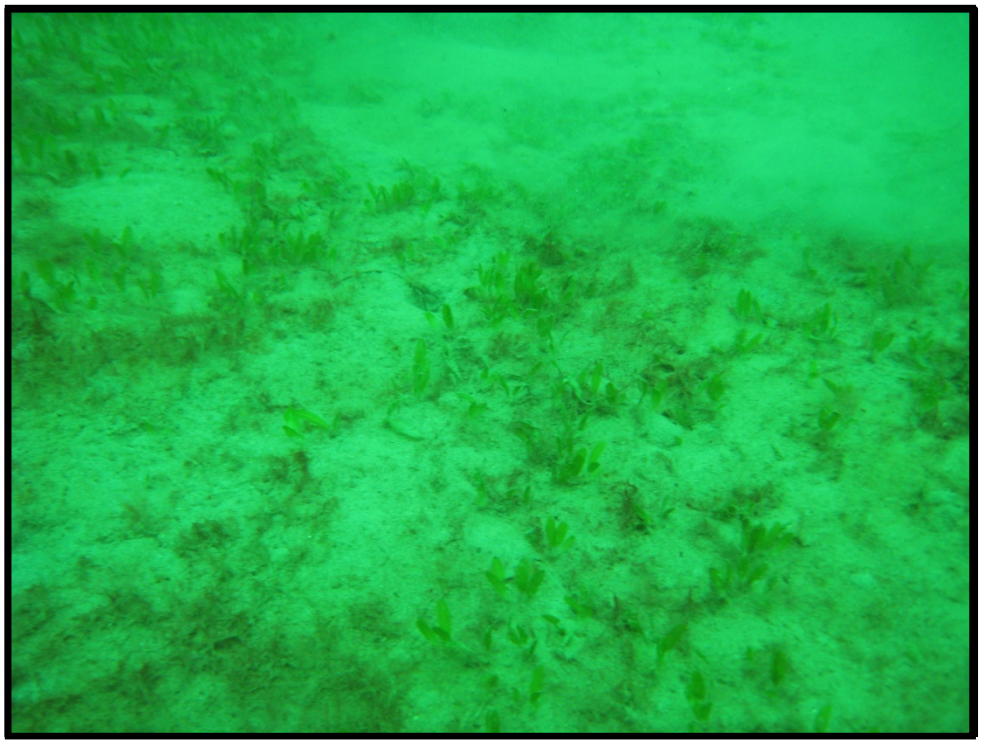
FLORIDA INLAND NAVIGATION DISTRICT
Intracoastal Waterway Deepening Project in the Vicinity of the Port of Palm Beach
Palm Beach County, Florida

Attachment 6
Benthic Habitat Assessment Report

BENTHIC HABITAT ASSESSMENT REPORT

Intracoastal Waterway Deepening Project in the Vicinity of Palm Beach Harbor
Work Order No. 11-04



Prepared for:

Florida Inland Navigation District
1314 Marcinski Road
Jupiter, Florida 33477

Prepared by:

SCHEDA ECOLOGICAL ASSOCIATES

1486-E Skees Road
West Palm Beach, FL 33411

PINNACLE GROUP INTERNATIONAL
MARINE, ESTUARINE AND COASTAL ECOLOGY

2219 Seacrest Boulevard
Delray Beach, Florida 33444

January 18, 2012

1.0 BACKGROUND

The Florida Inland Navigation District (FIND) is proposing to deepen a portion of the Intracoastal Waterway (ICWW) in the vicinity of Palm Beach Harbor (adjacent to the City of Riviera Beach, Palm Beach County, Florida) to -17 feet (ft) mean low water. FIND contracted the Scheda Ecological Associates, Inc. and Pinnacle Group International, LLC partnership to conduct a pre-dredging seagrass and benthic habitat survey of the project area. The data obtained during this survey/mapping event is to be used to assess potential natural resource impacts and permit the project.

2.0 SITE DESCRIPTION

The survey area encompassed approximately 27.74 acres of bottom in the Lake Worth Lagoon, spanning approximately 3,666 ft in length (north-to-south) and 325 ft in width (typically). The survey area consisted of the Federal ICWW navigation channel area, two wideners where the channel curves, and a 100-ft buffer surrounding the navigation channel. The Federal channel encompassed 44 percent (12.2 acres) of the total survey area. The limits of the survey area are depicted in Figure 1. About half of the survey area included the western Peanut Island beach shoreline. The area is known habitat for the federally endangered Johnson's seagrass (*Halophila johnsonii*) as well as other seagrass species.

3.0 METHODOLOGY

The seagrass mapping event was conducted over a four (4) day period from September 26, 2011 to September 29, 2011. A team of four (4) certified scientific divers experienced in conducting benthic resource assessments in Palm Beach County and Lake Worth Lagoon were used to complete the assessment. Weather conditions ranged from sunny to partly cloudy with light winds (0-10 mph); optimal conditions to properly conduct the underwater surveys. Underwater visibility ranged from a few feet (typically during the outgoing tide) to a maximum of 30 ft (typically around high tide).

The mapping event was conducted in two phases in accordance with the "Recommendations for Sampling *Halophila johnsonii* at a Project Site" in the Final Recovery Plan for Johnson's Seagrass prepared by the Johnson's Seagrass Recovery Team, for the NMFS and NOAA (NMFS 2002).

Phase 1

The first phase consisted of an initial reconnaissance of the entire survey area to delineate and identify existing seagrass beds. Phase 1 included a series of 11 transects with 30-ft spacing that spanned the length of the survey area (See Figure 1). Please note that transect spacing varied during the survey due to weather and tidal conditions, however the 11 transects were sufficient to effectively characterize the width of the survey area. The transects extended a minimum of 20 ft beyond the survey area limits to provide a buffer zone around the survey area. Water depths were collected throughout the survey area at fixed intervals along each transect.

A scientific diver experienced in identifying seagrasses, particularly *Halophila* species, was towed behind the vessel along each transect. Tow speeds were constant and slow, not exceeding two knots. Using SCUBA outfitted with communications, the scientific diver delineated the boundaries of seagrass beds and benthic habitat types along each transect by communicating with on-vessel staff who recorded a georeferenced navigational target associated with the edge of the each seagrass bed and/or benthic habitat boundary observed. The transects were traversed during the incoming tide when visibility was greatest. Therefore, divers could delineate bottom habitat types in a minimum 20-ft swath around each transect.

All seagrass beds observed during the survey were carefully delineated and mapped using a Trimble DGPS receiver. The navigation data identifying the delineated seagrass and habitat boundaries were then plotted using ArcInfo GIS and presented on georectified aerial photographs. Qualitative video and still photographic data was also collected for identification verification of seagrasses and biota observed during the survey.

Phase 2

The second phase incorporated quantitative sampling methods to determine seagrass densities. Seagrass densities were determined along ten (10) 100-ft long modified belt transects evenly distributed across seagrass beds identified during Phase I (See Figure 1). The modified belt transects were conducted *in situ* by a scientific diver equipped with a one square meter (m) quadrat (1.0 m x 1.0 m [3.3 ft x 3.3 ft = 10.76 sq ft]). Quadrat sampling was conducted at ten (10) locations along each modified belt transect and were determined using a stratified random sampling design. The diver recorded species composition, percent cover, abundance, shoot density, and blade length data, as well as presence of flowering, using multiple 10 x 10-cm cells. Seagrass coverage was recorded using the Braun-Blanquet scale of abundance (Braun-Blanquet 1932).

The collected transect and quadrat data provided sufficient information to adequately describe the distribution and abundance of seagrass in the survey area. The sampling area surveyed around the ten modified belt transects covered over two (2) percent of the total seagrass area observed during Phase I (exceeding the minimum one percent coverage requirement established in the NMFS/NOAA Johnson's Seagrass protocol for large area projects).

In addition to seagrass data, the divers recorded the biota observed during the survey, including macroalgae, sponges, sessile invertebrates, and fishes. These biota were field-identified to the lowest practical level. Occurrences of protected wildlife (manatee, sea turtles and smalltooth sawfish) were also noted during the mapping event.

4.0 RESULTS

A total of 10.65 acres of seagrass were identified and delineated in the survey area. Approximately 5.34 acres of seagrass occur within the boundaries of the Federal navigation channel. Other benthic habitat types identified include unvegetated sand bottom, unvegetated shell hash bottom, macroalgae dominated sand/shell hash, hardbottom dominated by sponge and algal communities, and hardbottom dominated by macroalgae. The locations of all observed habitat types are depicted in Figure 2.

A total of three seagrass species were identified in the survey area: Cuban shoal grass (*Halodule wrightii*), paddle grass (*Halophila decipiens*) and Johnson's seagrass. These occurred in both single-species and mixed beds that were distributed throughout the survey area (See Figure 3). The seagrass beds occur at water depths ranging from 2-3 ft deep near the Peanut Island shoreline to over 20 ft deep at the south end of the survey area near the Port of Palm Beach.

Paddle grass was the most widely distributed of the three grasses covering 8.99 acres in the survey area. It also exhibited the relatively greatest coverage, averaging about 20 percent aerial cover in identified beds. Both Johnson's seagrass and Cuban shoal grass occurred occasionally throughout the survey area and typically exhibited relatively low coverage and abundance. Johnson's seagrass occurred in either mixed or single-species beds over a total of 1.21 acres. Approximately 0.18 acres of Johnson's seagrass occurs within the limits of the Federal navigation channel. Cuban shoal grass covered a total of 0.46 acres. Table 1 (attached) lists the seagrass coverage, recorded as an average per each 100-ft belt transect, in the survey area. Table 2 (attached) lists average shoot count and blade heights recorded along each seagrass transect.

A total of 0.86 acres of hardbottom habitat was observed in the survey area with the majority occurring at the survey area's southwest end. Approximately 0.16 acres of hardbottom occur within the boundaries of the Federal navigation channel. The hardbottom habitat was characterized by exposed limerock, boulders, and rubble that were encrusted with macroalgae and/or sponges. Located adjacent to the Riviera Beach Municipal Marina, the hardbottom habitat may occur as a result of previous dredging activity. It typically occurs at depths greater than 10 ft deep. Sponges and macroalgae commonly observed in the habitat are listed in Table 3.

A West Indian Manatee (*Trichechus manatus)* was observed migrating through the survey area during the second day of the mapping event. No other federal or state-listed species were observed.

ArcMap GIS and Autocad files depicting the limits of all seagrass beds and other benthic habitat types will be provided to FIND along with this report. A comprehensive list of observed biota is included in Table 3. Representative photographs of select habitats and seagrass species is also attached.

FIND Palm Beach Harbor
Seagrass Mapping
Palm Beach County, Florida

TRANSECT LOCATION MAP

Figure 1

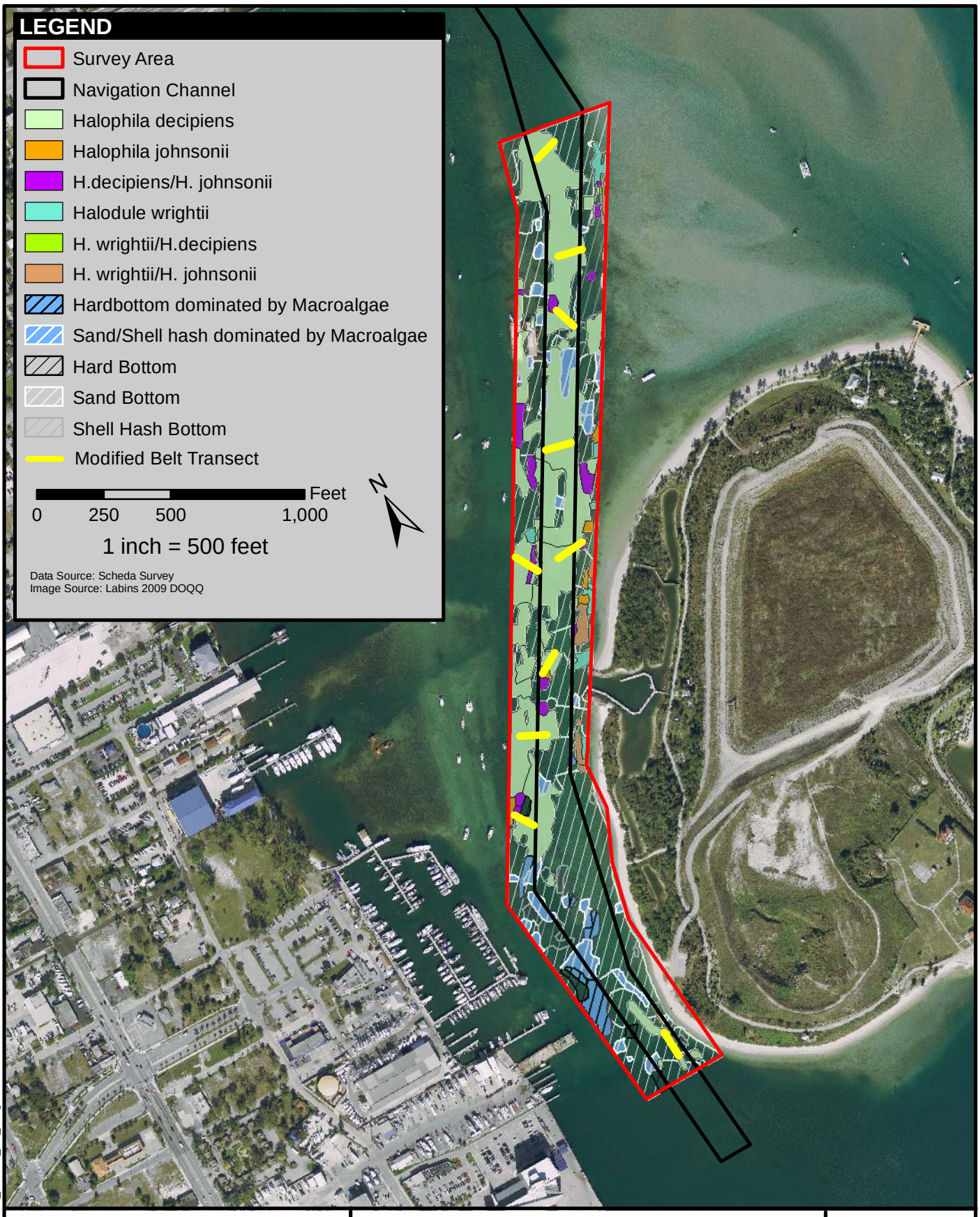
G:\x\Projects\2150\2150_scheda_diff_seagrass.mxd bm

Y:\Employee Folders\Greg\FIND_GISFiles\2150_Figure 2.mxd cs

FIND PALM BEACH HARBOR SEAGRASS MAPPING
Palm Beach County, Florida

SEAGRASS MAP

Figure 2



GIs\Projects\2150\2150_scheda_diff_seagrass.mxd bm

FIND Palm Beach Harbor Seagrass Mapping Palm Beach County, Florida

SEAGRASS MAP

Figure 3

Table 1. Average Percent Cover for Seagrass, Macroalgae and Other Invertebrates identified during the mapping event.

Transect	Seagrasses			Macroalgae	Invertebrates	Dominant Substrate	Average Water Depth (ft)
	Halophila johnsonii	*Halophila decipiens*	*Halodule wrightii*				
1	0	28.5	0	1.4	0	Fine Sand Bottom	9
2	0.3	13.5	0	0.8	0	Sand Bottom with Shell Hash	9
3	0	14.85	0	1.6	0.6	Sand Bottom with Shell Hash	10
4	0.1	35.25	0	2	0.3	Sand Bottom	11
5	0.4	19.5	0	0.4	0	Sand Bottom with Shell Hash	8
6	0	8.6	0	1	0.4	Sand Bottom with Shell Hash	10
7	0	35.25	0	1.6	0.2	Sand Bottom	12
8	0	15	0	0.3	0.3	Sand Bottom with Shell Hash	12
9	0	15	0	0.5	0.3	Sand Bottom with Shell Hash	11
10	0	1	0	0.1	0.1	Sand Bottom with Shell Hash	21

Table 2. Average Seagrass Shoot Counts and Blade Heights recording during the mapping event.

	Halophila johnsonii		*Halophila Decipiens*	
Transect	Shoot Count	Blade Height	Shoot Count	Blade Height
1	0	0	4.4	0.94
2	0.32	0.96	3.44	0.88
3	0	0	10.08	0.96
4	0.18	0.71	16.28	1
5	1.82	1.11	13.57	1.11
6	0	0	8.16	0.71
7	0	0	16.02	1
8	0	0	17.4	0.96
9	0	0	17.4	0.96
10	0	0	8.92	0.72

Table 3. List of Biota observed during mapping event.

MACROALGAE
Dictyota spp.
Acetabularia sp.
Caulerpa sertularioides
Caulerpa prolifera
Caulerpa Mexicana
Penicillus sp.
Unidentified Rhodophyta
Laurencia sp.
Unidentified Chloropyta
Gracilaria sp.
Padina sp.
SPONGES
Unidentified Porifera
Lotrochota sp. (finger sponge)
OTHER INVERTEBRATES
Lytechinus variegatus
Diadema antillarum
Ophioderma appressum
Balanus variegatus amphitrite
Busycon sp.
Coenobita clypeatus
Clibanarius sp.
Bulla sp.
Hermodice carunculata
Panulirus argus
Unidentified Hemichordata
Tubeworm
FISH
Acanthostracion quadricornis
Lutjanus apodus
Syngnathinae sp.
Sparisoma spp.
Acanthurus spp.
Abudefduf spp.
Anisotremus spp.
Balistes capriscus
Acanthurus bahianus
Abudefduf saxatilis
Anisotremus virginicus
Unidentified Gobiidae
MAMMALS
Trichechus manatus

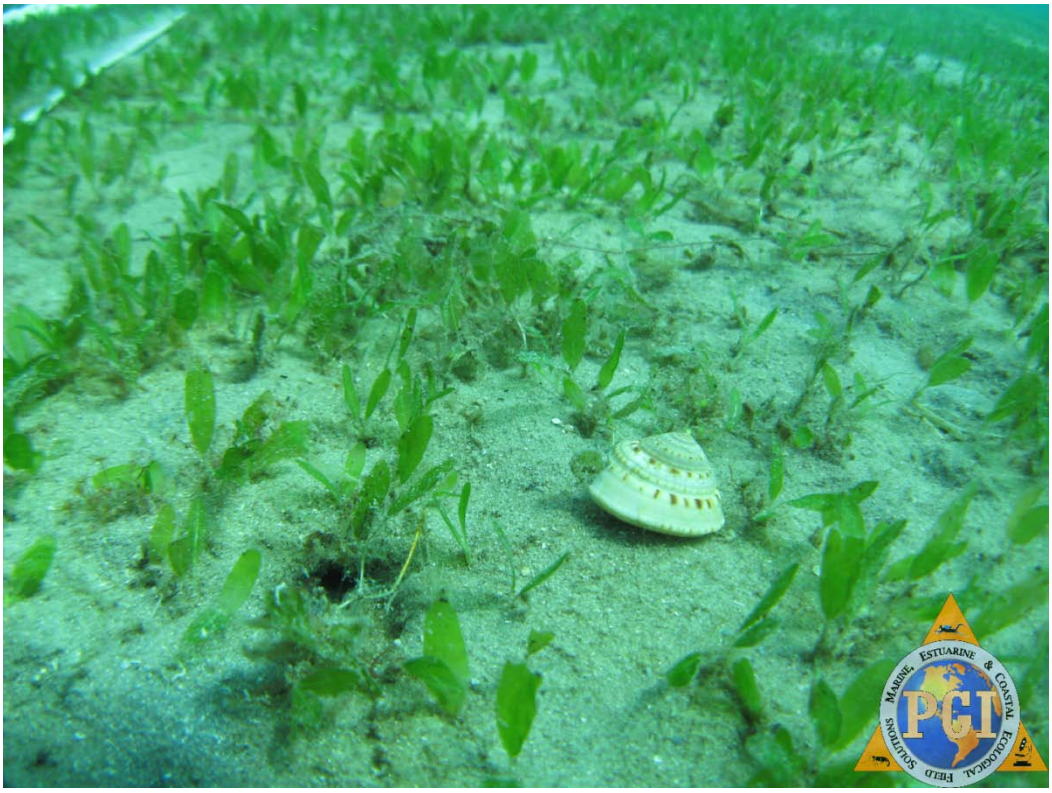


Photo 1: Typical view of a paddle grass (*Halophila decipiens*) bed occurring within the survey area.

Photo 2: Macroalgae *(Caulerpa sertularioides)* occurring on sand bottom within the survey area.

Photo 3: Close-up view of paddle grass (*Halophila decipiens*) occurring in survey area.

Photo 4: Close-up view of Johnson's seagrass (*Halophila johnsonii)* occurring in survey area.

Photo 5: Divers conducting seagrass percent coverage, shoot count, and blade length estimates along a modified belt transect.

Photo 6: Diver conducting seagrass shoot count and blade length estimates along a modified belt transect.

Photo 7: Sea urchin (*Lytechinus variegatus)* observed in unvegetated sand/ shell hash bottom.