A FINAL REPORT

"Sea Turtle Capture and Habitat Characterization Study"

Submitted by

Texas A&M University at Galveston
P.O. Box 1675
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to the

National Marine Fisheries Service
Southeast Fisheries Center
Galveston Laboratory
Galveston, Texas 77551-5991

Prepared by

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PREFACE

Texas A&M University (TAMU) was subcontracted by the National Marine Fisheries Service (NMFS) Galveston Laboratory to assist in a study on sea turtle utilization of and movement within inshore habitats adjacent to South Padre Island, Texas. This subcontract was part of a larger contract between NMFS and the U.S. Army Corps of Engineers to assess potential impact of channel dredging operations on sea turtles. The University was mandated by NMFS to capture sea turtles within Brazos Santiago Pass and lower Laguna Madre areas for tagging and tracking purposes. Using location data provided by the NMFS tracking program, TAMU characterized environmental attributes of various habitats occupied by tagged turtles. This report summarizes results of sea turtle capture operations and habitat characterization activities conducted by TAMU during April through September 1991. Results of additional capture activities, conducted through December 1991, also are reported herein to further characterize seasonal occurrence of sea turtles in the South Padre Island study area.

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Introduction

Concern about recovery and management of endangered sea turtle stocks of the Gulf of Mexico was addressed by a 1989 Minerals Management Service Workshop on Marine Mammals and Turtles in the Gulf of Mexico. Draft proceedings from this workshop and a Marine Turtle Habitat Plan developed by National Marine Fisheries Service (NMFS) sea turtle biologists (Thompson et al. 1990) both recommend characterization of turtle habitat as the most appropriate research approach to recovery and management of Gulf sea turtle stocks. Mandates with the highest priority for optimizing research on these stocks (Thompson et al. 1990) included identifying and characterizing habitats of Kemp's ridley (*Lepidochelys kempi*) and green sea turtles (*Chelonia mydas*). Texas waters provide critical habitat for both these species. Mark-recapture and stranding data collected by NMFS indicate inshore waters from eastern Texas to the Mississippi Sound are currently crucial habitat for all size classes of Kemp's ridley except the pelagic stage. Another critical habitat that harbors green turtles includes seagrass beds in Texas' Laguna Madre. Numerous sightings of sea turtles by the public at jetties and channel entrances along the central and south Texas coast during summer months suggest these areas also serve as development habitats for juvenile and subadult sea turtles.

Several activities have been identified as sources of mortality to sea turtles in inshore waters (Magnusom *et al.* 1990). Most notable among these are channel dredging operations by the U.S. Army Corps of Engineers (COE). Specific COE dredging activities posing risks to sea turtles include maintenance dredging of intracoastal waterways and about 45 ship channels in the Gulf and Atlantic, disposal of dredged materials, beach nourishment, and marine construction (Thompson *et al.* 1990).

Resolution of sea turtle/industry conflicts such as channel dredging and implementation of proper management of existing stocks are severely compromised by the paucity of quantitative data on natural history of sea turtles, particularly those in the northwestern Gulf. A Sea Turtle Conservation Amendment developed by Senator Howell Heflin from Alabama called, in part, for information on: "estimates of the status, size, age structure and where possible sex structure...and the distribution and concentration of each of the relevant species of sea turtles, in the waters of the U.S., Mexico...during both the migratory and reproductive phases of their lives" (news release from the Office of U.S. Sen. Howell Heflin of Alabama, July 12, 1988). A Regional Sea Turtle Review Workshop dealing with turtle stocks of the South Atlantic and Gulf of Mexico has recommended that NOAA "..... should assist with gathering crucially important data on distribution and abundance of all sea turtle species in state nearshore and inshore waters" (October 14, 1988, letter from Messrs. Ralph Rayburn and Michael Weber, co-chairmen, Regional Sea Turtle Review Workshop, to Dr. Joseph Angelovic, Director of NMFS' Southeast Region). An even larger information gap exists on species composition, size distribution, spatial and temporal abundance, habitat preference, feeding grounds and nesting activity of sea turtles in nearshore and estuarine waters of Texas. Reduced abundances, cryptic habitats, and smaller size of the immature stages of sea turtles in nearshore and estuarine waters together with poor water clarity in these areas render visual observations and acquisition of natural history data on live turtles in the northwestern Gulf very difficult. Consequently, netting and tag-recapture operations in selected Texas bays could provide essential data on abundance and distribution of live turtles in these bays.

Risks associated with COE dredging activities were the subject of collaborative research conducted by Texas A&M University (TAMU) and NMFS personnel during Summer 1991 on green and loggerhead turtles inhabiting seagrass, jetty and channel environments of the Brazos Santiago Pass and lower Laguna Madre adjacent to South Padre Island, Texas. Five turtles captured in TAMU's netting program were provided to NMFS who equipped them with radio and sonic transmitters in order to define behavior and movement in the South Padre Island area. Daily location data generated by NMFS' tracking program were used by TAMU to characterize habitats frequented by these tagged turtles. This report summarizes results of TAMU's sea turtle capture operations in the South Padre Island study area and the characterization of habitats utilized by these turtles.

Study Area and Methods

Study Area

Turtle capture and habitat characterization were conducted in Brazos Santiago Pass and lower Laguna Madre habitats adjacent to South Padre Island, Texas during April-December 1991 (Fig. 1). This study area was partitioned into three, relatively discrete sea turtle capture/habitat characterization sites (Figs. 2, 3 and 4). These sites are described below.

Brazos Santiago Pass Site: This site consists of the Brazos Santiago Pass and adjacent North and South Jetties (Fig. 2). Brazos Santiago Pass is a narrow (92 m wide) channel between the south end of South Padre Island and the north end of Brazos Island that has a maximum depth of 11.6 m. The North and South Jetties are 1.5 km long granite mound structures bordering the

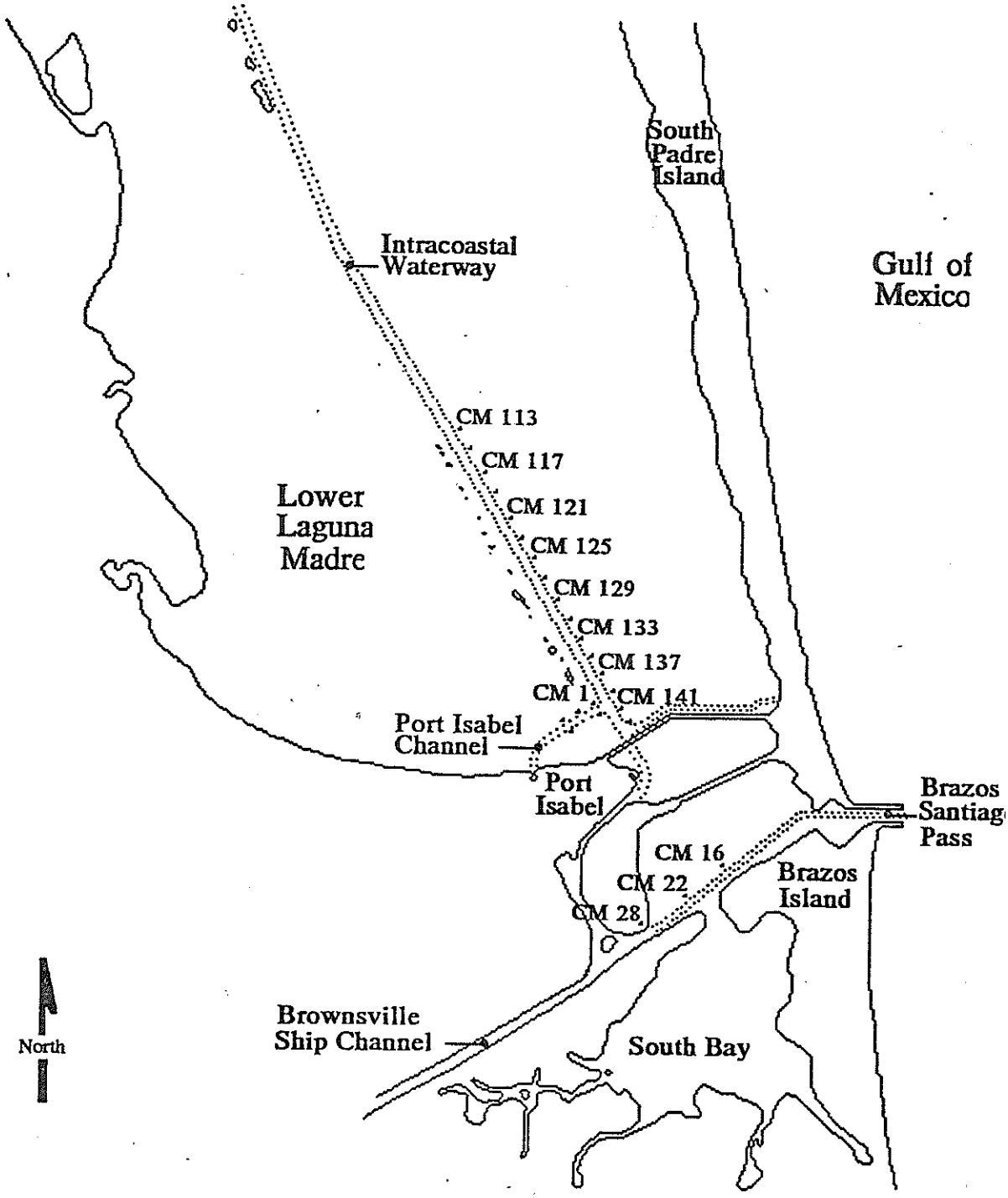

Figure 1. Map of South Padre Island study area. CM denotes channel markers.

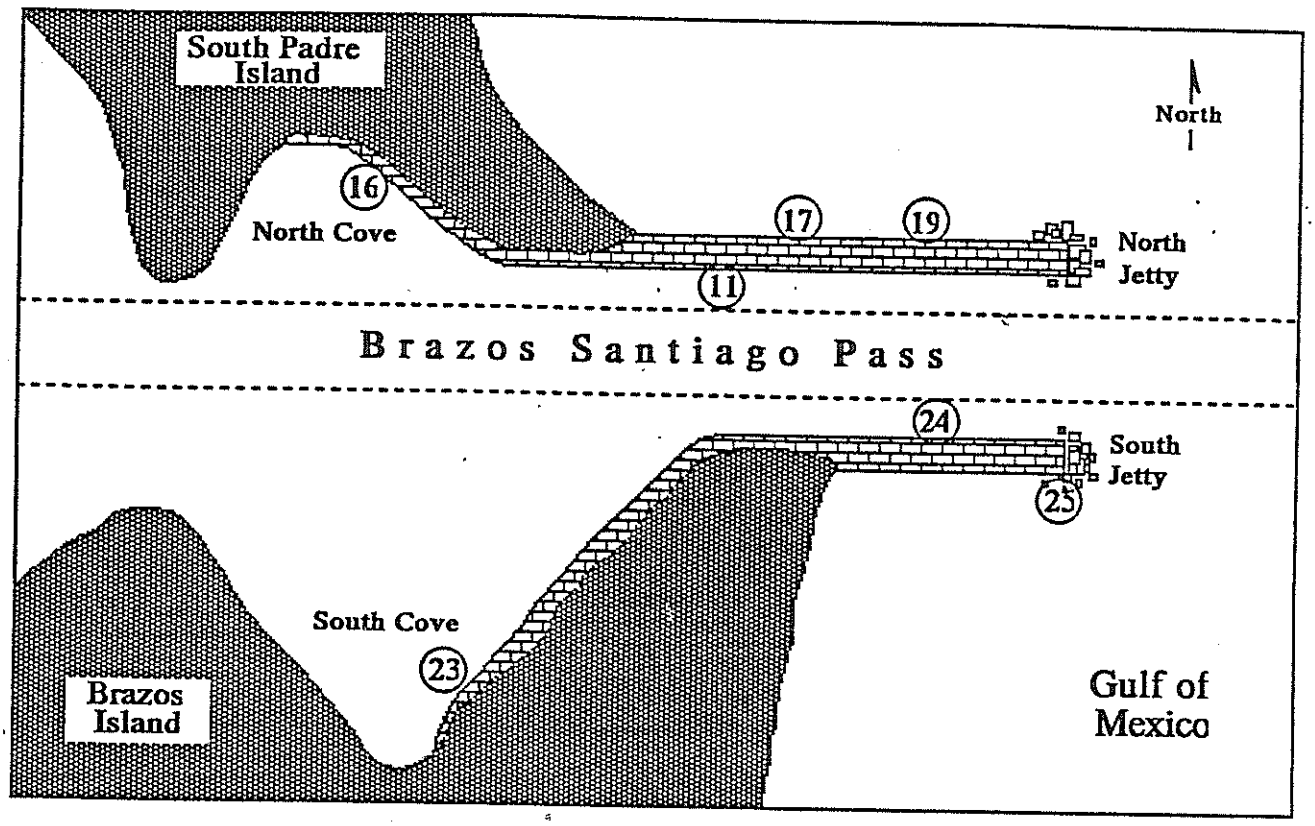

Figure 2. Brazos Santiago Pass habitats and sampling stations (ⓐ).

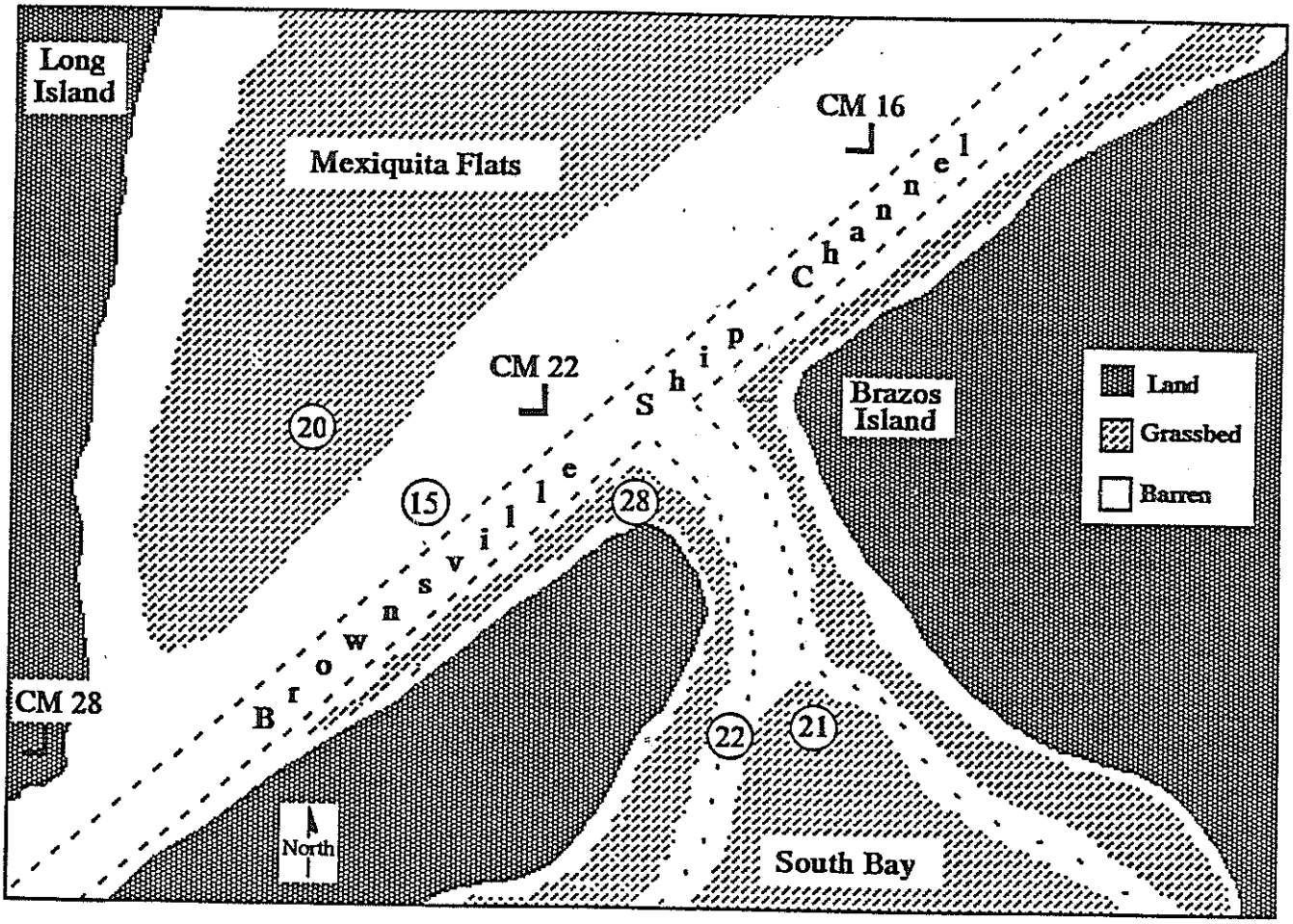

Figure 3. South Bay/Mexiquita Flats habitats and sampling stations (#).

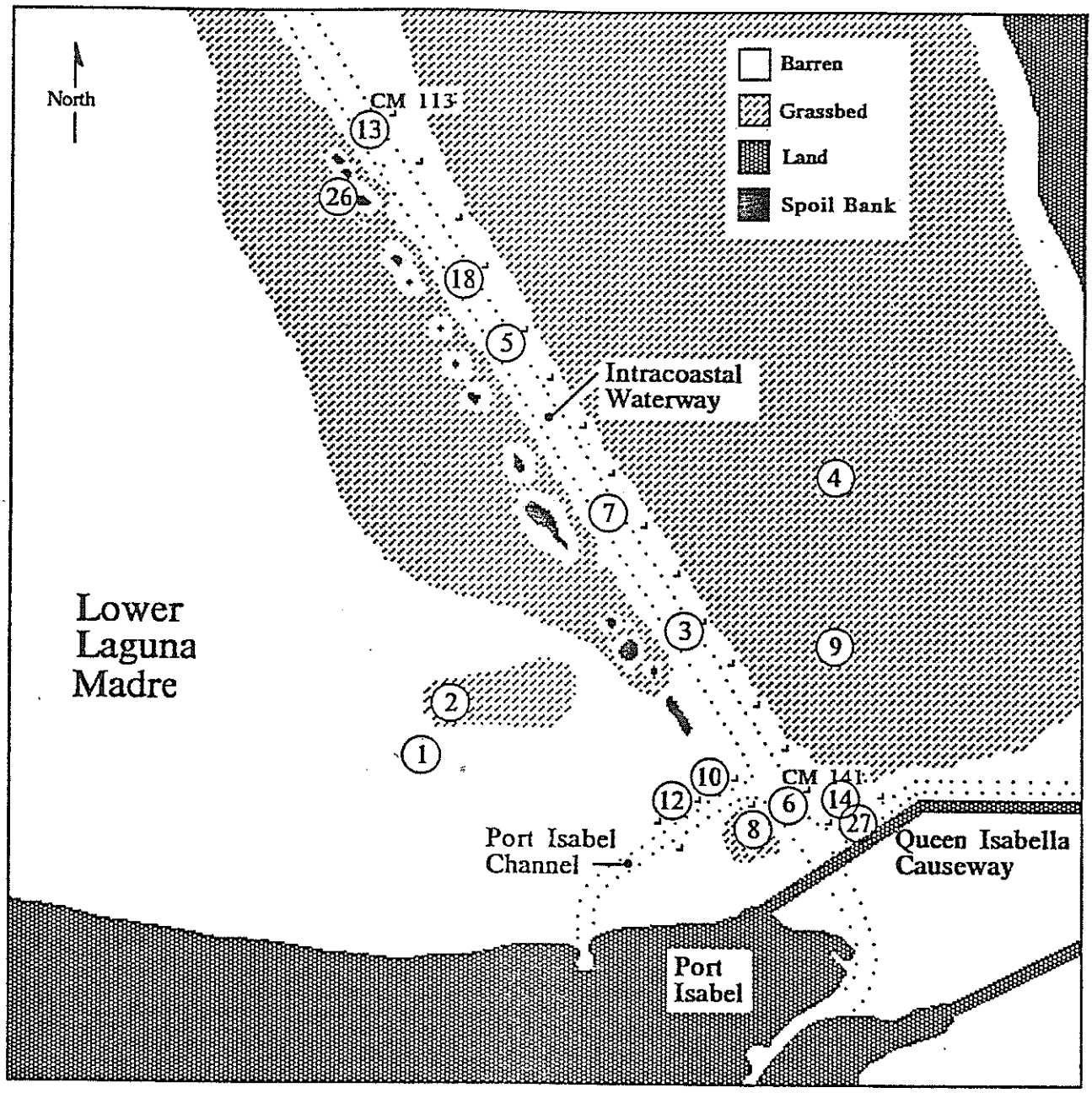

Figure 4. Lower Laguna Madre habitats and sampling stations (#).

north and south sides of the Brazos Santiago Pass at its entrance into the Gulf of Mexico. Shallow, relatively flat cove areas with a hard sand bottom and average depth of 2.1 m are located inside the west end of each jetty. These habitats support various species and concentrations of algae. Seven sampling stations (5 barren-bottom, 2 channel) were located within the jetty site (Table 1), with these locations based on: 1) NMFS' mandate that initial sea turtle capture and characterization efforts be conducted at Brazos Santiago Pass; 2) habitats exhibiting certain conditions (depth, minimal obstructions) that rendered them compatible for netting; and 3) a change in habitats occupied by turtles over time.

South Bay/Mexiquita Flats Site: The South Bay/Mexiquita Flats site consists of grassbed and channel habitats along the easternmost reaches of the Brownsville Ship Channel (BSC) between Channel Markers 28 and 16 (Fig. 3). The channel habitat of the BSC is 2.25 km long, 61.0 m wide with an average maximum depth of 11.0 m and is bordered on the south and north by seagrass habitats of South Bay and Mexiquita Flats, respectively. The BSC channel substrate consisted of mud with varying portions of sand, clay, and silt and extended to grassbed habitat at a depth of 1.8 m. Grassbed habitats in South Bay and Mexiquita Flats were less than 1.5 m deep and consisted of a silt and hard sand substrate. This site contained five sampling stations (3 grassbeds, 1 channel, 1 barren-bottom - Table 1).

Lower Laguna Madre Site: The lower Laguna Madre site encompassed the lower Laguna Madre from Intracoastal Waterway (IWW) Channel Marker 113 south to the Queen Isabella Causeway (Fig. 4). This site contains the IWW channel and adjacent grassbed and barren-

Table 1. Description of sampling stations in the South Padre Island study area.

SITE	STATION	LOCATION	HABITAT	LAT/LONG
	11	S side N Jetty 750m W of end	Channel	(26 03.70'N/97 09.0
	16	S side of N jetty at Dolphin Cove	Barren bottom	(26 02.40'N/97 09.4
BRAZOS	17	N side of N jetty 475 m W of end	Barren bottom	(26 03.84'N/97 09.0
SANTIAGO	19	N side of N jetty 250 m W of end	Barren bottom	(26 03.87'N/97 08.9
PASS	23	N side of S jetty at cove	Barren bottom	(26 03.81'N/97 09.4
	24	N side of S jetty 525 m W of end	Channel	(26 03.61'N/97 08.9
	25	S side of S jetty 25m W of end	Barren bottom	(26 03.80'N/97 08.7
	15	N of and adjacent to BSC between CM 22 & Long Island	Barren bottom	(26 02.40'N/97 11.5
SOUTH BAY /	20	Mexiquita Flats between BSC CM 22 & Long Island	Grassbed	(26 02.49'N/97 11.5
MEXIQUITA	21	South Bay at entrance channel fork	Grassbed	(26 02.24'N/97 11.0
FLATS	22	South Bay entrance channel	Channel	(26 02.24'N/97 11.0
	28	W side of entrance to South Bay	Grassbed	(26 02.30'n/97 11.3
	1	SW of and adjacent to Walt's Bar	Barren bottom	(26 05.04'N/97 13.7
	2	Walt's Bar	Grassbed	(26 05.58'N/97 13.5
	3	IWW CM 131	Channel	(26 05.66'N/97 12.7
	4	1.6 km E of IWW between CM 131&133	Grassbed	(26 05.67'N/97 12.0
	5	IWW CM 121	Channel	(26 06.99'N/97 13.4
	6	IWW CM 141	Channel	(26 05.19'N/97 12.2
LOWER	7	Between IWW CM 125 & CM127	Channel	(26 06.30'N/97 13.1
LAGUNA	8	100m SW of Pt. Isabel CM 1	Grassbed	(26 04.50'N/97 12.2
MADRE	9	600m E of IWW CM 135	Grassbed	(26 05.07'N/97 12.2
	10	300m NW of Pt. Isabel CM 2	Barren bottom	(26 04.70'N/97 12.3
	12	600m NW of Pt. Isabel CM 5	Barren bottom	(26 04.59'N/97 12.7
	13	IWW CM 113	Channel	(26 07.78'N/97 13.9
	14	Between causeway CM 2 & IWW CM 141	Barren bottom	(26 05.22'N/97 11.7
	18	IWW CM 119	Channel	(26 06.95'N/97 13.6
	26	0.5 km W of IWW CM 135	Grassbed	(26 07.34'N/97 14.2
	27	N of and adjacent to causeway 100 m E of IWW channel	Barren bottom	(26 04.37'N/97 11.8

bottom (hard bottom, mudflat and dredge spoil) habitats. The IWW channel habitat incorporates an area 6.9 km long and 38.1 m wide with an average depth of 3.7 m. The channel substrate ranged from a deep ($\geq$ 1.2 m) soft silt at the north end to hard sand/shell hash at the south end. Six sampling stations were located in this channel habitat (Table 1).

The southern end of the Laguna Madre adjacent to the IWW was generally less than 1.2 m deep and composed of scattered barren-bottom and grassbed habitats (Fig. 4). The substrate in these habitats ranged from mud with varying proportions of sand and clay to hard sand that supported seagrasses. Ten sampling stations (5 grassbeds, 3 hard bottom and 2 dredge spoils) were located among these habitats (Table 1).

Sea Turtle Capture and Related Activities

Entanglement Netting: Turtle capture was accomplished with 91.5 m long entanglement nets of different depth and mesh size specifications deployed in two configurations. This experimental design increased the array of turtles and habitats that could be sampled. These nets were 3.7 m deep with 12.7 cm bar mesh of #9 twisted nylon or 4.9 m deep with 25.4 cm bar mesh of #9 twisted nylon. Shallow coves of Brazos Santiago Pass, grassbeds and channels of the lower Laguna Madre and South Bay/Mexiquita Flats were sampled during the day with one to four stationary entanglement nets (of similar or mixed specifications) set adjacent to one another for 8 to 12 hours (Fig. 5). Sampling at the deeper, jetty habitat was modified to a more active capture method of encircling turtles with entanglement nets. The encircling technique was attempted only when a turtle targeted for capture displayed certain behavioral traits. These traits

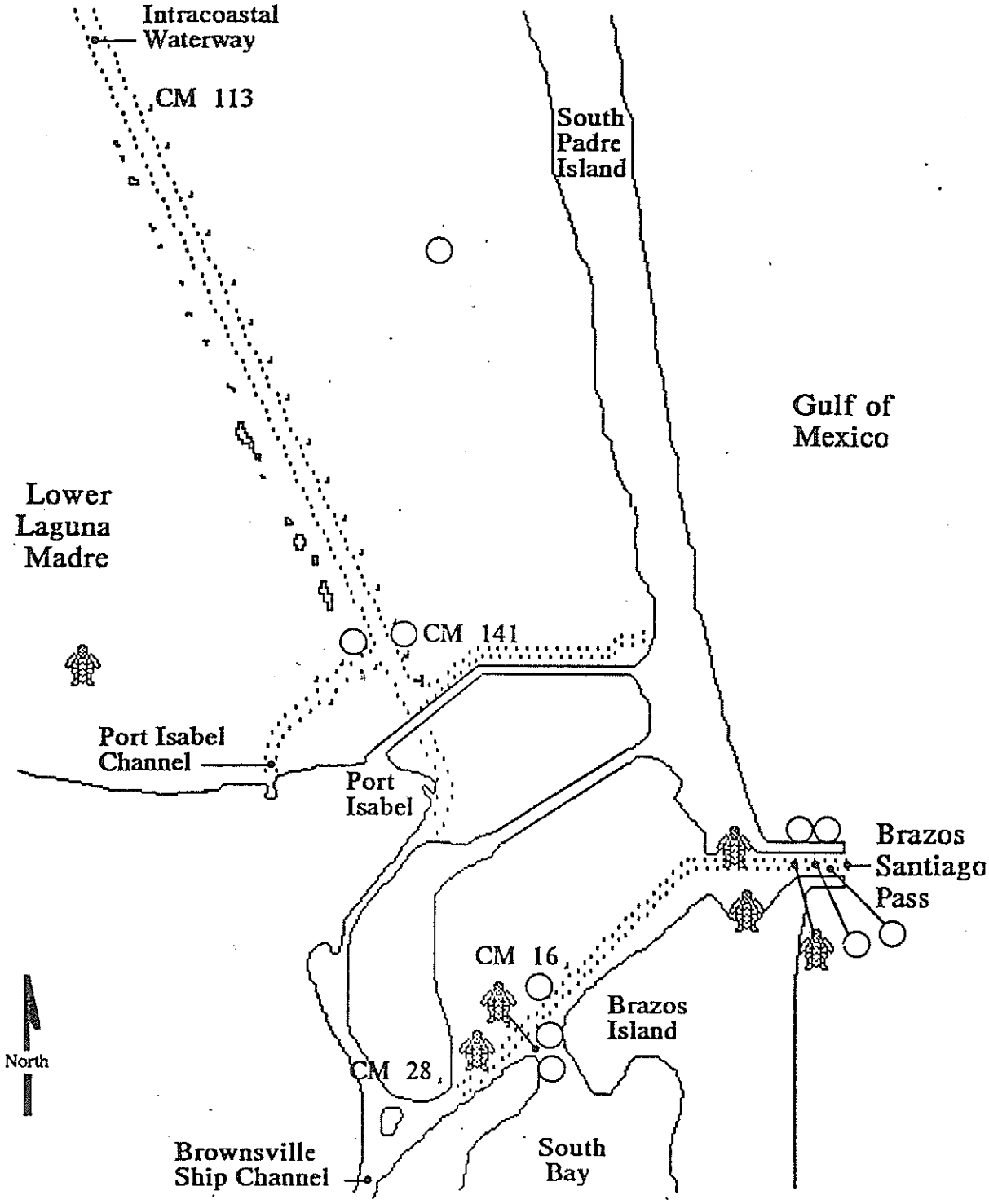

Figure 5. Entanglement netting deployment (◯) and sea turtle capture locations (🐢) within the South Padre Island study site.

included: 1) exhibiting a sustained ($\geq$ 30 minutes) pattern of surfacing and sounding which became predictable (i.e., surfacing to breathe every 12 minutes); and 2) surfacing occurred no more than 10 m from and along a very limited ($\leq$ 30 m) length of the jetty. Once these traits became well established, the encircling set began approximately 1 minute prior to the predicted surfacing time by securing one end of the net to the jetty and quickly encircling the expected surfacing spot with the remaining net deployed from a boat. The net was brought to the jetty to create a "semi-circle" of netting around the turtle. Divers entered the encircled area to close off any escape route and to catch or maneuver a turtle into the net. The rocky bottom along the jetties often fouled the net and made turtle capture in this habitat difficult.

Tagging Activities: Immediately following capture, all turtles were transported to the University of Texas' Pan American Laboratory on South Padre Island where they were held for 24 hr before being tagged and released. All turtles were measured, photographed and tagged at the lab. Straight line carapace length and width were measured with a forester's calipers. Over-the-curve carapace length and width were measured with nylon twine and a forester's caliper. All measurements were made to the nearest 0.1 cm. Turtles were then photographed with a 35-mm camera and placed in a 3.0-m diameter fiberglass holding tank. The following day the turtles were tagged with one monel flipper tag (provided by NMFS/Miami), on the trailing edge of each fore flipper and released at the same location as captured. Tagging data were submitted to NMFS (Miami) on two data forms entitled, NMFS/SEFC Marine Turtle Tagging Data (Rehabilitated, Netted or other Release) and NMFS/SEFC Marine Turtle Tagged/Recapture Data.

Fecal Pellet Analysis: Periodic checks of each turtle's condition were made during the 24-hr holding period, and fecal samples were collected from the tanks. All fecal samples were preserved in 10% formalin, labelled and held for laboratory analysis. Each fecal pellet sample was pulse blended to an even consistency in the laboratory. These contents were then poured into a #35 sieve and rinsed with seawater. Three samples were removed from each fecal solution with a spoon and then observed under a compound scope to identify particulate plant and algae matter to the lowest possible taxon.

Visual Observations: Visual sightings were conducted along the North and South Jetties at Brazos Santiago Pass to aid in turtle capture and habitat characterization efforts. These sighting efforts helped to locate turtles and define the habitats they frequented. Random observations were made by 2-5 individuals surveying the jetties on random days throughout the study period. Date, time, location, and species were recorded each time a turtle was sighted.

Habitat Characterization

Five turtles captured during netting activities across the study area were provided to NMFS personnel who equipped them with radio and sonic tags (Table 2). These turtles were released in the same area in which they were captured, and were later tracked by NMFS personnel. Data from NMFS tracking efforts were used by TAMU personnel to pinpoint habitats occupied by the tracked turtles. These data were used to identify 28 stations (9 channel, 11 barren-bottom and 8 grassbed sites) whose habitat attributes were characterized from 1 July through 25 October 1991 (Table 1).

Table 2. Sea turtle capture and tagging statistics from the South Padre Island study area during April - November 1991.

Capture				Net Size		Carapace	Flipper	Sonic/Radio	
Date	Time	Station	Site	(m)	Species	Length (cm)	Tag #	Tag	Capture Notes
4/12/91	1712	23	Brazos Santiago Pass	3.66	*Chelonia mydas*	36.6	QQC701/QQC702	None	
5/16/91	0803	23	Brazos Santiago Pass	3.66	*Chelonia mydas*	39.4	QQC703/QQC704	None	
5/16/91	1201	23	Brazos Santiago Pass	3.66	*Chelonia mydas*	37.5	QQC701/QQC702	None	Recapture
6/26/91	1258	1	Lower Laguna Madre	3.66	*Caretta caretta*	72.5	QQC705/QQC706	Both	
7/15/91	0815	11	Brazos Santiago Pass	4.88	*Chelonia mydas*	34.2	QQC707/NNZ612	Both	
7/26/91	1210	15	Mexiquita Flats	3.66	*Chelonia mydas*	53.6	QQC708/QQC709	Both	
8/1/91	0958	15	Mexiquita Flats	4.88	*Chelonia mydas*	54.1	QQC711/NNZ753	Both	
8/1/91	1225	15	Mexiquita Flats	4.88	*Chelonia mydas*	49.9	QQC710/NNZ611	Both	
9/12/91	1750	28	South Bay	4.88	*Chelonia mydas*	40.3	QQC712/QQC713	None	
10/22/91	1015	15	Mexiquita Flats	4.88	*Chelonia mydas*	58.8	QQC714/QQC715	None	
10/22/91	1137	15	Mexiquita Flats	4.88	*Chelonia mydas*	46.7	QQC716/QQC717	None	
10/22/91	1150	15	Mexiquita Flats	4.88	*Chelonia mydas*	48.2	QQC718/QQC719	None	
10/23/91	1143	15	South Bay	4.88	*Chelonia mydas*	40.2	QQC720/QQC721	None	
10/24/91	0945	15	Mexiquita Flats	4.88	*Chelonia mydas*	48.2	QQC718/QQC719	None	Recapture
11/18/91	1345	N/A	Brazos Santiago Pass	N/A	*Chelonia mydas*	26.0	QQC722/QQC723	None	Hand
11/21/91	0940	15	Mexiquita Flats	4.88	*Chelonia mydas*	58.9	QQC724/QQC725	None	
11/21/91	1214	15	Mexiquita Flats	4.88	*Chelonia mydas*	45.3	QQC726/QQC727	None	
11/21/91	1227	15	Mexiquita Flats	4.88	*Chelonia mydas*	51.5	QQC728/QQC729	None	
11/22/91	1720	N/A	Brazos Santiago Pass	N/A	*Chelonia mydas*	28.6	QQC730/QQC731	None	Foul Hooked

On-site habitat characterization efforts (Table 3) consisted of: 1) hydrological monitoring; 2) SCUBA surveys; and 3) trawl surveys. A description of these characterization techniques follows.

Hydrological Monitoring: Surface and bottom measurements (depth permitting) were taken whenever a station was occupied to characterize water temperature, salinity and conductivity. Water temperature (to the nearest 0.1° C), salinity (to the nearest 0.1 ppt) and conductivity (to the nearest 0.1 mmhos/cm) were measured with a Beckman Instrument Company Conductivity-Salinity-Temperature meter.

SCUBA Surveys: Each station was initially characterized by a SCUBA survey to describe habitat and potential food sources available to sea turtles. This survey consisted of several tasks (listed in order of performance): 1) subsurface visual observations; 2) quantitative transects; 3) sample quadrates (flora and fauna); and 4) sediment core samples.

Subsurface visual observations were conducted by two to four SCUBA divers to describe the habitat (i.e. channel, grassbed, barren-bottom) and assess prevailing water conditions (i.e. visibility, current). This assessment dictated which characterization tasks could be conducted and the number of samples taken for each task.

Quantitative transects were deployed to characterize the availability of forage species. The ability to conduct transect sampling was dependent on visibility. At stations with visibility $\geq$ 1 m, three 25-m transect lines (weighted 0.6-cm nylon line) were laid parallel to one another approximately 20 m apart. Transects were visually surveyed by two SCUBA divers swimming

Table 3. Methodologies deployed in habitat characterization at the South Padre Island study area.

STATION	HYDROLOGY	TRANSECT	QUADRATE	CORE	TRAWL
1	X		X	X	X
2	X		X	X	X
3	X		X	X	X
4	X	X	X	X	X
5	X		X	X	X
6	X		X	X	X
7	X		X	X	X
8	X			X	X
9	X	X	X	X	X
10	X		X	X	X
11	X		X	X	X
12	X		X	X	X
13	X		X	X	X
14	X		X	X	X
15	X		X	X	X
16	X	X	X	X	X
17	X	X	X	X	X
18	X		X	X	X
19	X	X	X	X	X
20	X		X	X	X
21	X		X	X	X
22	X			X	X
23	X			X	X
24	X			X	X
25	X	X	X	X	X
26	X	X	X	X	X
27	X		X	X	X
28	X		X	X	X

down the line (one on each side), with each diver recording all organisms and habitat characteristics along a 1-m wide corridor.

Quadrates were utilized to characterize prey availability, vegetative cover and sediment texture. After completing the swimming transects, a 1 m^2 quadrate (1.9-cm diameter PVC) was randomly placed on each transect line (if no transect line, quadrates were randomly placed within the station) and visually surveyed by one or two SCUBA divers recording all organisms and sediment types within the quadrate. Next one 0.25 m^2 quadrate (1.9-cm diameter PVC) was placed inside each 1 m^2 quadrate, and its contents were recorded and collected. Algae and seagrasses within the 0.25 m^2 quadrate were cut approximately 2.54 cm above the sediment, bagged, preserved in 10% formalin and returned to the laboratory for analysis. All demersal organisms within the 0.25 m^2 quadrate also were recorded, collected, preserved in 10% formalin and returned to the laboratory. The number of quadrates deployed at a station varied with habitat type. One set (i.e., 1 m^2 and 0.25 m^2) of quadrates was sampled at channel and barren-bottom stations. Three sets of quadrates were sampled at all grassbed stations. Six additional replicate quadrates (vegetation analysis only) were taken within the South Bay/Mexiquita Flats site to verify the percent composition found in initial quadrates. Nine quadrates were used to sample the zonation (boulders, rubble, sand) at jetty stations. Three sets of quadrate samples were taken from each jetty transect by SCUBA divers swimming down the transect 10 kicks and randomly placing the quadrate on the line.

Each vegetation sample was emptied into a #35 sieve, rinsed with seawater, and separated to the lowest possible taxon. Separated taxa were placed in paper bags which were labelled and stapled shut. Each paper bag was dried in an oven for approximately 40 hr at 82° C. After

drying, each bag and its contents were weighed (to the nearest 0.01 g) and the mass of an empty, stapled bag was subtracted. The resulting weight was used as the dry mass for each species.

Following quadrate sampling, cores were taken for the purpose of analyzing sediment texture. One 15.2-cm long x 3.8-cm diameter core (PVC) sample was taken by a SCUBA diver at each station. All core samples were labeled, frozen and held for analysis. This analysis followed procedures developed by Folk (1965) and began with a representative subsample from each sediment core sample being placed in a dispersant solution and shaken overnight. Once dispersed, it was wet-sieved through a standard 62 μ (U.S. #230) stainless steel sieve (4 ϕ) with distilled water. The sand fraction ($>$ 4 ϕ) was dried, weighed, disaggregated and Ro-Tapped (15 min) through a 0.5 ϕ interval stack of eleven brass sieves (-10 ϕ to 4 ϕ). The weight of each 0.5 ϕ interval was determined. The silt-clay fraction ($>$ 4 ϕ) was collected in 1000 ml columns filled to capacity with distilled water and pipetted at depths and times after stirring to 0.5 ϕ intervals.

Trawl Survey: Three replicate tows of a 6.1-m otter trawl having 1.9-cm bar mesh netting throughout and a 0.6-cm bar mesh cod end were conducted at respective sampling stations to characterize food item availability in channel, grassbed and barren-bottom sites. Trawls were towed for 5 minutes at all sites except those in grassbed habitats. One minute tows were conducted at these sites to reduce clogging of the trawl with vegetation. Each trawl sample was sorted, identified to the lowest possible taxon, measured (only fish and commercially-important

shrimp and crabs), counted and recorded in the field. All unidentified organisms were returned to the lab for analysis.

Results

Sea Turtle Capture and Related Activities

Turtle capture activities were conducted from 12 April - 12 December 1991, during which time the Brazos Santiago Pass, South Bay/Mexiquita Flats, and lower Laguna Madre sites were netted 29, 15 and 6 days, respectively (Table 4). This netting effort was conducted at 16 locations across the 3 sites as follows: 7 in Brazos Santiago Pass, 5 in South Bay/Mexiquita Flats and 4 in the lower Laguna Madre (Fig. 5).

Daily capture effort expended at each site is presented in Table 4. Over 905 netting hours were generated during 90 net sets. Total netting hours ranged from 118 at lower Laguna Madre habitats to 427 at Brazos Santiago Pass (Table 5). These net-sets were supplemented by 11 encirclement attempts made over 7 days at Brazos Santiago Pass habitats.

Capture efforts produced 19 sea turtles: 17 in entanglement nets and 2 by incidental means (Table 2). These turtles consisted of 4 green turtles from the Brazos Santiago Pass site, 12 green turtles from the South Bay/Mexiquita Flats site and 1 loggerhead from the lower Laguna Madre site. Five turtles were captured in 3.7-m deep nets and the remaining 12 in 4.9-m deep nets. Included among these captures were one recapture from the Brazos Santiago Pass site and another recapture from the South Bay/Mexiquita Flats site. Incidental captures included two green turtles from the North Jetty at Brazos Santiago Pass, where one was foul hooked by a fisherman and the other hand-captured by TAMU.

Table 4. Netting effort, capture statistics and hydrological conditions within the South Padre Island study area during April-December 1991.

		DAILY RANGE						
		DEPTH	TEMPERATURE (C)		SALINITY	NET DEPTH	NET SET	
DATE	LOCATION	(m)	AIR	WATER	(ppt)	(m)	(hrs)	CAPTURE
4/12/91	BSP	1.8 - 3.4	20.5 - 26.6	21.5 - 22.0	30.0	3.66 & 4.88	19.00	X-CM
4/14/91	BSP	1.8 - 3.4	22.7 - 29.4	20.5 - 23.0	29.0 - 34.0	3.66 & 4.88	20.08	
4/15/91/N	BSP	1.8 - 3.4	18.3 - 26.1	22.0 - 23.0	30.0 - 32.0	3.66 & 4.88	24.25	
4/16-17/91	BSP	1.8 - 3.4	18.3 - 27.7	24.0	27.0 - 30.0	3.66 & 4.88	46.16	
5/13/91	BSP	1.8 - 3.3	25.5 - 29.4	26.0 - 27.0	28.0 - 29.0	3.66 & 4.88	23.34	
5/15/91	BSP	1.8 - 3.3	24.4 - 30.5	26.0 - 27.0	27.0	3.66 & 4.88	24.17	
5/16/91	BSP	1.2 - 2.7	25.5 - 28.9	27.0 - 25.5	29.0 - 30.0	3.66 & 4.88	22.92	RX-CM
5/17/91	BSP	1.2 - 2.7	23.9 - 31.1	25.0 - 26.5	29.0 - 32.0	3.66 & 4.88	23.00	
5/18/91	BSP	1.2 - 2.7	23.3 - 27.7	26.0	30.0 - 32.0	3.66 & 4.88	23.42	
6/24/91	BSP	1.8 - 3.4	26.0 - 29.0	26.5 - 27.0	34.6 - 34.8	(2) 4.88	22.33	
6/25/91	BSP	1.8 - 3.4	26.0 - 29.0	26.5 - 28.0	34.7 - 34.8	(2) 4.88	22.56	
6/25/91	SB/MF	0.5 - 2.1	26.0 - 30.0	27.0	34.0	(2) 3.66	18.25	
6/26/91	LLM	1.2 - 1.8	26.6 - 30.0	27.0	36.5	(2) 3.66	22.67	X-CC
6/26/91	BSP	1.8 - 3.4	27.0 - 30.0	28.0	34.8 - 34.9	4.88	13.25	
6/27/91	BSP	1.8 - 3.4	27.0 - 30.0	28.0	35.2	4.88	12.83	
6/27/91	LLM	1.2 - 1.8	26.6 - 30.0	28.0	37.0	(2) 3.66	23.58	
6/28/91	BSP	1.8 - 3.4	27.0 - 30.0	26.5	35.1	4.88	16.00	
7/1/91	BSP	1.8 - 3.4	28.0	28.0	35.0	4.88	12.17	
7/2/91	BSP	1.8 - 3.4	28.0	27.0	35.0	4.88	12.33	
7/3/91	BSP	1.8 - 3.4	26.0 - 29.0	28.0	34.0	(2) 4.88	24.00	
7/5/91	BSP	1.8 - 3.4	26.0 - 29.0	29.0	35.0	4.88	11.58	
7/8/91	BSP	1.8 - 3.4	26.0 - 30.0	27.0	34.0	(2) 4.88	23.75	
7/9/91	BSP	1.8 - 3.4	30.0	28.0	36.0	(2) 4.88	19.91	
7/12/91	BSP	0.5 - 6.4	26.0 - 30.0	26.0	35.0	(2) 4.88	N/A	
7/13/91	BSP	0.5 - 7.0	28.0	26.0	35.0	(2) 4.88	N/A	
7/15/91	BSP	0.5 - 7.6	27.0 - 30.0	26.0	35.0	(2) 4.88	N/A	X-CM

Table 4. Continued.

DATE	LOCATION	DAILY RANGE DEPTH (m)	TEMPERATURE (C) AIR	TEMPERATURE (C) WATER	SALINITY (ppt)	NET DEPTH (m)	NET SET (hrs)	CAPTURE
7/18/91	BSP	0.5 - 6.4	27.0 - 30.0	26.0	35.0	3.66	N/A	
7/22/91	LLM	1.5 - 4.0	26.0 - 30.0	24.0	38.0	3.66 & 4.88	12.42	
7/24/91	LLM	1.5 - 3.5	26.0 - 28.0	25.0	37.0	3.66 & 4.88	23.58	
7/25/91	SB/MF	1.5 - 1.8	27.0 - 29.0	25.0 - 29.0	34.0 - 38.0	3.66 & 4.88	23.16	
7/26/91	SB/MF	1.5 - 1.8	27.0 - 30.0	25.0 -28.0	34.0 - 37.0	(4) 3.66	46.16	X-CM
7/29/91	BSP	1.2 - 5.0	28.0 - 30.0	24.0 - 26.0	36.0 - 37.0	4.88	9.75	
8/1/91	SB/MF	1.5 -1.8	28.0 - 30.0	28.0 - 29.0	35.0	3.66 & 4.88	21.58	XX-CM
8/3/91	LLM	0.3 - 1.2	29.0 - 30.0	28.0 - 29.5	36.0	(2) 3.66	16.25	
8/4/91	LLM	1.2 - 1.8	28.0 - 30.0	27.0	36.0	(2) 3.66	19.58	
8/5/91	BSP	0.5 - 5.2	27.0 - 31.0	28.0	36.0	3.66	N/A	
9/10/91	SB/MF	0.9 - 1.8	26.0 - 30.0	28.0	35.0	3.66 & 4.88	19.08	
9/11/91	SB/MF	1.5	27.0 - 30.0	28.0	35.0	(2) 4.88	17.58	
9/12/91	SB/MF	0.9 - 1.8	27.0 - 30.0	28.0	37.0	(2) 3.66	18.06	X-CM
9/13/91	BSP	0.5 - 4.6	28.0 - 31.0	29	35	(2) 4.88	N/A	
10/22/91	SB/MF	0.5 - 1.8	26.0- 28.0	27.1	33.6	3.66 & (2) 4.88	26.92	XXX-CM
10/23/91	SB/MF	0.5 - 1.8	26.0 - 28.0	27.0	34.4	3.66 & (2) 4.88	26.92	X-CM
10/24/91	SB/MF	0.5 - 1.8	26.0 - 28.0	26.8	32.6	3.66 & (2) 4.88	26.58	R-CM
11/19/91	SB/MF	1.2 - 1.8	25.0	23.0	32.0	(3) 4.88	18.84	
11/21/91	SB/MF	0.8 - 1.5	16.0 - 25.0	20.0	37.0	(3) 4.88	22.50	XXX-CM
11/22/91	SB/MF	1.5	21.0	19.0	38.0	(2) 3.66 & 4.88	22.58	
12/9/91	SB/MF	1.2-1.8	20.0-26.0	20.6	30.0	3.66 & (2) 4.88	26.33	
12/10/91	SB/MF	1.2-1.8	20.0-22.0	20.0-21.0	32.0	3.66 & (2) 4.88	25.83	
12/12/91	BSP	0.5 - 2.1	22.0 - 26.0	21.0	35.0	4.88	N/A	

BSP - BRAZOS SANTIAGO PASS SITE
LLM - LOWER LAGUNA MADRE SITE
SB/MF- SOUTH BAY/MEXIQUITA FLATS SITE
N - NIGHT SET
X - INDICATES INDIVIDUAL CAPTURE
R - INDICATES INDIVIDUAL RECAPTURE
CC - Caretta caretta
CM - Chelonia mydas

Table 5. Total netting effort and sea turtle captures for South Padre Island study sites during April - December 1991.

Entanglement Netting	Total Hours	Captures
Brazos Santiago Pass	427	3
South Bay/Mexiquita Flats	360	12
Lower Laguna Madre	118	1 *
TOTAL	905	16

	Attempts	Captures
Encirclement	11	1
Incidental		2

* - capture of Caretta caretta

Turtle captures occurred from 12 April - 22 November 1991 (Table 2). Monthly total captures ranged from 0 in December to 5 during both October and November. The latter two months each yielded one multiple catch of three turtles in one day. Over one half of all netted turtles were captured between 1100 - 1300 hrs.

Straight carapace length (SCL) of the 17 green turtles captured in the study area ranged from 28.6 to 58.9 cm (Table 2 and Fig. 6). All green turtles captured from the Brazos Santiago Pass site (jetties) exhibited a SCL $<$ 40 cm while those from the South Bay/Mexiquita Flats site (grassbeds/channels) were always $>$ 40 cm SCL (Fig. 6). The only loggerhead captured was 72.5 cm SCL.

Visual Observations: Visual observations were conducted from 3 July - 12 December 1991 in an attempt to locate sea turtles utilizing Brazos Santiago Pass habitats. Table 6 summarizes results of these visual observations plus incidental turtle sightings made during netting operations. Two-hundred-eighty-one sightings of a possible 106 individual turtles were recorded during 27 days of observation effort. An additional nine sightings of a suspected seven turtles were recorded from incidental observations. Ninety seven turtles were observed along the jetty proper while nine turtles were seen in adjacent coves. Turtles were sighted monthly along the jetty proper; however, after an incidental sighting in May, turtles were not observed in the coves again until October. All of the sightings were green turtles except for three individuals that could not be identified. One of the most frequently observed and easily identifiable turtles was a 34.2-cm SCL green turtle initially captured on 15 July, tagged (flipper tags-QQC707/NNZ612

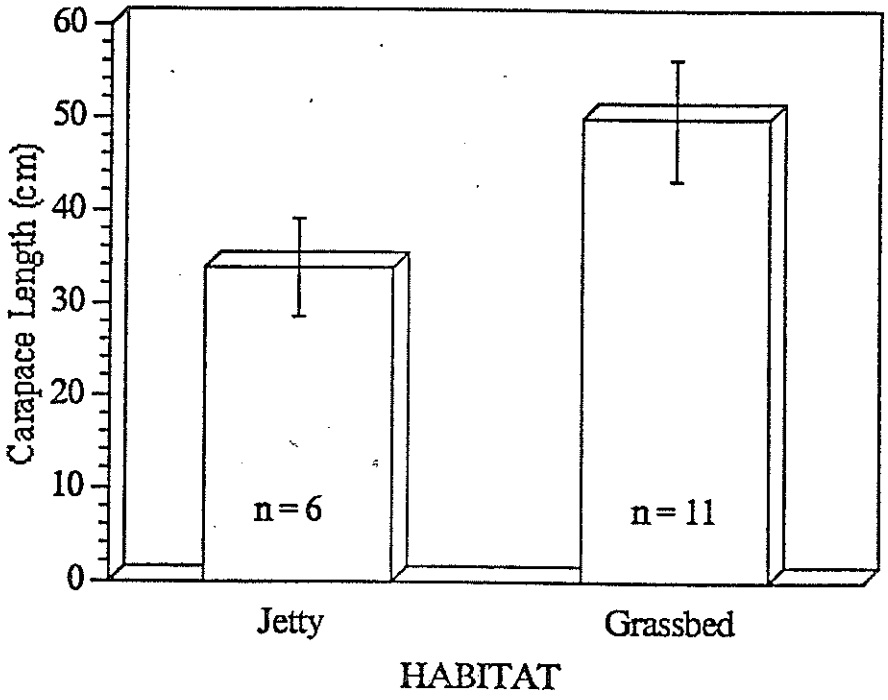

Figure 6. Mean carapace length (cm) of green sea turtles (*Chelonia mydas*) netted at jetty and grassbed habitats. Vertical bar denotes standard deviation.

Table 6. Sightings of green (Chelonia mydas) and unidentified sea turtle species within the South Padre Island study area during May-December 1991.

DATE	LOCATION	# TURTLES SIGHTED	TOTAL SIGHTINGS	COMMENTS
7/03/91	N. JETTY:PASS SIDE	1	1	
7/12/91	N. JETTY:PASS SIDE	1	1	
7/12/91	N. JETTY:GULF SIDE	1	1	
7/13/91	N. JETTY:GULF SIDE	1	1	
7/13/91	N. JETTY:PASS SIDE	3	12	
7/14/91	N. JETTY:PASS SIDE	3	7	
7/14/91	N. JETTY:GULF SIDE	1	1	
7/15/91	N. JETTY:GULF SIDE	1	1	
7/15/91	N. JETTY:PASS SIDE	4	11	
7/17/91	S. JETTY:PASS SIDE	1	12	
7/18/91	N. JETTY:PASS SIDE	2	4	
7/18/91	N. JETTY:GULF SIDE	3	16	
7/27/91	S. JETTY:PASS SIDE	1	1	
7/27/91	N. JETTY:PASS SIDE	1	1	
7/28/91	N. JETTY:PASS SIDE	1	4	
7/29/91	S. JETTY:PASS SIDE	2	2	
8/06/91	S. JETTY:PASS SIDE	1	1	
8/07/91	N. JETTY:GULF SIDE	1	1	TAGGED TURTLE#
9/04/91	N. JETTY:PASS SIDE	3	3	
9/04/91	N. JETTY:GULF SIDE	1	1	
9/06/91	N. JETTY:GULF SIDE	1	2	
9/06/91	N. JETTY:PASS SIDE	2	7	
9/06/91	S. JETTY:PASS SIDE	1	7	
9/07/91	N. JETTY:GULF SIDE	1	2	
9/08/91	N. JETTY:GULF SIDE	5	5	TAGGED TURTLE#
9/08/91	N. JETTY:PASS SIDE	4	8	
9/08/91	S. JETTY:PASS SIDE	1	11	
9/09/91	N. JETTY:GULF SIDE	3	37	TAGGED TURTLE#
9/09/91	N. JETTY:PASS SIDE	2	5	
9/13/91	N. JETTY:GULF SIDE	5	15	TAGGED TURTLE#
9/13/91	S. JETTY:PASS SIDE	2	10	
9/14/91	N. JETTY:GULF SIDE	2	2	TAGGED TURTLE#
10/21/91	N. JETTY:GULF SIDE	3	15	TAGGED TURTLE#
10/21/91	N. JETTY:PASS SIDE	1	1	
10/21/91	S. JETTY:GULF SIDE	1	1	
10/21/91	S. JETTY:PASS SIDE	1	2	
10/25/91	S. JETTY:PASS SIDE	1	4	
10/25/91	N. JETTY:GULF SIDE	2	2	TAGGED TURTLE#2
10/25/91	N. JETTY:PASS SIDE	1	1	
10/26/91	N. JETTY:PASS SIDE	7	16	
10/26/91	N. JETTY:GULF SIDE	3	3	TAGGED TURTLE#2
10/26/91	S. JETTY:PASS SIDE	5	6	3-AT S.COVE
11/18/91	N. JETTY:PASS SIDE	6	6	2-AT N. COVE
12/08/91	N. JETTY:PASS SIDE	1	1	
12/10/91	S. JETTY:PASS SIDE	2	3	

Table 6. Continued.

DATE	LOCATION	# TURTLES SIGHTED	TOTAL SIGHTINGS	COMMENTS
12/10/91	N. JETTY:GULF SIDE	1	1	
12/11/91	N. JETTY:GULF SIDE	1	1	
12/11/91	N. JETTY:PASS SIDE	2	2	
12/11/91	S. JETTY:PASS SIDE	3	15	2-AT S. COVE
12/12/91	S. JETTY:PASS SIDE	2	7	ALL AT S. COVE
12/12/91	N. JETTY:GULF SIDE	1	1	
INCIDENTAL SIGHTINGS / UNIDENTIFIED TURTLES				
5/15/91	S. JETTY:PASS SIDE	1	1	AT S. COVE
7/17/91	LOWER LAGUNA MADRE CM	1	2	
7/24/91	LOWER LAGUNA MADRE CM	1	2	
7/25/91	S. BAY/MEXIQUITA FLATS	1	1	
7/26/91	S. BAY/MEXIQUITA FLATS	1	1	
8/01/91	S. BAY/MEXIQUITA FLATS	1	1	
11/22/91	S. BAY/MEXIQUITA FLATS	1	1	
	TOTAL	113	290	

and radio/sonic tagged) and released (Table 2) within the Brazos Santiago Pass (Station 11). This turtle was observed along the Gulf side of the North Jetty (Stations 17 and 19) at least monthly during August through October.

Habitat Characterization

Hydrological Monitoring: Water temperature (surface) across the entire study area during the characterization period (July - September) ranged from 25.0° C at Brazos Santiago Pass site on 22 July to 33.0° C at both Brazos Santiago Pass and South Bay/Mexiquita Flat sites on 5 - 6 August (Appendix Table 1). Homogenous readings averaging 28.7°C characterized water temperatures throughout the study area. The last week of July exhibited the highest degree of temperature fluctuation, with an average temperature of 26.8°C across the study area.

Surface salinity readings across the study area were relatively stable (Appendix Table 1). Values ranging from 33 ppt at Brazos Santiago Pass site on 8 September to 37 ppt lower Laguna Madre site on 6 September were indicative of a homogenous salinity regime during the characterization period. The average salinity for the entire study area was 35.3 ppt.

Sediment Analysis: Texture analyses indicated sand contributed the highest percentage of sediment across study area habitats (Table 7). Exceptions to this trend included Station 13, the uppermost station within the IWW, which exhibited the greatest percentage of clay and silt combined, and Station 28, a grassbed habitat in the South Bay/Mexiquita Flats site, having a deep (3 cm) silt layer above sand.

Table 7. Texture composition of sediment from South Padre Island study area stations.

STATION	CORE DEPTH (cm)	% COMPOSITION SAND	SILT	CLAY	SEDIMENT DESCRIPTION
1	0 - 2.5	57.55	20.54	21.91	fine muddy sand w/ shell hash
	2.5 - 7.0	40.57	26.71	32.72	sandy mud w/ less shell hash
2	0 - 6.0	69.25	17.08	13.67	muddy sand w/ shell hash
6	0 - 1.0	56.79	27.43	15.78	fine muddy sand (oxidized)
	1.0 - 7.0	42.74	33.19	24.07	black sandy mud
7	0 - 2.0	89.25	4.67	6.08	muddy sand w/ shell hash
8	0 - 1.0	69.82	17.55	12.63	fine muddy sand (slightly oxidized
	1.0 - 5.0	59.82	18.73	21.45	muddy sand
9	0 - 5.0	45.72	28.71	25.57	fine sandy mud
11	0 - 3.5	57.77	23.90	18.33	muddy sand w/ very little shell has
12	0 - 1.0	84.31	13.07	2.62	fine silty sand
	1.0 - 5.0	87.82	6.41	5.77	muddy sand
13	0 - 1.5	17.09	25.12	57.79	oxidized sandy clay
	1.5 - 5.0	8.08	33.23	58.69	black silty clay
14	0 - 3.0	59.26	23.06	17.68	muddy sand w/ shell hash
15	0 - 8.0	35.32	31.03	33.65	fine sandy mud (oxidized)
17	0 - 1.0	45.71	7.15	47.14	sandy clay
	1.0 - 6.0	91.96	1.44	6.60	sand w/ shell hash
20	0 - 1.0	55.10	27.21	17.69	muddy sand
	1.0 - 6.0	58.06	34.26	7.68	muddy sand
23	0 - 7.0	90.00	4.31	5.69	sand
26	0 - 2.5	84.10	11.36	4.54	silty sand w/ shell hash
	2.5 - 6.0	61.96	16.36	21.68	fine muddy sand w/ shell hash
28	0 - 3.0	29.20	44.25	26.55	sandy mud
	3.0 - 8.0	37.98	36.92	25.10	sandy mud

Habitat Utilization: Five radio- and sonic-tagged turtles were tracked by NMFS to identify the utilization of habitats by turtles in the South Padre Island study area. Turtles used for tracking purposes included one loggerhead and four green sea turtles (Table 2). A brief summary of NMFS' tracking results is provided here as an insight to TAMU's selection of habitats which were characterized.

The first turtle to be tagged and tracked was a 72.5-cm SCL loggerhead captured from lower Laguna Madre Station 1 on 26 June. This turtle remained in the lower Laguna Madre throughout the tracking program and primarily utilized IWW channel habitat between Channel Markers 119 and 141 and adjacent grassbeds immediately east of the IWW (Fig. 7). The first green turtle to be tracked was a 34.2-cm SCL individual netted at Brazos Santiago Pass Station 11 on 15 July. After its release, this turtle continued to utilize jetty environs at Brazos Santiago Pass (Fig. 8). This turtle was commonly seen by TAMU observers along the Gulf side of the North Jetty (Stations 17 and 19) through October. The remaining three turtles used in NMFS' tracking program were all green turtles captured at Mexiquita Flats Station 15 (Table 2). The first of these was a 53.6-cm SCL green captured on 26 July that remained in grassbed habitats of Mexiquita Flats and the mouth of South Bay (Fig. 9). A similar habitat utilization pattern was exhibited by a 49.9-cm SCL green captured on 1 August. This turtle restricted its movements to grassbed habitats bordering the Brownsville Ship Channel along Mexiquita Flats and the northeastern shore of Brazos Island (Fig. 10). The last turtle to be tracked was a 54.1-cm SCL green taken on 1 August (Table 2). This individual exhibited the most wide-spread movement among tagged turtles (Fig. 11) by utilizing grassbed and/or channel habitat within all three TAMU study sites.

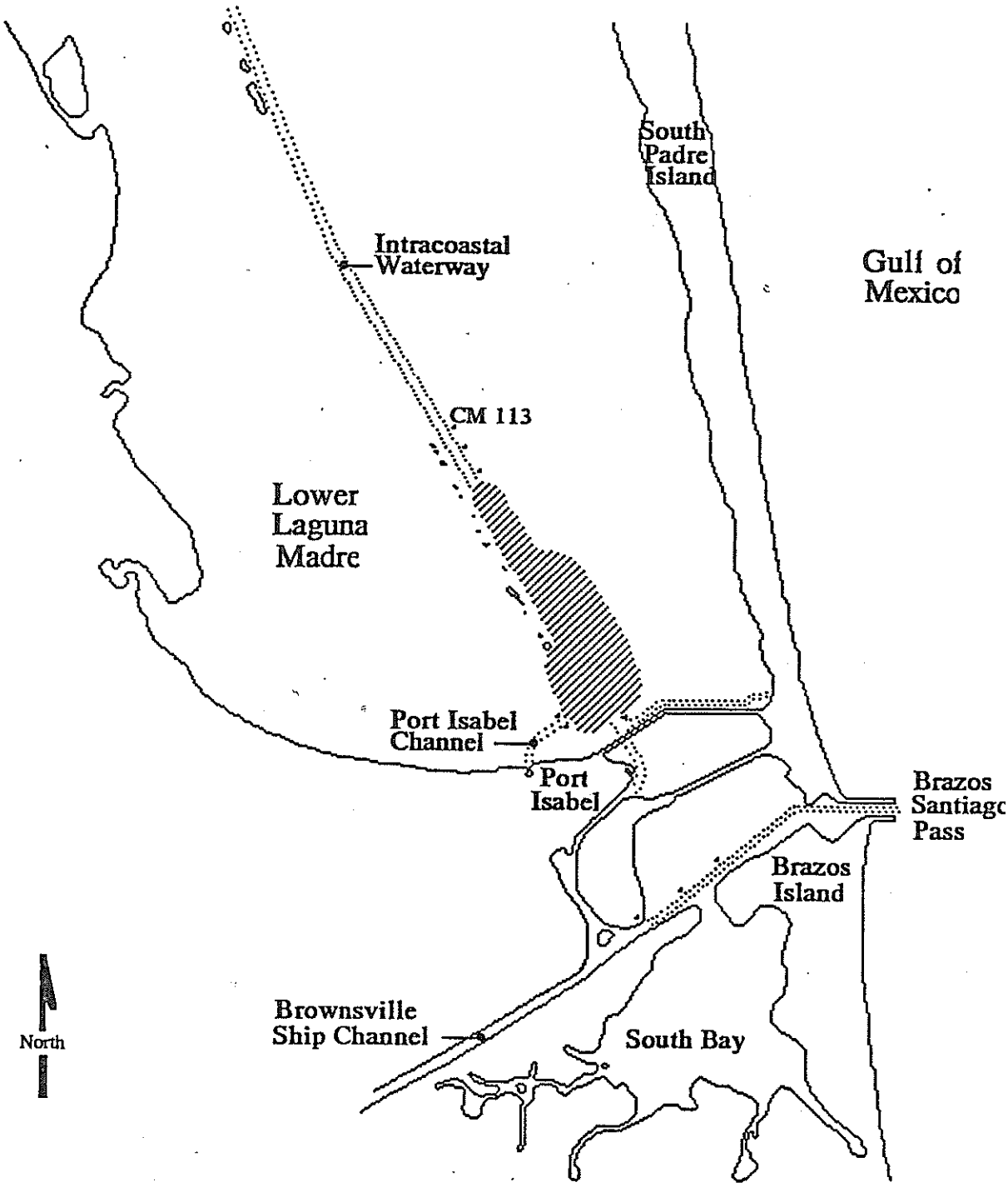

Figure 7. Areal extent of movement by a tagged (QQC 705, QQC 706, NNZ 752) loggerhead (Caretta caretta).

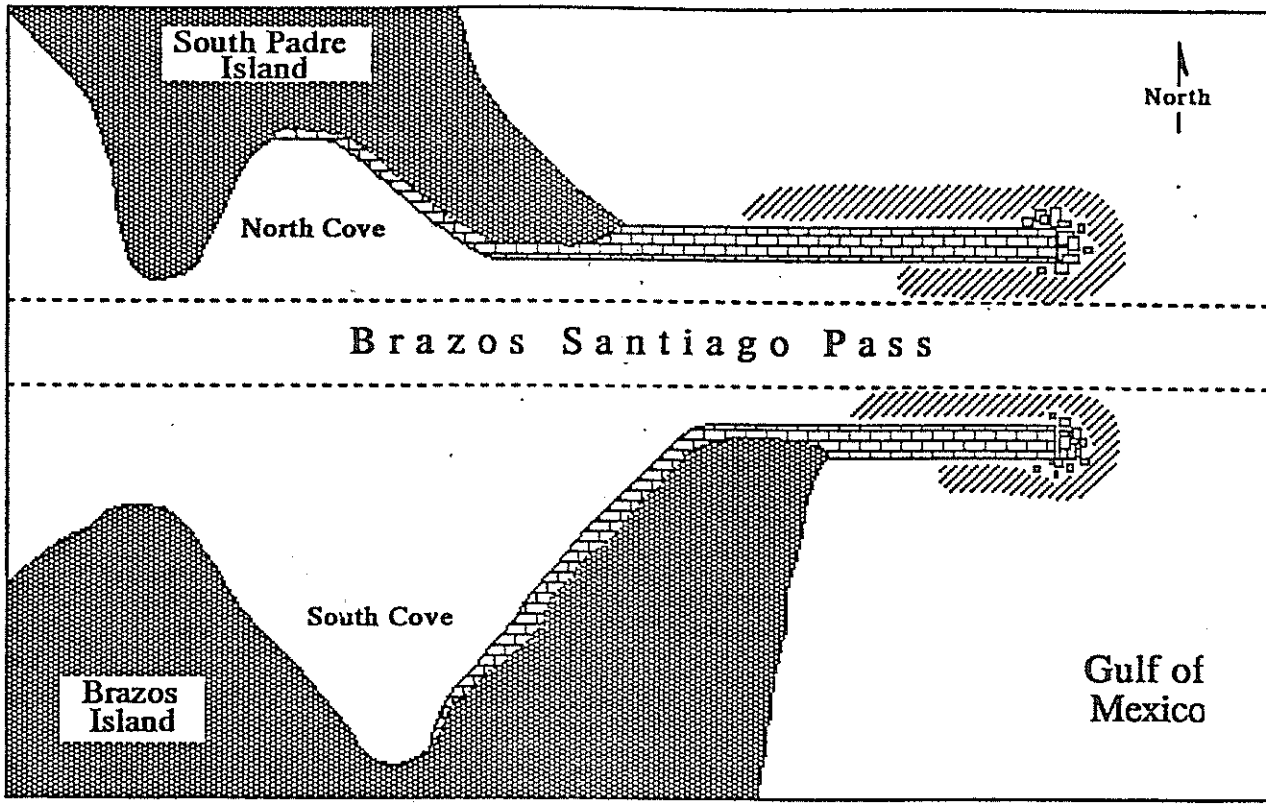

Figure 8. Areal extent of movement by a tagged (QQC 707, NNZ 612) 34.2 cm SCL green turtle (Chelonia mydas).

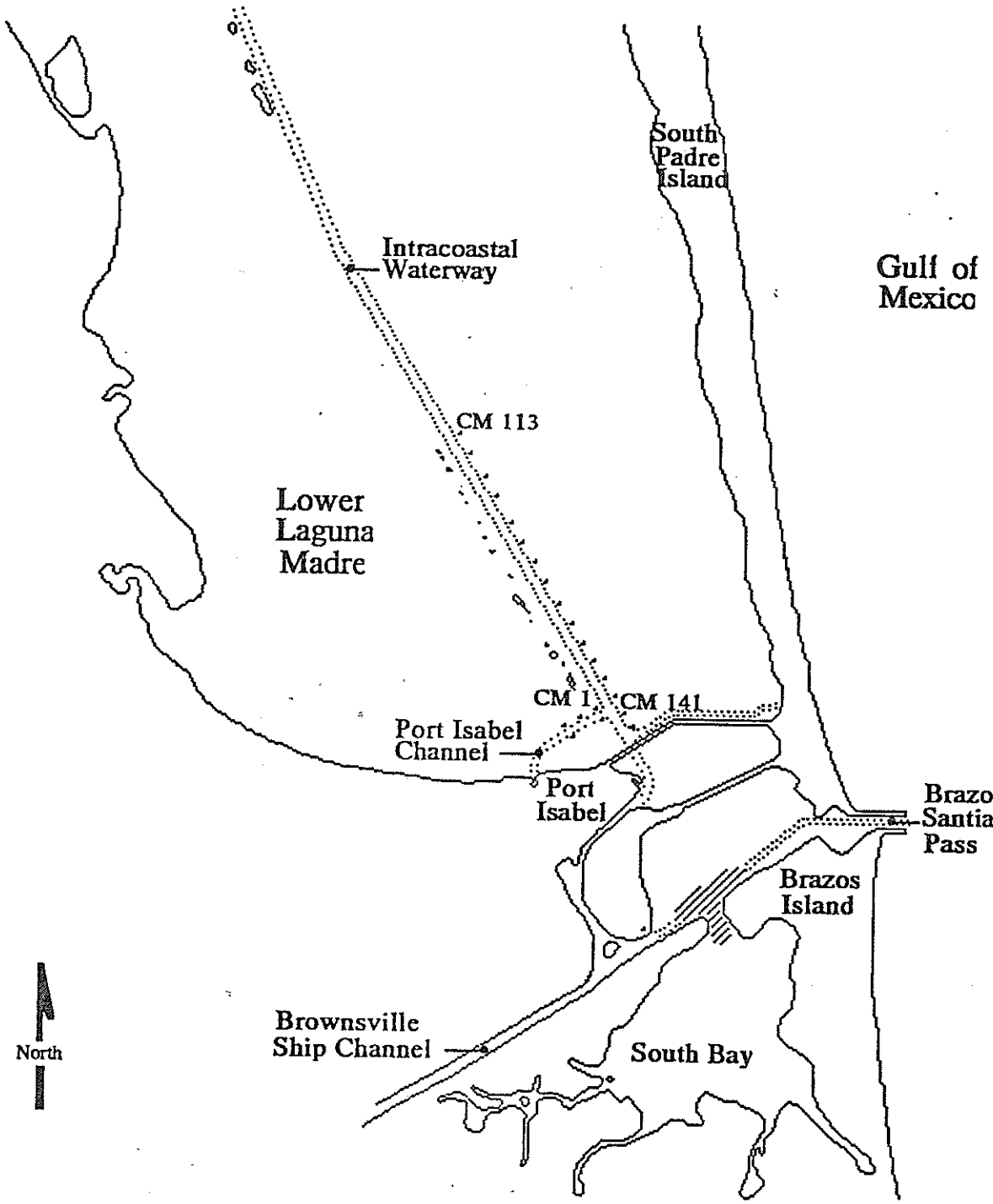

Figure 9. Areal extent of movement by a tagged (QQC 708, QQC 709) 53.6 cm SCL green turtle (Chelonia mydas).

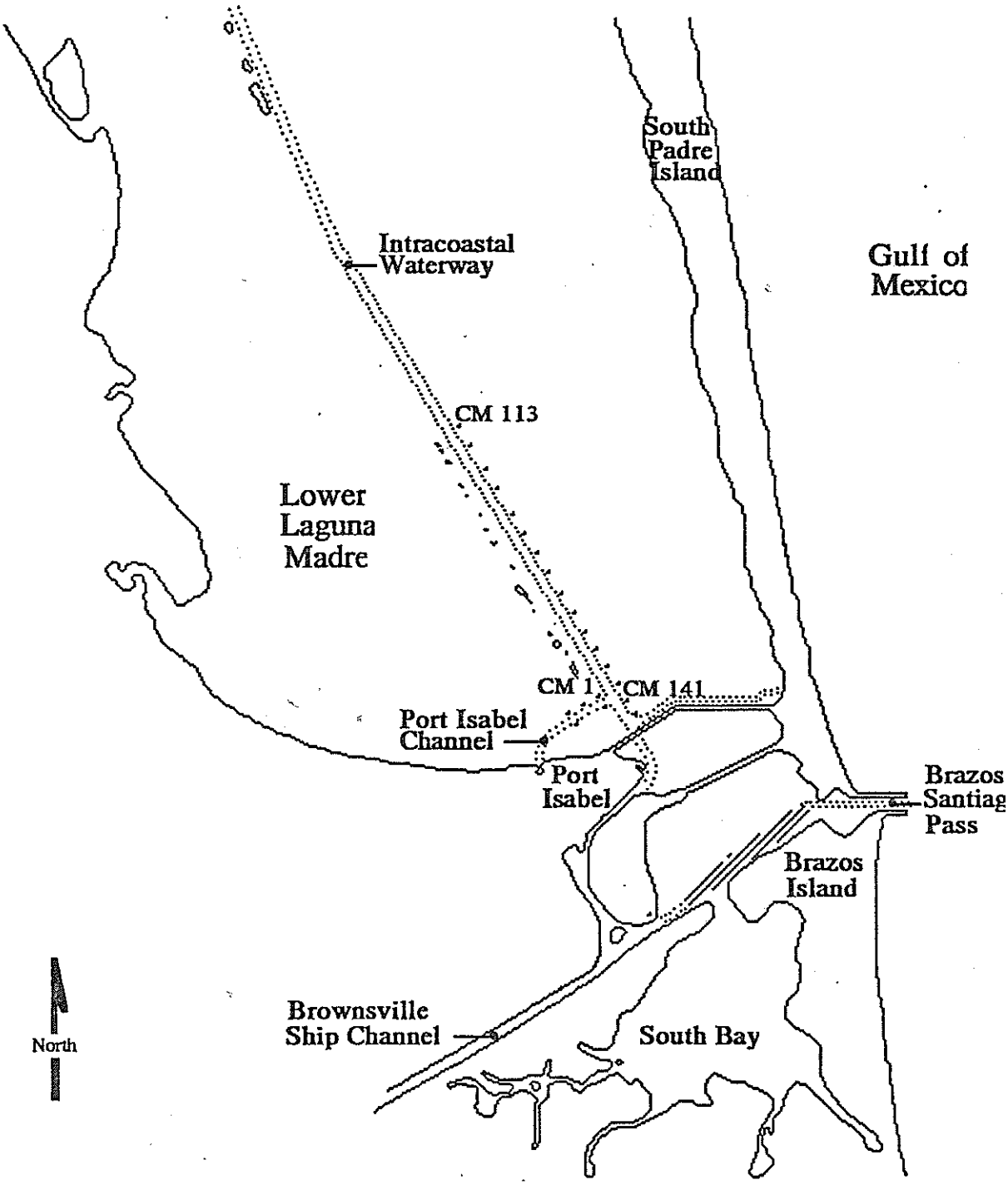

Figure 10. Areal extent of movement by a tagged (QQC 710, NNZ 611) 49.9 cm SCL green turtle (Chelonia mydas).

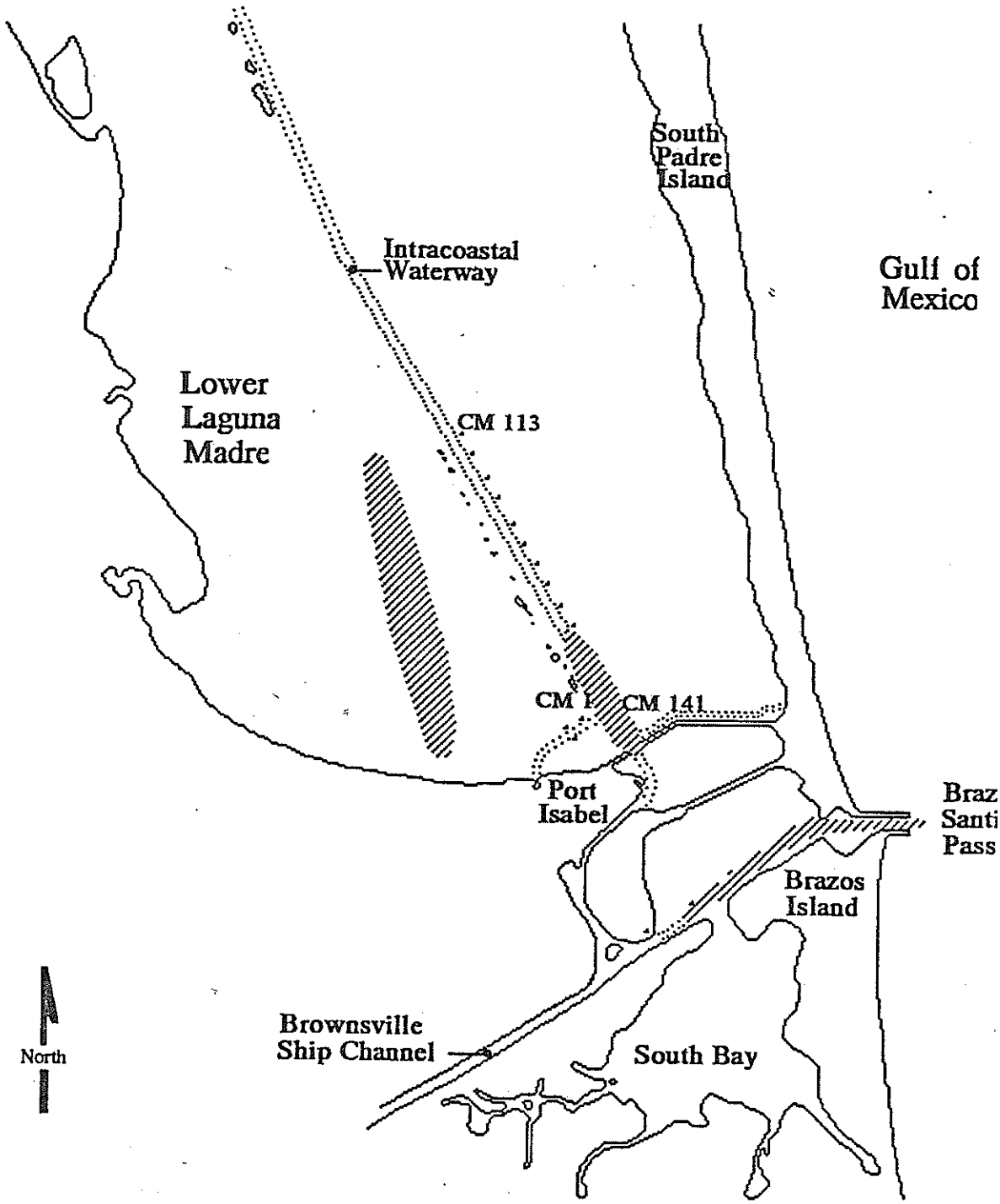

Figure 11. Areal extent of movement by a tagged (QQC 711, NNZ 753) 54.1 cm SCL green turtle (Chelonia mydas).

Brazos Santiago Pass Site - Jetty Description: The jetty habitat consisted of three distinct physical and biological zones. Physically, these zones differed in depth, bottom topography, and sediment type. Biological differences were evident in the concentrations and species diversity of the fouling communities (flora and fauna) and associated biota. The zones observed in all jetty habitats included:

Zone 1 - Partially exposed and submerged ($\leq$ 3 m deep) granite builders with various species and concentrations of fouling organisms. The most dominant fouling species (listed in order of abundance) observed (Table 8) were barnacles (*Balanus* sp.), algae (*Ulva fasciata, Podina vickersiae, Bryocladia thysigera*), sea urchins (*Arbacia punctulata*) and oyster spat (*Ostrea equestris*). This zone extends 5 - 10 m away from the jetty proper with a depth range of 1.8 - 3.0 m. The greatest diversity and concentration of fouling organisms were observed within this zone.

Zone 2 - Scattered granite boulders ($>$ 3 m deep) and rubble with a thin to moderate silt layer (increasing with depth). The abundance and diversity of the fouling organisms decreased from that in Zone 1 with the exception of oyster spat (the dominant species), stony coral (*Astrangia astreiformis*) and gorgonia (*Leptogorgia virgulata*). The sparse concentration of algae (particularly the filamentous alga *Ectocarpus siliculosus*) which occurred along the shallowest edge of this zone decreased with depth. This zone begins 6 - 15 m away from the jetty proper and is 5 - 10 m wide and 2 - 4.5 m deep. The greatest diversity of fishes was observed in this zone.

Table 8. Plant and encrusting taxa occurring in the South Padre Island study area during July - Octob

TAXON	STATIONS															
	Brazos Santiago Pass					SB/MF			Lower Laguna Madre							
	11	16	17	24	25	20	21	28	1	2	4	8	9	10	26	2
Halodule wrightii					D	X	X	X	X	X		X	X		X	X
Halophila engelmannii								X	X	X		X			X	
Syringodium filiforme					D	X	X	X	X	X	X	X	X	X	X	
Thalassia testudinum					D	X	X	X	X	X	X	X	X		X	X
Bryocladia thysigera	X	X	X													
Centroceras clavulatum			X													
Ceramium byssoideum	X	X	X													
Chondria littoralis					X			X		X		X	X		X	X
Cladophora albida		X														
Codium fragile				X												
Corallina cubensis	X					X	X	X	X	X		X				X
Dictyota dichotoma					X	X	X	X	X	X	X	X	X			
Ectocarpus siliculosus	X															
Gracilaria foliifera		X	X			X		X								
Hypnea musciformis								X	X	X	X	X	X		X	
Laurencia poitei			X			X	X	X	X	X	X	X	X		X	X
Lomentaria baileyana	X		X													
Myriotrichia subcorymbosa	X															
Podina vickersiae	X	X		X												
Rhodomenia pseudopalmata		X	X	X												
Sargassum filipendula	X			X										X		
Sargassum fluitans	X	X		X	X							X	X			
Sargassum natans	X	X				X		X	X					X		
Solieria tenera	X	X	X			X	X	X	X	X		X		X		
Spyridia filamentosa	X			X				X		X		X				
Ulva fasciata	X	X	X													
Ulvella lens		X														
Styela plicata														X		
Red sponge	X		X													
Sea Pen																
Coral	X															
Astrangia astreiformis	X		X		X											
Leptogorgia virgulata			X													
Ostrea equestris	X		X		X											
Balanus eburneus	X	X			X											
Balanus improvisus			X													
Bugula neritina		X				X		X		X						

PIC - Port Isabel Channel Markers 1 and 2
D - dead representatives of these species
SB/MF - South Bay/Mexiquita Flats

Zone 3 - Little to no scattered rubble, flat barren bottom with varying amounts of silt and scattered oyster shell. With the exception of the coves, which were barren rippled sand, the silt layer depth ranged from moderate (≥ 1.0 cm) to very heavy (≥ 15.2 cm). This zone begins 10 - 25 m away from the jetty proper with a depth range of 2.1 - 7.5 m. No vegetation and very sparse biota (few hermit crabs, few scattered gorgonia) were observed in this zone.

All stations within the Brazos Santiago Pass Site displayed this zonation with slight variations in depth, zone size and distance from the jetty proper. Differences in species diversity and abundance also were observed between stations. The vegetation diversity ranged from 14 species at Station 11 to three species at Station 25 (Table 8).

Brazos Santiago Pass Site - Trawl Survey: Channel habitat within Brazos Santiago Pass and immediately adjacent to the North and South Jetties was largely dominated by a varied ichthyofaunal assemblage (Tables 9 and 10 and Appendix Table 2). Four fish species, including Atlantic croaker (*Micropogonias undulatus* - 21.4%), pigfish (*Orthoprisitis chrysoptera* - 17.0%), pinfish (*Lagodon rhomboides* - 7.2%) and sand seatrout (*Cynoscion arenarius* - 6.9%), contributed over 52% of the total catch. Swimming crabs in the Family Portunidae were the only dominant invertebrate taxa (7.6%) at Brazos Santiago Pass channel habitats. The 42 taxa trawled from the two channel stations within this site represented species typically associated with reef structure [sea urchin (*Arbacia punctulata)*, pigfish, red snapper (*Lutjanus campechanus*), barred grunt (*Conodon nobilis*), hunchback scorpionfish (*Scorpaena dispar*) and Atlantic spadefish (*Chaetodipterus faber*)] as well as demersal transients known to migrate

Table 9. Demersal taxa collected at trawl stations in the South Padre Island study area. Nomenclature follov
that of Fotheringham and Brunenmeister (1989), Williams et al. (1989), and Robins et al. (1990).

TAXON	COMMON NAME
Unid. sponges	sponge
Leptogorgia setacea	sea whip
Unid. anemones	anemone
Unid. worms	worm
Diopatra cuprea	tube-building worm
Unid. snails	snail
Cerithidea pliculosa	horn shell
Crepidula fornicata	common Atlantic slipper shell
Cantharus cancellarius	cancellate cantharus
Busycon sp.	whelk
Busycon perversum	whelk
Anachis semiplicata	half-folded dove shell
F. Olividae	olive snail
Bulla striata	bubble shell
Aplysia brasiliana	sea hare
Unid. bivalves	bivalve
Anadra ovalis	blood ark
Noetia ponderosa	ponderous ark
Argopecten irradians amplicostatus	bay scallop
Ostrea equestris	horse oyster
Chione cancellata	cross barred venus
Loliguncula brevis	bay squid
Unid. barnacles	barnacle
Squilla empusa	mantis shrimp
F. Isopoda	isopod
Cymothoa excisa	
Bopryssa sp.	parasitic isopod
F. Amphipoda	amphipod
Unid. shrimp	shrimp
Penaeus aztecus	brown shrimp
Penaeus setiferus	white shrimp
Acetes americanus	net-clinger shrimp
Brachycarpus biunguiculatus	twoclaw shrimp
Leander paulensis	
Leander tenuicornis	brown grass shrimp
Palaemonetes sp.	grass shrimp
Palaemonetes intermedius	brackish grass shrimp
Palaemonetes pugio	daggerblade grass shrimp
Palaemonetes vulgaris	marsh grass shrimp
Alpheus heterochaelis	bigclaw snapping shrimp
Hippolyte pleuracantha	false zostera shrimp
Hippolyte zostericola	zostera shrimp
Tozeuma carolinense	arrow shrimp
F. Diogenidae	hermit crab
Clibanarius vittatus	thinstripe hermit crab
Isocheles wurdemanni	surf hermit crab
Pagurus pollicaris	flat claw hermit crab

Table 9. Continued.

TAXON	COMMON NAME
Calappa sulcata	yellow box crab
Hepatus epheliticus	calico box crab
Libinia sp.	spider crab
Libinia dubia	longnose spider crab
Stenorhynchus seticornis	yellowline arrow crab
Arenaeus cribrarius	speckled swimming crab
Callinectes exasperatus	rugose swimming crab
Callinectes rathbunae	sharptoothed swimming crab
Callinectes sapidus	blue crab
Callinectes similis	lesser blue crab
Ovalipes quadulpensis	lady crab
Portunus sp.	swimming crab
Portunus sayi	sargassum swimming crab
Portunus spinimanus	blotched swimming crab
Portunus ventralis	
F. Xanthidae	mud crab
Menippe adina	gulf stone crab
Neopanope texana	mud crab
Panopeus herbstii	Atlantic mud crab
Astropecten duplicatus	sea star
Arbacia punctulata	sea urchin
Molgula manhattensis	sea squirt
Rhinobatos lentiginosus	Atlantic guitarfish
Narcine brasiliensis	lesser electric ray
Dasyatis americana	southern stingray
Dasyatis sabina	Atlantic stingray
Gymnura micrura	smooth butterfly ray
Harengula jaguana	scaled sardine
Anchoa hepsetus	striped anchovy
Anchoa mitchilli	bay anchovy
Synodus foetens	inshore lizardfish
Arius felis	sea catfish
Opsanus beta	gulf toadfish
Porichthys plectrodon	Atlantic midshipman
Urophycis floridana	southern hake
Brotula barbata	bearded brotula
Hippocampus erectus	lined seahorse
Hippocampus zosterae	dwarf seahorse
Syngnathus floridae	dusky pipefish
Syngnathus louisianae	chain pipefish
Syngnathus pelagicus	sargassum pipefish
Syngnathus scovelli	gulf pipefish
Centropristis philadelphica	rock seabass
Diplectrum formosum	sand perch
Mycteroperca microlepis	gag
Mycteroperca rubra	comb grouper
Serranus subligarius	belted sandfish
Rachycentron canadum	cobia
Caranx crysos	blue runner
Caranx hippos	crevalle jack
Hemicaranx amblyrhynchus	bluntnose jack
Selene setapinnis	Atlantic moonfish

Table 9. Continued.

TAXON	COMMON NAME
Selene vomer	lookdown
Lutjanus campechanus	red snapper
Lutjanus synagris	lane snapper
Eucinostomus argenteus	spotfin mojarra
Eucinostomus gula	silver jenny
Eucinostomus harengulus	aggie mojarra
Eucinostomus melanopterus	flagfin mojarra
Conodon nobilis	barred grunt
Orthopristis chrysoptera	pigfish
Archosargus probatocephalus	sheepshead
Lagodon rhomboides	pinfish
Bairdiella chrysoura	silver perch
Cynoscion arenarius	sand seatrout
Cynoscion nebulosus	spotted seatrout
Cynoscion nothus	silver seatrout
Larimus fasciatus	banded drum
Leiostomus xanthurus	spot
Menticirrhus americanus	southern kingfish
Menticirrhus littoralis	gulf kingfish
Micropogonias undulatus	Atlantic croaker
Sciaenops ocellatus	red drum
Stellifer lanceolatus	star drum
Chaetodipterus faber	Atlantic spadefish
Polydactylus octonemus	Atlantic threadfin
Gobionellus boleosoma	darter goby
Gobiosoma bosc	naked goby
Gobiosoma robustum	code goby
Trichiurus lepturus	atlantic cutalassfish
Scomberomorus maculatus	Spanish mackerel
Peprilus burti	gulf butterfish
Scorpaena dispar	hunchback scorpionfish
Scorpaena plumieri	spotted scorpionfish
Prionotus rubio	blackfin searobin
Prionotus tribulus	bighead searobin
Ancylopsetta dilecta	three-eye flounder
Ancylopsetta quadrocellata	ocellated flounder
Citharichthys macrops	spotted whiff
Citharichthys spilopterus	bay whiff
Etropus crossotus	fringed flounder
Paralichthys albigutta	gulf flounder
Paralichthys lethostigma	southern flounder
Syacium gunteri	shoal flounder
Symphurus plagiusa	blackcheek tonguefish
Trinectes maculatus	hogchoker
Balistes capriscus	gray triggerfish
Monacanthus hispidus	planehead filefish
Lactophrys sp.	cowfish
Lactophrys quadricornis	scrawled cowfish
Lagocephalus laevigatus	smooth puffer
Chilomycterus schoepfi	striped burrfish

Table 10. Dominant (≥ 2 % of total catch) taxa in trawl tows at Brazos Santiago Pass channel stations (11,24) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=6 tows)	%
Unidentified sponges	41	6.83	8.02
F. Diogenidae	14	2.33	2.74
F. Portunidae	39	6.50	7.63
Portunus spinimanus	18		3.52
Rhinobatos lentiginosus	13	2.17	2.54
Eucinostomus argenteus	16	2.67	3.13
Orthopristis chrysoptera	87	14.50	17.03
Lagodon rhomboides	37	6.17	7.24
Cynoscion arenarius	35	5.83	6.85
Leiostomus xanthurus	15	2.50	2.94
Micropogonias undulatus	108	18.00	21.14
Polydactylus octonemus	19	3.17	3.72
Trichiurus lepturus	20	3.33	3.91
All other taxa (28)	67	11.17	13.11
TOTAL	511	85.17	100.00

through channels [Atlantic guitarfish (*Rhinobatos lentiginosus*), Atlantic croaker, spot (*Leiostomus xanthurus*) and Atlantic cutlassfish (*Trichiurus lepturus*)]. Overall, catch per unit effort (CPUE) statistics for trawl tows (n=6) in channel habitats (85.2 organisms/tow) of Brazos Santiago Pass (Table 10) compared quite favorably with similar statistics from the lower Laguna Madre (78.0) and greatly surpassed that (27.0) from South Bay/Mexiquita Flats (Tables 11 and 12, respectively).

Barren hard-bottom habitats within the Brazos Santiago Pass site incorporated two cove stations (Station 16 - North Cove and Station 23 - South Cove) and three near-jetty stations (Stations 17 and 19-Gulf side of North Jetty; Station 25 - Gulf side of South Jetty) where fish, particularly spot (22.0%), pinfish (17.3%), and pigfish (11.7%), were dominant (Table 13). As with trawl catch statistics from the adjacent channel habitat, the only dominant invertebrates were a collective assemblage of swimming crabs in the Family Portunidae (4.7%). Except for a low species diversity along the Gulf side of the South Jetty (Station 25), species assemblages were rather similar across the barren-bottom habitats adjacent to Brazos Santiago Pass (Appendix Table 3) and reflected a mixture of organisms typically associated with channel and reef ecosystems. Overall, CPUE at barren-bottom stations was approximately half that at Brazos Santiago Pass channel stations while species diversity at these habitats was very similar (Tables 13 and 10, respectively, and Appendix Tables 3 and 2, respectively).

<u>South Bay/Mexiquita Flats Site - Vegetation Analysis</u>: Grassbed habitat within the South Bay/Mexiquita Flats site extended from the north side of the Brownsville ship Channel (BSC) across Mexiquita Flats (Fig. 12). Narrow grassbeds also run along the south side of the BSC

Table 11. Dominant* taxa in trawl tows at Lower Laguna Madre channel stations (3,5,6,7,13,18) during July-September 1991.

TAXON	TOTAL CATCH		CPUE (n=33 tows)	%	
Loliguncula brevis	175		5.30	6.80	
Penaeus aztecus	1		0.03	0.04	
Acetes americanus	193		5.85	7.50	
Hippolyte pleuracantha	352		10.67	13.68	
F. Diogenidae	70		2.12	2.72	
Clibanarius vittatus	58		1.76	2.25	
F. Portunidae	479		14.52	18.62	
Callinectes sapidus		363			14.11
Callinectes similis		97			3.77
Eucinostomus argenteus	148		4.48	5.75	
Eucinostomus harengulus	126		3.82	4.90	
Orthopristis chrysoptera	62		1.88	2.41	
Lagodon rhomboides	179		5.42	6.96	
Cynoscion arenarius	72		2.18	2.80	
Micropogonias undulatus	164		4.97	6.37	
All other taxa(74)	494		14.97	19.20	
TOTAL	2573		77.97	100.00	

* Those taxa comprising ≥ 2% of total catch after the deletion of Anchoa mitchilli (31095 individuals).

Table 12. Dominant (≥ 2 % of total catch) taxa in trawl tows at the South Bay/Mexiquita Flats channel station (22) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=3 tows)	%
Palaemonetes sp.	2	0.67	2.47
F. Diogenidae	2	0.67	2.47
Callinectes sapidus	10	3.33	12.35
Dasyatis sabina	3	1.00	3.70
Eucinostomus argenteus	31	10.33	38.27
Orthopristis chrysoptera	8	2.67	9.88
Lagodon rhomboides	7	2.33	8.64
Micropogonias undulatus	7	2.33	8.64
Prionotus tribulus	2	0.67	2.47
Paralichthys albigutta	2	0.67	2.47
All other taxa (7)	7	2.33	8.64
TOTAL	81	27.00	100.00

Table 13. Dominant (≥ 2 % of total catch) taxa in trawl tows at Brazos Santiago Pass barren-bottom stations (16,17,19,23,25) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=15 tows)	%
F. Portunidae	32	2.13	4.86
Callinectes sapidus	14		2.09
Eucinostomus melanopterus	22	1.47	3.34
Orthopristis chrysoptera	79	5.27	12.01
Lagodon rhomboides	117	7.80	17.78
Cynoscion arenarius	54	3.60	8.21
Leiostomus xanthurus	149	9.93	22.64
Menticirrhus littoralis	15	1.00	2.28
Micropogonias undulatus	51	3.40	7.75
Ancylopsetta quadrocellata	19	1.27	2.89
All other taxa (39)	120	8.00	18.24
TOTAL	658	43.87	100.00

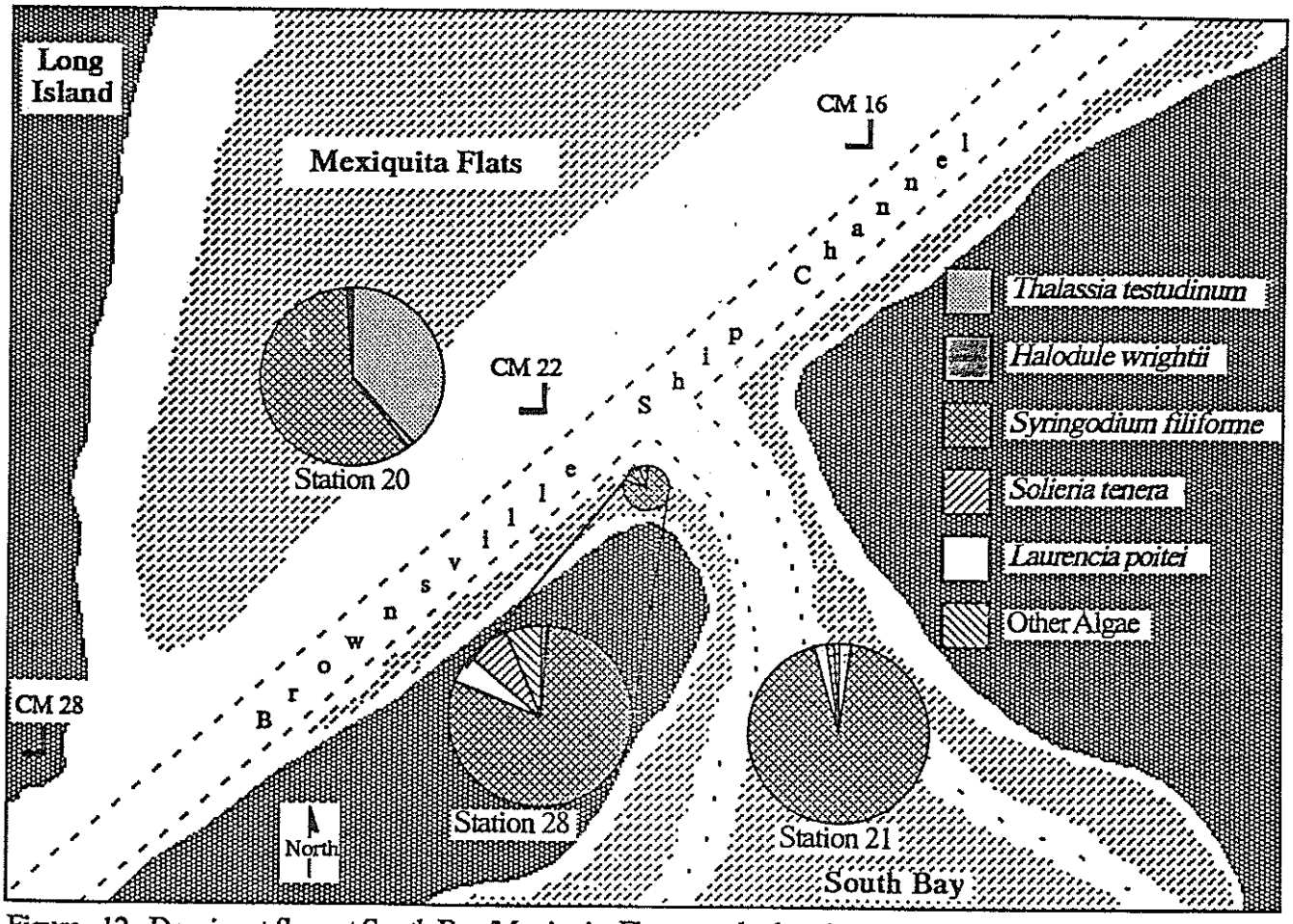

Figure 12. Dominant flora at South Bay/Mexiquita Flats grassbed stations.

and on both sides of the entrance channel into South Bay, where they expand into the bay proper. There are three grassbed stations at this site (Fig. 12): Station 20 lies to the north of the BSC between Channel Marker 22 and Long Island; Station 21 at the northernmost edge of South Bay grassbeds; and Station 28 at the northwestern edge of the entrance channel into South Bay.

Manatee grass (*Syringodium filiforme*) was the dominant sea grass species within grassbed habitats at South Bay/Mexiquita Flats stations (Fig. 12 and Appendix Table 4). Station 20 contained 61.65% manatee grass as well as large amounts of turtle grass (*Thalassia testudinum*, 36.10%), with very little shoal grass (*Halodule wrightii*, 1.11%) and traces of seven algal species (1.13%). Station 21 contained 93.32% manatee grass with a small amount of shoal grass (2.09%) and turtle grass (0.11%). Traces (3.48%) of four algae species also were found. Station 28 contained 79.52% manatee grass with traces of turtle grass and shoal grass, 1.05% and 0.69% respectively. This station had the greatest algal abundance, with 7.41% *Solieria tenera*, 5.08% *Laurencia poitei*, and 6.26% of nine other algae species.

Blade height statistics indicated that all three dominant sea grass species exhibited greatest growth at Station 28 (Fig. 13). Sea grass development at Stations 20 and 21 varied with species (Appendix Table 5).

The physical arrangement of constituent sea grass and algal species was fairly consistent among South Bay/Mexiquita Flat stations. Sea grasses were randomly intermixed with algae including *Dictyota dichotoma, L. poitei, Hypnea musciformis, S. tenera, Corallina cubensis, Spyridia filamentosa, Chondria littoralis,* and *Gracilaria foliifera.* Algal species often were attached to, or wrapped around, seagrass blades. *Sargassum* spp. were found laying across

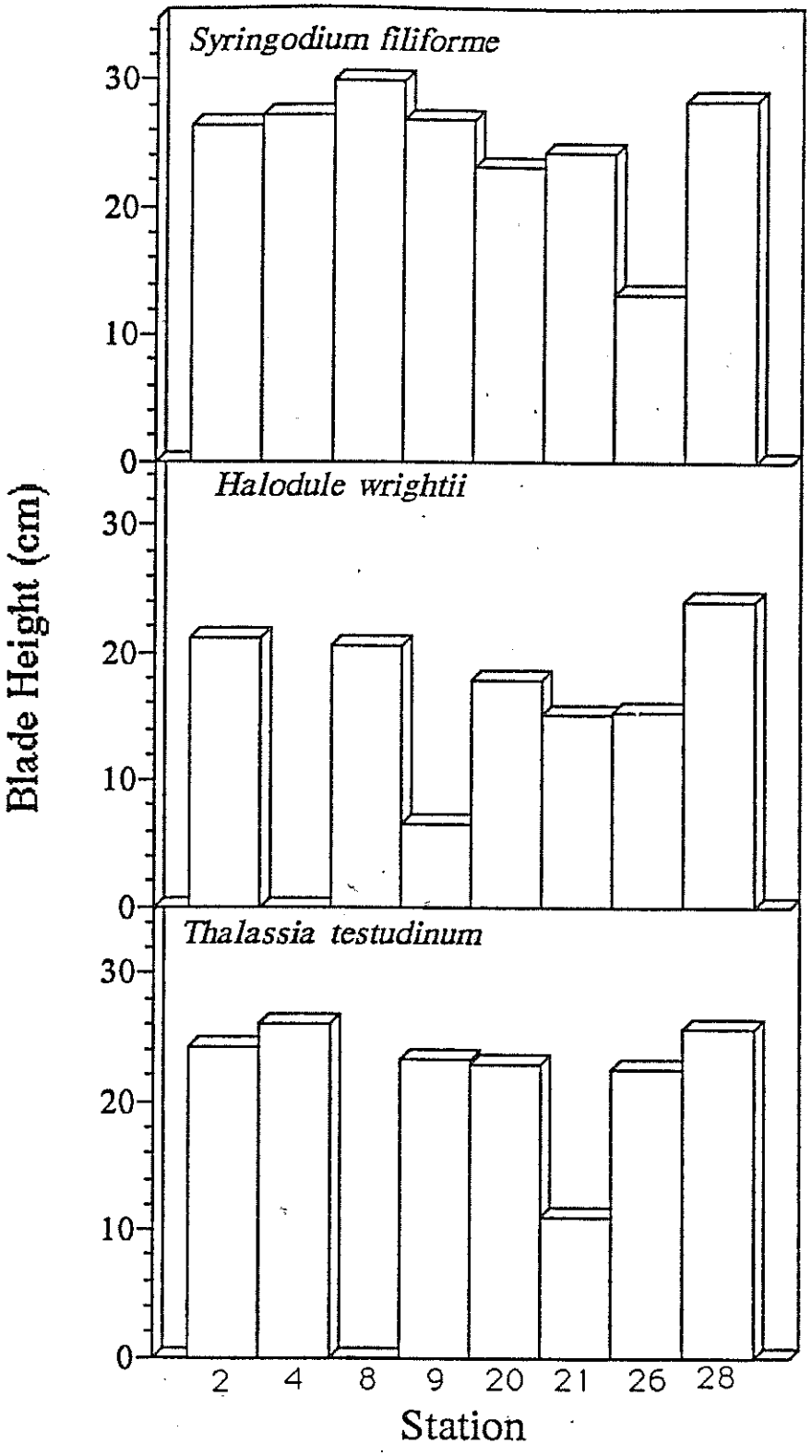

Figure 13. Blade height (cm) of dominant seagrass species at grassbed stations.

grassbeds, and the aquatic plant *Halophila engelmannii* was occasionally observed growing among sea grasses. In all cases where the bryozoan *Bugula neritina* was encountered in grassbed habitat, it was found to be epiphytic on seagrass blades.

South Bay/Mexiquita Flats Site - Trawl Survey: South Bay/Mexiquita Flats was a relatively small, well-confined site with grassbed, barren-bottom and channel habitats in close proximity to one another (Fig. 3). For this reason, only five trawl stations (20, 21 and 28 - grassbed; 15 - barren-bottom; 22 - channel) were deployed at this site. Grassbed, barren-bottom and channel habitats ranked first, second and third, respectively, in CPUE and number of species statistics at the South Bay/Mexiquita Flats site (Tables 14, 15 and 12). The 52 assorted taxa caught in grassbed trawls (Table 14 and Appendix Table 6) were dominated by pinfish (43.7%) and, to a lesser degree, the arrow shrimp (*Tozeuma carolinense* -12.4%). All other dominant taxa were invertebrates (primarily shrimp in the genus *Penaeus* or *Hippolyte*) with percent contributions to the total catch $\leq$ 6.5%. Nevertheless, the grassbed faunal community at this site was distinguished by a wide array of invertebrate taxa, whose diversity (Appendix Table 6) rivaled that of lower Laguna Madre grassbeds. One exception to these similarities in invertebrate diversity was the failure of South Bay/Mexiquita Flats grassbeds to yield blue crab (*Callinectes sapidus*) abundances comparable to those in the lower Laguna Madre (Tables 14 and 16).

Barren-bottom (Station 15) and channel habitats (Station 22) within the South Bay/Mexiquita Flats site exhibited faunal communities similar to those in grassbed habitat (Tables 13, 12 and 14, respectively). Barren-bottom provided prime habitat for four dominant demersal taxa - pinfish (34.1%), pigfish (11.4%), aggie mojarra (*Eucinostomus harengulus* -

Table 14. Dominant (≥ 2 % of total catch) taxa in trawl tows at South Bay/Mexiquita Flats grassbed stations (20,21,28) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=9 tows)	%
Unidentified snails	70	7.78	4.95
Penaeus aztecus	85	9.44	6.01
Hippolyte pleuracantha	78	8.67	5.51
Hippolyte zostericola	47	5.22	3.32
Tozeuma carolinense	175	19.44	12.37
F. Xanthidae	41	4.56	2.90
Neopanope texana	90	10.00	6.36
Lagodon rhomboides	618	68.67	43.67
All other taxa (43)	211	23.44	14.91
TOTAL	1415	157.22	100.00

Table 15. Dominant (≥ 2 % of total catch) taxa in trawl tows at the South Bay/Mexiquita Flats barren-bottom station (15) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=3 tows)	%
Aplysia brasiliana	26	8.67	8.20
F. Diogenidae	20	6.67	6.31
Callinectes sapidus	19	6.33	5.99
Callinectes similis	22	7.33	6.94
Synodus foetens	9	3.00	2.84
Eucinostomus gula	17	5.67	5.36
Eucinostomus harengulus	33	11.00	10.41
Orthopristis chrysoptera	36	12.00	11.36
Lagodon rhomboides	108	36.00	34.07
All other taxa (13)	27	9.00	8.52
TOTAL	317	105.67	100.00

Table 16. Dominant* taxa in trawl tows at Lower Laguna Madre grassbed stations (2,4,8,9,26) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=24 tows)	%	
Unidentified shrimp	316	13.17	11.73	
Penaeus aztecus	66	2.75	2.45	
Palaemonetes sp.	148	6.17	5.49	
Hippolyte zostericola	109	4.54	4.04	
Tozeuma carolinense	138	5.75	5.12	
F. Portunidae	136	5.67	5.05	
Callinectes sapidus	129			4.79
F. Xanthidae	158	6.58	5.86	
Neopanope texana	126	5.25	4.68	
Opsanus beta	112	4.67	4.16	
Orthopristis chrysoptera	126	5.25	4.68	
Lagodon rhomboides	715	29.79	26.53	
All other taxa (71)	545	22.71	20.22	
TOTAL	2695	112.29	100.00	

* Those taxa comprising ≥ 2% of total catch after the deletion of Anchoa mitchilli (633 individuals).

10.4%) and *Callinectes* sp (12.9%) - which collectively contributed nearly 70% of the total catch (Table 13). Although much reduced, catches from the channel habitat community were taxonomically similar to those at barren-bottom habitat, with the spotfin mojarra (*Eucinostomus argenteus* - 38.3%) and blue crab (12.4%) comprising over 50% of the demersal population (Appendix Tables 2 and 3).

Lower Laguna Madre Site - Vegetation Analysis: Grassbed habitat within the lower Laguna Madre site extended north from the Queen Isabella Causeway between the Intracoastal Waterway IWW and South Padre Island (Fig. 4). Another grassbed immediately west of the IWW extended north from just above Port Isabel Channel and beyond Channel Marker 113. Smaller grassbeds were located west of IWW Channel Marker 135 at Walt's Bar and southwest of the intersection of the IWW and Port Isabel Channel.

Five grassbed stations were located at this site (Fig. 14): Station 2 in the westernmost portion of the grassbed covering Walt's Bar; Station 4 was 1.6 km east of the IWW between Channel Markers 131 and 133; Station 8 was 100 m southwest of Port Isabel Channel Marker 1; Station 9 was 600 m east of IWW Channel Marker 135; and Station 26 was 0.5 km west of IWW Channel Marker 135.

Turtle grass, was the dominant sea grass species across the lower Laguna Madre site (Fig. 14 and Appendix Table 4). Station 2 contained 48.42% turtle grass with 20.88% manatee grass and 14.32% shoal grass. There were also significant amounts of the algae *S. tenera* and *L. poitei*, 6.99% and 5.03% respectively. Seven other algal species made up the remaining 4.34%. Station 9 contained 56.62% turtle grass with 19.81% manatee grass and almost no shoal

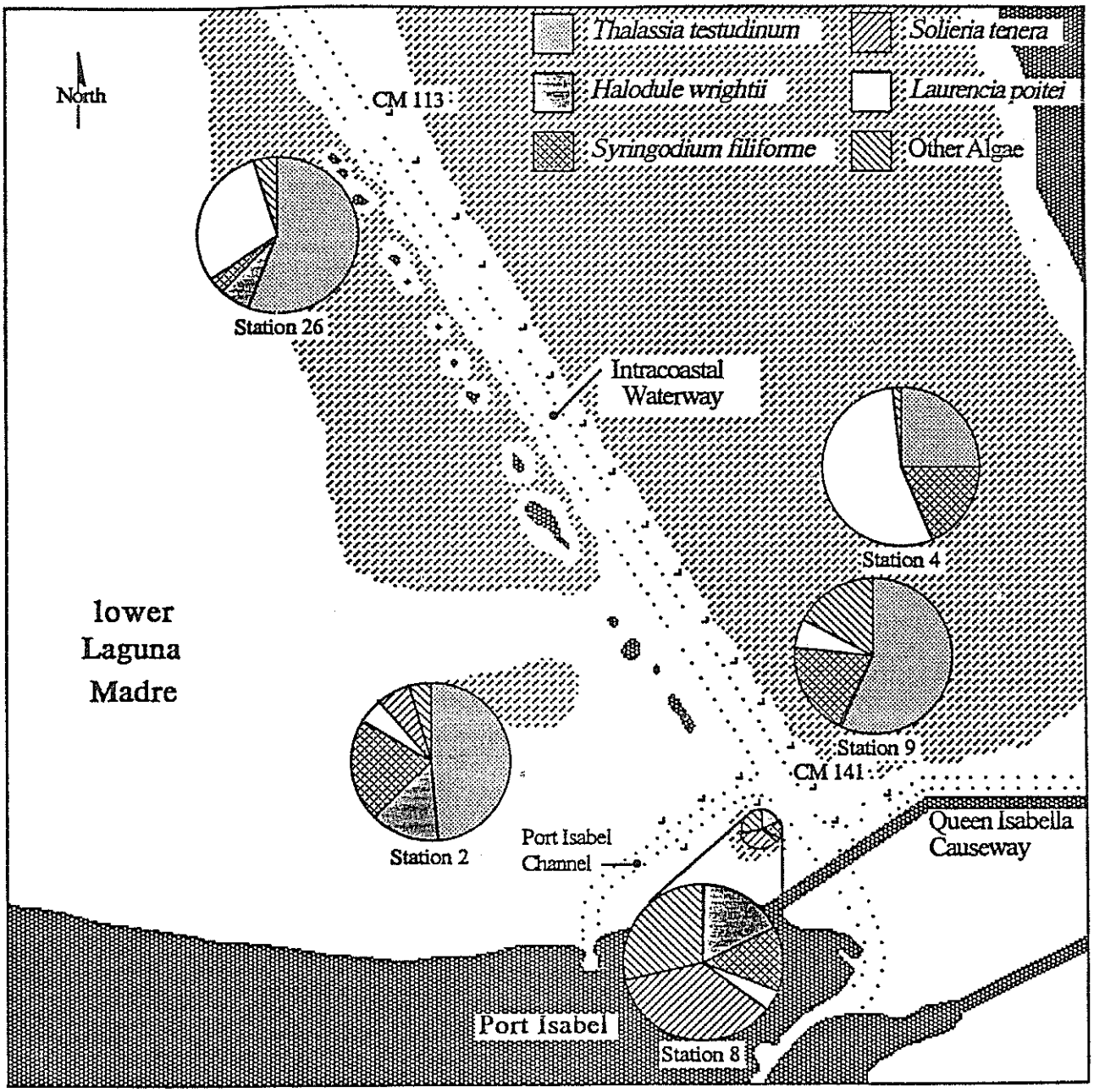

Figure 14. Dominant flora at lower Laguna Madre grassbed stations.

grass (0.24%). There was also a great abundance of the algae *H. musciformis* (15.69%) and *L. poitei* (5.76%). Two other algal species made up the remaining 1.88%. Station 26 contained 55.52% turtle grass with lesser amounts of shoal grass and manatee grass, 6.69% and 3.12% respectively. *L. poitei* made up 29.80% of the vegetative biomass and three other algae made up the remaining 4.87%. The grassbed habitats at Stations 4 and 8 were dominated by algal species. Station 4 contained 54.67% *L. poitei* and 1.81% of two other algae. Turtle grass and manatee grass also had a strong presence here, making up 24.90% and 18.62% of the vegetative biomass, respectively. Station 8 was dominated by *S. tenera* (36.07%) with another 15.29% made up of *C. cubensis*. Seven other algae made up another 17.67%. Shoal grass was the dominant sea grass species (17.10%) with 13.29% manatee grass and very little turtle grass (0.58%).

Blade height statistics indicated fluctuating development of all sea grass species across all of the stations (Fig. 13). The physical arrangement of the various sea grasses and algae was similar to that found in the South Bay/Mexiquita Flats site.

Lower Laguna Madre Site - Trawl Survey: Trawl tows (n=33) at six lower Laguna Madre stations (3, 5, 6, 7, 13 and 18) in IWW channel habitat produced 89 demersal taxa comprised of 33,668 organisms (Appendix Table 2), 92.5% (31,095 individuals) of which were bay anchovy (*Anchoa mitchilli*). Anchovy abundance statistics greatly overshadowed those of other inhabitants of the IWW and were misleading since 97% of this species' total was taken at one station (6). Consequently, bay anchovies were deleted from trawl catches at IWW stations in an effort to better define the contribution of constituent taxa to channel communities (Table 11).

This deletion resulted in channel communities being dominated (65.1% of revised catch totals) by seven taxa - four invertebrates [bay squid (*Loliguncula brevis*) 6.8%; net-clinger shrimp (*Acetes americanus* -7.5%) false zostera shrimp (*Hippolyte pleuracantha* - 13.7%) blue crabs (17.9%) and three fishes (aggie mojarra - 5.8%; pinfish - 7.0%; Atlantic croaker - 6.4%). Although the lower Laguna Madre site contained a larger number of sampling stations and received more trawling effort, channel habitat in this site probably exhibited a greater diversity and abundance of demersal taxa than that in similar habitats at Brazos Santiago Pass and South Bay/Mexiquita Flats sites (Tables 11, 10 and 12, respectively). This was particularly true for invertebrate taxa including squid, and penaeid shrimp and portunid swimming crabs which are common food sources for the loggerhead sea turtle. Occupation of the six IWW stations by the loggerhead during summer months (Fig. 7) was concurrent with moderate to high abundance of bay squid, penaeid shrimp, callinectid crabs and demersal fish species whose size made these species an attractive food item.

Barren-bottom stations in the lower Laguna Madre incorporated three hard-bottom (Stations 1, 14 and 27) and two dredge-spoil (Stations 10 and 12) habitats which collectively (n=21 tows) produced 49 demersal taxa comprised of 4271 individuals (Table 17). The demersal community at barren-bottom habitats resembled that in the IWW. The bay anchovy, due to large abundance of this schooling species at station 1, accounted for 67.9% of the total catch over barren-bottom habitat (Table 17). Deleting the bay anchovy from barren-bottom catches resulted in blue crab (16.4%), pigfish (13.7%) and pinfish (22.3%) representing over half (52.4%) of revised faunal totals for this habitat. Other dominant species known to be food sources for the loggerhead which occupied at least three barren-bottom stations during summer

Table 17. Dominant* taxa in trawl tows at Lower Laguna Madre barren-bottom stations (1,10,12,14,27) during July-September 1991.

TAXON	TOTAL CATCH	CPUE (n=21 tows)	%	
Loliguncula brevis	29	1.38	2.12	
Penaeus aztecus	42	2.00	3.06	
Palaemonetes sp.	59	2.81	4.30	
Tozeuma carolinense	105	5.00	7.66	
F. Diogenidae	40	1.90	2.92	
F. Portunidae	248	11.81	18.09	
Callinectes sapidus		224		16.43
Centropristis philadelphica	52	2.48	3.79	
Eucinostomus argenteus	66	3.14	4.81	
Orthopristis chrysoptera	188	8.95	13.71	
Lagodon rhomboides	305	14.52	22.25	
All other taxa (48)	237	11.29	17.29	
TOTAL	1371	65.29	100.00	

* Those taxa comprising ≥ 2% of total catch after the deletion of Anchoa mitchilli (2900 individuals).

months included bay squid (2.1%) and brown shrimp (*Penaeus aztecus* - 3.1%). Station 1, the loggerhead capture site, yielded the highest CPUE (with and without anchovy abundance included), a wide assortment of invertebrate and fish taxa, and modest abundances of potential loggerhead food sources, including squid, blue crabs and other portunid swimming crabs (Appendix Table 3). Other notable findings within barren-bottom habitats were the diverse demersal communities at active dredge spoil sites (Stations 10 and 12) frequented by the loggerhead (Appendix Table 3 and Fig. 7). Catches at theses stations included sizeable percentages of potential loggerhead food items such as blue crabs (5.9% to 30.6%) and brown shrimp (3.0 to 7.1%). Collectively, barren-bottom habitats at the lower Laguna Madre site produced trawl catches which compared favorably with those from similar habitat at Brazos Santiago Pass and South Bay/Mexiquita Flats sites (Appendix Tables 3).

Trawl tows (27) at the five lower Laguna Madre grassbed stations (2, 4, 8, 9 and 26) produced 73 taxa comprised of 4139 individuals (Table 16). As with catches from channel and barren bottom habitats, bay anchovy (1372 individuals) dominated (33.1%) grassbed communities (Table 16 and Appendix Table 6). Other dominant taxa, after omission of bay anchovy, included pinfish (26.9%), three other less abundant fish species (collectively 12.1%) and a much broader array of dominant invertebrate taxa than was taken at channel and barren-bottom habitats with the lower Laguna Madre site (Tables 16, 11 and 17, respectively). Prominent among dominant invertebrate taxa were species such as brown shrimp (2.4%), blue crabs (7.3%) and xanthid mud crabs (5.8%) that represent potential food items for the loggerhead which frequented grassbed habitats (Stations 4, 8 and 9) immediately adjacent to the IWW channel environs. A comparison of dominant taxa at lower Laguna Madre grassbed

stations with those from South Bay/Mexiquita Flats (Tables 16 and 14, respectively) revealed invertebrates comprising larger percent of trawl catches at the former site while pinfish abundance greatly overshadowed that for other taxa from the latter site.

Fecal Pellet Analysis: Fecal samples obtained from 18 green turtles contained minute pieces of algae and/or sea grass in a partially digested state (Table 18). Advanced digestion prevented algae from being identified to species. Sea grasses also were unidentifiable for the most part, except that about 20% of the epidermal tissue layers exhibited a speckling characteristic of manatee grass.

Earliest fecal pellet analyses were conducted on four green turtles captured at the Brazos Santiago Pass site between April and July (Table 18). Fecal contents of these turtles were similar, consisting mostly of algae with one sample containing an insect wing and an intact hydroid *Obelia*. Only one of four turtles from the Brazos Santiago Pass exhibited sea grass in its fecal contents. The remaining 14 fecal samples analyzed after July came from 12 turtles captured at the South Bay/Mexiquita Flats site and 2 incidental captures at the Brazos Santiago Pass site. All of these fecal contents were dominated by sea grasses, with traces of algae found occasionally. Also noted among these contents were an intact hydroid *Obelia* from one turtle and unidentified minute eggcasings found intact in six fecal samples.

Table 18. Fecal contents of green sea turtles (Chelonia mydas) captured in the South Padre Island study area during April - November 1991.

Date	Capture Site	Carapace Length (cm)	Fecal Contents
4/12/91	Brazos Santiago Pass	36.6	All algae
5/16/91	Brazos Santiago Pass	39.4	All algae, hydroid Obelia (intact)
5/16/91	Brazos Santiago Pass	37.5	All algae, insect wing (intact)
7/15/91	Brazos Santiago Pass	34.2	Mostly algae with some grass
7/26/91	Mexiquita Flats	53.6	Mostly grass with traces of algae
8/1/91	Mexiquita Flats	54.1	Mostly grass with traces of algae
8/1/91	Mexiquita Flats	49.9	Mostly grass with traces of algae, hydroid Obelia (intact)
9/12/91	South Bay	40.3	Mostly grass with traces of algae
10/22/91	Mexiquita Flats	58.8	Mostly grass with traces of algae
10/22/91	Mexiquita Flats	46.7	Mostly grass with traces of algae
10/22/91	Mexiquita Flats	48.2	Mostly grass with traces of algae
10/23/91	South Bay	40.2	Mostly grass with traces of algae
10/24/91	Mexiquita Flats	48.2	Mostly grass with traces of algae
11/18/91	Brazos Santiago Pass	26.0	Mostly grass with traces of algae
11/21/91	Mexiquita Flats	58.9	Mostly grass with traces of algae
11/21/91	Mexiquita Flats	45.3	Mostly grass with traces of algae
11/21/91	Mexiquita Flats	51.5	Mostly grass with traces of algae
11/22/91	Brazos Santiago Pass	28.6	Mostly grass with traces of algae

Discussion

Sea Turtle Capture

Capture statistics from this study indicate that entanglement netting was a reasonably effective method of catching sea turtles in the South Padre Island study area. Seventeen of 19 turtles captured during the study were taken in entanglement nets. These turtles exhibited a wide range of sizes (i.e., a 26.0-cm SCL green and a 72.5-cm SCL loggerhead) and were captured across a variety of jetty, channel and grassbed habitats, each with a unique array of environmental traits.

Deploying entanglement nets of different mesh sizes and depths facilitated capture of sea turtles across a wider array of habitats in the study area. Each entanglement net design demonstrated an ability to capture turtles. Shallow, small-mesh nets (3.7 m deep with 12.7-cm bar mesh) produced five turtles in 37 nets sets and were particularly effective in capturing the younger turtles inhabiting jetty environs. Small-mesh nets also tended to foul less frequently on jetty rocks, and when fouled with vegetation, were effectively cleaned with a change in tides. Deployment and sampling efficiency of shallow, small-mesh nets became more restricted with an increase in water depth and current speed. Deeper, large-mesh nets (4.9 m deep with 25.4-cm bar mesh) yielded 12 turtles in 53 net sets. These larger nets, although less effective in jetty habitats, were less restricted by depth and current, produced a smaller volume of by-catch and were probably less visible to potential prey.

Numerous sightings of turtles near the North and South Jetties at Brazos Santiago Pass accentuated the importance of jetties as a turtle capture site. However, capture success at the

jetties was compromised by this habitat's rugged physical setting. This dilemma could be solved by deploying turtle encirclement techniques with nets modified to negate depth restrictions and bottom obstructions. Increasing the depth of the small-mesh net design to 7.4 m and adding chafing gear along the leadline is one modification that will be evaluated at jetty environs during Summer 1992.

Habitat Utilization

The South Padre Island study area provided a variety of habitats suitable for utilization by green and loggerhead turtles. Capture of turtles in nets deployed at the Brazos Santiago Pass site as well as numerous sea turtle sightings at this site from April through November were indicative of the Pass' role as a major corridor to an array of habitats frequented by turtle species. Three habitats - jetty, channel and grassbed - were utilized in one fashion or another by green and loggerhead turtles.

TAMU's netting results and turtle sightings combined with NMFS' tracking data indicate that jetty and Brazos Santiago Pass environs were a primary habitat for green turtles. The jetty, with its varied array of attached algae species and crevices, may have provided a food source and refuge for younger greens frequently seen at this site. Numerous sightings of younger green turtles within Brazos Santiago Pass habitats throughout the study period and the strong site fidelity shown by one small radio/sonic tagged green (tag #'s QQC707/NNZ612) certainly suggest that jetty environs are important to younger cohorts of this species. Visual observations indicated this turtle remained along the Gulf side of the North Jetty long after the battery life of its tag expired. In addition, the size of green turtles captured and observed within Brazos

Santiago Pass habitats was much less than that of turtles from South Bay/Mexiquita Flats and lower Laguna Madre sites. Analyses of fecal pellets from greens captured at jetty habitats provided limited information on feeding habits. However, these analyses did indicate the possibility of young greens grazing on algae found at the jetties. In addition to using jetties as a feeding ground, green turtles exhibited a propensity for occurring at specific sites along the jetties. The radio- and sonic-tagged green turtle commonly seen at the North Jetty throughout the study was almost always sighted along a confined, near-jetty zone between Stations 17 and 19. This behavior may indicate that jetties provide young greens with refuge or a seasonal residence as well as a foraging area.

Capture data and/or NMFS' tracking results indicate that larger greens preferred grassbed habitats of South Bay/Mexiquita Flats and lower Laguna Madre sites over jetty habitats at the Brazos Santiago Pass site. The fact that all green turtles netted in grassbeds were noticeably larger than other smaller cohorts netted and frequently sighted at Brazos Santiago Pass habitats may indicate a segregation of the green sea turtle community by habitat and/or feeding preference. Turtles initially captured in grassbed habitats generally returned to these sites after being tagged. These turtles also tended to exhibit a wider range of movement than greens at the jetty, with this movement restricted to grassbed habitats. This "habitat fidelity", combined with fecal pellet analyses that indicate larger greens fed on sea grasses, support a theory of foraging-related partitioning of habitats within the study area by turtle size or feeding ability. The well developed grassbeds found throughout South Bay/Mexiquita Flats and lower Laguna Madre sites are typical of green turtle feeding grounds documented by numerous other studies.

Channel environs of the lower Laguna Madre were a preferred habitat for the only loggerhead captured during the study. This habitat, particularly that within the IWW between Channel Markers 119 and 141, harbored sizeable abundances of portunid swimming crabs, especially the blue crab. These high crab abundances and sizeable quantities of other possible loggerhead food items such as squid, penaeid shrimp and various demersal fish species made channel environs an attractive feeding grounds. The loggerhead would occasionally venture into adjacent grassbeds where crab abundances also were high. NMFS' data indicate that the loggerhead largely remained in the lower Laguna Madre site throughout the tracking period. Failure of this species to occupy channel habitats within Brazos Santiago Pass and South Bay/Mexiquita Flats sites may have resulted from reduced invertebrate abundances at these sites.

Extensive use of habitats within the South Padre Island study area by sea turtles precipitated some concern about potential impact to these communities from COE dredging operations. Maintenance dredging of the IWW channel and Brazos Santiago Pass poses a direct threat to species such as loggerhead and green turtles which use these habitats as foraging and/or refuge areas. Dredging activities represent a risk to these species through suction of turtles into intake-water ports and destruction of foraging grounds. Despite these concerns dredging operations along reaches of the IWW within the study area during a 2-week period in July did not appear to influence loggerhead movement and/or utilization of channel habitats. In addition, trawl samples taken at two active dredge spoil sites (Stations 10 and 12) yielded a varied assemblage of demersal organisms.

Additional investigations are needed to better define sea turtle dependence upon and utilization of habitats within the South Padre Island study area and to assess potential impacts

to these communities by COE dredging operations. Recommendations specific to these investigations include the following:

1. Seasonal Occurrence - The TAMU and NMFS studies provide considerable information on sea turtle occurrence and habitat utilization during summer and fall months. Similar monitoring efforts should be expended during winter and spring months to assess the possibility of turtles "overwintering" in the study area and to define those periods of reduced turtle abundance that could be scheduled for dredging operations. Use of longer-lived batteries in NMFS' tags would expand the length of time turtles could be tracked and, as such, provide a wider array of data on seasonal occurrence in the study area.

2. Habitat Utilization - Brazos Santiago Pass and South Bay/Mexiquita Flats sites received over 86% of the netting effort during the present study. An increased capture effort should be expended in the lower Laguna Madre site due to the potential attraction of sea turtles to its rich seagrass and channel habitats. The limited netting effort conducted in lower Laguna Madre prevented a true characterization of sea turtle occurrence in this site and compromised an assessment of impact to these turtles from COE dredging operations.

3. Feeding Ecology - Although two green turtles were sighted grazing on algae in the intertidal zone of the North Jetty, visual observations of most turtles feeding in the study area were difficult to make due to poor water clarity and the cryptic behavior of turtles. Furthermore, fecal pellet analyses provided limited insight to sea turtle feeding ecology. A more detailed cellular examination than that deployed during the present study is needed to improve taxomonic identificaton of seagrass and algae species. An analysis

of caloric content and nutritional value of dominant seagrass and algae species is needed to better define the role that jetty and grassbed habitats play in feeding ecology of green turtles in the study area.

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Appendix Table 1. Water temperature, salinity and conductivity levels at Brazos Santiago Pass, South Bay/ Mexiquita Flats and Lower Laguna Madre stations during July-September 1991.

		TEMPERATURE (C)		SALINITY (ppt)		CONDUCTIVITY (mohm/cm)	
DATE	STATION	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM
7/01/91	1	27.4	27.4	35.1	35.0	55.1	54.9
7/02/91	2	28.4	28.6	35.0	35.0	56.0	56.0
7/04/91	3	29.9	29.8	34.8	34.9	57.1	57.1
7/04/91	4	29.8	29.9	34.7	34.7	57.3	57.1
7/05/91	5	31.2	29.8	35.7	34.5	58.9	57.3
7/05/91	6	32.2	32.0	35.3	35.2	60.0	59.9
7/08/91	7	26.8	26.8	34.8	34.6	54.1	53.8
7/09/91	8	26.6	26.6	35.1	34.9	54.2	54.2
7/11/91	9	29.5	29.5	34.7	35.0	57.1	57.1
7/13/91	10	27.3	27.2	35.4	35.5	55.4	55.4
7/16/91	10	31.0	N/T	36.0	N/T	N/T	N/T
7/17/91	6	30.0	N/T	35.0	N/T	N/T	N/T
7/22/91	6	25.1	25.0	35.5	32.4	53.9	49.3
7/24/91	8	25.2	25.1	35.5	35.6	53.8	58.8
7/24/91	10	25.2	25.5	35.4	34.5	53.9	53.9
7/24/91	12	26.7	26.5	35.5	35.6	55.3	55.1
7/25/91	13	28.2	28.0	35.6	35.6	56.9	56.8
7/26/91	2	29.0	28.9	35.7	35.7	57.7	57.7
7/26/91	14	25.5	25.4	35.7	35.5	54.2	53.8
7/26/91	15	28.8	28.7	35.1	35.2	56.9	56.9
7/27/91	16	26.2	26.0	35.6	35.6	55.0	54.9
7/27/91	17	26.0	25.2	35.6	35.7	54.5	53.7
7/29/91	18	28.8	28.8	35.6	34.9	57.9	56.2
7/31/91	19	25.0	24.3	35.7	33.6	53.8	50.6
8/05/91	22	33.0	N/T	35.0	N/T	N/T	N/T
8/06/91	20	31.0	N/T	N/T	N/T	N/T	N/T
8/06/91	21	33.0	N/T	35.0	N/T	N/T	N/T
8/06/91	23	29.8	29.7	35.8	35.9	58.8	58.6
8/06/91	24	29.8	N/T	35.9	N/T	58.7	N/T
9/04/91	11	30.0	N/T	34.0	N/T	N/T	N/T
9/05/91	26	30.5	N/T	35.0	N/T	N/T	N/T
9/06/91	8	30.0	N/T	35.5	N/T	N/T	N/T
9/06/91	27	29.0	N/T	37.0	N/T	N/T	N/T
9/07/91	28	29.0	N/T	35.5	N/T	N/T	N/T
9/08/91	6	29.0	N/T	36.0	N/T	N/T	N/T
9/08/91	7	29.0	N/T	36.0	N/T	N/T	N/T
9/08/91	13	28.0	N/T	36.0	N/T	N/T	N/T
9/08/91	25	30.0	N/T	33.0	N/T	N/T	N/T

N/T- Not taken

Appendix Table 2. Abundance and size of nekton species in trawl tows at channel stations during July-September 1991.

STATION 3
7/4/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MAX
Aplysia brasiliana	1	1		2	0.19		
Argopecten irradians amplicostatus		1		1	0.10		
Loliguncula brevis	2	23	12	37	3.59		
Penaeus aztecus		1		1	0.10		
Palaemonetes sp.	1	1	2	4	0.39		
F. Diogenidae	7	17	9	33	3.20		
Callinectes sapidus	32	50	8	90	8.73	16	16
F. Xanthidae	1	2		3	0.29		
Arbacia punctulata		1		1	0.10		
Anchoa mitchilli	284	43	412	739	71.68	27	5
Arius felis	1	11		12	1.16	140	22
Synodus foetens	2			2	0.19		
Opsanus beta				1	0.10	16	1
Eucinostomus argenteus	12	37		49	4.75	28	5
Orthopristis chrysoptera	11	1		12	1.16	68	15
Lagodon rhomboides	14	14		28	2.72	69	13
Cynoscion arenarius	1			1	0.10	140	14
Micropogonias undulatus	6	1		7	0.68	98	14
Chaetodipterus faber		1		1	0.10	43	4
Gobiosoma robustum			1	1	0.10	25	2
Paralichthys albigutta	1			1	0.10	247	24
Monacanthus hispidus	1	2		3	0.29	59	6
Chilomycterus schoepfi	2			2	0.19	149	15
TOTAL	379	207	444	1031	100.00		

Appendix Table 2. Continued.

STATION 5
7/5/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Aplysia brasiliana	1	3		4	3.77		
Loliguncula brevis	2	1		3	2.83		
Penaeus aztecus	1	1		2	1.89	53	83
Palaemonetes sp.	1		1	2	1.89		
F. Diogenidae	1	1	2	4	3.77		
Hepatus epheliticuas			1	1	0.94		
Libinia sp.			1	1	0.94		
Callinectes sapidus	11	4	14	29	27.36	10	147
F. Xanthidae	1			1	0.94		
Gymnura micrura		1		1	0.94	299	299
Arius felis		2		2	1.89	244	244
Eucinostomus argenteus	8	8		16	15.09	31	58
Lagodon rhomboides	19	7		26	24.53	68	125
Micropogonias undulatus	7	3		10	9.43	97	145
Chaetodipterus faber	1	1		2	1.89	43	48
Gobiosoma robustum			1	1	0.94	126	126
Monacanthus hispidus	1			1	0.94	58	58
TOTAL	54	32	20	106	100.00		

Appendix Table 2. Continued.

STATION 6
7/5/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MA
Diopatra cuprea		1		1	0.01		
Loliguncula brevis	15	6	33	54	0.40		
Penaeus aztecus			2	2	0.01	62	
Penaeus setiferus			1	1	0.01	139	1
F. Diogenidae		4	5	9	0.07		
Callinectes sapidus	15	15	13	43	0.32	49	1
Harengula jaguana	1	4	2	7	0.05	22	
Anchoa hepsetus	1			1	0.01	69	
Anchoa mitchilli	4039	3758	5505	13302	98.02	30	
Opsanus beta			1	1	0.01	14	
Syngnathus pelagicus		1		1	0.01	116	1
Caranx hippos		1		1	0.01	76	
Selene vomer		1		1	0.01	24	
Eucinostomus argenteus	12	10	19	41	0.30	27	
Orthopristis chrysoptera	7	6	5	18	0.13	59	1
Lagodon rhomboides	9	1	7	17	0.13	48	1
Cynoscion arenarius	8	6	5	19	0.14	42	1
Cynoscion nebulosus			7	7	0.05	64	
Leiostomus xanthurus	4	3		7	0.05	63	
Menticirrhus americanus		1		1	0.01	78	
Micropogonias undulatus	8	9	7	24	0.18	73	1
Chaetodipterus faber	2		1	3	0.02	20	
Trichiurus lepturus			1	1	0.01	222	2
Ancylopsetta quadrocellata		2		2	0.01	97	
Citharichthys spilopterus		1		1	0.01	76	
Chilomycterus schoepfi	4		2	6	0.04	122	1
TOTAL	4125	3830	5616	13571	100.00		

Appendix Table 2. Continued.

STATION 6
7/17/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified sponges		1		1	0.01		
Unidentified snails	2			2	0.02		
Cantharus cancellarius		1		1	0.01		
Anachis semiplicata		1		1	0.01		
Loliguncula brevis	2	5	3	10	0.11		
F. Isopoda	1			1	0.01		
F. Amphipoda	1	1		2	0.02		
Penaeus aztecus	1			1	0.01	85	85
Penaeus setiferus	1	2	2	5	0.06	109	127
Acetes americanus	8	4		12	0.14		
F. Diogenidae	2	2		4	0.05		
Callinectes sapidus	24	24	22	70	0.80	36	142
Molgula manhattensis	1			1	0.01		
Harengula jaguana	1			1	0.01	24	24
Anchoa hepsetus	4	1	2	7	0.08	35	52
Anchoa mitchilli	3725	1421	3413	8559	97.73	25	43
Synodus foetens	1			1	0.01	105	105
Eucinostomus argenteus	3	3	4	10	0.11	27	59
Eucinostomus harengulus	2	4	1	7	0.08	27	31
Orthopristis chrysoptera	4		1	5	0.06	68	152
Lagodon rhomboides	3	3		6	0.07	56	122
Cynoscion arenarius	4	3	7	14	0.16	25	145
Micropogonias undulatus	5	9	12	26	0.30	32	155
Polydactylus octonemus		1		1	0.01	142	142
Trichiurus lepturus			1	1	0.01	410	410
Prionotus tribulus			1	1	0.01	102	102
Ancylopsetta quadrocellata	1	2		3	0.03	97	156
Citharichthys spilopterus			1	1	0.01	76	76
Etropus crossotus			1	1	0.01	66	66
Paralichthys albigutta			1	1	0.01	221	221
Syacium gunteri		1		1	0.01	76	76
Chilomycterus schoepfi			1	1	0.01	110	110
TOTAL	3796	1489	3473	8758	100.00		

Appendix Table 2. Continued.

STATION 6
7/22/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Ostrea equestris		1		1	0.01		
Loliguncula brevis	7	1	9	17	0.19		
Unidentified barnacles		7		7	0.08		
Squilla empusa			1	1	0.01		
Cymothoa excisa		1	1	2	0.02		
Penaeus aztecus	1		4	5	0.06	63	91
Penaeus setiferus	2		1	3	0.03	81	104
Acetes americanus	6	98	39	143	1.63		
Paleomonetes vulgaris	1			1	0.01		
Alpheus heterochaelis	2		5	7	0.08		
Hippolyte pleuracantha	5			5	0.06		
Callinectes exasperatus	1			1	0.01		
Callinectes sapidus	5	4	10	19	0.22	78	150
Callinectes similis	7	17	17	41	0.47	52	104
Portunus sp.	1			1	0.01	44	44
Neopanope texana		2		2	0.02		
Astropecten duplicatus	1			1	0.01		
Harengula jaguana	2	2	4	8	0.09	23	27
Anchoa hepsetus	2	3	4	9	0.10	40	103
Anchoa mitchilli	4255	1892	2198	8345	95.10	30	4
Opsanus beta	1			1	0.01	155	155
Caranx crysos		1		1	0.01	121	121
Caranx hippos		1		1	0.01	113	113
Selene setapinnis		1		1	0.01	36	36
Lutjanus campechanus	1			1	0.01	158	158
Lutjanus synagris	1			1	0.01	160	160
Eucinostomus argenteus	3	9	5	17	0.19	31	61
Eucinostomus gula	2			2	0.02	44	54
Eucinostomus harengulus		7	7	14	0.16	26	61
Orthopristis chrysoptera	7	2	3	12	0.14	71	121
Lagodon rhomboides	4	1	1	6	0.07	72	113
Cynoscion arenarius	11	4	4	19	0.22	51	151
Cynoscion nebulosus		4		4	0.05	29	33
Cynoscion nothus	2		2	4	0.05	58	61
Micropogonias undulatus	17	21	16	54	0.62	89	181
Trichiurus lepturus		9	4	13	0.15	219	317
Ancylopsetta quadrocellata	1	1	1	3	0.03	81	151
Chilomycterus schoepfi		2		2	0.02	71	91
TOTAL	4348	2091	2336	8775	100.00		

Appendix Table 2. Continued.

STATION 6
9/8/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Loliguncula brevis			3	3	2.59		
Penaeus aztecus		2	12	14	12.07	19	
Acetes americanus			16	16	13.79		
Pagurus pollicaris	3	1	2	6	5.17		
Callinectes sapidus	4	2	1	7	6.03	91	
Callinectes similis	1	6	9	16	13.79	31	
Portunus spinimanus		1		1	0.86	55	
Synodus foetens	2			2	1.72	132	
Centropristis philadelphica	1	1		2	1.72	108	
Selene vomer	2		2	4	3.45	35	
Lutjanus synagris	1			1	0.86	100	
Eucinostomus harengulus	1	3		4	3.45	30	
Orthopristis chrysoptera	4		1	5	4.31	81	
Lagodon rhomboides	2	2		4	3.45	74	
Cynoscion arenarius		2	1	3	2.59	42	
Leiostomus xanthurus	1			1	0.86	160	
Micropogonias undulatus	4	1	3	8	6.90	97	
Peprilus burti		1	1	2	1.72	7	
Ancylopsetta quadrocellata	2	4	2	8	6.90	88	
Citharichthys spilopterus	1	3	4	8	6.90	65	
Chilomycterus schoepfi	1			1	0.86	113	
TOTAL	30	29	57	116	100.00		

Appendix Table 2. Continued.

STATION 7
7/8/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MA
Aplysia brasiliana			1	1	0.18		
Unidentified bivalve		3		3	0.55		
Loliguncula brevis	18	1	3	22	4.03		
Penaeus aztecus	4	3	2	9	1.65	64	1
Penaeus setiferus	7		2	9	1.65	57	1
Hippolyte pleuracantha	297		50	347	63.55		
F. Diogenidae		2	10	12	2.20		
Clibanarius vittatus	5			5	0.92		
Libinia sp.	1			1	0.18		
Arenaeus cribrarius		1		1	0.18	53	
Callinectes sapidus	19	8	19	46	8.42	31	1
Callinectes similis	1			1	0.18		
F. Xanthidae		1	1	2	0.37		
Dasyatis americana			1	1	0.18	224	2
Anchoa mitchilli	7			7	1.28	31	
Arius felis		6	2	8	1.47	32	2
Synodus foetens	1			1	0.18	140	1
Selene setapinnis	8	1		9	1.65	31	
Eucinostomus argenteus	1			1	0.18	44	
Orthopristis chrysoptera	3		5	8	1.47	69	1
Lagodon rhomboides	7	3	3	13	2.38	62	1
Bairdiella chrysoura		2		2	0.37	62	
Cynoscion arenarius	3	1	1	5	0.92	41	1
Leiostomus xanthurus	3			3	0.55	63	
Micropogonias undulatus	5	1		6	1.10	94	1
Trichiurus lepturus	3		3	6	1.10	240	3
Prionotus tribulus		2		2	0.37	83	1
Ancylopsetta quadrocellata	2			2	0.37	96	1
Citharichthys spilopterus	2		1	3	0.55	75	
Etropus crossotus	2	2		4	0.73	54	
Syacium gunteri	1			1	0.18	92	
Balistes capriscus	1			1	0.18	69	
Chilomycterus schoepfi	2		2	4	0.73	46	1
TOTAL	403	37	106	546	100.00		

Appendix Table 2. Continued.

STATION 7
9/8/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MAX
Aplysia brasiliana			1	1	0.82		
Loliguncula brevis		2		2	1.64		
Acetes americanus	4	16	2	22	18.03		
Callinectes sapidus	3		1	4	3.28	126	14
Callinectes similis		3	4	7	5.74	72	9
Syngnathus louisianae	2			2	1.64	181	19
Eucinostomus harengulus	19	33	3	55	45.08	21	5
Eucinostomus melanopterus	1			1	0.82	56	5
Lagodon rhomboides	7	6	1	14	11.48	71	12
Cynoscion nothus		3		3	2.46	18	2
Menticirrhus americanus		1	1	2	1.64	28	3
Micropogonias undulatus	3	3	1	7	5.74	128	16
Peprilus burti	2			2	1.64	6	
TOTAL	41	67	14	122	100.00		

Appendix Table 2. Continued.

STATION 11
9/4/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MA
Unidentified sponges	4	21	16	41	23.16		
Leptogorgia setacea			4	4	2.26		
F. Diogenidae	1			1	0.56		
Hepatus epheliticus			2	2	1.13	59	
Libinia sp.		1	1	2	1.13		
Callinectes sapidus		2	2	4	2.26	133	1
Callinectes similis	2			2	1.13	17	
Portunus spinimanus	2	7	5	14	7.91	9	
F. Xanthidae		1		1	0.56		
Arbacia punctulata			1	1	0.56		
Rhinobatos lentiginosus	5		7	12	6.78	184	2
Dasyatis sabina	2	1	2	5	2.82	115	1
Arius felis		1	1	2	1.13	215	2
Brotula barbata			1	1	0.56	181	1
Syngnathus louisianae	1			1	0.56	153	1
Lutjanus synagris			1	1	0.56	96	
Orthopristis chrysoptera	1		1	2	1.13	114	1
Lagodon rhomboides	6	1	1	8	4.52	79	1
Cynoscion arenarius	1			1	0.56	191	1
Leiostomus xanthurus		2	1	3	1.69	94	1
Menticirrhus americanus	2		4	6	3.39	47	1
Micropogonias undulatus	23	8	13	44	24.86	116	1
Polydactylus octonemus	2	15	2	19	10.73	104	1
TOTAL	52	60	65	177	100.00		

Appendix Table 2. Continued.

STATION 13
7/25/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WI MIN	M
Unidentified snails			1	1	0.40		
Cerithidea pliculosa			1	1	0.40		
Anachis semiplicata			2	2	0.80		
Loliguncula brevis	5	12	7	24	9.64		
Squilla empusa		1		1	0.40		
Penaeus aztecus	3	3	2	8	3.21	58	
Penaeus setiferus			1	1	0.40	41	
Alpheus heterochaelis		4		4	1.61		
F. Diogenidae	1		5	6	2.41		
Isocheles wurdemanni				1	0.40		
Callinectes rathbunae			3	3	1.20		
Callinectes sapidus	6		10	16	6.43	11	
Callinectes similis	3	6	8	17	6.83	50	
Portunus sp.			2	2	0.80		
F. Xanthidae		2	8	10	4.02		
Anchoa hepsetus	8			8	3.21	34	
Anchoa mitchilli	8	70	16	94	37.75	28	
Arius felis		1	2	3	1.20	171	
Syngnathus louisianae		1		1	0.40	178	
Eucinostomus argenteus	7	5	1	13	5.22	33	
Orthopristis chrysoptera		1		1	0.40	96	
Lagodon rhomboides		2	2	4	1.61	105	
Cynoscion arenarius	5			5	2.01	58	
Leiostomus xanthurus	2		1	3	1.20	68	
Micropogonias undulatus	3	2	3	8	3.21	132	
Trichiurus lepturus			3	3	1.20	236	
Ancylopsetta quadrocellata			2	2	0.80	112	
Citharichthys spilopterus	1		4	5	2.01	44	
Paralichthys lethostigma			1	1	0.40	304	
Chilomycterus schoepfi			1	1	0.40	142	
TOTAL	52	110	86	249	100.00		

Appendix Table 2. Continued.

STATION 13
9/8/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Unidentified sponge		1		1	1.00		
Unidentified anemones		1	1	2	2.00		
Unidentified worms			1	1	1.00		
Anachis semiplicata			1	1	1.00		
Aplysia brasiliana		2	1	3	3.00		
Loliguncula brevis			1	1	1.00		
Acetes americanus			4	4	4.00		
Penaeus aztecus	1		9	10	10.00		
Clibanarius vittatus		1	2	3	3.00		
Pagurus pollicaris		1		1	1.00		
Callinectes sapidus		4	1	5	5.00	135	1
Callinectes similis	1	1	5	7	7.00	30	
Portunus sp.			5	5	5.00		
Portunus ventralis		2		2	2.00		
F. Xanthidae			6	6	6.00		
Neopanope texana		3	10	13	13.00		
Astropecten duplicatus	1			1	1.00		
Arius felis			3	3	3.00	162	1
Opsanus beta		1	1	2	2.00	29	1
Eucinostomus harengulus		1	14	15	15.00	25	
Orthopristis chrysoptera		1		1	1.00	73	
Lagodon rhomboides		2	3	5	5.00	52	1
Cynoscion arenarius		1	1	2	2.00	34	1
Leiostomus xanthurus	1		1	2	2.00	133	1
Micropogonias undulatus		1		1	1.00	167	1
Citharichthys spilopterus	1			1	1.00	69	
Paralichthys lethostigma	1		1	2	2.00	244	2
TOTAL	6	23	71	100	100.00		

Appendix Table 2. Continued.

STATION 18
7/29/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified sponges		2		2	0.82		
Anachis semiplicata	1	1	1	3	1.23		
Aplysia brasiliana	1	3	1	5	2.06		
Unidentified bivalve		4		4	1.65		
Loliguncula brevis	1		1	2	0.82		
Unidentified shrimp	1	1	1	3	1.23		
Penaeus aztecus		3		3	1.23	33	66
Palaemonetes sp.		1		1	0.41		
Palaemonetes vulgaris			1	1	0.41		
Alpheus heterochaelis		2	1	3	1.23		
F. Diogenidae		2		2	0.82		
Libinia sp.		1		1	0.41		
Callinectes sapidus	11	12	11	34	13.99	77	152
Callinectes similis	4		4	8	3.29	63	91
Portunus sp.	1		1	2	0.82		
Portunus sayi				0	0.00		
Neopanope texana			4	4	1.65		
Gymnura micura	1			1	0.41	280	280
Anchoa mitchilli	49			49	20.16	30	42
Opsanus beta			3	3	1.23	18	26
Prionotus tribulus		1	1	2	0.82	135	135
Eucinostomus argenteus		1		1	0.41	27	27
Eucinostomus harengulus	31			31	12.76	42	70
Lagodon rhomboides	26	18	12	56	23.05	59	122
Bairdiella chrysoura		1		1	0.41	68	68
Cynoscion arenarius	4			4	1.65	137	162
Leiostomus xanthurus		1		1	0.41	165	165
Micropogonias undulatus	3	8	2	13	5.35	97	165
Citharichthys spilopterus			1	1	0.41	75	75
Symphurus plagiusa	1			1	0.41	121	121
Chilomycterus schoepfi	1			1	0.41	110	110
TOTAL	136	62	45	243	100.00		

Appendix Table 2. Continued.

STATION 22
8/5/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Penaeus aztecus		1		1	1.23	49	49
Palaemonetes sp.	1	1		2	2.47		
F. Diogenidae	1		1	2	2.47		
Callinectes sapidus	2	5	3	10	12.35	16	154
F. Xanthidae		1		1	1.23		
Dasyatis sabina	2		1	3	3.70	116	142
Synodus foetens	1			1	1.23	108	108
Syngnathus louisianae			1	1	1.23	185	185
Eucinostomus argenteus	7	8	16	31	38.27	25	69
Orthopristis chrysoptera	3	1	4	8	9.88	80	158
Lagodon rhomboides		3	4	7	8.64	57	101
Bairdiella chrysoura		1		1	1.23	132	132
Leiostomus xanthurus			1	1	1.23	155	155
Micropogonias undulatus	3	2	2	7	8.64	127	162
Prionotus tribulus			2	2	2.47	114	139
Citharichthys spilopterus			1	1	1.23	72	72
Paralichthys albigutta	2			2	2.47	178	185
TOTAL	22	23	36	81	100.00		

Appendix Table 2. Continued.

STATION 24
8/6/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Squilla empusa		1		1	0.30		
Bopyrissa sp.		1		1	0.30		
Penaeus aztecus		1	1	2	0.60	115	1
Penaeus setiferus	6			6	1.80	94	1
F. Diogenidae	3	8	2	13	3.89		
Arenaeus cribrarius	2	2	2	6	1.80	92	1
Callinectes rathbunae			1	1	0.30		
Callinectes sapidus		2	1	3	0.90	20	1
Callinectes similis		1	3	4	1.20	23	
Ovalipes quadulpensis			1	1	0.30	35	
Portunus spinimanus		1	3	4	1.20	36	
Panopeus herbstii			1	1	0.30		
Arbacia punctulata	2			2	0.60		
Rhinobatos lentiginosus			1	1	0.30	207	2
Dasyatis sabina		2	2	4	1.20	116	1
Arius felis		1		1	0.30	221	2
Synodus foetens		1	3	4	1.20	148	2
Selene vomer	1	2	1	4	1.20	50	
Lutjanus campechanus	3			3	0.90	133	1
Eucinostomus argenteus	3	7	6	16	4.79	58	
Conodon nobilis		1	1	2	0.60	31	
Orthopristis chrysoptera	12	53	20	85	25.45	49	1
Lagodon rhomboides		15	14	29	8.68	75	1
Cynoscion arenarius	9	18	7	34	10.18	73	1
Cynoscion nebulosus			1	1	0.30	116	3
Larimus fasciatus	2			2	0.60	114	1
Leiostomus xanthurus		9	3	12	3.59	79	1
Menticirrhus americanus		1		1	0.30	129	1
Micropogonias undulatus	14	32	18	64	19.16	110	1
Stellifer lanceolatus		1		1	0.30	25	
Chaetodipterus faber			1	1	0.30	68	
Trichiurus lepturus	19		1	20	5.99	285	6
Scorpaena dispar	1			1	0.30	108	1
Prionotus tribulus			1	1	0.30	91	
Citharichthys spilopterus		1		1	0.30	75	
Lagocephalus laevigatus		1		1	0.30	161	1
TOTAL	77	162	95	334	100.00		

Appendix Table 3. Abundance and size of nekton species in trawl tows at barren-bottom stations during July-September 1991.

STATION 1
7/1/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Aplysia brasiliana			1	1	0.03		
Unidentified bivalve			1	1	0.03		
Loliguncula brevis	4	7	14	25	0.76		
Penaeus aztecus		3		3	0.09	58	82
F. Diogenidae			1	1	0.03		
Callinectes sapidus	15	14	8	37	1.12	85	145
Portunus spinimanus	6	5		11	0.33	25	40
Panopeus herbstii		1		1	0.03	14	14
Molgula manhattensis	2	2		4	0.12		
Harengula jaguana		5	18	23	0.69	25	31
Anchoa mitchilli	1127	242	1522	2891	87.34	27	51
Synodus foetens			1	1	0.03	85	85
Hippocampus erectus		1		1	0.03		
Centropristis philadelphica		51	1	52	1.57	48	51
Selene setapinnis	1			1	0.03	71	71
Lutjanus synagris		1	1	2	0.06	33	33
Eucinostomus argenteus	7	12	19	38	1.15	31	56
Orthopristis chrysoptera	24	36	26	86	2.60	43	158
Lagodon rhomboides	32	23	57	112	3.38	27	154
Bairdiella chrysoura	1			1	0.03	145	145
Leiostomus xanthururs			1	1	0.03	63	63
Micropogonias undulatus	7		2	11	0.33	125	140
Gobionellus boleosoma		2		1	0.03	29	29
Monacanthus hispidus		1	2	2	0.06	42	58
Chilomycterus shoepfi	2		1	3	0.09	60	159
TOTAL	1228	406	1676	3310	100.00		

Appendix Table 3. Continued.

STATION 10
7/13/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Penaeus aztecus	3	4	2	9	5.29	46	89
Penaeus setiferus			1	1	0.59		
Palaemonetes sp.			9	9	5.29		
Tozeuma carolinense			6	6	3.53		
F. Diogenidae			1	1	0.59		
Callinectes sapidus	17	18	17	52	30.59	56	198
Portunus sp.		1	2	3	1.76	42	65
Synodus foetens			1	1	0.59	94	94
Opsanus beta	3	3	5	11	6.47	94	207
Eucinostomus argenteus		1		1	0.59	31	31
Orthopristis chrysoptera	5	8	7	20	11.76	15	160
Lagodon rhomboides	10	21	8	39	22.94	35	138
Bairdiella chrysoura	1	5		6	3.53	32	123
Micropogonias undulatus	1	3		4	2.35	128	148
Gobiosoma robustum		1		1	0.59	22	22
Paralichthys albigutta	1			1	0.59	156	156
Lactophrys sp.	1			1	0.59	42	42
Chilomycterus schoepfi		1	3	4	2.35	84	144
TOTAL	42	66	62	170	100.00		

Appendix Table 3. Continued.

STATION 10
7/16/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified sponges			1	1	0.51		
Busycon sp.	1			1	0.51		
Aplysia brasiliana			1	1	0.51		
Loliguncula brevis		1		1	0.51		
Squilla empusa			1	1	0.51	74	74
Penaeus aztecus		6		6	3.03	26	65
Penaeus setiferus			1	1	0.51	35	35
Palaemonetes sp.		12		12	6.06		
Tozeuma carolinense		18		18	9.09		
F. Diogenidae	1		6	7	3.54		
Callinectes sapidus	13	5	18	36	18.18	65	163
Molgula manhattensis			1	1	0.51		
Anchoa mitchilli	8		1	9	4.55	27	40
Opsanus beta		6		6	3.03	14	148
Hippocampus erectus		1		1	0.51	81	81
Syngnathus louisianae		1		1	0.51	118	118
Syngnathus pelagicus		1		1	0.51	191	191
Syngnathus scovelli		4		4	2.02	70	82
Eucinostomus argenteus		1	1	2	1.01	43	54
Orthopristis chrysoptera	10	9	8	27	13.64	55	161
Lagodon rhomboides	5	24	17	46	23.23	37	138
Leiostomus xanthurus	3			3	1.52	146	171
Micropogonias undulatus		3		3	1.52	122	145
Gobiosoma bosc		1		1	0.51	25	25
Chilomycterus schoepfi	3	4	1	8	4.04	108	143
TOTAL	44	97	57	198	100.00		

Appendix Table 3. Continued.

STATION 10
7/24/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Unidentified sponges			2	2	0.59		
Argopecten irradians amplicostatus			7	7	2.06		
Loliguncula brevis			1	1	0.29		
Penaeus aztecus	5	7	12	24	7.06	19	
Palaemonetes sp.	17	12	9	38	11.18		
Alpheus heterochaelis	2	2	3	7	2.06		
Tozeuma carolinense	29	26	19	74	21.76		
F. Diogenidae	1	1	12	14	4.12		
Libinia sp.			1	1	0.29		
Callinectes sapidus	3	17	9	29	8.53	91	
Callinectes similis			2	2	0.59	49	
Portunus sp.		1		1	0.29	36	
Portunus spinimanus			1	1	0.29	44	
F. Xanthidae	7	2		9	2.65		
Molgula manhattensis			1	1	0.29		
Arius felis		1		1	0.29	156	
Opsanus beta	5	2	2	9	2.65	97	
Hippocampus erectus			1	1	0.29		
Diplectrum formosum		1		1	0.29	43	
Lutjanus synagris	1	1	1	3	0.88	50	
Eucinostomus argenteus		5	8	13	3.82	31	
Orthopristis chrysoptera		6	9	15	4.41	52	
Lagodon rhomboides	20	26	21	67	19.71	44	
Bairdiella chrysoura	7	1		8	2.35	19	
Leiostomus xanthurus			1	1	0.29	154	
Micropogonias undulatus	2		1	3	0.88	133	
Trichiurus lepturus			1	1	0.29	281	
Paralichthys albigutta		2		2	0.59	225	
Chilomycterus schoepfi	3		1	4	1.18	99	
TOTAL	102	113	125	340	100.00		

Appendix Table 3. Continued.

STATION 12
7/24/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MA
Busycon perversum		1	1	2	1.96		
Loliguncula brevis		1	1	2	1.96		
F. Diogenidae	4	4	5	13	12.75		
Callinectes sapidus	13	8	3	24	23.53	16	1
Callinectes similis	2	1	3	6	5.88	30	1
Astropecten duplicatus	1		1	2	1.96		
Gymnura micrura		1		1	0.98	334	3
Eucinostomus argenteus		5	2	7	6.86	42	
Orthopristis chrysoptera	4	3	8	15	14.71	79	1
Lagodon rhomboides	6	2	9	17	16.67	62	1
Leiostomus xanthurus	1			1	0.98	162	1
Micropogonias undulatus	3			3	2.94	130	1
Trichiurus lepturus			2	2	1.96	244	2
Prionotus rubio			1	1	0.98	77	
Citharichthys spilopterus		1		1	0.98		
Etropus crossotus			3	3	2.94	42	
Chilomycterus schoepfi	1	1		2	1.96	119	1
TOTAL	35	28	39	102	100.00		

Appendix Table 3. Continued.

STATION 14
7/26/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified sponges	2	1	2	5	5.81		
F. Diogenidae	2	1	1	4	4.65		
Callinectes sapidus	14	17	15	46	53.49	77	151
F. Xanthidae		1	1	2	2.33		
Astropecten duplicatus		4		4	4.65		
Eucinostomus argenteus	1	2	1	4	4.65	28	51
Orthopristis chrysoptera	3	2	1	6	6.98	93	162
Lagodon rhomboides	1	5	5	11	12.79	78	126
Monacanthus hispidus		1		1	1.16	66	66
Chilomycterus schoepfi		2	1	3	3.49	125	178
TOTAL	23	36	27	86	100.00		

Appendix Table 3. Continued.

STATION 15
7/26/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Aplysia brasiliana	1	4	21	26	8.20		
Unidentified bivalve	1			1	0.32		
F. Diogenidae	7	5	8	20	6.31		
Callinectes sapidus	6	8	5	19	5.99	22	1
Callinectes similis	5	10	7	22	6.94	61	1
F. Xanthidae	1			1	0.32		
Arius felis		1		1	0.32	249	2
Synodus foetens	3	2	4	9	2.84	82	1
Opsanus beta	2			2	0.63	128	1
Syngnathus scovelli	1			1	0.32	155	1
Diplectrum formosum		3	1	4	1.26	45	
Eucinostomus gula	17			17	5.36	41	
Eucinostomus harengulus	7	9	17	33	10.41	29	
Orthopristis chrysoptera	22	7	7	36	11.36	24	1
Lagodon rhomboides	51	32	25	108	34.07	54	1
Leiostomus xanthurus	3	1		4	1.26	64	
Micropogonias undulatus	4	1	1	6	1.89	135	1
Citharichthys macrops			1	1	0.32	105	1
Paralichthys lethostigma	2			2	0.63	123	1
Syacium gunteri	1			1	0.32	60	
Balistes capriscus		2		2	0.63	66	
Chilomycterus schoepfi	1			1	0.32	125	1
TOTAL	135	85	97	317	100.00		

Appendix Table 3. Continued.

STATION 16
7/27/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MAX
Aplysia brasiliana			1	1	0.97		
Loliguncula brevis			1	1	0.97		
F. Isopoda			18	18	17.48		
Penaeus aztecus	2	1		3	2.91	64	8
F. Diogenidae	1			1	0.97		
Arenaeus cribrarius	1		1	2	1.94	51	6
Callinectes sapidus	1	1		2	1.94	114	11
Portunus sp.	2			2	1.94		
Portunus spinimanus	1			1	0.97	46	4
Molgula manhattensis	1			1	0.97		
Narcine brasiliensis	2			2	1.94	104	18
Rhinobatos lentiginosus	1		2	3	2.91	197	21
Gymnura micrura	1			1	0.97	372	37
Orthopristis chrysoptera	24	6	18	48	46.60	61	13
Lagodon rhomboides	1		3	4	3.88	74	10
Leiostomus xanthurus			1	1	0.97	74	
Micropogonias undulatus			1	1	0.97	104	10
Ancylopsetta quadrocellata	2		1	3	2.91	71	11
Paralichthys albigutta			1	1	0.97	187	18
Syacium gunteri	1			1	0.97	83	8
Trinectes maculatus		1		1	0.97	68	6
Balistes capriscus	1			1	0.97	51	5
Chilomycterus schoepfi	2	1	1	4	3.88	122	15
TOTAL	44	10	49	103	100.00		

Appendix Table 3. Continued.

STATION 17
7/27/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
F. Diogenidae			3	3	3.53		
Arenaeus cribrarius		4	1	5	5.88	69	142
Callinectes sapidus	1		2	3	3.53	114	134
Dasyatis sabina	1			1	1.18	108	108
Eucinostomus harengulus			1	1	1.18	62	62
Eucinostomus melanopterus	4		18	22	25.88	36	96
Orthopristis chrysoptera			2	2	2.35	127	133
Lagodon rhomboides	11		24	35	41.18	59	115
Menticirrhus americanus	1			1	1.18		
Prionotus tribulus		1	1	2	2.35	70	82
Ancylopsetta quadrocellata	4	1	1	6	7.06	92	121
Syacium gunteri	1		1	2	2.35	83	91
Trinectes maculatus		1		1	1.18	72	72
Lagocephalus laevigatus	1			1	1.18	166	166
TOTAL	24	7	54	85	100.00		

Appendix Table 3. Continued.

STATION 19
7/31/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MAX
Unidentified anemones			1	1	0.32		
Penaeus aztecus		1	2	3	0.96	77	98
Penaeus setiferus		1	2	3	0.96	78	133
F. Diogenidae		1	2	3	0.96		
Callinectes sapidus		2	2	4	1.28	74	156
Dasyatis sabina		1		1	0.32	194	194
Gymnura micrura	1			1	0.32	400	400
Selene vomer		1		1	0.32	40	40
Orthopristis chrysoptera		2	2	4	1.28	70	79
Lagodon rhomboides	9	16	14	39	12.46	64	112
Cynoscion arenarius		12	35	47	15.02	60	149
Larimus fasciatus		1	2	3	0.96	44	51
Leiostomus xanthurus	1	47	98	146	46.65	61	106
Menticirrhus littoralis		7	8	15	4.79	48	120
Micropogonias undulatus		14	14	28	8.95	89	140
Polydactylus octonemus		1	1	2	0.64	70	96
Prionotus rubio		1		1	0.32	93	93
Prionotus tribulus			1	1	0.32	104	104
Ancylopsetta quadrocellata		2	4	6	1.92	86	122
Citharichthys macrops		1	1	2	0.64	94	112
Etropus crossotus			1	1	0.32	92	92
Lagocephalus laevigatus			1	1	0.32	168	168
TOTAL	11	111	191	313	100.00		

Appendix Table 3. Continued.

STATION 23
8/6/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Squilla empusa			1	1	0.78		
Penaeus setiferus			2	2	1.56	106	122
F. Diogenidae			3	3	2.34		
Callinectes sapidus		1		1	0.78	95	95
Callinectes similis			3	3	2.34	43	62
Rhinobatos lentiginosus	3	4	1	8	6.25	187	222
Synodus foetens	2	4		6	4.69	56	212
Opsanus beta			1	1	0.78	163	163
Selene setapinnis		1		1	0.78	47	47
Eucinostomus argenteus	3	2	4	9	7.03	58	88
Orthopristis chrysoptera	11	5	9	25	19.53	60	100
Lagodon rhomboides	2	11	13	26	20.31	73	145
Bairdiella chrysoura	1			1	0.78	164	164
Cynoscion arenarius		2	5	7	5.47	80	139
Leiostomus xanthurus			2	2	1.56	83	87
Micropogonias undulatus	5	6	11	22	17.19	105	163
Polydactylus octonemus			1	1	0.78	119	119
Ancylopsetta quadrocellata		3	1	4	3.13	95	165
Citharichthys spilopterus		1	2	3	2.34	79	98
Syacium gunteri	1		1	2	1.56	98	110
TOTAL	28	40	60	128	100.00		

Appendix Table 3. Continued.

STATION 25
9/8/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Leptogorgia setacea		1		1	3.85		
Calappa sulcata			1	1	3.85	104	104
Arenaeus cribrarius		4	1	5	19.23	93	138
Callinectes sapidus	1		3	4	15.38	140	147
Gymnura micrura		1		1	3.85	325	325
Conodon nobilis			1	1	3.85	88	88
Lagodon rhomboides	4	2	7	13	50.00	78	119
TOTAL	5	8	13	26	100.00		

Appendix Table 3. Continued.

STATION 27
9/6/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified sponges	1			1	1.67		
Chione cancellata		1		1	1.67		
Clibanarius vittatus			1	1	1.67		
Pagurus pollicaris	1			1	1.67		
Arbacia punctulata			3	3	5.00		
Lutjanus synagris			1	1	1.67	100	100
Eucinostomus argenteus			1	1	1.67	30	30
Eucinostomus harengulus	3	1	2	6	10.00	28	46
Orthopristis chrysoptera	4	7	8	19	31.67	91	182
Lagodon rhomboides	4	3	6	13	21.67	111	135
Micropogonias undulatus			1	1	1.67	170	170
Ancylopsetta quadrocellata	1			1	1.67	143	143
Paralichthys albigutta			2	2	3.33	162	200
Balistes capriscus	1		1	2	3.33	71	102
Lactophrys quadricornis	3	2		5	8.33	173	215
Chilomycterus schoepfi	2			2	3.33	121	190
TOTAL	20	14	26	60	100.00		

Appendix Table 4. Biomass (g) and percent composition of vegetation species at Lower Laguna Madre and SouthBay/Mexiquita Flats stations during July - October 1991. See Table 8 for complete species nomenclature.

Date	Station	Rep	*T. test.*	*H. Wrightii*	*S. fill.*	*S. fluitans*	*S. natans*	*D. dich.*	*L. potted*	*H. musc.*	*H. engel.*	*S. tenera*	*C. cub.*	*S. filam.*	*B. perfilos*	*C. litt.*	*G. fol*
7/2/91	2	1	0.00	6.16	6.39	0.00	0.00	0.25	0.67	1.24	0.00	4.82	1.11	0.00	0.00	0.00	0.
7/2/91	2	2	0.34	10.29	3.32	0.00	0.00	0.66	1.87	0.00	0.00	5.56	0.81	0.00	0.00	0.32	0.
7/2/91	2	3	12.57	0.64	3.13	0.00	0.00	0.00	0.15	0.00	0.00	0.12	0.35	0.15	0.00	0.00	0.
7/26/91	2	1	26.09	0.60	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.
7/26/91	2	2	24.30	3.78	6.92	0.00	0.00	0.36	0.89	0.00	0.20	0.00	0.00	0.00	0.89	0.00	0.
7/26/91	2	3	14.59	1.57	13.52	0.00	0.00	0.51	4.51	0.00	0.14	0.75	0.00	0.00	0.00	0.00	0.
		Ave	12.98	3.84	5.60	0.00	0.00	0.30	1.35	0.21	0.06	1.88	0.38	0.03	0.15	0.05	0.
		%	48.42	14.32	20.88	0.00	0.00	1.11	5.03	0.77	0.21	6.99	1.41	0.09	0.55	0.20	0.
7/4/91	4	1	3.72	0.00	24.85	0.00	0.00	0.45	39.83	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.
7/4/91	4	2	32.65	0.00	6.67	0.00	0.00	0.00	44.48	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.
7/4/91	4	3	12.07	0.00	4.70	0.00	0.00	0.35	22.06	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.
		Ave	16.15	0.00	12.07	0.00	0.00	0.27	35.46	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0
		%	24.90	0.00	18.62	0.00	0.00	0.41	54.67	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0
7/23/91	8	1	0.00	2.47	3.32	0.60	0.00	0.00	0.00	0.31	0.00	11.68	0.68	0.00	0.00	0.00	0
7/23/91	8	2	0.00	8.05	0.54	0.39	0.00	0.17	0.35	0.30	0.24	15.22	0.37	0.00	0.00	0.00	0
9/6/91	8	1	0.00	0.74	1.74	0.00	0.00	0.04	0.17	0.00	0.00	0.21	0.34	0.12	0.00	0.37	0
9/6/91	8	2	0.46	1.43	3.52	1.69	0.00	0.15	2.16	2.70	0.00	0.74	8.44	0.00	0.00	2.45	0
9/6/91	8	3	0.00	0.81	1.37	0.21	0.00	0.10	0.73	0.00	0.00	0.62	2.24	0.24	0.00	0.46	0
		Ave	0.09	2.70	2.10	0.58	0.00	0.09	0.68	0.66	0.05	5.69	2.41	0.07	0.00	0.66	0
		%	0.58	17.10	13.29	3.66	0.00	0.58	4.32	4.19	0.30	36.07	15.29	0.46	0.00	4.16	0
7/9/91	9	1	17.75	0.00	5.64	0.76	0.00	0.37	2.98	13.95	0.00	0.00	0.00	0.00	0.00	0.00	0
7/9/91	9	2	30.65	0.00	12.23	0.00	0.00	0.41	2.38	1.62	0.00	0.00	0.00	0.00	0.00	0.00	0
7/9/91	9	3	14.15	0.27	4.02	0.00	0.00	0.54	1.00	1.76	0.00	0.00	0.00	0.00	0.00	0.00	0
		Ave	20.85	0.09	7.30	0.25	0.00	0.44	2.12	5.78	0.00	0.00	0.00	0.00	0.00	0.00	0
		%	56.62	0.24	19.81	0.69	0.00	1.19	5.76	15.69	0.00	0.00	0.00	0.00	0.00	0.00	0
8/2/91	20	1	0.00	0.28	28.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
8/2/91	20	2	14.74	1.69	36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
8/2/91	20	3	2.26	0.53	57.15	0.00	0.22	0.30	1.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0
10/25/91	20	1	28.25	1.25	16.34	0.00	0.00	0.11	0.19	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0
10/25/91	20	2	20.02	0.00	5.81	0.00	0.00	0.00	0.29	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0
10/25/91	20	3	17.28	0.00	7.78	0.00	0.00	0.00	0.05	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0
10/25/91	20	4	15.90	0.00	23.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
10/25/91	20	5	13.62	0.00	6.24	0.00	0.00	0.00	0.06	0.00	0.00	0.17	0.00	0.00	0.07	0.00	0
10/25/91	20	6	9.34	0.00	24.86	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0
		Ave	13.49	0.42	23.04	0.00	0.02	0.05	0.22	0.00	0.00	0.08	0.01	0.00	0.02	0.00	0
		%	36.10	1.11	61.65	0.00	0.07	0.12	0.59	0.00	0.00	0.22	0.03	0.00	0.05	0.00	0
8/5/91	21	1	0.00	0.00	33.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8/5/91	21	2	0.00	0.78	54.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8/5/91	21	3	0.28	0.93	50.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10/25/91	21	1	0.00	0.50	16.92	0.00	0.00	0.33	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	
10/25/91	21	2	0.00	0.59	9.31	0.00	0.00	0.00	0.95	0.00	0.00	1.30	0.00	0.00	0.00	0.00	
10/25/91	21	3	0.00	0.60	12.02	0.00	0.00	0.32	0.59	0.00	0.00	0.45	0.00	0.00	0.00	0.00	
10/25/91	21	4	0.00	0.73	11.88	0.00	0.00	0.35	3.42	0.00	0.00	1.15	0.39	0.00	0.00	0.00	
10/25/91	21	5	0.00	0.00	17.97	0.00	0.00	0.00	0.39	0.00	0.00	0.57	0.00	0.00	0.00	0.00	
10/25/91	21	6	0.00	0.97	20.45	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	
		Ave	0.03	0.57	25.34	0.00	0.00	0.11	0.59	0.00	0.00	0.47	0.04	0.00	0.00	0.00	
		%	0.11	2.09	93.32	0.00	0.00	0.41	2.19	0.00	0.00	1.72	0.16	0.00	0.00	0.00	
9/5/91	26	1	21.22	0.03	0.00	0.00	0.00	0.00	16.69	2.76	0.00	0.00	0.00	0.00	0.00	0.43	
9/5/91	26	2	4.78	6.10	0.15	0.00	0.00	0.00	3.60	1.26	0.08	0.00	0.00	0.00	0.00	0.00	
9/5/91	26	3	25.63	0.09	2.75	0.00	0.00	0.00	7.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
		Ave	17.21	2.07	0.97	0.00	0.00	0.00	9.24	1.34	0.03	0.00	0.00	0.00	0.00	0.14	
		%	55.52	6.69	3.12	0.00	0.00	0.00	29.80	4.32	0.09	0.00	0.00	0.00	0.00	0.46	
9/7/91	28	1	1.15	0.00	32.01	0.00	0.00	0.15	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.21	
9/7/91	28	2	1.13	1.01	44.32	0.00	0.00	0.42	0.21	0.00	0.16	3.08	0.00	3.34	0.15	0.26	
9/7/91	28	3	0.94	1.69	32.46	0.00	0.00	0.41	0.00	0.00	0.00	2.74	0.06	0.00	0.00	6.54	
10/25/91	28	1	0.00	0.00	33.19	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10/25/91	28	2	0.00	0.00	37.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	
10/25/91	28	3	0.00	0.00	33.88	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10/25/91	28	4	0.00	0.00	26.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10/25/91	28	5	0.00	0.00	26.57	0.00	0.00	0.00	0.28	0.00	0.00	7.26	0.00	0.00	0.00	0.00	
10/25/91	28	6	0.77	0.00	27.54	0.00	0.00	0.07	0.35	0.00	0.00	0.00	0.17	0.00	0.14	0.00	
10/25/91	28	7	0.56	0.58	16.68	0.00	0.00	0.00	3.21	0.80	0.00	2.58	7.16	0.00	0.00	0.00	
10/25/91	28	8	0.00	0.00	31.57	0.00	0.64	0.36	7.80	1.79	0.00	8.12	4.69	0.00	0.00	0.00	
10/25/91	28	9	1.56	0.00	30.44	0.00	0.00	0.34	3.60	0.00	0.00	3.43	1.34	0.00	0.00	0.00	
10/25/91	28	10	0.00	0.00	34.10	0.00	0.00	0.44	3.87	0.00	0.00	8.97	1.68	0.00	0.00	0.00	
10/25/91	28	11	0.00	0.00	25.31	0.00	0.00	0.00	3.03	0.00	0.00	3.40	0.82	0.00	0.00	0.00	
10/25/91	28	12	0.00	0.75	32.85	0.00	0.00	0.37	7.31	0.86	0.00	3.59	2.01	0.00	0.00	0.00	
		Ave	0.41	0.27	30.98	0.00	0.04	0.21	1.98	0.23	0.01	2.89	1.20	0.22	0.02	0.47	
		%	1.05	0.69	79.52	0.00	0.11	0.53	5.08	0.59	0.03	7.41	3.07	0.57	0.06	1.20	

Appendix Table 5. Blade height (cm) of dominant seagrass taxa at lower Laguna Madre and South Bay/Mexiquita Flats stations during July - October 1991.

Date	Station	Replicate	*Thalassia testudinum*	*Halodule wrightii*	*Syringodium filiforme*
7/2/91	2	1	-	20.46	25.24
7/2/91	2	2	5.3	19.5	29.4
7/2/91	2	3	35.5	23.8	26.2
7/26/91	2	1	25.1	16.5	15.4
7/26/91	2	2	24.4	21.7	30.9
7/26/91	2	3	30.7	24.6	30.7
		Ave	24.2	21.1	26.3
7/4/91	4	1	29.0	-	31.3
7/4/91	4	2	23.9	-	30.4
7/4/91	4	3	25.2	-	19.9
		Ave	26.0	-	27.2
7/23/91	8	1	-	14.7	16.1
7/23/91	8	2	-	16.9	17.5
9/6/91	8	1	-	27.2	39.9
9/6/91	8	2	-	23.9	39.8
9/6/91	8	3	-	19.6	36.4
		Ave	-	20.5	29.9
7/9/91	9	1	22.7	-	30.0
7/9/91	9	2	27.5	-	28.5
7/9/91	9	3	19.5	6.5	21.8
		Ave	23.2	6.5	26.8
8/2/91	20	1	-	15.4	23.1
8/2/91	20	2	28.4	14.5	25.3
8/2/91	20	3	21.9	26.9	36.1
10/25/91	20	1	16.5	14.2	15.7
10/25/91	20	2	19.9	-	12.9
10/25/91	20	3	17.2	-	18.9
10/25/91	20	4	16.8	-	28.7
10/25/91	20	5	21.9	-	17.2
10/25/91	20	6	39.7	-	28.8
		Ave	22.8	17.8	23.0
8/5/91	21	1	-	-	24.7
8/5/91	21	2	-	21.2	23.7
8/5/91	21	3	11.1	12.7	20.4
10/25/91	21	1	-	12.7	23.3
10/25/91	21	2	-	13.2	14.5
10/25/91	21	3	-	16.9	27.8
10/25/91	21	4	-	15.3	34.9
10/25/91	21	5	-	-	26.1
10/25/91	21	6	-	13.3	23.4
		Ave	11.1	15.0	24.3
9/5/91	26	1	27.7	14.4	3.6
9/5/91	26	2	19.4	15.9	7.9
9/5/91	26	3	20.0	-	27.8
		Ave	22.4	15.2	13.1
9/7/91	28	1	31.6	-	33.6
9/7/91	28	2	-	26.2	34.6
9/7/91	28	3	-	27.2	42.5
10/25/91	28	1	-	-	30.5
10/25/91	28	2	-	-	23.7
10/25/91	28	3	-	-	23.9
10/25/91	28	4	-	-	23.5
10/25/91	28	5	-	-	25.7
10/25/91	28	6	22.8	-	23.0
10/25/91	28	7	18.3	21.9	29.0
10/25/91	28	8	-	-	25.7
10/25/91	28	9	29.5	-	30.0
10/25/91	28	10	-	-	30.8
10/25/91	28	11	-	-	22.6
10/25/91	28	12	-	21.2	27.0
		Ave	25.5	24.1	28.4

"Dash" - no representatives of the species found in that replicate.

Appendix Table 6. Abundance and size of nekton species in trawl tows at grassbed stations during July-September 1991.

STATION 2
7/2/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Penaeus aztecus	3			3	1.57	33	
Alpheus heterochaelis	3			3	1.57		
Hippolyte pleuracantha	27		1	28	14.66		
Tozeuma carolinense	23	8	6	37	19.37		
Libinia sp.	1			1	0.52		
Callinectes sapidus		6	1	7	3.66	42	1
Portunus spinimanus		1		1	0.52		
F. Xanthidae	10	2	2	14	7.33		
Opsanus beta		6		6	3.14	44	1
Syngnathus scovelli		1		1	0.52		
Eucinostomus argenteus		1		1	0.52	23	
Orthopristis chrysoptera	4	3	25	32	16.75	44	
Lagodon rhomboides	11	19	15	45	23.56	32	1
Bairdiella chrysoura	3	1	1	5	2.62	28	1
Sciaenops ocellatus	1			1	0.52		
Gobiosoma bosc	1			1	0.52	33	
Gobiosoma robustum	1			1	0.52	31	
Paralichthys albigutta	1			1	0.52		
Chilomycterus schoepfi		2	1	3	1.57	41	1
TOTAL	89	50	52	191	100.00		

Appendix Table 6 Continued.

STATION 2
7/26/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Anachis semiplicata	1			1	0.34		
Unidentified bivalve	1	1		2	0.68		
Argopecten irradians amplicostatus	1			1	0.34		
Tozeuma carolinense	2	7	2	11	3.72		
Callinectes sapidus	1	6	1	8	2.70	65	145
Syngnathus floridae	1			1	0.34	200	200
Syngnathus scovelli		1		1	0.34	226	226
Lutjanus synagris		1	1	2	0.68	57	63
Eucinostomus harengulus			2	2	0.68	21	24
Orthopristis chrysoptera	5	5	7	17	5.74	47	94
Lagodon rhomboides	50	114	76	240	81.08	34	92
Bairdiella chrysoura	3	6		9	3.04	36	132
Chilomycterus schoepfi		1		1	0.34	131	131
TOTAL	65	142	89	296	100.00		

Appendix Table 6. Continued.

STATION 4
7/4/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified snails		12		12	6.09		
F. Olividae			4	4	1.90		
Aplysia brasiliana			1	1	0.47		
Argopecten irradians amplicostatus		7	5	12	5.69		
Unidentified shrimp	1	1	1	3	1.42		
Penaeus aztecus	4	2		6	2.84	61	80
Alpheus heterochaelis			1	1	0.47		
Tozeuma carolinense			1	1	0.47		
F. Diogenidae	1			1	0.47		
Callinectes sapidus	1	1		2	0.95	16	122
F. Xanthidae	11	34	30	75	35.55		
Menippe adina	1			1	0.47		
Opsanus beta	14	10	7	31	14.69	18	205
Orthopristis chrysoptera	1	2		3	1.42	61	80
Archosargus probatocephalus		2		2	0.95	24	26
Lagodon rhomboides	3	15	18	36	17.06	28	53
Gobiosoma bosc	3		3	6	2.84	27	37
Gobiosoma robustum	4	8	2	14	6.64	18	33
TOTAL	40	86	71	197	93.77		

Appendix Table 6. Continued.

STATION 8
7/9/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Aplysia brasiliana			1	1	0.08		
Squilla empusa			1	1	0.08		
Unidentified shrimp		300		300	23.42		
Penaeus aztecus	3	6	1	10	0.78	54	87
Penaeus setiferus			1	1	0.08	110	110
Palaemonetes sp.	18			18	1.41		
Tozeuma carolinense		20		20	1.56		
F. Diogenidae			2	2	0.16		
Libinia sp.	2	2		4	0.31		
Callinectes sapidus	13	19	23	55	4.29	26	150
Portunus spinimanus	1			1	0.08	40	40
Astropecten duplicatus			2	2	0.16		
Molgula manhattensis	2			2	0.16		
Gymnura micrura			2	2	0.16	243	271
Anchoa mitchilli	15	59	557	631	49.26	28	46
Arius felis	1			1	0.08	183	183
Synodus foetens		1		1	0.08	91	91
Opsanus beta	4	5	1	10	0.78	85	171
Syngnathus pelagicus	2	1		3	0.23	85	122
Syngnathus scovelli	3	1	2	6	0.47	89	191
Centropristis philadelphica		2		2	0.16	38	40
Rachycentron canadum		1		1	0.08	200	200
Hemicaranx amblyrhynchus		1		1	0.08	75	75
Selene setapinnis		1	3	4	0.31	30	50
Lutjanus campechanus	1			1	0.08	142	142
Lutjanus synagris	4	4		8	0.62	40	49
Eucinostomus argenteus	3	20	7	30	2.34	27	57
Orthopristis chrysoptera	14	13	11	38	2.97	45	160
Lagodon rhomboides	36	44	7	87	6.79	38	139
Bairdiella chrysoura	7	7		14	1.09	34	52
Cynoscion arenarius			2	2	0.16	46	62
Micropogonias undulatus			1	1	0.08	130	130
Trichiurus lepturus	1	1	2	4	0.31	250	295
Scomberomorus maculatus		1		1	0.08	142	142
Peprilus burti			3	3	0.23	39	42
Ancylopsetta dilecta			1	1	0.08	130	130
Ancylopsetta quadrocellata			1	1	0.08	112	112
Citharichthys spilopterus	2		3	5	0.39	41	90
Paralichthys albigutta	1			1	0.08	197	197
Monacanthus hispidus	1			1	0.08	49	49
Chilomycterus schoepfi		4		4	0.31	116	123
TOTAL	134	513	634	1281	100.00		

Appendix Table 6. Continued.

STATION 8
7/24/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WI MIN	M
Anachis semiplicata	4			4	0.71		
Aplysia brasiliana	1			1	0.18		
Unidentified bivalve	2			2	0.35		
Argopecten irradians amplicostatus	4		2	6	1.06		
Penaeus aztecus	4	6	5	15	2.66	24	
Brachycarpus biungiculatus		2		2	0.35		
Palaemonetes sp.		54	74	128	22.70		
Palaemontes intermedius		1	1	2	0.35		
Palaemonetes vulgaris	15		3	18	3.19		
Tozeuma carolinense	5	17	15	37	6.56		
F. Diogenidae	2			2	0.35		
Libinia sp.	2		1	3	0.53		
Callinectes sapidus	11	14	9	34	6.03	46	1
Callinectes similis	1			1	0.18	63	
Portunus sp.			3	3	0.53	33	
F. Xanthidae	12	14	33	59	10.46		
Molgula manhattensis	2	2	4	8	1.42		
Anchoa mitchilli	2			2	0.35	33	
Opsanus beta	8	8	13	29	5.14	14	1
Hippocampus erectus		1	1	2	0.35	18	
Hippocampus zosterae			1	1	0.18		
Syngnathus louisianae	2	1		3	0.53	132	1
Syngnathus pelagicus	1	2		3	0.53	122	2
Syngnathus scovelli	5	8	1	14	2.48	78	
Diplectrum formosum	2	1	1	4	0.71	23	
Lutjanus synagris	2	1	2	5	0.89	54	
Eucinostomus argenteus	3	2	1	6	1.06	22	
Eucinostomus harengulus		1		1	0.18	42	
Orthopristis chrysoptera	8	6	10	24	4.26	47	1
Lagodon rhomboides	36	50	27	113	20.04	42	1
Bairdiella chrysoura	1		2	3	0.53	41	
Gobiosoma bosc	1	2		3	0.53	21	
Gobiosoma robustum		2	3	5	0.89	21	
Scorpaena dispar	1			1	0.18	135	1
Citharichthys spilopterus		2		2	0.35	71	
Paralichthys albigutta	3		2	5	0.89	126	2
Monacanthus hispidus	2			2	0.35		
Lactophrys quadricornis		1		1	0.18	18	
Chilomycterus schoepfi	3	5	2	10	1.77	89	1
TOTAL	145	203	216	564	100.00		

Appendix Table 6. Continued.

STATION 8
9/6/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/W MIN
Crepidula fornicata		1		1	0.22	
Anachis semiplicata	1	2	1	4	0.86	
Anadara ovalis	2	1		3	0.65	
Noetia ponderosa	8	2	2	12	2.58	
Argopecten irradians amplicostatus	1			1	0.22	
Unidentified shrimp	12			12	2.58	
Penaeus aztecus	5	6	21	32	6.88	43
Acetes americanus			1	1	0.22	
Leander paulensis	30			30	6.45	
Leander tenuicornis			23	23	4.95	
Palaemonetes vulgaris	17		15	32	6.88	
Hippolyte zostericola	93		15	108	23.23	
Tozeuma carolinense	12		13	25	5.38	
Clibanarius vittatus		1		1	0.22	
Libinia dubia	1			1	0.22	
Stenorynchus seticornis		1		1	0.22	
Callinectes exasperatus	1			1	0.22	
Callinectes sapidus	2	5	2	9	1.94	10
Neopanope texana	28	23	16	67	14.41	
Urophycis floridana	1			1	0.22	29
Opsanus beta	8	10	6	24	5.16	18
Hippocampus erectus	2			2	0.43	24
Hippocampus zosterae			3	3	0.65	18
Syngnathus pelagicus			1	1	0.22	77
Syngnathus scovelli	1	1	3	5	1.08	75
Mycteroperca microlepis		1	1	2	0.43	151
Lutjanus synagris		1		1	0.22	20
Eucinostomus harengulus	1	1		2	0.43	26
Orthopristis chrysoptera	2			2	0.43	76
Lagodon rhomboides	9	29	10	48	10.32	55
Bairdiella chrysoura		2		2	0.43	32
Gobionellus boleosoma	1			1	0.22	
Gobiosoma robustum		1		1	0.22	27
Scorpaena dispar			1	1	0.22	52
Scorpaena plumieri		1		1	0.22	54
Paralichthys albigutta	1			1	0.22	273
Paralichthys lethostigma	1			1	0.22	211
Chilomycterus schoepfi	2			2	0.43	25
TOTAL	242	89	134	465	100.00	

Appendix Table 6. Continued.

STATION 9
7/11/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Aplysia brasiliana	1			1	0.56		
Argopecten irradians amplicostatus	1	1		2	1.11		
Unidentified shrimp	1			1	0.56		
Penaeus aztecus	1			1	0.56	100	100
Palaemonetes sp.			2	2	1.11		
Tozeuma carolinense			7	7	3.89		
Callinectes sapidus	4	2	1	7	3.89	86	146
F. Xanthidae	1	7	1	9	5.00		
Opsanus beta	2	2	3	7	3.89	22	208
Selene vomer	1			1	0.56	71	71
Orthopristis chrysoptera	4	2	3	9	5.00	47	118
Lagodon rhomboides	32	35	61	128	71.11	33	129
Bairdiella chrysoura		1	1	2	1.11	42	43
Gobiosoma bosc			1	1	0.56	26	26
Gobiosoma robustum			1	1	0.56	24	24
Chilomycterus schoepfi		1		1	0.56	204	204
TOTAL	48	51	81	180	100.00		

Appendix Table 6. Continued.

STATION 20
8/6/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDT MIN	MA
Unidentified snails	12	16		28	8.95		
Argopecten irradians amplicostatus	9	6		15	4.79		
Penaeus aztecus	2			2	0.64	35	4
Palaemonetes sp.	1	4		5	1.60		
Hippolyte pleuracantha	4	2	1	7	2.24		
Tozeuma carolinense	14	7	3	24	7.67		
F. Diogenidae	2			2	0.64		
Callinectes sapidus	1	2		3	0.96	121	13
F. Xanthidae		1		1	0.32		
Opsanus beta	1	3	1	5	1.60	105	19
Syngnathus louisianae		1		1	0.32	228	22
Diplectrum formosum		1		1	0.32	29	2
Selene setapinnis	1			1	0.32	62	6
Eucinostomus argenteus		3	1	4	1.28	19	4
Eucinostomus melanopterus		1		1	0.32	20	2
Orthopristis chrysoptera		1	1	2	0.64	53	7
Lagodon rhomboides	14	37	151	202	64.54	29	11
Bairdiella chrysoura	1	4	1	6	1.92	96	12
Leiostomus xanthurus			2	2	0.64	63	6
Paralichthys albigutta	1			1	0.32	194	19
TOTAL	63	89	161	313	100.00		

Appendix Table 6. Continued.

STATION 21
8/6/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WID MIN	MA
Unidentified snails		9	43	52	12.26		
Argopecten irradians amplicostatus			1	1	0.24		
Penaeus aztecus	4	18	15	37	8.73	24	
Palaemonetes sp.		5	8	13	3.07		
Alpheus heterochaelis			2	2	0.47		
Hippolyte pleuracantha			1	1	0.24		
Tozeuma carolinense	8	3	1	12	2.83		
F. Diogenidae			3	3	0.71		
Callinectes sapidus	1	1	5	7	1.65	21	1
F. Xanthidae		2	38	40	9.43		
Arius felis	1			1	0.24	318	3
Opsanus beta	1	3	4	8	1.89	37	1
Syngnathus louisianae	1			1	0.24	168	1
Centropristis philadelphica	1			1	0.24	60	
Diplectrum formosum		1		1	0.24	29	
Mycteroperca microlepis			1	1	0.24	122	1
Lutjanus synagris		2		2	0.47	75	
Eucinostomus melanopterus		2		2	0.47	25	
Orthopristis chrysoptera	1	1		2	0.47	59	
Archosargus probatocephalus		1		1	0.24	47	
Lagodon rhomboides	101	103	8	212	50.00	35	
Bairdiella chrysoura	13	1	2	16	3.77	118	1
Cynoscion arenarius	1			1	0.24	157	1
Micropogonias undulatus		1		1	0.24	135	1
Sciaenops ocellatus		1		1	0.24	204	2
Gobiosoma robustum		1	4	5	1.18	21	
TOTAL	133	155	136	424	100.00		

Appendix Tables 6. Continued.

STATION 26
9/5/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Anachis semiplicata			3	3	2.04	7	10
Bulla striata		12	2	14	9.52	10	17
Aplysia brasiliana	1			1	0.68		
Argopecten irradians amplicostatus		9		9	6.12		
Penaeus aztecus		8	1	9	6.12	22	22
Leander paulensis		2		2	1.36		
Alpheus heterochaelis		6	1	7	4.76		
Hippolyte zostericola		1		1	0.68		
Callinectes sapidus	3	4		7	4.76	19	142
F. Xanthidae	1			1	0.68		
Neopanope texana		47	12	59	40.14		
Opsanus beta		2	3	5	3.40	21	33
Eucinostomus harengulus		3		3	2.04	19	25
Orthopristis chrysoptera		1		1	0.68	58	58
Lagodon rhomboides	6	6	6	18	12.24	26	90
Cynoscion nebulosus	1			1	0.68	190	190
Gobiosoma bosc		5	1	6	4.08	16	26
TOTAL	12	106	29	147	100.00		

Appendix Table 6. Continued.

STATION 28
9/7/91

TAXON	REPLICATE 1	2	3	TOTAL	%	LENGTH/WIDTH MIN	MAX
Unidentified worms		2		2	0.29		
Crepidula fornicata		1	1	2	0.29		
Anachis semiplicata			8	8	1.16		
Bulla striata	1	2		3	0.44		
Aplysia brasiliana	2		3	5	0.73		
Unidentified bivalve		1		1	0.15		
Anadara ovalis		6		6	0.87		
Noetia ponderosa	1			1	0.15		
F. Amphipoda	3			3	0.44		
Penaeus aztecus	11	20	15	46	6.69	15	69
Brachycarpus biunguiculatus			5	5	0.73		
Palaemontes vulgaris	10	4	2	16	2.33		
Alpheus heterochaelis		3		3	0.44		
Hippolyte pleuracantha		69	1	70	10.17		
Hippolyte zostericola	46		1	47	6.83		
Tozeuma carolinense	49	74	16	139	20.20		
Clibanarius vittatus	1		1	2	0.29		
Callinectes rathbunae			1	1	0.15	14	14
Callinectes sapidus	2	4	4	10	1.45	7	85
Neopanope texana	15	50	25	90	13.08		
Opsanus beta			1	1	0.15	245	245
Syngnathus louisianae	1			1	0.15	171	171
Syngnathus pelagicus	3	2	2	7	1.02	161	182
Syngnathus scovelli	2			2	0.29	68	79
Mycteroperca rubra		1		1	0.15	158	158
Serranus subligarius			1	1	0.15	33	33
Eucinostomus harengulus	1	1		2	0.29	12	15
Lagodon rhomboides	72	16	116	204	29.65	32	104
Cynoscion arenarius	1	1	3	5	0.73	122	127
Cynoscion nebulosus	1			1	0.15	86	86
Sciaenops ocellatus			1	1	0.15	250	250
Citharichthys spilopterus		1		1	0.15	90	90
Paralichthys lethostigma	1			1	0.15	241	241
TOTAL	223	258	207	688	100.00		