Extents
Releve Communities
Area not Included

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Restoration Project

Malibu,
California

Figure 5b.

Broad Beach

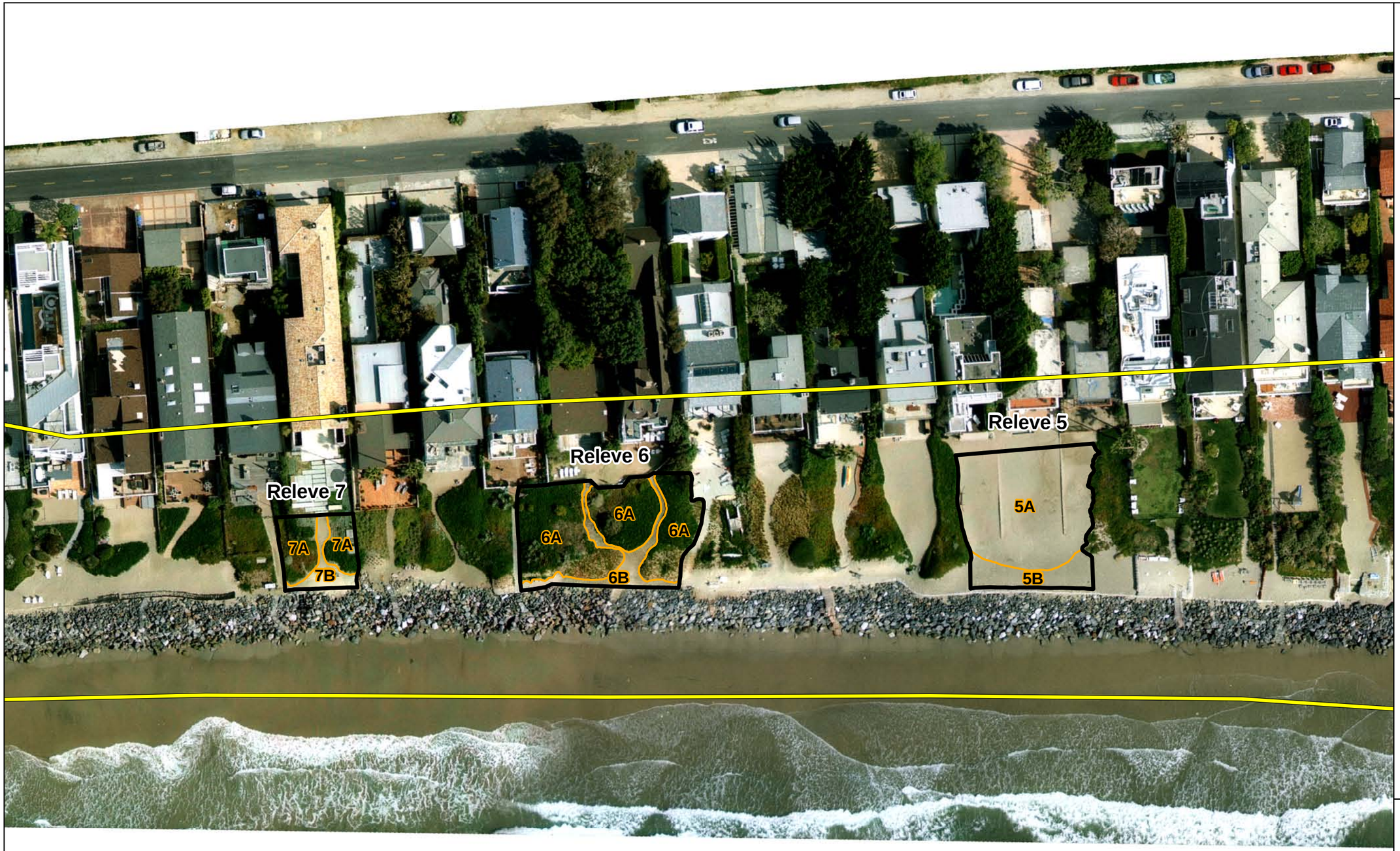
Vegetation Releves

N
E
S
W

0 25 50 100
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\BB Releves mxd



Study Area
Releve Extents
Releve Communities
Area not Included

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Restoration Project

Malibu,
California

Figure 5c.

Broad Beach

Vegetation Releves

N
E
W
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0 25 50 100
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\BB Releves mxd

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Restoration Project

Malibu,
California

Figure 5d.

Broad Beach

Vegetation Releves

N
E
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S

0 25 50
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\BB Releves mxd

Study Area

Releve Extents

Releve Communities

Area not Included

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Restoration Project

Malibu,
California

Figure 5e.

Broad Beach

Vegetation Releves

N
E
W
S

0 25 50 100

Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: 2012 Aerial Moffatt and Nichol

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\BB Releves mxd

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Restoration Project

Malibu,
California

Figure 6.

Ormond Beach

Vegetation Releves

N
W E
S

0 50 100 200
Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: ESRI Imagery June 2010

Path: L:\Acad 2000 Files\19000\19095\2013\ArcMap\September 2013\OB Releves.mxd

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30 percent to 100 percent. Plant cover at Ormond Beach ranged from approximately 15 to 30 percent. Levels of species richness and plant density were substantially higher at Broad Beach relative to the Ormond Beach reference site. This can largely be attributed to the predominance of landscape and invasive communities at Broad Beach. Landscaped areas at Broad Beach contained a disproportionately high number of species compared to areas containing native dune mate vegetation; this discrepancy can be attributed to the fact that plant species were intentionally introduced to the landscaped areas whereas native vegetation is subject to natural recruitment and the availability of suitable plant propagules.

Data collected along the transects at Broad Beach are included in Appendix C. Species area curves for each transect, as well as for the entire site are also included in Appendix C. As shown by the species area curves, the number of plant species within any given area at Broad Beach varies considerably. This can be attributed to the patchiness of vegetation at the site, as well as the artificially high diversity resulting from the high number of ornamental species at the site. However, the species area curve created for the site as a whole indicates that the sampling effort was sufficient to document most species at the site. That said, WRA biologists surveyed the entirety of the Study Area and documented every species encountered—a sampling effort much greater than the site-wide species area curve suggest is necessary to adequately capture the range of species present at the site. Given that only four species were observed in the reference foredune at Ormond Beach, it is expected that that a much lower sampling effort would be necessary to adequately document the range of species in typical foredune habitat.

3.2 Wildlife

Foredune Infauna

No vertebrates, including silvery legless lizard, were encountered in the pit-fall traps. Additionally, no globose dune beetles or sandy beach tiger beetles were captured; however, the placement of the pit-fall trap arrays were not installed in the preferred habitat of the sandy beach tiger beetle which includes swales behind dunes or upper beaches beyond normal high tides. In general, suitable habitat for sandy beach tiger beetle is absent from the Study Area. Previous studies have documented globose dune beetle in remnant foredune habitat at 30732 Pacific Coast Highway, a large, undeveloped lot near the eastern extent of the Study Area. Although pit-fall traps, one of which was installed in the aforementioned undeveloped lot at 30732 Pacific Coast Highway, failed to detect globose dune beetle, WRA biologists observed subterranean beetle tracks during the June 2013 surveys, suggesting that this species is still extant in foredune habitat at the site. It is likely that the beetle occurs in only limited areas where dune mat or other sparse vegetation occurs.

Avian Species

The results of the avian point counts are included in Appendix D. One special-status avian species, Allen's hummingbird (*Selasphorus sasin*; U.S. Fish and Wildlife Service Bird of Conservation Concern) was detected within the Study Area. Within the Study Area, Allen's hummingbird was only observed interacting with ornamental flowering plants in landscaped

areas near residences and not within any areas that would be directly modified by implementation of the proposed project. On several occasions during the site visit, flocks of brown pelicans were observed flying offshore adjacent to the Study Area. Brown pelicans do not nest in the vicinity of the Study Area; however, they are likely to opportunistically forage offshore.

El Segundo Blue Butterfly

El Segundo blue butterfly was not observed within the Study Area. An ornamental variety of buckwheat was identified within a planted landscape area adjacent to one residence within the Study Area; however, coast buckwheat, the obligate host plant for El Segundo blue butterfly, was not observed during the site visit. El Segundo blue butterfly has not been detected in other areas of the Malibu coastline where coast buckwheat is extant. Based on the absence of this species' host plant and lack of confirmed detections in the vicinity of the Study Area, it was determined that El Segundo blue butterfly is unlikely to occur within the Study Area.

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APPENDIX A

POTENTIAL FOR SPECIAL-STATUS PLANT SPECIES TO OCCUR AT THE SITE

Appendix A. Potential for special-status plant species to occur in the Study Area. List compiled from the California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDB; May 2013), U.S. Fish and Wildlife Service (USFWS) Species Lists (May 2013), and California Native Plant Society (CNPS) Rare and Endangered Plant Inventory (May 2013) searches of the Point Dume, Newbury Park, Thousand Oaks, Calabasas, Malibu Beach, and Triunfo Pass USGS 7.5' quadrangles.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
red sand-verbana *Abronia maritima*	List 4	Coastal dunes. Elevation range: 0 – 325 feet. Blooms: February – November.	**High Potential.** The Study Area contains coastal dune habitat sufficient to support this species.	**Present.** This species was observed within the Study Area.
western spleenwort *Asplenium vespertinum*	List 4	Chaparral, cismontane woodland, coastal scrub; located on rocky sites. Elevation range: 585 – 3250 feet. Blooms: February – June.	**No Potential.** The Study Area does not contain chaparral, woodland, or scrub habitat necessary to support this species.	No further actions are recommended for this species.
Braunton's milk-vetch *Astragalus brauntonii*	FE; List 1B.1	Closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland; recent burns, disturbed areas; located on saline to alkaline substrate. Elevation range: 10 – 2080 feet. Blooms: January – August.	**No Potential.** The Study Area does not contain forest, chaparral, or grassland habitat necessary to support this species.	No further actions are recommended for this species.
Coulter's saltbush *Atriplex coulteri*	List 1B.2	Coastal bluff scrub, coastal scrub, coastal dunes, valley and foothill grassland; located on ocean bluffs, ridgetops, and alkaline low sites. Elevation range: 10 – 1495 feet. Blooms: March – October.	**Moderate Potential.** The Study Area contains coastal dune habitat sufficient to support this species.	**Not Observed.** This species was not observed during the 2010/2011 protocol-level rare plant surveys or during the 2013 biological survey. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	List 1B.2	Alkaline soils in coastal bluff scrub and coastal scrub. Elevation range: 10-200 meters. Blooms April to October.	**Unlikely.** Coastal scrub and coastal bluff scrub habitats are absent from the Study Area. Habitat degradation at the site further reduces the potential for this specie to occur.	No further actions are recommended for this species.
Malibu Baccharis *Baccharis malibuensis*	List 1B.1	Coastal scrub, chaparral, cismontane woodland; located on Conejo volcanic substrates, often roadsides. Elevation range: 485 – 995 feet. Blooms: August.	**No Potential.** The Study Area does not contain chaparral, woodland, or scrub habitat necessary to support this species.	No further actions are recommended for this species.
round-leaved filaree *California macrophyllum*	List 1B.1	Cismontane woodland, valley and foothill grassland; located on clay substrates. Elevation range: 45 – 3900 feet. Blooms: March – May.	**No Potential.** The Study Area does not contain woodland or grassland habitat, or clay substrate necessary to support this species.	No further actions are recommended for this species.
Catalina mariposa lily *Calochortus catalinae*	List 4	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Elevation range: 45 – 2275 feet. Blooms: February – June.	**No Potential.** The Study Area does not contain chaparral, woodland, scrub, or grassland habitat necessary to support this species.	No further actions are recommended for this species.
slender mariposa lily *Calochortus clavatus* var. *gracilis*	List 1B.2	Chaparral, coastal scrub; located on grassy slopes and shaded canyons. Elevation range: 1040 – 3250 feet. Blooms: March – June.	**No Potential.** The Study Area does not contain chaparral and scrub habitat necessary to support this species.	No further actions are recommended for this species.
Plummer's mariposa lily *Calochortus plummerae*	List 4.2	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest; located on rocky and sandy sites derived of granite alluvial material; common following fire. Elevation range: 325 – 5525 feet. Blooms: May – July.	**No Potential.** The Study Area does not contain scrub, chaparral, grassland, woodland, or forest habitat necessary to support this species.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
Lewis' evening-primrose *Camissoniopsis lewisii*	List 3	Coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland; located on sandy or clay substrates. Elevation range: 0 – 975 feet. Blooms: March – June.	**High Potential.** The Study Area contains coastal dune habitat that may support this species.	**Not Observed.** This species was not observed during the protocol-level rare plant surveys in 2010 and 2011, nor was it observed during the 2013 biological survey. No further actions are recommended for this species.
southern tarplant *Centromadia parryi* ssp. *australis*	List 1B.1	Marshes and swamps, valley and foothill grassland; located in mesic sites on alkaline on grassland-marsh transitions. Elevation range: 0 – 1385 feet. Blooms: May – November.	**No Potential.** The Study Area does not contain marsh, swamp, or alkaline grassland habitat necessary to support this species.	No further actions are recommended for this species.
Orcutt's pincushion *Chaenactis glabriuscula* var. *orcuttiana*	List 1B.1	Coastal bluff scrub, coastal dunes; located on sandy substrate. Elevation range: 0 – 325 feet. Blooms: January – August.	**High Potential.** The Study Area contains coastal dune habitat that may support this species. The Project Area supports coast bluff scrub habitat.	**Not Observed.** This species was not observed during the protocol-level rare plant surveys in 2010 and 2011, nor was it observed during the 2013 biological surveys. This species was not observed during the September site visit to the western end of the Project Area.
San Fernando Valley spineflower *Chorizanthe parryi* var. *fernandina*	FC; SE; List 1B.1	Coastal scrub; located on sandy substrate. Elevation range: 485 – 3965 feet. Blooms: April – July.	**No Potential.** The Study Area does not contain coastal scrub habitat necessary to support this species.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
Parry's spineflower *Chorizanthe parryi* var. *parryi*	List 1B.1	Coastal scrub, chaparral; located on dry slops and flats underlain by sandy substrate often a margins of two vegetation communities. Elevation range: 890 – 3965 feet. Blooms: April – June.	**No Potential.** The Study Area does not contain scrub or chaparral habitat necessary to support this species.	No further actions are recommended for this species.
Santa Susana tarplant *Deinandra minthornii*	List 1B.2	Chaparral, coastal scrub; located on sandstone outcrops and crevices in shrubland habitat. Elevation range: 910 – 2470 feet. Blooms: July – November.	**No Potential.** The Study Area does not contain chaparral or coastal scrub habitat necessary to support this species.	No further actions are recommended for this species.
dune larkspur *Delphinium parryi* ssp. *blochmaniae*	List 1B.2	Chaparral, coastal dunes; located on rocky sites and maritime dunes. Elevation range: 0 – 650 feet. Blooms: April – May.	**Moderate Potential.** The Study Area contains coastal dune habitat that may support this species.	**Not Observed.** This species was not observed during the protocol-level rare plant surveys in 2010 and 2011, nor was it observed during the 2013 biological survey. No further actions are recommended for this species.
Norris' beard moss *Didymodon norrisii*	List 2B.2	Cismontane woodland, lower montane coniferous forest; located seasonally wet exposed rock or terraces with drying in summer. Elevation range: 1950 – 6415 feet.	**No Potential.** The Study Area does not contain woodland or forest habitat necessary to support this species.	No further actions are recommended for this species.
Blochman's dudleya *Dudleya blochmaniae* ssp. *blochmaniae*	List 1B.1	Coastal scrub, coastal bluff scrub, valley and foothill grassland; located open, rocky slopes often underlain by shallow clay derived from serpentine. Elevation range: 15 – 1465 feet. Blooms: April – June.	**No Potential.** The Study Area does not contain scrub or grassland habitat necessary to support this species.	No further actions are recommended for this species. This species was not observed during the September site visit to the western end of the Project Area.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
Agoura hills dudleya *Dudleya cymosa* ssp. *agourensis*	FT; List 1B.2	Chaparral, cismontane woodland; located on rocky, volcanic breccias. Elevation range: 650 – 1625 feet. Blooms: May – June.	**No Potential.** The Study Area does not contain chaparral or woodland habitat necessary to support this species.	No further actions are recommended for this species.
marcescent dudleya *Dudleya cymosa* ssp. *marcescens*	FT; SR; List 1B.2	Chaparral; located on rock faces of volcanic cliffs. Elevation range: 485 – 1690 feet. Blooms: April – July.	**No Potential.** The Study Area does not contain chaparral habitat necessary to support this species.	No further actions are recommended for this species.
Santa Monica dudleya *Dudleya cymosa* ssp. *ovatifolia*	FT; List 1B.2	Chaparral, coastal scrub; in canyons of sedimentary conglomerates on north-facing slopes. Elevation range: 485 – 5445 feet. Blooms: March – June.	**No Potential.** The Study Area does not contain chaparral or scrub habitat necessary to support this species.	No further actions are recommended for this species.
many-stemmed dudleya *Dudleya multicaulis*	List 1B.2	Chaparral, coastal scrub, valley and foothill grassland; located on heavy clay or sandy substrate in grassy sites. Elevation range: 45 – 2570 feet. Blooms: April – July.	**No Potential.** The Study Area does not contain chaparral, scrub, or grassland habitat necessary to support this species.	No further actions are recommended for this species.
conejo dudleya *Dudleya parva*	FT; List 1B.2	Coastal scrub, valley and foothill grassland; located on clay volcanic derived substrate in grassy hillsides. Elevation range: 195 – 1465 feet. Blooms: May – June.	**No Potential.** The Study Area does not contain scrub or grassland habitat necessary to support this species.	No further actions are recommended for this species.
Verity's dudleya *Dudleya verityi*	FT; List 1B.2	Chaparral, cismontane woodland, coastal scrub; located on volcanic outcrops in Santa Monica Mountains. Elevation range: 195 – 390 feet. Blooms: May – June.	**No Potential.** The Study Area does not contain chaparral, woodland, or scrub habitat necessary to support this species.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
conejo buckwheat *Eriogonum crocatum*	SR; List 1B.2	Chaparral, coastal scrub, valley and foothill grassland; located on Conejo volcanic outcrops. Elevation range: 160 – 1885 feet. Blooms: April – July.	**No Potential.** The Study Area does not contain chaparral, scrub, or grassland habitat necessary to support this species.	No further actions are recommended for this species.
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 – 3250 feet. Blooms: March – June.	**Moderate Potential.** The Study Area contains coastal dune habitat that may support this species.	**Not Observed.** This species was not observed during the protocol-level rare plant survey. No further actions are recommended for this species.
decumbent goldenbush *Isocoma menziesii* var. *decumbens*	List 1B.2	Chaparral and coastal scrub. Elevation range: 10-135 meters. Blooms: April-November.	**Unlikely.** Chaparral and coastal scrub habitats do not occur in the Study Area. Habitat degradation in the Study Area further reduces the potential for this species to occur there.	**Not Observed.** This species was not observed during the protocol-level rare plant survey. No further actions are recommended for this species.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	List 1B.1	Coastal salt marsh, playa, valley and foothill grassland, vernal pools; typically in alkaline playa, sink, and grassland sites. Elevation range: 0 – 3965 feet. Blooms: February – June.	**No Potential.** The Study Area does not contain salt marsh, playa, vernal pool, or alkaline grassland habitat necessary to support this species.	No further actions are recommended for this species.
white-veined monardella *Monardella hypoleuca* ssp. *hypoleuca*	List 1B.3	Cismontane woodland and chaparral. Elevation range: 50-1525 meters. Blooms: April-December.	**No Potential.** Cismontane woodland and chaparral habitats do not occur within the Study Area.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
Ojai navarretia *Navarretia ojaiensis*	List 1B.1	Chaparral, coastal scrub, valley and foothill grassland; located in openings of shrublands and grasslands. Elevation range: 890 – 2015 feet. Blooms: May – July.	**No Potential.** The Study Area does not contain chaparral, scrub, or grassland habitat necessary to support this species.	No further actions are recommended for this species.
chaparral nolina *Nolina cismontana*	List 1B.2	Chaparral, coastal scrub; typically located on sandstone, shale, and gabbro substrates. Elevation range: 455 – 4140 feet. Blooms: May – July.	**No Potential.** The Study Area does not contain chaparral or scrub habitat necessary to support this species.	No further actions are recommended for this species.
California Orcutt grass *Orcuttia californica*	FE; SE; List 1B.1	Vernal pools. Elevation range: 45 – 2145 feet. Blooms: April – August.	**No Potential.** The Study Area does not contain vernal pool habitat necessary to support this species.	No further actions are recommended for this species.
Lyon's Pentachaeta *Pentachaeta lyonii*	FE; SE; List 1B.1	Chaparral, valley and foothill grassland; located on the margins of grassland and shrubland; often on roadsides and firebreaks. Elevation range: 95 – 2045 feet. Blooms: March – August.	**No Potential.** The Study Area does not contain chaparral or grassland habitat necessary to support this species.	No further actions are recommended for this species.
Hubby's phacelia *Phacelia hubbyi*	List 4	Chaparral, coastal scrub, valley and foothill grassland; located gravelly, rocky, or talus sites. Elevation range: 0 – 3250 feet. Blooms: April – June.	**No Potential.** The Study Area does not contain chaparral, scrub, or grassland habitat necessary to support this species.	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 and swamps; located on sandy, sometimes rocky substrates. Elevation range: 20 – 975 feet. Blooms: March – August.	**High Potential.** The Study Area contains coastal dune habitat that may support this species.	**Not Observed.** This species was not observed during the protocol-level rare plant survey. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RECOMMENDATIONS
white rabbit-tobacco *Pseudognaphalium leucocephalum*	List 2	Chaparral, cismontane woodland, coastal scrub, riparian woodland; located on gravelly and sandy substrate. Elevation range: 0 – 6825 feet. Blooms: July – December.	**No Potential.** The Study Area does not contain chaparral, woodland, scrub, or riparian habitat necessary to support this species.	No further actions are recommended for this species.
chaparral ragwort *Senecio aphanactis*	List 2B.2	Cismontane woodland, coastal scrub; located on drying alkaline flats. Elevation range: 45 – 2600 feet. Blooms: January – April.	**No Potential.** The Study Area does not contain woodland or scrub habitat necessary to support this species.	No further actions are recommended for this species.
Sonoran maiden fern *Thelypteris puberula* var. *sonorensis*	List 2B.2	Meadows and seeps; located on seepy streamsides. Elevation range: 160 – 1985 feet.	**No Potential.** The Study Area does not contain meadow or seep streamside habitat necessary to support this species.	No further actions are recommended for this species.

APPENDIX B

PLANT AND WILDLIFE SPECIES OBSERVED IN THE STUDY AREA

Appendix B-1. Plant species observed in the Study Area

Scientific name	Common name	Origin	Invasive Status[1]	Conservation Status[2]
Abronia maritima	pink sand verbena	native	N/A	List 4
Achillea millefolium	common yarrow	native	N/A	N/A
Achillea millefolium	Common yarrow	native	N/A	N/A
Agapanthus sp.	Agapanthus	non-native	N/A	N/A
Agave americana	American century plant	non-native	N/A	N/A
Agave attenuata	lion's tail	non-native	N/A	N/A
Aira caryophyllea	silver hairgrass	non-native	assessed	N/A
Aloe arborescens	Krantz' aloe	non-native	N/A	N/A
Aloe sp.	Aloe	non-native	N/A	N/A
Ambrosia chamissonis	beach bur	native	N/A	N/A
Anagallis arvensis	pimpernel	non-native	N/A	N/A
Arctotheca sp.	Cape weed	non-native	moderate	N/A
Armeria maritima ssp. californica	California sea pink	native	N/A	N/A
Artemisia californica	California sagebrush	native	N/A	N/A
Atriplex lentiformis	Big saltbush	native	N/A	N/A
Atriplex semibaccata	Australian salt bush	non-native	moderate	N/A
Baccharis pilularis	coyote brush	native	N/A	N/A
Bromus diandrus	Ripgut brome	non-native	moderate	N/A
Bromus madritensis ssp. madritensis	foxtail chess	non-native	N/A	N/A
Cakile maritima	sea rocket	non-native	limited	N/A
Calystegia soldanella	Beach morning glory	native	N/A	N/A
Camissonia sp.	Ornamental suncup	native	N/A	N/A
Camissoniopsis cheiranthifolia ssp. *cheiranthifolia [Camissonia cheiranthifolia ssp. cheiranthifolia]*	beach evening primrose	native	N/A	N/A
Carex praegracilis	clustered field sedge	native	N/A	N/A
Carex sp.	Sedge	?	N/A	N/A
Carissa macrocarpa	Amatungulu	non-native	N/A	N/A

Scientific name	Common name	Origin	Invasive Status[1]	Conservation Status[2]
Carpobrotus edulis	Hottentot Fig	non-native	high	N/A
Ceanothus sp.	California-lilac	native		
Ceanothus thyrsiflorus	Blue blossom	native	N/A	N/A
Chamaesyce sp.	sandmat	various	N/A	N/A
Conyza canadensis var. canadensis	Canadian horseweed	native	N/A	N/A
Corethrogyne filaginifolia	Sand aster	native	N/A	N/A
Cortaderia sp.	Pampas grass	non-native	high	N/A
Crassula ovata	Jade plant	non-native	N/A	N/A
Cynodon dactylon	Bermuda grass	non-native	moderate	N/A
Delairea odorata [Senecio mikanioides]	Cape ivy	non-native	high	N/A
Dimorphotheca fruticosa [Osteospermum fruticosum]	shrubby daisy-bush	non-native	N/A	N/A
Distichlis spicata	salt grass	native	N/A	N/A
Echium candicans	pride-of-Madeira	non-native	limited	N/A
Elymus glaucus	Blue wildrye	native	N/A	N/A
Elymus sp. (ornamental)	Rye grass	non-native	N/A	N/A
Eriogonum sp. (ornamental)*	ornamental buckwheat	native	N/A	N/A
Erodium cicutarium	redstem filaree	non-native	limited	N/A
Euphorbia peplus	petty spurge	non-native	N/A	N/A
Foeniculum vulgare	fennel	non-native	high	N/A
Fragaria chiloensis	beach strawberry	native	N/A	N/A
Geranium sp. (ornamental)	Geranium	non-native	N/A	N/A
Hebe speciosa	New Zealand hebe	non-native	N/A	N/A
Hedypnois cretica	Crete weed	non-native	N/A	N/A
Heliotropium curassavicum	Heliotrope	native	N/A	N/A
Helminthotheca echioides [Picris echioides]	bristly ox tongue	non-native	limited	N/A

* Following the 2010 and 2011 WRA plant surveys, this buckwheat was reported as *Eriogonum parvifolium*. After a more thorough review of the plant's morphological characteristics during the 2013 surveys, it was determined to be an ornamental species.

Scientific name	Common name	Origin	Invasive Status[1]	Conservation Status[2]
Heterotheca grandiflora	Telegraph weed	native	N/A	N/A
Juncus patens	common rush	native	N/A	N/A
Leptosyne gigantea [Coreopsis gigantean]	giant coreopsis	native	N/A	N/A
Leymus sp.	creeping wild rye	native	N/A	N/A
Limonium perezii	Perez's sea lavender	non-native	N/A	N/A
Lotus corniculatus	Bird's-foot trefoil	non-native	N/A	N/A
Lupinus chamissonis	Chamisso bush lupine	native	N/A	N/A
Malva nicaeensis	Bull mallow	non-native	N/A	N/A
Medicago polymorpha	Bur medic	non-native	limited	N/A
Melilotus indicus	Yellow annual sweetclover	non-native	N/A	N/A
Metrosideros excelsa	New Zealand Christmas tree	non-native	N/A	N/A
Muhlenbergia rigens	deer grass	native	N/A	N/A
Oxalis corniculata	Yellow sorrel	non-native	N/A	N/A
Oxalis pes-caprae	Bermuda buttercup	non-native	moderate	N/A
Pennisetum setaceum	Crimson fountaingrass	non-native	moderate	N/A
Phoenix canariensis	Canary Island date palm	non-native	limited	N/A
Phormium tenax	New Zealand flax	non-native	N/A	N/A
Pittosporum undulatum	Victorian box	non-native	assessed	N/A
Pittosporum undulatum	Victorian box	non-native	N/A	N/A
Plumeria sp.	Plumeria	non-native	N/A	N/A
Polygonum sp.	Knotweed	?	N/A	N/A
Pseudognaphalium luteo-album [Gnaphalium luteo-album]	Everlasting Cudweed	non-native	N/A	N/A
Rhaphiolepis indica	Indian hawthorn	non-native	N/A	N/A
Rhus integrifolia	lemonade sumac	native	N/A	N/A
Rosmarinus officinalis	Rosemary	non-native	N/A	N/A
Salsola sp.	Russian thistle	non-native	invasive	N/A
Sonchus asper ssp. asper	prickly sow thistle	non-native	assessed	N/A
Sonchus oleraceus	common sow thistle	non-native	N/A	N/A

Scientific name	Common name	Origin	Invasive Status[1]	Conservation Status[2]
Taraxacum officinale	Dandelion	non-native	assessed	N/A
Thymus vulgaris	Garden thyme	non-native	N/A	N/A
Tulbaghia violacea	Society garlic	non-native	N/A	N/A
Vulpia sp.	Fescue	?	N/A	N/A
Zantedeschia aethiopica	calla lily	non-native	limited	N/A

[1]Invasive Status: California Invasive Plant Inventory
[2]Conservation Status: CNPS Inventory of Rare and Endangered Plants

Appendix B-2. Wildlife species observed in the Study Area

Scientific name	Common name	Resident/ Nonresident	Conservation Status[1]
Buteo jamaicensis	Red-tailed Hawk	Year-round	N/A
Carduelis tristis	American Goldfinch	Year-round	N/A
Carpodacus mexicanus	House Finch	Year-round	N/A
Charadrius vociferus	Killdeer	Year-round	N/A
Columbia livia	Rock Pigeon	Year-round	N/A
Corvus brachyrhynchos	American Crow	Year-round	N/A
Geothlypis trichas	Common Yellowthroat	Year-round	N/A
Hirundo rustica	Barn Swallow	Summer	N/A
Larus occidentalis	Western Gull	Year-round	N/A
Melospiza melodia	Song Sparrow	Year-round	N/A
Mimus polyglottos	Northern Mockingbird	Year-round	N/A
Psaltriparus minimus	Bushtit	Year-round	N/A
Sayornis nigricans	Black Phoebe	Year-round	N/A
Selasphorus sasin	Allen's Hummingbird	Summer	BCC
Carduelis sp.	Unknown Goldfinch	N/A	N/A
Larus sp.	Unknown Gull	N/A	N/A
Iceterus sp.	Unknown Oriole	Summer	N/A

[1] BCC - U.S. Fish & Wildlife Service (USFWS) Bird of Conservation Concern

APPENDIX C

VEGETATION DATA

Appendix C-1. Summary of relevé data collected at Broad Beach

Relevé	Relevé Community	Relevé Size (acres)	Native Cover (%)	Vegetative Cover (%)	Native Cover (acres)	Vegetative Cover (acres)	Total Area (acres)	Total Native Cover (acres)	Total Vegetative Cover (acres)	Total Native Cover (%)	Total Vegetative Cover (%)
1	a	0.082	0.59	0.85	0.048	0.069	0.606	0.089	0.300	14.70	49.48
1	b	0.195	0.02	0.67	0.004	0.131					
1	c	0.050	0.36	0.68	0.018	0.034					
1	d	0.042	0.00	0.98	0.000	0.041					
1	e	0.025	0.75	0.97	0.018	0.024					
1	f	0.212	-	-	0.000	0.000					
2	a	0.053	0.12	0.69	0.006	0.037	0.271	0.025	0.136	9.38	50.30
2	b	0.062	0.13	0.67	0.008	0.041					
2	c	0.069	0.16	0.84	0.011	0.058					
2	d	0.088	-	-	0.000	0.000					
3	a	0.093	0.44	0.89	0.041	0.083	0.390	0.102	0.280	26.12	71.76
3	b	0.072	0.44	0.97	0.032	0.071					
3	c	0.130	0.22	0.97	0.029	0.126					
3	d	0.094	-	-	0.000	0.000					
4	a	0.158	0.02	0.98	0.004	0.155	0.213	0.004	0.155	1.65	72.65
4	b	0.055	-	-	0.000	0.000					
5	a	0.128	0.19	0.36	0.024	0.046	0.154	0.024	0.046	15.65	29.74
5	b	0.026	-	-	0.000	0.000					
6	a	0.134	0.03	0.97	0.003	0.131	0.159	0.003	0.131	2.16	82.22
6	b	0.025	-	-	0.000	0.000					

Relevé	Relevé Community	Relevé Size (acres)	Native Cover (%)	Vegetative Cover (%)	Native Cover (acres)	Vegetative Cover (acres)	Total Area (acres)	Total Native Cover (acres)	Total Vegetative Cover (acres)	Total Native Cover (%)	Total Vegetative Cover (%)
7	a	0.035	0.14	0.96	0.005	0.034	0.048	0.005	0.034	10.41	69.99
7	b	0.013	-	-	0.000	0.000					
8	a	0.133	0.60	0.98	0.080	0.130	0.152	0.080	0.130	52.79	85.29
8	b	0.019	-	-	0.000	0.000					
9	a	0.044	0.00	1.00	0.000	0.044	0.044	0.000	0.044	0.00	100.00
10	a	0.054	0.93	0.98	0.051	0.053	0.069	0.051	0.053	73.13	76.79
10	b	0.015	-	-	0.000	0.000					
11	a	0.025	0.83	0.96	0.021	0.024	0.025	0.021	0.024	82.61	95.65
Totals:		***2.131***			***0.404***	***1.331***	***2.131***	***0.404***	***1.331***	***18.96***	***62.48***

Appendix C-2. Individual relevé data from Broad Beach

Broad Beach Relevé 1, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	n	2.5	2.56%	3.03%	2.56%	0.00%
Achillea millefolium	Common yarrow	n	37.5	38.46%	45.45%	38.46%	0.00%
Anagallis arvensis	Pimpernel	x	2.5	2.56%	3.03%	0.00%	0.00%
Bromus diandrus	Ripgut brome	i	2.5	2.56%	3.03%	0.00%	2.56%
Cakile maritima	Sea rocket	i	2.5	2.56%	3.03%	0.00%	2.56%
Camissoniopsis cheiranthifolia	Beach evening primrose	n	15	15.38%	18.18%	15.38%	0.00%
Carpobrotus edulis	Hottentot fig	i	2.5	2.56%	3.03%	0.00%	2.56%
Conyza canadensis var. canadensis	Canadian horseweed	n	2.5	2.56%	3.03%	2.56%	0.00%
Geranium sp. (ornamental)	Geranium	x	2.5	2.56%	3.03%	0.00%	0.00%
Medicago polymorpha	Bur medic	i	2.5	2.56%	3.03%	0.00%	2.56%
Melilotus indicus	Yellow annual sweetclover	x	2.5	2.56%	3.03%	0.00%	0.00%
Oxalis corniculata	Yellow sorrel	x	2.5	2.56%	3.03%	0.00%	0.00%
Polygonum sp.	Knotweed	?	2.5	2.56%	3.03%	0.00%	0.00%
Sonchus oleraceus	Common sow thistle	x	2.5	2.56%	3.03%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	15	15.38%	0.00%	0.00%	0.00%
		Total vegetative cover	82.5	84.62%	100.00%	58.97%	10.26%

Broad Beach Relevé 1, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	97.5	100.00%	--	--	--

Broad Beach Relevé 1, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Bromus diandrus	Ripgut brome	i	2.5	2.17%	3.23%	0.00%	2.17%
Cakile maritima	Sea rocket	i	2.5	2.17%	3.23%	0.00%	2.17%
Camissoniopsis cheiranthifolia	Beach evening primrose	n	2.5	2.17%	3.23%	2.17%	0.00%
Carpobrotus edulis	Hottentot fig	i	62.5	54.35%	80.65%	0.00%	54.35%
Erodium cicutarium	Redstem filaree	i	2.5	2.17%	3.23%	0.00%	2.17%
Medicago polymorpha	Bur medic	i	2.5	2.17%	3.23%	0.00%	2.17%
Sonchus oleraceus	Common sow thistle	x	2.5	2.17%	3.23%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	37.5	32.61%	0	0	0
		Total vegetative cover	77.5	67.39%	100.00%	2.17%	63.04%

Broad Beach Relevé 1, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	115	100.00%	--	--	--

Broad Beach Relevé 1, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Bromus diandrus	Ripgut brome	i	15	12.77%	18.75%	0.00%	12.77%
Camissoniopsis cheiranthifolia	Beach evening primrose	n	37.5	31.91%	46.88%	31.91%	0.00%
Carpobrotus edulis	Hottentot fig	i	2.5	2.13%	3.13%	0.00%	2.13%
Conyza canadensis var. canadensis	Canadian horseweed	n	2.5	2.13%	3.13%	2.13%	0.00%
Erodium cicutarium	Redstem filaree	i	2.5	2.13%	3.13%	0.00%	2.13%
Heterotheca grandiflora	Telegraph weed	n	2.5	2.13%	3.13%	2.13%	0.00%
Medicago polymorpha	Bur medic	i	15	12.77%	18.75%	0.00%	12.77%
Sonchus oleraceus	Common sow thistle	x	2.5	2.13%	3.13%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	37.5	31.91%	0.00%	0.00%	0.00%

Broad Beach Relevé 1, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
		Total vegetative cover	80	68.09%	100.00%	36.17%	29.79%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	117.5	100.00%	--	--	--

Broad Beach Relevé 1, Community D							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Atriplex semibaccata	Australian salt bush	i	2.5	2.17%	2.22%	0.00%	2.17%
Bromus diandrus	Ripgut brome	i	2.5	2.17%	2.22%	0.00%	2.17%
Carpobrotus edulis	Hottentot fig	i	37.5	32.61%	33.33%	0.00%	32.61%
Medicago polymorpha	Bur medic	i	62.5	54.35%	55.56%	0.00%	54.35%
Salsola sp.	Russian thistle	i	2.5	2.17%	2.22%	0.00%	2.17%
Sonchus oleraceus	Common sow thistle	x	2.5	2.17%	2.22%	0.00%	0.00%
Vulpia sp.	Fescue	?	2.5	2.17%	2.22%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.17%	0.00%	0.00%	0.00%

Broad Beach Relevé 1, Community D							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
		Total vegetative cover	112.5	97.83%	100.00%	0.00%	93.48%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	115	100.00%	--	--	--

Broad Beach Relevé 1, Community E							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	n	15	16.67%	17.14%	16.67%	0.00%
Ambrosia chamissonis	Beach bur	n	37.5	41.67%	42.86%	41.67%	0.00%
Cakile maritima	Sea rocket	i	2.5	2.78%	2.86%	0.00%	2.78%
Camissoniopsis cheiranthifolia	Beach evening primrose	n	15	16.67%	17.14%	16.67%	0.00%
Carpobrotus edulis	Hottentot fig	i	15	16.67%	17.14%	0.00%	16.67%
Limonium perezii	Perez's sea lavender	x	2.5	2.78%	2.86%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.78%	0.00%	0.00%	0.00%
		Total vegetative	87.5	97.22%	100.00%	75.00%	19.44%

Broad Beach Relevé 1, Community E							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
		cover					
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	90	100.00%	--	--	--

Broad Beach Relevé 2, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	n	15	12.24%	17.65%	12.24%	0.00%
Cakile maritima	Sea rocket	i	2.5	2.04%	2.94%	0.00%	2.04%
Carpobrotus edulis	Hottentot fig	i	62.5	51.02%	73.53%	0.00%	51.02%
Limonium perezii	Perez's sea lavender	x	2.5	2.04%	2.94%	0.00%	0.00%
Pennisetum setaceum	Crimson fountaingrass	i	2.5	2.04%	2.94%	0.00%	2.04%
Bare ground (open sand)	Open sand	--	37.5	30.61%	0.00%	0.00%	0.00%
		Total vegetative cover	85	69.39%	100.00%	12.24%	55.10%

Broad Beach Relevé 2, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	122.5	100.00%	--	--	--

Broad Beach Relevé 2, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	n	15	13.04%	19.35%	13.04%	0.00%
Carpobrotus edulis	Hottentot fig	i	62.5	54.35%	80.65%	0.00%	54.35%
Bare ground (open sand)	Open sand	--	37.5	32.61%	0.00%	0.00%	0.00%
		Total vegetative cover	77.5	67.39%	100.00%	13.04%	54.35%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	115	100.00%	--	--	--

Broad Beach Relevé 2, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	n	15	15.79%	18.75%	15.79%	0.00%
Carpobrotus edulis	Hottentot fig	i	62.5	65.79%	78.13%	0.00%	65.79%
Limonium perezii	Perez's sea lavender	x	2.5	2.63%	3.13%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	15	15.79%	0.00%	0.00%	0.00%
		Total vegetative cover	80	84.21%	100.00%	15.79%	65.79%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	95	100.00%	--	--	--

Broad Beach Relevé 3, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Artemisia californica	California sagebrush	n	2.5	11.11%	12.50%	11.11%	0.00%
Camissonia sp.	Ornamental suncup	n	2.5	11.11%	12.50%	11.11%	0.00%
Chamaesyce sp.	Sandmat	?	2.5	11.11%	12.50%	0.00%	0.00%

Broad Beach Relevé 3, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Conyza canadensis var. canadensis	Canadian horseweed	n	2.5	11.11%	12.50%	11.11%	0.00%
Elymus glaucus	Blue wildrye	n	2.5	11.11%	12.50%	11.11%	0.00%
Limonium perezii	Perez's sea lavender	x	2.5	11.11%	12.50%	0.00%	0.00%
Oxalis corniculata	Yellow sorrel	x	2.5	11.11%	12.50%	0.00%	0.00%
Sonchus asper ssp. *asper*	Prickly sow thistle	x	2.5	11.11%	12.50%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	11.11%	0.00%	0.00%	0.00%
		Total vegetative cover	20	88.89%	100.00%	44.44%	0.00%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	22.5	100.00%	--	--	--

Broad Beach Relevé 3, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Arctotheca sp.	Cape weed	i	2.5	2.56%	2.63%	0.00%	2.56%
Carex sp.	Sedge	?	37.5	38.46%	39.47%	0.00%	0.00%

Broad Beach Relevé 3, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Carex praegracilis	Clustered field sedge	n	37.5	38.46%	39.47%	38.46%	0.00%
Ceanothus sp.	California-lilac	n	2.5	2.56%	2.63%	2.56%	0.00%
Elymus glaucus	Blue wildrye	n	2.5	2.56%	2.63%	2.56%	0.00%
Elymus sp. (ornamental)	Rye grass	x	2.5	2.56%	2.63%	0.00%	0.00%
Euphorbia peplus	Petty spurge	x	2.5	2.56%	2.63%	0.00%	0.00%
Oxalis corniculata	Yellow sorrel	x	2.5	2.56%	2.63%	0.00%	0.00%
Pennisetum setaceum	Crimson fountaingrass	i	2.5	2.56%	2.63%	0.00%	2.56%
Sonchus asper ssp. *asper*	Prickly sow thistle	x	2.5	2.56%	2.63%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.56%	0.00%	0.00%	0.00%
		Total vegetative cover	95	97.44%	100.00%	43.59%	5.13%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	97.5	100.00%	--	--	--

Broad Beach Relevé 3, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	n	15	16.67%	17.14%	16.67%	0.00%
Cakile maritima	Sea rocket	i	2.5	2.78%	2.86%	0.00%	2.78%
Camissoniopsis cheiranthifolia	Beach evening primrose	n	2.5	2.78%	2.86%	2.78%	0.00%
Carpobrotus edulis	Hottentot fig	i	62.5	69.44%	71.43%	0.00%	69.44%
Elymus glaucus	Blue wildrye	n	2.5	2.78%	2.86%	2.78%	0.00%
Hedypnois cretica	Crete weed	x	2.5	2.78%	2.86%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.78%	0.00%	0.00%	0.00%
		Total vegetative cover	87.5	97.22%	100.00%	22.22%	72.22%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	90	100.00%	--	--	--

Broad Beach Relevé 4, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Agapanthus sp.	Agapanthus	x	2.5	2.22%	2.27%	0.00%	0.00%
Agave attenuata	Lion's tail	x	2.5	2.22%	2.27%	0.00%	0.00%
Arctotheca sp.	Cape weed	i	2.5	2.22%	2.27%	0.00%	2.22%
Carissa macrocarpa	Amatungulu	x	2.5	2.22%	2.27%	0.00%	0.00%
Carpobrotus edulis	Hottentot fig	i	37.5	33.33%	34.09%	0.00%	33.33%
Cortaderia sp.	Pampas grass	i	37.5	33.33%	34.09%	0.00%	33.33%
Limonium perezii	Perez's sea lavender	x	2.5	2.22%	2.27%	0.00%	0.00%
Metrosideros excelsa	New Zealand Christmas tree	x	15	13.33%	13.64%	0.00%	0.00%
Muhlenbergia rigens	Deer grass	n	2.5	2.22%	2.27%	2.22%	0.00%
Rosmarinus officinalis	Rosemary	x	2.5	2.22%	2.27%	0.00%	0.00%
Thymus vulgaris	Garden thyme	x	2.5	2.22%	2.27%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.22%	0.00%	0.00%	0.00%
		Total vegetative cover	110	97.78%	100.00%	2.22%	68.89%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	112.5	100.00%	--	--	--

Broad Beach Relevé 5, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Anagallis arvensis	Pimpernel	x	2.5	1.89%	5.26%	0.00%	0.00%
Bromus madritensis ssp. madritensis	Foxtail chess	x	2.5	1.89%	5.26%	0.00%	0.00%
Calystegia soldanella	Beach morning glory	n	2.5	1.89%	5.26%	1.89%	0.00%
Carpobrotus edulis	Hottentot fig	i	2.5	1.89%	5.26%	0.00%	1.89%
Chamaesyce sp.	Sandmat	?	2.5	1.89%	5.26%	0.00%	0.00%
Conyza canadensis var. canadensis	Canadian horseweed	n	2.5	1.89%	5.26%	1.89%	0.00%
Distichlis spicata	Salt grass	n	2.5	1.89%	5.26%	1.89%	0.00%
Heliotropium curassavicum	Heliotrope	n	15	11.32%	31.58%	11.32%	0.00%
Lotus corniculatus	Bird's-foot trefoil	x	2.5	1.89%	5.26%	0.00%	0.00%
Lupinus chamissonis	Chamisso bush lupine	n	2.5	1.89%	5.26%	1.89%	0.00%
Malva nicaeensis	Bull mallow	x	2.5	1.89%	5.26%	0.00%	0.00%
Melilotus indicus	Yellow annual sweetclover	x	2.5	1.89%	5.26%	0.00%	0.00%
Polygonum sp.	Knotweed	?	2.5	1.89%	5.26%	0.00%	0.00%
Sonchus oleraceus	Common sow thistle	x	2.5	1.89%	5.26%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	85	64.15%	0.00%	0.00%	0.00%
		Total vegetative cover	47.5	35.85%	100.00%	18.87%	1.89%

Broad Beach Relevé 5, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	132.5	100.00%	--	--	--

Broad Beach Relevé 6, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Agave americana	American century plant	x	2.5	2.56%	2.63%	0.00%	0.00%
Aloe sp.	Aloe	x	2.5	2.56%	2.63%	0.00%	0.00%
Carpobrotus edulis	Hottentot fig	i	85	87.18%	89.47%	0.00%	87.18%
Corethrogyne filaginifolia	Sand aster	n	2.5	2.56%	2.63%	2.56%	0.00%
Crassula ovata	Jade plant	x	2.5	2.56%	2.63%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.56%	0.00%	0.00%	0.00%
		Total vegetative cover	95	97.44%	100.00%	2.56%	87.18%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	97.5	100.00%	--	--	--

Broad Beach Relevé 7, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Arctotheca sp.	Cape weed	i	2.5	3.57%	3.70%	0.00%	3.57%
Baccharis pilularis	Coyote brush	n	2.5	3.57%	3.70%	3.57%	0.00%
Carex praegracilis	Clustered field sedge	n	0.05	0.07%	0.07%	0.07%	0.00%
Carpobrotus edulis	Hottentot fig	i	37.5	53.50%	55.47%	0.00%	53.50%
Corethrogyne filaginifolia	Sand aster	n	2.5	3.57%	3.70%	3.57%	0.00%
Eriogonum parvifolium	Coast buckwheat	n	2.5	3.57%	3.70%	3.57%	0.00%
Fragaria chiloensis	Beach strawberry	n	2.5	3.57%	3.70%	3.57%	0.00%
Oxalis corniculata	Yellow sorrel	x	15	21.40%	22.19%	0.00%	0.00%
Phoenix canariensis	Canary Island date palm	i	0.05	0.07%	0.07%	0.00%	0.07%
Tulbaghia violacea	Society garlic	x	2.5	3.57%	3.70%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	3.57%	0.00%	0.00%	0.00%
		Total vegetative cover	67.6	96.43%	100.00%	14.34%	57.13%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	70.1	100.00%	--	--	--

Broad Beach Relevé 8, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Anagallis arvensis	Pimpernel	x	2.5	2.32%	2.38%	0.00%	0.00%
Arctotheca sp.	Cape weed	i	2.5	2.32%	2.38%	0.00%	2.32%
Camissoniopsis cheiranthifolia	Beach evening primrose	n	2.5	2.32%	2.38%	2.32%	0.00%
Chamaesyce sp.	Sandmat	?	2.5	2.32%	2.38%	0.00%	0.00%
Cortaderia sp.	Pampas grass	i	2.5	2.32%	2.38%	0.00%	2.32%
Cynodon dactylon	Bermuda grass	i	2.5	2.32%	2.38%	0.00%	2.32%
Elymus sp. (ornamental)	Rye grass	x	15	13.94%	14.27%	0.00%	0.00%
Euphorbia peplus	Petty spurge	x	0.05	0.05%	0.05%	0.00%	0.00%
Heterotheca grandiflora	Telegraph weed	n	0.05	0.05%	0.05%	0.05%	0.00%
Leymus sp.	Creeping wild rye	n	62.5	58.09%	59.47%	58.09%	0.00%
Limonium perezii	Perez's sea lavender	x	2.5	2.32%	2.38%	0.00%	0.00%
Melilotus indicus	Yellow annual sweetclover	x	2.5	2.32%	2.38%	0.00%	0.00%
Phoenix canariensis	Canary Island date palm	i	2.5	2.32%	2.38%	0.00%	2.32%
Polygonum sp.	Knotweed	?	2.5	2.32%	2.38%	0.00%	0.00%
Sonchus oleraceus	Common sow thistle	x	2.5	2.32%	2.38%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.32%	0.00%	0.00%	0.00%
		Total vegetative	105.1	97.68%	100.00%	60.46%	9.29%

Broad Beach Relevé 8, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
		cover					
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	107.6	100.00%	--	--	--

Broad Beach Relevé 9, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Carpobrotus edulis	Hottentot fig	i	97.5	100.00%	100.00%	0.00%	100.00%
Bare ground (open sand)	Open sand	--	0	0.00%	0.00%	0.00%	0.00%
		Total vegetative cover	97.5	100.00%	100.00%	0.00%	100.00%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	97.5	100.00%	--	--	--

Broad Beach Relevé 10, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Agave attenuata	Lion's tail	x	2.5	2.33%	2.38%	0.00%	0.00%
Aloe sp.	Aloe	x	2.5	2.33%	2.38%	0.00%	0.00%
Carex praegracilis	Clustered field sedge	n	15	13.95%	14.29%	13.95%	0.00%
Leymus sp.	Creeping wild rye	n	85	79.07%	80.95%	79.07%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.33%	0.00%	0.00%	0.00%
		Total vegetative cover	105	97.67%	100.00%	93.02%	0.00%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	107.5	100.00%	--	--	--

Broad Beach Relevé 11, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Achillea millefolium	Common yarrow	n	15	26.09%	27.27%	26.09%	0.00%
Carex praegracilis	Clustered field sedge	n	15	26.09%	27.27%	26.09%	0.00%
Carpobrotus edulis	Hottentot fig	i	2.5	4.35%	4.55%	0.00%	4.35%

Broad Beach Relevé 11, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover**	**Percent of Total Cover (Absolute)**	**Percent of Vegetative Cover (Relative)**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ceanothus thyrsiflorus	Blue blossom	n	15	26.09%	27.27%	26.09%	0.00%
Chamaesyce sp.	Sandmat	?	2.5	4.35%	4.55%	0.00%	0.00%
Fragaria chiloensis	Beach strawberry	n	2.5	4.35%	4.55%	4.35%	0.00%
Sonchus oleraceus	Common sow thistle	x	2.5	4.35%	4.55%	0.00%	0.00%
Bare ground (open sand)	Open sand	--	2.5	4.35%	0.00%	0.00%	0.00%
		Total vegetative cover	55	95.65%	100.00%	82.61%	4.35%
*Native = n, Invasive = i, Exotic = e, Unknown = ?		**Total cover including sand**	57.5	100.00%	--	--	--

Appendix C-3. Summary of relevé data collected at Ormond Beach

Relevé	Relevé Community	Relevé Size (acres)	Native Cover (%)	Vegetative Cover (%)	Native Cover (acres)	Vegetative Cover (acres)	Total Area (acres)	Total Native Cover (acres)	Total Vegetative Cover (acres)	Total Native Cover (%)	Total Vegetative Cover (%)
1	a	0.002	0.27	0.55	0.000	0.001	0.124	0.033	0.034	26.37	27.54
1	b	0.043	0.66	0.68	0.028	0.029					
1	c	0.001	0.55	0.55	0.001	0.001					
1	d	0.003	0.67	0.69	0.002	0.002					
1	e	0.002	0.83	0.85	0.002	0.002					
1	f	0.074	-	-	0.000	0.000					
2	a	0.001	0.85	0.85	0.001	0.001	0.090	0.013	0.014	14.77	15.30
2	b	0.003	0.98	0.98	0.003	0.003					
2	c	0.002	0.85	0.85	0.002	0.002					
2	d	0.002	0.63	0.63	0.001	0.001					
2	e	0.001	0.15	0.15	0.000	0.000					
2	f	0.001	0.78	0.81	0.001	0.001					
2	g	0.002	0.72	0.86	0.002	0.002					
2	h	0.004	0.83	0.85	0.004	0.004					
2	i	0.003	-	-	0.000	0.000					
2	j	0.070	-	-	0.000	0.000					
3	a	0.004	0.95	0.97	0.004	0.004	0.061	0.016	0.017	26.90	27.72
3	b	0.001	0.32	0.32	0.000	0.000					
3	c	0.015	0.82	0.84	0.012	0.013					
3	d	0.001	0.19	0.19	0.000	0.000					

Relevé	Relevé Community	Relevé Size (acres)	Native Cover (%)	Vegetative Cover (%)	Native Cover (acres)	Vegetative Cover (acres)	Total Area (acres)	Total Native Cover (acres)	Total Vegetative Cover (acres)	Total Native Cover (%)	Total Vegetative Cover (%)
3	e	0.041	-	-	0.000	0.000					
4	a	0.001	0.81	0.81	0.001	0.001	0.251	0.054	0.055	21.28	21.89
4	b	0.003	0.976	0.976	0.003	0.003					
4	c	0.020	0.66	0.68	0.013	0.014					
4	d	0.002	0.50	0.53	0.001	0.001					
4	e	0.001	0.67	0.67	0.000	0.000					
4	f	0.013	0.85	0.88	0.011	0.012					
4	g	0.023	0.85	0.88	0.019	0.020					
4	h	0.005	0.43	0.46	0.002	0.002					
4	i	0.001	0.78	0.88	0.001	0.001					
4	j	0.001	0.50	0.50	0.000	0.000					
4	k	0.001	0.81	0.81	0.001	0.001					
4	l	0.181	-	-	0.000	0.000					
Totals:		***0.527***			***0.116***	***0.120***	***0.527***	***0.116***	***0.120***	***22.02***	***22.77***

Appendix C-4. Individual relevé data from Ormond Beach

Ormond Beach Relevé 1, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	37.5	27.27%	50.00%	27.27%	0.00%
Cakile maritima	Sea rocket	*i*	37.5	27.27%	50.00%	0.00%	27.27%
Bare ground (open sand)	Open sand	--	62.5	45.45%	0	0	0
	Total vegetative cover		75	54.55%	100.00%	27.27%	27.27%
*Native = n, Invasive = i	**Total cover including sand**		137.5	100.00%	--	--	--

Ormond Beach Relevé 1, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	62.5	53.19%	78.13%	53.19%	0.00%
Ambrosia chamissonis	Beach bur	*n*	15	12.77%	18.75%	12.77%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.13%	3.13%	0.00%	2.13%
Bare ground (open sand)	Open sand	--	37.5	31.91%	0.00%	0.00%	0.00%
	Total vegetative cover		80	68.09%	100.00%	65.96%	2.13%
*Native = n, Invasive = i	**Total cover including sand**		117.5	100.00%	--	--	--

Ormond Beach Relevé 1, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	37.5	27.27%	50.00%	27.27%	0.00%
Ambrosia chamissonis	Beach bur	*n*	37.5	27.27%	50.00%	27.27%	0.00%
Bare ground (open sand)	Open sand	--	62.5	45.45%	0.00%	0.00%	0.00%
	Total vegetative cover		75	54.55%	100.00%	54.55%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		137.5	100.00%	--	--	--

Ormond Beach Relevé 1, Community D							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	15	12.50%	18.18%	12.50%	0.00%
Ambrosia chamissonis	Beach bur	*n*	62.5	52.08%	75.76%	52.08%	0.00%
Atriplex lentiformis	Big saltbush	*n*	2.5	2.08%	3.03%	2.08%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.08%	3.03%	0.00%	2.08%
Bare ground (open sand)	Open sand	--	37.5	31.25%	0.00%	0.00%	0.00%
	Total vegetative cover		82.5	68.75%	100.00%	66.67%	2.08%
*Native = n, Invasive = i	**Total cover including sand**		120	100.00%	--	--	--

Ormond Beach Relevé 1, Community E							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	85	82.93%	97.14%	82.93%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.44%	2.86%	0.00%	2.44%
Bare ground (open sand)	Open sand	--	15	14.63%	0.00%	0.00%	0.00%
		Total vegetative cover	87.5	85.37%	100.00%	82.93%	2.44%
*Native = n, Invasive = i		**Total cover including sand**	102.5	100.00%	--	--	--

Ormond Beach Relevé 2, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	85	82.93%	97.14%	82.93%	0.00%
Ambrosia chamissonis	Beach bur	*n*	2.5	2.44%	2.86%	2.44%	0.00%
Bare ground (open sand)	Open sand	--	15	14.63%	0.00%	0.00%	0.00%
		Total vegetative cover	87.5	85.37%	100.00%	85.37%	0.00%
*Native = n, Invasive = i		**Total cover including sand**	102.5	100.00%	--	--	--

Ormond Beach Relevé 2, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	2.5	2.38%	2.44%	2.38%	0.00%
Ambrosia chamissonis	Beach bur	*n*	85	80.95%	82.93%	80.95%	0.00%
Atriplex lentiformis	Big saltbush	*n*	15	14.29%	14.63%	14.29%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.38%	0.00%	0.00%	0.00%
	Total vegetative cover		102.5	97.62%	100.00%	97.62%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		105	100.00%	--	--	--

Ormond Beach Relevé 2, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	85	85.00%	100.00%	85.00%	0.00%
Bare ground (open sand)	Open sand	--	15	15.00%	0.00%	0.00%	0.00%
	Total vegetative cover		85	85.00%	100.00%	85.00%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		100	100.00%	--	--	--

Ormond Beach Relevé 2, Community D							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	62.5	62.50%	100.00%	62.50%	0.00%
Bare ground (open sand)	Open sand	--	37.5	37.50%	0.00%	0.00%	0.00%
	Total vegetative cover		62.5	62.50%	100.00%	62.50%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		100	100.00%	--	--	--

Ormond Beach Relevé 2, Community E							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	15	15.00%	100.00%	15.00%	0.00%
Bare ground (open sand)	Open sand	--	85	85.00%	0.00%	0.00%	0.00%
	Total vegetative cover		15	15.00%	100.00%	15.00%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		100	100.00%	--	--	--

Ormond Beach Relevé 2, Community F							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	62.5	78.13%	96.15%	78.13%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	3.13%	3.85%	0.00%	3.13%
Bare ground (open sand)	Open sand	--	15	18.75%	0.00%	0.00%	0.00%
	Total vegetative cover		65	81.25%	100.00%	78.13%	3.13%
*Native = n, Invasive = i	**Total cover including sand**		80	100.00%	--	--	--

Ormond Beach Relevé 2, Community G							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	62.5	58.14%	67.57%	58.14%	0.00%
Atriplex lentiformis	Big saltbush	*n*	15	13.95%	16.22%	13.95%	0.00%
Cakile maritima	Sea rocket	*i*	15	13.95%	16.22%	0.00%	13.95%
Bare ground (open sand)	Open sand	--	15	13.95%	0.00%	0.00%	0.00%
	Total vegetative cover		92.5	86.05%	100.00%	72.09%	13.95%
*Native = n, Invasive = i	**Total cover including sand**		107.5	100.00%	--	--	--

Ormond Beach Relevé 2, Community H							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	85	82.93%	97.14%	82.93%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.44%	2.86%	0.00%	2.44%
Bare ground (open sand)	Open sand	--	15	14.63%	0.00%	0.00%	0.00%
	Total vegetative cover		87.5	85.37%	100.00%	82.93%	2.44%
*Native = n, Invasive = i	**Total cover including sand**		102.5	100.00%	--	--	--

Ormond Beach Relevé 3, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	2.5	2.70%	2.78%	2.70%	0.00%
Ambrosia chamissonis	Beach bur	*n*	85	91.89%	94.44%	91.89%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.70%	2.78%	0.00%	2.70%
Bare ground (open sand)	Open sand	--	2.5	2.70%	0.00%	0.00%	0.00%
	Total vegetative cover		90	97.30%	100.00%	94.59%	2.70%
*Native = n, Invasive = i	**Total cover including sand**		92.5	100.00%	--	--	--

Ormond Beach Relevé 3, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	15	16.22%	50.00%	16.22%	0.00%
Atriplex lentiformis	Big saltbush	*n*	15	16.22%	50.00%	16.22%	0.00%
Bare ground (open sand)	Open sand	--	62.5	67.57%	0.00%	0.00%	0.00%
	Total vegetative cover		30	32.43%	100.00%	32.43%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		92.5	100.00%	--	--	--

Ormond Beach Relevé 3, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	62.5	65.79%	78.13%	65.79%	0.00%
Ambrosia chamissonis	Beach bur	*n*	15	15.79%	18.75%	15.79%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.63%	3.13%	0.00%	2.63%
Bare ground (open sand)	Open sand	--	15	15.79%	0.00%	0.00%	0.00%
	Total vegetative cover		80	84.21%	100.00%	81.58%	2.63%
*Native = n, Invasive = i	**Total cover including sand**		95	100.00%	--	--	--

Ormond Beach Relevé 3, Community D							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Atriplex lentiformis	Big saltbush	*n*	15	19.35%	100.00%	19.35%	0.00%
Bare ground (open sand)	Open sand	--	62.5	80.65%	0.00%	0.00%	0.00%
	Total vegetative cover		15	19.35%	100.00%	19.35%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		77.5	100.00%	--	--	--

Ormond Beach Relevé 4, Community A							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	2.5	3.13%	3.85%	3.13%	0.00%
Atriplex lentiformis	Big saltbush	*n*	62.5	78.13%	96.15%	78.13%	0.00%
Bare ground (open sand)	Open sand	--	15	18.75%	0.00%	0.00%	0.00%
	Total vegetative cover		65	81.25%	100.00%	81.25%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		80	100.00%	--	--	--

Ormond Beach Relevé 4, Community B							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	85	82.93%	85.00%	82.93%	0.00%
Atriplex lentiformis	Big saltbush	*n*	15	14.63%	15.00%	14.63%	0.00%
Bare ground (open sand)	Open sand	--	2.5	2.44%	0.00%	0.00%	0.00%
	Total vegetative cover		100	97.56%	100.00%	97.56%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		102.5	100.00%	--	--	--

Ormond Beach Relevé 4, Community C							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	15	12.77%	18.75%	12.77%	0.00%
Ambrosia chamissonis	Beach bur	*n*	62.5	53.19%	78.13%	53.19%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.13%	3.13%	0.00%	2.13%
Bare ground (open sand)	Open sand	--	37.5	31.91%	0.00%	0.00%	0.00%
	Total vegetative cover		80	68.09%	100.00%	65.96%	2.13%
*Native = n, Invasive = i	**Total cover including sand**		117.5	100.00%	--	--	--

Relevé 4, Community D							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	2.5	3.13%	5.88%	3.13%	0.00%
Ambrosia chamissonis	Beach bur	*n*	37.5	46.88%	88.24%	46.88%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	3.13%	5.88%	0.00%	3.13%
Bare ground (open sand)	Open sand	--	37.5	46.88%	0.00%	0.00%	0.00%
	Total vegetative cover		42.5	53.13%	100.00%	50.00%	3.13%
*Native = n, Invasive = i	**Total cover including sand**		80	100.00%	--	--	--

Ormond Beach Relevé 4, Community E							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	37.5	33.33%	50.00%	33.33%	0.00%
Ambrosia chamissonis	Beach bur	*n*	37.5	33.33%	50.00%	33.33%	0.00%
Bare ground (open sand)	Open sand	--	37.5	33.33%	0.00%	0.00%	0.00%
	Total vegetative cover		75	66.67%	100.00%	66.67%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		112.5	100.00%	--	--	--

Ormond Beach Relevé 4, Community F							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	37.5	31.25%	35.71%	31.25%	0.00%
Ambrosia chamissonis	Beach bur	*n*	62.5	52.08%	59.52%	52.08%	0.00%
Atriplex lentiformis	Big saltbush	*n*	2.5	2.08%	2.38%	2.08%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.08%	2.38%	0.00%	2.08%
Bare ground (open sand)	Open sand	--	15	12.50%	0.00%	0.00%	0.00%
	Total vegetative cover		105	87.50%	100.00%	85.42%	2.08%
*Native = n, Invasive = i	**Total cover including sand**		120	100.00%	--	--	--

Relevé 4, Community G							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	85	70.83%	80.95%	70.83%	0.00%
Ambrosia chamissonis	Beach bur	*n*	15	12.50%	14.29%	12.50%	0.00%
Atriplex lentiformis	Big saltbush	*n*	2.5	2.08%	2.38%	2.08%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	2.08%	2.38%	0.00%	2.08%

Relevé 4, Community G							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Bare ground (open sand)	Open sand	--	15	12.50%	0.00%	0.00%	0.00%
		Total vegetative cover	105	87.50%	100.00%	85.42%	2.08%
*Native = n, Invasive = i		**Total cover including sand**	120	100.00%	--	--	--

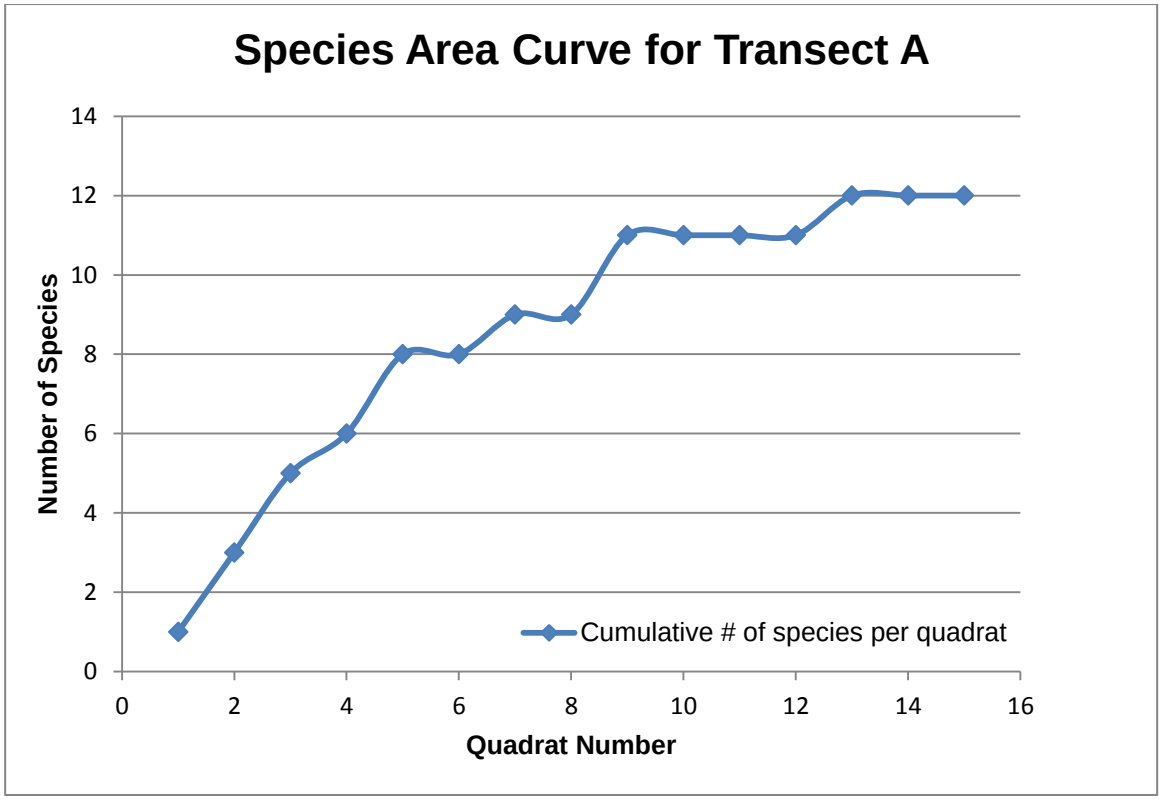
Ormond Beach Relevé 4, Community H							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Abronia maritima	Red sand verbena	*n*	15	21.43%	46.15%	21.43%	0.00%
Ambrosia chamissonis	Beach bur	*n*	15	21.43%	46.15%	21.43%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	3.57%	7.69%	0.00%	3.57%
Bare ground (open sand)	Open sand	--	37.5	53.57%	0.00%	0.00%	0.00%
		Total vegetative cover	32.5	46.43%	100.00%	42.86%	3.57%
*Native = n, Invasive = i		**Total cover including sand**	70	100.00%	--	--	--

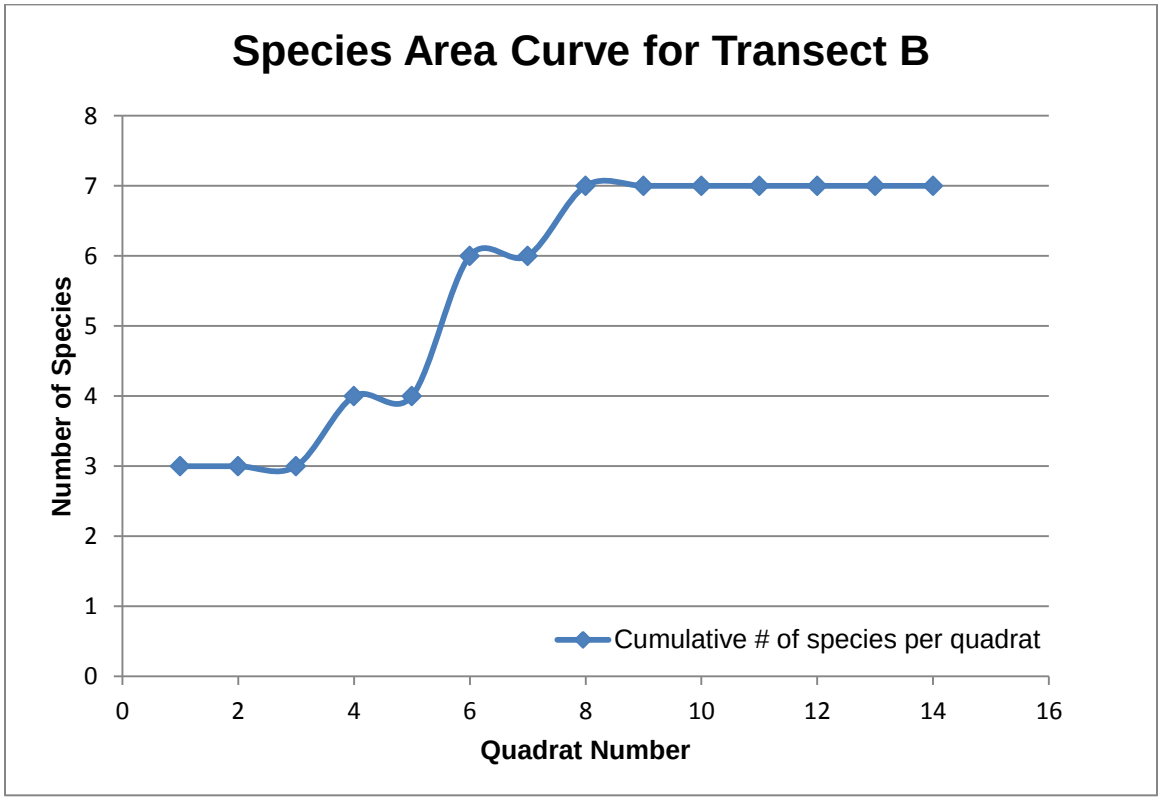
Ormond Beach Relevé 4, Community I							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Ambrosia chamissonis	Beach bur	*n*	62.5	78.13%	96.15%	78.13%	0.00%
Cakile maritima	Sea rocket	*i*	2.5	3.13%	3.85%	0.00%	3.13%
Bare ground (open sand)	Open sand	--	15	18.75%	0.00%	0.00%	0.00%
	Total vegetative cover		65	81.25%	100.00%	78.13%	3.13%
*Native = n, Invasive = i	**Total cover including sand**		80	100.00%	--	--	--

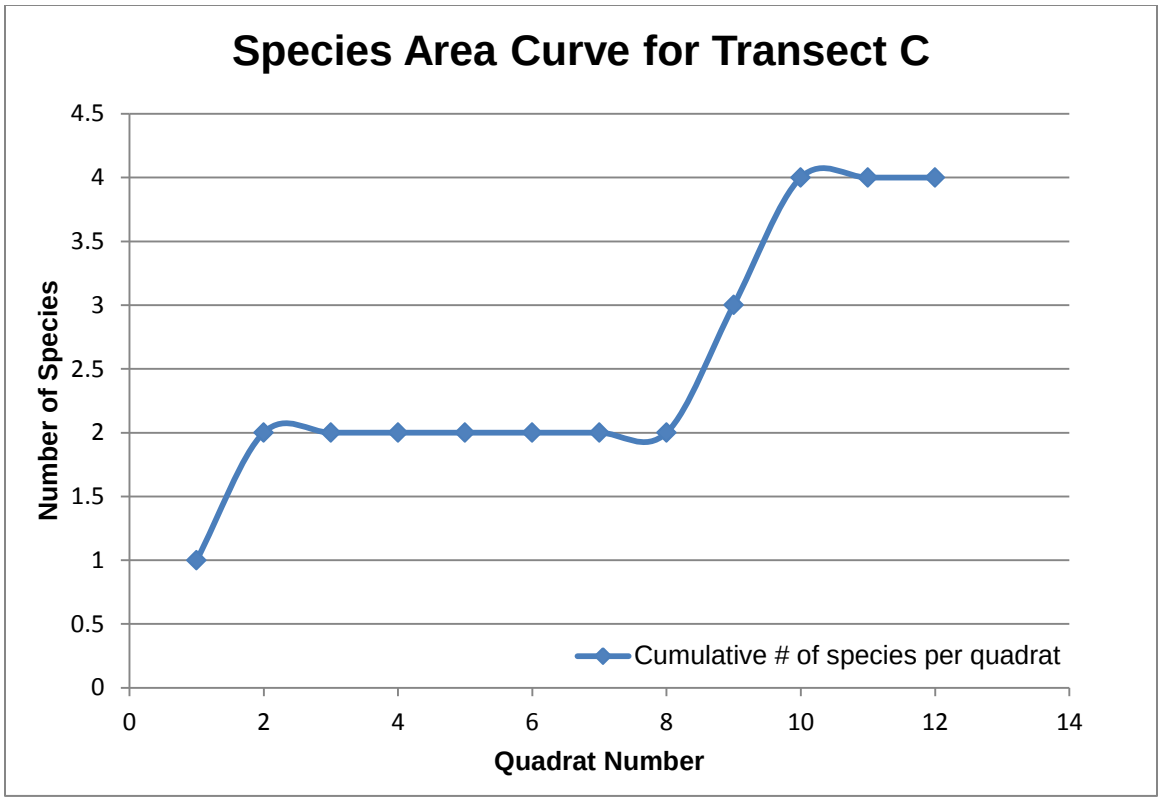
Ormond Beach Relevé 4, Community J							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Atriplex lentiformis	Big saltbush	*n*	37.5	50.00%	100.00%	50.00%	0.00%
Bare ground (open sand)	Open sand	--	37.5	50.00%	0.00%	0.00%	0.00%
	Total vegetative cover		37.5	50.00%	100.00%	50.00%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		75	100.00%	--	--	--

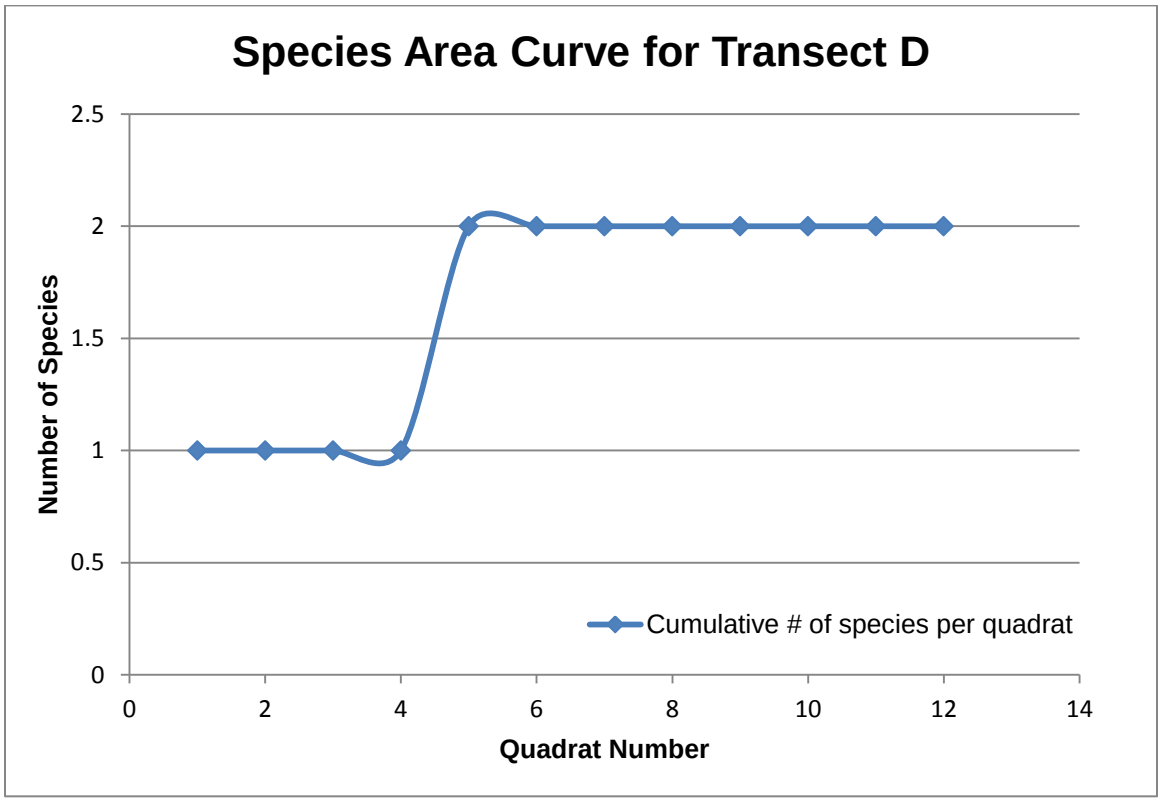
Ormond Beach Relevé 4, Community K							
Species Name	**Common Name**	**Origin***	**Percent Cover (%)**	**Percent Absolute Cover Vegetation**	**Percent Relative Cover Vegetation**	**Percent Absolute Cover Native Vegetation**	**Percent Absolute Cover Invasive Vegetation**
Atriplex lentiformis	Big saltbush	*n*	62.5	80.65%	100.00%	80.65%	0.00%
Bare ground (open sand)	Open sand	--	15	19.35%	0.00%	0.00%	0.00%
	Total vegetative cover		62.5	80.65%	100.00%	80.65%	0.00%
*Native = n, Invasive = i	**Total cover including sand**		77.5	100.00%	--	--	--

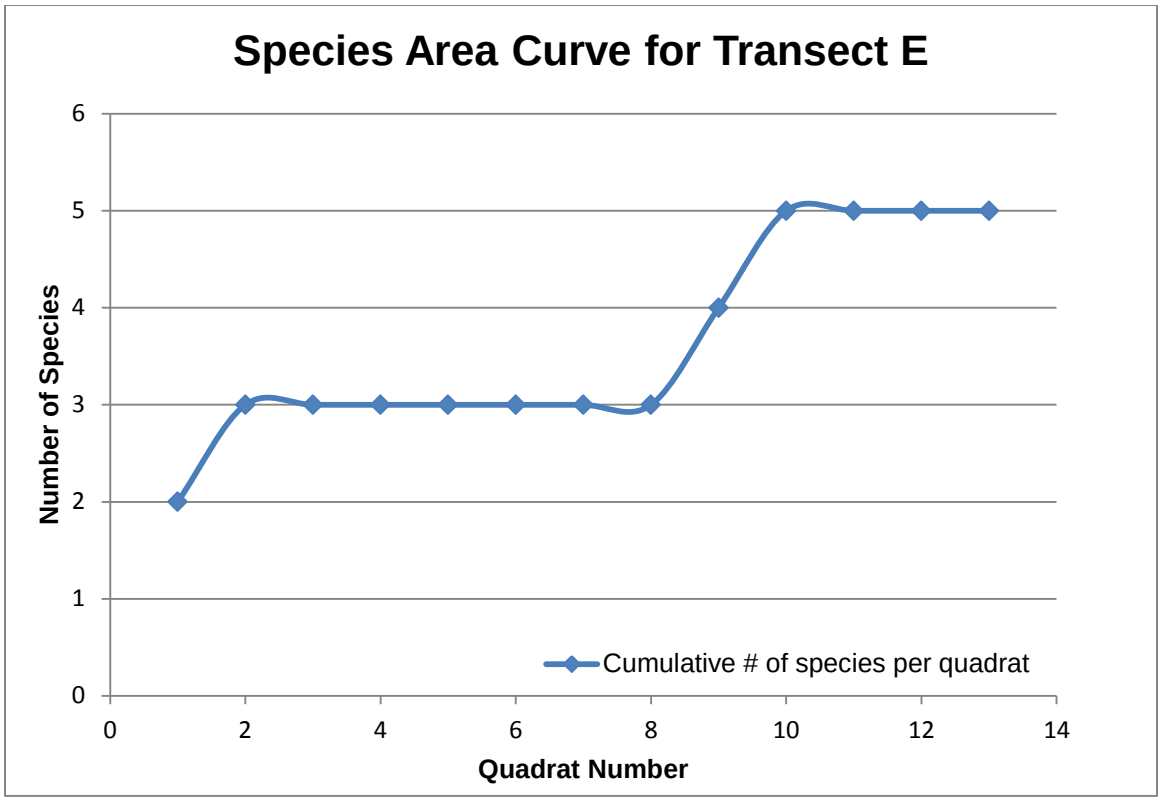
Appendix C-5. Species area curves for Broad Beach

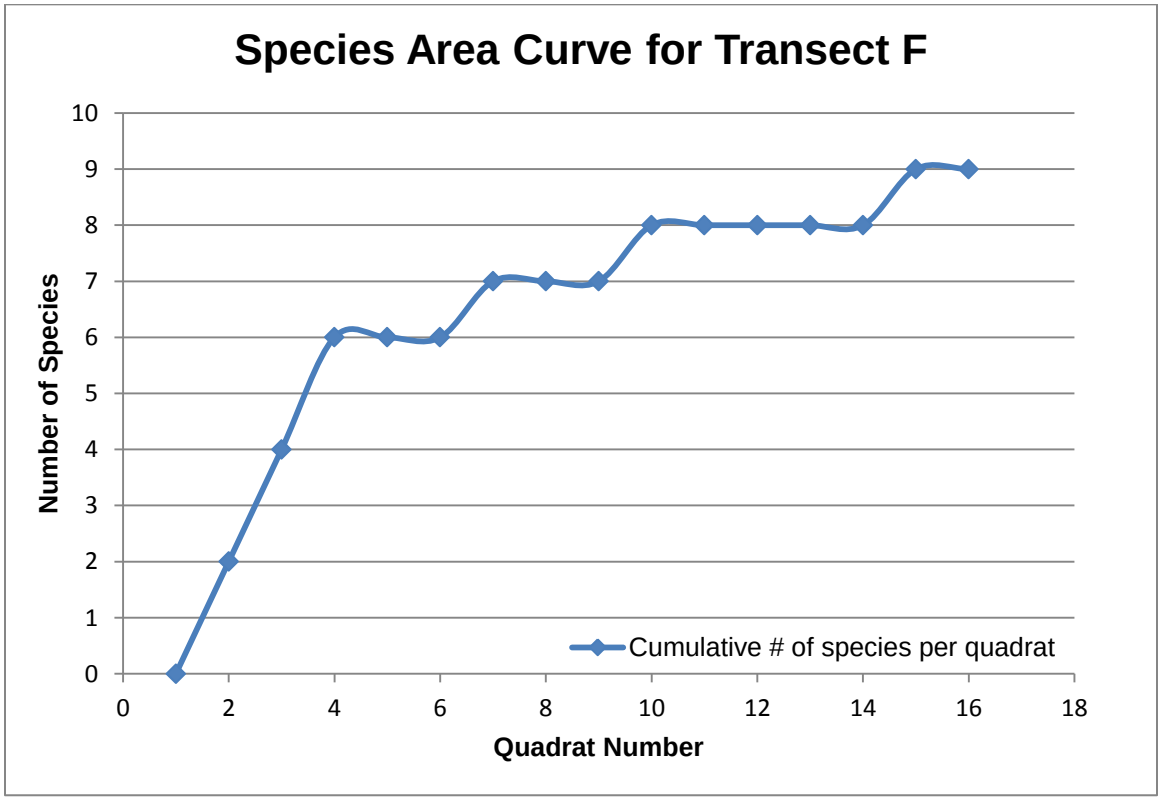


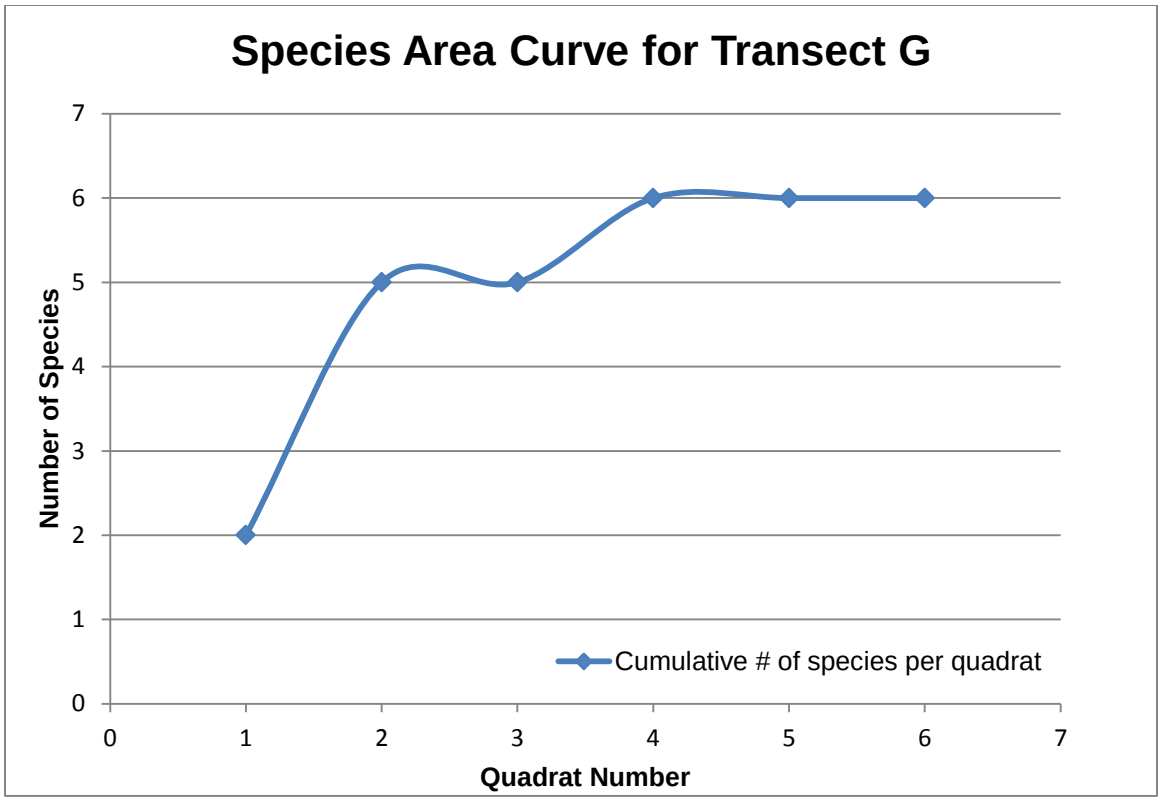


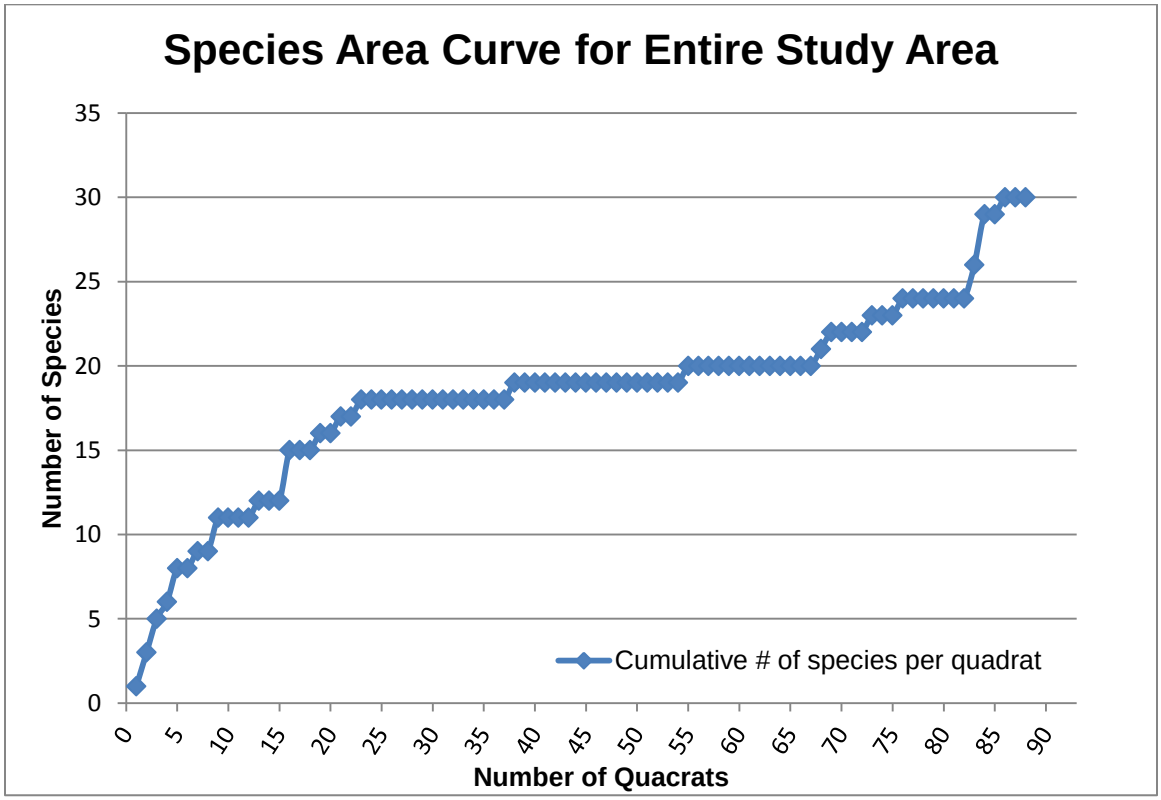

Species Area Curve for Transect C
Number of Species
Quadrat Number
Cumulative # of species per quadrat
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0
2
4
6
8
10
12
14


Species Area Curve for Transect D
Number of Species
Quadrat Number
Cumulative # of species per quadrat
0
0.5
1
1.5
2
2.5
0
2
4
6
8
10
12
14


Species Area Curve for Transect E
Number of Species
Quadrat Number
Cumulative # of species per quadrat
0
1
2
3
4
5
6
0
2
4
6
8
10
12
14


Species Area Curve for Transect F
Number of Species
Quadrat Number
Cumulative # of species per quadrat
0
1
2
3
4
5
6
7
8
9
10
0
2
4
6
8
10
12
14
16
18


Species Area Curve for Transect G
Number of Species
Quadrat Number
Cumulative # of species per quadrat
0
1
2
3
4
5
6
7


Species Area Curve for Entire Study Area
Number of Species
Number of Quacrats
Cumulative # of species per quadrat
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90

APPENDIX D

AVIAN POINT COUNT DATA

Appendix D. Avian point count data from surveys conducted in foredune habitat at Broad Beach on June 5, 2013

Point Number	Time	Species	Common Name	Quantity	Observation Method	Distance (m) and Bearing	Notes
1	0808-0818	*Carpodacus mexicanus*	House Finch	2	Visual	35m NW	male/female pair
		Corvus brachyrhynchos	American Crow	3	Visual - Perched	25m NE	male/female pair perched on wire
		Columbia livia	Rock Pigeon	5	Visual - Fly over	>50m NW	
		Selasphorus sasin	Allen's Hummingbird	1	Visual	25m W	
		Hirundo rustica	Barn Swallow	1	Visual	15m S	foraging
		Geothlypis trichas	Common Yellowthroat	1	Aural - Singing	40m N	
		XXGU	Unknown Gull	3	Visual - Fly over	75m S	
		Melospiza melodia	Song Sparrow	2	Visual	15m W	food carry
2	0826-0836	*Charadrius vociferus*	Killdeer	2	Visual	10m S	male/female pair foraging
		Carpodacus mexicanus	House Finch	1	Visual	40m NE	
		Carpodacus mexicanus	House Finch	1	Visual	5m N	
		Columbia livia	Rock Pigeon	3	Visual	100m N	flying

Point Number	Time	Species	Common Name	Quantity	Observation Method	Distance (m) and Bearing	Notes
		XXGU	Unknown Gull	2	Visual - Fly over		
		Psaltriparus minimus	Bushtit	1	Aural - Call	40m ENE	
		Corvus brachyrhynchos	American Crow	1	Visual	10m S	flying
		Carpodacus mexicanus	House Finch	5	Visual - Fly over	15m N	
		XXGF	Unknown Goldfinch	1	Visual - Fly over	65m N	
3	0900-0910	*Sayornis nigricans*	Black Phoebe	1	Visual - Perched	65m WNW	
		Corvus brachyrhynchos	American Crow	4	Visual - Perched	60m WNW	
		Carduelis tristis	American Goldfinch	3	Visual - Perched	40m WNW	male/female
		Carpodacus mexicanus	House Finch	3	Visual - Perched	40m WNW	2 males/female
		Buteo jamaicensis	Red-tailed Hawk	1	Visual - Perched	85m NE	on T-pole
		XXOR	Unknown Oriole	1	Visual	15m N	male
		Selasphorus sasin	Allen's Hummingbird	1	Visual	15m N	
4	0945-0955	*Corvus brachyrhynchos*	American Crow	1	Visual	70m N	

Point Number	Time	Species	Common Name	Quantity	Observation Method	Distance (m) and Bearing	Notes
		Sayornis nigricans	Black Phoebe	1	Aural - Call	25m ENE	
		Carpodacus mexicanus	House Finch	2	Visual	12m N	
5	1230-1240	*Mimus polyglottos*	Northern Mockingbird	3	Visual - Singing & Perching	45m N	
		XXGU	Unknown Gull	3	Visual - Fly over	15m N	
		Carpodacus mexicanus	House Finch	4	Various	45m N	
		Corvus brachyrhynchos	American Crow	1	Visual - Fly over	60m N	
6	1250-1300	*Carpodacus mexicanus*	House Finch	4	Visual - Perched	35m NW	
		Carpodacus mexicanus	House Finch	6	Visual - Perched	75m WNW	
		Larus occidentalis	Western Gull	9	Perched & Flying	50m W	