



Monitoring Salt Marsh Vegetation and Nekton at Assateague Island National Seashore

2014 Summary Report

Natural Resource Data Series NPS/NCBN/NRDS—2015/789



ON THE COVER

Salt marsh at Assateague Island National Seashore (ASIS).
Photograph by Robin Baranowski

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All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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Abstract

The Northeast Coastal and Barrier Network (NCBN) began monitoring salt marsh vegetation and nekton at Assateague Island National Seashore (ASIS) in 2008. This report summarizes the fourth year of data collected at nine permanent monitoring sites during the summer of 2014. Monitoring will continue on a biennial basis.

Fifty vegetation plots were sampled at each of the nine marsh sites (total = 450 plots). The percent cover of each vegetation species and non-vegetation cover type within each 1 m² plot was visually estimated using a revised Braun-Blanquet method. Sixteen vegetation species and five non-vegetation cover types were recorded.

A total of 138 nekton stations were established on creeks and pools/pannes. Each station was sampled twice during the field season. Nekton stations were sampled using a 1 m² aluminum throw trap. Seven species of nekton were recorded in 2014, including five fish, one crab, and one shrimp species. Common mummichog (*Fundulus heteroclitus*), sheepshead minnow (*Cyprinodon variegatus*), and rainwater killifish (*Lucania parva*) accounted for approximately 91% of all nekton captured in 2014.

Introduction

National Park Service (NPS) managers need accurate information about how, when and why natural systems change over time in order to make sound management decisions. To address this need, the NPS initiated natural resource monitoring through the Natural Resource Challenge. The Inventory and Monitoring Program (I&M), the key component of this effort, organizes 270 park units into 32 networks tasked with conducting long-term ‘vital signs’ monitoring (Fancy et al. 2009). Vital signs are defined as measurable, early warning signals that may indicate change in the long-term health of natural systems. Early detection of potential problems allows park managers to take steps in restoring or maintaining the ecological health of park resources.

The Northeast Coastal and Barrier Network (NCBN) consists of eight parks extending along the Northeast Atlantic Coast. Vital Signs chosen as part of the Network’s monitoring plan include salt marsh vegetation communities, nekton communities, essential estuarine water quality parameters, and specific coastal geomorphologic features (Stevens et al. 2005). Detailed monitoring protocols have been developed and implemented in the eight parks. This annual report summarizes salt marsh vegetation and nekton community data collected at Assateague Island National Seashore (ASIS) according to two protocols—*Monitoring Nekton in Salt Marshes: A Protocol for the National Park Service’s Long-Term Monitoring Program, Northeast Coastal and Barrier Network* (James-Pirri et al. 2012) and *Monitoring Salt Marsh Vegetation: A Protocol for the National Park Service’s Long-Term Monitoring Program, Northeast Coastal and Barrier Network* (James-Pirri et al. In Review).

Methods

Permanent Site Selection

All salt marsh areas were identified and delineated into 5-8 hectare areas using a GIS. Nine permanent sites (established in 2008) were randomly selected for long-term vegetation and nekton monitoring (Fig. 1). The number of sites chosen was based on available habitat and the logistics and feasibility of sampling. Detailed information about the site selection process and sampling design can be found in the Salt Marsh Vegetation (James-Pirri et al. In Review) and Nekton Protocols (James-Pirri et al. 2012). Vegetation and nekton data collection at all nine sites began in 2008 and will continue on a biennial basis.

Nekton Sampling Station Selection and Data Collection

While monitoring sites remain permanent from year to year, nekton stations within each site are re-randomized each sampling year. All sampling stations were randomly established on the perimeter of pools or along the length of creeks (James-Pirri et al. 2012). Universal Transverse Mercator (UTM) coordinates for each station are provided in Appendix A. Nekton stations were sampled twice, once in early summer (mid- to late-June) and once in late summer (early-August) (Table 1).

Nekton in creeks or pools and flooded pannes were sampled using a 1 m² aluminum throw trap (Kushlan 1981, Sogard and Able 1991, Raposa and Roman 2001, James-Pirri et al. 2012). All nekton were collected from the trap using a 1 mm mesh dip net.

For each sampling station, all nekton that were captured in the throw trap were identified and enumerated. Lengths of fifteen haphazardly selected individuals of each species were measured (fish – total length; crabs – carapace width; shrimp – total length). Once identified and measured, all organisms were returned to the location where they were collected (outside the throw trap). Water temperature, depth, and salinity were recorded for each sampling station during each sampling event.

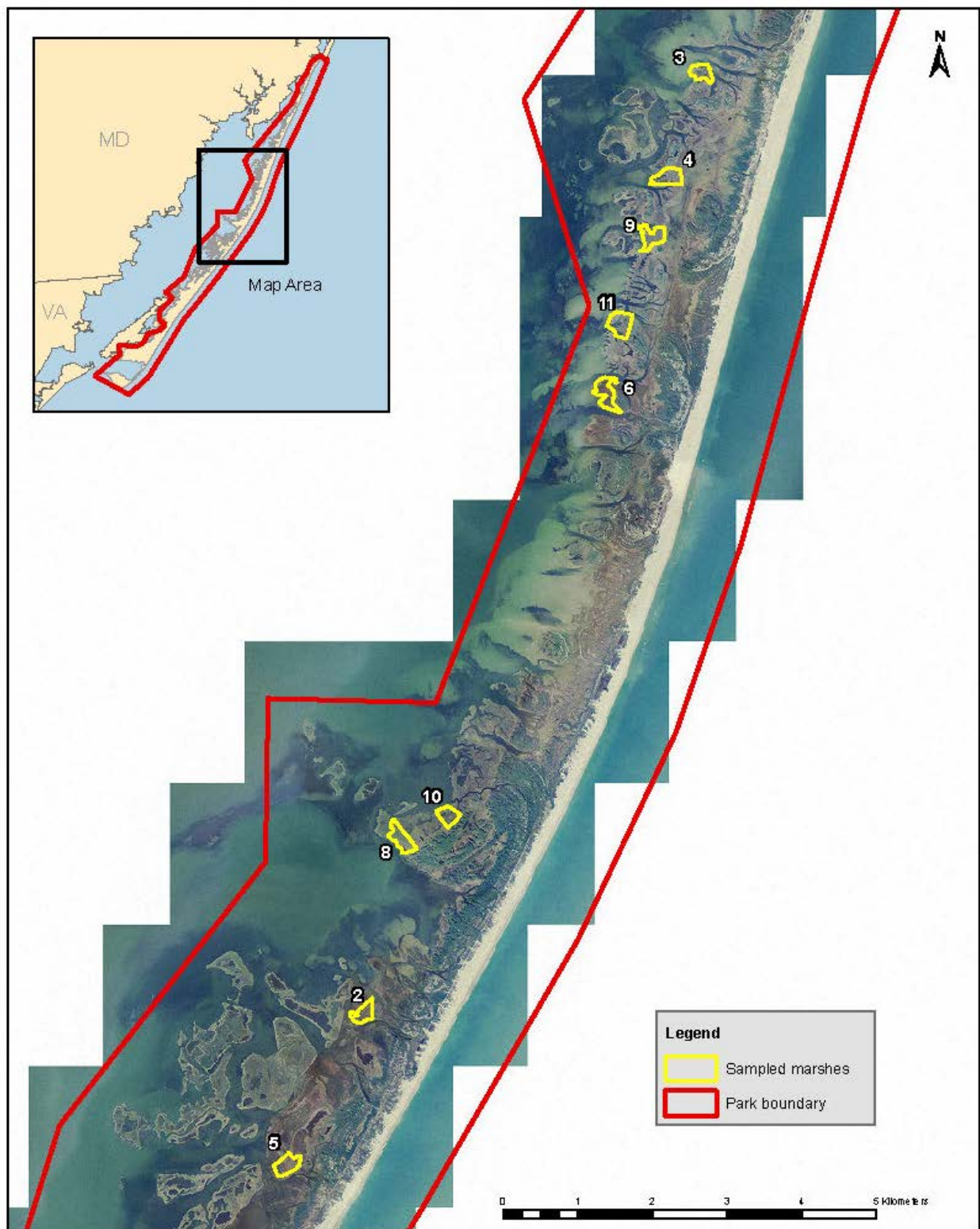


Figure 1. Permanent nekton and vegetation monitoring sites established by NCBN at Assateague Island National Seashore (ASIS) in 2008. These nine sites will continue to be monitored biennially.

Table 1. Sampling dates and number of unique nekton sampling stations at each site at ASIS in 2014. Sampling stations are displayed by habitat type. '-' indicates habitat not available. '*' one or more stations could not be sampled due to insufficient water or inaccessibility.

Site	Event	Dates	Habitat		Total
			Pool/Panne	Tidal Creek	
2	Early	6/12/2014	15	--	15
2	Late	8/4/2014	14*	--	14
3	Early	6/13/2014	15	2	17
3	Late	7/28/2014	14*	2	16
4	Early	6/17/2014	13	5	18
4	Late	7/30/2014	13	5	18
5	Early	6/11/2014	11	--	11
5	Late	7/29/2014	4*	--	4
6	Early	6/10/2014	15	2	17
6	Late	8/7/2014	14*	2	16
8	Early	6/9/2014	14	1	15
8	Late	8/5/2014	14	1	15
9	Early	6/13/2014	15	--	15
9	Late	8/6/2014	15	--	15
10	Early	6/9/2014	15	--	15
10	Late	7/31/2014	13*	--	13
11	Early	6/16/2014	15	--	15
11	Late	8/1/2014	13*	--	13

Vegetation Plot Selection and Data Collection

Vegetation sampling was conducted once at each of the nine marsh sites (Table 2). For each site, ten transects extending from bay to upland were systematically placed based on a single random start (James-Pirri et al. In Review). Plots were established by treating the total length of all ten transects as a single transect and randomly selecting points (*i.e.*, plots) along this total length. This combination of systematic transects and replicate plots is necessary to ensure interspersed of the plots throughout the marsh study area, thus providing a representative sample of all salt marsh communities (*e.g.*, low marsh, high marsh).

All vegetation species and non-vegetation cover types present in each plot were recorded (Table 3), and the estimated percent cover was determined using a modified Braun-Blanquet cover scale (0: 0%; 1: <1%; 2: 1-5%; 3: 6-25%; 4: 26-50%; 5: 51-75%; 6: 76-100%), (Kent and Coker 1992).

Table 2. Sampling dates and total number of vegetation plots sampled at nine marsh sites at ASIS in 2014.

Site	Dates	Total
2	6/24/2014	50
3	7/11/2014	50
4	6/25/2014	50
5	7/2/2014	50
6	6/23/2014	50
8	6/30/14, 7/1/2014	50
9	6/27/2014	50
10	6/30/2014	50
11	7/21/2014	50

Table 3. Definition of standard cover type categories used in the Northeast Coastal and Barrier Network salt marsh vegetation monitoring protocol (James-Pirri et al. In Review).

Live vascular plants	Identified by species (herbaceous and shrubs).
Standing non-living vascular plants	Identified by species (e.g., <i>S. alterniflora</i> Not Living). This category only includes standing dead (attached) plants that are from a previous year's growth. There may be some dead leaves from this year's growth (e.g., the ends of leaves or leaves that are being replaced by new growth, etc.). In cases where dead leaves are from the current growing season, plant cover is recorded as live.
Macroalgae	Identified by species. This category generally includes the rockweeds (e.g., <i>Fucus</i> , <i>Ascophyllum</i>). Microalgae (e.g., diatom mats) and fine filamentous algae are not included in this category.
Bare ground	Includes mud, sand, microalgae cover, etc. These are areas that are not flooded with water and are devoid of standing live, standing dead, or macroalgae. There can be a thin film of surface water within the bare ground category.
Water	Permanent standing water is identified in plots that are partly within a creek, ditch, marsh pool, or flooded panne.
Wrack/litter	Wrack is material that has floated into the plot. This is generally dead (not attached) plant material, but could also be trash. Litter is dead plant material that is highly decomposed and is no longer attached.
Trash	Items such as logs, old piers, tires, etc.
Rock	Boulders or rocks can be found on the surface of northern New England marshes.

Data Summary

Nekton

Nekton species composition, average density, average length, and standard error were calculated using standard formulae. The same is true of the average values of the environmental variables (water temp, salinity, and depth) calculated for each habitat type during each sampling event. Details can be found in the Analysis and Reporting Standard Operating Procedure of James-Pirri et al. (2012).

Vegetation

Vegetation data were recorded using the modified Braun-Blanquet scale as described above (Kent and Coker 1992). For summary purposes, each Braun-Blanquet value was converted to the midpoint of the percent range it represented (Table 4) as described in Wikum and Shanholtzer (1978), and the average percent cover was calculated for each species and non-vegetation cover type using these mid-points.

Table 4. Modified Braun-Blanquet scale and corresponding midpoint values for determining percent cover of each vegetation species and non-vegetation cover type.

BB Value	Percent Cover	Midpoint
0	0%	0%
1	< 1%	0.50%
2	1 - 5%	3%
3	6 - 25%	15.50%
4	26 - 50%	38%
5	51 - 75%	63%
6	76 - 100%	88%

Wikum and Shanholtzer (1978) outline a method for calculating an importance value for each species. So as not to confuse this value with ecological importance, we refer to it as a 'relative prevalence' value. Although Wikum and Shanholtzer (1978) present their importance value as a sum of the percent frequency and percent cover values, we have chosen to average these values so that relative prevalence is on a more readily interpretable percent scale. We present the relative percent prevalence for each species and non-vegetation cover type as the average of the relative percent cover and the relative percent frequency. A detailed description of the analyses and formulae are presented in the salt marsh vegetation protocol (James-Pirri et al. In Review).

Relative percent cover is the percentage of all plots that each species covers relative to all other species present in the plots. The sum of all relative percent cover values for all species and non-vegetation cover types equals 100%. Relative percent frequency is the number of plots where each species is present, relative to all other species observed in the plots. The sum of the relative percent frequency values for all species and non-vegetation cover type equals 100%.

In addition to relative percent prevalence, we report the average percent cover of each species and non-vegetation cover type for all plots combined. Because the relative percent prevalence incorporates both percent frequency and percent cover, it provides information about how a species is distributed (*i.e.*, its ‘patchiness’) throughout the salt marsh and may differ substantially from the average percent cover for a given species.

Species were grouped by salinity tolerance (USDA 2015) to help characterize the vegetation community. Species listed by the United States Department of Agriculture (USDA), or the state of Maryland (USDA 2015, Maryland Natural Heritage Program 2010) as exotic, invasive, threatened, endangered, or rare, are noted in the vegetation table. Additional information about plants listed by the state of Maryland is available on the Maryland Invasive Species Council and National Invasive Species Information Center websites. The locations of sample plots where listed species were observed are noted in Appendix A.

Results

Nekton

The average nekton density at ASIS is presented in Tables 5a and b. A total of seven nekton species were captured in 2014 (Table 6). Common mummichog (*F. heteroclitus*), sheepshead minnow (*C. variegatus*), and rainwater killifish (*L. parva*) accounted for approximately 91% of all nekton captured (Table 7). The average, maximum, and minimum lengths for each species observed in 2014 are presented in Tables 8a and b. Additional tables summarizing data by site are provided in the Appendices.

Table 5. (a) Average density and standard error [individuals per 1 m² ± SE (total count)] of nekton captured at ASIS in 2014. Data were summarized for each sampling event and both events combined. (b) Number of unique nekton stations sampled at ASIS in 2014.

(a)

Habitat	Average Density [individuals per 1 m ² ± SE (total count)]		
	Event 1	Event 2	Events 1 & 2
Pool/Panne	22.2 ± 3.0 (2848)	16.4 ± 2.8 (1873)	20.4 ± 2.9 (4721)
Tidal Creek	37.2 ± 8.6 (372)	13.8 ± 5.6 (138)	25.5 ± 4.7 (510)
All	23.3 ± 2.9 (3220)	16.2 ± 2.6 (2011)	20.8 ± 2.7 (5231)

(b)

Habitat	No. of Stations		
	Event 1	Event 2	Events 1 & 2
Pool/Panne	128	114	128
Tidal Creek	10	10	10
All	138	124	138

Table 6. Nekton species richness (No. of species observed) at ASIS in 2014. Data were summarized for each sampling event and both events combined.

Event	No. of Stations	No. of Species Observed
1	138	6
2	124	7
1 & 2	138	7

Table 7. Nekton species and community composition (%) at ASIS in 2014. Data were summarized for each sampling event and both events combined. n = total number of nekton captured during that event. ‘-’ indicates species not present.

Life History Group/Species	Common Name	Group/Species Composition (%)		
		Event 1 (n = 3220)	Event 2 (n = 2011)	Events 1 & 2 (n = 5231)
Resident Fish		94.4	86.4	91.3
<i>Cyprinodon variegatus</i>	sheepshead minnow	64.8	46.3	57.7
<i>Fundulus heteroclitus</i>	mummichog	24.2	13.8	20.2
<i>Lucania parva</i>	rainwater killifish	5.4	26.2	13.4
Resident Shrimp		0.1	0.2	0.1
<i>Palaemonetes pugio</i>	daggerblade grass shrimp	0.1	0.2	0.1
Transient Crustacean		0.1	0.2	0.2
<i>Callinectes sapidus</i>	blue crab	0.1	0.2	0.2
Transient Fish		5.4	13.2	8.4
<i>Menidia species</i>	silverside species	5.4	13.2	8.4
<i>Anguilla rostrata</i>	American eel	--	< 0.05	< 0.05

Table 8. (a) Average length [mm $\pm$ SE (no. measured)] of nekton at ASIS in 2014. Length data for each species was summarized over all stations sampled during each event and both events combined. '-' indicates species not present. (b) Minimum and maximum length (mm) of each nekton species at ASIS in 2014. '-' indicates species not present.

(a)

		Average Length [mm ± SE (no. measured)]		
Life History Group/Species	Common Name	Event 1	Event 2	Events 1 & 2
Resident Fish				
<i>Cyprinodon variegatus</i>	sheepshead minnow	14.0 ± 0.2 (1007)	20.1 ± 0.3 (659)	16.4 ± 0.2 (1666)
<i>Fundulus heteroclitus</i>	mummichog	20.1 ± 0.5 (441)	27.6 ± 0.6 (226)	22.7 ± 0.4 (667)
<i>Lucania parva</i>	rainwater killifish	16.4 ± 0.3 (130)	20.4 ± 0.4 (223)	19.0 ± 0.3 (353)
Resident Shrimp				
<i>Palaemonetes pugio</i>	daggerblade grass shrimp	33.0 ± 0.6 (3)	32.2 ± 2.8 (4)	32.6 ± 1.5 (7)
Transient Crustacean				
<i>Callinectes sapidus</i>	blue crab	40.0 ± 10.8 (4)	70.2 ± 11.7 (4)	55.1 ± 9.3 (8)
Transient Fish				
<i>Anguilla rostrata</i>	American eel	--	66.0 (1)	66.0 (1)
<i>Menidia species</i>	silverside species	17.0 ± 0.4 (143)	23.0 ± 0.4 (141)	19.9 ± 0.3 (284)

(b)

		Event 1		Event 2		Events 1 & 2	
Life History Group/Species	Common Name	Min.	Max.	Min.	Max.	Min.	Max.
Resident Fish							
<i>Cyprinodon variegatus</i>	sheepshead minnow	4	44	5	48	4	48
<i>Fundulus heteroclitus</i>	mummichog	4	72	9	76	4	76
<i>Lucania parva</i>	rainwater killifish	9	24	7	34	7	34
Resident Shrimp							
<i>Palaemonetes pugio</i>	daggerblade grass shrimp	32	34	24	36	24	36
Transient Crustacean							
<i>Callinectes sapidus</i>	blue crab	19	70	47	102	19	102
Transient Fish							
<i>Anguilla rostrata</i>	American eel	--	--	66	66	66	66
<i>Menidia species</i>	silverside species	8	32	14	34	8	34

Water temperature, depth, and salinity at each nekton sampling station were measured during each sampling event (Table 9). Currently, these data are collected in a manner that may help to explain anomalies in nekton observed at a particular location during a specific sampling event. These parameters would need to be measured continuously over the course of the field season in order to lend any real insight into observed changes in the nekton community.

Table 9. Average water temperature, depth, and salinity [Average $\pm$ SE (no. of stations)] at nekton sampling stations at ASIS in 2014. Data were summarized over all stations for each sampling event.

Habitat	Average $\pm$ SE (no. of stations)			
	Event 1		Event 2	
	Pool/Panne	Tidal Creek	Pool/Panne	Tidal Creek
Temperature ($^{\circ}$ C)	30.0 $\pm$ 0.3 (128)	29.6 $\pm$ 1.1 (10)	28.3 $\pm$ 0.3 (114)	25.8 $\pm$ 0.7 (10)
Depth (cm)	14.7 $\pm$ 0.8 (128)	31.2 $\pm$ 2.9 (10)	11.6 $\pm$ 0.8 (114)	26.6 $\pm$ 2.7 (10)
Salinity (ppt)	32.8 $\pm$ 0.3 (128)	32.4 $\pm$ 0.5 (10)	33.7 $\pm$ 1.1 (114)	33.6 $\pm$ 1.5 (10)

Vegetation

Sixteen vegetation species and five non-vegetation cover types were recorded at ASIS in 2014 (Table 10). None of the vegetation species observed in the 2014 plots are federally listed by the USDA as exotic, invasive, threatened, endangered, or rare (USDA 2015). Additionally, none of the species observed are listed by the state of Maryland as threatened, endangered, or rare (Maryland Natural Heritage Program 2010). During the data QC process, it was determined that the percent cover of dead vegetation was likely overestimated for some (if not all species) during the 2014 field season; therefore these data were removed from the summary presented in this report. The Network will be evaluating whether or not to continue identifying and recording dead vegetation in the future. Tables summarizing vegetation data by site are provided in the Appendices.

Table 10. Average percent cover (Average % Cover $\pm$ SE), frequency, and relative percent prevalence of each plant species and non-vegetation cover type observed at ASIS in 2014. Data were summarized over all 450 plots. Percent cover was estimated using the midpoint values of Braun-Blanquet percent ranges (Table 4).

Cover Type		Avg. %		Rel. %	Rel. %	Rel. %
Salinity Tolerance		Cover $\pm$ SE	Frequency	Cover	Freq.	Prevalence
Species	Common Name					
Vegetation		30.8 $\pm$ 1.3	366	34.5	48.1	41.3
High Salinity Tolerance		30.6 $\pm$ 1.3	366	34.3	47.4	40.8
<i>Spartina alterniflora</i>	saltmarsh cordgrass	16.4 $\pm$ 0.9	285	18.4	21.8	20.1
<i>Distichlis spicata</i>	spikegrass	3.0 $\pm$ 0.4	124	3.3	9.5	6.4
<i>Spartina patens</i>	salt meadow cordgrass	5.2 $\pm$ 0.7	88	5.8	6.7	6.2
<i>Iva frutescens</i>	marsh elder	2.1 $\pm$ 0.5	34	2.4	2.6	2.5
<i>Rhodophyta species</i>	red algae	2.6 $\pm$ 0.7	21	3.0	1.6	2.3
<i>Limonium carolinianum</i>	sea lavender	0.2 $\pm$ 0.1	23	0.3	1.8	1.1
<i>Salicornia maritima</i>	glasswort	0.1 $\pm$ 0	26	0.1	2.0	1.1
<i>Juncus gerardii</i>	black grass	0.1 $\pm$ 0.1	1	0.2	0.1	0.2
<i>Ruppia maritima</i>	widgeon grass	< 0.05	5	< 0.05	0.4	0.2
<i>Salicornia depressa</i>	Virginia glasswort	< 0.05	3	< 0.05	0.2	0.1
<i>Salicornia sp.</i>	glasswort species	< 0.05	2	< 0.05	0.2	0.1
<i>Suaeda maritima</i>	herbaceous seepweed	< 0.05	2	< 0.05	0.2	0.1
<i>Ulva lactuca</i>	sea lettuce	< 0.05	2	< 0.05	0.2	0.1
<i>Solidago sempervirens</i>	seaside goldenrod	< 0.05	1	< 0.05	0.1	< 0.05
Medium Salinity Tolerance		0.2 $\pm$ 0.1	8	0.2	0.6	0.4
<i>Morella cerifera</i>	Southern bayberry	0.1 $\pm$ 0.1	5	0.2	0.4	0.3
<i>Schoenoplectus pungens</i> var. <i>pungens</i>	common threesquare	< 0.05	2	< 0.05	0.2	0.1
No Salinity Tolerance		< 0.05	1	< 0.05	0.1	< 0.05
<i>Phytolacca americana</i>	American pokeweed	< 0.05	1	< 0.05	0.1	< 0.05
Non-Vegetation		48.9 $\pm$ 1.9	387	54.7	33.3	44.0
water	water	35.3 $\pm$ 2	219	39.5	16.7	28.1
bare ground	bare ground	13.6 $\pm$ 1.2	217	15.2	16.6	15.9
Incidental Cover		9.6 $\pm$ 1	234	10.8	19	14.9
wrack & litter	wrack / litter	9.4 $\pm$ 0.9	225	10.6	17.2	13.9
horse manure	horse manure	0.2 $\pm$ 0	20	0.2	1.5	0.8
trash	garbage	< 0.05	4	< 0.05	0.3	0.2

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Appendix A: Coordinates for nekton stations sampled at ASIS in 2014.

Table A-1. Coordinates for nekton stations sampled at ASIS site 2 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A2P1_359_2014	480009	4213203
A2P11_148_2014	480018	4213189
A2P12_057_2014	480023	4213229
A2P13_274_2014	480082	4213293
A2P14_309_2014	480130	4213307
A2P15_344_2014	480042	4213290
A2P16_225_2014	480101	4213370
A2P17_97_2014	480175	4213437
A2P2_159_2014	480049	4213272
A2P4_293_2014	480014	4213202
A2P5_233_2014	480083	4213283
A2P6_124_2014	480062	4213231
A2P7_313_2014	480090	4213319
A2P8_148_2014	480187	4213430
A2P9_315_2014	480050	4213216
A2P1_359_2014	480009	4213203

Table A-2. Coordinates for nekton stations sampled at ASIS site 3 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A3C165_2014	484641	4225823
A3C173_2014	484639	4225823
A3P1_355_2014	484757	4225770
A3P10_104_2014	484520	4225918
A3P11_257_2014	484755	4225800
A3P12_008_2014	484737	4225838
A3P13_081_2014	484743	4225871
A3P14_228_2014	484717	4225926
A3P15_008_2014	484735	4225889
A3P2_255_2014	484711	4225865
A3P3_338_2014	484548	4225958
A3P4_080_2014	484673	4225895
A3P5_225_2014	484807	4225804
A3P6_147_2014	484636	4225953
A3P7_230_2014	484600	4225870
A3P8_143_2014	484542	4225945
A3P9_336_2014	484619	4225896

Table A-3. Coordinates for nekton stations sampled at ASIS site 4 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A4C1_2014	483981	4224493
A4C16_2014	484399	4224464
A4C19_2014	484400	4224462
A4C22_2014	484391	4224464
A4C35_2014	484390	4224469
A4P1_168_2014	484370	4224606
A4P10_44_2014	484190	4224548
A4P11_142_2014	484082	4224482
A4P12_334_2014	484049	4224461
A4P13_266_2014	484053	4224476
A4P14_304_2014	484105	4224449
A4P2_215_2014	484316	4224542
A4P3_307_2014	484131	4224400
A4P4_47_2014	484225	4224521
A4P5_229_2014	484115	4224500
A4P6_74_2014	484373	4224500
A4P7_290_2014	484385	4224409
A4P8_170_2014	484219	4224551

Table A-4. Coordinates for nekton stations sampled at ASIS site 5 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A5P1_16_2014	479221	4211247
A5P16_29_2014	479036	4211285
A5P18_360_2014	479059	4211136
A5P19_209_2014	479236	4211340
A5P2_80_2014	479102	4211352
A5P20_202_2014	478998	4211261
A5P3_311_2014	479050	4211231
A5P4_185_2014	479077	4211176
A5P6_145_2014	479093	4211347
A5P7_246_2014	479075	4211158
A5P8_338_2014	479071	4211134

Table A-5. Coordinates for nekton stations sampled at ASIS site 6 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A6C2_2014	483422	4221483
A6C8_2014	483420	4221475
A6P1_149_2014	483429	4221455
A6P10_54_2014	483380	4221591
A6P11_20_2014	483404	4221465
A6P12_164_2014	483379	4221450
A6P13_253_2014	483475	4221633
A6P14_170_2014	483443	4221601
A6P15_135_2014	483423	4221723
A6P2_241_2014	483438	4221547
A6P3_64_2014	483314	4221636
A6P4_355_2014	483408	4221758
A6P5_97_2014	483441	4221469
A6P6_33_2014	483472	4221523
A6P7_230_2014	483386	4221748
A6P8_130_2014	483392	4221715
A6P9_312_2014	483434	4221476

Table A-6. Coordinates for nekton stations sampled at ASIS site 8 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A8P1_165_2014	480627	4215664
A8P11_348_2014	480642	4215730
A8P12_74_2014	480563	4215799
A8P13_225_2014	480737	4215628
A8P14_21_2014	480793	4215500
A8P15_358_2014	480600	4215767
A8P16_334_2014	480616	4215631
A8P17_7_2014	480687	4215687
A8P2_106_2014	480763	4215492
A8P4_356_2014	480680	4215672
A8P5_10_2014	480640	4215725
A8P6_282_2014	480668	4215666
A8P7_47_2014	480675	4215607
A8P8_137_2014	480776	4215501
A8P9_266_2014	480691	4215592

Table A-7. Coordinates for nekton stations sampled at ASIS site 9 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A9P1_188_2014	483949	4223648
A9P10_148_2014	484086	4223801
A9P11_324_2014	484083	4223708
A9P12_178_2014	484095	4223672
A9P13_103_2014	483879	4223709
A9P14_095_2014	483932	4223631
A9P15_225_2014	484082	4223729
A9P2_205_2014	483911	4223669
A9P3_050_2014	483935	4223783
A9P4_143_2014	484081	4223618
A9P5_315_2014	484137	4223793
A9P6_022_2014	484121	4223746
A9P7_106_2014	484107	4223788
A9P8_49_2014	484084	4223771
A9P9_280_2014	484101	4223821

Table A-8. Coordinates for nekton stations sampled at ASIS site 10 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A10P1_265_2014	481254	4215938
A10P10_155_2014	481324	4215875
A10P11_061_2014	481269	4215890
A10P12_296_2014	481320	4216014
A10P13_340_2014	481186	4216002
A10P14_193_2014	481286	4216025
A10P15_060_2014	481196	4215948
A10P2_106_2014	481364	4215959
A10P3_315_2014	481292	4215994
A10P4_117_2014	481311	4215844
A10P5_286_2014	481231	4215951
A10P6_250_2014	481213	4215928
A10P7_041_2014	481396	4215954
A10P8_126_2014	481309	4216026
A10P9_284_2014	481264	4215953

Table A-9. Coordinates for nekton stations sampled at ASIS site 11 in 2014, UTM, Zone 18, NAD 83, meters.

Station ID	UTMX (east)	UTMY (north)
A11P1_344_2014	483529	4222671
A11P10_266_2014	483492	4222630
A11P11_243_2014	483556	4222363
A11P12_263_2014	483645	4222662
A11P13_324_2014	483610	4222410
A11P14_274_2014	483661	4222482
A11P15_022_2014	483557	4222662
A11P16_114_2014	483574	4222661
A11P2_118_2014	483567	4222490
A11P3_035_2014	483669	4222507
A11P4_193_2014	483563	4222479
A11P5_056_2014	483511	4222661
A11P6_328_2014	483628	4222400
A11P7_148_2014	483595	4222673
A11P9_108_2014	483717	4222659

Appendix B: Coordinates for vegetation plot locations at ASIS in 2014.

Table B-1. Coordinates for vegetation plots sampled ASIS site 2 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A2V1014_2014	480222	4213430	A2V3514_2014	480049	4213213
A2V1114_2014	480026	4213185	A2V3614_2014	480129	4213369
A2V114_2014	480105	4213265	A2V3714_2014	480174	4213294
A2V1214_2014	480070	4213177	A2V3814_2014	480108	4213262
A2V1314_2014	480170	4213301	A2V3914_2014	480138	4213285
A2V1414_2014	480067	4213331	A2V4014_2014	480171	4213302
A2V1514_2014	480082	4213305	A2V4114_2014	480141	4213202
A2V1614_2014	479972	4213270	A2V414_2014	480214	4213440
A2V1714_2014	480059	4213266	A2V4414_2014	480134	4213363
A2V1814_2014	480126	4213230	A2V4514_2014	480175	4213363
A2V2114_2014	480220	4213434	A2V4614_2014	480116	4213175
A2V214_2014	480187	4213343	A2V4714_2014	480194	4213332
A2V2214_2014	480126	4213225	A2V4814_2014	480180	4213430
A2V2314_2014	480098	4213278	A2V4914_2014	480223	4213357
A2V2414_2014	480114	4213251	A2V5014_2014	479989	4213242
A2V2614_2014	480143	4213273	A2V514_2014	480081	4213234
A2V2714_2014	480094	4213354	A2V5314_2014	480224	4213425
A2V2814_2014	480085	4213159	A2V5414_2014	480116	4213175
A2V2914_2014	480023	4213190	A2V5514_2014	480076	4213238
A2V3014_2014	479985	4213249	A2V5914_2014	480178	4213360
A2V3114_2014	480153	4213257	A2V6014_2014	480185	4213350
A2V314_2014	480075	4213315	A2V614_2014	480147	4213196
A2V3214_2014	480054	4213275	A2V714_2014	480139	4213205
A2V3314_2014	480237	4213477	A2V814_2014	479980	4213255
A2V3414_2014	480161	4213315	A2V914_2014	480172	4213296

Table B-2. Coordinates for vegetation plots sampled ASIS site 3 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A3V1014_2014	484771	4225790	A3V3214_2014	484745	4225826
A3V1114_2014	484704	4225929	A3V3314_2014	484698	4226011
A3V114_2014	484573	4225963	A3V3414_2014	484776	4225806
A3V1214_2014	484583	4225874	A3V3514_2014	484770	4225795
A3V1314_2014	484523	4225917	A3V3614_2014	484717	4225962
A3V1414_2014	484687	4225873	A3V3714_2014	484567	4225828
A3V1514_2014	484713	4225950	A3V3814_2014	484598	4225922
A3V1614_2014	484665	4225910	A3V3914_2014	484620	4225996
A3V1714_2014	484713	4225837	A3V4014_2014	484639	4225835
A3V1814_2014	484518	4225898	A3V4114_2014	484565	4225934
A3V1914_2014	484713	4225846	A3V414_2014	484794	4225863
A3V2014_2014	484667	4225915	A3V4214_2014	484684	4225856
A3V2114_2014	484650	4225863	A3V4314_2014	484781	4225827
A3V214_2014	484734	4225906	A3V4414_2014	484590	4225894
A3V2214_2014	484726	4226000	A3V4514_2014	484711	4225944
A3V2314_2014	484617	4225874	A3V4614_2014	484600	4225820
A3V2414_2014	484544	4225982	A3V4714_2014	484761	4225873
A3V2514_2014	484579	4225978	A3V4814_2014	484718	4225849
A3V2614_2014	484563	4225923	A3V4914_2014	484646	4225844
A3V2714_2014	484601	4225932	A3V5014_2014	484657	4225886
A3V2814_2014	484763	4225762	A3V514_2014	484681	4225849
A3V2914_2014	484579	4225983	A3V614_2014	484655	4225869
A3V3014_2014	484768	4225787	A3V714_2014	484649	4225975
A3V3114_2014	484717	4225849	A3V814_2014	484670	4225928
A3V314_2014	484583	4225875	A3V914_2014	484579	4225865

Table B-3. Coordinates for vegetation plots sampled ASIS site 4 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A4V1014_2014	484232	4224457	A4V3414_2014	484288	4224502
A4V1114_2014	484370	4224605	A4V3614_2014	484266	4224412
A4V114_2014	484198	4224547	A4V3714_2014	484249	4224502
A4V1214_2014	484115	4224507	A4V3814_2014	484191	4224481
A4V1414_2014	484360	4224562	A4V3914_2014	484326	4224431
A4V1514_2014	484134	4224527	A4V4014_2014	484286	4224412
A4V1614_2014	484192	4224435	A4V4114_2014	484136	4224527
A4V1714_2014	484279	4224413	A4V414_2014	484371	4224562
A4V1814_2014	484296	4224411	A4V4214_2014	484153	4224416
A4V1914_2014	483998	4224490	A4V4314_2014	484204	4224504
A4V2014_2014	484296	4224477	A4V4414_2014	484244	4224481
A4V2114_2014	484306	4224587	A4V4514_2014	484258	4224590
A4V214_2014	484367	4224496	A4V4614_2014	484145	4224572
A4V2214_2014	484166	4224458	A4V4714_2014	484190	4224614
A4V2314_2014	484369	4224409	A4V4814_2014	484374	4224430
A4V2414_2014	484175	4224459	A4V4914_2014	484215	4224480
A4V2514_2014	484336	4224539	A4V5014_2014	484301	4224454
A4V2714_2014	484190	4224459	A4V5114_2014	484259	4224523
A4V2814_2014	484015	4224487	A4V514_2014	484387	4224559
A4V2914_2014	484227	4224456	A4V5214_2014	484303	4224564
A4V3014_2014	484039	4224487	A4V5314_2014	484403	4224407
A4V3114_2014	484332	4224410	A4V614_2014	484193	4224569
A4V314_2014	484341	4224451	A4V714_2014	484399	4224495
A4V3214_2014	484113	4224463	A4V814_2014	484318	4224588
A4V3314_2014	484329	4224432	A4V914_2014	484199	4224416

Table B-4. Coordinates for vegetation plots sampled ASIS site 5 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	U4MX (east)	UTMY (north)
A5V1014_2014	479105	4211269	A5V3414_2014	479063	4211284
A5V1114_2014	479031	4211213	A5V3514_2014	479094	4211233
A5V114_2014	479123	4211339	A5V3614_2014	479152	4211292
A5V1214_2014	478998	4211108	A5V3714_2014	479142	4211257
A5V1314_2014	479205	4211190	A5V3814_2014	478997	4211265
A5V1414_2014	479114	4211141	A5V3914_2014	479248	4211255
A5V1514_2014	479186	4211236	A5V4014_2014	479057	4211284
A5V1614_2014	479030	4211176	A5V4114_2014	479079	4211279
A5V1714_2014	479038	4211128	A5V414_2014	479042	4211290
A5V1914_2014	478976	4211276	A5V4214_2014	479069	4211241
A5V2014_2014	479028	4211216	A5V4314_2014	479119	4211305
A5V2114_2014	479085	4211231	A5V4414_2014	479033	4211334
A5V214_2014	479253	4211253	A5V4514_2014	478987	4211229
A5V2214_2014	478986	4211310	A5V4614_2014	479079	4211317
A5V2314_2014	479002	4211263	A5V4714_2014	479241	4211257
A5V2414_2014	478966	4211157	A5V4814_2014	479086	4211191
A5V2514_2014	479258	4211372	A5V4914_2014	479206	4211272
A5V2614_2014	479128	4211219	A5V5014_2014	479183	4211239
A5V2714_2014	479070	4211160	A5V5114_2014	479060	4211246
A5V2914_2014	479048	4211244	A5V514_2014	479245	4211257
A5V3014_2014	479227	4211222	A5V5214_2014	479153	4211251
A5V3114_2014	479106	4211308	A5V614_2014	479187	4211318
A5V314_2014	479178	4211321	A5V714_2014	479004	4211145
A5V3214_2014	479251	4211252	A5V814_2014	479161	4211247
A5V3314_2014	479176	4211321	A5V914_2014	479084	4211237

Table B-5. Coordinates for vegetation plots sampled ASIS site 6 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A6V1014_2014	483485	4221549	A6V3514_2014	483377	4221776
A6V1114_2014	483367	4221595	A6V3614_2014	483246	4221729
A6V114_2014	483417	4221683	A6V3714_2014	483553	4221370
A6V1214_2014	483430	4221595	A6V3814_2014	483308	4221685
A6V1314_2014	483369	4221684	A6V3914_2014	483315	4221730
A6V1414_2014	483372	4221684	A6V4014_2014	483441	4221685
A6V1514_2014	483292	4221640	A6V4114_2014	483448	4221461
A6V1614_2014	483428	4221730	A6V414_2014	483375	4221594
A6V1714_2014	483514	4221775	A6V4214_2014	483543	4221371
A6V1814_2014	483446	4221640	A6V4314_2014	483443	4221731
A6V2014_2014	483423	4221414	A6V4414_2014	483482	4221416
A6V214_2014	483547	4221369	A6V4514_2014	483326	4221595
A6V2314_2014	483385	4221730	A6V4614_2014	483312	4221594
A6V2414_2014	483340	4221775	A6V4714_2014	483373	4221458
A6V2514_2014	483376	4221463	A6V4914_2014	483427	4221548
A6V2614_2014	483424	4221413	A6V5014_2014	483489	4221597
A6V2714_2014	483415	4221597	A6V5114_2014	483243	4221730
A6V2814_2014	483433	4221597	A6V514_2014	483352	4221596
A6V2914_2014	483368	4221685	A6V5214_2014	483448	4221549
A6V3014_2014	483372	4221638	A6V5314_2014	483433	4221462
A6V3114_2014	483465	4221462	A6V5414_2014	483478	4221415
A6V314_2014	483437	4221776	A6V614_2014	483304	4221639
A6V3214_2014	483320	4221730	A6V714_2014	483330	4221684
A6V3314_2014	483307	4221732	A6V814_2014	483425	4221687
A6V3414_2014	483479	4221414	A6V914_2014	483429	4221414

Table B-6. Coordinates for vegetation plots sampled ASIS site 8 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A8V1014_2014	480699	4215467	A8V3214_2014	480785	4215465
A8V1114_2014	480615	4215542	A8V3314_2014	480753	4215586
A8V114_2014	480589	4215728	A8V3414_2014	480775	4215523
A8V1214_2014	480588	4215690	A8V3514_2014	480676	4215612
A8V1314_2014	480755	4215472	A8V3614_2014	480736	4215495
A8V1414_2014	480785	4215504	A8V3714_2014	480508	4215873
A8V1514_2014	480531	4215623	A8V3814_2014	480592	4215683
A8V1614_2014	480554	4215770	A8V3914_2014	480740	4215486
A8V1714_2014	480685	4215447	A8V4014_2014	480527	4215767
A8V1814_2014	480623	4215757	A8V4114_2014	480537	4215871
A8V1914_2014	480587	4215651	A8V414_2014	480616	4215764
A8V2014_2014	480728	4215618	A8V4214_2014	480599	4215791
A8V2114_2014	480618	4215764	A8V4314_2014	480625	4215602
A8V214_2014	480566	4215566	A8V4414_2014	480568	4215596
A8V2214_2014	480779	4215551	A8V4514_2014	480672	4215469
A8V2314_2014	480680	4215601	A8V4614_2014	480535	4215796
A8V2414_2014	480744	4215481	A8V4714_2014	480628	4215522
A8V2514_2014	480671	4215578	A8V4814_2014	480473	4215688
A8V2614_2014	480663	4215552	A8V4914_2014	480754	4215545
A8V2714_2014	480535	4215644	A8V5014_2014	480551	4215848
A8V2814_2014	480631	4215520	A8V514_2014	480609	4215512
A8V2914_2014	480743	4215482	A8V614_2014	480562	4215688
A8V3014_2014	480522	4215772	A8V714_2014	480627	4215560
A8V3114_2014	480571	4215598	A8V814_2014	480685	4215637
A8V314_2014	480645	4215577	A8V914_2014	480647	4215573

Table B-7. Coordinates for vegetation plots sampled ASIS site 9 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A9V1014_2014	483884	4223685	A9V3214_2014	483891	4223577
A9V1114_2014	483975	4223648	A9V3314_2014	483998	4223688
A9V114_2014	484110	4223719	A9V3414_2014	484135	4223753
A9V1214_2014	483923	4223577	A9V3514_2014	484158	4223719
A9V1314_2014	484053	4223757	A9V3614_2014	484044	4223613
A9V1414_2014	483899	4223862	A9V3714_2014	483895	4223615
A9V1514_2014	484177	4223791	A9V3814_2014	483855	4223721
A9V1614_2014	484002	4223614	A9V3914_2014	484053	4223759
A9V1714_2014	483910	4223862	A9V4014_2014	483906	4223579
A9V1814_2014	483963	4223579	A9V4114_2014	483902	4223577
A9V1914_2014	484126	4223721	A9V414_2014	483939	4223797
A9V2014_2014	484167	4223791	A9V4214_2014	483908	4223652
A9V2114_2014	484156	4223791	A9V4314_2014	483934	4223577
A9V214_2014	484021	4223649	A9V4414_2014	483908	4223615
A9V2214_2014	483928	4223576	A9V4514_2014	483899	4223689
A9V2314_2014	484029	4223757	A9V4614_2014	484114	4223721
A9V2414_2014	483871	4223723	A9V4714_2014	483876	4223542
A9V2514_2014	483844	4223826	A9V4814_2014	483827	4223833
A9V2614_2014	484062	4223648	A9V4914_2014	483977	4223684
A9V2714_2014	483964	4223685	A9V5014_2014	483893	4223724
A9V2814_2014	483928	4223760	A9V514_2014	483904	4223758
A9V2914_2014	483897	4223581	A9V614_2014	483987	4223721
A9V3014_2014	483963	4223579	A9V714_2014	484104	4223760
A9V3114_2014	484016	4223610	A9V814_2014	483863	4223723
A9V314_2014	483915	4223793	A9V914_2014	483899	4223543

Table B-8. Coordinates for vegetation plots sampled ASIS site 10 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A10V1014_2014	481315	4215837	A10V3314_2014	481360	4215865
A10V1114_2014	481235	4215828	A10V3414_2014	481285	4215989
A10V114_2014	481329	4215810	A10V3514_2014	481202	4215933
A10V1214_2014	481323	4216013	A10V3614_2014	481305	4215811
A10V1414_2014	481378	4215980	A10V3714_2014	481184	4215911
A10V1514_2014	481162	4215907	A10V3814_2014	481325	4215869
A10V1614_2014	481375	4215929	A10V3914_2014	481169	4215941
A10V1714_2014	481229	4216030	A10V4014_2014	481326	4216012
A10V1814_2014	481198	4215890	A10V4214_2014	481169	4215934
A10V1914_2014	481301	4215857	A10V4314_2014	481288	4216032
A10V2014_2014	481173	4216031	A10V4414_2014	481272	4215810
A10V2114_2014	481284	4216038	A10V4614_2014	481321	4215825
A10V214_2014	481120	4216018	A10V4714_2014	481267	4215973
A10V2214_2014	481303	4215860	A10V4814_2014	481338	4215951
A10V2314_2014	481206	4215925	A10V5014_2014	481142	4215982
A10V2414_2014	481241	4215915	A10V514_2014	481385	4215972
A10V2514_2014	481272	4215861	A10V5214_2014	481352	4215972
A10V2614_2014	481359	4215863	A10V5314_2014	481249	4215952
A10V2714_2014	481384	4215916	A10V5414_2014	481313	4215844
A10V2814_2014	481220	4215997	A10V5514_2014	481274	4215908
A10V2914_2014	481319	4215877	A10V5614_2014	481240	4216013
A10V3014_2014	481258	4215891	A10V5714_2014	481340	4215901
A10V3114_2014	481280	4216044	A10V714_2014	481333	4215957
A10V314_2014	481330	4215960	A10V814_2014	481305	4215810
A10V3214_2014	481196	4216035	A10V914_2014	481163	4215996

Table B-9. Coordinates for vegetation plots sampled ASIS site 11 in 2014, UTM, Zone 18, NAD 83, meters.

Plot ID	UTMX (east)	UTMY (north)	Plot ID	UTMX (east)	UTMY (north)
A11V1014_2014	483675	4222561	A11V3214_2014	483453	4222626
A11V1114_2014	483483	4222583	A11V3314_2014	483689	4222490
A11V114_2014	483698	4222521	A11V3414_2014	483560	4222594
A11V1214_2014	483543	4222496	A11V3514_2014	483548	4222494
A11V1314_2014	483609	4222511	A11V3614_2014	483506	4222684
A11V1414_2014	483459	4222588	A11V3714_2014	483645	4222428
A11V1514_2014	483706	4222624	A11V3814_2014	483544	4222532
A11V1614_2014	483715	4222620	A11V3914_2014	483598	4222513
A11V1714_2014	483567	4222416	A11V4014_2014	483551	4222669
A11V1814_2014	483556	4222667	A11V4114_2014	483557	4222594
A11V1914_2014	483469	4222589	A11V414_2014	483596	4222443
A11V2014_2014	483499	4222542	A11V4214_2014	483702	4222518
A11V2114_2014	483487	4222511	A11V4314_2014	483691	4222488
A11V214_2014	483666	4222496	A11V4414_2014	483594	4222441
A11V2214_2014	483667	4222529	A11V4514_2014	483610	4222370
A11V2314_2014	483640	4222360	A11V4614_2014	483664	4222564
A11V2414_2014	483536	4222675	A11V4714_2014	483583	4222482
A11V2514_2014	483526	4222390	A11V4814_2014	483600	4222583
A11V2614_2014	483608	4222405	A11V4914_2014	483550	4222599
A11V2714_2014	483666	4222601	A11V5014_2014	483659	4222423
A11V2814_2014	483586	4222658	A11V514_2014	483523	4222503
A11V2914_2014	483540	4222672	A11V614_2014	483598	4222515
A11V3014_2014	483594	4222658	A11V714_2014	483439	4222628
A11V3114_2014	483596	4222547	A11V814_2014	483687	4222631
A11V314_2014	483623	4222433	A11V914_2014	483566	4222664

Appendix C. Nekton species and community density at ASIS in 2014 summarized by site and sampling event.

Table C-1. (a) Average density and standard error [individuals per 1 m² ± SE (total count)] of nekton captured at ASIS in 2014. Data were summarized for each site and sampling event as well as both events combined. (b) Number of unique stations sampled at each site during each sampling event. ‘*’ one or more stations could not be sampled due to insufficient water or inaccessibility.

(a)

1	Average Density		
	[individuals per 1 m ² ± SE (total count)]		
	Event 1	Event 2	Events 1 & 2
2	15.3 ± 3.4 (229)	8.9 ± 1.6 (125)	12.2 ± 2 (354)
3	26.4 ± 6.9 (448)	13.8 ± 4.8 (220)	20.2 ± 4.3 (668)
4	10.6 ± 2.2 (191)	17.1 ± 4.8 (307)	13.8 ± 2.7 (498)
5	63.1 ± 24.3 (694)	15.0 ± 9.3 (60)	50.3 ± 18.6 (754)
6	30.8 ± 8.3 (523)	9.9 ± 3.5 (158)	20.6 ± 4.9 (681)
8	18.7 ± 5.5 (281)	11.7 ± 3.3 (176)	15.2 ± 3.2 (457)
9	11.5 ± 5 (172)	13.5 ± 4.4 (203)	12.5 ± 3.3 (375)
10	20.4 ± 5.6 (306)	24.9 ± 9.4 (324)	22.5 ± 5.2 (630)
11	25.1 ± 8.1 (376)	33.7 ± 19.1 (438)	29.1 ± 9.7 (814)

(b)

Site	Event	No. of Stations	Observed No. of Species
2	1	15	5
2	2	13*	4
3	1	15	4
3	2	13*	5
4	1	15	6
4	2	14*	4
5	1	17	3
5	2	16*	5
6	1	18	4
6	2	18	4
8	1	11	4
8	2	4*	3
9	1	17	4
9	2	16*	6
10	1	15	3
10	2	15	5
11	1	15	3
11	2	15	4

Appendix D. Nekton species richness at ASIS in 2014 summarized by site.

Table D-1. Species richness (No. of species observed) at ASIS in 2014. Data were summarized by site.

Site	No. of Stations	Observed No. of Species
2	15	4
3	17	5
4	18	6
5	11	4
6	17	5
8	15	4
9	15	4
10	15	4
11	15	6

Appendix E. Nekton species and community composition summarized by site and sampling event.

Table E-1. Nekton species and community composition (%) at ASIS in 2014. (a) Data were summarized by site. n = total number of nekton captured at that site. '-' Species or community was not present. (b) Data were summarized by site and sampling event. n = Total number of nekton captured for that site and event. '-' species or community was not present.

(a)

Life History Group/Species	Common Name	Group/Species Composition (%)								
		Site 2 (n=354)	Site 3 (n=668)	Site 4 (n=498)	Site 5 (n=754)	Site 6 (n=681)	Site 8 (n=457)	Site 9 (n=375)	Site 10 (n=630)	Site 11 (n=814)
Resident Fish		99.7	81.7	88.6	93.0	97.5	99.8	81.1	81.1	98.3
<i>Cyprinodon variegatus</i>	sheepshead minnow	79.9	73.2	66.1	72.8	44.5	48.8	69.3	56.3	27.9
<i>Fundulus heteroclitus</i>	mummichog	14.7	6.7	7.2	13.1	36.4	50.1	6.1	21.7	23.0
<i>Lucania parva</i>	rainwater killifish	5.1	1.8	15.3	7.0	16.6	0.9	5.6	3.0	47.4
Resident Shrimp		--	--	0.6	--	--	--	--	--	0.5
<i>Palaemonetes pugio</i>	daggerblade grass shrimp	--	--	0.6	--	--	--	--	--	0.5
Transient Crustacean		--	0.4	0.8	--	0.1	--	--	--	--
<i>Callinectes sapidus</i>	blue crab	--	0.4	0.8	--	0.1	--	--	--	--
Transient Fish		0.3	17.8	10.0	7.0	2.3	0.2	18.9	18.9	1.2
<i>Menidia species</i>	silverside species	0.3	17.8	10.0	7.0	2.3	0.2	18.9	18.9	1.1
<i>Anguilla rostrata</i>	American eel	--	--	--	--	--	--	--	--	0.1

(b)

		Group Species Composition (%)									
Life History Group/Species	Common Name	Site 2		Site 3		Site 4		Site 5		Site 6	
		Event 1 (n=229)	Event 2 (n=125)	Event 1 (n=448)	Event 2 (n=220)	Event 1 (n=191)	Event 2 (n=307)	Event 1 (n=694)	Event 2 (n=60)	Event 1 (n=523)	Event 2 (n=158)
Resident Fish		100	99.2	93.5	57.7	78.5	94.8	93.8	83.3	99.8	89.9
<i>Cyprinodon variegatus</i>	sheepshead minnow	78.6	82.4	87.7	43.6	56.5	72.0	79.0	1.7	50.5	24.7
<i>Fundulus heteroclitus</i>	mummichog	18.3	8.0	4.7	10.9	5.2	8.5	14.3	--	42.6	15.8
<i>Lucania parva</i>	rainwater killifish	3.1	8.8	1.1	3.2	16.8	14.3	0.6	81.7	6.7	49.4
Resident Shrimp		--	--	--	--	1.6	--	--	--	--	--
<i>Palaemonetes pugio</i>	daggerblade grass shrimp	--	--	--	--	1.6	--	--	--	--	--
Transient Crustacean		--	--	0.4	0.5	1.0	0.7	--	--	--	0.6
<i>Callinectes sapidus</i>	blue crab	--	--	0.4	0.5	1.0	0.7	--	--	--	0.6
Transient Fish		--	0.8	6.0	41.8	18.8	4.6	6.2	16.7	0.2	9.5
<i>Menidia species</i>	silverside species	--	0.8	6.0	41.8	18.8	4.6	6.2	16.7	0.2	9.5
<i>Anguilla rostrata</i>	American eel	--	--	--	--	--	--	--	--	--	--

(Table E-1, b continued)

		Group Species Composition (%)							
Life History Group/Species	Common Name	Site 8		Site 9		Site 10		Site 11	
		Event 1 (n=281)	Event 2 (n=176)	Event 1 (n=172)	Event 2 (n=203)	Event 1 (n=306)	Event 2 (n=324)	Event 1 (n=376)	Event 2 (n=438)
Resident Fish		100.0	99.4	89.5	73.9	85.0	77.5	99.2	97.5
<i>Cyprinodon variegatus</i>	sheepshead minnow	53.4	41.5	82.6	58.1	58.8	54.0	32.2	24.2
<i>Fundulus heteroclitus</i>	mummichog	45.6	57.4	5.8	6.4	26.1	17.6	43.9	5.0
<i>Lucania parva</i>	rainwater killifish	1.1	0.6	1.2	9.4	--	5.9	23.1	68.3
Resident Shrimp		--	--	--	--	--	--	--	0.9
<i>Palaemonetes pugio</i>	daggerblade grass shrimp	--	--	--	--	--	--	--	0.9
Transient Crustacean		--	--	--	--	--	--	--	--
<i>Callinectes sapidus</i>	blue crab	--	--	--	--	--	--	--	--
Transient Fish		--	0.6	10.5	26.1	15.0	22.5	0.8	1.6
<i>Menidia species</i>	silverside species	--	0.6	10.5	26.1	15.0	22.5	0.8	1.4
<i>Anguilla rostrata</i>	American eel	--	--	--	--	--	--	--	0.2

Appendix G. Vegetation relative percent cover summarized by site.

Table G-1. Relative percent cover of each plant species and non-vegetation cover type observed at ASIS in 2014. Data were summarized for each site and over all 450 plots. '-' species or cover type was not present.

Cover Type		Relative % Cover									
Salinity Tolerance		Site (No. of Plots)									
Species	Common Name	2 (50)	3 (50)	4 (50)	5 (50)	6 (50)	8 (50)	9 (50)	10 (50)	11 (50)	All (450)
Vegetation		41.5	27.9	25.7	53.9	36.0	36.1	35.3	29.1	28.6	34.5
High Salinity Tolerance		40.5	27.9	25.7	53.9	35.4	36.1	35.3	28.8	28.6	34.3
<i>Spartina alterniflora</i>	saltmarsh cordgrass	11.5	24.4	21.5	11.1	14.9	33.5	23.4	17.3	12.2	18.4
<i>Spartina patens</i>	salt meadow cordgrass	7.6	--	1.2	28.4	3.9	1.8	3.7	6.5	2.5	5.8
<i>Distichlis spicata</i>	spikegrass	9.2	0.7	2.2	10.2	0.3	0.4	2.5	1.4	2.9	3.3
<i>Rhodophyta</i>	red algae	--	0.3	--	--	13.8	0.1	2.2	0.1	7.5	3.0
<i>Iva frutescens</i>	marsh elder	10.3	--	--	1.3	2.3	--	3.1	0.5	2.9	2.4
<i>Limonium carolinianum</i>	sea lavender	0.6	--	0.5	0.6	0.1	--	0.4	--	0.2	0.3
<i>Juncus gerardii</i>	black grass	1.3	--	--	--	--	--	--	--	--	0.2
<i>Salicornia maritima</i>	glasswort	0.1	0.2	0.4	--	< 0.05	0.1	0.1	--	0.1	0.1
<i>Ruppia maritima</i>	widgeon grass	--	0.1	0.1	--	--	0.2	--	--	--	< 0.05
<i>Salicornia depressa</i>	Virginia glasswort	--	--	--	--	--	--	--	--	0.2	< 0.05
<i>Salicornia sp.</i>	glasswort species	--	0.1	--	--	--	--	--	--	0.1	< 0.05
<i>Solidago sempervirens</i>	seaside goldenrod	0.1	--	--	--	--	--	--	--	--	< 0.05
<i>Suaeda maritima</i>	herbaceous seepweed	--	--	--	--	0.1	--	--	--	--	< 0.05
<i>Ulva lactuca</i>	sea lettuce	--	--	--	--	--	--	--	0.5	--	< 0.05
Medium Salinity Tolerance		0.6	--	--	--	0.6	--	--	0.2	--	0.2
<i>Morella cerifera</i>	southern bayberry	0.6	--	--	--	0.6	--	--	0.1	--	0.2
<i>Schoenoplectus pungens var. pungens</i>	common threesquare	--	--	--	--	--	--	--	0.2	--	< 0.05
No Salinity Tolerance		0.3	--	--	--	--	--	--	--	--	< 0.05
<i>Phytolacca americana</i>	American pokeweed	0.3	--	--	--	--	--	--	--	--	< 0.05
Non-Vegetation		43.6	56.4	67.5	37.1	51.6	56.2	57.5	61.0	60.4	54.7
water	water	37.0	38.3	64.9	7.1	41.4	27.8	44.6	28.1	54.6	39.5
bare ground	bare ground	6.6	18.1	2.5	29.9	10.2	28.5	12.8	33.0	5.8	15.2
Incidental Cover		14.9	15.7	6.8	9.0	12.4	7.7	7.2	9.9	11.0	10.8
wrack & litter	wrack / litter	14.8	15.5	6.7	8.6	12.2	7.5	6.8	9.9	10.6	10.6
horse manure	horse manure	--	0.1	0.1	0.3	0.2	0.2	0.4	--	0.4	0.2
trash	garbage	0.1	0.1	--	0.1	--	--	--	--	0.1	< 0.05

Appendix F. Vegetation frequency summarized by site.

Table F-1. Frequency of each plant species and non-vegetation cover type observed at ASIS in 2014. Data were summarized for each site and over all 450 plots. '-' species or cover type not observed.

Cover Type		Site (no. of plots)									
Salinity Tolerance											
Species	Common Name	2 (50)	3 (50)	4 (50)	5 (50)	6 (50)	8 (50)	9 (50)	10 (50)	11 (50)	All (450)
Vegetation		47	40	34	45	40	43	41	39	37	366
High Salinity Tolerance		47	40	34	45	40	43	41	39	37	366
<i>Spartina alterniflora</i>	saltmarsh cordgrass	31	36	32	26	26	42	38	31	23	285
<i>Distichlis spicata</i>	spikegrass	22	12	10	29	6	5	13	11	16	124
<i>Spartina patens</i>	salt meadow cordgrass	24	--	3	23	9	4	7	8	10	88
<i>Iva frutescens</i>	marsh elder	13	--	--	4	5	--	2	2	8	34
<i>Rhodophyta</i>	red algae	--	1	--	--	9	1	2	1	7	21
<i>Limonium carolinianum</i>	sea lavender	6	--	3	4	2	--	5	--	3	23
<i>Salicornia depressa</i>	Virginia glasswort	--	--	--	--	--	--	--	--	3	3
<i>Salicornia maritima</i>	glasswort	2	6	8	--	2	1	5	--	2	26
<i>Salicornia</i> sp.	glasswort species	--	1	--	--	--	--	--	--	1	2
<i>Juncus gerardii</i>	black grass	1	--	--	--	--	--	--	--	--	1
<i>Ruppia maritima</i>	widgeon grass	--	2	1	--	--	2	--	--	--	5
<i>Solidago sempervirens</i>	seaside goldenrod	1	--	--	--	--	--	--	--	--	1
<i>Suaeda maritima</i>	herbaceous seepweed	--	--	--	--	2	--	--	--	--	2
<i>Ulva lactuca</i>	sea lettuce	--	--	--	--	--	--	--	2	--	2
Medium Salinity Tolerance		2	--	--	1	2	--	--	3	--	8
<i>Morella cerifera</i>	Southern Bayberry	2	--	--	--	2	--	--	1	--	5
<i>Schoenoplectus pungens</i> var. <i>pungens</i>	common threesquare	--	--	--	--	--	--	--	2	--	2
No Salinity Tolerance		1	--	--	--	--	--	--	--	--	1
<i>Phytolacca americana</i>	American pokeweed	1	--	--	--	--	--	--	--	--	1
Non-Vegetation		41	48	47	36	45	39	49	37	45	387
water	water	26	29	39	4	28	14	26	18	35	219
bare ground	bare ground	24	31	11	33	20	32	28	26	12	217
Incidental Cover		30	31	24	28	26	22	23	24	26	234
wrack & litter	wrack / litter	29	30	24	25	25	20	22	24	26	225
horse manure	horse manure	--	2	1	4	3	2	5	--	3	20
trash	garbage	1	1	--	1	--	--	--	--	1	4

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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