1993 Summary Report for:

CRYSTAL RIVER 3 YEAR NPDES MONITORING PROJECT

FPC Contract S01100

Work Authorization 301 (Addenda 1 and 2)

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INTRODUCTION

Florida Power Corporation (FPC) and federal and state regulatory agencies seek to demonstrate that the operation of new helper cooling towers at the FPC Crystal River Station will lead to an expansion in the area of benthic habitat occupied by submerged aquatic vegetation (SAV: seagrasses and rhizophytic macroalgae). A monitoring program was begun in the Fall of 1993 and will continue on an annual basis through the Fall of 1995. The monitoring program emphasizes near-shore waters within a two mile radius of the point of discharge (POD) of the Crystal River Station.

Available Information

Early surveys and aerials are described in the 316 Demonstration Report and the 1986 MML report, "Submerged Aquatic Vegetation in the Vicinity of the FPC Crystal River Power Station."

Studies performed in the 1970s by the University of Florida contained a single map by Martin Van Tine of "approximate attached macrophyte standing crop" during the summer of an unknown year (Florida Power Corporation, 1975). The map depicted areas of high and low standing crop, including barren areas. Nothing is known of sampling methods or effort.

Two SAV surveys were performed in the vicinity of the Crystal River Station during the 1980s. The first was conducted under MML supervision as part of the 316 Demonstration Study, in 1983 and 1984. The second was sponsored by FPC and conducted by MML in 1986, to determine the nature of offshore SAV beds closer to the influence of the Withlacoochee River.

The 316 Demonstration Study occupied 50 survey stations. "Thermal" stations fell along four transects between the Barge and Intake Canals. "Control" stations fell along three transects north of the Barge Canal and three transects south of the Intake Canal. (Thirteen of the 50 stations fall within a 2 mile radius from POD, north of the intake canal.) Ten square-meter quadrats were deployed at each station and percent cover of seagrass and algae was determined in each. Nine "intensive" stations were equally divided among Halodule, Thalassia, and Syringodium sites in thermal and control areas. Intensive stations were visited on 6 week intervals. Biomass and productivity (2-week clip method) was measured at each station. No intensive stations were sampled in November of either year. Aerial

photographs were taken in February of 1983 and 1984, and in October/November of 1983. Only three of eight planned, quarterly overflights produced successful aerial images due to poor water quality. Later ground-truthing resulted in SAV maps drawn at a scale of 1:18,000 on stable acetate.

Dense SAV was mapped south of the Intake Canal and between the Intake and Discharge Canals. Sparse SAV beds were mapped in Basins 1 and 3. SAV near Fisherman's Cut was seasonally variable. A large area of SAV in Basin 4 was more persistent. Most of these areas fall within a 2-mile POD radius. Barren areas were most widespread in Basins 1, 2 and 3. Other results are presented in the 316 Demonstration Report.

In November 1986, MML surveyed 177 stations between the Barge and Intake Canals, west of the POD. Station density was determined through a statistical analysis of previous SAV bed distribution. (Twenty-five stations fell within a 2-mile POD radius.) Original LORAN positions of all stations are still available. At each station, 120 meter dive lines were surveyed for dispersion and abundance of SAV.

The survey found that most stations west of the 1983-84 study area contained SAV. SAV (especially sparse macroalgae) was also found at areas mapped as barren in the earlier studies. Caulerpa species were ubiquitous, but other rhizophytic algae were more common in the southern half of the survey area. Overall, there were declines in SAV richness and cover toward the north and toward the west, within the 1986 survey area. Extensive areas of drift and lithophytic Sargassum were also observed.

Rationale

The major questions to be answered by the monitoring plan are:

1) Are barren areas being colonized by SAV?

2) Are existing areas of SAV expanding?

To answer Question 1, it is necessary to design and implement a robust survey program in barren areas. To answer Question 2, selected SAV beds will be surveyed at a very fine scale and results will be compared each year. Beds will be chosen on the basis of geographic (basin), depth, historic temperature, and species characteristics. The perimeter of selected beds will be staked and subsequent surveys will compare edge

locations to stake locations. To anticipate the possibility of stake loss, a second system of benchmarks and measurements was developed.

Professional aerial photography will be used to backstop the field measurements. We have not recommended using aerial imagery as a primary source of SAV dispersion data because past experience has shown that turbidity, color, tide, sea surface conditions, and weather are significant impediments to successful photography at this site. On the other hand, when it is successful, aerial photography can reveal changes in SAV that fixed-station methods might miss. Consequently, we have arranged to fly the site and examine each year's new imagery prior to commencing field work, where possible. If the imagery is good, field time can be spent investigating apparent features and changes. If the imagery is poor, there will be no loss of data.

Important corollary questions include:

3) Changes in SAV cover outside of the designated study area (control sites);

4) Changes in the relative abundance of macroalgae, compared to seagrasses; and

5) Changes in the biomass or productivity of existing SAV beds.

We address Question 3 by occupying barren and vegetated sites in control sites, and by including these areas in the flight lines for aerial photography. Where possible, control stations are selected at a variety of depths comparable to stations within the 2-mile POD radius.

We address Question 4 by measuring percent cover by species, and percent barren area, at stations within the SAV beds selected for more intensive surveys.

Changes in SAV biomass or productivity (Question 5) will be determined by sampling the intensive survey beds during August of each year. The 316 Demonstration Study reported a strong dependence of variation in these parameters, on time. Seagrass biomass and productivity during the Fall are transitional between maxima in August and September, and minima in December and January. Consequently, it may be difficult to identify statistically significant differences between years, using November data. Interannual

differences are particularly difficult to detect in beds of mixed species, which are more common than single-species beds near Crystal River Station.

The 1994 Summary Report will include descriptions of methods and data resulting from the summer measurements of biomass and productivity.

METHODS

Positioning

Several independent systems were employed. Approximate station locations were mapped onto charts carried in the field, to depict the orientation of a station to creeks, islands, day marks, levees, and other land marks. The end points of transects were marked on land or in marshes with steel bars, stones, colored paint, or other permanent material. Locations were also determined by recording compass bearings to local landmarks.

Transect end points and station locations were measured using a Voyager LORAN Navigator and a Magellan NAVPRO global positioning system. Electronic positions also were measured for NOS benchmarks at the mouth of the discharge canal, and at the U.S. Geological Survey "Knott" benchmark on Drum Island. Preliminary analysis of the electronic data indicate high field reproducibility but relatively low map precision (see Discussion).

Barren Area Transects

Prospective barren areas were defined by analyzing historic data and conducting a reconnaissance of the study area. Effort was concentrated in areas suggested as once-vegetated by historical sources, but presently barren. Final transect locations were selected to cover the ranges of depths, bottom types, and thermal effects encountered at the site. As shown in Figure 1, most effort was directed to Basins 1, 2 and 3, with some effort in the areas of Basins 4 and 5, closest to the POD (e.g, inside the 2-mile radius).

Barren areas were surveyed by a diver towed behind a shallow draft vessel. Most transects ran due north or south to pre-determined landmarks. For long transects, or transects run under inclement weather, tows followed transect

lines marked in advance with temporary buoys. Buoys marked end points and way points, as needed. Beginning and end points were permanently positioned and marked. Where needed, tows were made into the current to reduce drift.

If the diver encountered seagrass or rhizophytic algae in barren areas the vessel stopped and marked the site(s). After the transect was finished, the crew returned to temporary markers. The immediate area was reconnoitered to determine the extent of SAV. If it corresponded to a previously-mapped SAV bed, it was recorded as "mapped" and was discounted as barren area. If new, the area, centroid position, species composition, and percent cover (see below) of the SAV was to be recorded, unless the vegetation was found to be Sargassum attached to rock outcrops[1]. All SAV markers and transect buoys were then recovered, and a new transect begun.

Intensive SAV BED Surveys

Sites were chosen for the initial surveys based on their location relative to the discharge canal. An initial field effort (a 2 day reconnaissance trip) was undertaken to determine present-day SAV bed locations. Previous mapping studies and aerial photographs of various ages were used as guides to areas where SAV beds were known to have been present in the past. High probability areas were searched by skin divers and the 15 stations depicted in Figure 1 were occupied. The selection process divided the sites between 3 thermally un-impacted "control" sites and 12 impacted sites.

GPS and LORAN coordinates and compass sightings were used to record the location of seagrass beds selected for study. Several beds were marked by crab trap buoys anchored with screw-in tie down anchors. General site descriptions were recorded for each area in order to relocate the beds on subsequent trips.

Within each bed, the position of a "center" marker was determined by GPS, LORAN, and compass bearings. Center markers are hemispherical concrete parking lot markers. Each marker was painted with blue anti-fouling paint and anchored to the bottom with screw-in anchors. Concrete markers were tied to the anchors with 1" diameter nylon rope.

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[1]/ In fact, the only SAV encountered on barren-area transects was either already mapped, or Sargassum growing on rock outcrops.

Edges of all 15 sites were marked in order to determine whether the seagrass beds expand, contract, or remain unchanged during the duration of the three year study. New growth or contraction of existing seagrass bed edges will be determined by returning to the marked beds at one-year intervals. Seagrass bed edges were marked with short (<1.0 m) sections of 3/8" steel reinforcement rods driven into the bottom with a small sledge hammer. Each steel stake was allowed to extend about 10 cm upward from the sediment surface. Seagrass bed edges were usually very easy to define, based on the sharp delineations between bare bottom and vegetated bottom.

A surveyor's tape was strung out along the set of edge markers at each site. Distances between edge markers and the distance from the center marker to each edge marker were recorded. Relocation of the edge markers and center marker, on future site visits, will be facilitated by these measurements. It should also be possible to locate the exact position of lost edge markers if the center marker is found.

The percentage of bottom covered by SAV on the edge of each bed (from 0.0 to 1.0 m into each bed) and deeper into the bed (at a distance of 2.0 to 3.0 m) was measured. Ten 1.0 m2 quadrat-based estimates of bottom cover were taken along the vegetated edge of each SAV bed. The quadrats were positioned on the vegetated side of a randomly selected subset of the 15 edge markers at each site. Ten 1.0 m2 additional cover estimates were made by flipping the quadrat frame over twice away from the perimeter of each seagrass bed.

Subdivisions (100 cm2) of the 1.0 m2 quadrat were used as the units for the cover estimates. SAV coverage was determined by counting the number of units in which various species of SAV were actually rooted. A barren square was defined as being devoid of any rooted vegetation. Seagrass blades from plants rooted in other units were not counted as cover in the otherwise completely barren units. Four seagrasses (Halodule, Syringodium, Thalassia, and Halophila) were encountered in the study sites. Two species of the rhizophytic algal genus, Caulerpa, were found at several of the sites. Divers recorded data on slates and the data were transferred to log books for later use.

To document that water or sediment depths did not vary so much near the edges of SAV beds that future lateral growth might be inhibited, additional data were collected at each site. Water depth and sediment thickness were measured on the edge of each SAV bed and at 1.0 and 2.0 m distances into the barren zone. A marked measuring stick was used to measure water depth.

Sediment thickness was determined by pushing a 1.5 m long, 3/8" diameter iron rod into the bottom. The rod was pushed in to its full length or to the point of refusal. The rod was then withdrawn and the depth of penetration was measured. Measurements of each type were made adjacent to alternate stake markers along the edges of each of the 15 seagrass beds.

DISCUSSION

All data collected from the 1993 sampling effort appear in the tables and appendix tables that follow. These data form the baseline of descriptive information against which prospective changes in 1994 and 1995 will be measured.

As mentioned before, two additional types of data are likely to be generated before the barren transects and intensive SAV beds are revisited. If the 1993 aerial photography is successful, images will be photo-interpreted, ground-truthed, and digitally mapped by a subcontractor. An effort will be made during ground-truthing to distinguish lithophytic Sargassum from seagrasses and rhizophytic algae. A separate report will accompany the maps.

The digital map will also be useful in plotting the precise locations of transects and intensive survey sites. At present, no existing base map is available at the level of detail needed to plot LORAN and GPS data collected in 1993. If the 1993 aerial photography is successful, the 1994 Summary Report will contain a registered base map showing the precise locations of transects and stations.

The second type of new information will result from the biomass and productivity studies first scheduled for August, 1994. We propose to perform the SAV condition monitoring in August of 1994 and 1995, for 3 reasons. First, November condition data are transitional between seasonal extremes, and highly variable. Second, August water temperatures are annual maxima, so impacts to SAV respiration and net productivity will be accentuated. Third, an August sampling time allows for laboratory processing of samples by the due date of the annual reports.

FIGURE 1

The base map employed in Figure 1A and 1B is a composite in which marsh and canal shorelines, and oyster reefs, have been added to the 1983 SAV map produced as part of the FPC 316 Demonstration Study. Shorelines were transferred from U.S. Geological Survey topographic quadrangles and oyster reefs were taken from unpublished data available at Mote Marine Laboratory. Spoil islands of the Cross-Florida Barge Canal appear at the top of the map, which is north. The discharge canal levee is the shorter feature depicted to the north of the longer levee on the intake canal. In the map, A denotes algal beds; S, seagrass beds; AS, mixed beds dominated by algae; SA, mixed beds dominated by seagrass; O, open or barren bottom.

Figure 1A

This figure depicts the number and orientation of barren area transects established for the present study. One transect, "13W", is not shown. It is north of the Barge Canal, extending from Green 35 day mark on the Canal, to Green 23A day mark on the Withlacoochee River. Note that most transects have at least one land-side end, which has been marked in the field with a permanent monument. Transect "9W" is 2 miles from the point of discharge.

Figure 1B

This figure depicts the locations of SAV beds selected for intensive surveys (percent cover, biomass, productivity, etc.). One station, "10", is immediately south of station "9" but off the figure. Stations 1-3 are in Basin 1. Stations 5-7 are in Basin 2. Four stations between the canals are in Basin 3. Station 11 is in Rocky Cove. Station 13 is 2 miles from the point of discharge.

FIGURE 1A

FIGURE 1B

Table 1. Coordinates of seagrass survey transects.

Transect	Base Latitude	Base Longitude	End Latitude	End Longitude	Base Loran (45)	Base Loran (62)	End Loran (45)	End Loran (62)
1W	28 57 35.1	82 43 34.9	28 57 51.9	82 43 33.8	45228.34	62881.46	45230.49	62881.28
2W	28 57 36.4	82 43 49.4	28 58 02.2	82 43 49.1	45230.18	62883.19	45234.21	62882.99
3W	28 57 33.4	82 44 02.5	28 58 34.9	82 44 08.4	45232.58	62885.16	45240.93	62884.77
4W	28 57 35.8	82 44 17.1	28 58 34.0	82 44 23.8	45234.41	62886.86	45242.99	62886.69
5W	28 57 31.8	82 44 36.5	28 58 08.5	82 44 37.3	45236.43	62888.88	45241.70	62888.66
6W	28 57 31.8	82 44 36.5	28 57 11.0	82 44 37.4	45236.43	62888.88	45231.83	62889.06
7W			28 56 58.2	82 44 48.1			45233.29	62890.74
8W			28 56 54.5	82 44 58.4			45234.42	62892.08
9W	28 56 48.9	82 45 15.6			45236.71	62894.34		
1N			28 57 41.4	82 44 05.2			45233.15	62884.81
11W	28 57 54.1	82 36 13.2	28 58 03.9	82 46 12.6	45252.52	62900.14	45253.71	62900.27
2N	28 58 06.5	82 46 26.1	28 58 03.9	82 46 12.6	45255.38	62901.73	45253.71	62900.27
12W	28 58 46.9	82 45 37.8	28 57 05.3	82 45 34.6	45238.65	62896.69	45241.36	62896.41
10W	28 57 31.2	82 45 41.1	28 57 19.2	82 45 42.1	45243.29	62896.76	45243.29	62896.82
13W	28 58 45.4	82 47 07.8	28 59 14.9	82 47 10.2	45266.69	62906.44	45271.22	62906.49

Table 2. Station locations for the seagrass bed edge observations.

Station	Date	Latitude	Longitude	Loran (45)	Loran (62)
1	09-Nov-93	28 57 58.39	82 43 56.35	45234.56	62883.88
2	10-Nov-93	28 58 00.79	82 43 50.00	45234.06	62883.08
3	10-Nov-93	28 58 03.88	82 43 41.91	45233.61	62882.21
4	10-Nov-93	28 57 17.67	82 44 21.52	45232.47	62887.19
5	11-Nov-93	28 58 35.81	82 44 33.48	45244.78	62888.00
6	11-Nov-93	N/A	N/A	45240.33	62885.49
7	11-Nov-93	28 58 25 00	82 44 09 00	45237.91	62884.67
8	11-Nov-93	28 57 07.30	82 44 19.26	45230.70	62887.06
9	23-Nov-93	28 56 49.65	82 43 25.10	45220.91	62880.80
10	23-Nov-93	28 56 41.19	82 43 14.31	45218.47	62879.68
11	23-Nov-93	28 57 23.73	82 43 38.31	45227.68	62882.13
12	24-Nov-93	28 57 10.49	82 44 17.21	45230.03	62886.80
13	24-Nov-93	28 58 12.34	82 45 15.62	45274.30	67893.40
14	07-Dec-93	28 57 04.40	82 44 35.00	45232.39	67889.09
15	07-Dec-93	28 57 05.90	82 44 39.40	45232.91	62889.56

Table 3. Summary statistics for water depth variations (cm) from the grass bed perimeter to 1 meter outside the bed.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	.23	1.30	-2	3
2	15	.00	1.20	-2	3
3	9	.67	2.60	-5	4
4	8	-1.63	2.62	-7	0
5	7	2.14	3.93	0	10
6	8	.13	1.73	-2	4
7	8	1.88	3.72	0	10
8	6	-.83	2.04	-5	0
9	8	-1.88	2.53	-5	2
10	8	.63	2.07	-2	5
11	8	-1.25	1.83	-5	1
12	8	.13	2.64	-3	4
13	8	-.63	1.77	-5	0
14	9	5.78	3.63	0	10
15	8	.63	3.20	-5	5

Table 4. Summary statistics for water depth variations (cm) from the grass bed perimeter to 2 meters outside the bed.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	-.46	1.13	-2	2
2	15	.27	1.58	-2	5
3	9	1.67	2.50	-1	6
4	8	-2.50	3.02	-7	2
5	7	3.14	2.41	0	5
6	8	.13	.83	-1	2
7	8	4.38	8.21	-5	20
8	6	.83	2.04	0	5
9	8	-3.25	2.19	-5	0
10	8	.88	2.10	-2	5
11	8	-1.50	1.93	-5	1
12	8	-.88	2.42	-3	4
13	8	.00	.00	0	0
14	9	11.89	8.25	2	30
15	8	.25	2.76	-5	5

Table 5. Summary statistics for sediment depth from the grass bed perimeter.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	69.00	33.55	15	100
2	15	73.67	34.62	25	120
3	9	12.22	8.80	3	28
4	8	11.75	16.30	0	48
5	7	100.71	24.57	70	150
6	7	59.29	39.52	15	100
7	8	39.25	26.44	20	100
8	6	21.17	8.70	7	30
9	8	11.88	6.79	2	20
10	8	35.63	39.04	5	115
11	8	7.38	5.95	1	20
12	8	6.25	3.06	2	10
13	8	45.63	18.69	20	75
14	9	54.00	43.19	10	140
15	8	8.63	4.47	5	19

Table 6. Summary statistics for sediment depth from 1 meter outside the grass bed perimeter.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	70.15	28.67	18	100
2	15	73.73	35.55	25	120
3	9	13.67	6.69	8	30
4	8	10.50	16.80	0	48
5	7	97.86	31.07	65	160
6	7	61.43	37.42	17	100
7	8	30.88	15.76	15	55
8	6	20.83	6.71	12	30
9	8	10.50	6.76	2	20
10	8	35.88	40.52	2	120
11	8	4.25	2.87	1	10
12	8	8.88	5.41	2	20
13	8	39.50	14.40	22	58
14	9	56.11	41.02	5	120
15	8	8.63	3.74	3	15

Table 7. Summary statistics for sediment depth from 2 meters outside the grass bed perimeter.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	66.08	29.81	20	100
2	15	78.47	36.16	25	126
3	9	11.89	8.48	5	26
4	8	14.13	19.64	0	53
5	7	91.57	28.41	70	150
6	7	37.14	16.89	15	58
7	8	22.25	12.31	10	48
8	6	17.50	4.59	12	25
9	8	14.13	6.56	2	20
10	8	31.38	41.78	2	120
11	8	5.50	4.34	1	13
12	8	6.63	4.47	1	12
13	8	47.38	20.79	15	70
14	9	55.89	37.67	5	130
15	8	8.00	2.62	5	12

Table 8. Summary statistics for sediment depth differences from the grass bed perimeter and 1 meter outside the bed.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	1.15	23.06	-42	42
2	15	.07	11.82	-27	30
3	9	1.44	6.89	-10	8
4	8	-1.25	4.03	-10	4
5	7	-2.86	17.04	-30	20
6	7	2.14	10.01	-10	23
7	8	-8.38	28.44	-75	15
8	6	-.33	5.32	-10	5
9	8	-1.38	8.83	-14	13
10	8	.25	20.12	-22	45
11	8	-3.13	7.22	-19	4
12	8	2.63	5.78	-4	14
13	8	-6.13	10.66	-21	5
14	9	2.11	37.57	-38	90
15	8	.00	5.90	-11	8

Table 9. Summary statistics for sediment depth differences from the grass bed perimeter and 2 meters outside the bed.

Station	(n)	Mean	S.D.	Mininum	Maximum
1	13	-2.92	29.68	-52	72
2	15	4.80	14.72	-25	42
3	9	-.33	6.60	-7	13
4	8	2.38	13.38	-12	31
5	7	-9.14	10.65	-29	0
6	7	-22.14	41.05	-80	33
7	8	-17.00	27.59	-80	8
8	6	-3.67	5.65	-10	5
9	8	2.25	8.46	-10	18
10	8	-4.25	7.05	-13	5
11	8	-1.88	6.36	-15	5
12	8	.38	4.75	-7	7
13	8	1.75	13.04	-18	15
14	9	1.89	27.14	-58	25
15	8	-.63	5.95	-13	7

Table 10. Average percent cover (n=10) of 1m quadrats on the perimeter and 2 meters inside the perimeter of seagrass beds.

Station	Perimeter Total Vegetation	Perimeter Seagrass	Perimeter Algae	Inside Total Vegetation	Inside Seagrass	Inside Algae
1	79.6	79.6	.0	80.0	80.0	.0
2	87.1	87.1	.0	96.4	96.4	.0
3	80.1	80.1	.0	93.7	93.7	.0
4	76.3	76.3	.0	87.0	86.6	1.3
5	90.4	90.4	.0	83.2	83.2	.0
6	91.8	91.8	.0	98.7	98.7	.0
7	91.5	91.5	.0	98.5	98.5	.0
8	94.7	94.7	.5	93.2	93.2	.0
9	87.6	87.6	.2	81.2	81.2	.0
10	76.8	74.7	4.4	57.0	56.7	1.7
11	98.0	98.0	.0	98.3	98.3	.0
12	90.3	86.6	2.2	92.7	88.9	3.8
13	72.2	31.7	40.5	80.4	19.4	63.4
14	90.7	90.7	.0	91.2	91.2	.3
15	83.9	83.9	2.7	96.9	96.9	.0

Table 11. Counts of presence of seagrass and algae species in 1 m^2 quadrats inside (I) and on perimeters (P) of grass beds.

Station	n	*Halodule wrightii*		*Halophila englemannii*		*Syringodium filiforme*		*Thalassia testudinum*		*Caulerpa prolifera*		*Caulerpa mexicana*	
		P	I	P	I	P	I	P	I	P	I	P	I
1	10	9	10	0	0	0	0	0	0	0	0	0	0
2	10	10	10	0	0	0	0	0	0	0	0	0	0
3	10	10	10	0	0	0	0	0	0	0	0	0	0
4	9	9	9	1	0	0	0	0	0	0	2	0	0
5	10	10	10	0	0	0	0	0	0	0	0	0	0
6	9	9	9	4	2	0	0	0	0	0	0	0	0
7	10	10	10	0	1	0	0	0	0	0	0	0	0
8	9	9	9	2	4	0	0	0	0	1	0	0	0
9	10	0	1	6	2	10	10	0	0	1	0	0	0
10	10	0	0	1	1	10	9	0	0	4	3	0	0
11	10	0	0	2	0	10	10	0	0	0	0	0	0
12	10	0	2	0	0	10	10	0	0	3	4	0	0
13	10	4	1	0	0	0	0	1	3	4	7	7	7
14	10	9	10	0	0	0	0	1	1	0	1	0	0
15	10	7	8	0	0	0	0	3	3	1	0	0	0
Total		96	99	16	10	40	39	5	7	14	17	7	7

Appendix Table 1. Water and sediment depths at the seagrass bed perimeters and differences in depths at 0, 1 and 2 meters from the bed edge.

Station	Perimeter ID. (ft)	Water Depths (cm)					Sediment Depths (cm)				
		0m	1m	2m	0m-1m	0m-2m	0m	1m	2m	0m-1m	0m-2m
1	0.0	88	87	86	-1	-2	82	47	61	-35	-21
1	16.1	86	89	85	3	-1	87	79	71	-8	-16
1	27.2	89	91	87	2	-2	71	100	100	29	29
1	40.3	88	88	88	0	0	100	100	48	0	-52
1	73.0	90	90	89	0	-1	100	100	100	0	0
1	88.0	91	91	91	0	0	100	100	82	0	-18
1	99.0	93	94	95	1	2	28	70	100	42	72
1	114.0	94	94	95	0	1	100	58	71	-42	-29
1	130.0	90	90	90	0	0	100	100	100	0	0
1	149.0	91	90	90	-1	-1	36	38	36	2	0
1	166.5	89	90	89	1	0	20	18	20	-2	0
1	184.8	82	80	81	-2	-1	58	60	50	2	-8
1	198.7	85	85	84	0	-1	15	42	20	27	5
2	0.0	80	79	80	-1	0	40	40	25	0	-15
2	11.4	80	80	80	0	0	25	25	32	0	7
2	21.6	80	80	81	0	1	34	33	35	-1	1
2	32.1	81	81	81	0	0	26	30	28	4	2
2	44.4	85	88	85	3	0	78	74	120	-4	42
2	60.0	90	90	90	0	0	120	120	120	0	0
2	71.6	90	90	90	0	0	71	101	71	30	0
2	79.1	91	89	89	-2	-2	120	120	95	0	-25
2	90.3	89	90	94	1	5	120	120	120	0	0
2	99.2	90	88	90	-2	0	120	120	126	0	6
2	105.1	90	90	90	0	0	90	80	99	-10	9
2	113.6	88	89	90	1	2	70	43	82	-27	12
2	126.3	90	90	90	0	0	76	71	94	-5	18
2	139.4	90	90	89	0	-1	60	73	70	13	10
2	147.1	89	89	88	0	-1	55	56	60	1	5
3	0.0	70	70	69	0	-1	5	11	5	6	0
3	10.7	68	70	70	2	2	12	8	5	-4	-7
3	22.8	70	70	70	0	0	18	11	13	-7	-5
3	34.9	75	70	75	-5	0	5	11	5	6	0

Appendix Table 1. Continued.

Station	Perimeter ID. (ft)	Water Depths (cm) 0m	1m	2m	0m-1m	0m-2m	Sediment Depths (cm) 0m	1m	2m	0m-1m	0m-2m
3	62.2	70	70	70	0	0	5	12	18	7	13
3	102.3	71	75	77	4	6	28	18	23	-10	-5
3	120.2	70	70	75	0	5	12	12	5	0	-7
3	141.6	70	72	70	2	0	3	10	7	7	4
3	176.2	65	68	68	3	3	22	30	26	8	4
4	0.0	82	80	80	-2	-2	2	1	0	-1	-2
4	20.4	94	90	90	-4	-4	22	20	53	-2	31
4	57.5	95	95	95	0	0	48	48	36	0	-12
4	92.3	85	85	85	0	0	2	3	10	1	8
4	97.8	90	90	86	0	-4	8	12	8	4	0
4	108.8	85	85	80	0	-5	2	0	1	-2	-1
4	132.3	87	80	80	-7	-7	10	0	0	-10	-10
4	139.8	80	80	82	0	2	0	0	5	0	5
5	0.0	125	125	130	0	5	150	160	150	10	0
5	13.5	130	130	132	0	2	70	90	70	20	0
5	21.6	130	140	135	10	5	100	100	90	0	-10
5	52.0	130	135	135	5	5	100	100	100	0	0
5	57.4	135	135	135	0	0	100	70	71	-30	-29
5	82.3	130	130	135	0	5	85	65	70	-20	-15
5	89.0	130	130	130	0	0	100	100	90	0	-10
6	0.0	105	104	105	-1	0	100	100	45	0	-55
6	18.6	105	105	105	0	0	100	100	45	0	-55
6	33.4	100	100	100	0	0	100	100	20	0	-80
6	54.6	95	95	95	0	0	25	25	25	0	0
6	72.8	95	95	95	0	0	15	17	15	2	0
6	101.2	95	95	94	0	-1	50	40	52	-10	2
6	110.4	100	104	100	4	0	N/A	N/A	N/A	0	0
6	120.9	102	100	104	-2	2	25	48	58	23	33
7	0.0	70	70	70	0	0	100	25	20	-75	-80
7	16.2	70	70	70	0	0	22	15	25	-7	3
7	22.1	70	70	70	0	0	45	40	30	-5	-15
7	52.3	70	70	70	0	0	40	55	48	15	8
7	59.2	100	100	95	0	-5	22	18	10	-4	-12

Appendix Table 1. Continued.

Station	Perimeter ID. (ft)	Water Depths (cm) 0m	1m	2m	0m-1m	0m-2m	Sediment Depths (cm) 0m	1m	2m	0m-1m	0m-2m
7	80.7	90	90	100	0	10	25	15	12	-10	-13
7	93.4	80	90	100	10	20	40	50	15	10	-25
7	107.0	90	95	100	5	10	20	29	18	9	-2
8	0.0	150	150	150	0	0	30	20	25	-10	-5
8	10.4	150	150	150	0	0	30	30	20	0	-10
8	22.9	150	150	150	0	0	23	27	15	4	-8
8	43.9	150	150	150	0	0	20	20	15	0	-5
8	79.0	145	140	150	-5	5	17	16	18	-1	1
8	86.6	150	150	150	0	0	7	12	12	5	5
9	0.0	120	115	115	-5	-5	2	15	2	13	0
9	37.3	128	127	125	-1	-3	10	10	18	0	8
9	63.5	125	125	120	0	-5	15	2	10	-13	-5
9	95.1	125	122	120	-3	-5	18	17	20	-1	2
9	116.3	125	120	120	-5	-5	15	20	20	5	5
9	136.9	125	122	122	-3	-3	20	6	10	-14	-10
9	153.8	130	130	130	0	0	2	2	20	0	18
9	167.4	130	132	130	2	0	13	12	13	-1	0
10	0.0	105	105	105	0	0	14	2	2	-12	-12
10	25.1	105	110	110	5	5	14	16	16	2	2
10	48.2	115	115	115	0	0	5	3	6	-2	1
10	75.8	120	120	120	0	0	25	13	15	-12	-10
10	101.0	125	123	123	-2	-2	15	60	15	45	0
10	126.0	120	120	122	0	2	20	18	7	-2	-13
10	149.4	115	115	115	0	0	77	55	70	-22	-7
10	166.3	113	115	115	2	2	115	120	120	5	5
11	0.0	82	80	79	-2	-3	10	10	13	0	3
11	11.1	80	75	78	-5	-2	8	3	1	-5	-7
11	21.0	80	78	75	-2	-5	5	1	10	-4	5
11	29.6	78	78	78	0	0	2	5	1	3	-1
11	51.1	71	71	69	0	-2	8	4	7	-4	-1
11	81.0	80	79	80	-1	0	20	1	5	-19	-15
11	87.6	80	79	79	-1	-1	1	5	2	4	1
11	97.0	79	80	80	1	1	5	5	5	0	0

Appendix Table 1. Continued.

Station	Perimeter ID. (ft)	Water Depths (cm) 0m	1m	2m	0m-1m	0m-2m	Sediment Depths (cm) 0m	1m	2m	0m-1m	0m-2m
12	0.0	118	115	115	-3	-3	5	7	12	2	7
12	18.5	115	115	115	0	0	10	12	12	2	2
12	34.8	116	120	120	4	4	6	20	10	14	4
12	52.5	120	120	120	0	0	2	7	2	5	0
12	71.0	118	118	115	0	-3	4	2	1	-2	-3
12	85.5	112	110	110	-2	-2	4	10	8	6	4
12	100.6	101	105	101	4	0	9	5	5	-4	-4
12	124.3	98	96	95	-2	-3	10	8	3	-2	-7
13	0.0	80	75	80	-5	0	20	25	15	5	-5
13	30.3	95	95	95	0	0	50	35	65	-15	15
13	56.8	110	110	110	0	0	35	35	45	0	10
13	75.4	120	120	120	0	0	22	22	25	0	3
13	87.0	120	120	120	0	0	52	31	34	-21	-18
13	105.5	115	115	115	0	0	75	55	60	-20	-15
13	122.1	120	120	120	0	0	55	55	70	0	15
13	127.5	120	120	120	0	0	56	58	65	2	9
14	0.0	80	80	85	0	5	20	110	45	90	25
14	22.2	89	95	97	6	8	72	52	90	-20	18
14	41.4	115	120	125	5	10	55	76	76	21	21
14	59.1	130	140	160	10	30	140	120	130	-20	-10
14	77.9	130	140	145	10	15	100	62	42	-38	-58
14	87.3	130	140	145	10	15	40	30	35	-10	-5
14	109.7	95	100	110	5	15	30	45	55	15	25
14	129.3	80	82	82	2	2	10	5	25	-5	15
14	149.2	68	72	75	4	7	19	5	5	-14	-14
15	0.0	90	90	95	0	5	5	5	5	0	0
15	19.3	90	95	92	5	2	9	3	7	-6	-2
15	41.4	90	95	90	5	0	8	11	8	3	0
15	62.0	90	90	90	0	0	7	15	12	8	5
15	80.2	90	90	90	0	0	5	8	12	3	7
15	102.1	90	90	90	0	0	7	8	7	1	0
15	116.5	95	90	90	-5	-5	19	8	6	-11	-13
15	133.6	95	95	95	0	0	9	11	7	2	-2

Appendix Table 2. Vegetation coverage (percent) in seagrass beds for 1 m^2 quadrats along bed perimeters and two meters inside beds.

Station	Perimeter ID.	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
1	16.1	I	43	43	0	*Halodule wrightii*	43
1	27.2	I	93	93	0	*Halodule wrightii*	93
1	27.2	P	74	74	0	*Halodule wrightii*	74
1	40.3	I	85	85	0	*Halodule wrightii*	85
1	40.3	P	89	89	0	*Halodule wrightii*	89
1	54.0	I	97	97	0	*Halodule wrightii*	97
1	54.0	P	79	79	0	*Halodule wrightii*	79
1	73.0	I	71	71	0	*Halodule wrightii*	71
1	73.0	P	79	79	0	*Halodule wrightii*	79
1	138.7	I	96	96	0	*Halodule wrightii*	96
1	138.7	P	82	82	0	*Halodule wrightii*	82
1	149.0	I	94	94	0	*Halodule wrightii*	94
1	149.0	P	87	87	0	*Halodule wrightii*	87
1	166.5	I	96	96	0	*Halodule wrightii*	96
1	166.5	P	73	73	0	*Halodule wrightii*	73
1	184.8	I	90	90	0	*Halodule wrightii*	90
1	184.8	P	73	73	0	*Halodule wrightii*	73
1	198.7	I	35	35	0	*Halodule wrightii*	35
1	198.7	P	80	80	0	*Halodule wrightii*	80
2	0.0	I	96	96	0	*Halodule wrightii*	96
2	0.0	P	94	94	0	*Halodule wrightii*	94
2	32.1	I	98	98	0	*Halodule wrightii*	98
2	32.1	P	80	80	0	*Halodule wrightii*	80
2	44.4	I	98	98	0	*Halodule wrightii*	98
2	44.4	P	95	95	0	*Halodule wrightii*	95
2	60.0	I	98	98	0	*Halodule wrightii*	98
2	60.0	P	100	100	0	*Halodule wrightii*	100
2	71.6	I	100	100	0	*Halodule wrightii*	100
2	71.6	P	100	100	0	*Halodule wrightii*	100
2	79.1	I	97	97	0	*Halodule wrightii*	97
2	79.1	P	87	87	0	*Halodule wrightii*	87

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species		Cover
	2	99.2	I	95	95	0	*Halodule wrightii*		95
	2	99.2	P	93	93	0	*Halodule wrightii*		93
	2	113.6	I	96	96	0	*Halodule wrightii*		96
	2	113.6	P	82	82	0	*Halodule wrightii*		82
	2	126.3	I	92	92	0	*Halodule wrightii*		92
	2	126.3	P	83	83	0	*Halodule wrightii*		83
	2	139.4	I	94	94	0	*Halodule wrightii*		94
	2	139.4	P	57	57	0	*Halodule wrightii*		57
	3	0.0	I	88	88	0	*Halodule wrightii*		88
	3	0.0	P	70	70	0	*Halodule wrightii*		70
	3	10.7	I	87	87	0	*Halodule wrightii*		87
	3	10.7	P	84	84	0	*Halodule wrightii*		84
	3	22.8	I	100	100	0	*Halodule wrightii*		100
	3	22.8	P	92	92	0	*Halodule wrightii*		92
	3	34.9	I	100	100	0	*Halodule wrightii*		100
	3	34.9	P	94	94	0	*Halodule wrightii*		94
	3	62.2	I	98	98	0	*Halodule wrightii*		98
	3	62.2	P	64	64	0	*Halodule wrightii*		64
	3	93.0	I	81	81	0	*Halodule wrightii*		81
	3	93.0	P	84	84	0	*Halodule wrightii*		84
	3	120.2	I	91	91	0	*Halodule wrightii*		91
	3	120.2	P	98	98	0	*Halodule wrightii*		98
	3	141.6	I	100	100	0	*Halodule wrightii*		100
	3	141.6	P	46	46	0	*Halodule wrightii*		46
	3	163.0	I	100	100	0	*Halodule wrightii*		100
	3	163.0	P	93	93	0	*Halodule wrightii*		93
	3	176.2	I	92	92	0	*Halodule wrightii*		92
	3	176.2	P	76	76	0	*Halodule wrightii*		76
	4	0.0	I	84	84	0	*Halodule wrightii*		84
	4	0.0	P	92	92	0	*Halodule wrightii*		92
	4	20.4	I	74	74	0	*Halodule wrightii*		74
	4	20.4	P	71	71	0	*Halodule wrightii*		71

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	4	36.1	I	71	71	0	*Halodule wrightii*	71
	4	36.1	P	68	68	0	*Halodule wrightii*	68
	4	50.5	I	87	87	0	*Halodule wrightii*	87
	4	50.5	P	66	66	0	*Halodule wrightii*	65
	4	50.5	P	66	66	0	*Halophila englemannii*	1
	4	57.5	I	94	94	0	*Halodule wrightii*	94
	4	57.5	P	73	73	0	*Halodule wrightii*	73
	4	92.3	I	96	96	0	*Halodule wrightii*	96
	4	92.3	P	78	78	0	*Halodule wrightii*	78
	4	103.8	I	89	87	2	*Caulerpa prolifera*	2
	4	103.8	I	89	87	2	*Halodule wrightii*	87
	4	103.8	P	70	70	0	*Halodule wrightii*	70
	4	124.5	I	95	95	5	*Caulerpa prolifera*	5
	4	124.5	I	95	95	5	*Halodule wrightii*	90
	4	124.5	P	89	89	0	*Halodule wrightii*	89
	4	139.8	I	83	83	0	*Halodule wrightii*	83
	4	139.8	P	90	90	0	*Halodule wrightii*	90
	5	0.0	I	40	40	0	*Halodule wrightii*	40
	5	0.0	P	92	92	0	*Halodule wrightii*	92
	5	5.8	I	96	96	0	*Halodule wrightii*	96
	5	5.8	P	93	93	0	*Halodule wrightii*	93
	5	13.5	I	91	91	0	*Halodule wrightii*	91
	5	13.5	P	93	93	0	*Halodule wrightii*	93
	5	21.6	I	93	93	0	*Halodule wrightii*	93
	5	21.6	P	83	83	0	*Halodule wrightii*	83
	5	31.6	I	84	84	0	*Halodule wrightii*	84
	5	31.6	P	88	88	0	*Halodule wrightii*	88
	5	38.8	I	77	77	0	*Halodule wrightii*	77
	5	38.8	P	89	89	0	*Halodule wrightii*	89
	5	45.4	I	80	80	0	*Halodule wrightii*	80
	5	45.4	P	88	88	0	*Halodule wrightii*	88
	5	82.3	I	79	79	0	*Halodule wrightii*	79

Appendix Table 2. Continued

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	5	82.3	P	100	100	0	*Halodule wrightii*	100
	5	89.0	I	96	96	0	*Halodule wrightii*	96
	5	89.0	P	88	88	0	*Halodule wrightii*	88
	5	102.3	I	96	96	0	*Halodule wrightii*	96
	5	102.3	P	90	90	0	*Halodule wrightii*	90
	6	0.0	I	100	100	0	*Halodule wrightii*	100
	6	0.0	P	100	100	0	*Halodule wrightii*	100
	6	18.6	I	97	97	0	*Halodule wrightii*	59
	6	18.6	I	97	97	0	*Halophila englemannii*	38
	6	18.6	P	75	75	0	*Halodule wrightii*	75
	6	27.9	I	99	99	0	*Halodule wrightii*	99
	6	27.9	I	99	99	0	*Halophila englemannii*	1
	6	27.9	P	83	83	0	*Halodule wrightii*	83
	6	27.9	P	83	83	0	*Halophila englemannii*	10
	6	33.4	I	100	100	0	*Halodule wrightii*	100
	6	33.4	P	94	94	0	*Halodule wrightii*	92
	6	33.4	P	94	94	0	*Halophila englemannii*	2
	6	40.6	I	99	99	0	*Halodule wrightii*	99
	6	40.6	P	90	90	0	*Halodule wrightii*	90
	6	54.6	I	99	99	0	*Halodule wrightii*	99
	6	54.6	P	98	98	0	*Halodule wrightii*	97
	6	54.6	P	98	98	0	*Halophila englemannii*	1
	6	84.5	I	99	99	0	*Halodule wrightii*	99
	6	84.5	P	94	94	0	*Halodule wrightii*	94
	6	101.2	I	99	99	0	*Halodule wrightii*	99
	6	101.2	P	98	98	0	*Halodule wrightii*	98
	6	120.9	I	98	98	0	*Halodule wrightii*	98
	6	120.9	P	93	93	0	*Halodule wrightii*	93
	6	120.9	P	93	93	0	*Halophila englemannii*	15
	7	0.0	I	100	100	0	*Halodule wrightii*	100
	7	0.0	P	93	93	0	*Halodule wrightii*	93
	7	16.2	I	88	88	0	*Halodule wrightii*	88

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	7	16.2	P	86	86	0	*Halodule wrightii*	86
	7	22.1	I	95	95	0	*Halodule wrightii*	95
	7	22.1	P	66	66	0	*Halodule wrightii*	66
	7	37.3	I	100	100	0	*Halodule wrightii*	100
	7	37.3	P	100	100	0	*Halodule wrightii*	100
	7	44.9	I	100	100	0	*Halodule wrightii*	100
	7	44.9	P	90	90	0	*Halodule wrightii*	90
	7	74.0	I	100	100	0	*Halodule wrightii*	100
	7	74.0	P	94	94	0	*Halodule wrightii*	94
	7	80.7	I	100	100	0	*Halodule wrightii*	100
	7	80.7	P	96	96	0	*Halodule wrightii*	96
	7	93.4	I	100	100	0	*Halodule wrightii*	100
	7	93.4	P	100	100	0	*Halodule wrightii*	100
	7	101.0	I	100	100	0	*Halodule wrightii*	100
	7	101.0	I	100	100	0	*Halophila englemannii*	2
	7	101.0	P	97	97	0	*Halodule wrightii*	97
	7	107.0	I	100	100	0	*Halodule wrightii*	100
	7	107.0	P	93	93	0	*Halodule wrightii*	93
	8	0.0	I	91	91	0	*Halodule wrightii*	91
	8	0.0	I	91	91	0	*Halophila englemannii*	6
	8	0.0	P	99	99	2	*Caulerpa prolifera*	2
	8	0.0	P	99	99	2	*Halodule wrightii*	99
	8	0.0	P	99	99	2	*Halophila englemannii*	2
	8	5.7	I	97	97	0	*Halodule wrightii*	97
	8	5.7	I	97	97	0	*Halophila englemannii*	2
	8	5.7	P	94	94	0	*Halodule wrightii*	94
	8	13.4	I	98	98	0	*Halodule wrightii*	98
	8	13.4	I	98	98	0	*Halophila englemannii*	6
	8	13.4	P	100	100	0	*Halodule wrightii*	100
	8	22.9	I	100	100	0	*Halodule wrightii*	100
	8	22.9	I	100	100	0	*Halophila englemannii*	4
	8	22.9	P	95	95	0	*Halodule wrightii*	95

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	8	28.3	I	94	94	0	*Halodule wrightii*	94
	8	28.3	P	94	94	0	*Halodule wrightii*	94
	8	28.3	P	94	94	0	*Halophila englemannii*	4
	8	43.9	I	90	90	0	*Halodule wrightii*	90
	8	43.9	P	76	76	0	*Halodule wrightii*	76
	8	48.7	I	75	75	0	*Halodule wrightii*	75
	8	48.7	P	100	100	0	*Halodule wrightii*	100
	8	57.6	I	86	86	0	*Halodule wrightii*	86
	8	57.6	P	96	96	0	*Halodule wrightii*	96
	8	79.0	I	94	94	0	*Halodule wrightii*	94
	8	79.0	P	90	90	0	*Halodule wrightii*	90
	9	0.0	I	56	56	0	*Syringodium filiforme*	56
	9	0.0	P	94	94	0	*Halophila englemannii*	2
	9	0.0	P	94	94	0	*Syringodium filiforme*	94
	9	11.0	I	94	94	0	*Syringodium filiforme*	94
	9	11.0	P	96	96	0	*Syringodium filiforme*	96
	9	24.0	I	94	94	0	*Halodule wrightii*	6
	9	24.0	I	94	94	0	*Syringodium filiforme*	94
	9	24.0	P	93	93	0	*Syringodium filiforme*	93
	9	49.6	I	85	85	0	*Syringodium filiforme*	85
	9	49.6	P	80	80	1	*Caulerpa prolifera*	1
	9	49.6	P	80	80	1	*Halophila englemannii*	3
	9	49.6	P	80	80	1	*Syringodium filiforme*	80
	9	63.5	I	93	93	0	*Syringodium filiforme*	93
	9	63.5	P	86	86	0	*Syringodium filiforme*	86
	9	78.3	I	84	84	0	*Halophila englemannii*	2
	9	78.3	I	84	84	0	*Syringodium filiforme*	82
	9	78.3	P	92	92	0	*Syringodium filiforme*	92
	9	116.3	I	28	28	0	*Syringodium filiforme*	28
	9	116.3	P	89	89	0	*Halophila englemannii*	11
	9	116.3	P	89	89	0	*Syringodium filiforme*	78
	9	136.9	I	91	91	0	*Halophila englemannii*	10

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	9	136.9	I	91	91	0	*Syringodium filiforme*	91
	9	136.9	P	79	79	0	*Halophila englemannii*	10
	9	136.9	P	79	79	0	*Syringodium filiforme*	79
	9	153.8	I	67	67	0	*Syringodium filiforme*	67
	9	153.8	P	89	89	0	*Halophila englemannii*	7
	9	153.8	P	89	89	0	*Syringodium filiforme*	89
	9	167.4	I	94	94	0	*Syringodium filiforme*	94
	9	167.4	P	90	90	0	*Halophila englemannii*	3
	9	167.4	P	90	90	0	*Syringodium filiforme*	90
	10	0.0	I	24	24	0	*Halophila englemannii*	17
	10	0.0	I	24	24	0	*Syringodium filiforme*	7
	10	0.0	P	90	90	4	*Caulerpa prolifera*	4
	10	0.0	P	90	90	4	*Syringodium filiforme*	90
	10	14.0	I	78	78	0	*Syringodium filiforme*	78
	10	14.0	P	77	77	8	*Caulerpa prolifera*	8
	10	14.0	P	77	77	8	*Syringodium filiforme*	77
	10	25.1	I	84	84	4	*Caulerpa prolifera*	4
	10	25.1	I	84	84	4	*Syringodium filiforme*	84
	10	25.1	P	84	68	16	*Caulerpa prolifera*	16
	10	25.1	P	84	68	16	*Syringodium filiforme*	84
	10	36.8	I	59	59	0	*Syringodium filiforme*	59
	10	36.8	P	80	80	0	*Syringodium filiforme*	80
	10	48.2	I	68	68	6	*Caulerpa prolifera*	6
	10	48.2	I	68	68	6	*Syringodium filiforme*	68
	10	48.2	P	77	77	0	*Syringodium filiforme*	77
	10	63.7	I	60	58	2	*Caulerpa prolifera*	2
	10	63.7	I	60	58	2	*Syringodium filiforme*	58
	10	63.7	P	6	6	0	*Syringodium filiforme*	6
	10	75.8	I	0	0	0	Bare	0
	10	75.8	P	13	13	0	*Syringodium filiforme*	13
	10	91.1	I	19	19	0	*Syringodium filiforme*	19
	10	91.1	P	87	87	5	*Caulerpa prolifera*	5

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	10	91.1	P	87	87	5	*Syringodium filiforme*	87
	10	136.7	I	76	76	0	*Syringodium filiforme*	76
	10	136.7	P	100	100	0	*Halophila englemannii*	3
	10	136.7	P	100	100	0	*Syringodium filiforme*	100
	10	166.3	I	94	94	0	*Syringodium filiforme*	94
	10	166.3	P	100	100	0	*Syringodium filiforme*	100
	11	0.0	I	100	100	0	*Syringodium filiforme*	100
	11	0.0	P	99	99	0	*Syringodium filiforme*	99
	11	11.1	I	100	100	0	*Syringodium filiforme*	100
	11	11.1	P	100	100	0	*Halophila englemannii*	1
	11	11.1	P	100	100	0	*Syringodium filiforme*	100
	11	21.0	I	99	99	0	*Syringodium filiforme*	99
	11	21.0	P	97	97	0	*Syringodium filiforme*	97
	11	29.6	I	100	100	0	*Syringodium filiforme*	100
	11	29.6	P	98	98	0	*Syringodium filiforme*	98
	11	40.6	I	94	94	0	*Syringodium filiforme*	94
	11	40.6	P	100	100	0	*Syringodium filiforme*	100
	11	51.1	I	95	95	0	*Syringodium filiforme*	95
	11	51.1	P	93	93	0	*Halophila englemannii*	2
	11	51.1	P	93	93	0	*Syringodium filiforme*	93
	11	81.0	I	95	95	0	*Syringodium filiforme*	95
	11	81.0	P	100	100	0	*Syringodium filiforme*	100
	11	87.6	I	100	100	0	*Syringodium filiforme*	100
	11	87.6	P	100	100	0	*Syringodium filiforme*	100
	11	104.2	I	100	100	0	*Syringodium filiforme*	100
	11	104.2	P	100	100	0	*Syringodium filiforme*	100
	11	115.0	I	100	100	0	*Syringodium filiforme*	100
	11	115.0	P	96	96	0	*Syringodium filiforme*	96
	12	0.0	I	100	100	0	*Halodule wrightii*	100
	12	0.0	I	100	100	0	*Syringodium filiforme*	100
	12	0.0	P	88	88	0	*Syringodium filiforme*	88
	12	10.0	I	98	92	6	*Caulerpa prolifera*	6

Appendix Table 2 . Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	12	10.0	I	98	92	6	*Syringodium filiforme*	92
	12	10.0	P	88	88	0	*Syringodium filiforme*	88
	12	28.1	I	70	68	2	*Caulerpa prolifera*	2
	12	28.1	I	70	68	2	*Halodule wrightii*	34
	12	28.1	I	70	68	2	*Syringodium filiforme*	34
	12	28.1	P	89	88	1	*Caulerpa prolifera*	1
	12	28.1	P	89	88	1	*Syringodium filiforme*	88
	12	42.2	I	100	80	20	*Caulerpa prolifera*	20
	12	42.2	I	100	80	20	*Syringodium filiforme*	80
	12	42.2	P	88	66	12	*Caulerpa prolifera*	12
	12	42.2	P	88	66	12	*Syringodium filiforme*	66
	12	52.5	I	97	97	0	*Syringodium filiforme*	97
	12	52.5	P	94	93	1	*Caulerpa prolifera*	1
	12	52.5	P	94	93	1	*Syringodium filiforme*	93
	12	61.6	I	100	99	1	*Caulerpa prolifera*	1
	12	61.6	I	100	99	1	*Syringodium filiforme*	99
	12	61.6	P	96	96	0	*Syringodium filiforme*	96
	12	71.0	I	97	97	0	*Syringodium filiforme*	97
	12	71.0	P	95	95	0	*Syringodium filiforme*	95
	12	85.5	I	89	89	0	*Syringodium filiforme*	89
	12	85.5	P	95	95	0	*Syringodium filiforme*	95
	12	92.6	I	96	96	0	*Syringodium filiforme*	96
	12	92.6	P	78	78	0	*Syringodium filiforme*	78
	12	110.4	I	98	98	0	*Syringodium filiforme*	98
	12	110.4	P	92	92	0	*Syringodium filiforme*	92
	13	0.0	I	96	96	15	*Caulerpa prolifera*	15
	13	0.0	I	96	96	15	*Halodule wrightii*	96
	13	0.0	I	96	96	15	*Thalassia testudinum*	5
	13	0.0	P	82	76	6	*Caulerpa prolifera*	6
	13	0.0	P	82	76	6	*Halodule wrightii*	78
	13	14.5	I	94	10	84	*Caulerpa prolifera*	6
	13	14.5	I	94	10	84	*Caulerpa mexicana*	78

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	13	14.5	I	94	10	84	*Thalassia testudinum*	10
	13	14.5	P	68	55	13	*Caulerpa mexicana*	13
	13	14.5	P	68	55	13	*Halodule wrightii*	55
	13	14.5	P	68	55	13	*Thalassia testudinum*	3
	13	30.3	I	53	16	37	*Caulerpa mexicana*	37
	13	30.3	I	53	16	37	*Thalassia testudinum*	16
	13	30.3	P	55	0	55	*Caulerpa mexicana*	55
	13	48.8	I	97	0	97	*Caulerpa prolifera*	70
	13	48.8	I	97	0	97	*Caulerpa mexicana*	27
	13	48.8	P	100	0	100	*Caulerpa prolifera*	80
	13	48.8	P	100	0	100	*Caulerpa mexicana*	20
	13	56.8	I	50	0	50	*Caulerpa prolifera*	20
	13	56.8	I	50	0	50	*Caulerpa mexicana*	30
	13	56.8	P	72	0	72	*Caulerpa mexicana*	72
	13	75.4	I	90	0	90	*Caulerpa prolifera*	80
	13	75.4	I	90	0	90	*Caulerpa mexicana*	10
	13	75.4	P	60	0	60	*Caulerpa mexicana*	60
	13	87.0	I	70	0	70	*Caulerpa prolifera*	70
	13	87.0	P	70	0	70	*Caulerpa prolifera*	70
	13	94.9	I	42	0	42	*Caulerpa prolifera*	42
	13	94.9	P	40	0	40	*Caulerpa mexicana*	40
	13	122.1	I	95	0	95	*Caulerpa mexicana*	95
	13	122.1	P	60	20	40	*Caulerpa mexicana*	40
	13	122.1	P	60	20	40	*Halodule wrightii*	20
	13	127.5	I	90	0	90	*Caulerpa mexicana*	90
	13	127.5	P	85	75	10	*Caulerpa prolifera*	10
	13	127.5	P	85	75	10	*Halodule wrightii*	75
	14	0.0	I	69	69	0	*Halodule wrightii*	69
	14	0.0	P	100	100	0	*Halodule wrightii*	100
	14	22.2	I	98	98	0	*Halodule wrightii*	98
	14	22.2	P	100	100	0	*Halodule wrightii*	100
	14	41.4	I	95	95	0	*Halodule wrightii*	95

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	14	41.4	P	82	82	0	*Halodule wrightii*	82
	14	50.6	I	97	97	0	*Halodule wrightii*	97
	14	50.6	P	73	73	0	*Halodule wrightii*	73
	14	59.1	I	95	95	0	*Halodule wrightii*	95
	14	59.1	P	95	95	0	*Halodule wrightii*	95
	14	77.9	I	93	93	2	*Caulerpa prolifera*	2
	14	77.9	I	93	93	2	*Halodule wrightii*	91
	14	77.9	P	97	97	0	*Halodule wrightii*	97
	14	87.3	I	93	93	0	*Halodule wrightii*	93
	14	87.3	P	96	96	0	*Halodule wrightii*	96
	14	109.7	I	95	95	0	*Halodule wrightii*	95
	14	109.7	P	89	89	0	*Halodule wrightii*	89
	14	129.3	I	83	83	0	*Halodule wrightii*	3
	14	129.3	I	83	83	0	*Thalassia testudinum*	83
	14	129.3	P	77	77	0	*Thalassia testudinum*	77
	14	149.2	I	100	100	0	*Halodule wrightii*	100
	14	149.2	P	98	98	0	*Halodule wrightii*	98
	15	0.0	I	95	95	0	*Thalassia testudinum*	95
	15	0.0	P	90	90	0	*Thalassia testudinum*	90
	15	19.3	I	95	95	0	*Thalassia testudinum*	95
	15	19.3	P	88	88	0	*Thalassia testudinum*	88
	15	32.4	I	89	89	0	*Halodule wrightii*	18
	15	32.4	I	89	89	0	*Thalassia testudinum*	86
	15	32.4	P	28	28	0	*Thalassia testudinum*	28
	15	41.4	I	100	100	0	*Halodule wrightii*	100
	15	41.4	P	89	89	0	*Halodule wrightii*	89
	15	62.0	I	100	100	0	*Halodule wrightii*	100
	15	62.0	P	100	100	0	*Halodule wrightii*	100
	15	69.8	I	100	100	0	*Halodule wrightii*	100
	15	69.8	P	78	78	0	*Halodule wrightii*	78
	15	90.1	I	100	100	0	*Halodule wrightii*	100
	15	90.1	P	100	100	0	*Halodule wrightii*	100

Appendix Table 2. Continued.

Station	Perimeter ID.	Perimeter (ft)	Perimeter/ Interior (P/I)	Total Vegetation	Total Seagrass	Total Algae	Species	Cover
	15	102.1	I	100	100	0	*Halodule wrightii*	100
	15	102.1	P	75	75	15	*Caulerpa prolifera*	15
	15	102.1	P	75	75	15	*Halodule wrightii*	75
	15	116.5	I	100	100	0	*Halodule wrightii*	100
	15	116.5	P	100	100	0	*Halodule wrightii*	100
	15	133.6	I	98	98	0	*Halodule wrightii*	98
	15	133.6	P	100	100	0	*Halodule wrightii*	100