EXPLORATORY CLAM SURVEY OF FLORIDA NEARSHORE AND ESTUARINE WATERS WITH COMMERCIAL HYDRAULIC DREDGING GEAR

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EXPLORATORY CLAM SURVEY OF FLORIDA NEARSHORE AND ESTUARINE WATERS WITH COMMERCIAL HYDRAULIC DREDGING GEAR

ABSTRACT

Distribution and abundance of commercial clams were investigated, using a hydraulic Nantucket clam dredge and a Maryland soft-shell escalator clam dredge at 846 stations along the west and southeast coasts of Florida, during 1970 and 1971. Sunray venus clams, *Macrocallista nimbosa,* occurred along the entire west coast but were more abundant north of Tampa Bay and were found in commercial quantities only on the existing commercial Bell Shoal bed. Southern quahogs, *Mercenaria campechiensis,* were most abundant near passes along central and southwest Florida. In bays, both species were usually associated with seagrasses, but this was not noted in open Gulf collections. Both species were seldom collected beyond 9.2 m depths. The most abundant bivalve was the marsh clam, *Rangia cuneata,* confined to brackish areas of the Peace and Myakka Rivers. At lower salinities *R. cuneata* were larger and had more size classes.

INTRODUCTION

Florida clam production has been dominated by three species–the northern quahog, *Mercenaria mercenaria,* the southern quahog, *Mercenaria campechiensis,* and the sunray venus clam, *Macrocallista nimbosa.* Limited harvesting of marsh clams, *Rangia cuneata,* has also contributed to Florida clam production.

Almost 100 years of quahog landings have been recorded for Florida (Table 1); 1880 marked the beginning of commercial southern quahog harvesting from the Ten Thousand Islands, at one time the location of the most productive and extensive clam bed in the United States (Schroeder, 1924; Harper, 1927; Tiller et al., 1952; Carpenter, 1967). Harvesting in this area with mechanical conveyor-type dredges began in 1905 (Schroeder, 1924), continuing until 1947 when production fell from a peak of 1800 bushels to fewer than 200 bushels of clams per day, the minimum necessary to economically operate the Marco cannery (Tebeau, 1966). Coincident with this decline was the 1946-1947 red tide, the most devastating outbreak ever recorded for Florida (Steidinger and Joyce, 1973). Many fishermen believe this red tide was responsible for the decline of the Ten Thousand Islands quahog fishery.

The first organized clam survey in Florida was that of Schroeder (1924). In addition to noting abundance, distribution, and preferential habitat of *Mercenaria campechiensis* in the Ten Thousand Islands clam bed, Schroeder described collecting gear and methods of the fishery (with particular emphasis on mechanical dredges), cannery equipment, plant operation, and final products. His report also included a brief history of the fishery and its productivity. Schroeder reported no serious environmental effects from mechanical dredging, but a 1938 Florida State Board of Conservation report included affidavits by local fishermen alleging detrimental effects to clam habitat by overfishing, shell breakage, and uprooting of marine vegetation (Tiller et al., 1952). However, a 1943 U.S. Fish and Wildlife Service report estimated potential fishery production to be almost unlimited, with an abundance of one bushel of clams per six square yards dredged (Tiller et al., 1952). After the 1947 fishery decline, a few private surveys were conducted in the area. Results of one of these, using a Fall River dredge, prompted a local fisherman to construct another conveyor dredge which he operated from 1948 until 1949 when the fishery again collapsed (Tiller et al., 1952). Since then, no commercial clam operations have been conducted in the Ten Thousand Islands. Moreover, only in 1962 and 1965 have significant numbers of clams been harvested along the Florida west coast, principally from Charlotte Harbor (Futch and Torpey, 1966). Recently, Florida east coast landings of northern quahogs have exceeded west coast southern quahog production. No mechanical harvesters have been employed in the east coast fishery.

As part of their 1950-1952 survey of Atlantic and Gulf coast quahog fisheries, Tiller et al. (1952)

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reported that small fisheries once existed at Matanzas Inlet and at Charlotte Harbor and adjacent inshore waters near Englewood; the latter fishery sustained heavy mortalities in the early 1950's. In addition, they reported limited stocks suitable for local use in lower Tampa Bay and fairly plentiful stocks, but with no developing fishery, in the Cedar Keys area.

From 1957 through 1962, the U.S. Fish and Wildlife Service conducted five clam surveys in Florida waters using modified 13-, 14-, and 22-tooth Fall River dredges with two-inch stretched-mesh liners (Cummins, 1966; Carpenter, 1967). Most drags were made in depths of three to five fathoms. Vessel draft prevented their sampling inshore of the three fathom curve, thus precluding sampling the Ten Thousand Islands bed. Three M/V *Silver Bay* cruises (Numbers 2, 3, 10) and one by the M/V *Oregon* (Number 83) were conducted on the Florida west coast between Perdido Pass and Cape Romano (Bullis, 1957a,b, 1962; Captiva, 1958; also U.S. Fish and Wildlife Service, 1957a,b, 1958, 1963). Two additional *Silver Bay* cruises (Numbers 21, 28) were conducted on the east coast between Cape Canaveral and the mouth of the St. Johns River, but only a few clams were captured (Bullis, 1960, 1961; also U.S. Fish and Wildlife Service, 1960, 1961).

The first Florida State Board of Conservation (FSBC) clam survey was conducted in Charlotte Harbor and adjacent waters (Woodburn, 1962). Tampa Bay, the next area explored for clams by the FSBC, was surveyed in 1964 and 1965 (Sims and Stokes, 1967).

Since 1960, several investigations have been conducted in Florida concerning cultivation of *Mercenaria campechiensis;* certain of these also dealt with adaptability to west Florida waters of northern varieties of *M. mercenaria* and hybrids from crosses with *M. campechiensis* (Menzel, 1961a,b, 1962, 1968, 1971; Menzel and Sims, 1962; Woodburn, 1961; Taylor and Saloman, 1968a). Benthic studies in Tampa Bay by the Bureau of Commercial Fisheries Biological Labora-

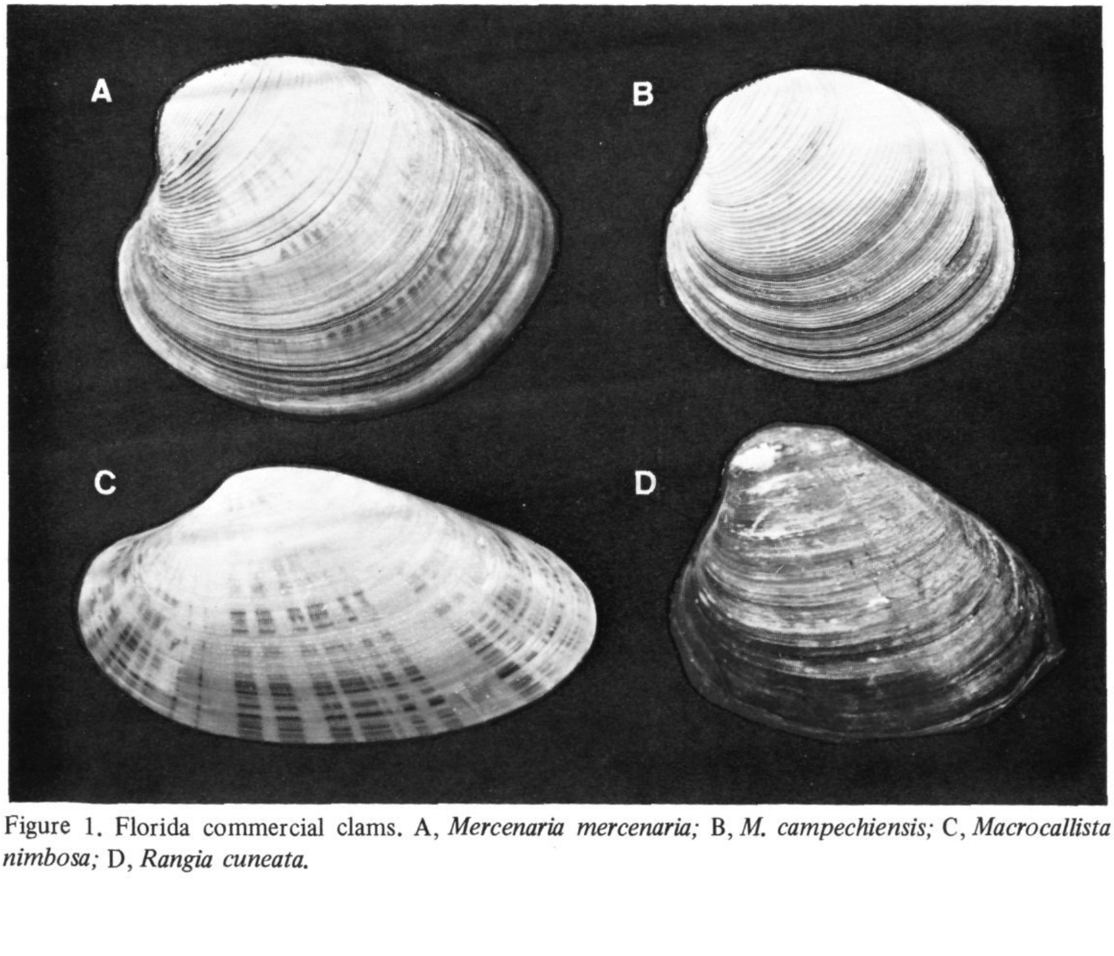

Figure 1. Florida commercial clams. A, *Mercenaria mercenaria;* B, *M. campechiensis;* C, *Macrocallista nimbosa;* D, *Rangia cuneata.*

TABLE 1. QUAHOG AND SUNRAY VENUS CLAM LANDINGS IN POUNDS AND DOCKSIDE VALUE, FLORIDA EAST AND WEST COASTS, 1880-1972

(From Florida Board of Conservation and Florida Department of Natural Resources [effective July 1, 1969] Annual Summaries of Florida Marine Landings, and Fishery Statistics Digest, U.S. Fish and Wildlife Service.)

Year	East Coast		West Coast		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Quahogs						
1880	5,000	$ –		$ –	5,000	$ –
1908	57,000	–	182,000	–	239,000	–
1923	5,000	–	602,000	–	607,000	–
1930	49,840	–	661,736	–	711,576	–
1932	12,000	–	1,108,812	–	1,120,812	–
1940	6,700	–	701,100	–	707,800	–
1945	3,000	–	687,700	–	690,700	–
1950	875	263	4,375	1,313	5,250	1,576
1951	8,010	4,119	8,531	4,387	16,541	8,504
1952	4,648	2,324	10,073	5,036	14,721	7,360
1953	10,284	5,142	12,100	6,050	22,384	11,192
1954	4,953	2,477	26,413	13,206	31,366	15,683
1955	6,294	1,448	15,739	3,620	22,033	5,068
1956	500	175	18,149	6,352	18,649	6,527
1957	–	–	40,957	12,697	40,957	12,697
1958	1,374	426	18,673	5,789	20,047	6,215
1959	1,466	469	17,060	5,459	18,526	5,928
1960	2,134	683	23,893	7,646	26,027	8,329
1961	4,101	1,353	15,123	5,444	19,224	6,797
1962	2,746	879	225,973	50,392	228,719	51,271
1963	675	216	7,372	2,322	8,047	2,538
1964	1,121	359	71,697	23,882	72,818	24,241
1965	24,454	10,133	114,052	41,794	138,506	51,927
1966	2,401	840	3,475	1,216	5,876	2,056
1967	17,168	8,755	3,811	1,143	20,979	9,898
1968	27,148	13,574	7,331	3,665	34,479	17,239
1969	40,683	20,343	10,823	6,247	51,506	26,690
1970	51,320	27,955	9,484	5,216	60,804	33,171
1971	95,257	47,629	4,007	2,003	99,264	49,632
1972	63,468	39,979	–	–	63,468	39,979
Sunray venus clams						
1967	–	–	350,170	35,017	–	–
1968	–	–	410,099	41,906	–	–
1969	–	–	635,684	64,522	–	–
1970	–	–	759,788	75,979	–	–
1971	–	–	99,154	9,915	–	–
1972	–	–	214,962	26,956		

tory at St. Petersburg Beach have resulted in much information concerning age and growth (Saloman and Taylor, 1969), distribution within the Tampa Bay area, and habitat preference of *M. campechiensis* (Taylor and Saloman, 1968a,b, 1969, 1970; Taylor et al., 1970; Sykes and Hall, 1970). Despite these studies, much remains to be learned about the basic biology of *M. campechiensis.*

Another clam of potential economic importance to Florida is *Rangia cuneata,* first surveyed by Woodburn (1962) in the Peace and Myakka Rivers. Although these clams have been utilized for home consumption and as bait for blue crabs (E. Hendrickson, personal communication), commercial harvesting has been restricted chiefly by local industrial and domestic pollution. *Rangia* have been commercially harvested for canning in Texas, and currently support a small commercial fishery in North Carolina (Engle, 1970) where 53,640 and 46,762 pounds were landed in 1970 and 1971 (U.S. Department of Commerce, 1971, 1972).

In 1967 a new west coast fishery harvesting *Macrocallista nimbosa* with a hydraulic Nantucket clam dredge at Bell Shoal near St. Joe Bay was initiated under observation of the Florida Department of Natural Resources (FDNR) Marine Research Laboratory (Stokes et al., 1968; Joyce, 1971). This was the first time since 1949 that mechanical shellfish harvesting equipment had been used in Florida. A biologist was therefore assigned to observe and report effects of dredging on the substrate and associated biota. Information was reported on harvesting efficiency, production, processing, and age and growth (Stokes et al., 1968).

Over two million pounds of *M. nimbosa,* with a total dockside value slightly exceeding a quarter of a million dollars, were landed from 1967 through 1972 (Table 1). However, production was restricted in 1971 due to difficulties experienced by the single processor at Apalachicola. New facilities have since been constructed and the fishery is once again active, but harvesting is limited pending development of new markets (G. C. Kirvin, personal communication).

In 1967 the FDNR initiated a program to study effects of a Maryland soft-shell escalator clam dredge (R/V *Venus*) on estuarine communities and to survey clam stocks in Tampa Bay and at Cedar Keys (Godcharles, 1971). Although shellfish were efficiently harvested, the dredge proved destructive to rooted vegetation. Seagrasses had not recolonized one denuded Tampa Bay study site 36 months after initial dredging.

In November 1969 the FDNR research vessel *Hernan Cortez,* equipped with hydraulic Nantucket clam gear, began an exploratory survey in northwest Florida to locate additional exploitable populations of sunray venus clams and others of commercial value (Jolley, 1972). At this time it was assumed that only the relatively small size of the Bell Shoal bed would limit growth of this burgeoning fishery. Our paper reports continued survey results from 22 May 1970 to 9 September 1971. In January 1971 the survey was expanded under Commercial Fisheries Research and Development Act PL 88-309 to include exploration of the Florida east coast and to explore shallow estuarine areas using the R/V *Venus.* In addition to locating exploitable stocks, the survey was designed to develop ecological information important in understanding distributions of the species involved.

METHODS AND MATERIALS

Design and operation of the hydraulic Nantucket clam dredge used on the R/V *Hernan Cortez* (Figure 2) were described by Jolley (1972), and those of the R/V *Venus* (Figure 3), a Maryland soft-shell escalator clam dredge, were described by Godcharles (1971). Both gear types utilize water pressure to dislodge clams from the substrate. The *Venus* conveyor belt system provided continuous harvesting, whereas the Nantucket dredge was intermittently raised to the deck and emptied. On the Nantucket dredge, apertures between adjacent steel flat bars on the cage and adjacent steel rods on the dredge blade assembly were 31 and 20 mm. Operating depth was 3.1 to about 14.6 m; draft of the *Hernan Cortez* prevented sampling at depths less than 3.1 m. The dredge was towed by a 7.2 cm polypropylene hauser with a 3:1 length-to-depth ratio; hose ratio was maintained at 4 or 5:1. Water pump pressure was varied with depth in accordance with Jolley's (1972) procedure.

Figure 2. R/V *Hernan Cortez* with hydraulic Nantucket clam gear.

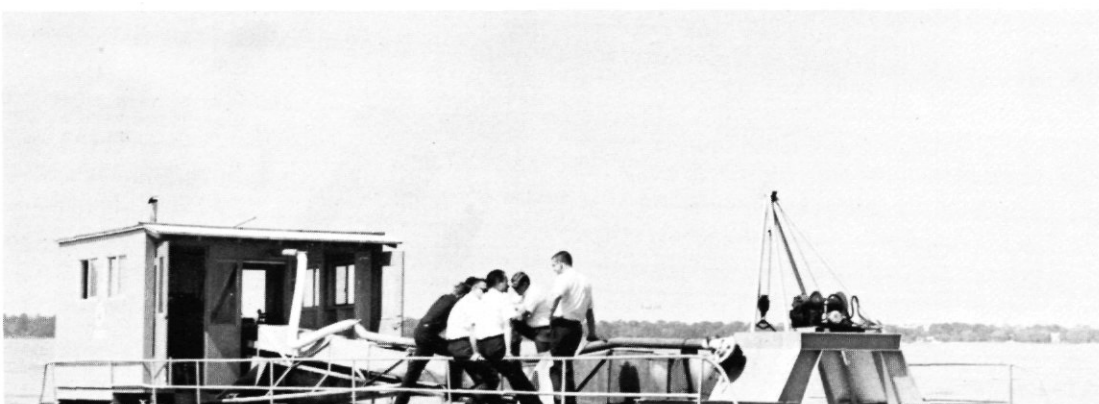

Figure 3. R/V *Venus.*

The *Venus* conveyor belt had a trapezoidal mesh size 24.4 high by 11.6 and 13.6 mm wide. Operating depth was approximately 0.9 to 4.6 m. The dredgehead was not forced through the substrate; rather, the water jets eroded a trough while the outdrive unit provided steering and forward motion (Manning, 1957; Godcharles, 1971).

Optimum dredging efficiency for both gear types was obtained on sandy substrate and efficiency was greatly reduced on muddy bottoms (Godcharles, 1971; Jolley, 1972). Damage to the Nantucket dredge collecting blade on rocky or uneven substrate prompted use of a box dredge or scrape (33 cm high, 92 cm wide, 76 cm deep), previously described by Joyce and Williams (1969), to provide transect continuity. Sampling was immediately discontinued when rocky substrates were encountered by the *Venus.* Both vessels used 10-minute sampling periods.

Depth, water temperature, salinity, and water clarity were recorded at each station (Appendix I). Water temperature was determined with a centigrade immersion thermometer, salinity with an American Optical refractometer, and clarity with a Secchi disk. Dissolved oxygen (dO) values were obtained aboard the R/V *Venus* with a YSI model 51A oxygen meter at 48 stations in Charlotte Harbor and 76 stations in the Ten Thousand Islands. Readings were obtained during active sampling from the stern of the vessel to negate possible aeration by the water pump and dredgehead nozzles. Substrate at all stations was determined from dredged sediments.

A total of 846 stations were sampled by the R/V *Venus* and the R/V *Hernan Cortez* from Panama City to Cape Sable and from Indian Key to Ft. Pierce. The 192 stations sampled by the *Venus* were restricted to Tampa Bay, Charlotte Harbor, and the Ten Thousand Islands. The 654 stations sampled by the *Hernan Cortez* were located throughout the study area.

Coordinates for all stations are listed in Appendix I. Figure 4 shows the geographic extent of survey areas and areas covered by each U.S. Coast & Geodetic Survey (C&GS) chart (Figures 5 through 20) upon which all stations are depicted except one (Station 498, off Key West). Areas I and II were separated at latitude 27°29′N; Area III extended north from the Atlantic side of Indian Key to Jupiter Inlet and was separated from Area IV at latitude 27°00′N.

Prior to January 1971, east-west transects by the *Hernan Cortez* were spaced three miles apart, but were extended to five miles apart in Area II (south of Charlotte Harbor) and in Areas III and IV. Stations along transects were located at 5 ft (1.5 m) depth intervals from about 10 to 45 ft (3.1 to 13.7 m). *Venus* transects were set two miles apart with stations every mile along each transect. Stations were not selected by depth. A zigzag pattern, with stations sampled at approximately one mile intervals, was employed in the Intracoastal Waterway and the Manatee, Myakka and Peace Rivers. Sampling frequency by the *Hernan Cortez* was increased in areas yielding substantial numbers of clams from normal effort.

Clams were counted or numerically estimated by volumetric measure according to the following criteria: 1 bushel of sunray venus clams (mean length 130 mm) yields approximately 150 clams (Stokes et al., 1968); 1 bushel (35.2 liters) of southern quahogs (mean length 100 mm) yields approximately 100 clams. Captured clams are listed by species and station in Appendix II. Clam production was calculated by depth (shallow = 0.9-4.6 m; moderate = 4.7-9.2 m; deep = 9.3-15.3 m) for each area and each C&GS chart (Tables 2 and 3). Catch effort for quahogs and sunray venus clams was determined in two ways:

$$\text{Regular catch effort } (C/f_r) = \frac{\text{Number of clams}}{\text{Total stations sampled}}$$

$$\text{Limited catch effort } (C/f_1) = \frac{\text{Number of clams}}{\text{Total productive stations}}$$

RESULTS AND DISCUSSION

Distributions

Macrocallista nimbosa evidently occurs sympatrically with *Mercenaria campechiensis* along much of the Atlantic and Gulf coasts. Along the Atlantic coast *M. nimbosa* has been reported from North Carolina (Pearse et al., 1942; Abbott, 1954; Wolfe and Wolfe, 1970; Porter and Tyler, 1971) to

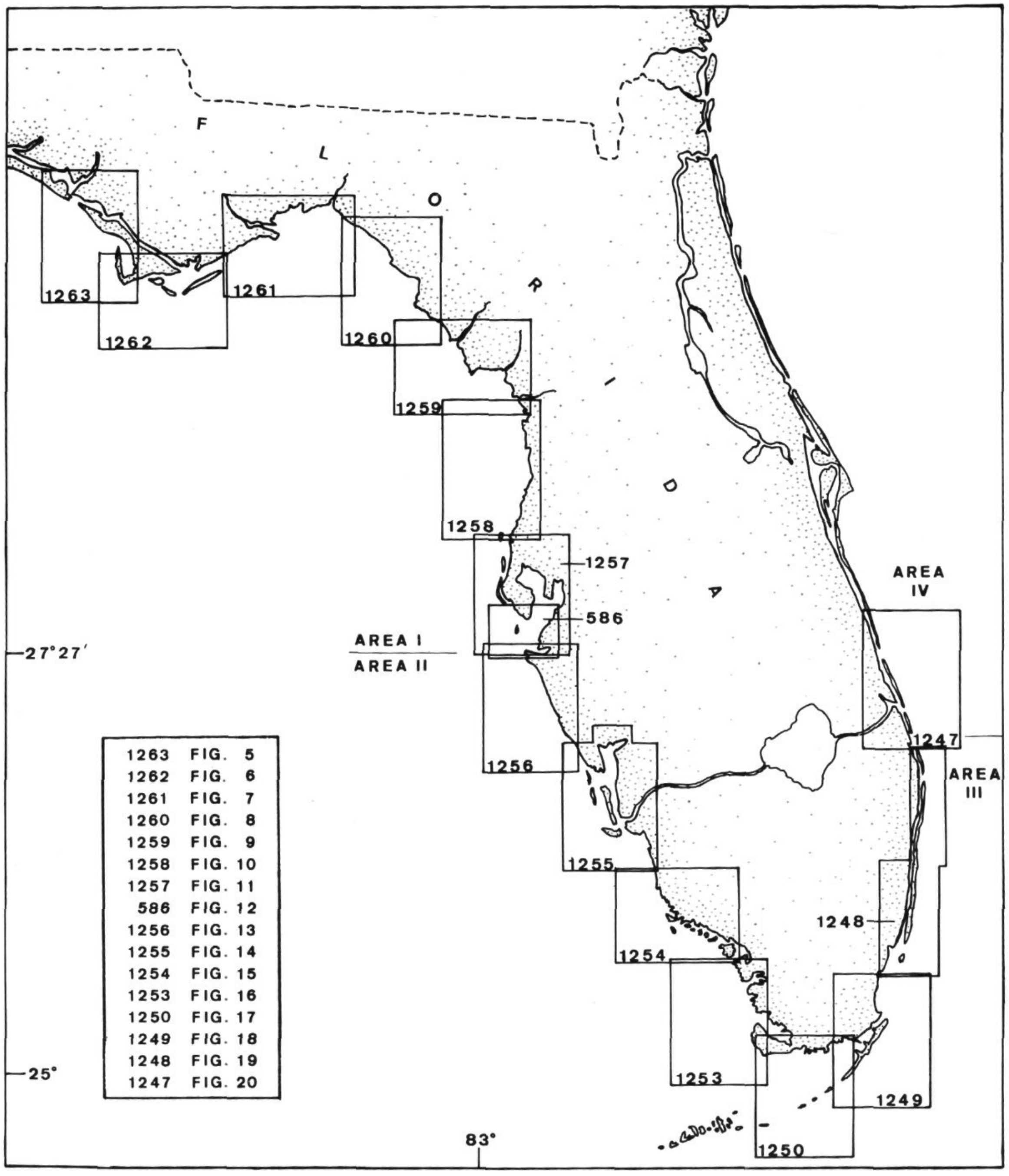

Figure 4. Map of Florida showing Areas I, II, III, and IV and U.S. Coast & Geodetic Survey Charts 1263 through 1247 (excluding 1251 and 1252) with corresponding figure numbers.

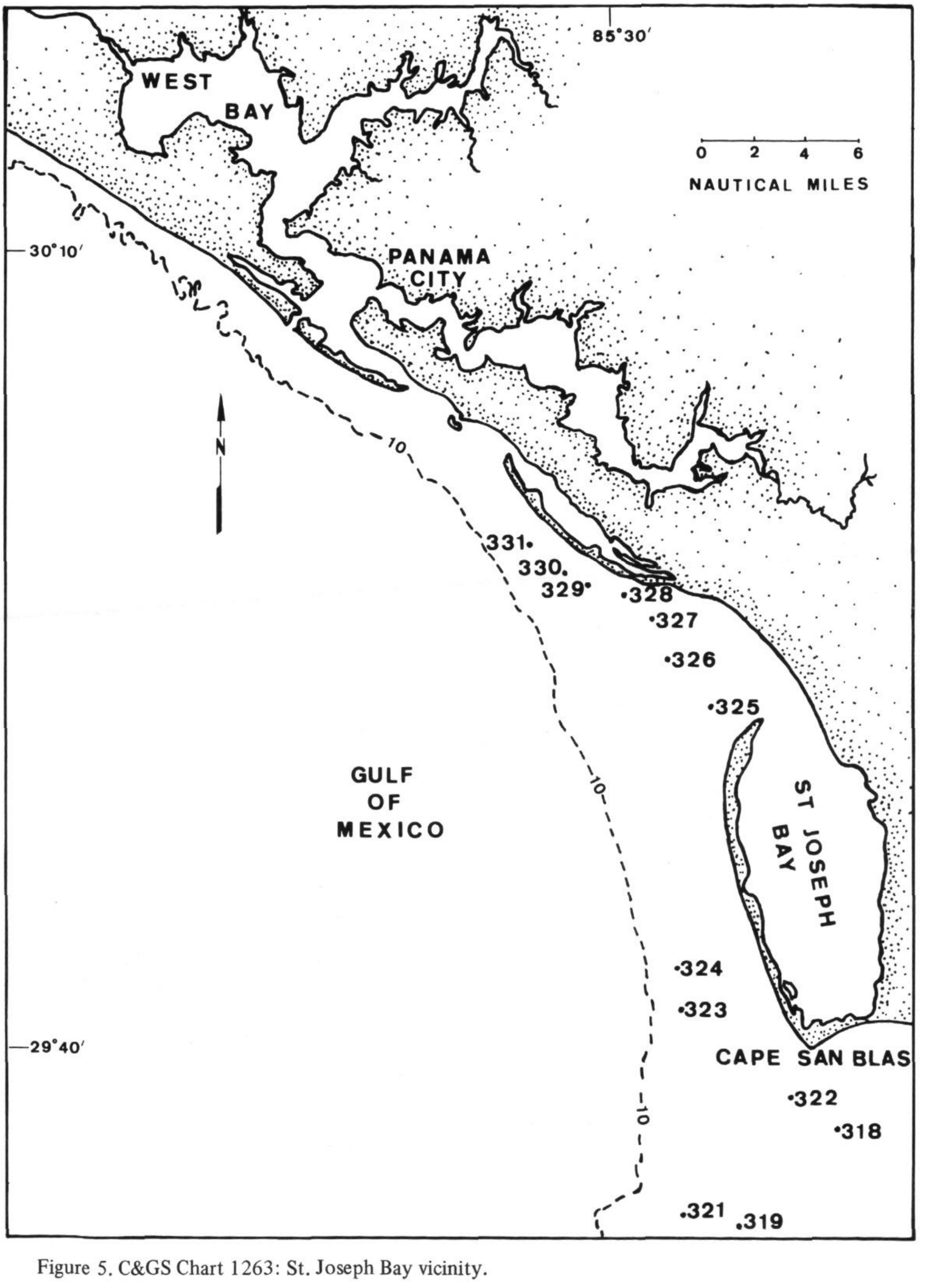

Figure 5. C&GS Chart 1263: St. Joseph Bay vicinity.

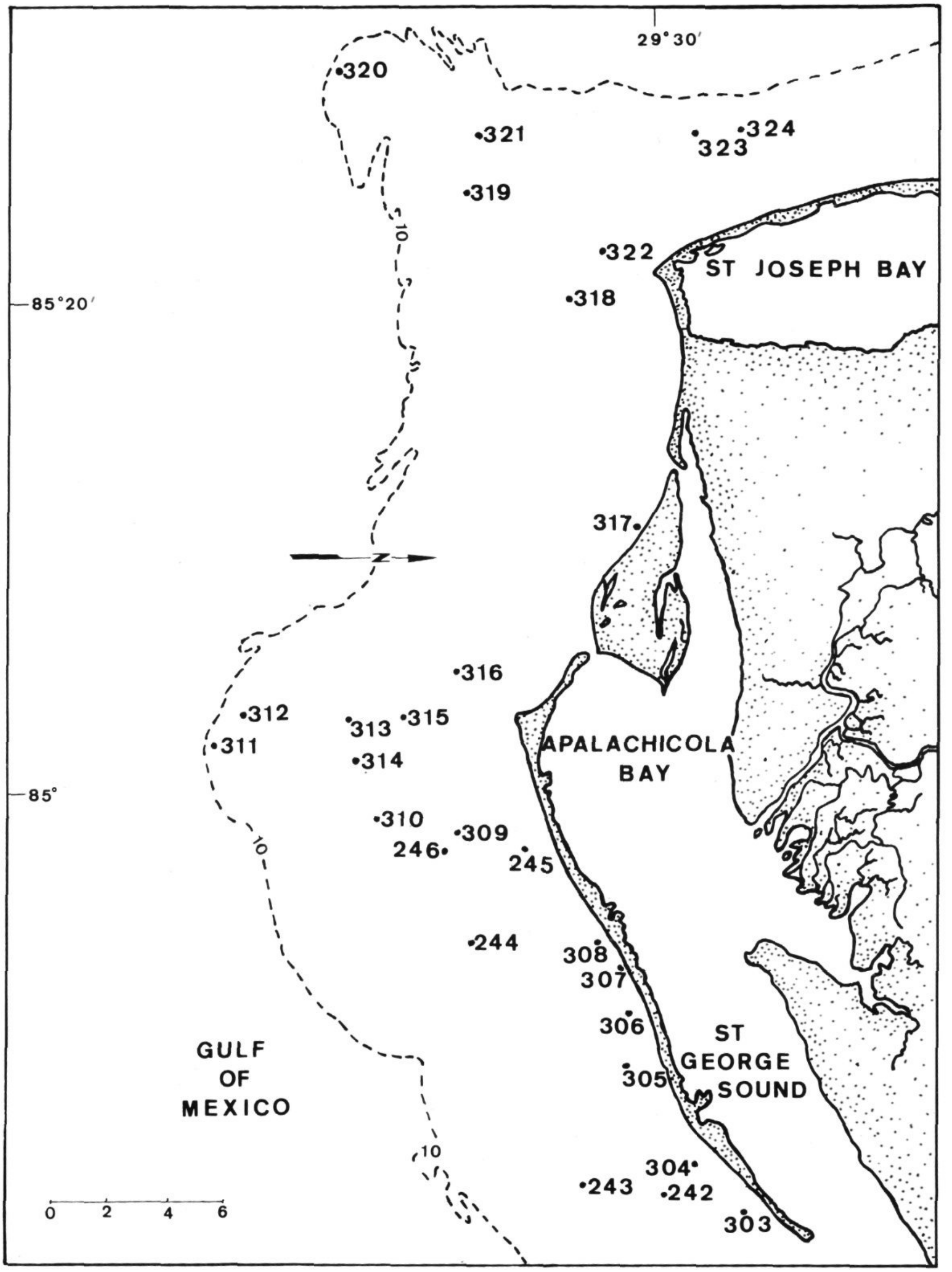

Figure 6. C&GS Chart 1262: Cape San Blas to Apalachicola Bay.

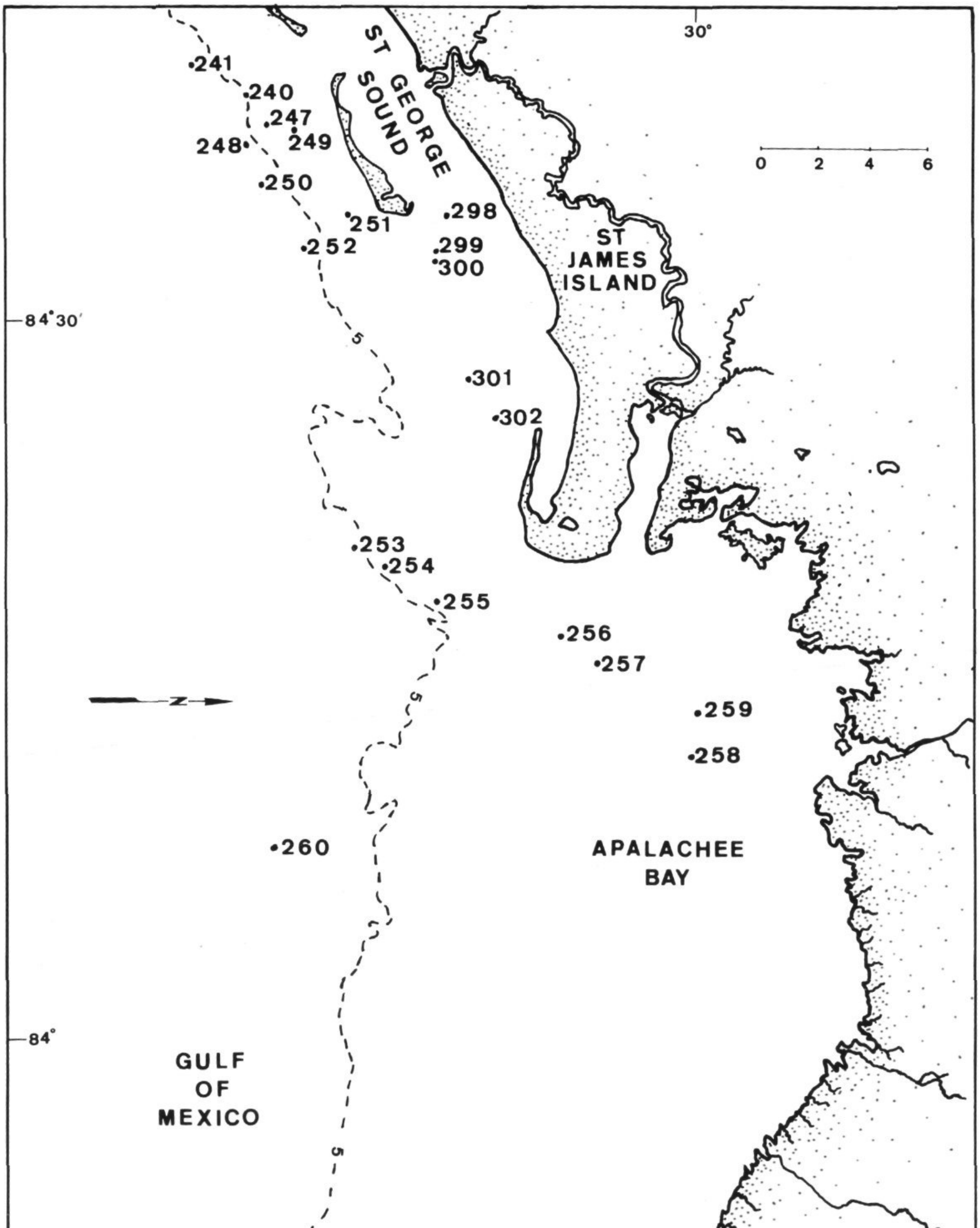

Figure 7. C&GS Chart 1261: Apalachee Bay.

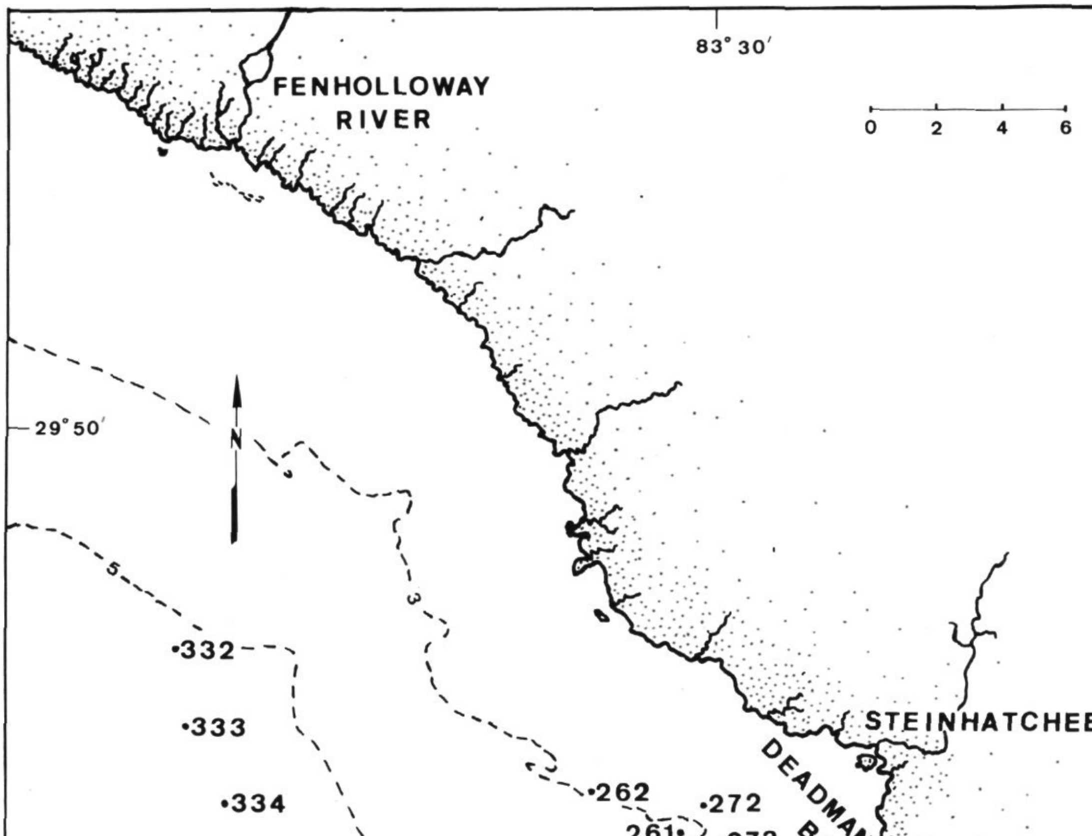

Figure 8. C&GS Chart 1260: Rock Island to Horseshoe Point.

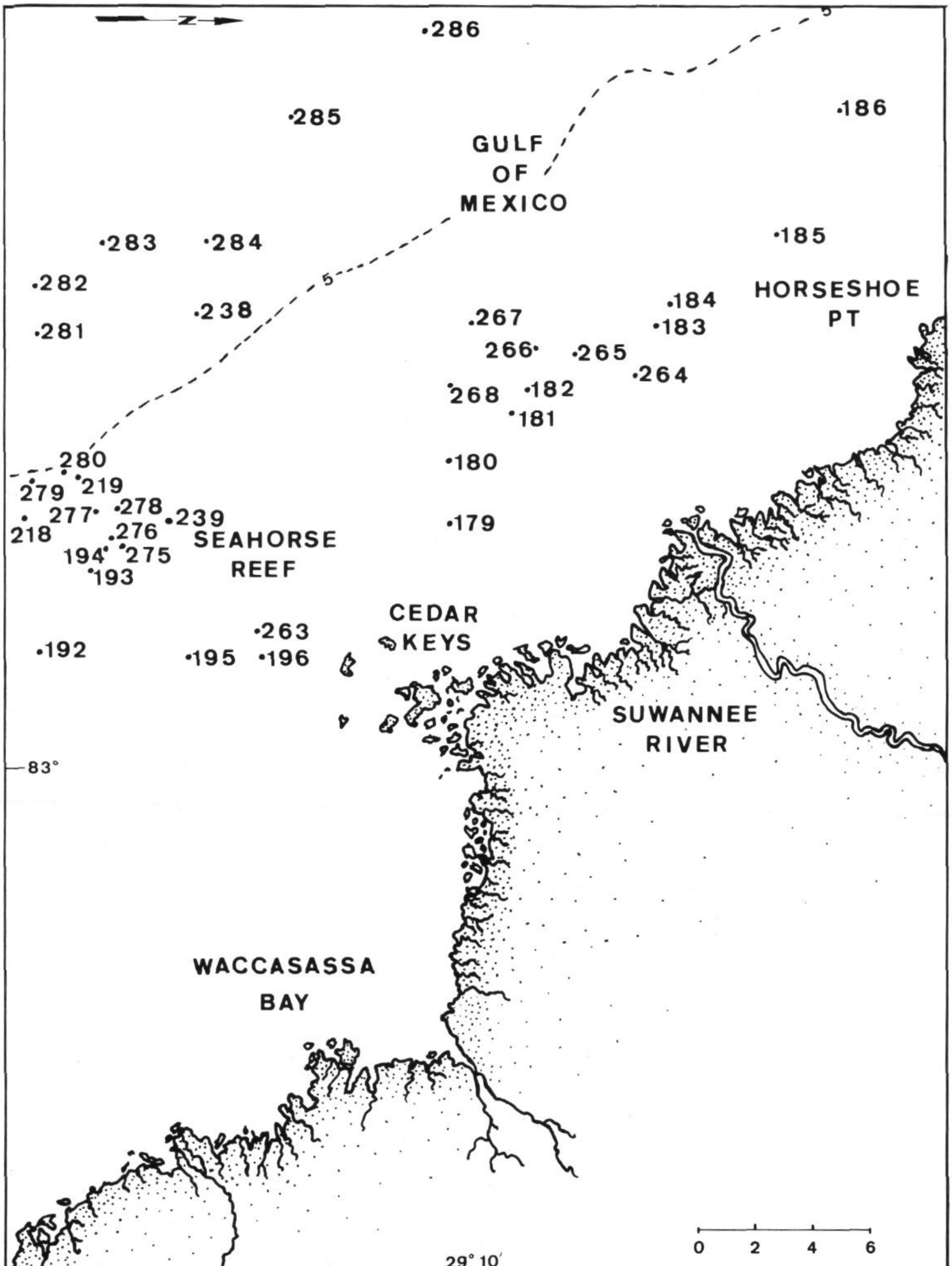

Figure 9. C&GS Chart 1259: Horseshoe Point to Crystal River.

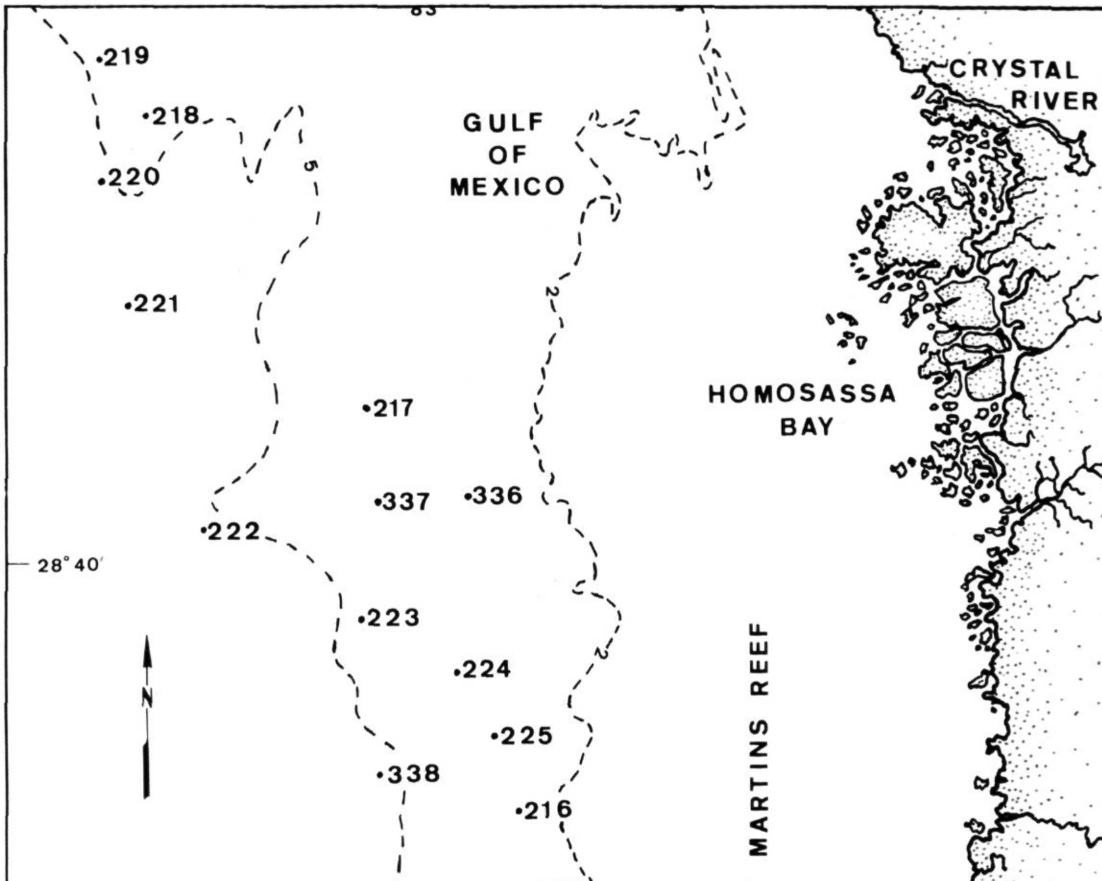

Figure 10. C&GS Chart 1258: Crystal River to Anclote Keys.

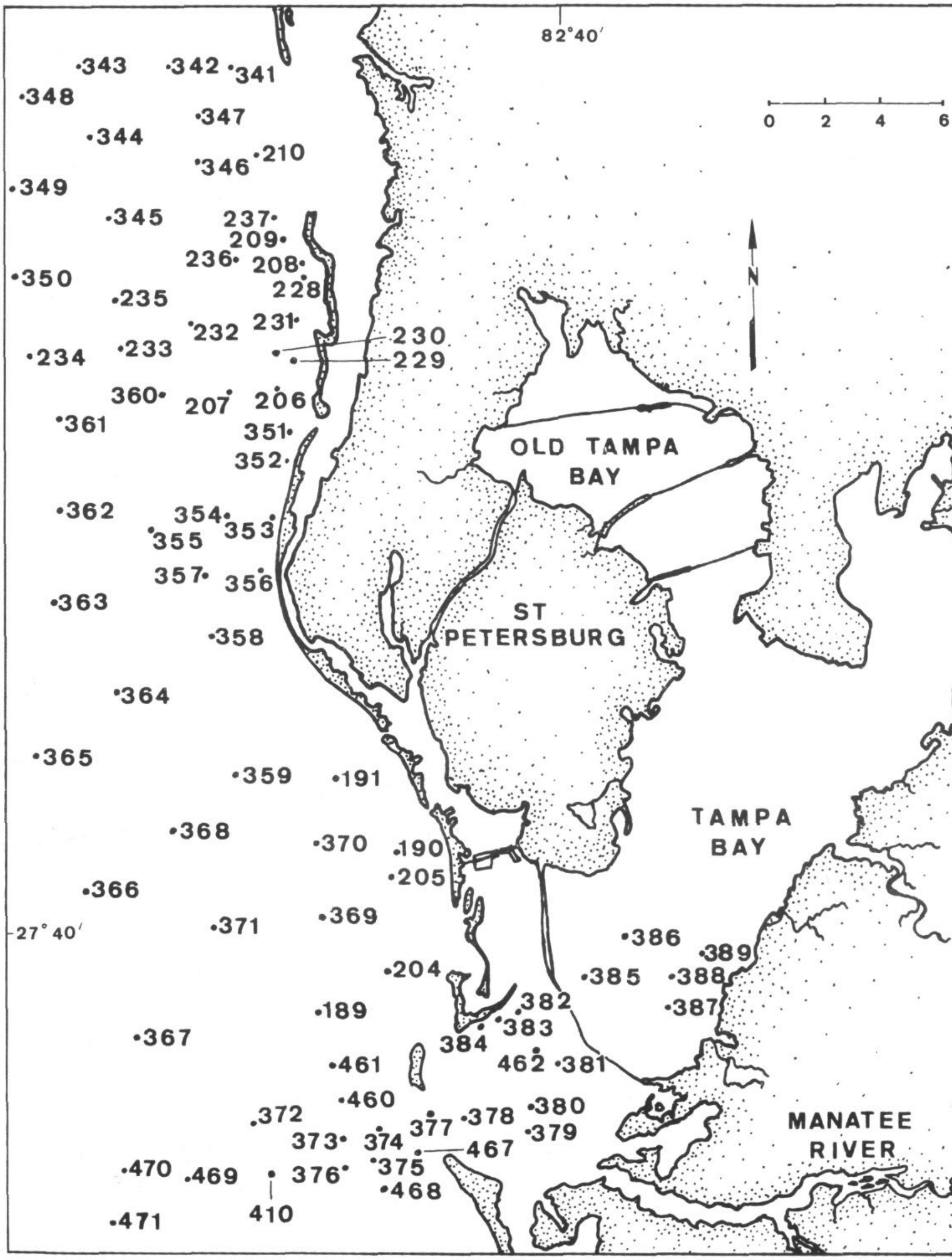

Figure 11. C&GS Chart 1257: St. Joseph Sound to Tampa Bay.

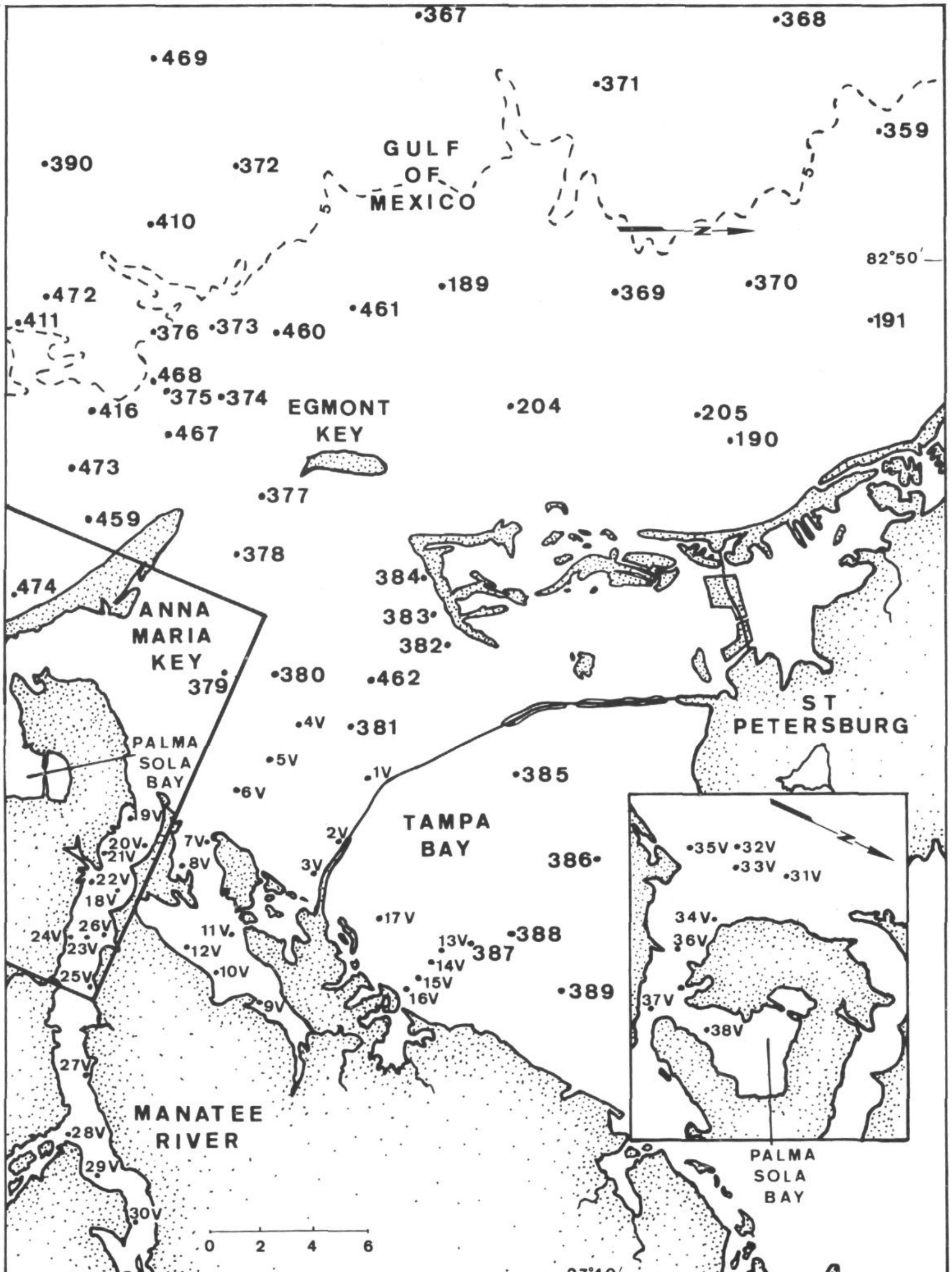

Figure 12. C&GS Chart 586: Tampa Bay.

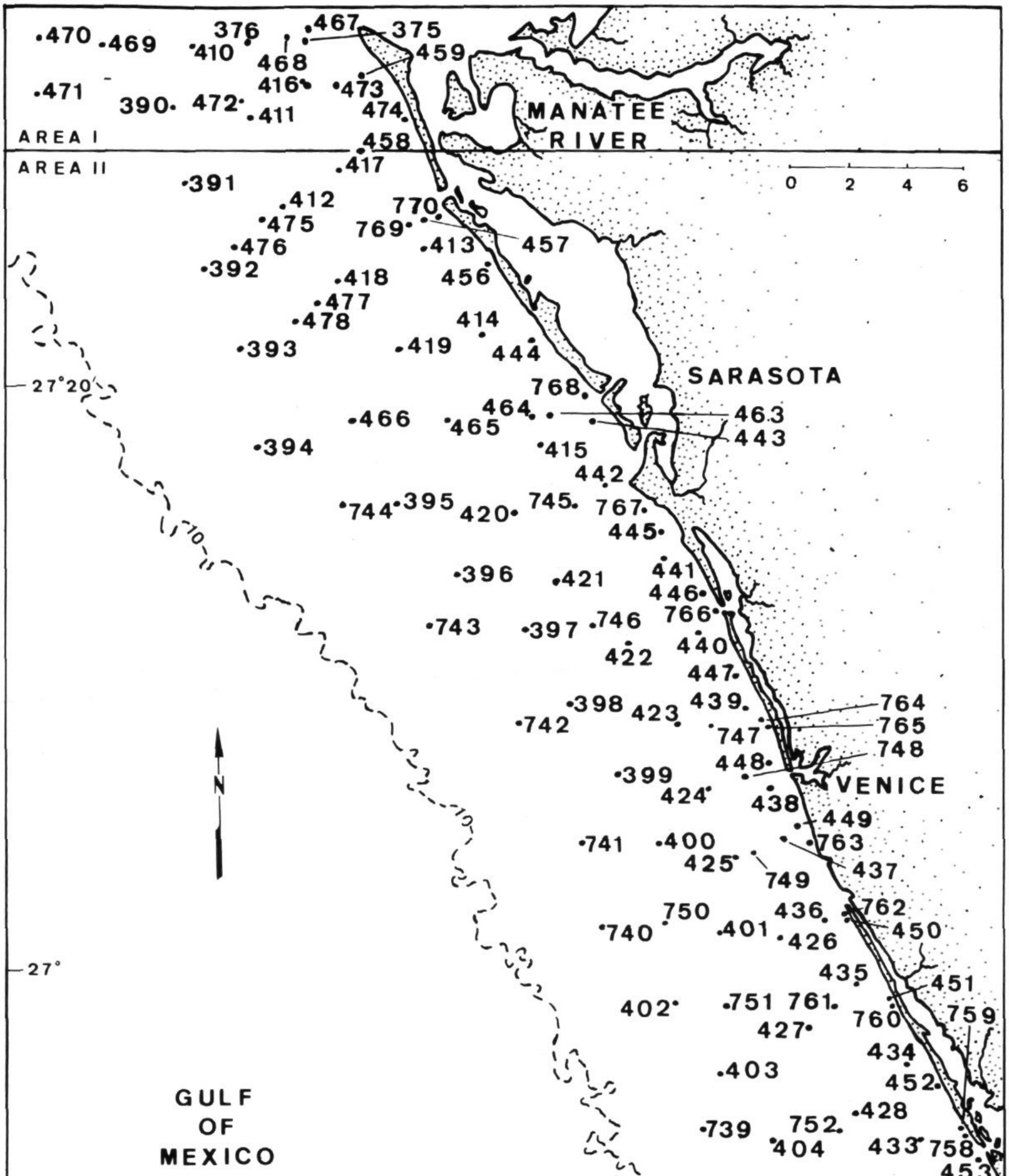

Figure 13. C&GS Chart 1256: Passage Key Inlet to Lemon Bay.

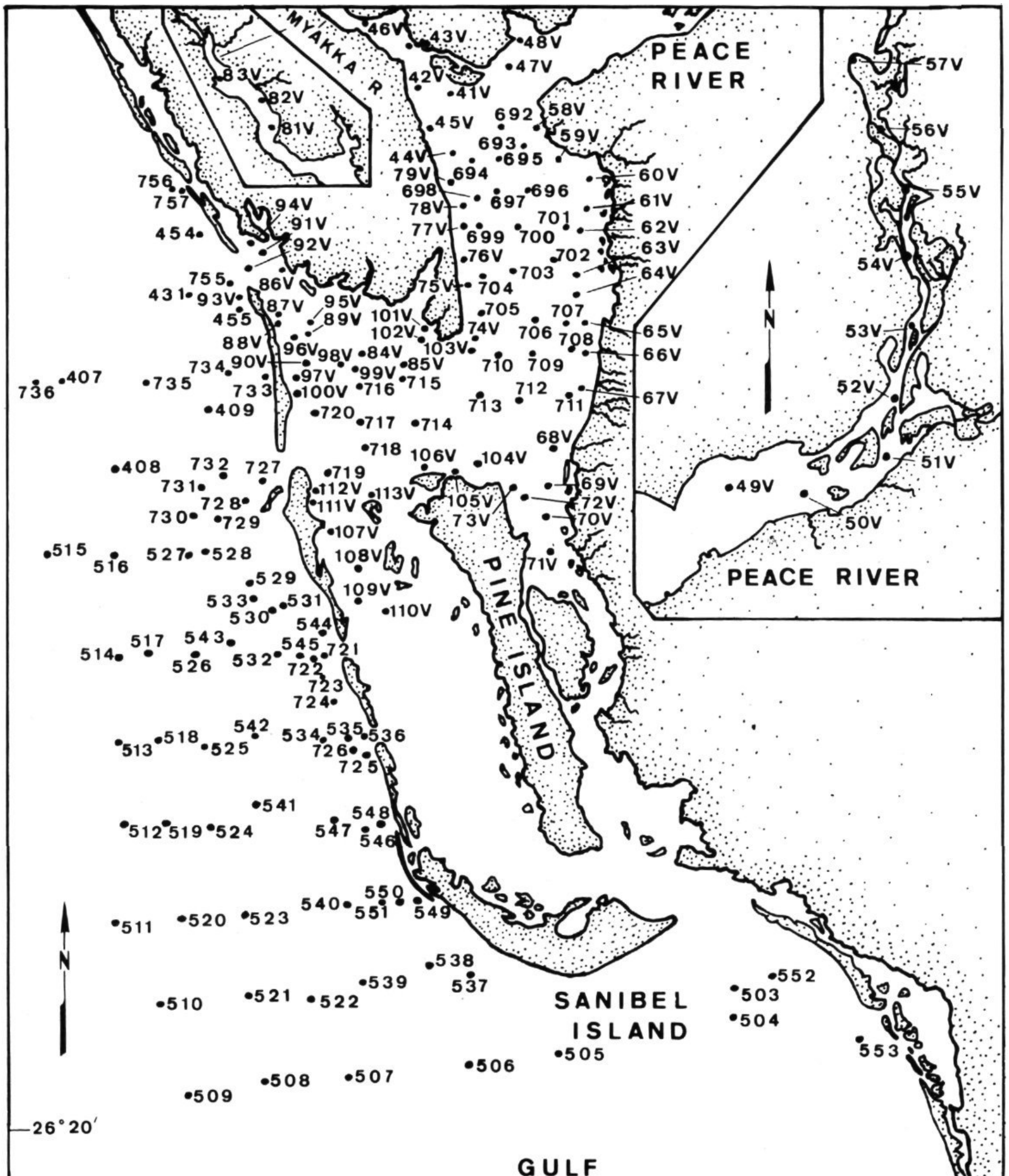

Figure 14. C&GS Chart 1255: Lemon Bay to Estero Bay, including Charlotte Harbor.

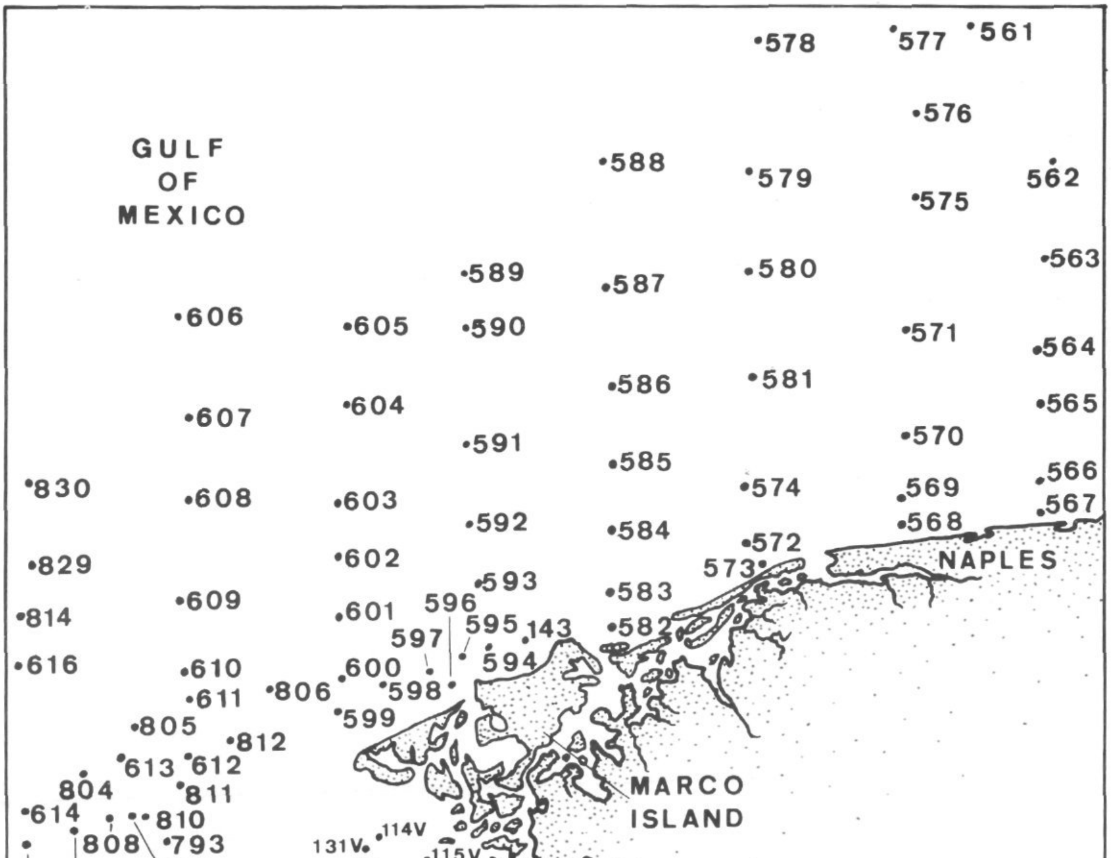

Figure 15. C&GS Chart 1254: Clam Pass to Chatham River.

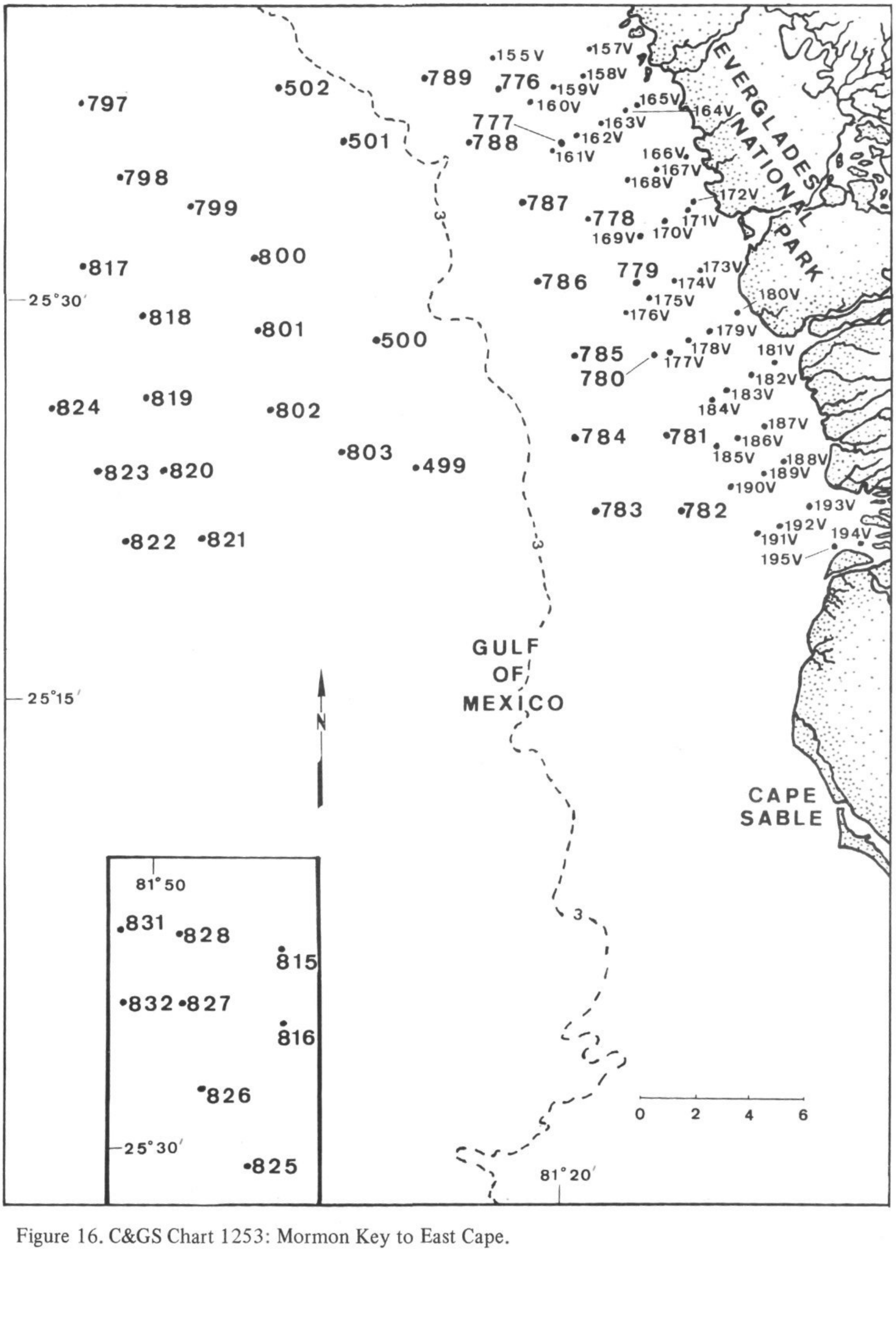

Figure 16. C&GS Chart 1253: Mormon Key to East Cape.

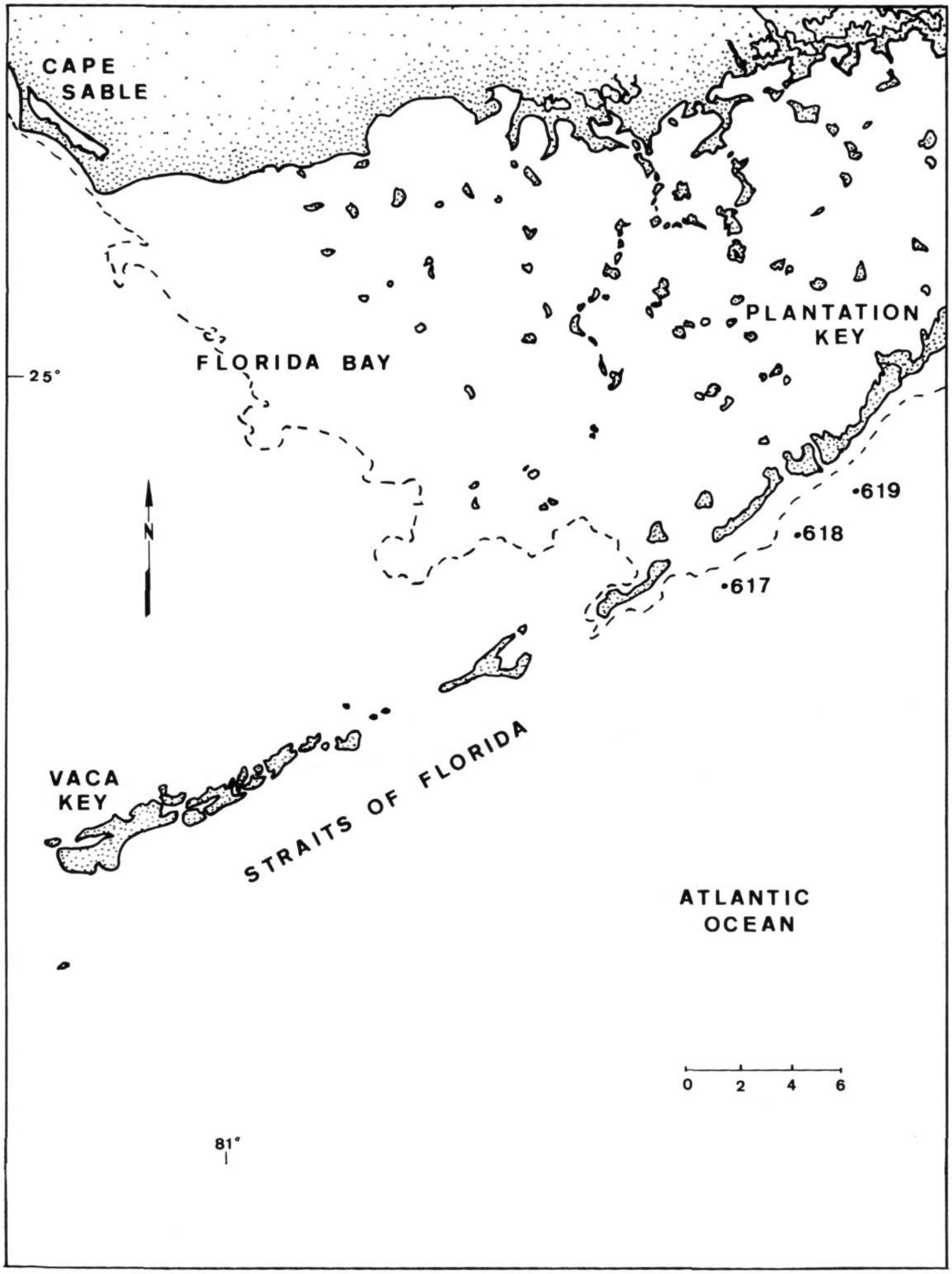

Figure 17. C&GS Chart 1250: Sombrero Key to Alligator Reef.

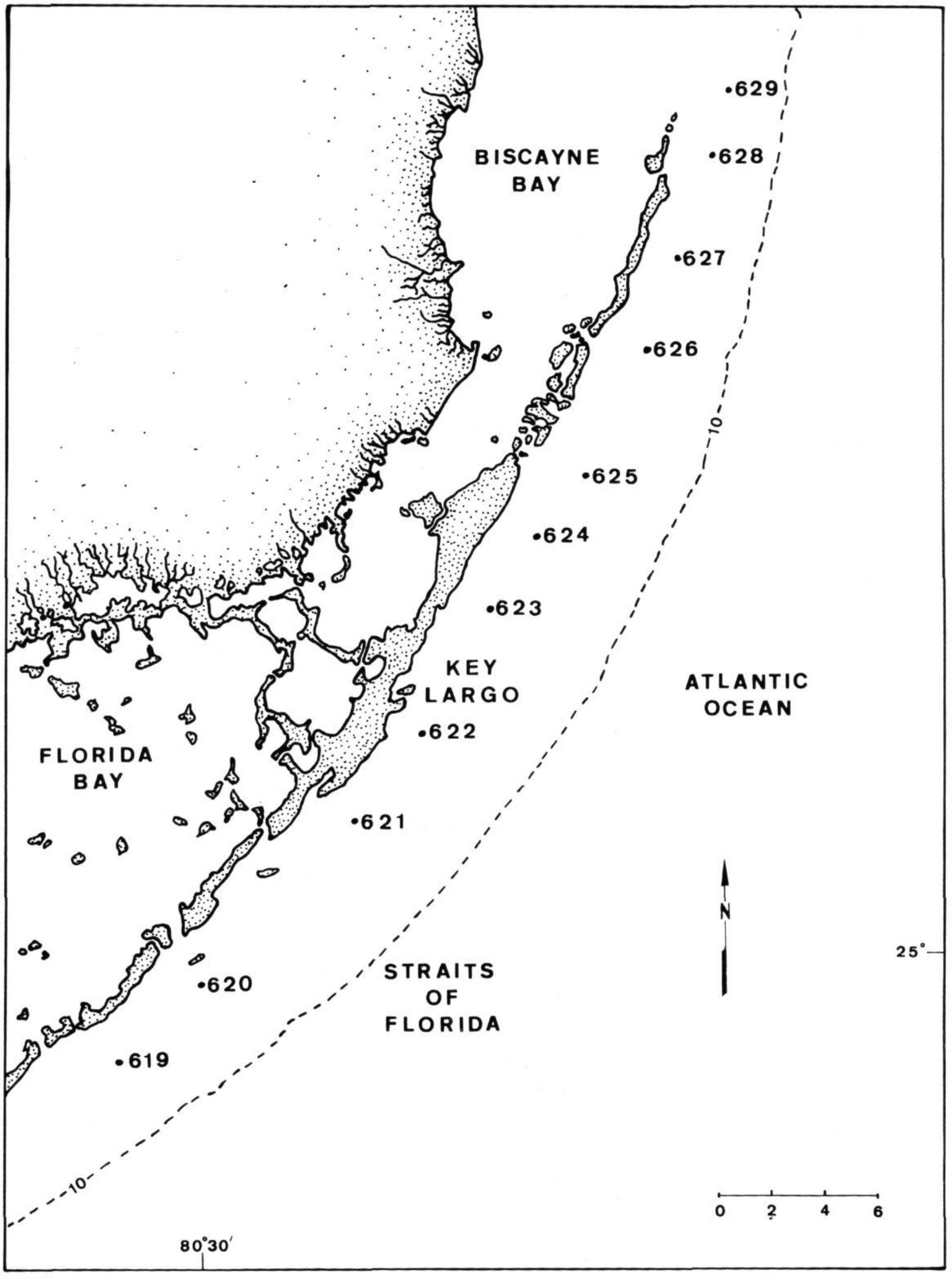

Figure 18. C&GS Chart 1249: Alligator Reef to Fowey Rocks.

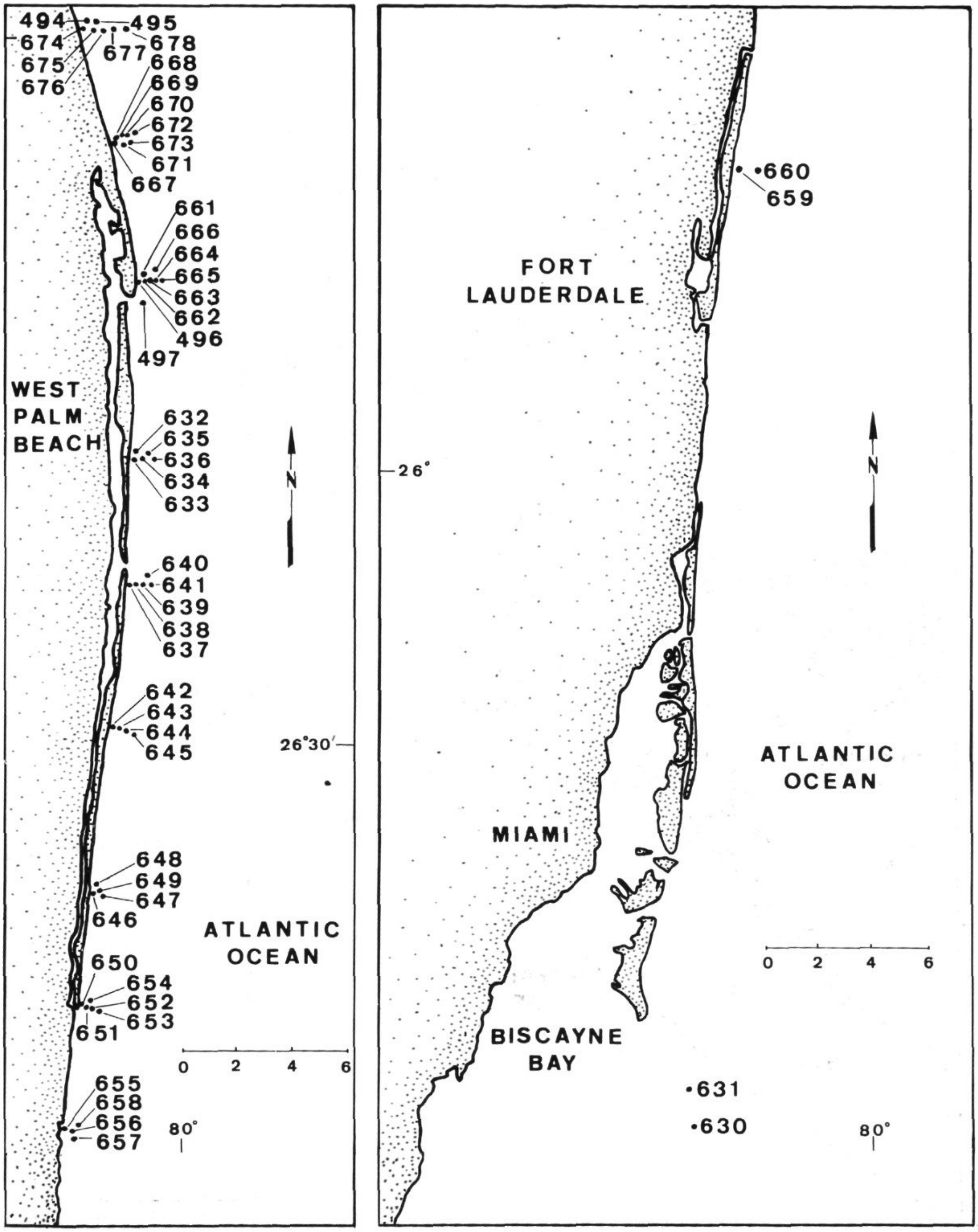

Figure 19. C&GS Chart 1248: Fowey Rocks to Jupiter Inlet.

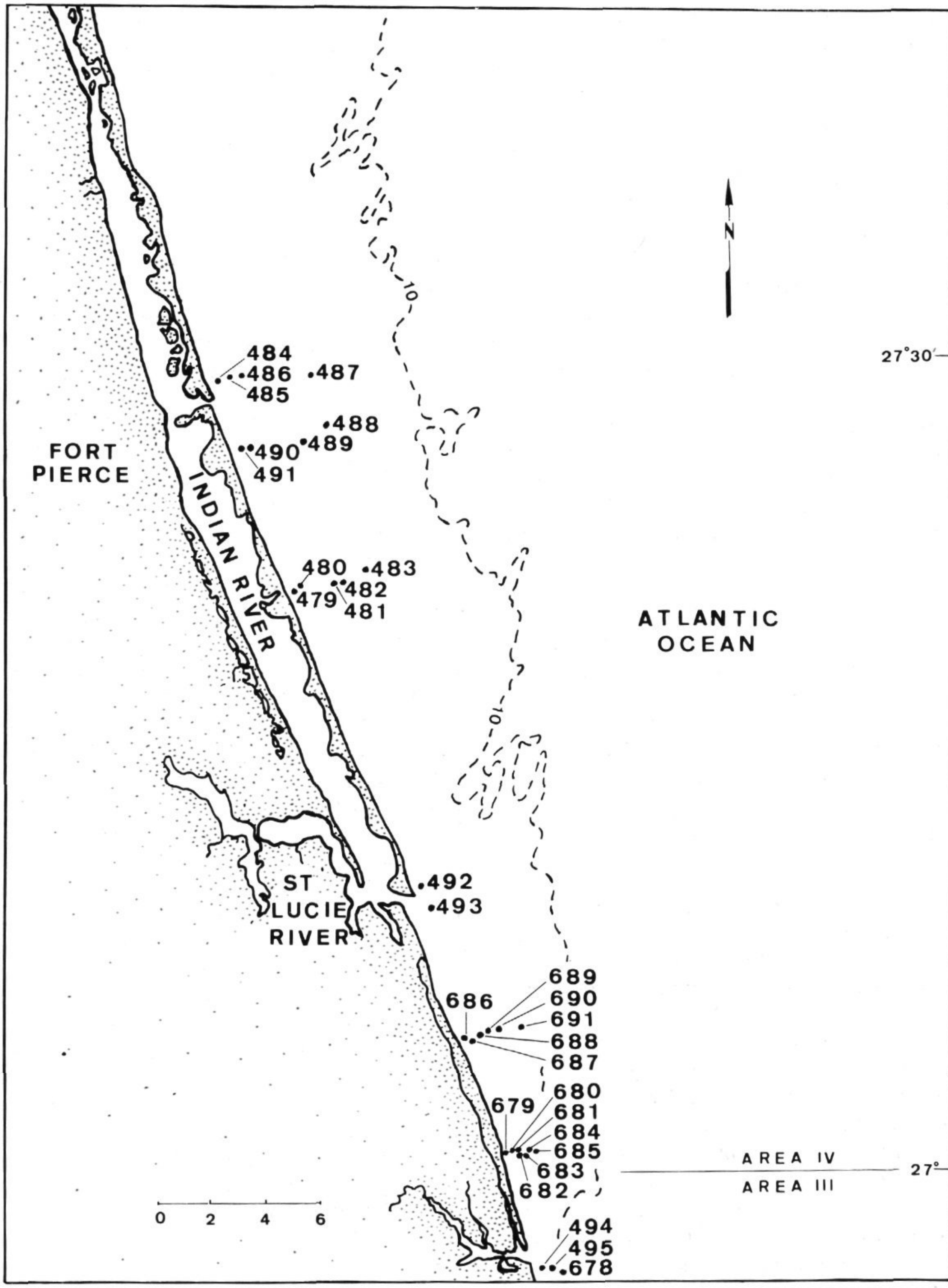

Figure 20. C&GS Chart 1247: Jupiter Inlet to Ft. Pierce.

Cape Canaveral (Clench, 1942). *Mercenaria campechiensis* ranges from New Jersey (Merrill and Ropes, 1967) to the St. Lucie Inlet (FDNR Invertebrate Reference Collection, FSBC I 273, 278); it is common at Jupiter Inlet and occurs occasionally at Lake Worth (C. Plockelman, Palm Beach County Shell Club, personal communication). Extent to which its bathymetric range overlaps that of *M. nimbosa* on the Atlantic coast is not well documented. Porter and Tyler (1971) reported *M. nimbosa* from intertidal areas to 19.8 m in North Carolina but such information is unavailable for other Atlantic coast areas. Bathymetric occurrence of *M. campechiensis* has for the most part been defined throughout its Atlantic coast range; in the north it occurs offshore in depths of 7-36 m and is occasionally found near inlets (Porter and Chestnut, 1960; Cummins, 1966; Merrill and Ropes, 1967), while south of Cape Canaveral it is found inshore as well (Menzel, 1968). The closely related northern quahog, *Mercenaria mercenaria,* is found inshore of the southern quahog all along the Atlantic coast range of the latter, but ranges further north to the Gulf of St. Lawrence (Belding, 1912; Johnson, 1934; Abbott, 1954). Probable natural hybridization of these congeners has been reported in North Carolina (Porter and Tyler, 1971). Menzel (1968) mentioned "ample opportunity for hybridization" along the lower east coast of Florida, but only typical *M. campechiensis* were collected during our survey.

Macrocallista nimbosa has been reported along the Gulf coast from Cape Sable, Florida (Tabb and Manning, 1961) to Texas (Clench, 1942; Andrews, 1971). Pulley (1952) reported only dead specimens from Texas as did Andrews (1971), who speculated that living specimens must have been previously abundant as indicated by shells in Texas Indian middens and that living specimens may occur offshore. Cary (1906) and Cary and Spaulding (1909) reported limited occurrence of *M. nimbosa* at Chandeleur Islands, Louisiana, but the species is not included on recent Louisiana marine faunal lists of Harry (1942), Behre (1950), Dawson (1966), and Hoese (1972). Vanatta (1903) reported *M. nimbosa* in Mississippi, but Moore (1961) noted that living specimens appeared to be rare. Sunray venus clams have been reported from Mobile, Alabama by Smith (1951).

Distribution of *Mercenaria campechiensis* in the Gulf of Mexico is similar to that of *M. nimbosa,* but it has also been reported from the Bay of Campeche by Jaume (1946). It occurs offshore in Texas (Carpenter, 1967; Tunnell and Chaney, 1970; Andrews, 1971), but is replaced by *M. campechiensis texana* in coastal bays and passes (Ladd, 1951; Pulley, 1952; Andrews, 1971). Abbott (1954) and Parker (1959) recognize this subspecies as *M. mercenaria texana.* Menzel (1968) extended its range eastward to Panama City and Apalachicola Bay. What probably are *M. campechiensis* have been reported for Texas (Ladd, 1951), Louisiana (Cary, 1906; Spaulding, 1906; Cary and Spaulding, 1909; Hoese, 1972), Mississippi (Vanatta, 1903; Moore, 1961), and Florida (Vanatta, 1903; Schroeder, 1924). Both *Venus (=Mercenaria) mercenaria mercenaria* and Venus *(=Mercenaria) campechiensis campechiensis* have been reported from Louisiana (Harry, 1942; Behre, 1950), and *Venus (=Mercenaria) mercenaria mortoni* has been reported from Mississippi and Florida (Vanatta, 1903; Schroeder, 1924). These taxonomic incongruities result from basing specific and subspecific characters solely upon shell morphology. Chanley (1959) showed that external zigzag mottling of *M. mercenaria notata* was inherited in *M. mercenaria* in a Mendelian ratio. Behre (1950) recognized *M. m. mercenaria* and *M. c. campechiensis* but questioned the validity of reporting both, since characters varied greatly; she speculated that some, especially shell smoothness, might be environmentally induced. Menzel (1968) observed that *M. mercenaria* found south of St. Augustine were quite similar to *M. m. texana.* He reported that 75% of F_2 hybrids of *M. campechiensis* and *M. mercenaria* closely resembled *M. m. texana,* but concurred with Pulley (1952) that *M. mercenaria* does not occur in the Gulf of Mexico, thereby eliminating the possibility of hybridization there. Such confusion suggests that further systematic study be devoted to Florida and northern Gulf *Mercenaria* species. However, all quahogs collected in our survey appeared to be typical *M. campechiensis.*

Geographical distribution of *Rangia cuneata* is similar to that of *M. campechiensis,* but *Rangia* occurs only in river-influenced, low salinity environments. Along the Atlantic coast it has been reported from Maryland to Florida. Populations in the Northeast, Elk, and Potomac Rivers of Maryland are suspected of having been introduced (Pfitzenmeyer and Drobeck, 1964; Gallagher and Wells, 1969). Further south, *Rangia* has been reported from the James River in Virginia (Wass, 1963), the Pamlico, Neuse, and Trent Rivers of North Carolina (Wolfe and Petteway, 1968; Porter and Tyler, 1971), and the Altamaha River of Georgia (Godwin, 1968). Florida east coast specimens have been reported from the St. Johns River south of Jacksonville, from near Stuart, and from the Intracoastal Waterway at Boynton Beach (Woodburn, 1962). Trynet collections in the St. Lucie River by Gunter and Hall (1963) yielded only dead specimens.

Along the Gulf coast, *Rangia* has been reported from Alvarado and Vera Cruz, Mexico (Dall, 1894; Woodburn, 1962; Andrews, 1971). In Texas, distribution has been reported as "landward of oysters" in all river-influenced bays of low salinity (Pulley, 1952; Andrews, 1971). Ladd (1951) reported it abundant in Hynes and San Antonio Bays. *Rangia* has been reported in Louisiana from Barataria Bay (Harry, 1942; Behre, 1950), Lake Pontchartrain (Smith, 1951; Fairbanks, 1963), and the Chandeleur Islands (Cary, 1906). It has also been found at Ship Island, Mississippi (Moore, 1961) and Mobile Bay, Alabama (Dall, 1894; Smith, 1951). In west Florida, it has been reported from Pensacola, Apalachicola, Ochlocknee Bay, the Wakulla and East Rivers, the Myakka and Peace Rivers (Menzel, 1956; Woodburn, 1962), and the Caloosahatchee River (Gunter and Hall, 1965). Latitudinal coordinates (ca. 26°30'N) of southernmost collection sites along both Florida coasts are almost identical.

Catch Analyses By Area and Chart Locality

AREA I

Chart 1263–St. Joseph Bay Vicinity (Figure 5)

Macrocallista nimbosa were caught in greater quantities in this chart locality than in any other. Distribution of these clams by capture depth and stations sampled is shown in Figure 21. Seven of nine stations produced approximately 1,900 clams, 79% of all caught in Area I and 73% of all caught during the survey. Three stations (325, 326, 327) on Bell Shoal yielded 11 bushels (1,734 clams) from depths of 4.0 to 6.9 m. Yields from these stations are comparable to commercial efforts producing 1,000 to 2,000 clams per 15 to 20-minute drag on the Bell Schoal bed (Jolley, 1972). The 32 clams measured at Station 325 averaged 132 mm, similar to the mean size of 130 mm reported by Stokes et al. (1968). Regular and limited catch efforts were far greater than those of any other locality (Table 2).

Jolley (1972) sampled 11 stations in this locality. His Station 51 off Shell Island produced 80 clams (FDNR unpublished data), his highest yield, but he had no stations on Bell Shoal.

A few *Mercenaria campechiensis* were captured in this locality by Stokes et al. (1968) and Jolley (1972), but none were found during our survey.

Captiva (1958) reported no clams from four M/V *Silver Bay* stations in 6.1 m along St. Joe Spit. Likewise, three *Silver Bay* stations in 13 to 22 m southwest of Cape San Blas (Bullis, 1957a; Bullis and Thompson, 1965) yielded no clams. Our stations 323 and 324 and Jolley's stations 74, 140 and 141 off Cape San Blas and St. Joe Spit produced no clams.

Chart 1262–Cape San Blas to Apalachicola Bay (Figure 6)

Thirteen of 25 stations produced 73 *Macrocallista nimbosa;* greatest single yield (20 clams) was at Station 304 in 5.5 m off St. George Sound. These were the largest captured during the survey, averaging 147 mm from moderate depths and 145 mm at deep stations. Distribution of these clams by capture depth and stations sampled is shown in Figure 21. No *Mercenaria* were collected.

No clams were reported by Bullis (1957b) or Bullis and Thompson (1965) from two M/V *Silver Bay* stations off St. George Island.

Chart 1261–Apalachee Bay (Figure 7)

Distributions of *Macrocallista* and *Mercenaria* by capture depth and stations sampled are shown in Figure 21.

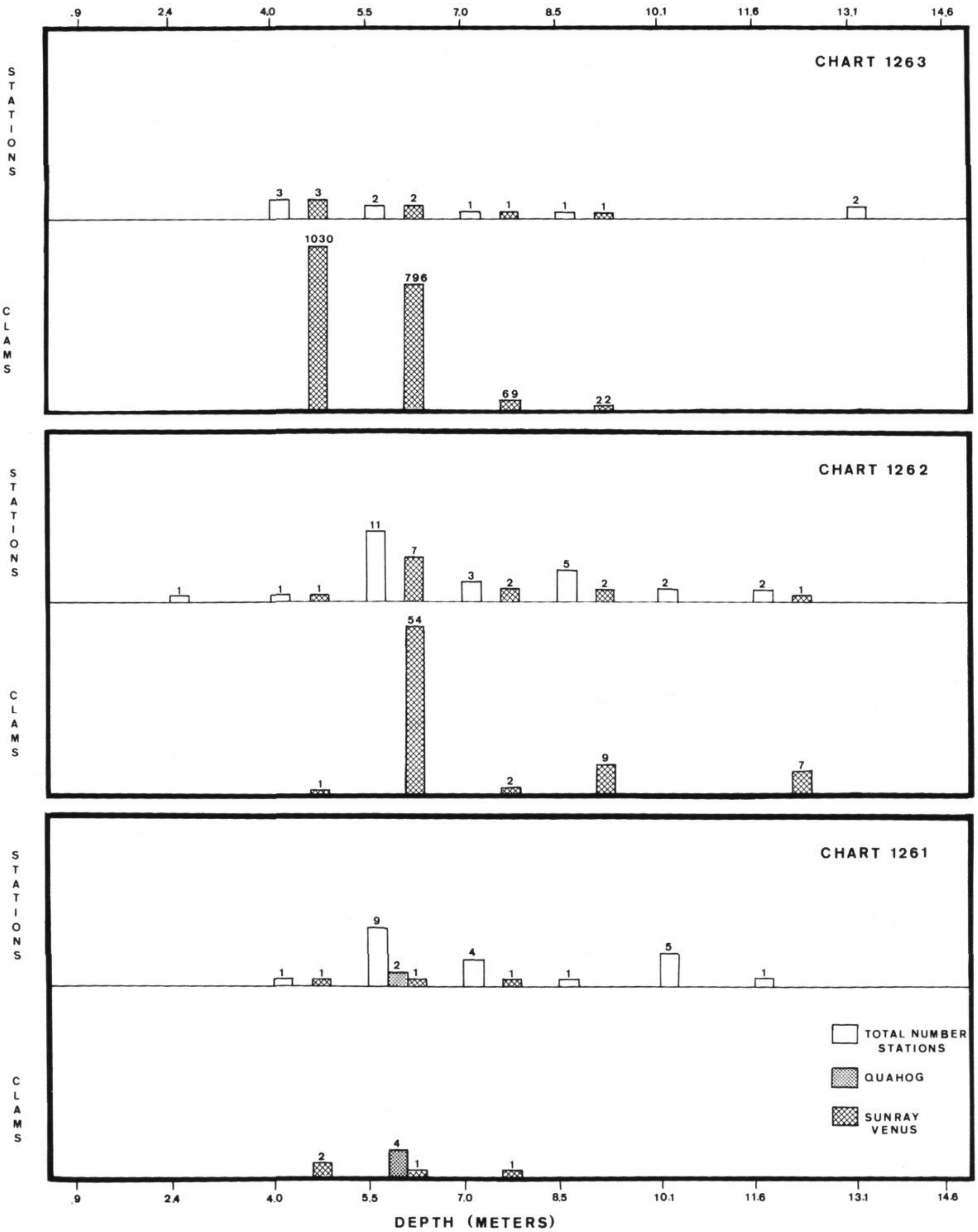

Figure 21. Distribution of stations sampled, numbers of stations producing *Mercenaria* (quahogs) and *Macrocallista* (sunray venus clams), and numbers of *Mercenaria* and *Macrocallista* captured by depth for chart localities 1263, 1262 and 1261. Depth interval variance from 1.5 to 1.6 m resulted from conversion to metric equivalents.

This was the least productive chart locality in Area I for *Macrocallista nimbosa.* Clams were found at only two of 21 stations, yielding C/f_r and C/f_l) values of only 0.2 and 1.3. This was also Jolley's (1972) least productive area, although he had anticipated good catches because of physiographic similarity and of proximity to Bell Shoal; moreover, concentrations of *M. nimbosa* had been previously reported inshore at Alligator Harbor by Akin and Humm (1959).

Mercenaria campechiensis at Stations 299 and 302 were the northernmost taken in this survey.

No clams were reported from the single *Silver Bay* station off Dog Island by Bullis (1957b) or Bullis and Thompson (1965).

Chart 1260–Rock Island to Horseshoe Point (Figure 8)

Only four of 23 stations produced *Macrocallista nimbosa.* Most (12 of 13) were taken at three adjacent stations (271, 272, 273) in 3.7 to 5.2 m off Steinhatchee. Distribution of these clams by capture depth and stations sampled is shown in Figure 22. No *Mercenaria* were captured.

The only prior sampling in this locality was by the R/V *Venus* which collected seven small *Macrocallista nimbosa* and two small *Mercenaria campechiensis* at three stations between Deadman Bay and Horseshoe Point in November 1969 (Godcharles, 1971).

Chart 1259–Horseshoe Point to Crystal River (Figure 9)

This was the third most productive chart locality sampled, yielding 142 *Macrocallista nimbosa* at 14 of 37 stations and C/f_r and C/f_l values of 3.8 and 10.1. Distribution of these clams by capture depth and stations sampled is shown in Figure 22. Largest catch (43 clams) occurred at Station 277, immediately south of Seahorse Reef in 6.1 m.

Jolley (1972) reported this as his most productive locality for *M. nimbosa.* Nine of his stations in 3.1 to 5.5 m along the southern perimeter of Seahorse Reef yielded 49 to 128 clams (FDNR, unpublished data). Sampling only on Seahorse Reef, Jolley reported a total catch of approximately 900 clams and catch per unit effort of 29 clams per ten-minute drag, greatly exceeding our catches. However, only one of our stations (239) was located on the productive southern tip of Seahorse Reef.

During October and November 1969, 63% of *M. nimbosa* collected here by the R/V *Venus* were from three stations at the northern end of Seahorse Reef, producing four clams per 15 minutes of sampling (Godcharles, 1971).

The R/V *Hernan Cortez* collected only one *Mercenaria campechiensis* in this locality (Station 181). Jolley (1972) reported none here, but the R/V *Venus* found *M. campechiensis* at the southern end of Suwannee Reef in November and December 1969 (Godcharles, 1971). No clams were reported from the *Silver Bay* station in 7.9 m off Seahorse Reef by Bullis (1957b) or Bullis and Thompson (1965).

Chart 1258–Crystal River to Anclote Keys (Figure 10)

Distributions of *Macrocallista* and *Mercenaria* by capture depth and stations sampled are shown in Figure 22.

This locality ranked second in *Macrocallista nimbosa* production, with C/f_r and C/f_l values of 4.7 and 18.0. Most (121 of 126 clams) were taken in 4.3 to 4.9 m at four stations (197, 198, 203, and 211) off the north end of Anclote Key; the remainder were taken at Station 220 off Crystal River. Sizes ranged from 84 to 154 mm with a mean of 130 mm, similar to that reported from Bell Shoal by Stokes et al. (1968). Godcharles (1971) reported 22 clams per 15-minute collection (one R/V *Venus* station) near Anclote Key in December 1969.

Only seven *Mercenaria campechiensis* were collected, all from four stations near Anclote Key. No clams were reported by Bullis (1957b), Captiva (1958), or Bullis and Thompson (1965) at *Silver Bay* stations in 5.5 and 7.4 m off St. Martins Reef and Anclote Key.

Chart 1257–St. Joseph Sound to Tampa Bay (Figure 11)

Distributions of *Macrocallista* and *Mercenaria*

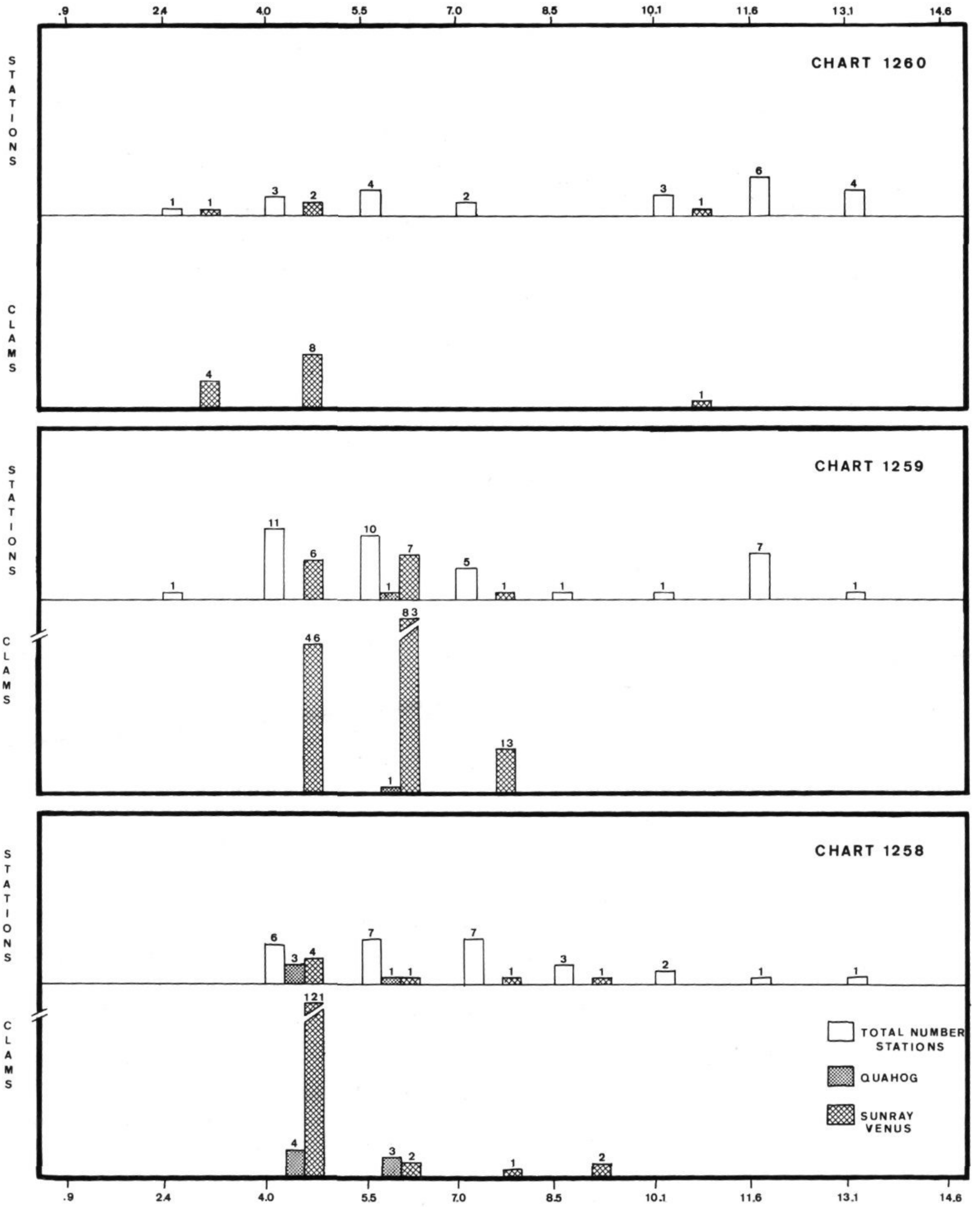

Figure 22. *Mercenaria* (quahogs) and *Macrocallista* (sunray venus clams) production, chart localities 1260, 1259, and 1258. (For detailed explanation, see Figure 21.)

by capture depth and stations sampled are shown in Figure 23.

Twelve of 71 stations sampled produced 39 *Macrocallista nimbosa.* Nineteen were collected at Station 210 in 4.3 m between Anclote Key and Honeymoon Island.

Twenty-two stations yielded 264 *Mercenaria campechiensis,* resulting in C/f_r and C/f_l values of 3.7 and 12.0. Highest yields (98 and 32 clams) were from Stations 208 and 228 in 4.3 and 3.7 m off Hurricane Pass. Godcharles (1971) collected 45 *M. campechiensis* per 15-minute sample at one R/V *Venus* station inshore from our Station 210 in December 1969. Incidental sampling near this site in July 1971 yielded 195 clams (34-132 mm, $\bar{x}$ = 102 mm) in approximately 45 minutes of dredging by the *Venus.*

Three *Silver Bay* and *Oregon* surveys conducted from 1957 to 1962 revealed large numbers of *M. campechiensis* off Pass-a-Grille and St. Petersburg Beach. In 1957, 8 of 10 *Silver Bay* stations sampled for 15 to 40 minutes with a Fall River dredge produced a total of 268 *M. campechiensis* with catch effort values (per 10-minute tow) up to 36.7 and a mean catch effort of 11.8. In 1958, 11 of 12 *Silver Bay* stations yielded over 1,500 clams with catch efforts up to 220.0 and a mean catch effort of 85.6. Four years later (1962), with similar gear and towing times, 14 of 16 *Oregon* stations yielded approximately 750 clams with catch efforts up to 61.7 and a mean catch effort of 18.1 (Carpenter, 1967; National Marine Fisheries Service, unpublished data). Catches in 1957 and 1962 suggest that those in 1958 represent an exceptional year; alternately, they may merely reflect high variability of clam dispersal, as was often encountered in our survey. In approximately the same location, four of our stations (190, 205, 369, 370) yielded only 36 *M. campechiensis,* with a catch effort of 9.0.

Charts 1257, 586–Tampa Bay (Figures 11, 12)

Macrocallista and *Mercenaria* collected in Tampa Bay by the *Venus* and *Hernan Cortez* are shown in Figure 23 by capture depth and stations sampled. Also included are Area I totals for the two species.

One hundred eleven *Macrocallista nimbosa* were captured at 23 *Venus* and *Hernan Cortez* stations; largest catch (26 clams) was at *Hernan Cortez* Station 386 south of Pinellas Point. Previous samplings by the R/V *Venus* from 1968 through 1970 indicated that greatest concentrations of *M. nimbosa* occurred in lower Tampa Bay east of the Sunshine Skyway (Godcharles, 1971).

Results from previous clam surveys and related projects of our laboratory (Sims and Stokes, 1967; Godcharles, 1971) and the National Marine Fisheries Service (Taylor and Saloman, 1968a, 1969, 1970; Taylor et al., 1970) show that *Mercenaria campechiensis* concentrations in this vicinity are greatest in the lower parts of Boca Ciega and Tampa Bays. During our survey, 607 of 620 total *M. campechiensis* were captured from lower Tampa Bay stations and 519 of these were from ten *Hernan Cortez* stations. Resulting C/f_r and C/f_l values of 37.1 and 51.9 were the highest recorded in the survey. Greatest *M. campechiensis* catches using hydraulic Nantucket gear were in 6.4 m at Station 389 off Piney Point (approximately 250 clams) and at Station 462 west of the Sunshine Skyway (155 clams).

Greatest *M. campechiensis* catch by the *Venus* during this survey (37 clams) was at Station 35V on School Key Bar. *M. campechiensis* C/f_r and C/f_l values (5.9 and 7.3) for Tampa Bay stations were also the highest recorded for the *Venus* during our survey.

AREA II

Chart 1256–Passage Key Inlet to Lemon Bay (Figure 13)

Distributions of *Macrocallista* and *Mercenaria* by capture depth and stations sampled are shown in Figure 24.

Forty of 98 stations sampled yielded a total of 389 *Mercenaria campechiensis* with C/f_r and C/f_l values of 4.0 and 9.7, the second highest for Area II. Stations producing *M. campechiensis* were located throughout the area; those most productive were close to shore (shallow and moderate depths). Highest catch (74 clams) was at Station 442 in 8.5 m off Big Sarasota Pass. A single *Macrocallista nimbosa* was collected in this locality (at Station 770, off Longboat Pass).

Surveys in 1958 and 1962 by the *Silver Bay* and *Oregon* off Venice and Manasota yielded large

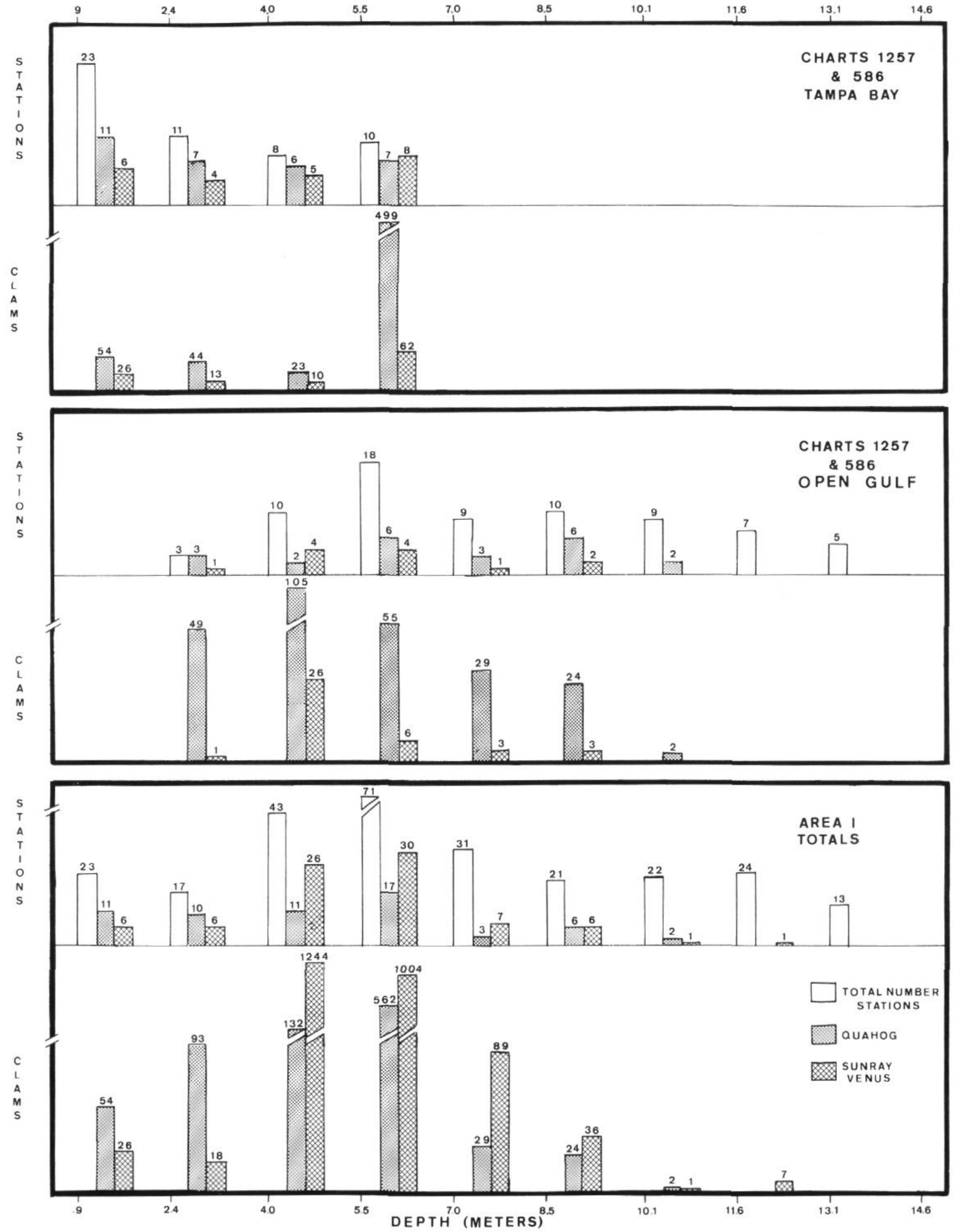

Figure 23. *Mercenaria* (quahogs) and *Macrocallista* (sunray venus clams) production, chart localities 1257 and 586 (Tampa Bay), charts 1257 and 586 (open Gulf), and totals for Area I. (For detailed explanation, see Figure 21.)

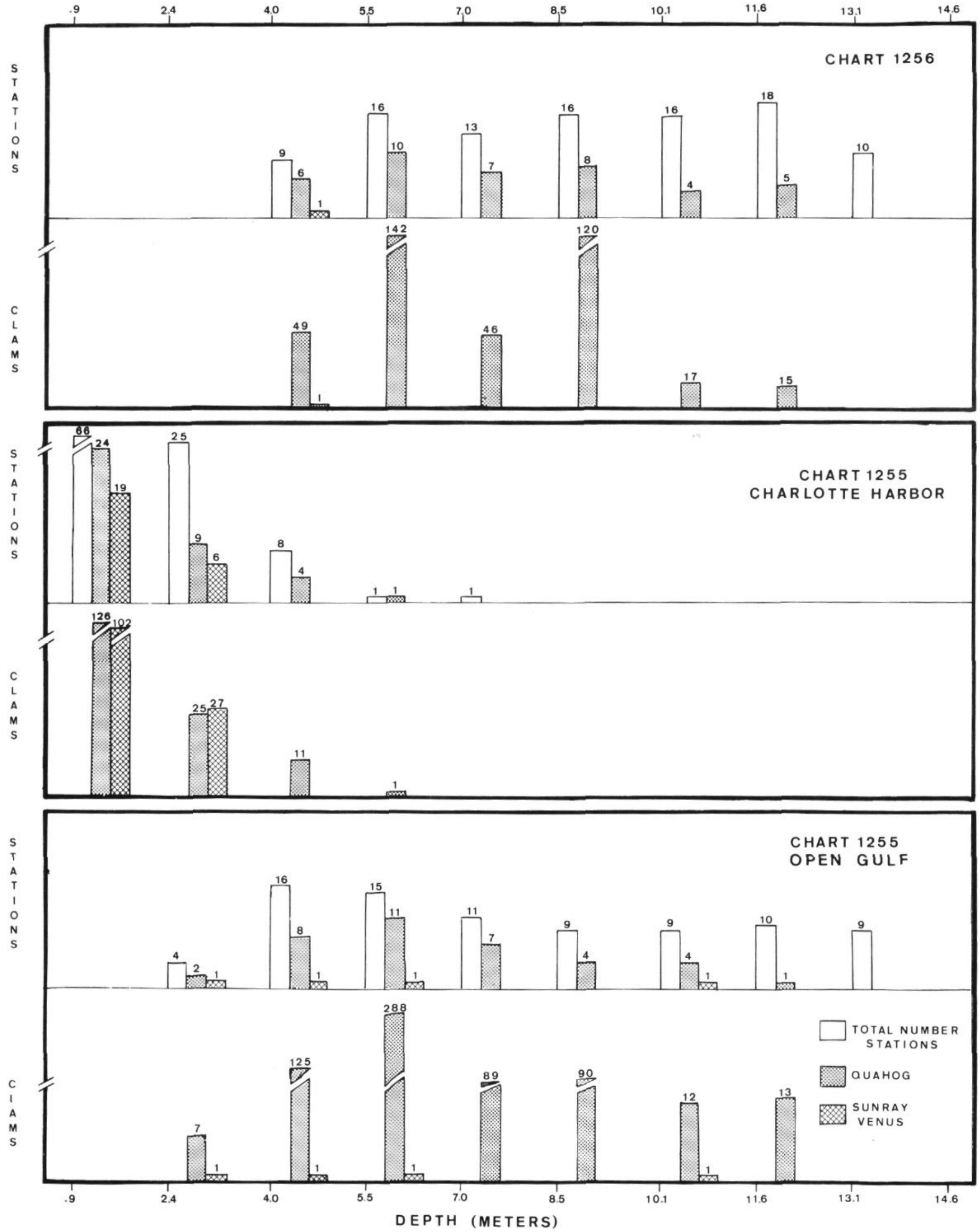

Figure 24. *Mercenaria* (quahogs) and *Macrocallista* (sunray venus clams) production, chart localities 1256, 1255 (Charlotte Harbor), and 1255 (open Gulf). (For detailed explanation, see Figure 21.)

numbers of *Mercenaria campechiensis* similar in densities to those off Pass-a-Grille and St. Petersburg Beach. Only one *Silver Bay* station was sampled in this vicinity in 1957. In 1958, six of seven *Silver Bay* stations produced a total of over 940 clams with catch effort values up to 550.0 and a mean catch effort of 123.2. In 1962, six of seven stations sampled in this vicinity by the *Oregon* produced a total of 270 clams with catch effort values up to 102.7 and a mean catch effort of 31.2 (Carpenter, 1967; National Marine Fisheries Service, unpublished data). Our two stations (448 and 449) near Venice produced only 29 *M. campechiensis.*

Chart 1255–Lemon Bay to Estero Bay, including Charlotte Harbor (Figure 14)

Macrocallista and *Mercenaria* collected in the open Gulf by the *Hernan Cortez* and in Charlotte Harbor by both vessels are shown by depth of occurrence in Figure 24.

The open Gulf portion of this locality was the second most productive for *M. campechiensis* in our survey. Thirty-seven of 83 stations yielded a total of 624 clams, with C/f_r and C/f_l values of 7.5 and 16.9. *M. campechiensis* were taken in all depths.

Greatest catches were at Redfish Pass (Station 726: 95 clams), Captiva Pass (Station 545: 70 clams), and Gasparilla Pass (Station 755: 65 clams). Moderate depths were most productive, with C/f_r and C/f_l values of 11.7 and 20.0.

In 1962, a 15-minute tow by the *Oregon* in 4 to 5 fathoms northwest of Gasparilla Island collected 154 *M. campechiensis* (Carpenter, 1967). Three of our stations (409, 733, 734) west of Gasparilla Island produced a total of 117 clams.

Single *Macrocallista nimbosa* were collected from four open Gulf stations. Station 526, off Captiva Pass, was the only Area II deep station (10.7 m) where *M. nimbosa* was found.

Fewer *Mercenaria campechiensis* were taken in Charlotte Harbor than in the open Gulf. A total of 163 were taken at 13 of 29 *Hernan Cortez* stations and at 25 of 72 *Venus* stations, producing respective C/f_l values of 2.5 and 5.2. The northernmost stations producing *M. campechiensis* were at the mouths of the Myakka and Peace Rivers (42V and 47V). From there south to Cape Haze, nine *Hernan Cortez* and six *Venus* stations yielded 21 and 12 clams. From Cape Haze to Boca Grande, three *Hernan Cortez* and ten *Venus* stations produced 10 and 36 clams.

Fifty percent of the *M. campechiensis* from estuarine waters were taken at nine *Venus* stations in Gasparilla Sound and Placida Harbor. Station 87V, yielding 25 clams, was located near the mouth of Grouper Hole, an embayment off Gasparilla Island, where large quantities of quahogs were commercially harvested in the early 1960's (Woodburn, 1962; Futch and Torpey, 1966). Woodburn found 15 to 20 *M. campechiensis* per square yard at Grouper Hole in 1961. Access to this area was too shallow for the R/V *Venus,* but three men treading and raking collected only 23 clams in 30 minutes. These were sparsely scattered throughout the muddy, grassy bottom and ranged in size from 89 to 118 mm (mean 91 mm).

Five *Hernan Cortez* stations and 20 *Venus* stations produced 24 and 105 *Macrocallista nimbosa.* Station 78V was the northernmost Charlotte Harbor station where *M. nimbosa* were captured. None were caught by the *Hernan Cortez* in the middle regions of the bay north of Cape Haze, but 24 were captured at five *Hernan Cortez* stations near the center of the lower bay. Highest catches for the *Hernan Cortez* and *Venus* were 14 and 25 clams at Stations 718 and 84V. *M. nimbosa* were approximately two to three times smaller than those from the open Gulf or from northern chart localities, ranging from 23 to 110 mm, with a mean size of 47 mm.

Yields of marsh clams, *Rangia cuneata,* from the Peace and Myakka Rivers were the highest of any bivalve captured during the survey. Approximately 11,000 were collected by the *Venus* at six of nine Peace River stations from Long Island to Lettuce Lake Cutoff. Numbers taken at Stations 53V, 54V, 55V, and 56V were 1,500, 4,500, 3,500, and 1,200 clams (volumetric estimates). *Rangia* were found in a similar low salinity environment in the Myakka River. Two of three stations upstream from the El Jobean railroad bridge yielded approximately 3,350 clams, most from Station 83V. *Rangia* abundance in some parts of this river may approach that of the Peace

River, but shallow depths prevented extensive sampling.

Rangia are found in nearly all small tributaries of the Peace River from Bird Key to Lettuce Lake Cutoff (E. Hendrickson, personal communication, 1971). Woodburn (1962) found *Rangia* from Long Island to the legal freshwater line about 8.4 nautical miles north of Hunter Creek. He found dense populations from Long Island to Harbor Heights on soft mud bottoms bordered by black rush, *Juncus roemerianus.* We found *Rangia* three miles further upstream from Harbor Heights. While evaluating effects of a phosphate dam rupture near Ft. Meade on the Peace River in December 1971, M. A. Moe, Jr. (personal communication) found *Rangia* in large numbers near Lettuce Lake Cutoff close to our Station 56V. He noted that these clams appeared healthy and covered the bottom densely but were overlain by six to eight inches of phosphate sludge.

Woodburn (1962) found *Rangia* in the Myakka River from two miles north of the El Jobean railroad bridge to two miles north of the U.S. 41 highway bridge in habitats similar to those he described for Peace River populations. Our limited sampling supports Woodburn's findings near the El Jobean railroad bridge.

Chart 1254–Clam Pass to Chatham River (Figure 15)

Distributions of *Macrocallista* and *Mercenaria* by capture depth and stations sampled are shown in Figure 25.

Twenty-one of 81 *Hernan Cortez* stations produced a total of 145 *Mercenaria campechiensis* and 8 of 42 *Venus* stations produced 14 clams. North of Cape Romano 12 *Hernan Cortez* stations produced 108 *M. campechiensis;* highest yields were at Station 564 off Clam Pass (41 clams) and at Station 594 off Caxambas Pass (34 clams), representing 69% of *M. campechiensis* taken from this vicinity.

Off San Carlos Bay and Cape Romano, *M. campechiensis* production by the *Oregon* and *Silver Bay* ranked third and fourth for U.S. Fish and Wildlife Service west coast surveys, but yields did not compare with those off Pass-a-Grille and Venice (Carpenter, 1967).

South of Cape Romano, 37 *M. campechiensis* were collected at 9 *Hernan Cortez* stations, the most productive being Station 791 (10 clams). The *Venus* sampled only south of Cape Romano; its most productive stations (142V) yielded only four clams. *M. campechiensis* collected by the *Venus* were small, ranging from 28 to 150 mm, with a mean size of 56 mm.

The portion of this survey south of Cape Romano encompassed part of the once highly productive Ten Thousand Islands clam bed. Quahog shell was found throughout, with prodigious quantities at one *Hernan Cortez* station (773) and 12 *Venus* stations (124V, 125V, 126V, 127V, 129V, 130V, 139V, 142V, 143V, 153V, 154V, 156V).

Macrocallista nimbosa were collected at six *Hernan Cortez* stations (12 clams) and at 14 *Venus* stations (44 clams). None were collected from Captiva Island to Cape Romano, but seven were taken at four *Hernan Cortez* stations (612, 808, 809, 810) on Cape Romano Shoals. Most (47) of the remaining clams were taken at 13 *Venus* and 2 *Hernan Cortez* stations between Indian Key and Pavilion Key. Highest yields were 13 and 10 clams at Stations 148V and 150V near Pavilion Key. *M. nimbosa* were small, ranging from 21 to 133 mm, with means of 101 mm from *Hernan Cortez* stations and 61 mm from *Venus* stations.

Chart 1253–Mormon Key to East Cape (Figure 16)

Distributions of *Macrocallista* and *Mercenaria* by capture depth and stations sampled are shown in Figure 25.

Only 15 small *Mercenaria campechiensis* were collected at 6 of 40 *Venus* stations from Porpoise Point to Station 187V off Shark Point; clams ranged from 34 to 92 mm, with a mean of 53 mm. None were taken at 41 *Hernan Cortez* stations.

Portions of the area from Mormon Key to Shark Point also contributed to the old Ten Thousand Islands clam fishery. Quahog shells were conspicuous at most *Venus* stations and very abundant at 17 (162V, 163V, 164V, 169V, 170V, 171V, 172V, 174V, 179V, 184V, 185V, 186V, 188V, 189V, 190V, 191V, 192V).

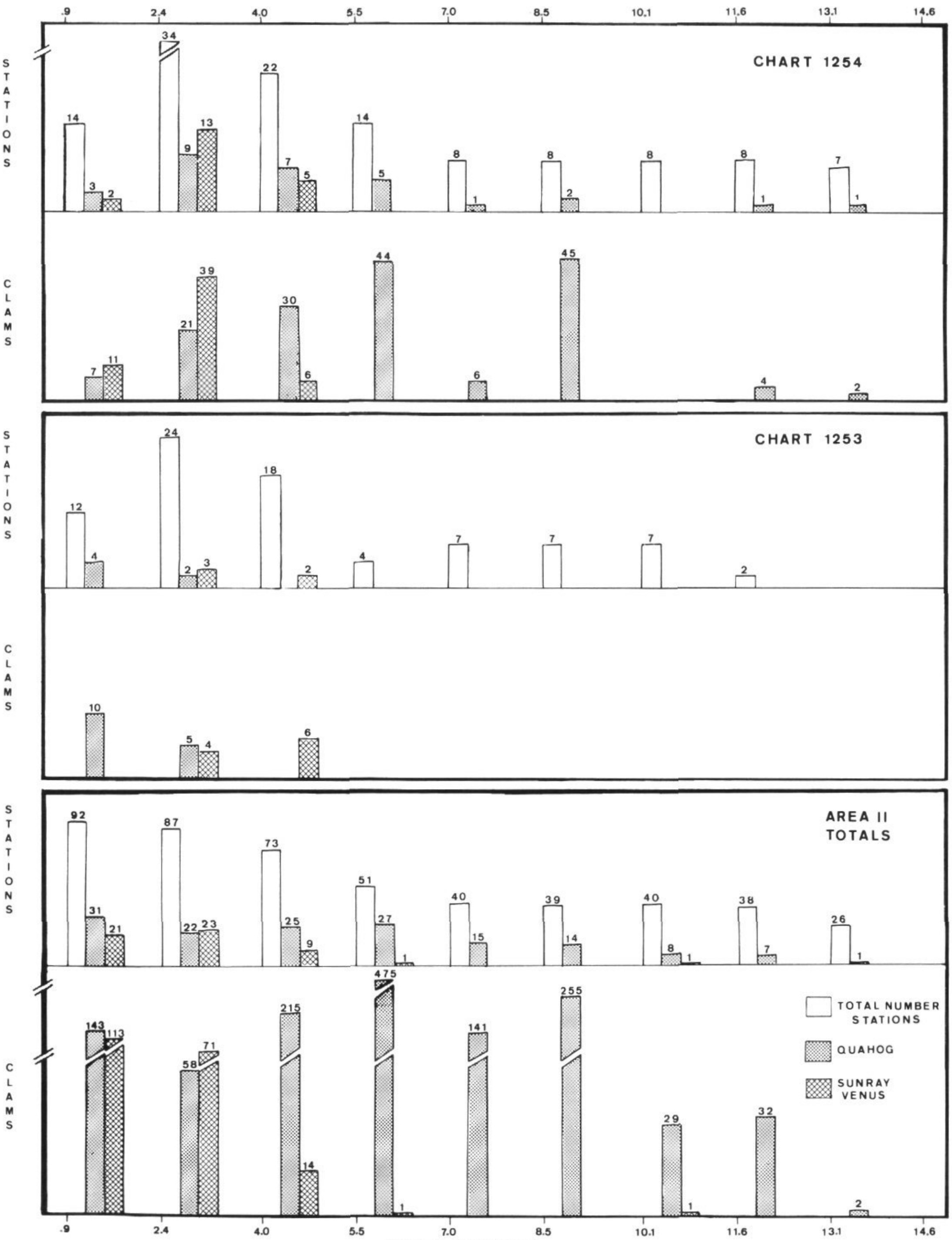

Figure 25. *Mercenaria* (quahogs) and *Macrocallista* (sunray venus clams) production, chart localities 1254, 1253, and totals for Area II. (For detailed explanation, see Figure 21.)

Nine *Macrocallista nimbosa* were taken at four *Venus* stations. One additional clam was taken at *Hernan Cortez* Station 789. These clams were small ranging from 40 to 106 mm, with a mean of 65 mm. Station 167V off Porpoise Point was the southernmost station where *M. nimbosa* were collected.

AREA III

Charts 1250-1248–Florida Keys to Jupiter Inlet (Figures 17, 18, 19)

No *Mercenaria* or *Macrocallista* were collected by the *Hernan Cortez* in any of these localities. The *Venus* did not sample in this area, nor in Area IV.

AREA IV

Chart 1247–Jupiter Inlet to Ft. Pierce (Figure 20)

Six *Mercenaria campechiensis* were taken from three moderate depth stations (480, 491, 688) and two deep stations (483, 489). Station 688, off Jupiter Island in 9.2 m, was the southernmost Atlantic Coast station yielding *M. campechiensis.* No *Macrocallista nimbosa* were captured in this area.

Habitat

Attempts were made to find if correlations existed between each species of clam and depth of capture, substrate, salinity, and dissolved oxygen (dO).

Dissolved oxygen ranged from 2.4 to 10.4 ppm among Charlotte Harbor stations; *Macrocallista nimbosa* were found where dO values averaged 7.7 ppm (5.6-10.4 ppm) and *Mercenaria campechiensis* were found where dO values averaged 6.6 ppm (4.6-9.6 ppm). Among the Ten Thousand Islands stations, dissolved oxygen ranged from 4.0 to 7.8 ppm; *M. nimbosa* were found where dO values averaged 6.0 ppm (5.0-7.8 ppm) and *M. campechiensis* were found where dO values averaged 5.8 ppm (4.0-7.8 ppm). Although Taylor and Saloman (1970) reported that *M. campechiensis* preferred habitats saturated with dissolved oxygen, no such correlation was evident during our survey.

Macrocallista nimbosa

Macrocallista nimbosa were found from just south of Panama City to Porpoise Point, Everglades National Park. Most were located at Bell Shoal (major commercial harvesting site) with

TABLE 2. CATCH EFFORT OF *MACROCALLISTA NIMBOSA* BY DEPTH

Chart No.	Shallow				Moderate				Deep			
	N_r	N_l	C/f_r	C/f_l	N_r	N_l	C/f_r	C/f_l	N_r	N_l	C/f_r	C/f_l
1263	2	2	323.0	323.0	5	5	254.2	254.2	2	–	–	–
1262	1	–	–	–	18	11	3.3	5.5	6	2	2.2	6.5
1261	–	–	–	–	15	3	0.3	1.3	6	–	–	–
1260	1	1	4.0	4.0	9	2	0.9	4.0	13	1	0.1	1.0
1259	3	–	–	–	25	14	5.7	10.1	9	–	–	–
1258	4	2	11.8	23.5	18	5	4.4	15.8	5	–	–	–
1257	8	5	3.4	5.4	41	7	0.3	1.7	22	–	–	–
TB	40	14	1.2	3.4	12	9	5.3	7.1	–	–	–	–
1256	9	1	0.1	1.0	41	–	–	–	48	–	–	–
1255	18	2	0.1	1.0	36	1	–	1.0	29	1	–	1.0
CH	98	25	1.3	5.2	3	–	–	–	–	–	–	–
1254	67	19	0.8	2.9	33	1	–	1.0	23	–	–	–
1253	53	5	0.2	2.0	19	–	–	–	9	–	–	–

N_r = total stations sampled N_l = stations yielding *M. nimbosa* C/f_r = regular catch effort
C/f_l = limited catch effort TB = Tampa Bay CH = Charlotte Harbor

smaller concentrations at Seahorse Reef near Cedar Key and near Anclote Key. Because previous clam surveys (Sims and Stokes, 1967; Stokes et al., 1968; Godcharles, 1971; Jolley, 1972) extensively covered Area I, we devoted relatively more effort to Area II. Moreover, consolidated limestone substrates further hindered sampling in portions of Area I. South of Tampa Bay, availability of the R/V *Venus* permitted better coverage of shallow depths but the yield did not equal that from the few shallow stations in Area I. Apparently *M. nimbosa* were more readily available in both shallow and moderate depths in Area I than in Area II (Table 2); few were captured in depths greater than 9.2 m.

Macrocallista nimbosa in the northeast Gulf from Pensacola to Tampa Bay, including Alligator Harbor and Bell Shoal, has been reported to prefer substrates of loose quartz sand, white sand, or some combination of sand, shell and seagrasses (Akin and Humm, 1959; Stokes et al., 1968; Cake, 1970; Godcharles, 1971; Jolley, 1972). During our survey *M. nimbosa* were taken among seagrasses at only two *Hernan Cortez* stations (272 and 266), the remainder occurring on bare sand or sand-shell substrates. According to Gould and Stewart (1955) and Stewart and Gorsline (1962), these substrates are dominant along the Florida west coast and at Bell Shoal. Only a small portion of *M. nimbosa* and *M. campechiensis* was taken from substrates containing mud or rock, except in Area II where over 60% of *M. campechiensis* were taken from mud substrate with variable amounts of sand, shell, and rock. At *Venus* stations in the Ten Thousand Islands, only 5% of *M. nimbosa* from Chart 1254 and 11% from Chart 1253 were taken with seagrasses. In contrast, 44% of Tampa Bay and 95% of Charlotte Harbor *M. nimbosa* were collected by the *Venus* at three Tampa Bay and 18 Charlotte Harbor stations where seagrasses occurred. Although seagrasses were present among collections of *M. nimbosa* at these stations, it is not known whether the clams were beneath the vegetation or on adjacent bare substrates.

Mercenaria campechiensis

Mercenaria campechiensis were most abundant in lower Tampa Bay. Other concentrations were off passes such as Hurricane (off Dunedin), Big Sarasota, Gasparilla, Captiva, Redfish, Clam, and Caxambas. However, clams were not numerous off the larger passes at Tampa Bay and Boca Grande. Moderate depths were generally most productive except off Hurricane Pass (chart locality 1257), where shallow stations produced more clams. Shallow and deep stations in chart locality 1255 were also more productive than were comparable stations in other localities. As noted with *Macrocallista nimbosa,* sampling effort was greater in Area II. However, even when such sampling bias is considered, *Mercenaria campechiensis* appears more readily available off central and southwest Florida than further north (Table 3).

Previous studies conducted in estuaries at Cedar Keys (Godcharles, 1971), Tampa Bay (Sims and Stokes, 1967; Taylor and Saloman, 1968a, 1970; Godcharles, 1971), Charlotte Harbor (Woodburn, 1962), and the Ten Thousand Islands (Schroeder, 1924) have noted the predominant occurrence of *M. campechiensis* in stands of turtle grass, *Thalassia testudinum.* No propinquity for such vegetation has been reported for *M. campechiensis* in the open Gulf or off the middle Atlantic states, nor was any observed during our survey at depths greater than 4.6 m. We found seagrasses with the *Hernan Cortez* at only ten open Gulf and two Charlotte Harbor stations; none were found in Tampa Bay. Only one of these stations (696, in Charlotte Harbor) yielded *M. campechiensis;* seagrasses at this station were *Halodule (=Diplanthera) wrightii* (see Phillips, 1967) and *Halophila englemannii.* High turbidity and subsequent curtailment of light penetration inhibit seagrass stands in Tampa Bay beyond one fathom (Phillips, 1962) and may explain seagrass scarcity at most other *Hernan Cortez* stations.

Conversely, *M. campechiensis* were frequently found among seagrasses with the R/V *Venus*; 39% from Tampa Bay and 74% from Charlotte Harbor stations were from substrates covered primarily with *Thalassia,* with smaller amounts of *Halodule* and *Syringodium filiforme. Halophila englemannii* was rarely encountered. Schroeder (1924), in his survey of the Ten Thousand Islands clam fishery, observed that "eelgrass thrives in all places where clams are abundant. In most cases where the grass

TABLE 3. CATCH EFFORT OF *MERCENARIA CAMPECHIENSIS* BY DEPTH

Chart No.	Shallow				Moderate				Deep			
	N_r	N_l	C/f_r	C/f_l	N_r	N_l	C/f_r	C/f_l	N_r	N_l	C/f_r	C/f_l
1263	2	–	–	–	5	–	–	–	2	–	–	–
1262	1	–	–	–	18	–	–	–	6	–	–	–
1261	–	–	–	–	15	2	0.3	2.0	6	–	–	–
1260	1	–	–	–	9	–	–	–	13	–	–	–
1259	3	–	–	–	25	1	–	1.0	9	–	–	–
1258	4	2	0.8	1.5	18	2	0.2	2.0	5	–	–	–
1257	8	5	19.3	30.8	41	13	2.4	7.5	22	4	0.6	3.0
TB	40	23	3.0	5.1	12	8	41.8	62.8	–	–	–	–
1256	9	6	5.4	8.2	41	23	6.7	12.5	48	12	1.4	5.4
1255	18	10	7.3	13.2	36	21	11.7	20.0	29	6	2.4	11.7
CH	98	37	1.7	4.4	3	1	0.3	1.0	–	–	–	–
1254	67	18	0.9	3.2	33	9	2.9	10.7	23	2	0.3	3.0
1253	53	6	0.3	2.5	19	–	–	–	9	–	–	–

N_r = total stations sampled N_l = stations yielding *M. campechiensis* C/f_r = regular catch effort
C/f_l = limited catch effort TB = Tampa Bay CH = Charlotte Harbor

is absent few or no clams are present." "Eelgrass" in this case probably refers to *Thalassia* or *Halodule*; both are abundant near shore from Marco Island to Lostmans River (Phillips, 1960). Dense stands of *Thalassia* and *Halodule* were encountered at three *Venus* stations (151V, 180V, 181V) in this area, all landward of the one fathom curve near mangrove islands; similar distribution of vegetation was reported from this area by Benda and Puri (1962). Seagrasses were found at only seven *Venus* stations in chart locality 1254, one of which produced *M. campechiensis*. Two of seven seagrass stations in chart locality 1253 produced *M. campechiensis*.

Wells (1957) suggested that eelgrass, *Zostera marina*, reduced current speed, thereby favoring increased settings of *M. mercenaria*. Kerswill (1941) speculated that eelgrass provides attachment sites for byssal threads of young clams. Seagrasses may also provide favorable clam habitat by entrapping and increasing deposition of silt and detritus, thereby binding and stabilizing the substrate (Ginsburg and Lowenstam, 1958; Phillips, 1960; Humm, 1972). Such particle entrapment reduces turbidity (Phillips, 1960) and may increase primary and secondary food supplies. Fox et al. (1952) noted that marine leptopel (colloidal or finely particulate organic and inorganic detritus) is a nutritional source for filter feeders. Bader (1954) and Saila et al. (1967) found that organic content of sediments was the most significant variable governing clam abundance. Marshall and Lukas (1970) found that sediments beneath eelgrass had more interstitial water than others without vegetation, thus retarding sediment compaction. If this is true of Florida seagrasses, it may facilitate clam burrowing. The maze of rhizomes and blades may also provide protection from predators.

However, too much silt and detritus in conjunction with reduced currents may cause anaerobic and toxic conditions at the sediment surface (Bader, 1954; Phillips, 1960; Marshall and Lukas, 1970), may bury and smother young clams, or may slow metabolic waste removal (Pratt, 1953). Long Island Sound quahog fishermen suggested that decline of eelgrass about 1931 promoted better water circulation, thereby bringing more areas into clam production (Tiller et al., 1952). Taylor and Saloman (1968a) found that growth rates of small *M. campechiensis* planted on vegetation-free substrate in lower Tampa Bay were similar to those in natural seagrass areas in Boca

Ciega Bay. Conversely, in the Bideford River (Prince Edward Island) Kerswill (1941) found reduced growth rates for *M. mercenaria* occurring on or near eelgrass beds.

High turbidities associated with silt-clay sediments in the extensively dredged portions of central and northern Boca Ciega Bay limit seagrasses to very shallow waters (Taylor and Saloman, 1968b) and also limit the "abundance and diversity of benthic mollusks" (Sykes and Hall, 1970). *Thalassia* prefers salinities greater than 25 o/oo (Phillips, 1960), and *M. campechiensis* prefers those greater than 24 o/oo (Taylor and Saloman, 1970); both are abundant in lower portions of Tampa Bay and Charlotte Harbor complexes adjacent to the open Gulf (Phillips, 1960, 1962; Woodburn, 1962; Sims and Stokes, 1967; Taylor and Saloman, 1968a,b, 1969, 1970; Taylor et al., 1970; Godcharles, 1971; Humm, 1972). However, highest *M. campechiensis* yields in Tampa Bay were at *Hernan Cortez* stations beyond the vegetative zone, suggesting that concurrence of seagrasses and *M. campechiensis* in the same estuarine areas of relatively high salinity and low turbidity may be merely coincidental.

Rangia cuneata

Rangia have long been acknowledged as inhabitants of brackish environments (Dall, 1894; Hedgpeth, 1950; Ladd, 1951; Moore, 1961; Woodburn, 1962; Fairbanks, 1963; Pfitzenmeyer and Drobeck, 1964; Gallagher and Wells, 1969). Woodburn stated that marsh clams favor areas fluctuating from brackish to fresh water. We found *Rangia* in the Peace River where bottom salinities ranged from 8.45 to 0.0 o/oo. Salinities in the Peace River fluctuate considerably and during the heavy summer rainy period may be depressed far downstream (Woodburn, 1962). *Rangia* were well established in the brackish zone, with little extra-specific competition from other sessile filter feeders. *Polymesoda caroliniana,* seldom collected, was the only other large clam found in the river. Salinity tolerance of *Rangia* has been experimentally determined by Castagna and Chanley (1966) as 0.0 to 30.0 o/oo, and preliminary experiments indicate a similar tolerance by *Rangia* larvae. Because this does not coincide with salinity conditions in the natural habitat, these authors suggest that other factors control distribution.

Our survey and that of Woodburn (1962) found *Rangia* in the Peace and Myakka Rivers primarily on soft mud bottoms. However, no sediment samples were taken to determine particle size profiles and silt-clay content. In North Carolina, Tenore et al. (1968) found a sand substrate preferable to one of clay-silt. They found that high concentrations of organic matter and phosphate in clay-silt sediments adversely affect *Rangia,* but that such concentrations in sand proved favorable. They indicated that *Rangia* utilized organic matter and phosphate from the substrate, but they did not determine whether *Rangia* ingested and assimilated them directly, or indirectly by ingesting bacteria and algae associated with these materials.

Size Distributions and Gear Selectivity

Macrocallista nimbosa and *Mercenaria campechiensis* captured by the *Hernan Cortez* and the *Venus* in Tampa Bay and Charlotte Harbor were generally smaller than those from the Gulf (Figures 26-29). Within each bay system more small clams were caught by the *Venus* and more large clams were taken by the *Hernan Cortez.* The *Venus* nearly always sampled depths shallower than those sampled by the *Hernan Cortez.* This may indicate that more small clams occur at shallow depths or may reflect different size selectivity by each gear type. Godcharles (1971) noted that large clams tend to slide back down the *Venus* conveyor belt, especially when inclined at a greater angle in deeper water. Furthermore, smaller mesh on the *Venus* conveyor probably favored retention of small clams.

No observations were made to quantify the loss of clams from the Nantucket clam dredge. However, escapement probably depended on clam size and positioning when coming in contact with apertures of the dredge cage (31 mm) and dredge blade (20 mm). Smaller openings of the dredge blade favored capture of smaller clams, but if not entrapped by sediments or by other collected biota, these could be lost through larger openings of the dredge cage. *M. nimbosa* as large as 90 mm ventral length could pass through openings between steel flat bars of the cage as their widths

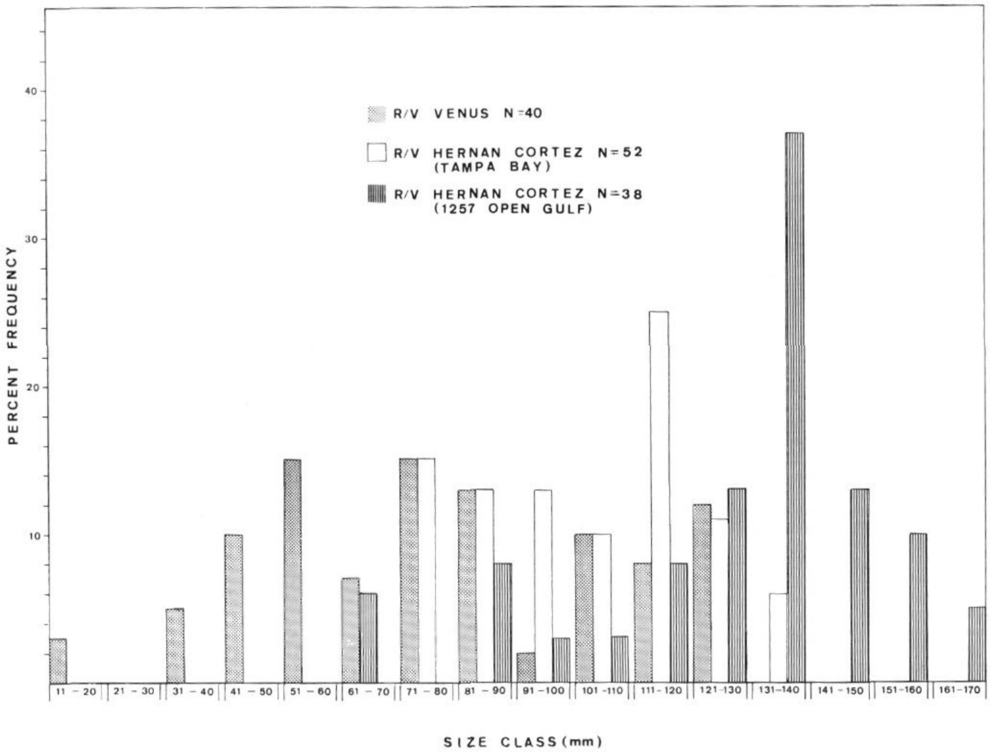

Figure 26. Size classes of *Macrocallista nimbosa* from Tampa Bay and adjacent open Gulf.

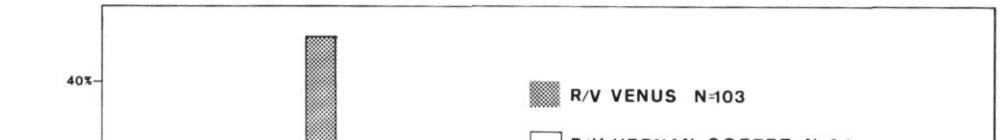

Figure 27. Size classes of *Macrocallista nimbosa* from Charlotte Harbor.

(maximum distance through both valves perpendicular to length and width measurements) are generally less than 31 mm. Probability of escape was even greater for *M. nimbosa* less than 60 mm ventral length (width approximately 20 mm), as their heights (greatest distance from umbo to ventral margin) average less than 31 mm. Probability of escape was greatest for *M. nimbosa* measuring less than 31 mm ventral length.

No *M. nimbosa* measuring less than 60 mm in length was taken in the open Gulf by the *Hernan Cortez* (two 60 mm specimens were collected at moderate and deep Area I stations). Although apertures of the Nantucket dredge cage were selective for larger *M. nimbosa,* small specimens (ventral lengths 21-60 mm) were present in Charlotte Harbor samples (Figure 27) and others (ventral lengths 34-48 mm) were previously captured in 3.1 to 7.0 m depths by Jolley (1972) in northwest Florida. Similarly, other small bivalves, particularly *Macrocallista maculata,* were collected offshore during our survey and during surveys of Stokes et al. (1968) and Jolley (1972).

Absence of small *M. nimbosa* from the Tampa Bay area (Figure 27) and from open Gulf sampling could reflect their unavailability to the *Hernan Cortez* during the periods sampled because of seasonal stock fluctuations, disjunct settlement of different year classes, or totally unsuccessful sets. In addition, offshore conditions may have been more favorable to clam growth, thus contributing to this size disparity. Finally, as suggested by Cake (1970), Godcharles (1971), Joyce (1971), and Jolley (1972), depth-related size disparities may be due to offshore migration of maturing clams.

Little size difference was apparent between *Mercenaria campechiensis* from bays and those from the open Gulf, although the largest were found at open Gulf stations. Clams larger than any taken in this survey have been found in upper Boca Ciega Bay (Sims, 1964; Saloman and Taylor, 1969).

Modes of escape of *M. campechiensis* from the Nantucket dredge were probably similar to those of *M. nimbosa.* However, height and length are nearly equivalent in *M. campechiensis* and width is

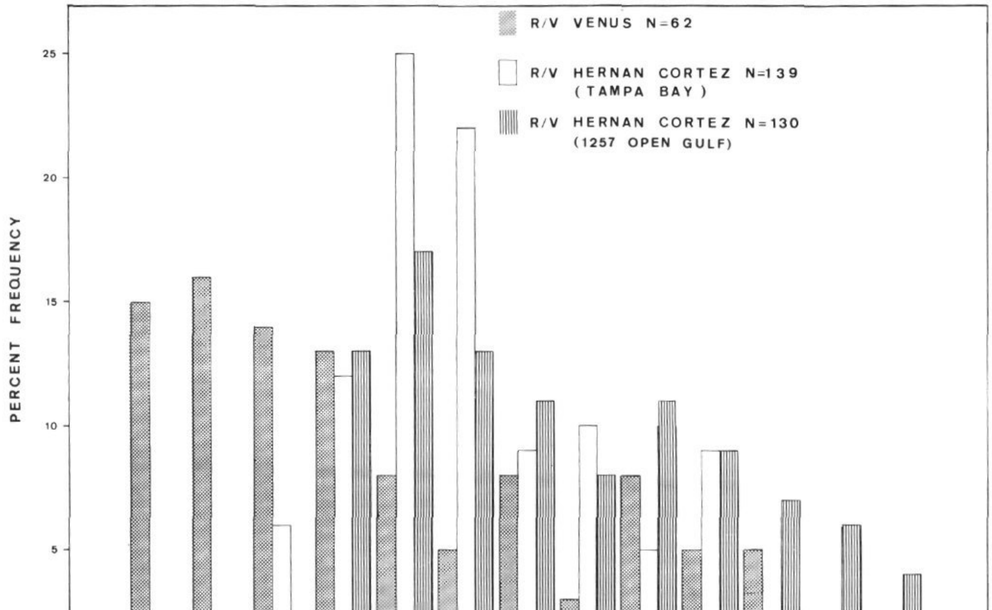

Figure 28. Size classes of *Mercenaria campechiensis* from Tampa Bay and adjacent open Gulf. A 165 mm clam from the open Gulf is not included.

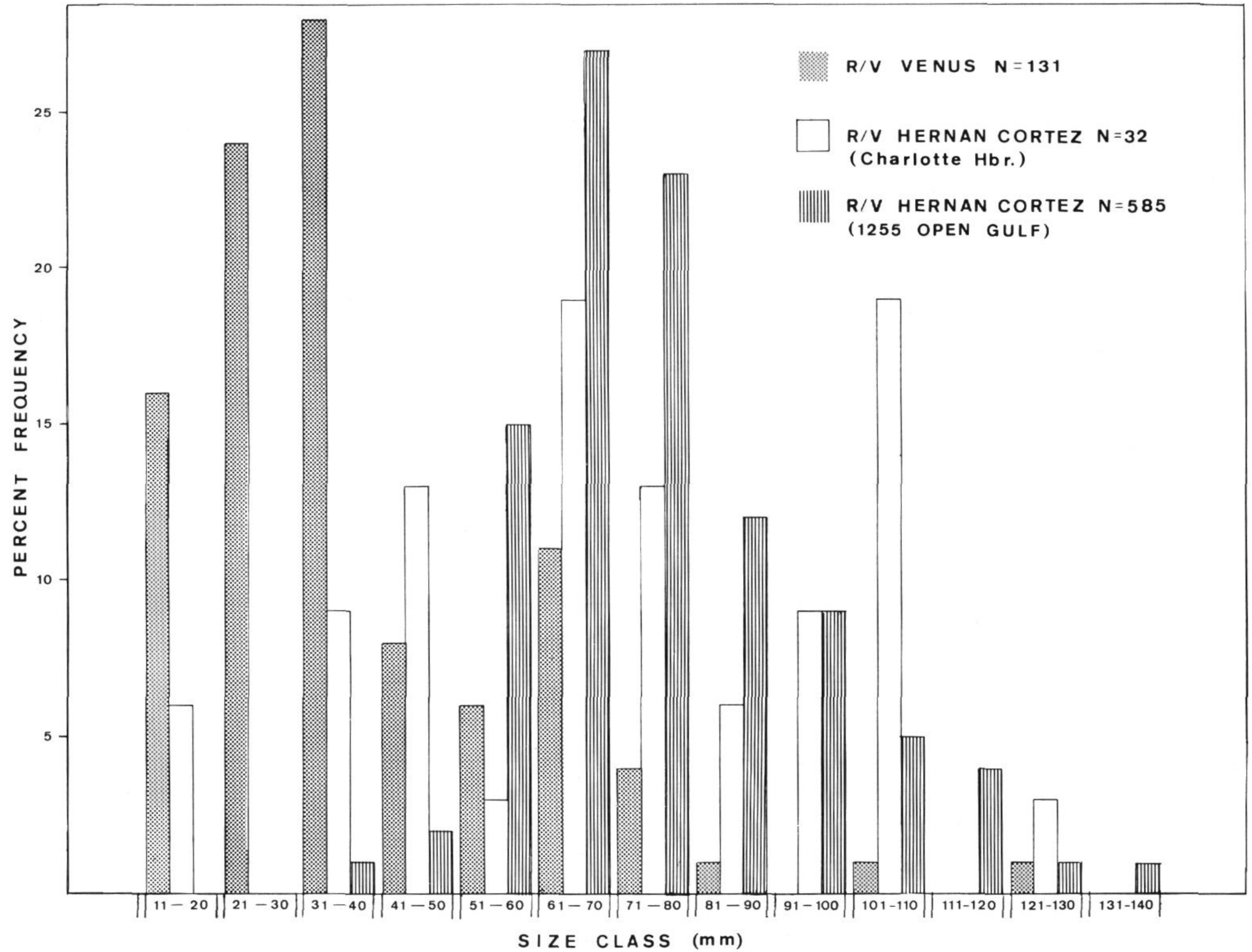

Figure 29. Size classes of *Mercenaria campechiensis* from Charlotte Harbor and adjacent open Gulf.

relatively great, averaging about 50% of ventral length (Taylor and Saloman, 1970) as opposed to 30% for *M. nimbosa* (FDNR unpublished data). Thus, more small *M. campechiensis* were probably retained in the Nantucket dredge. Probably the largest to escape measured about 55 mm ventral length (approximate width 31 mm).

Saloman and Taylor (1968a, 1969) reported annual recruitment of *M. campechiensis* in Boca Ciega Bay as undependable. Similar recruitment problems have been reported for *Mercenaria mercenaria* by Dow (1955), Glude (1955a), and Ropes (1960). Variable recruitment rates, coupled with disjunct settlement of young clams, may have been responsible for promotion and decline of some *M. campechiensis* beds along the Florida west coast. Figures 28 and 29 were derived by combining size frequency data from all productive Tampa Bay and Charlotte Harbor stations; individual station recruitment deficiencies were apparently masked by such treatment. However, size distribution data from individual Tampa Bay and Charlotte Harbor stations show that at most stations only one or two size classes were dominant. In the Chandeleur Islands, Louisiana, Spaulding (1906) also noted individual clam beds were comprised of quahogs of "nearly uniform size" and that sizes varied between clam beds.

Disease and predation may be responsible for poor recruitment and survival of young clams (Landers, 1954; Menzel and Sims, 1962; Taylor and Saloman, 1968a; Tubiash et al., 1970). Other contributing factors may include movement of young clams (Belding, 1912; Kerswill, 1941; Moulton, 1954; Carriker, 1956), substrate (Castagna, 1970), turbidity (Davis, 1960), pollution (Dow, 1954; Hidu, 1965; Pringle et al, 1968; Calabrese, 1972), available food concentrations (Loosanoff, 1959), temperature (Loosanoff, 1959; Davis and Calabrese, 1964), salinity (Davis and Calabrese, 1964), currents (Wells, 1957), and other environmental factors (Hurst, 1952; Butler, 1965).

Over sixty years ago Belding (1912) recommended large scale artificial culture, or quahog farming to amend recruitment deficiencies and effects of overfishing in the Massachusetts fishery. He also suggested implementation of clam spat collecting devices and transplantation of small quahogs from natural beds to augment recruitment on public or private shellfishing grounds. Some of these techniques have since been implemented with good success (Dow and Wallace, 1951, 1954; Glude, 1955b).

Rangia were collected only by the *Venus*. In the Peace River, larger clams were found upstream (Figure 30). Eight size classes ($\overline{x} = 52$ mm) were represented at Station 56V but only three size classes ($\overline{x} = 41$ mm) occurred at Station 51V. Pfitzenmeyer and Drobeck (1964) also found larger *Rangia* upstream in the Potomac River system, and their upstream station had four size classes compared with only one or two classes at downstream stations. However, *Rangia* in the Potomac system may have been recently introduced (Pfitzenmeyer and Drobeck, 1964) so their population dynamics may not be comparable to those of longer established populations in southwest Florida. Ladd (1951) also noted that *Rangia* grew larger and had thicker shells in lower salinity areas of Texas estuaries. Bottom salinities at the two Myakka River stations at which *Rangia* occurred were higher than those observed in the Peace River and clams were correspondingly smaller (Station 82V: range 11-33 mm, $\overline{x} = 22$ mm; Station 83V: range 10-30 mm, $\overline{x} = 17$ mm).

Progressive size increase and more size classes at lower salinity stations may indicate more optimal environmental conditions; correspondingly, fewer size classes and smaller mean size at higher salinities suggest that *Rangia* in these areas are living under conditions approaching their physiological tolerance limit. Fairbanks (1963) noted size difference in two populations of *Rangia* in Lake Pontchartrain, Louisiana. He suggested that high organic content of the substrate and water column may enhance larval and adult survival and growth, directly as a food source or indirectly by fostering denser phytoplankton populations, thereby decreasing intraspecific competition. He also postulated that differential incidence of parasitism and greater predation downstream by portunid crabs, penaeid shrimp, and sciaenid fish may favor upstream survival. Ingle (1954) noted that bivalves in low salinity estuaries are exempt from predation by echinoderms, which cannot tolerate such environments. All these factors may influence observed size distribution in Peace and Myakka River *Rangia* populations.

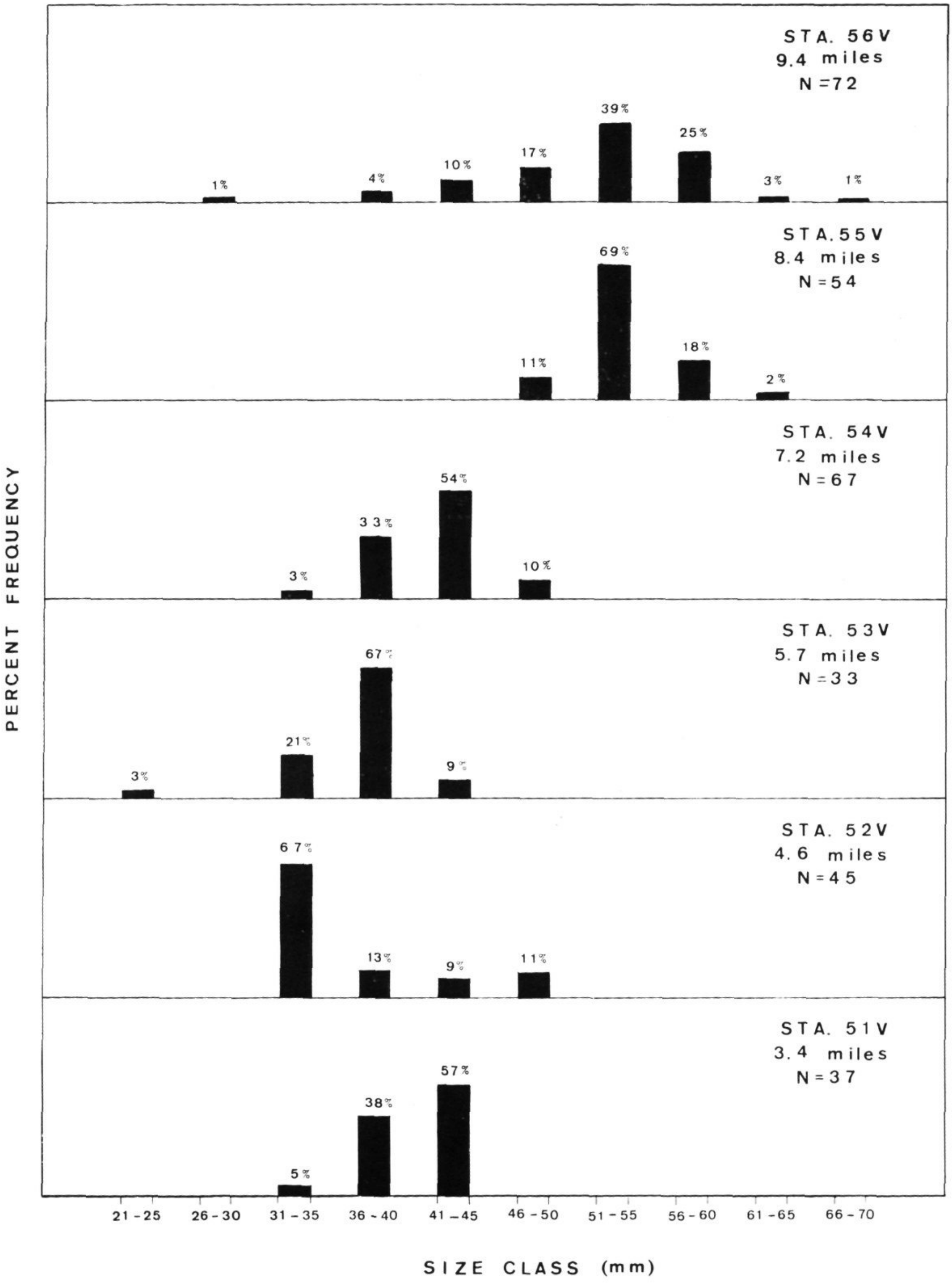

Figure 30. Size distribution of *Rangia cuneata* from Peace River Stations 51V-56V.

SUMMARY

1. The Florida clam industry depends primarily upon three species. *Mercenaria mercenaria* supports a small east coast fishery, *Macrocallista nimbosa* supports a developing fishery in northwest Florida, and *Mercenaria campechiensis* formerly supported a large fishery in the Ten Thousand Islands. Harvesting of *Rangia cuneata* has been minimal. Distributions of these species are discussed.
2. From May 1970 to September 1971, 846 stations were sampled by the R/V *Hernan Cortez* with a hydraulic Nantucket dredge and by the R/V *Venus,* a Maryland soft-shell escalator clam dredge. The *Hernan Cortez* operated in depths of 3.1 to 24.4 m, sampling 560 stations from Panama City to Cape Sable and 94 stations from the Florida Keys to Ft. Pierce. The *Venus* operated in depths of 0.9 to 4.6 m, sampling 38 stations in lower Tampa Bay, 72 stations in Charlotte Harbor, and 82 stations in the Ten Thousand Islands. A box dredge was used by the *Hernan Cortez* on rocky substrates.
3. *Macrocallista nimbosa* were found from Bell Shoal to Porpoise Point (Everglades National Park) and were most abundant on the commercial Bell Shoal bed. Anclote Keys and Seahorse Reef were the second and third most productive areas for *M. nimbosa,* but quantities did not approach those at Bell Shoal. *M. nimbosa* were more readily available in Area I (Panama City to Tampa Bay) than in Area II (south of Tampa Bay to Cape Sable) and were seldom collected in depths exceeding 9.2 m. In the open Gulf they were primarily found on sand or sand-shell substrates, but in Tampa Bay and Charlotte Harbor many were found with seagrasses.
4. *Mercenaria campechiensis* were found from Alligator Harbor to Shark Point (Everglades National Park) and were most abundant in lower Tampa Bay and off passes such as Hurricane, Big Sarasota, Gasparilla, Captiva, Redfish, Clam, and Caxambas. In the open Gulf the most productive stations were off Charlotte Harbor. *M. campechiensis* were seldom collected in depths exceeding 9.2 m. They were frequently found among seagrasses in lower Tampa Bay and Charlotte Harbor but no such association was seen in the open Gulf where seagrasses were infrequently found. It is not certain that seagrasses provide a favorable habitat for *M. campechiensis*; both may merely be coincident because of similar ecological requirements.
5. *Rangia cuneata* was the most abundant bivalve captured but occurred only in low salinity brackish waters of the Peace and Myakka Rivers. At upstream Peace River stations, *Rangia* were larger and more size classes were recognizable. Lower salinities may provide more favorable growing conditions and may substantially decrease predation and parasitism.
6. *Macrocallista nimbosa* and *Mercenaria campechiensis* from Tampa Bay and Charlotte Harbor were generally smaller than those from the open Gulf. In these bays, smaller clams were captured by the *Venus* and larger clams were taken by the *Hernan Cortez,* suggesting differential size selection by the two gear types or depth-related size differences. Absence of small *M. nimbosa* from the open Gulf may be due to seasonal stock fluctuations, disjunct settlements, more favorable environmental conditions affecting growth, or migration of maturing clams.

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To those who willingly provided valuable information and services to our field personnel, we are deeply appreciative. Ed Hendrickson of Gulfshore Seafood Co., Inc. and A. N. Lassen provided pertinent information on Charlotte Harbor clam resources. Nick and Ralph Turner of Turner Seafood and Captain Preston Sawyer of Naples provided historical information on the Ten

Thousand Islands clam fishery. Chief Ranger Doug Bowen of Everglades National Park and his staff were most hospitable and Acting Superintendent Joe L. Kennedy issued the permit authorizing our vessels to sample within the Park boundaries.

We also thank Federal Aid Coordinators I. B. Byrd and D. W. Geagan for their continued cooperation and Elmer J. Gutherz of the National Marine Fisheries Service for providing a computer printout of *Mercenaria* and *Macrocallista* collections.

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APPENDIX I. PHYSICAL DATA FROM R/V *HERNAN CORTEZ* AND R/V *VENUS* STATIONS

TB = Tampa Bay; CH = Charlotte Harbor; NCD = Nantucket Clam Dredge

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
AREA I											
323	1263/1262	8-17-70	29°41.5′N;85°27.0′W	14.0	29.5	29.0		32.31	12.2	Mud & shell	NCD
324	1263/1262	8-17-70	29°43.0′N;85°27.3′W	14.0	29.5	29.0		32.31	12.2	Sand & shell	"
325	1263	8-18-70	29°53.0′N;85°25.8′W	6.7	29.2	29.2		30.69	6.1	Sand & shell	"
326	1263	8-18-70	29°54.6′N;85°27.5′W	4.9	29.2	29.0		31.23	4.9	Sand & shell	"
327	1263	8-18-70	29°56.2′N;85°28.3′W	4.3	29.5	29.5		31.23	2.1	Sand & shell	"
328	1263	8-18-70	29°57.4′N;85°29.5′W	4.3	30.0	29.5		31.23	2.1	Sand	"
329	1263	8-18-70	29°57.5′N;85°31.0′W	5.5	30.0	29.5		31.23	2.4	Sand	"
330	1263	8-18-70	29°58.0′N;85°32.0′W	7.0	30.0	29.5		31.77	2.8	Sand	"
331	1263	8-18-70	29°59.0′N;85°33.5′W	8.5	30.0	29.5		31.77	3.1	Sand	"
242	1262	7- 3-70	29°40.5′N;84°43.7′W	9.2	28.2	27.3		35.00	8.2	Mud & sand	"
243	1262	7- 3-70	29°37.6′N;84°44.2′W	12.8	28.2	27.0		35.00	7.6	Mud & rock	"
244	1262	7- 3-70	29°33.6′N;84°54.0′W	11.0	29.1	28.0		34.47	3.7	Shell, gravel, mud	"
245	1262	7- 3-70	29°35.5′N;84°57.8′W	6.1	28.8	28.0		33.93	1.8	Shell	"
246	1262	7- 3-70	29°32.3′N;84°57.8′W	9.8	29.0	28.0		34.47	1.8	Limestone	"
303	1262	8-16-70	29°43.3′N;84°43.0′W	6.7	28.0	28.5		31.23	4.3	Sand	"
304	1262	8-16-70	29°41.5′N;84°45.0′W	5.5	28.0	28.2		31.77	5.5	Sand	"
305	1262	8-16-70	29°39.0′N;84°49.5′W	7.9	28.5	28.5		32.31	3.7	Mud & sand	"
306	1262	8-16-70	29°39.0′N;84°51.0′W	7.3	28.5	28.5		32.31	5.5	Mud & shell	"
307	1262	8-16-70	29°39.0′N;84°53.0′W	6.7	29.0	28.5		31.77	3.7	Mud & shell	"
308	1262	8-16-70	29°38.0′N;84°54.0′W	6.7	29.8	28.8		31.77	3.1	Mud & sand	"
309	1262	8-16-70	29°33.1′N;84°58.5′W	5.5	31.0	29.0		32.31	3.4	Sand	"
310	1262	8-16-70	29°30.0′N;84°59.0′W	7.9	30.0	28.5		32.31	2.4	Sand	"
311	1262	8-16-70	29°24.3′N;85°02.0′W	9.8	29.0	28.8		32.85	9.2	Sand	"
312	1262	8-16-70	29°25.4′N;85°03.3′W	10.4	29.8	28.8		32.85	3.7	Sand	"
313	1262	8-16-70	29°29.0′N;85°02.1′W	6.1	30.0	29.0		32.31	3.7	Sand	"
314	1262	8-17-70	29°29.4′N;85°01.5′W	6.1	28.0	28.5		32.31	4.3	Sand	"
315	1262	8-17-70	29°31.0′N;85°03.2′W	5.5	29.0	29.0		31.23	4.0	Shell	"
316	1262	8-17-70	29°33.1′N;85°05.0′W	6.7	29.0	29.0		31.77	3.7	Mud & shell	"

317	1262	8-17-70	29°34.3′N;85°11.0′W	3.1	30.0	29.5	30.69	1.2	Mud	NCD
318	1262/1263	8-17-70	29°37.0′N;85°20.3′W	4.9	29.5	29.5	31.77	1.8	Sand	”
319	1262/1263	8-17-70	29°33.3′N;85°24.5′W	7.9	29.5	29.5	32.31	7.9	Sand & shell	”
320	1262	8-17-70	29°28.7′N;85°29.7′W	12.2	30.0	30.0	32.31	12.2	Sand	”
321	1262/1263	8-17-70	29°33.7′N;85°26.9′W	8.5	29.5	29.3	32.31	8.5	Sand	”
322	1262/1263	8-17-70	29°38.2′N;85°22.2′W	5.5	30.0	29.5	31.77	2.4	Gravel, sand & shell	”
240	1261	7- 3-70	29°43.6′N;84°39.5′W	9.2	27.7	27.2	34.47	7.3	Shell, rock & sand	”
241	1261	7- 3-70	29°41.6′N;84°40.8′W	12.2	28.2	26.9	35.00	8.2	Sand & shell	”
247	1261	7- 4-70	29°44.3′N;84°38.2′W	7.9	28.2	27.0	34.47	3.7	Shell, rock & sand	”
248	1261	7- 4-70	29°43.6′N;84°37.4′W	11.0	27.6	27.1	35.00	7.6	Shell & rock	”
249	1261	7- 4-70	29°45.3′N;84°38.0′W	7.3	28.0	27.2	34.47	4.9	Rock, sand, mud & shell	”
250	1261	7- 4-70	29°44.2′N;84°35.7′W	11.0	27.8	27.3	34.47	6.7	Rock, shell	”
251	1261	7- 4-70	29°47.3′N;84°34.4′W	6.1	27.5	27.2	34.47	4.0	Sand, shell	”
252	1261	7- 4-70	29°45.6′N;84°33.0′W	11.0	27.8	27.0	34.47	4.9	Rock, shell	”
253	1261	7- 5-70	29°47.5′N;84°20.6′W	11.0	27.5	27.4	34.47	6.4	Coral, shell	”
254	1261	7- 5-70	29°48.7′N;84°19.8′W	8.2	28.0	27.5	34.47	3.7	Rock, shell	”
255	1261	7- 5-70	29°50.5′N;84°18.4′W	7.3	29.0	28.0	33.93	5.5	Rock, shell	”
256	1261	7- 5-70	29°55.0′N;84°16.9′W	6.7	28.5	28.5	32.85	4.3	Sand, rock	”
257	1261	7- 5-70	29°56.3′N;84°15.8′W	4.9	28.8	28.7	32.85	4.3	Sand	”
258	1261	7- 5-70	29°59.8′N;84°11.9′W	6.1	28.6	28.3	31.23	2.8	Rock	”
259	1261	7- 5-70	30°00.0′N;84°13.8′W	6.1	28.8	28.6	31.23	2.8	Sand, rock	”
260	1261	7- 6-70	29°45.4′N;84°08.2′W	11.0	28.0	28.0	33.39	9.2	Rock	”
298	1261	8-15-70	29°51.0′N;84°34.5′W	6.1	28.0	28.7		1.2	Rock	”
299	1261	8-15-70	29°50.5′N;84°33.0′W	6.1	28.5	28.0	29.08	1.8	Mud	”
300	1261	8-15-70	29°50.5′N;84°32.5′W	6.1	28.7	28.4	29.62	1.8	Sand, mud, shell	”
301	1261	8-15-70	29°52.0′N;84°28.0′W	6.7	29.0	28.5	30.69	1.8	Mud	”
302	1261	8-15-70	29°52.5′N;84°26.0′W	5.5	29.5	28.7	31.23	3.7	Sand, rock	”
187	1260	5-23-70	29°25.2′N;83°26.1′W	4.9	26.7	26.4	33.77	4.0	Rock	”
188	1260	5-23-70	29°29.8′N;83°32.7′W	7.3			32.31		Rock	”
261	1260	7-13-70	29°37.4′N;83°31.2′W	6.1	29.0	29.0	31.23	4.3	Rock	”
262	1260	7-13-70	29°38.7′N;83°34.4′W	5.8	29.1	29.1	31.23	5.8	Sand, rock	”
269	1260	7-29-70	29°32.0′N;83°33.4′W	7.6					Sand, rock	”
270	1260	7-29-70	29°33.9′N;83°32.2′W	6.4	30.5	29.5	30.15	5.2	Sand, rock	”
271	1260	7-29-70	29°36.3′N;83°31.0′W	5.2	30.1	29.7	29.62	5.2	Sand	”
272	1260	7-29-70	29°38.3′N;83°30.4′W	3.7	30.0	28.8	29.08	3.7	Sand, seagrass	”

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
273	1260	7-29-70	29°37.2'N;83°29.7'W	4.9	30.0	29.7		30.15	4.3	Sand	NCD
274	1260	7-29-70	29°34.1'N;83°29.3'W	6.1	30.5	29.5		31.77	3.7	Sand, rock	"
289	1260	8- 4-70	29°24.4'N;83°34.7'W	12.2	31.0	30.7		33.93	6.1	Coral, sand, rock	"
290	1260	8- 4-70	29°26.9'N;83°35.6'W	10.4	31.0	30.7		33.39	6.1	Coral, rock, sand	"
291	1260	8- 4-70	29°28.6'N;83°38.6'W	11.9	31.5	30.8		33.39	5.5	Coral, rock	"
292	1260	8- 4-70	29°31.7'N;83°38.7'W	11.0	31.0	31.0		33.39	6.1	Sand	"
293	1260	8- 5-70	29°31.5'N;83°45.2'W	13.4	30.5	30.5		32.85	4.6	Rock	"
294	1260	8- 5-70	29°28.7'N;83°42.6'W	13.1	30.5	30.5		33.39	4.6	Rock	"
295	1260	8- 5-70	29°26.4'N;83°40.0'W	12.8	30.5	30.2		33.93	6.1	Rock	"
296	1260	8- 5-70	29°23.6'N;83°40.0'W	14.6	30.5	31.0		33.93	6.4	Rock	"
297	1260	8- 5-70	29°21.0'N;83°36.8'W	12.2	30.7	30.5		33.93	8.5	Rock	"
332	1260	8-20-70	29°43.2'N;83°49.1'W	11.0	29.0	28.7		32.31	6.1	Rock	"
333	1260	8-20-70	29°40.7'N;83°48.9'W	12.2	29.1	28.8		32.31	5.5	Rock & sand	"
334	1260	8-20-70	29°38.3'N;83°47.4'W	11.9	29.1	28.5		33.39	5.8	Rock	"
335	1260	8-20-70	29°34.6'N;83°46.1'W	14.0	29.0	28.9		33.39		Rock, sand	"
179	1259	5-22-70	29°09.6'N;83°09.8'W	4.9	27.5	27.2		32.31	4.9	Sand, shell	"
180	1259	5-22-70	29°09.6'N;83°12.4'W	5.5	28.0	27.2		33.39	4.0	Sand	"
181	1259	5-22-70	29°11.8'N;83°14.2'W	5.5	28.0	27.2		33.39	4.0	Sand	"
182	1259	5-22-70	29°12.4'N;83°15.2'W	4.6-6.1	28.0	27.0		33.39	4.3	Rock	"
183	1259	5-22-70	29°16.7'N;83°16.7'W	4.9	27.9	26.8		31.77	4.6	Sand, shell	"
184	1259	5-22-70	29°17.4'N;83°18.6'W	4.9	27.0	26.5		31.77	4.6	Sand, shell	"
185	1259	5-23-70	29°21.5'N;83°21.4'W	4.3	25.8	25.8		30.69	4.3	Sand, shell	"
186	1259	5-23-70	29°23.4'N;83°26.4'W	5.5	25.9	25.9		33.39	5.2	Rock	"
192	1259	6- 5-70	28°55.1'N;83°04.6'W	7.3	26.3	26.1		33.85	3.7		"
193	1259	6- 5-70	28°56.9'N;83°07.9'W	6.1	26.3	26.2		32.31	4.6	Sand	"
194	1259	6- 5-70	28°57.5'N;83°08.8'W	7.3	26.8	26.5		33.93	4.3	Rock	"
195	1259	6- 5-70	29°00.5'N;83°04.5'W	4.9	27.0	26.5		33.93	3.1	Sand, rock	"
196	1259	6- 5-70	29°03.0'N;83°04.5'W	5.2	26.3	26.2		32.85	3.1	Rock	"
218	1259/1258	6-12-70	28°54.6'N;83°10.0'W	6.7	29.5	28.0		33.93	6.7	Sand	"
219	1259/1258	6-12-70	28°56.5'N;83°11.9'W	7.3	30.0	28.0		33.93	6.7	Rock	"
238	1259	6-19-70	29°00.7'N;83°18.3'W	11.0	29.5	29.5		33.93	10.4	Rock	"
239	1259	6-19-70	28°58.4'N;83°09.8'W	4.9	29.2	29.2		33.93	4.9	Sand	"

263	1259	7-24-70	29°02.8'N;83°05.5'W	3.7	30.0	29.4	30.15	1.8	Sand, mud	NCD
264	1259	7-26-70	29°16.2'N;83°15.7'W	4.6	28.9	29.5	30.15	2.1	Sand, shell	"
265	1259	7-26-70	29°14.0'N;83°16.4'W	4.9	29.4	29.2	31.77	2.4	Sand	"
266	1259	7-26-70	29°12.6'N;83°16.9'W	5.2	29.4	29.6		5.2	Sand	"
267	1259	7-26-70	29°10.4'N;83°17.9'W	5.8	29.8	29.8	32.85	5.8	Shell, rock	"
268	1259	7-26-70	29°09.6'N;83°15.2'W	5.8	29.8	29.7	32.85	5.8	Rock	"
275	1259	7-31-70	28°58.1'N;83°08.9'W	6.1	30.5	30.5	31.23	6.1	Sand	"
276	1259	7-31-70	28°57.7'N;83°09.2'W	6.4	30.8	30.5	31.77	4.9	Sand	"
277	1259	7-31-70	28°57.3'N;83°10.0'W	6.1	31.0	30.5	32.85	5.5	Sand	"
278	1259	7-31-70	28°57.9'N;83°10.5'W	7.3	31.0	30.5	32.85	5.2	Sand	"
279	1259	7-31-70	28°54.9'N;83°11.5'W	9.2	31.0	30.0	33.39	5.5	Rock	"
280	1259	7-31-70	28°56.0'N;83°11.8'W	7.6	31.5	30.5	32.85	6.7	Rock	"
281	1259	8- 3-70	28°55.1'N;83°17.4'W	12.2	30.0	30.5	34.47	5.5	Rock	"
282	1259	8- 3-70	28°55.0'N;83°19.4'W	12.2	31.0	30.5	33.93	6.1	Rock	"
283	1259	8- 3-70	28°57.5'N;83°21.1'W	14.0	31.0	30.5	33.93	5.5	Sand, rock	"
284	1259	8- 3-70	29°01.1'N;83°21.1'W	12.2	31.5	31.0	33.93	4.3	Sand, rock	"
285	1259	8- 4-70	29°04.3'N;83°26.1'W	12.8	30.5	30.5	33.93	8.2	Rock	"
286	1259	8- 4-70	29°08.8'N;83°29.6'W	12.8	30.5	30.5	33.93	9.2	Sand, rock	"
287	1259	8- 4-70	29°15.5'N;83°31.7'W	12.8	31.0	31.5	33.93	9.2	Sand	"
288	1259/1260	8- 4-70	29°20.8'N;83°32.9'W	12.8	31.0	30.7	33.93	9.2	Rock	"
197	1258	6- 8-70	28°14.8'N;82°52.9'W	4.3	27.2	27.1	33.93	2.8	Mud	"
198	1258	6- 8-70	28°12.0'N;82°53.1'W	4.9	27.5	27.1	32.85	2.1	Sand, shell	"
199	1258	6- 8-70	28°10.6'N;82°52.8'W	4.3	27.5	27.1	32.85	2.1	Sand	"
200	1258	6- 8-70	28°11.9'N;82°56.1'W	6.7	27.5	27.1	32.85	2.4	Rock	"
201	1258	6- 8-70	28°13.8'N;82°54.2'W	5.5	27.2	27.2	32.85	2.1	Sand, mud	"
202	1258	6- 9-70	28°15.0'N;82°55.8'W	7.3	26.5	26.5	32.85	5.5	Sand, rock	"
203	1258	6- 9-70	28°15.2'N;82°54.1'W	4.9	27.0	27.0	32.85	3.7	Sand, rock	"
211	1258	6-11-70	28°15.6'N;82°53.3'W	4.6	28.5	28.5	32.85	2.1	Sand	"
212	1258	6-11-70	28°25.5'N;82°56.4'W	4.3	28.2	28.2	32.85	2.8	Sand	"
213	1258	6-12-70	28°25.3'N;82°57.0'W	6.1	27.0	27.3	33.39	5.2	Sand, rock	"
214	1258	6-12-70	28°27.4'N;82°55.9'W	5.5	27.2	27.2	33.93	5.2	Rock	"
215	1258	6-12-70	28°29.5'N;82°55.9'W	5.5	27.5	27.5	34.47	5.2	Sand, rock	"
216	1258	6-12-70	28°32.3'N;82°56.4'W	5.5	27.8	27.7	33.39	4.9	Rock	"
217	1258	6-12-70	28°45.2'N;83°02.0'W	7.6	28.8	27.0	33.39	7.6	Sand, rock	"
220	1258	6-16-70	28°52.5'N;83°11.1'W	8.5	29.0	27.6	33.93	8.5	Sand, mud	"
221	1258	6-16-70	28°48.5'N;83°10.5'W	9.8	29.2	28.0	34.47	9.2	Rock	"

Station No.	U.S. C&GS Chatr No.	Date	Location	Depth (m)	Temperature °C		Salinity o/oo		Secchi (m)	Substrate	Gear
					Sur.	Bot.	Sur.	Bot.			
222	1258	6-16-70	28°41.3′N;83°07.9′W	10.4	28.5	28.0		35.00	5.5	Rock	NCD
223	1258	6-17-70	28°38.5′N;83°02.1′W	8.5	28.0	28.0		33.93	8.5	Rock	"
224	1258	6-17-70	28°36.7′N;82°58.7′W	7.3	28.2	28.2		33.93	5.2	Rock	"
225	1258	6-17-70	28°34.7′N;82°57.3′W	7.3	28.6	28.5		34.47	5.5	Rock	"
226	1258	6-17-70	28°23.7′N;83°04.8′W	12.2	29.0	28.0		33.93	12.2	Rock	"
227	1258	6-17-70	28°16.1′N;82°57.3′W	7.9	29.7	29.2		35.00	5.5	Mud, sand	"
336	1258	10-25-70	28°42.4′N;82°58.3′W	5.8	25.0	25.0	33.93	33.93	2.8	Rock	Box dredge
337	1258	10-25-70	28°42.2′N;83°01.5′W	7.3	25.0	25.0	33.93	34.47	3.1	Rock, sand	" "
338	1258	10-25-70	28°33.5′N;83°01.4′W	8.2	26.0	26.0	36.09	35.55	4.9	Rock	" "
339	1258	10-25-70	28°28.4′N;83°05.5′W	11.0	26.0	26.0	36.09	37.17	5.8	Rock	" "
340	1258	10-25-70	28°13.4′N;83°05.4′W	14.3	26.0	26.0	36.09	35.55	5.5	Rock	" "
189	1257/586	5-29-70	27°37.3′N;82°49.6′W	4.6	27.5	27.0		33.39	4.6	Sand	NCD
190	1257/586	5-29-70	27°42.7′N;82°46.3′W	5.8	28.0	27.0		34.47	2.1	Sand, mud, shell	"
191	1257/586	5-29-70	27°45.4′N;82°48.8′W	6.7	27.5	27.0		33.93	3.7	Sand, shell	"
204	1257/586	6-11-70	27°38.6′N;82°47.0′W	5.5	27.2	27.2		32.85	2.1	Sand, mud	"
205	1257/586	6-11-70	27°42.1′N;82°46.8′W	6.7	27.2	27.2		32.85	3.7	Shell, mud, sand	"
206	1257	6-11-70	27°58.7′N;82°51.1′W	5.5	28.0	27.2		32.85	1.8	Sand, mud	"
207	1257	6-11-70	27°58.8′N;82°53.0′W	7.3	27.5	27.2		32.85	4.0	Rock	"
208	1257	6-11-70	28°03.3′N;82°50.4′W	4.3	28.5	27.2		32.85	1.2		"
209	1257	6-11-70	28°04.0′N;82°50.9′W	3.7	28.8	28.5		32.85	1.5	Sand, mud	"
210	1257	6-11-70	28°07.1′N;82°51.9′W	4.3	28.7	28.5		32.85	2.0	Sand, mud	"
228	1257	6-17-70	28°03.0′N;82°50.2′W	3.7	29.0	28.5		34.47	0.9	Sand	"
229	1257	6-18-70	28°00.0′N;82°50.4′W	4.3	28.2	28.2		33.93	1.8	Mud, sand	"
230	1257	6-18-70	28°00.0′N;82°50.9′W	5.5	28.5	28.2		34.47	2.1	Mud, sand	"
231	1257	6-18-70	28°01.4′N;82°50.4′W	4.3	28.7	28.5		34.47	1.8	Sand, shell	"
232	1257	6-18-70	28°01.0′N;82°54.3′W	9.8	29.0	28.5		34.47	5.5	Sand, mud	"
233	1257	6-18-70	28°00.2′N;82°57.2′W	11.3	29.0	28.5		35.54	7.3	Sand, shell	"
234	1257	6-18-70	28°00.0′N;83°00.7′W	12.8	29.7	28.5		34.47	10.4	Rock	"
235	1257	6-18-70	28°01.8′N;82°57.5′W	10.4	29.7	29.0		35.00	5.5	Mud, shell	"
236	1257	6-18-70	28°03.3′N;82°52.6′W	7.6	29.2	28.0		34.47	3.7	Rock	"
237	1257	6-18-70	28°04.8′N;82°51.3′W	3.7	30.0	30.0		33.93	0.4	Mud, sand	"
341	1257	10-28-70	28°10.0′N;82°52.9′W	5.5	25.0	25.0		34.47	4.3	Rock	"

342	1257	10-28-70	28°10.0'N;82°55.3'W	7.0	25.0	25.0	35.00	3.7	Sand	NCD
343	1257	10-28-70	28°10.0'N;82°58.8'W	8.5	25.0	25.0	36.08	4.3	Rock	"
344	1257	10-28-70	28°07.4'N;82°58.4'W	10.4	25.5	25.0	36.08	3.7	Rock	"
345	1257	10-28-70	28°04.7'N;82°57.7'W	10.4	26.0	26.0	38.23	4.0	Rock	"
346	1257	10-28-70	28°06.7'N;82°54.2'W	7.0	24.5	25.0	34.47	3.7	Rock, sand	"
347	1257	10-28-70	28°08.3'N;82°54.2'W	7.0	25.0	25.0	34.47	3.1	Rock	"
348	1257	10-29-70	28°09.0'N;83°01.0'W	12.2	25.5	25.0	34.47	7.6	Rock	"
349	1257	10-29-70	28°05.8'N;83°01.4'W	13.4	25.5	25.5	35.00	5.2	Rock	"
350	1257	10-29-70	28°02.7'N;83°01.3'W	14.0	25.5	26.0	36.08	7.0	Rock	"
351	1257	10-29-70	27°57.3'N;82°50.7'W	5.8	26.0	25.0	35.54	1.8	Mud	"
352	1257	10-29-70	27°56.3'N;82°50.8'W	5.5	25.0	25.0	37.16	1.5	Mud	"
353	1257	10-29-70	27°54.4'N;82°51.4'W	5.5	26.0	25.0	37.16	1.5	Rock	"
354	1257	10-29-70	27°54.3'N;82°53.3'W	5.5	26.0	25.0	33.93	1.8	Rock	"
355	1257	10-29-70	27°54.0'N;82°56.0'W	5.8	26.0	25.0	35.00	3.4	Rock	"
356	1257	10-30-70	27°52.6'N;82°51.8'W	4.9	25.0	25.0	33.93	1.5	Mud	"
357	1257	10-30-70	27°52.4'N;82°54.0'W	4.9	25.0	25.0	34.47	2.1	Rock	"
358	1257	10-30-70	27°50.3'N;82°53.6'W	6.7	26.0	25.0	35.00	3.4	Rock	"
359	1257/586	10-30-70	27°45.5'N;82°52.8'W	7.3	25.5	25.0	35.00	7.3	Sand	"
360	1257	11- 2-70	27°58.6'N;82°55.7'W	8.9	25.5	25.0	35.00	6.7	Rock	"
361	1257	11- 2-70	27°57.8'N;82°59.6'W	12.2	25.0	25.5	35.54	6.1	Rock	"
362	1257	11- 2-70	27°54.7'N;82°59.6'W	10.4	25.5	25.0	37.69	4.9	Sand	"
363	1257	11- 2-70	27°51.5'N;82°59.8'W	10.7	25.0	25.0	32.85	4.3	Rock	"
364	1257	11- 3-70	27°48.4'N;82°57.4'W	10.7	25.5	25.0	33.93	7.3	Rock	"
365	1257	11- 3-70	27°46.2'N;83°00.5'W	14.0	25.5	25.0	34.47	6.1	Rock	"
366	1257	11- 3-70	27°41.5'N;82°58.6'W	12.8	26.0	25.5	36.08	8.5	Sand	"
367	1257/586	11- 3-70	27°36.4'N;82°56.5'W	12.8	25.5	25.0	35.54	6.7	Rock	"
368	1257/586	11- 3-70	27°43.6'N;82°55.2'W	9.8	25.0	25.5	34.47	6.1	Sand	"
369	1257/586	11-11-70	27°40.6'N;82°49.4'W	8.2	21.0	21.5	35.54	1.8	Sand	"
370	1257/586	11-11-70	27°43.1'N;82°49.6'W	8.5	21.5	21.5	37.16	1.8	Mud, sand	"
371	1257/586	11-11-70	27°40.2'N;82°53.7'W	6.1	22.0	22.0	36.62	2.8	Mud, sand	"
372	1257/586	11-11-70	27°33.4'N;82°52.1'W	10.4	22.5	22.5	38.23	5.5	Rock	"
373	1257/586	11-11-70	27°32.9'N;82°48.7'W	7.3	22.0	22.0	35.00	3.1	Sand	"
374	1257/586	11-11-70	27°33.1'N;82°47.2'W	6.1	22.0	22.0	36.62	2.4	Sand	"
375	1257/586/1256	11-12-70	27°32.1'N;82°47.3'W	5.2	21.5	22.0	36.08	2.4	Sand	"
376	1257/586/1256	11-12-70	27°31.8'N;82°48.6'W	9.2	22.0	22.0	33.93	2.4	Sand	"

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
390	586/1256	11-18-70	27°29.7′N;82°51.8′W	12.2	20.5	20.0		37.69	5.5	Rock	NCD
410	1257/586/1256	11-23-70	27°31.6′N;82°50.8′W	9.2	21.5	21.5		34.47	3.4	Sand, shell	"
411	586/1256	11-23-70	27°29.0′N;82°48.7′W	8.5	20.5	20.5		35.00	4.6	Sand	"
416	586/1256	11-30-70	27°30.4′N;82°46.8′W	9.2	19.5	18.5		35.00	3.7	Rock	"
459	586/1256	12- 4-70	27°30.6′N;82°44.5′W	5.5	19.0	19.5		35.00	2.8	Mud, rock	"
460	1257/586	12- 4-70	27°34.2′N;82°48.6′W	6.7	19.0	19.0		37.16	1.8	Sand	"
461	1257/586	12- 4-70	27°35.6′N;82°48.9′W	6.1	19.0	19.0		37.16	3.1	Sand, shell	"
467	1257/586/1256	1-29-71	27°32.1′N;82°46.4′W	4.6	15.5	15.5		33.39	2.4	Sand	"
468	1257/586/1256	1-29-71	27°31.8′N;82°47.5′W	7.6	16.0	16.0		35.00	2.8	Mud	"
469	1257/586/1256	1-29-71	27°31.7′N;82°54.4′W	12.2	17.0	16.5		33.93	3.7	Rock	"
470	1257/1256	1-29-71	27°31.9′N;82°56.8′W	13.7	17.0	17.0		35.54	5.5	Rock	"
471	1257/1256	1-29-71	27°30.0′N;82°56.9′W	13.7	17.0	17.0		34.47	8.2	Rock	"
472	586/1256	1-29-71	27°29.8′N;82°49.1′W	10.7	18.0	17.0		35.54	6.1	Rock	"
473	586/1256	1-29-71	27°30.3′N;82°45.5′W	6.1	16.5	15.5		33.93	3.4	Mud	"
474	586/1256	1-30-71	27°29.2′N;82°42.8′W	4.6	16.0	16.0		33.39	2.4	Rock	"
377	1257/586TB	11-12-70	27°33.9′N;82°45.1′W	5.8	22.0	21.5		36.08	1.5	Sand	"
378	1257/586TB	11-12-70	27°33.4′N;82°43.8′W	5.5	21.5	21.5		36.62	1.2	Sand, mud	"
379	1257/586TB	11-12-70	27°33.1′N;82°41.4′W	5.5	21.5	21.0		36.08	1.5	Sand	"
380	1257/586TB	11-12-70	27°34.1′N;82°41.3′W	6.7	21.5	21.0		36.08	1.8	Sand, mud	"
381	1257/586TB	11-12-70	27°35.6′N;82°40.2′W	6.1	22.5	21.5		37.16	1.2	Mud	"
382	1257/586TB	11-12-70	27°37.3′N;82°41.8′W	6.1	21.5	21.5		37.16	1.5	Mud, sand	"
383	1257/586TB	11-12-70	27°37.1′N;82°42.6′W	4.9	22.0	21.5		35.54	1.8	Mud, sand	"
384	1257/586TB	11-12-70	27°37.0′N;82°43.3′W	4.3	21.5	22.0		35.00	1.2	Rock, mud	"
385	1257/586TB	11-13-70	27°38.6′N;82°39.2′W	4.3	21.5	21.5		32.31	2.4	Mud	"
386	1257/586TB	11-13-70	27°40.2′N;82°37.4′W	5.5	21.5	21.5		35.54	1.2	Sand	"
387	1257/586TB	11-13-70	27°37.8′N;82°35.6′W	4.9	21.5	21.5		33.39	1.2	Rock	"
388	1257/586TB	11-13-70	27°38.6′N;82°35.8′W	6.7	22.0	21.5		32.31	1.8	Sand	"
389	1257/586TB	11-13-70	27°39.6′N;82°34.6′W	6.4	22.0	21.5		33.39	1.2	Sand	"
462	1257/586TB	12-14-70	27°35.9′N;82°41.2′W	6.4	19.5	19.5		33.39	1.8	Sand, shell	"
1V	586TB	1-15-71	27°35.9′N;82°39.1′W	4.3	21.0	20.5		31.23	1.5	Sand	R/V *Venus*
2V	586TB	1-15-71	27°35.2′N;82°38.1′W	3.4	21.0	20.5		31.23	1.5	Sand	" "
3V	586TB	1-15-71	27°34.9′N;82°37.2′W	3.7	21.0	21.0		29.62	1.5	Sand	" "

4V	586TB	1-26-71	27°34.5'N;82°40.5'W	4.3	16.5	16.5		32.31	2.1	Sand, mud	R/V *Venus*
5V	586TB	1-26-71	27°33.9'N;82°39.6'W	4.3	17.0	17.0		32.31	2.8	Sand, mud	” ”
6V	586TB	1-27-71	27°33.4'N;82°38.7'W	3.7	15.0	16.0	33.39	32.85	3.7	Mud, shell	” ”
7V	586TB	1-27-71	27°32.8'N;82°37.8'W	2.1	16.0	16.0		30.69	1.5	Shell, rock	” ”
8V	586TB	1-27-71	27°32.2'N;82°37.2'W	1.5	16.0	16.5		30.15	1.5	Mud, sand	” ”
9V	586TB	1-27-71	27°33.8'N;82°34.4'W	1.5	16.0	16.0		31.77	1.5	Mud	” ”
10V	586TB	2-18-71	27°33.0'N;82°35.0'W	1.8	16.0	16.0		28.54	0.9	Mud	” ”
11V	586TB	2-18-71	27°33.3'N;82°35.8'W	2.1	15.5	16.5		28.0	1.2	Mud	” ”
12V	586TB	2-17-71	27°32.2'N;82°35.8'W	2.4-2.8	15.5	15.5		29.08	1.5	Mud, sand	” ”
13V	586TB	2-16-71	27°37.2'N;82°35.4'W	3.1	14.5	15.0		28.54	1.0	Mud	” ”
14V	586TB	2-16-71	27°37.0'N;82°35.2'W	2.1	14.5	15.0		29.08	1.0	Mud	” ”
15V	586TB	2-16-71	27°36.8'N;82°34.9'W	1.5	14.5	14.5		27.46	1.2	Mud	” ”
16V	586TB	2-16-71	27°36.7'N;82°34.6'W	0.9	14.5	14.5		28.00	0.9	Mud	” ”
17V	586TB	2-16-71	27°35.9'N;82°36.0'W	1.5	15.0	15.0		28.00	1.0	Rock	” ”
18V	586TB	2-18-71	27°31.1'N;82°36.5'W	1.8	16.0	15.5		28.00	0.9	Mud	” ”
19V	586TB	2-18-71	27°31.3'N;82°38.4'W	3.1	16.5	16.0		29.08	0.9	Mud	” ”
20V	586TB	2-18-71	27°31.4'N;82°37.8'W	2.8	16.5	16.0		29.62	1.8	Mud	” ”
21V	586TB	2-19-71	27°30.9'N;82°37.5'W	1.5-2.1	17.0	16.5		28.54	0.7	Mud	” ”
22V	586TB	2-19-71	27°30.6'N;82°36.9'W	0.9	17.0	17.0		23.16	0.9	Sand, shell	” ”
23V	586TB	2-19-71	27°30.6'N;82°35.8'W	4.0	17.0	16.0		25.85	2.1	Mud	” ”
24V	586TB	2-18-71	27°30.3'N;82°35.8'W	1.5	17.0	17.0		27.46	0.9	Mud	” ”
25V	586TB	2-18-71	27°30.7'N;82°55.0'W	1.5	17.0	17.0		26.38	0.7	Mud	” ”
26V	586TB	2-18-71	27°30.9'N;82°35.8'W	1.5	17.0	17.0		26.92	1.0	Sand, mud	” ”
27V	586TB	2-25-71	27°30.5'N;82°32.9'W	1.5	22.0	22.0		24.23	0.6	Mud	” ”
28V	586TB	2-25-71	27°30.1'N;82°31.7'W	2.1	22.0	22.0		22.62	0.5	Mud	” ”
29V	586TB	2-25-71	27°30.6'N;82°30.8'W	2.8	22.0	22.0		21.54	0.6	Mud	” ”
30V	586TB	2-25-71	27°31.5'N;82°29.8'W	1.5	22.5	22.0		18.31	0.3	Mud	” ”
31V	586TB	3-29-71	27°32.1'N;82°40.3'W	3.1	20.0	20.0				Sand, shell	” ”
32V	586TB	3-29-71	27°32.2'N;82°40.6'W	3.1	20.5	20.0				Sand, shell	” ”
33V	586TB	3-29-71	27°31.9'N;82°41.3'W	1.2-1.5	20.0	20.0				Sand, shell	” ”
34V	586TB	4- 8-71	27°30.8'N;82°41.4'W	1.2-1.5	18.0	18.0	23.00	30.15		Sand, mud	” ”
35V	586TB	4- 8-71	27°31.8'N;82°42.5'W	1.5	18.2	18.0	31.23	31.23		Sand, shell	” ”
36V	586TB	4- 9-71	27°30.0'N;82°41.8'W	1.8	18.0	18.2	31.77	31.77		Mud, shell	” ”
37V	586TB	4- 9-71	27°28.8'N;82°41.7'W	2.1	18.0	19.0	31.77	31.23	1.2	Sand	” ”
38V	586TB	4- 9-71	27°28.8'N;82°40.5'W	0.9	18.5	18.5	31.23	31.23		Sand	” ”

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
AREA II											
391	1256	11-18-70	27°27.0′N;82°51.1′W	12.2	20.5	21.0		37.16	4.9	Rock	NCD
392	1256	11-18-70	27°24.2′N;82°50.4′W	12.2	21.0	20.5		37.16	4.6	Rock	”
393	1256	11-18-70	27°21.3′N;82°49.1′W	12.8	21.0	21.0		37.16	5.5	Mud, sand	”
394	1256	11-18-70	27°18.0′N;82°48.4′W	13.4	21.0	21.0		37.69	4.3	Rock	”
395	1256	11-18-70	27°16.0′N;82°43.2′W	12.5	20.5	20.5		37.16	4.9	Sand, rock	”
396	1256	11-18-70	27°13.6′N;82°40.8′W	12.5	21.0	20.5		36.62	4.3	Sand	”
397	1256	11-18-70	27°11.7′N;82°38.2′W	12.8	21.5	20.5		36.62	4.3	Rock	”
398	1256	11-19-70	27°09.1′N;82°36.5′W	12.8	21.0	21.0		34.47	4.3	Rock	”
399	1256	11-19-70	27°06.7′N;82°34.6′W	12.2	21.0	20.5		35.54	4.9	Sand	”
400	1256	11-19-70	27°04.3′N;82°33.0′W	12.2	21.0	20.5		36.62	5.5	Sand	”
401	1256	11-19-70	27°01.3′N;82°30.8′W	10.7	21.5	21.5		37.16	5.5	Mud, sand	”
402	1256	11-19-70	26°58.9′N;82°32.5′W	14.0	21.0	21.0		37.16	5.5	Rock, mud	”
403	1256	11-19-70	26°56.5′N;82°30.8′W	12.8	22.0	21.0		37.16	5.5	Mud	”
404	1256	11-19-70	26°54.2′N;82°28.7′W	12.8	21.5	21.5		37.69	6.1	Sand	”
405	1256	11-19-70	26°51.3′N;82°27.1′W	12.5	22.0	21.0		38.23	5.5	Rock, sand	”
406	1256	11-19-70	26°48.4′N;82°25.4′W	12.5	21.5	21.0		38.77	4.9	Sand	”
412	1256	11-23-70	27°26.2′N;82°47.5′W	9.5	20.5	20.5		37.16	4.9	Hard mud	”
413	1256	11-23-70	27°24.8′N;82°42.1′W	8.5	22.0	20.5		37.16	4.9	Sand	”
414	1256	11-23-70	27°21.8′N;82°39.9′W	9.2	22.0	20.5		36.08	4.9	Sand	”
415	1256	11-23-70	27°18.0′N;82°37.5′W	8.5	21.0	20.0		36.62	4.9	Sand, rock	”
417	1256	11-30-70	27°27.7′N;82°45.1′W	7.3	19.5	18.5		36.08	3.7	Sand, shell	”
418	1256	11-30-70	27°23.6′N;82°45.3′W	10.4	19.5	19.0		37.16	5.5	Rock	”
419	1256	11-30-70	27°21.3′N;82°43.0′W	11.0	19.0	18.5		36.08	4.3	Sand	”
420	1256	11-30-70	27°15.7′N;82°38.7′W	10.1	19.0	18.5		35.00	5.5	Rock	”
421	1256	12- 1-70	27°13.3′N;82°37.0′W	9.2	18.0	18.0		35.00	4.3	Sand, shell	”
422	1256	12- 1-70	27°11.1′N;82°34.3′W	9.2	18.5	18.0		36.08	4.3	Sand, shell	”
423	1256	12- 1-70	27°08.4′N;82°32.4′W	10.4	19.0	18.5		34.47	4.9	Mud	”
424	1256	12- 1-70	27°06.2′N;82°31.2′W	10.7	19.0	19.0		35.54	6.7	Mud	”
425	1256	12- 1-70	27°03.8′N;82°30.3′W	10.4	20.0	19.0		37.69	6.7	Rock	”
426	1256	12- 1-70	27°01.1′N;82°28.5′W	10.4	20.0	19.0		36.62	6.7	Sand	”
427	1256	12- 1-70	26°58.1′N;82°27.5′W	11.0	21.0	19.0		37.16	6.7	Mud	”
428	1256	12- 1-70	26°55.1′N;82°25.6′W	9.5	20.0	19.0		37.16	6.1	Mud	”

429	1256	12- 1-70	26°24.2′N;82°52.3′W	9.8	21.0	19.0	37.69	5.8	Sand, shell	NCD
430	1256	12- 1-70	26°48.2′N;82°20.8′W	9.8	22.0	20.5	37.69	5.5	Sand, shell	”
432	1256	12- 1-70	26°51.8′N;82°20.5′W	7.3	20.0	19.0	36.62	1.8	Mud	”
433	1256	12- 2-70	26°54.2′N;82°22.2′W	7.3	18.5	18.0	35.54	2.4	Mud	”
434	1256	12- 2-70	26°56.8′N;82°23.6′W	8.2	18.0	18.5	36.08	3.7	Sand	”
435	1256	12- 2-70	26°59.2′N;82°25.5′W	7.9	19.0	18.0	35.00	4.6	Sand, shell	”
436	1256	12- 2-70	27°01.7′N;82°26.8′W	7.9	19.0	18.5	36.08	5.5	Sand, shell	”
437	1256	12- 2-70	27°04.6′N;82°28.5′W	7.6	19.0	18.5	35.00	4.3	Rock	”
438	1256	12- 2-70	27°06.5′N;82°28.8′W	7.3	20.0	19.0	36.62	4.6	Rock	”
439	1256	12- 2-70	27°08.9′N;82°29.8′W	7.6	19.5	19.0	37.69	4.3	Sand	”
440	1256	12- 2-70	27°11.6′N;82°30.5′W	7.6	19.5	19.0	37.69	3.1	Sand, shell	”
441	1256	12- 2-70	27°14.2′N;82°32.9′W	8.2	18.0	18.5	37.69	3.1	Rock	”
442	1256	12- 2-70	27°16.6′N;82°35.1′W	8.5	19.0	18.5	37.69	3.4	Mud	”
443	1256	12- 2-70	27°19.3′N;82°35.9′W	6.1	19.5	19.0	36.08	3.1	Sand	”
444	1256	12- 2-70	27°21.6′N;82°38.0′W	5.8	20.0	19.0	34.47	2.4	Sand	”
445	1256	12- 3-70	27°15.2′N;82°33.1′W	6.1	18.0	18.5	35.54	2.4	Mud	”
446	1256	12- 3-70	27°12.9′N;82°31.5′W	5.8	19.0	18.5	34.47	1.8	Rock	”
447	1256	12- 3-70	27°10.1′N;82°30.2′W	6.4	18.5	19.5	36.62	3.1	Sand, shell, rock	”
448	1256	12- 3-70	27°07.1′N;82°28.8′W	6.4	19.0	18.5	36.08	1.8	Sand, shell, rock	”
449	1256	12- 3-70	27°04.6′N;82°27.7′W	5.5	19.0	18.5	37.16	3.1	Sand, shell	”
450	1256	12- 3-70	27°01.8′N;82°25.8′W	5.5	19.0	18.0	36.62	1.8	Rock	”
451	1256	12- 3-70	26°59.0′N;82°24.4′W	5.8	19.0	18.5	37.69	2.4	Rock, mud	”
452	1256	12- 3-70	26°56.0′N;82°22.4′W	6.1	19.0	18.5	37.16	2.4	Rock	”
453	1256	12- 3-70	26°53.5′N;82°20.8′W	5.8	19.0	18.5	37.16	1.8	Mud	”
456	1256	12- 4-70	27°24.2′N;82°39.6′W	6.1	19.0	18.5	35.00	3.1	Sand, shell	”
457	1256	12- 4-70	27°26.0′N;82°42.1′W	6.7	18.5	18.0	35.00	1.8	Mud	”
458	1256	12- 4-70	27°28.9′N;82°43.6′W	6.4	19.0	19.0	36.62	4.3	Mud	”
463	1256	1-26-71	27°19.0′N;82°37.2′W	7.6	17.0	16.0	33.93	2.4	Sand, shell	”
464	1256	1-26-71	27°18.9′N;82°38.1′W	9.2	17.0	17.0	35.00	4.3	Rock	”
465	1256	1-26-71	27°18.9′N;82°41.2′W	10.7	18.0	18.0	33.93	6.4	Rock	”
466	1256	1-26-71	27°18.7′N;82°44.8′W	12.2	18.0	18.0	34.47	7.9	Rock	”
475	1256	1-30-71	27°25.7′N;82°48.2′W	10.7	17.0	16.0	33.93	7.0	Rock	”
476	1256	1-30-71	27°24.8′N;82°49.3′W	12.2	17.0	17.0	33.93	6.7	Rock	”
477	1256	1-30-71	27°22.8′N;82°46.1′W	10.7	17.0	17.0	35.00	6.7	Sand	”
478	1256	1-30-71	27°22.3′N;82°47.0′W	12.2	17.0	17.0	34.47	6.1	Rock	”

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
737	1256	7-19-71	26°48.4′N;82°27.1′W	13.7	31.5	32.0	36.08	36.62	8.2	Rock	Box dredge
738	1256	7-19-71	26°51.4′N;82°28.3′W	13.7	31.0	30.5	37.16	37.16	7.6	Rock, sand	" "
739	1256	7-19-71	26°54.6′N;82°31.5′W	13.7	31.0	30.0	34.47	33.93	7.3	Rock, sand	" "
740	1256	7-19-71	27°01.4′N;82°35.2′W	13.7	31.0	30.0	33.93	34.47	4.0	Rock	NCD
741	1256	7-19-71	27°04.4′N;82°36.1′W	13.7	31.0	30.0	34.47	35.54	7.9	Rock	"
742	1256	7-20-71	27°08.6′N;82°38.4′W	13.7	30.0	30.0	33.93	34.47	9.2	Sand	"
743	1256	7-20-71	27°11.8′N;82°41.8′W	13.7	31.0	30.5	33.93	34.47	9.2	Sand	"
744	1256	7-20-71	27°15.9′N;82°45.3′W	13.7	31.0	31.0	34.47	34.47	9.2	Sand, shell	"
745	1256	7-20-71	27°15.9′N;82°36.6′W	9.2	31.0	31.0	33.93	34.47	4.3	Rock	"
746	1256	7-20-71	27°11.8′N;82°35.6′W	10.7	31.0	31.0	33.93	33.93	5.5	Rock, mud	"
747	1256	7-20-71	27°08.4′N;82°31.2′W	9.2	31.0	30.5	33.93	33.93	4.3	Rock, shell, mud	"
748	1256	7-20-71	27°06.6′N;82°29.8′W	9.2	31.0	31.0	33.93	33.93	3.7	Mud, sand, rock	"
749	1256	7-20-71	27°04.1′N;82°29.5′W	9.2	31.0	31.0	33.39	33.39	5.5		"
750	1256	7-21-71	27°01.7′N;82°32.8′W	12.2	31.0	31.0	34.47	34.47	5.5	Sand, shell	"
751	1256	7-21-71	26°58.8′N;82°30.6′W	12.2	31.0	31.0	33.39	33.39	6.4	Sand	"
752	1256	7-21-71	26°54.4′N;82°26.3′W	10.7	31.0	31.0	33.93	33.93	6.4	Rock, shell	"
753	1256	7-21-71	26°51.7′N;82°24.9′W	10.7	31.0	31.0	34.47	34.47	8.2	Shell, mud	"
754	1256	7-21-71	26°48.7′N;82°22.7′W	10.7	31.0	31.0	34.47	34.47	6.1	Rock	"
758	1256	7-21-71	26°54.4′N;82°21.5′W	6.1	32.0	32.0	35.00	35.00	3.4	Rock	"
759	1256	7-21-71	26°54.6′N;82°21.3′W	4.6	32.0	32.0	36.62	36.62	2.8	Sand, shell	"
760	1256	7-21-71	26°59.1′N;82°24.2′W	4.6	32.5	32.0	33.93	34.47	2.4	Rock	"
761	1256	7-22-71	26°58.9′N;82°26.5′W	9.2	32.0	32.0	33.93	34.47	4.3	Rock	"
762	1256	7-22-71	27°01.8′N;82°25.7′W	4.6	32.0	33.0	33.39	33.39	2.1	Mud, shell	"
763	1256	7-22-71	27°04.6′N;82°27.4′W	4.6	32.0	33.0	33.93	33.93	3.7	Rock	"
764	1256	7-22-71	27°08.5′N;82°29.1′W	6.1	32.0	32.0	33.93	34.47	2.8	Rock, mud	"
765	1256	7-22-71	27°08.6′N;82°28.8′W	4.6	34.0	32.0	33.93	34.47	3.4	Rock	"
766	1256	7-22-71	27°12.3′N;82°31.0′W	4.6	32.0	32.0	33.93	33.93	3.1	Shell	"
767	1256	7-22-71	27°15.7′N;82°33.8′W	4.6	32.0	32.0	33.39	32.85	2.4	Sand, shell	"
768	1256	7-22-71	27°19.7′N;82°35.8′W	4.6	31.0	31.0	32.85	32.85	2.4	Sand	"
769	1256	7-22-71	27°25.4′N;82°42.7′W	7.6	32.0	32.0	32.85	32.85	1.8	Mud	"
770	1256	7-22-71	27°25.8′N;82°41.6′W	4.6	32.0	32.0	32.85	32.85	2.1		"
692	1255CH	7-12-71	26°54.0′N;82°07.4′W	3.1	29.0	29.0	28.00	30.15	2.1	Mud	"
693	1255CH	7-12-71	26°53.4′N;82°06.6′W	3.1	29.0	29.0	29.08	30.69	3.1	Mud	"

694	1255CH	7-12-71	26°52.9'N;82°08.5'W	4.0	30.0	29.0	29.62	32.31	1.8	Mud	NCD
695	1255CH	7-12-71	26°52.9'N;82°07.4'W	4.6	31.0	30.0	29.62	29.08	3.1	Mud, shell	"
696	1255CH	7-12-71	26°51.9'N;82°06.3'W	3.1	30.0	30.0	32.31	33.93	3.1	Mud, sand	"
697	1255CH	7-12-71	26°51.8'N;82°07.5'W	7.0	30.0	29.0	28.54	32.31	2.1	Mud, shell	"
698	1255CH	7-12-71	26°51.6'N;82°08.3'W	3.1	30.0	29.0	28.00	31.23	1.8	Mud, sand, shell	"
699	1255CH	7-13-71	26°50.6'N;82°08.3'W	3.1	29.0	29.0	29.08	32.85	2.1	Mud, sand	"
700	1255CH	7-13-71	26°50.6'N;82°06.9'W	5.2	29.0	29.0	29.62	32.31	3.1	Mud, shell	"
701	1255CH	7-13-71	26°50.6'N;82°04.9'W	3.1	30.0	29.0	31.23	32.85	3.1	Rock	"
702	1255CH	7-13-71	26°49.4'N;82°05.4'W	3.1	30.0	29.0	33.39	33.39	3.1	Sand, mud	"
703	1255CH	7-13-71	26°49.2'N;82°06.9'W	4.3	30.0	29.0	30.69	32.85	2.8	Mud, shell	"
704	1255CH	7-14-71	26°48.9'N;82°08.0'W	3.4	29.5	29.5	29.62	32.85	3.2	Mud, sand	"
705	1255CH	7-14-71	26°47.7'N;82°08.0'W	3.1	30.0	30.0	29.62	32.31	2.8	Shell, mud	"
706	1255CH	7-14-71	26°47.5'N;82°06.1'W	5.8	30.0	29.5	31.23	32.85	3.7	Mud	"
707	1255CH	7-14-71	26°47.3'N;82°04.9'W	3.4	30.0	30.0	32.31	33.93	2.1	Sand, shell	"
708	1255CH	7-14-71	26°46.5'N;82°04.7'W	3.4	30.0	31.0	33.39	33.39	2.8	Sand, shell	"
709	1255CH	7-14-71	26°46.3'N;82°06.2'W	4.3	32.0	30.0	32.85	33.93	3.4	Mud, shell	"
710	1255CH	7-14-71	26°46.3'N;82°07.5'W	3.4	32.0	30.0	32.31	33.93	3.4	Mud, shell	"
711	1255CH	7-14-71	26°45.0'N;82°04.7'W	3.4	32.0	30.5	33.93	35.54	2.8	Sand	"
712	1255CH	7-14-71	26°44.8'N;82°06.7'W	3.7	31.0	30.0	33.39	33.93	3.4	Shell	"
713	1255CH	7-14-71	26°44.9'N;82°08.2'W	4.0	31.0	30.0	32.31	33.39	3.7	Shell	"
714	1255CH	7-15-71	26°44.0'N;82°10.6'W	3.7	30.0	30.0	33.93	33.93	3.2	Shell	"
715	1255CH	7-15-71	26°45.5'N;82°11.1'W	3.4	30.5	30.5	33.39	33.39	3.4	Sand, shell	"
716	1255CH	7-15-71	26°45.3'N;82°12.6'W	3.7	31.0	31.0	33.39	33.93	3.4	Sand, shell	"
717	1255CH	7-15-71	26°44.1'N;82°12.6'W	4.6	31.0	30.0	34.47	35.00	2.8	Shell, sand	"
718	1255CH	7-15-71	26°43.2'N;82°12.5'W	3.7	31.0	31.0	35.00	35.00	2.8	Sand, shell	"
719	1255CH	7-15-71	26°42.4'N;82°13.9'W	3.7	31.0	31.0	36.08	36.08	2.8	Sand, shell	"
720	1255CH	7-15-71	26°44.4'N;82°14.3'W	4.0	31.0	31.0	35.00	35.00	3.1	Mud, sand, shell	"
41V	1255CH	7-12-71	26°55.2'N;82°09.6'W	1.3	30.5	29.0	26.92	26.92	1.3	Mud	R/V *Venus*
42V	1255CH	7-12-71	26°55.4'N;82°10.5'W	2.4	30.5	30.0	28.00	28.00	1.2	Mud	" "
43V	1255CH	7-12-71	26°55.5'N;82°10.7'W	1.9	31.0	31.0	29.08	29.08	0.9	Mud	" "
44V	1255CH	7-13-71	26°53.1'N;82°09.4'W	3.1	29.0	29.0	29.08	29.62	1.4	Mud, sand	" "
45V	1255CH	7-13-71	26°54.0'N;82°10.1'W	1.2	30.0	30.0	29.08	29.08	1.2	Mud, sand	" "
46V	1255CH	7-13-71	26°57.5'N;82°12.4'W	1.2	30.0	30.0	26.92	26.92	0.9	Sand, mud	" "
47V	1255CH	7-13-71	26°56.1'N;82°07.3'W	1.8	31.0	31.0	26.38	26.92	1.2	Sand, mud	" "
48V	1255CH	7-13-71	26°57.0'N;82°06.7'W	1.2	32.5	31.5	25.31	25.31	0.9	Sand, mud	" "

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Bot.	Salinity o/oo Sur.	Bot.	Secchi (m)	Substrate	Gear
49V	1255CH	7-14-71	26°57.5'N;82°02.7'W	1.3	32.0	31.0	17.23	22.62	0.4	Mud, sand	R/V *Venus*
50V	1255CH	7-14-71	26°57.3'N;82°01.5'W	2.4	32.0	31.0	09.69	18.35	0.4	Mud	" "
51V	1255CH	7-14-71	26°57.8'N;81°59.8'W	1.5	32.0	32.0	06.46	08.45	0.4	Mud	" "
52V	1255CH	7-17-71	26°59.1'N;81°59.5'W	1.5	32.0	32.5	09.69	09.15	0.9	Sand	" "
53V	1255CH	7-17-71	27°00.2'N;81°59.2'W	1.8	32.0	31.0	04.31	07.00	0.6	Mud, sand	" "
54V	1255CH	7-17-71	27°01.5'N;81°59.3'W	1.8	31.5	31.0	02.16	01.08	1.0	Mud	" "
55V	1255CH	7-17-71	27°02.5'N;81°59.4'W	1.7	30.0	30.0	00.54	00.54	0.7	Sand	" "
56V	1255CH	7-17-71	27°03.6'N;81°59.9'W	1.5	30.0	31.0	00.00	00.00	0.7	Sand, mud	" "
57V	1255CH	7-17-71	27°04.8'N;82°00.4'W	1.5	31.0	31.0	00.00	00.00	0.7	Sand, mud	" "
58V	1255CH	7-19-71	26°53.9'N;82°06.2'W	1.8	33.0	33.0	30.69	30.69	0.9	Mud	" "
59V	1255CH	7-19-71	26°53.0'N;82°05.3'W	1.2	32.0	31.0	33.39	31.77	1.2	Mud	" "
60V	1255CH	7-19-71	26°52.3'N;82°04.0'W	1.8	33.0	33.0	31.77	31.77	0.9	Mud	" "
61V	1255CH	7-19-71	26°51.3'N;82°04.2'W	1.2	33.0	33.0	31.77	31.77	1.2	Sand, mud	" "
62V	1255CH	7-20-71	26°50.5'N;82°04.5'W	1.5	31.0	31.0	32.85	32.85	1.5	Sand	" "
63V	1255CH	7-20-71	26°49.4'N;82°04.5'W	1.2	31.0	31.0	33.39	33.93	1.2	Sand	" "
64V	1255CH	7-20-71	26°48.5'N;82°04.6'W	1.8	31.0	31.0	33.93	33.93	1.5	Sand	" "
65V	1255CH	7-20-71	26°47.4'N;82°04.2'W	0.9-1.2	31.0	31.0	33.93	33.93	1.2	Sand	" "
66V	1255CH	7-20-71	26°46.4'N;82°04.4'W	1.5-1.8	32.0	31.0	33.93	33.93	1.5	Sand, rock	" "
67V	1255CH	7-20-71	26°45.2'N;82°04.4'W	1.5	32.0	31.5	33.93	33.93	0.7	Sand	" "
68V	1255CH	7-20-71	26°43.2'N;82°05.4'W	1.5	32.0	32.0	33.93	33.93	1.2	Sand	" "
69V	1255CH	7-20-71	26°41.9'N;82°05.6'W	1.8	32.0	32.0	34.47	33.93	1.2	Sand	" "
70V	1255CH	7-20-71	26°40.9'N;82°05.6'W	0.9	32.0	32.0	32.31	33.39	0.9	Sand	" "
71V	1255CH	7-20-71	26°39.9'N;82°05.5'W	1.8	32.5	32.5	31.77	32.31	0.9	Sand, mud	" "
72V	1255CH	7-22-71	26°41.6'N;82°06.5'W	1.8	31.0	30.5	32.85	32.85	0.9	Sand	" "
73V	1255CH	7-22-71	26°41.8'N;82°07.0'W	0.9	30.0	29.5	33.39	33.39	0.9	Sand	" "
74V	1255CH	7-22-71	26°46.9'N;82°08.4'W	1.2-1.5	32.0	32.0	33.39	33.39	1.2	Sand, shell	" "
75V	1255CH	7-22-71	26°48.7'N;82°08.6'W	1.5-1.8	31.0	30.5	33.39	32.31	1.2	Sand, mud	" "
76V	1255CH	7-22-71	26°49.8'N;82°08.7'W	1.2	31.0	31.0	32.31	32.31	1.2	Sand, mud	" "
77V	1255CH	7-22-71	26°50.6'N;82°08.9'W	1.8	31.0	31.0	32.31	32.31	1.8	Sand, mud	" "
78V	1255CH	7-22-71	26°51.3'N;82°08.9'W	1.2	31.0	31.0	31.77	32.31	1.2	Sand	" "
79V	1255CH	7-22-71	26°52.2'N;82°09.2'W	1.7	31.0	31.0	30.15	30.15	1.2	Sand	" "
81V	1255CH	7-27-71	26°58.8'N;82°14.1'W	1.2	32.0	32.0	21.00	20.46	1.2	Sand, shell, mud	" "

82V	1255CH	7-27-71	26°59.8′N;82°14.4′W	1.0	31.5	31.5	16.15	16.69	1.0	Mud, shell	R/V	*Venus*
83V	1255CH	7-27-71	27°00.5′N;82°16.0′W	1.0	32.0	32.0	16.15	15.62	1.0	Sand, mud	”	”
84V	1255CH	7-28-71	26°46.4′N;82°12.6′W	1.8	32.5	33.0	33.93	33.93	0.7	Sand	”	”
85V	1255CH	7-28-71	26°46.0′N;82°11.8′W	2.4	32.0	32.0	33.39	33.39	1.5	Mud	”	”
86V	1255CH	7-29-71	26°49.2′N;82°15.4′W	2.1	30.5	31.0	35.00	35.54	0.6	Sand, mud	”	”
87V	1255CH	7-29-71	26°47.4′N;82°15.5′W	2.1	30.5	30.5	34.47	35.00	0.7	Mud, shell	”	”
88V	1255CH	7-29-71	26°47.4′N;82°15.9′W	1.0	31.0	30.5	34.47	35.00	0.9	Mud	”	”
89V	1255CH	7-29-71	26°47.1′N;82°14.7′W	1.8	31.0	30.5	33.93	34.47	0.8	Mud	”	”
90V	1255CH	7-29-71	26°46.1′N;82°14.8′W	1.8	31.5	31.0	33.93	33.39	0.9	Shell, mud	”	”
91V	1255CH	7-31-71	26°49.9′N;82°16.2′W	0.9-1.5	29.5	30.0	33.93	33.93	0.9	Mud, sand	”	”
92V	1255CH	7-31-71	26°49.3′N;82°16.8′W	0.9	30.0	30.0	35.00	35.00	0.9	Sand	”	”
93V	1255CH	7-31-71	26°48.1′N;82°17.2′W	1.8	31.0	31.0	35.00	35.54	1.8	Shell	”	”
94V	1255CH	8- 1-71	26°50.2′N;82°16.6′W	1.2-1.5	29.5	29.0	34.47	34.47	1.5	Mud, shell	”	”
95V	1255CH	8- 1-71	26°47.3′N;82°14.5′W	1.2	29.5	29.5	34.47	34.47	1.2	Sand	”	”
96V	1255CH	8- 1-71	26°46.9′N;82°15.2′W	1.5	30.0	30.0	33.39	34.47	1.5	Mud, shell	”	”
97V	1255CH	8- 1-71	26°45.8′N;82°15.1′W	1.5	30.0	30.0	33.93	33.39	0.9	Mud	”	”
98V	1255CH	8- 1-71	26°46.1′N;82°13.7′W	1.5	30.0	30.0	33.39	33.39	0.9	Mud, shell	”	”
99V	1255CH	8- 1-71	26°45.9′N;82°12.8′W	1.8	29.5	30.0	32.85	33.39	0.9	Mud, shell	”	”
100V	1255CH	8- 1-71	26°45.0′N;82°15.2′W	2.1	31.0	31.0	33.39	33.39	1.6	Sand	”	”
101V	1255CH	8- 2-71	26°47.3′N;82°10.3′W	1.2	29.0	30.0	35.54	36.08	0.6	Sand	”	”
102V	1255CH	8- 2-71	26°46.9′N;82°10.5′W	1.8	29.0	29.0	31.23	31.23	0.6	Mud	”	”
103V	1255CH	8- 2-71	26°46.4′N;82°08.9′W	1.5	30.0	30.0	31.77	31.77	1.5	Oyster shell	”	”
104V	1255CH	8- 2-71	26°42.6′N;82°08.2′W	1.8	30.0	30.0	32.31	32.31	1.5	Mud, shell	”	”
105V	1255CH	8- 2-71	26°42.4′N;82°09.2′W	1.8	30.5	30.0	31.23	32.31	1.3	Shell, mud	”	”
106V	1255CH	8- 2-71	26°42.6′N;82°10.3′W	0.9	29.0	29.0	33.39	33.39	0.9	Sand	”	”
107V	1255CH	8- 5-71	26°40.4′N;82°13.7′W	0.9-1.5	29.5	29.5	33.39	33.39	1.5	Sand	”	”
108V	1255CH	8- 5-71	26°39.2′N;82°12.9′W	2.4	30.0	30.0	33.93	33.39	2.0	Mud, shell	”	”
109V	1255CH	8- 5-71	26°38.1′N;82°12.8′W	1.8-2.1	29.5	30.0	35.00	35.00	1.8	Sand, shell	”	”
110V	1255CH	8- 5-71	26°37.7′N;82°11.5′W	1.3	30.0	30.0	37.16	37.16	1.3	Sand	”	”
111V	1255CH	8- 5-71	26°41.7′N;82°14.4′W	1.8-3.1	31.0	31.0	35.00	35.00	2.0	Sand, shell	”	”
112V	1255CH	8- 5-71	26°41.7′N;82°14.7′W	1.8	31.0	30.0	35.54	36.08	1.2	Sand	”	”
113V	1255CH	8- 5-71	26°41.7′N;82°12.2′W	2.1	31.0	31.0	33.93	34.47	2.0	Sand	”	”
407	1255	11-19-70	26°45.5′N;82°23.9′W	12.8	22.5	21.0		37.69	4.9	Mud	NCD	
408	1255	11-19-70	26°42.6′N;82°21.8′W	12.8	23.0	22.0		37.16	6.1	Mud	”	
409	1255	11-19-70	26°44.5′N;82°18.3′W	9.5	22.0	21.0		38.23	4.3	Mud	”	
431	1255	12- 1-70	26°48.1′N;82°19.1′W	7.6	20.5	19.0		36.62	5.5	Mud	”	

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity 0/00 Sur.	Salinity 0/00 Bot.	Secchi (m)	Substrate	Gear
454	1255	12- 3-70	26°50.4′N;82°18.8′W	6.1	19.0	18.5		35.54	1.8	Mud	NCD
455	1255	12- 3-70	26°47.9′N;82°17.4′W	4.3	19.0	19.0		36.08	1.8	Mud	"
503	1255	4-13-71	26°24.9′N;81°58.5′W	4.6	21.5	21.0	36.62	37.16	1.5	Mud, shell	"
504	1255	4-13-71	26°23.9′N;81°58.6′W	6.1	21.5	21.0	36.62	36.62	1.5	Mud	"
505	1255	4-13-71	26°22.7′N;82°05.3′W	7.6	21.0	21.0	34.47	34.47	1.8	Mud	"
506	1255	4-13-71	26°22.3′N;82°08.7′W	9.2	20.0	20.0	34.47	33.93	2.1	Rock	"
507	1255	4-14-71	26°21.9′N;82°13.1′W	10.7	21.0	21.0		33.93	5.5	Shell, sand	"
508	1255	4-14-71	26°21.7′N;82°16.3′W	12.2	21.5	21.5		33.39	6.1	Shell	Box dredge
509	1255	4-14-71	26°21.3′N;82°19.2′W	13.7	21.0	21.5	36.08	35.54	6.1	Rock, shell	" "
510	1255	4-14-71	26°24.4′N;82°20.2′W	13.7	20.0	20.5	37.16	36.62	5.2	Rock, shell	" "
511	1255	4-14-71	26°27.1′N;82°21.9′W	13.7	21.0	21.0	36.08	36.62	4.9	Rock	" "
512	1255	4-14-71	26°30.4′N;82°21.5′W	13.7	21.0	20.5	36.08	36.62	6.7	Rock	NCD
513	1255	4-14-71	26°33.3′N;82°21.7′W	13.7	21.0	21.0	37.16	37.16	7.3	Rock	"
514	1255	4-14-71	26°36.2′N;82°21.9′W	13.7	21.0	20.5	37.16	37.16	6.1	Mud, shell	"
515	1255	4-14-71	26°39.7′N;82°24.5′W	13.7	21.0	20.0	36.62	35.00	6.7	Shell	"
516	1255	4-15-71	26°39.5′N;82°22.1′W	12.2	20.5	20.0	33.93	33.93	9.2	Rock	"
517	1255	4-15-71	26°36.3′N;82°20.8′W	12.2	21.0	20.0	33.93	33.93	5.5	Rock, mud	"
518	1255	4-15-71	26°33.3′N;82°20.2′W	12.2	21.0	20.0	36.62	36.62	6.1	Sand, shell	"
519	1255	4-15-71	26°30.4′N;82°20.0′W	12.2	21.0	20.5	33.93	33.93	6.7	Rock, shell	"
520	1255	4-15-71	26°27.3′N;82°19.4′W	12.2	21.0	21.0		33.62	7.0	Rock	"
521	1255	4-15-71	26°24.6′N;82°17.0′W	12.2	21.0	21.0	37.16	37.69	5.2	Rock	"
522	1255	4-15-71	26°24.4′N;82°14.5′W	10.7	21.0	21.5	37.69	36.62	5.5	Mud	"
523	1255	4-15-71	26°27.3′N;82°17.0′W	10.7	21.0	21.0	35.00	35.00	5.5	Sand, shell	"
524	1255	4-15-71	26°30.4′N;82°18.3′W	10.7	21.0	21.0	35.54	35.54	5.5	Mud, shell	"
525	1255	4-15-71	26°33.2′N;82°18.6′W	10.7	20.5	20.5	34.47	34.47	5.5	Shell, sand	"
526	1255	4-16-71	26°36.2′N;82°19.0′W	10.7	21.0	20.5	35.00	35.00	4.9	Rock	"
527	1255	4-16-71	26°39.6′N;82°19.2′W	10.7	22.0	21.5		35.54	5.5	Rock, mud	"
528	1255	4-16-71	26°39.7′N;82°18.5′W	9.2	22.0	22.0		36.08	5.5	Mud	"
529	1255	4-16-71	26°38.6′N;82°16.8′W	7.6	22.0	21.0	36.08	36.08	4.6	Sand, shell	"
530	1255	4-16-71	26°37.7′N;82°16.0′W	6.1	22.0	21.0	36.62	37.69	4.9	Rock, sand, mud	"
531	1255	4-16-71	26°37.8′N;82°15.6′W	4.6	22.0	21.0	36.08	36.08	3.1	Sand, shell	"
532	1255	4-16-71	26°36.2′N;82°15.8′W	7.6	22.5	22.0		36.62	4.9	Rock	"
533	1255	4-16-71	26°38.1′N;82°16.7′W	7.6	22.5	22.0	35.54	36.62	4.0	Mud	"

534	1255	4-16-71	26°33.3′N;82°14.2′W	7.6	22.0	21.0	37.69	37.16	3.7	Rock	NCD
535	1255	4-16-71	26°33.4′N;82°13.1′W	6.1	22.0	21.0	35.54	36.62	3.4	Rock	"
536	1255	4-16-71	26°33.5′N;82°12.6′W	4.6	22.0	21.0	37.69	36.62	2.1	Sand, shell	"
537	1255	4-26-71	26°25.5′N;82°08.6′W	6.1	21.5	21.0	33.93	36.08	1.5	Sand, shell, mud	"
538	1255	4-26-71	26°25.6′N;82°10.0′W	7.6	22.0	20.0	35.00	35.00	2.4	Rock	"
539	1255	4-26-71	26°25.1′N;82°12.5′W	9.2	25.0	25.0	36.08	33.93	3.7	Sand, shell	"
540	1255	4-26-71	26°27.8′N;82°13.3′W	9.2	25.5	25.0	34.47	35.54	4.0	Rock	"
541	1255	4-26-71	26°30.8′N;82°16.2′W	9.2	25.0	20.0	33.93	33.93	5.2	Rock	"
542	1255	4-26-71	26°33.5′N;82°16.8′W	9.2	22.0	19.5	33.93	33.93	4.6	Mud, sand	"
543	1255	4-26-71	26°36.6′N;82°17.5′W	9.2	21.0	20.0	33.93	33.93	2.1	Rock	"
544	1255	4-27-71	26°36.9′N;82°14.3′W	4.6	22.0	21.0	33.93	33.93	2.4	Sand	"
545	1255	4-27-71	26°36.1′N;82°15.0′W	6.1	26.0	26.0	33.39	33.39	3.7	Sand, mud	"
546	1255	4-27-71	26°30.3′N;82°12.5′W	6.1	26.5	26.5	33.93	33.93	1.8	Sand, shell	"
547	1255	4-27-71	26°30.5′N;82°13.6′W	7.6	26.0	26.0	33.93	33.93	3.4	Mud, sand, shell	"
548	1255	4-27-71	26°30.5′N;82°12.0′W	4.6	27.5	28.0	37.16	36.08	2.1	Mud	"
549	1255	4-27-71	26°27.8′N;82°10.7′W	4.6	27.0	26.5		35.54	2.1	Mud	"
550	1255	4-27-71	26°27.8′N;82°11.3′W	6.1	27.0	26.5	35.00	35.00	2.4	Mud	"
551	1255	4-27-71	26°27.8′N;82°12.0′W	7.6	27.0	26.0	37.16	36.08	4.9	Mud	"
552	1255	4-28-71	26°25.3′N;81°57.2′W	4.6	27.0	27.0	33.93	33.93	1.5	Mud	"
553	1255	4-28-71	26°23.1′N;81°54.0′W	4.6	27.5	27.0	34.47	35.54	0.9	Mud	"
554	1255	4-28-71	26°17.3′N;81°50.5′W	4.6	27.5	27.5	36.62	36.62	1.8	Mud, rock	"
555	1255	4-28-71	26°17.2′N;81°51.2′W	6.1	27.5	27.5	36.62	35.54	3.4	Mud, rock	"
556	1255	4-28-71	26°17.1′N;81°52.9′W	7.6	28.0	27.0	36.62	36.62	2.4	Mud, rock	"
557	1255	4-28-71	26°17.1′N;81°55.8′W	9.2	27.5	26.5	35.00	35.00	3.4	Mud	"
558	1255	4-28-71	26°17.1′N;82°00.5′W	10.7	27.0	26.0	35.00	35.00	3.7	Mud	"
559	1255	4-28-71	26°17.7′N;82°13.1′W	12.2	26.5	25.5	35.00	35.00	5.5	Rock	"
560	1255	4-29-71	26°17.9′N;82°16.1′W	13.7	26.0	19.0	33.39	33.93	5.5	Rock	"
721	1255	7-18-71	26°36.0′N;82°14.3′W	3.1	31.0	31.0	34.47	34.47	3.1	Shell, mud	"
722	1255	7-18-71	26°36.0′N;82°14.4′W	5.5	31.0	31.0	34.47	34.47	4.0	Rock	"
723	1255	7-18-71	26°35.4′N;82°14.2′W	4.0	31.0	31.0	34.47	34.47	3.1	Shell, mud	"
724	1255	7-18-71	26°34.7′N;82°13.7′W	3.1	31.0	31.0	35.00	35.00	3.1	Sand	"
725	1255	7-18-71	26°32.7′N;82°12.6′W	3.1	31.5	31.5	35.54	35.54	2.8	Sand, shell	"
726	1255	7-18-71	26°33.0′N;82°13.0′W	5.5	32.0	31.0	35.00	35.00	2.8	Mud, shell	"
727	1255	7-18-71	26°42.0′N;82°16.4′W	3.7	31.5	31.5	36.08	36.08	3.1	Sand, shell	"
728	1255	7-18-71	26°41.5′N;82°17.1′W	4.3	31.5	31.5	36.08	36.08	2.8	Sand, shell	"

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Bot.	Salinity o/oo Sur.	Bot.	Secchi (m)	Substrate	Gear
729	1255	7-18-71	26°40.9'N;82°18.0'W	5.5	31.0	31.5	36.08	35.54	3.4	Mud	NCD
730	1255	7-18-71	26°41.0'N;82°19.1'W	5.5	31.0	31.0	35.54	35.54	3.1	Sand	"
731	1255	7-18-71	26°41.9'N;82°18.8'W	4.9	31.5	31.5	36.08	36.08	2.8	Sand, mud	"
732	1255	7-18-71	26°42.4'N;82°17.9'W	4.9	31.5	31.5	33.93	33.93	2.8		"
733	1255	7-19-71	26°45.8'N;82°16.3'W	4.6	31.0	31.0	35.00	35.00	2.8	Sand, shell	"
734	1255	7-19-71	26°45.7'N;82°17.7'W	7.6	31.0	31.0	34.47	35.00	3.1	Rock, shell	"
735	1255	7-19-71	26°45.5'N;82°20.7'W	10.7	32.0	32.0	35.54	35.54	7.9	Rock	Box dredge
736	1255	7-19-71	26°45.4'N;82°25.0'W	13.7	31.0	30.0	36.08	36.08	9.2	Rock, sand	" "
755	1255	7-21-71	26°48.8'N;82°17.6'W	6.1	32.0	32.0	37.69	37.16	2.4	Mud, sand	NCD
756	1255	7-21-71	26°51.8'N;82°19.6'W	6.1	32.0	32.0	37.16	37.16	2.8	Mud, shell	"
757	1255	7-21-71	26°52.0'N;82°19.5'W	4.6	32.0	32.0	36.08	36.62	2.1	Sand, shell	"
561	1254	4-29-71	26°10.0'N;82°06.1'W	13.7	26.0	24.0	33.93	33.93	6.7	Rock	"
562	1254	4-29-71	26°12.5'N;82°02.4'W	12.2	27.0	25.0	33.39	35.00	7.3	Sand, shell	"
563	1254	4-29-71	26°12.4'N;81°58.0'W	10.7	27.0	26.5	33.93	35.00	6.7	Rock	"
564	1254	4-29-71	26°12.6'N;81°55.1'W	9.2	27.0	26.5	35.54	35.54	4.6	Mud, shell	"
565	1254	4-29-71	26°12.3'N;81°53.3'W	7.6	28.0	26.0	36.08	35.00	2.4	Sand, shell	"
566	1254	4-29-71	26°12.3'N;81°50.5'W	6.1	28.0	27.5	37.69	37.69	4.6	Sand, shell	"
567	1254	4-29-71	26°12.4'N;81°49.4'W	4.6	28.5	28.0	34.47	35.00	2.1	Mud, rock	"
568	1254	5- 5-71	26°08.0'N;81°49.2'W	4.6	26.5	26.0	35.54	36.62	0.6	Rock	"
569	1254	5- 5-71	26°07.9'N;81°49.8'W	6.1	26.0	26.0	37.69	37.69	0.6	Rock, shell, mud	"
570	1254	5- 5-71	26°07.9'N;81°52.2'W	7.6	26.5	26.5	36.08	37.16	1.5	Rock	"
571	1254	5- 5-71	26°08.1'N;81°55.8'W	9.2	25.5	25.5	37.16	37.16	2.4	Rock	"
572	1254	5- 6-71	26°03.1'N;81°48.5'W	6.1	25.5	25.5	35.00	35.00	2.1	Rock	"
573	1254	5- 6-71	26°03.2'N;81°47.7'W	4.6	26.0	25.5	34.47	35.00	0.9	Mud, shell	"
574	1254	5- 6-71	26°03.0'N;81°50.4'W	7.6	26.0	26.0	36.62	37.16	1.8		"
575	1254	5-18-71	26°08.3'N;82°00.1'W	10.7	28.0	27.0	36.62	37.16	8.5	Rock	"
576	1254	5-18-71	26°08.4'N;82°03.1'W	12.2	27.5	26.5	35.00	35.00	9.2	Rock	"
577	1254	5-18-71	26°07.6'N;82°06.0'W	13.7	27.5	26.0	35.00	35.00	9.2	Rock	"
578	1254	5-19-71	26°03.4'N;82°05.5'W	13.7	26.0	26.0	34.47	34.47		Rock	Box Dredge
579	1254	5-19-71	26°03.1'N;82°02.2'W	12.2	26.5	27.0	34.47	34.47		Rock	" "
580	1254	5-19-71	26°03.1'N;81°57.7'W	10.7	27.0	27.0	35.00	36.08	9.2	Rock	" "
581	1254	5-19-71	26°03.2'N;81°54.1'W	9.2	27.5	27.0	35.00	37.16	9.2	Sand, shell	" "
582	1254	5-19-71	25°58.8'N;81°45.6'W	4.6	28.0	28.0	37.16	37.69	3.7	Sand, shell	NCD
583	1254	5-19-71	25°58.8'N;81°46.8'W	6.1	29.0	28.0	37.16	36.62	3.1	Sand, shell	"
584	1254	5-19-71	25°58.8'N;81°49.0'W	7.6	28.5	28.0	36.62	37.16	2.4	Rock	"
585	1254	5-19-71	25°58.8'N;81°51.2'W	9.2	29.0	28.0	34.47	35.00	1.8	Rock	"
586	1254	5-19-71	25°58.9'N;81°53.8'W	10.7	28.5	28.0	36.08	36.08	7.3	Rock	"

587	1254	5-19-71	25°58.8'N;81°57.2'W	12.2	28.5	27.5	36.08	35.54	7.3	Rock	Box dredge
588	1254	5-19-71	25°58.6'N;82°02.6'W	13.7	28.0	27.0	35.54	34.47	9.2	Rock	" "
589	1254	5-20-71	25°54.3'N;81°57.7'W	13.7	27.0	27.0	37.16	36.08	7.9	Rock	" "
590	1254	5-20-71	25°54.3'N;81°55.8'W	12.2	27.5	27.0	37.16	35.54	8.9	Rock, sand	" "
591	1254	5-20-71	25°54.3'N;81°51.9'W	10.7	28.0	28.0	36.62	35.00	8.5	Rock	" "
592	1254	5-20-71	25°54.3'N;81°49.0'W	9.2	28.0	28.0	37.16	37.16	5.5	Rock	NCD
593	1254	5-20-71	25°54.6'N;81°47.1'W	7.6	29.0	28.5	37.16	35.54	3.7	Rock	Box dredge
594	1254	5-20-71	25°54.9'N;81°44.9'W	6.1	29.0	28.5	37.69	38.23	3.7	Mud	NCD
595	1254	5-20-71	25°54.1'N;81°44.7'W	4.6	28.5	28.5	37.69	37.69	2.8	Mud, shell	"
596	1254	5-20-71	25°53.7'N;81°43.7'W	3.4	29.0	28.5	37.69	37.69	0.9	Mud	"
597	1254	5-20-71	25°53.0'N;81°44.1'W	6.1	28.5	28.5	36.62	37.16	0.9	Mud	"
598	1254	5-20-71	25°51.6'N;81°43.6'W	5.5	28.5	28.0	36.62	36.62	1.2	Mud, shell	"
599	1254	5-21-71	25°50.3'N;81°42.9'W	4.6	28.0	28.5	36.62	37.16	2.1	Sand	"
600	1254	5-21-71	25°50.3'N;81°43.9'W	6.1	28.0	28.0	36.08	36.62	4.9	Sand	"
601	1254	5-21-71	25°50.3'N;81°46.0'W	7.6	28.5	28.5	37.16	36.62	5.5	Sand	"
602	1254	5-21-71	25°50.2'N;81°48.1'W	9.2	28.0	28.0	36.62	36.62	5.5	Sand	"
603	1254	5-21-71	25°50.3'N;81°49.9'W	10.7	28.0	28.0	37.69	36.62	6.4	Sand	Box dredge
604	1254	5-21-71	25°50.2'N;81°53.2'W	12.2	28.5	27.5	37.16	37.69	7.6	Rock	NCD
605	1254	5-21-71	25°50.5'N;81°55.9'W	13.7	28.5	27.0	35.00	36.62	6.7	Rock	Box dredge
606	1254	5-21-71	25°45.4'N;81°56.4'W	13.7	27.0	27.0	36.62	35.54	4.6	Rock	NCD
607	1254	5-21-71	25°45.7'N;81°52.7'W	12.2	28.5	28.0	37.16	37.16	4.6	Rock	Box dredge
608	1254	5-21-71	25°45.6'N;81°50.0'W	10.7	28.0	28.0	35.54	35.54	7.6	Sand	"
609	1254	5-22-71	25°45.5'N;81°46.6'W	9.2	28.0	28.0	35.00	35.00	4.9	Sand	NCD
610	1254	5-22-71	25°45.4'N;81°44.1'W	7.6	28.5	28.0	36.62	36.08	4.9	Rock	"
611	1254	5-22-71	25°45.5'N;81°43.2'W	6.1	28.5	28.0	36.62	37.16	4.6	Sand, shell	"
612	1254	5-22-71	25°45.4'N;81°41.3'W	4.6	29.0	28.5	37.69	37.16	4.0	Sand	"
613	1254	5-22-71	25°43.7'N;81°41.2'W	3.7	29.0	29.0	37.69	37.69	3.7	Sand	"
614	1254	5-22-71	25°40.5'N;81°39.5'W	6.1	29.0	29.0	37.69	37.69	3.7	Sand	"
615	1254	5-22-71	25°40.5'N;81°38.2'W	4.6	28.0	28.0	37.69	36.62	4.6	Sand	"
616	1254	5-22-71	25°40.2'N;81°44.6'W	7.6	28.5	28.0	36.62	37.16	3.7	Sand	"
771	1254	8-14-71	25°48.3'N;81°34.8'W	3.4	27.5	27.5	36.08	36.08	0.3	Mud, shell	"
772	1254	8-14-71	25°46.8'N;81°33.2'W	3.4	27.5	27.5	33.93	34.47	0.6	Mud, shell	"
773	1254	8-19-71	26°44.9'N;81°30.5'W	3.1	29.0	29.0	32.85	33.39	1.5	Shell, sand	"
774	1254	8-19-71	26°43.3'N;81°27.6'W	3.1	29.0	29.0	33.39	34.47	1.5	Sand	"
775	1254	8-19-71	26°40.9'N;81°25.5'W	3.1	29.5	29.5	33.93	33.93	1.3	Sand	"
790	1254	8-20-71	25°41.4'N;81°28.7'W	4.6	31.5	30.0	36.08	36.62	1.2	Mud	"

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
791	1254	8-20-71	25°42.8'N;81°31.7'W	4.6	31.0	30.0	35.54	36.08	1.5	Mud	NCD
792	1254	8-20-71	25°44.2'N;81°34.7'W	4.6	31.0	30.0	35.54	35.00	1.2	Rock	"
793	1254	8-21-71	25°44.9'N;81°38.4'W	4.0	32.0	30.0			1.5	Mud	"
794	1254	8-21-71	25°45.0'N;81°36.2'W	4.3	31.0	30.0			1.8	Mud	"
795	1254	8-21-71	25°47.2'N;81°36.3'W	3.7	30.0	29.0			1.5	Mud	"
796	1254	8-21-71	25°45.7'N;81°34.3'W	3.4	30.0	29.5			1.2		"
804	1254	8-23-71	25°42.3'N;81°40.6'W	5.8	30.0	30.0			2.1	Shell	"
805	1254	8-23-71	25°43.9'N;81°42.2'W	6.1	30.0	29.5			1.8	Sand	"
806	1254	8-23-71	25°48.2'N;81°43.6'W	6.1	30.5	30.0			2.1	Sand, shell	"
807	1254	8-24-71	25°42.0'N;81°39.1'W	5.5	29.5	29.5			2.8	Sand, shell	"
808	1254	8-24-71	25°43.0'N;81°39.1'W	3.7	30.0	30.0			1.8	Sand, shell	"
809	1254	8-24-71	25°43.7'N;81°39.4'W	3.4	30.0	30.0			1.8	Sand	"
810	1254	8-24-71	25°44.2'N;81°39.1'W	4.9	30.0	30.0			1.8		"
811	1254	8-24-71	25°45.2'N;81°40.2'W	4.3	30.5	30.0			1.3		"
812	1254	8-24-71	25°46.9'N;81°41.8'W	4.9	31.0	30.0			1.8	Rock	"
813	1254	8-24-71	25°42.5'N;81°34.0'W	5.2	30.5	30.5			1.8	Sand	"
814	1254	9- 3-71	25°40.3'N;81°46.0'W	9.2	30.5	30.0	35.00	35.00	7.3	Mud	"
829	1254	9- 6-71	25°40.6'N;81°47.8'W	10.7	30.0	30.0	33.93	33.93	5.5	Rock	"
830	1254	9- 6-71	25°40.5'N;81°50.6'W	12.2	30.0	30.0	33.93	34.47	4.9	Rock	R/V *Venus*
114V	1254	8-11-71	25°51.4'N;81°38.5'W	1.5	29.0	29.0	35.54	35.54	1.0	Shell, mud	"
115V	1254	8-11-71	25°52.9'N;81°37.7'W	1.5	29.0	29.0	34.47	33.93	0.6	Shell, mud	"
116V	1254	8-11-71	25°52.8'N;81°36.2'W	1.8	30.0	29.5	34.47	33.93	0.4	Shell, mud	" "
117V	1254	8-11-71	25°51.9'N;81°35.1'W	1.8	30.0	30.0	33.93	33.39	0.4	Mud, shell	" "
118V	1254	8-14-71	25°51.8'N;81°34.6'W	1.5	27.0	27.0	32.31	32.85	0.4	Oyster shell	" "
119V	1254	8-14-71	25°51.3'N;81°33.5'W	1.6	27.0	27.0	32.31	32.85	0.3	Mud, oyster shell	" "
120V	1254	8-14-71	25°50.4'N;81°32.0'W	2.1	27.0	27.0	30.15	30.15	0.4	Sand, rock	" "
121V	1254	8-14-71	25°49.7'N;81°31.2'W	1.2-2.1	26.5	27.0	32.85	32.85	0.4	Shell, rock	" "
122V	1254	8-21-71	25°49.6'N;81°30.4'W	3.4	31.0	30.5	26.92	28.00	1.0	Sand, shell	" "
123V	1254	8-21-71	25°49.0'N;81°32.4'W	2.3	30.0	29.0	29.62	30.69	0.6	Shell	" "
124V	1254	8-21-71	25°48.4'N;81°32.3'W	3.7	30.2	29.8	28.00	31.23	0.6	Mud, shell	" "
125V	1254	8-22-71	25°49.5'N;81°32.9'W	3.4	30.0	30.0	28.00	28.00	0.4	Shell	" "
126V	1254	8-22-71	25°48.9'N;81°33.9'W	3.8	29.5	30.0	28.00	28.00	0.4	Shell	" "

127V	1254	8-22-71	25°50.0′N;81°35.7′W	4.0	30.0	29.5	28.54	28.54	0.7	Shell, mud	R/V *Venus*
128V	1254	8-22-71	25°50.7′N;81°34.9′W	3.4	30.0	29.5	28.54	28.00	0.6	Hard mud	" "
129V	1254	8-22-71	25°52.0′N;81°36.7′W	3.1	30.0	29.5	28.00	28.54	0.3	Mud, shell	" "
130V	1254	8-22-71	25°51.6′N;81°37.4′W	2.8	29.0	29.0	28.54	28.00	0.3	Mud, shell	" "
131V	1254	8-22-71	25°51.0′N;81°38.1′W	2.4	29.0	29.0	31.23	31.23	0.9	Shell, mud	" "
132V	1254	8-23-71	25°48.4′N;81°28.4′W	2.5	30.5	30.0	26.92	26.92	0.4	Shell, mud	" "
133V	1254	8-23-71	25°47.7′N;81°29.3′W	3.4	30.0	29.5	27.46	27.46	0.3	Shell, mud	" "
134V	1254	8-23-71	25°47.0′N;81°29.9′W	3.4	30.0	29.5	28.00	28.54	0.3	Shell	" "
135V	1254	8-23-71	25°46.4′N;81°30.8′W	4.0	30.0	30.0	29.08	28.54	0.4	Shell, mud	" "
136V	1254	8-23-71	25°44.7′N;81°29.2′W	4.6	30.0	30.0	31.23	29.62	0.6	Mud, shell	" "
137V	1254	8-23-71	25°45.3′N;81°28.3′W	4.3	30.0	30.0	30.69	29.08	0.4	Mud, shell	" "
138V	1254	8-23-71	25°45.8′N;81°27.3′W	4.3	30.0	29.5	28.54	28.54	0.4	Mud, shell	" "
139V	1254	8-23-71	25°46.5′N;81°26.5′W	3.4	30.0	30.0	27.46	27.46	0.6	Mud, shell	" "
140V	1254	8-23-71	25°47.1′N;81°25.8′W	2.6	30.0	30.0	25.85	25.85	0.6	Shell, mud	" "
141V	1254	8-24-71	25°46.0′N;81°23.2′W	1.2	31.0	30.0	17.77	21.54	0.3	Mud	" "
142V	1254	8-24-71	25°45.4′N;81°23.9′W	2.1	31.0	31.0	25.85	31.23	0.6	Shell, mud	" "
143V	1254	8-24-71	25°44.8′N;81°24.8′W	3.2	31.0	30.0	23.69	28.00	0.9	Shell, mud	" "
144V	1254	8-24-71	25°44.2′N;81°25.7′W	3.1	31.0	30.0	25.85	28.54	1.0	Shell, mud	" "
145V	1254	8-24-71	25°43.6′N;81°26.6′W	3.4-3.7	31.0	30.0	26.92	30.15	0.9	Shell, mud	" "
146V	1254	8-24-71	25°42.3′N;81°24.9′W	3.1	31.5	29.5	25.85	30.69	1.0	Mud, shell	" "
147V	1254	8-24-71	25°42.9′N;81°23.9′W	2.8	32.5	30.0	23.69	30.69	1.0	Mud, shell	" "
148V	1254	8-24-71	25°43.4′N;81°23.1′W	2.4	32.0	31.0	22.08	25.85	0.7	Mud, sand	" "
149V	1254	8-24-71	25°44.2′N;81°22.2′W	2.4	31.5	31.0	23.16	25.31	0.6	Mud, shell	" "
150V	1254	8-24-71	25°42.2′N;81°22.1′W	2.2	33.5	30.5	25.85	30.15	1.2	Mud, shell	" "
151V	1254	8-24-71	25°41.6′N;81°20.0′W	1.8	31.0	30.0	27.46	32.31	0.9	Mud	" "
152V	1254	8-25-71	25°41.3′N;81°20.5′W	2.1	32.0	30.5	25.31	30.15	0.6	Mud, shell	" "
153V	1254	8-25-71	25°40.7′N;81°21.4′W	2.8-3.1	32.0	30.0	28.54	33.39	0.7	Mud, shell	" "
154V	1254	8-25-71	25°40.1′N;81°22.3′W	3.5	33.0	30.5	28.00	33.39	1.2	Shell, mud	" "
156V	1254	8-31-71	25°41.4′N;81°19.2′W	2.4	30.5	30.0	29.08	32.31	1.2	Mud, shell	" "
499	1253	3-13-71	25°23.7′N;81°26.0′W	6.1	22.5	22.0		36.62	2.8	Rock	NCD
500	1253	3-13-71	25°28.6′N;81°27.6′W	6.1	22.0	22.0		36.62	1.8	Shell	"
501	1253	3-13-71	25°36.1′N;81°29.1′W	6.1	21.5	21.5		36.62	4.0	Sand, shell	"
502	1253	3-13-71	25°38.0′N;81°31.8′W	6.1	21.0	21.0		35.00	3.7	Sand	"
776	1253	8-19-71	25°37.9′N;81°22.5′W	3.2	29.0	29.0	36.62	35.54	1.3	Sand	"
777	1253	8-19-71	25°35.8′N;81°20.1′W	3.2	29.5	29.5	35.54	36.08	1.3	Mud, sand	"
778	1253	8-19-71	25°33.1′N;81°18.8′W	3.4	29.5	29.0	35.54	36.08	1.5	Mud, sand	"

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
779	1253	8-19-71	25°30.8'N;81°16.9'W	3.1	29.5	29.5	35.54	36.62	1.5	Shell, mud	NCD
780	1253	8-19-71	25°27.9'N;81°16.2'W	3.1	29.5	29.5	37.69	38.23	0.9	Rock	"
781	1253	8-19-71	25°25.1'N;81°15.6'W	3.1	30.0	29.5	37.69	37.69	1.2	Mud	"
782	1253	8-19-71	25°22.1'N;81°14.9'W	3.1	30.0	30.0	40.38	40.38	1.2	Mud, shell	"
783	1253	8-20-71	25°22.0'N;81°18.4'W	4.6	29.5	29.5	37.16	37.69	1.8	Rock	"
784	1253	8-20-71	25°24.9'N;81°19.4'W	4.9	29.5	29.5	37.69	38.77	1.8	Rock, mud, shell	"
785	1253	8-20-71	25°27.9'N;81°19.4'W	4.6	29.5	29.5	38.23	38.77	1.8	Mud, shell	"
786	1253	8-20-71	25°30.7'N;81°20.9'W	4.6	30.0	29.5	38.77	39.31	1.8	Mud	"
787	1253	8-20-71	25°33.6'N;81°21.5'W	4.6	30.0	30.0	38.23	40.92	1.7	Mud, rock	"
788	1253	8-20-71	25°35.9'N;81°23.7'W	4.6	30.5	30.0	38.23	38.77	1.5	Mud	"
789	1253	8-20-71	25°38.3'N;81°25.6'W	4.6	31.0	30.0	35.54	37.69	1.5		"
797	1253	8-22-71	25°37.4'N;81°40.0'W	7.6	30.0	29.0			2.3	Shell, sand	"
798	1253	8-22-71	25°34.8'N;81°38.3'W	7.6	30.0	29.0			2.1	Shell	"
799	1253	8-22-71	25°33.5'N;81°35.4'W	7.6	30.0	30.0			4.3	Rock, shell, sand	"
800	1253	8-22-71	25°31.6'N;81°32.7'W	7.6	30.0	29.5			3.1	Rock	"
801	1253	8-22-71	25°28.7'N;81°31.5'W	7.6	30.5	29.5			3.1	Rock	"
802	1253	8-22-71	25°25.8'N;81°32.0'W	7.6	30.0	30.0			3.1	Shell, rock	"
803	1253	8-22-71	25°24.3'N;81°29.0'W	7.6	30.0	30.0			3.1	Rock	"
815	1253	9- 3-71	25°37.4'N;81°44.6'W	9.2	30.5	30.5	35.54	35.54	6.4	Shell	"
816	1253	9- 3-71	25°34.5'N;81°44.6'W	9.2	30.5	30.0	36.62	36.62	3.7	Sand	"
817	1253	9- 3-71	25°31.3'N;81°39.8'W	9.2	30.5	30.5	36.62	38.77	4.9	Rock	"
818	1253	9- 3-71	25°28.3'N;81°37.2'W	9.2	31.0	31.0	35.54	35.54	5.5	Rock	"
819	1253	9- 3-71	25°26.5'N;81°37.3'W	9.2	30.0	30.0	35.00	35.00	3.7	Rock	"
820	1253	9- 3-71	25°23.5'N;81°36.4'W	9.2	30.0	29.5	35.54	35.54	4.9	Rock, shell	"
821	1253	9- 4-71	25°21.1'N;81°34.8'W	9.2	30.0	29.5	35.00	35.00	5.5	Sand	"
822	1253	9- 4-71	25°21.0'N;81°38.1'W	10.7	30.0	29.5	35.00	35.00	5.8	Sand	"
823	1253	9- 6-71	25°23.6'N;81°39.1'W	10.7	30.0	30.0	34.47	34.47	5.5	Coral rock	"
824	1253	9- 6-71	25°26.1'N;81°41.3'W	10.7	29.0	29.5	32.31	34.47	4.9	Sand	Box dredge
825	1253	9- 6-71	25°29.2'N;81°46.1'W	10.7	29.0	29.5	33.39	34.47	4.9	Sand	" "
826	1253	9- 6-71	25°32.0'N;81°48.2'W	10.7	29.5	30.0	33.39	34.47	5.2	Sand	" "
827	1253	9- 6-71	25°35.4'N;81°49.0'W	10.7	29.0	30.0	33.39	34.47	5.2	Sand	NCD
828	1253	9- 6-71	25°38.0'N;81°49.0'W	10.7	29.5	29.5	34.47	34.47	5.5	Rock, sand	"
831	1253	9- 6-71	25°38.2'N;81°51.5'W	12.2	29.0	30.0	33.39	34.47	9.2	Sand	Box dredge
832	1253	9- 6-71	25°35.2'N;81°51.2'W	12.2	29.5	30.0	33.39	34.47	8.5	Sand	" "
155V	1253	8-25-71	25°39.6'N;81°23.3'W	4.3	32.5	30.5	28.00	36.08	1.0	Mud, shell	R/V *Venus*
157V	1253	8-25-71	25°39.4'N;81°18.8'W	1.8	29.5	29.5	32.31	32.31	0.9	Sand	" "
158V	1253	9- 1-71	25°38.4'N;81°19.3'W	3.4	28.0	28.5	30.69	32.85	1.5	Shell, mud	" "

159V	1253	9- 1-71	25°38.0'N;81°20.3'W	4.0	29.0	29.0	33.39	33.93	1.5	Shell, mud	R/V *Venus*
160V	1253	9- 1-71	25°37.5'N;81°21.2'W	4.6	29.0	29.0	34.47	34.47	1.8	Shell, mud	” ”
161V	1253	9- 1-71	25°35.7'N;81°20.3'W	4.6	29.5	29.5	34.47	35.00	1.2	Shell, mud	” ”
162V	1253	9- 1-71	25°36.2'N;81°19.3'W	4.6	29.0	29.0	35.54	35.54	1.3	Shell, mud	” ”
163V	1253	9- 4-71	25°36.7'N;81°18.3'W	2.8	28.0	28.0	33.93	33.93	0.9	Shell, mud	” ”
164V	1253	9- 4-71	25°37.2'N;81°17.3'W	3.1	28.0	28.0	33.93	33.39	0.6	Shell, mud	” ”
165V	1253	9- 4-71	25°37.4'N;81°16.7'W	2.4	28.0	28.0	32.31	32.31	0.9	Shell, mud	” ”
166V	1253	9- 4-71	25°35.4'N;81°15.0'W	2.2	28.5	28.0	31.77	31.77	0.7	Shell, mud	” ”
167V	1253	9- 4-71	25°35.0'N;81°16.0'W	3.1	29.0	29.0	32.31	32.85	0.9	Mud, shell	” ”
168V	1253	9- 4-71	25°34.6'N;81°17.2'W	4.3	29.0	28.0	33.93	33.93	0.9	Shell, mud	” ”
169V	1253	9- 4-71	25°32.5'N;81°16.8'W	4.6	28.5	28.5	35.00	35.00	1.0	Shell, mud	” ”
170V	1253	9- 4-71	25°32.9'N;81°15.8'W	3.4	28.5	28.0	33.93	34.47	1.0	Shell, mud	” ”
171V	1253	9- 4-71	25°33.4'N;81°14.8'W	2.8	28.5	28.5	32.85	32.85	0.9	Shell, mud	” ”
172V	1253	9- 4-71	25°33.7'N;81°14.1'W	1.9	28.5	28.0	32.31	32.31	0.3	Shell, mud	” ”
173V	1253	9- 5-71	25°31.1'N;81°14.2'W	1.0	28.0	28.0	30.15	30.15	1.0	Shell, mud	” ”
174V	1253	9- 5-71	25°30.7'N;81°15.1'W	2.8	28.0	28.0	32.85	33.39	1.0	Shell, mud	” ”
175V	1253	9- 5-71	25°30.1'N;81°16.1'W	4.0	28.0	28.5	33.39	34.47	0.9	Shell, mud	” ”
176V	1253	9- 5-71	25°29.6'N;81°17.1'W	4.3	28.5	28.5	35.00	35.00	0.9	Shell, mud	” ”
177V	1253	9- 5-71	25°28.0'N;81°15.7'W	4.0	28.5	28.5	34.47	34.47	1.0	Shell, mud, rock	” ”
178V	1253	9- 5-71	25°28.5'N;81°14.7'W	3.7	28.5	28.5	33.39	33.39	1.2	Shell, mud	” ”
179V	1253	9- 5-71	25°28.9'N;81°13.7'W	2.8	28.5	28.5	31.77	32.31	1.2	Shell, mud	” ”
180V	1253	9- 5-71	25°29.5'N;81°12.7'W	1.8	29.0	29.0	30.69	30.69	1.5	Hard sand	” ”
181V	1253	9- 5-71	25°27.7'N;81°11.2'W	1.2	29.0	29.0	30.15	30.15	1.2	Sandy mud	” ”
182V	1253	9- 5-71	25°27.3'N;81°12.1'W	2.8	29.0	28.5	32.31	32.31	1.5	Shell, mud	” ”
183V	1253	9- 6-71	25°26.7'N;81°13.1'W	2.8	28.5	28.5	28.00	30.15	0.6	Mud, shell	” ”
184V	1253	9- 8-71	25°26.2'N;81°14.0'W	2.4	27.0	27.5	30.15	30.69	0.6	Mud, shell	” ”
185V	1253	9- 8-71	25°24.5'N;81°13.5'W	2.2	27.5	27.5	31.23	31.23	0.6	Mud, shell	” ”
186V	1253	9- 8-71	25°24.9'N;81°12.5'W	2.1	28.0	28.0	30.69	30.69	0.4	Mud, shell	” ”
187V	1253	9- 8-71	25°25.3'N;81°11.5'W	1.2	28.0	28.0	26.38	26.38	0.3	Mud, shell	” ”
188V	1253	9- 8-71	25°24.0'N;81°10.6'W	1.6	29.0	28.5	26.92	26.38	0.3	Mud, shell	” ”
189V	1253	9- 8-71	25°23.6'N;81°11.6'W	2.0	28.0	28.0	29.62	30.15	0.3	Mud, shell	” ”
190V	1253	9- 8-71	25°23.1'N;81°12.7'W	4.0	28.0	28.0	33.39	33.39	0.4	Shell, mud	” ”
191V	1253	9- 8-71	25°21.2'N;81°11.8'W	2.8	28.0	28.0	32.31	32.31	0.3	Shell	” ”
192V	1253	9- 8-71	25°21.6'N;81°10.8'W	2.8	28.0	28.0	31.23	30.15	0.3	Shell, mud	” ”
193V	1253	9- 8-71	25°22.2'N;81°09.7'W	2.1	28.0	28.0	29.08	29.08	0.3	Mud	” ”
194V	1253	9- 9-71	25°20.9'N;81°07.6'W	2.8	28.0	28.0	28.00	28.00	1.2	Mangrove detritus	” ”
195V	1253	9- 9-71	25°20.6'N;81°08.7'W	3.7	28.0	28.0	30.15	30.15	1.0	Hard shell	” ”
498	1251	3-13-71	24°40.3'N;81°48.7'W	6.1	22.0	22.0	36.62	36.62	4.3	Rock	Box dredge

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
AREA III											
617	1250	5-30-71	24°52.0'N;80°39.1'W	4.3	28.0	28.0	36.08	36.08	4.3	Rock, sand	Box dredge
618	1250	5-30-71	24°54.1'N;80°36.1'W	4.0	28.0	28.0		36.08	4.0	Rock	” ”
619	1250/1249	5-30-71	24°55.8'N;80°33.4'W	4.6	28.0	28.0		35.54	4.6	Rock	” ”
620	1249	5-30-71	24°58.9'N;80°29.8'W	4.0	28.5	28.0		37.69	4.0	Rock, sand	” ”
621	1249	5-30-71	25°05.0'N;80°23.6'W	4.0	28.5	28.0		37.69	4.0	White sand	” ”
622	1249	5-30-71	25°08.3'N;80°20.7'W	4.0	28.5	28.5		37.69	4.0	White mud	” ”
623	1249	5-30-71	25°13.2'N;80°17.8'W	3.1	28.5	28.5		37.69	3.1	White mud	” ”
624	1249	5-30-71	25°15.9'N;80°15.9'W	3.7	28.0	28.0		37.69	3.7	White mud	” ”
625	1249	5-30-71	25°18.2'N;80°14.8'W	5.2	27.5	27.0		36.62	5.2	White mud	” ”
626	1249	5-30-71	25°23.1'N;80°11.3'W	4.3	28.0	28.0		36.62	3.1	White mud	” ”
627	1249	5-31-71	25°26.5'N;80°10.0'W	4.9	27.0	27.0		35.00	4.9	Mud	” ”
628	1249	5-31-71	25°30.5'N;80°08.6'W	4.3	27.0	27.5		35.00	4.3	Sand, rock	” ”
629	1249	5-31-71	25°33.1'N;80°07.8'W	4.6	27.0	27.0		35.54	4.6	Sand	” ”
494	1248/1247	3- 9-71	26°56.5'N;80°03.8'W	6.1	22.0	22.5		37.69	5.5	Sand	” ”
495	1248/1247	3- 9-71	26°56.3'N;80°03.5'W	11.6-19.5	22.5	22.0		37.69	5.8	Sand, rock	” ”
496	1248	3- 9-71	26°47.0'N;80°01.7'W	6.1	22.5	23.0		36.62	5.5	Rock	” ”
497	1248	3- 9-71	26°46.2'N;80°01.5'W	13.7	22.5	23.0		36.62	4.9	Rock	” ”
630	1248	5-31-71	25°36.1'N;80°07.2'W	4.6	27.0	27.0		36.62	4.6	Sand	” ”
631	1248	5-31-71	25°37.4'N;80°07.4'W	4.9	27.0	27.0		36.08	4.9	Sand	” ”
632	1248	6- 8-71	26°40.7'N;80°01.7'W	4.6-7.3	25.0	24.5		36.08	6.8	Sand	NCD
633	1248	6- 8-71	26°40.5'N;80°01.8'W	7.6-10.1	26.0	24.0	36.08	36.62	10.1	Sand	”
634	1248	6- 8-71	26°40.7'N;80°01.5'W	11.5	26.5	25.0	36.08	35.54	10.7	Rock, sand	”
635	1248	6- 8-71	26°40.7'N;80°01.3'N	13.0	26.0	24.0	35.54	36.08	11.0	Rock, sand	”
636	1248	6- 8-71	26°40.5'N;80°01.1'W	13.7	26.5	24.0	36.62	36.08	10.7	Rock	Box dredge
637	1248	6- 8-71	26°36.0'N;80°02.0'W	4.6	26.5	26.5	36.08	36.62	4.6	Sand	NCD
638	1248	6- 8-71	26°36.0'N;80°01.9'W	7.6	26.5	26.5	37.69	37.69	7.6	Sand	”
639	1248	6- 8-71	26°36.0'N;80°01.8'W	7.6	26.0	26.0	36.08	36.08	7.6	Rock, sand	”
640	1248	6- 8-71	26°36.1'N;80°01.6'W	9.2-12.2	26.5	26.0	35.54	35.54	9.2	Rock	Box dredge
641	1248	6- 8-71	26°35.8'N;80°01.4'W	12.2-24.4	26.5	26.0		35.00	10.7	Rock	” ”
642	1248	6- 8-71	26°30.8'N;80°02.9'W	4.6-6.1	26.0	25.0	35.54	35.54	6.1	Hard sand	” ”
643	1248	6- 8-71	26°30.8'N;80°02.6'W	7.3	26.5	26.5	35.00	36.08	7.3	Sand	NCD
644	1248	6- 9-71	26°30.7'N;80°02.5'W	13.7-16.8	26.5	26.5	35.00	35.00	6.1	Sand	Box dredge

645	1248	6- 9-71	26°30.5'N;80°02.2'W	10.7	26.5	26.5	34.47	35.08	6.1	Sand	NCD
646	1248	6- 9-71	26°24.7'N;80°03.7'W	5.5	27.0	27.0	35.00	35.00	5.5	Sand	"
647	1248	6- 9-71	26°24.6'N;80°03.5'W	6.4	27.5	27.0	35.00	36.08	6.4	Sand	"
648	1248	6- 9-71	26°24.7'N;80°03.4'W	7.6-9.2	27.0	27.0	35.54	35.54	7.3	Sand	"
649	1248	6- 9-71	26°24.5'N;80°03.3'W	10.7-13.7	27.5	27.0	37.16	36.62	9.5	Sand	"
650	1248	6- 9-71	26°20.5'N;80°04.1'W	5.5	28.5	27.5	37.69	37.69	5.5	Sand	"
651	1248	6- 9-71	26°20.4'N;80°04.0'W	7.3-8.9	28.5	27.5	35.00	37.69	7.3	Rock	"
652	1248	6- 9-71	26°20.4'N;80°04.0'W	7.6	28.0	27.5	37.69	37.69	7.3	Rock, sand	"
653	1248	6- 9-71	26°20.4'N;80°03.9'W	10.4-11.9	28.0	27.0	35.00	37.69	7.3	Rock	"
654	1248	6- 9-71	26°20.5'N;80°03.7'W	12.2-13.7	28.5	27.5	37.69	36.62	8.5	Rock	"
655	1248	6- 9-71	26°15.9'N;80°04.6'W	5.5	28.5	28.0	37.69	37.69	5.5	Rock	"
656	1248	6- 9-71	26°15.9'N;80°04.5'W	6.1-7.6	28.5	28.0	35.54	35.54	3.7	Rock	"
657	1248	6-10-71	26°15.6'N;80°04.5'W	7.6-9.2	27.0	27.0	35.00	35.00	9.2	Sand	"
658	1248	6-10-71	26°15.9'N;80°04.3'W	10.7-13.7	27.0	27.0	34.47	35.00	9.2	Rock	Box dredge
659	1248	6-10-71	26°11.0'N;80°05.2'W	4.6-10.7	27.5	27.0	36.08	36.08	10.7	Rock	" "
660	1248	6-10-71	26°11.0'N;80°05.1'W	10.7-13.7	27.0	27.0	35.54	35.54	10.7	Rock, sand	" "
661	1248	6-11-71	26°47.1'N;80°01.6'W	6.1	26.5	26.5	37.16	37.16	5.5	Rock	" "
662	1248	6-11-71	26°46.9'N;80°01.5'W	7.6	27.0	26.5	37.16	37.16	6.1	Sand	" "
663	1248	6-11-71	26°46.9'N;80°01.4'W	9.2	26.5	26.0	36.08	36.08	9.2	Sand	NCD
664	1248	6-11-71	26°46.9'N;80°01.5'W	10.7	26.5	26.0	36.08	35.54	10.7	Sand	"
665	1248	6-11-71	26°46.9'N;80°01.2'W	12.2	27.0	26.0	37.16	36.08	11.0	Sand, rock	"
666	1248	6-11-71	26°47.3'N;80°01.1'W	13.7	26.5	26.0	35.54	35.54	10.7	Rock	"
667	1248	6-11-71	26°52.2'N;80°02.7'W	5.5	26.0	26.5	35.54	35.00	5.5	Sand	"
668	1248	6-11-71	26°52.3'N;80°02.8'W	7.3	26.5	26.0	36.62	35.54	7.3	Sand	"
669	1248	6-11-71	26°52.3'N;80°02.4'W	7.6	26.0	26.0	35.54	35.54	7.6	Sand	"
670	1248	6-11-71	26°52.3'N;80°02.4'W	9.8	26.5	26.0	35.00	34.47	9.8	Mud	"
671	1248	6-11-71	26°52.1'N;80°02.5'W	10.7	26.0	26.0	35.54	35.00	9.2	Mud	"
672	1248	6-11-71	26°52.4'N;80°02.2'W	12.2	26.5	26.5	35.54	34.47	9.2	Mud, rock	"
673	1248	6-11-71	26°52.2'N;80°02.1'W	13.7	26.0	26.0	35.54	35.00	9.2	Sand	"
674	1248	6-12-71	26°56.1'N;80°04.1'W	4.6	26.0	26.0	34.47	35.00	1.8	Sand	"
675	1248/1247	6-12-71	26°56.3'N;80°03.7'W	7.6	26.0	26.0	34.47	34.47	7.3	Mud	"
676	1248/1247	6-12-71	26°56.1'N;80°03.4'W	11.0	26.0	26.0	34.47	34.47	11.0	Mud	"
677	1248/1247	6-12-71	26°56.1'N;80°03.3'W	12.2	26.5	26.5	34.47	33.93	11.0	Mud	"
678	1248/1247	6-12-71	26°56.2'N;80°03.1'W	13.7	26.0	26.0	35.00	34.47	7.0	Mud	"

Station No.	U.S. C&GS Chart No.	Date	Location	Depth (m)	Temperature °C Sur.	Temperature °C Bot.	Salinity o/oo Sur.	Salinity o/oo Bot.	Secchi (m)	Substrate	Gear
AREA IV											
479	1247	3- 3-71	27°21.5'N;80°14.3'W	6.1	20.0	21.0		35.00	5.5	Sand	NCD
480	1247	3- 3-71	27°21.5'N;80°14.2'W	9.2	20.0	20.0		35.54	5.5	Mud, shell	"
481	1247	3- 3-71	27°21.7'N;80°12.3'W	6.1	20.5	20.0		36.62	6.1	Sand	"
482	1247	3- 3-71	27°21.7'N;80°12.2'W	7.3	20.0	20.5		36.62	5.5	Sand	"
483	1247	3- 3-71	27°22.1'N;80°11.2'W	13.7	22.0	21.0		37.69	5.5	Sand, shell	"
484	1247	3- 6-71	27°29.0'N;80°17.1'W	4.6	19.0	19.0		35.54	4.0	Rock	"
485	1247	3- 6-71	27°29.2'N;80°17.0'W	6.4	19.0	19.0		36.62	3.1	Sand	"
486	1247	3- 6-71	27°29.2'N;80°16.1'W	9.2	19.0	19.5		36.62	3.7	Sand, mud	"
487	1247	3- 6-71	27°29.3'N;80°13.4'W	13.7	19.0	19.5		36.62	3.7	Sand, rock	"
488	1247	3- 6-71	27°27.5'N;80°12.8'W	13.7	19.5	19.0		36.62	7.3	Rock	"
489	1247	3- 6-71	27°26.8'N;80°13.6'W	9.2	19.5	18.5		36.62	6.1	Shell	"
490	1247	3- 6-71	27°26.6'N;80°16.0'W	9.2	19.5	19.0		36.62	4.0	Sand	"
491	1247	3- 6-71	27°26.7'N;80°15.9'W	7.3	20.0	19.5		36.62	3.1	Rock, sand	"
492	1247	3- 9-71	27°10.3'N;80°08.9'W	6.1	21.5	21.5		36.62	3.7	Rock, sand	Box dredge
493	1247	3- 9-71	27°09.7'N;80°08.4'W	9.2	21.5	21.5		35.00	4.3	Rock	" "
679	1247	6-12-71	27°00.5'N;80°05.3'W	4.6	27.5	27.0	37.69	36.62	3.7	Mud	NCD
680	1247	6-12-71	27°00.7'N;80°05.2'W	6.1	27.0	27.0	34.47	34.47	4.6	Mud	"
681	1247	6-12-71	27°00.7'N;80°04.9'W	7.6	27.0	27.0	35.59	35.00	5.2	Mud	"
682	1247	6-12-71	27°00.7'N;80°04.8'W	9.2	27.0	27.0	36.08	34.47	5.5	Mud	"
683	1247	6-12-71	27°00.7'N;80°04.6'W	10.7	27.0	27.0	36.62	35.54	7.3	Sand, mud	"
684	1247	6-12-71	27°00.7'N;80°04.4'W	12.2	27.0	27.0	36.08	35.54	11.0	Sand, mud	"
685	1247	6-12-71	27°00.7'N;80°04.2'W	13.7	27.0	26.5	37.69	36.08	10.7	Sand, mud	"
686	1247	6-13-71	27°04.8'N;80°06.9'W	6.1	27.0	26.5	35.00	35.00	5.5	Rock, sand	Box dredge
687	1247	6-13-71	27°04.8'N;80°06.7'W	7.6	27.0	27.0	34.47	34.47	7.6	Mud, sand	NCD
688	1247	6-13-71	27°04.9'N;80°06.4'W	9.2	27.0	27.0	36.62	36.08	5.5	Sand	"
689	1247	6-13-71	27°05.1'N;80°06.1'W	10.7	27.0	27.0	36.08	35.54	9.2	Sand	"
690	1247	6-13-71	27°05.2'N;80°05.7'W	12.2	27.5	26.0	35.54	36.08	8.5	Sand	"
691	1247	6-13-71	27°05.2'N;80°04.7'W	13.7	27.5	26.0	35.54	35.00	6.1	Sand	"

APPENDIX II. *MACROCALLISTA NIMBOSA, MERCENARIA CAMPECHIENSIS,* AND *RANGIA CUNEATA* COLLECTED BY R/V *HERNAN CORTEZ* AND R/V *VENUS*

Species are listed by area, depth (SHALLOW = 0.9-4.6 m; MODERATE = 4.7-9.2 m; DEEP = 9.3-15.3 m), C&GS chart number (in brackets []; CH = Charlotte Harbor, TB = Tampa Bay), station number, and number of specimens (in italics). V following station number = R/V *Venus* collection (all others are R/V *Hernan Cortez* collections); e = volumetric estimate.

Macrocallista nimbosa

AREA I SHALLOW [1263] 327:*600*^{e}, 328:*46*; [1260] 272:*4*; [1258] 197:*28*, 211:*19*; [1257] 189:*4*, 209:*1*, 210:*19*, 229:*1*, 467:*2*; [TB] 384:*1*, 385:*5*, 1V:*1*, 3V:*9*, 4V:*1*, 11V:*2*, 16V:*7*, 20V:*2*, 31V:*1*, 32V:*1*, 33V:*2*, 34V:*1*, 37V:*5*, 38V:*9*; MODERATE [1263] 325: *750*^{e}, 326:*384*, 329:*46*, 330:*69*, 331:*22*; [1262] 303:*2*, 304:*20*, 309:*4*, 310:*1*, 311:*6*, 313:*14*, 314:*11*, 316:*1*, 318:*1*, 319:*1*, 321:*3*, 322:*2*; [1261] 247:*1*, 251:*1*, 257:*2*; [1260] 271:*3*, 273:*5*; [1259] 179:*8*, 180:*2*, 181:*6*, 183:*1*, 193:*3*, 195:*3*, 218:*9*, 239:*19*, 265:*13*, 266:*2*, 275:*15*, 276:*5*, 277:*43*, 278:*13*; [1258] 198:*57*, 201:*2*, 202:*1*, 203:*17*, 220:*2*; [1257] 190:*1*, 204:*1*, 206:*1*, 342:*3*, 370:*1*, 371:*2*, 374:*3*; [TB] 378:*2*, 379:*4*, 381:*15*, 382:*3*, 383:*2*, 386:*26*, 388:*1*, 389:*7*, 462:*4*; DEEP [1262] 320:*7*; [1260] 290:*1*.

AREA II SHALLOW [1256] 770:*1*; [CH] 708:*3*, 711:*2*, 712:*3*, 714:*2*, 718:*14*, 60V:*1*, 62V:*12*, 63V:*1*, 66V:*1*, 68V:*1*, 69V:*13*, 70V:*2*, 71V:*11*, 72V:*7*, 75V:*1*, 76V:*6*, 77V:*1*, 78V:*1*, 84V:*25*, 91V:*4*, 96V:*1*, 97V:*9*, 104V:*1*, 105V:*4*, 111V:*3*; [1255] 544:*1*, 724:*1*; [1254] 612:*1*, 774:*2*, 775:*3*, 808:*2*, 809:*3*, 130V:*2*, 132V:*6*, 134V:*1*, 136V:*2*, 137V:*1*, 138V:*1*, 142V:*1*, 143V:*1*, 144V:*2*, 145V:*1*, 146V:*1*, 147V:*2*, 148V:*13*, 150V:*10*; [1253] 789:*1*, 155V:*3*, 158V:*2*, 160V:*3*, 167V:*1*; MODERATE [1255] 729:*1*; [1254] 810:*1*; DEEP [1255] 526:*1*.

Mercenaria campechiensis

AREA I SHALLOW [1258] 197:*2*, 211:*1*; [1257] 208:*98*, 209:*8*, 228:*32*, 229:*7*, 237:*9*; [TB] 384:*2*, 385:*15*, 1V:*1*, 2V:*13*, 3V:*3*, 4V:*1*, 5V:*1*, 6V:*16*, 7V:*1*, 9V:*1*, 10V:*1*, 11V:*1*, 12V:*5*, 13V:*2*, 14V:*1*, 15V:*3*, 20V:*1*, 22V:*4*, 31V:*4*, 33V:*6*, 35V:*37*, 36V:*1*, 38V:*1*; MODERATE [1261] 299:*3*, 302:*1*; [1259] 181:*1*; [1258] 198:*1*, 201:*3*; [1257] 190:*18*, 206:*7*, 230:*4*, 351:*7*, 359:*2*, 369:*17*, 370:*1*, 373:*10*, 376:*6*, 410:*6*, 411:*1*, 460:*18*, 461:*1*; [TB] 377:*2*, 378:*1*, 379:*32*, 380:*9*, 383:*3*, 388:*50*, 389:*250*^{e}, 462:*155*; DEEP [1257] 232:*9*, 233:*1*, 235:*1*, 368:*1*.

AREA II SHALLOW [1256] 759:*4*, 760:*6*, 762:*31*, 766:*2*, 767:*4*, 768:*2*; [CH] 696:*2*, 698:*2*, 699:*1*, 702:*4*, 703:*3*, 704:*1*, 709:*4*, 710:*4*, 712:*5*, 716:*1*, 717:*2*, 720:*2*, 42V:*2*, 44V:*5*, 47V:*1*, 59V:*2*, 60V:*1*, 61V:*1*, 68V:*1*, 70V:*2*, 71V:*1*, 72V:*2*, 87V:*25*, 89V:*1*, 91V:*2*, 92V:*9*, 95V:*6*, 96V:*5*, 97V:*20*, 98V:*8*, 99V:*4*, 100V:*3*, 104V:*19*, 106V:*7*, 109V:*1*, 112V:*2*, 113V:*1*; [1255] 503:*2*, 536:*43*, 544:*12*, 548:*1*, 549:*7*, 554:*10*, 721:*1*, 725:*6*, 733:*31*, 757:*19*; [1254] 568:*3*, 573:*1*, 596:*5*, 771:*4*, 772:*2*, 790:*7*, 791:*10*, 793:*4*, 794:*4*, 795:*3*, 131V:*1*, 132V:*3*, 141V:*2*, 142V:*4*, 147V:*1*, 150V:*1*, 153V:*1*, 154V:*1*; [1253] 166V:*4*, 173V:*4*, 179V:*2*, 183V:*3*, 185V:*1*, 187V:*1*; MODERATE [1256] 413:*1*, 421:*3*, 422:*2*, 433:*1*, 434:*7*, 435:*5*, 439:*6*, 440:*4*, 442:*74*, 443:*6*, 444:*3*, 445:*19*, 447:*39*, 448:*26*, 449:*3*, 451:*3*, 453:*3*, 458:*38*, 463:*21*, 747:*7*, 764:*2*, 769:*2*; [CH] 706:*1*; [1255] 454:*6*, 505:*4*, 506:*2*, 529:*21*, 530:*14*, 532:*13*, 533:*3*, 537:*3*, 539:*38*, 542:*5*, 545:*70*, 546:*5*, 547:*4*, 550:*12*, 551:*3*, 555:*9*, 722:*1*, 726:*95*, 734:*41*, 755:*65*, 756:*8*; [1254] 564:*41*, 565:*6*, 566:*1*, 569:*2*, 583:*5*, 594:*34*, 602:*4*, 611:*2*, 813:*1*; DEEP [1256] 400:*5*, 403:*5*, 404:*1*, 406:*1*, 412:*4*, 424:*1*, 426:*7*, 428:*19*, 429:*10*, 751:*3*, 753:*3*, 754:*6*; [1255] 408:*13*, 409:*45*, 507:*1*, 522:*1*, 524:*1*, 527:*9*; [1254] 562:*4*, 577:*2*.

AREA IV MODERATE [1247] 480:*1*, 491:*1*, 688:*1*; DEEP [1247] 483:*2*, 489:*1*.

Rangia cuneata

AREA II SHALLOW [CH] 51V:*37*, 52V:*266*, 53V:*1500*^{e}, 54V:*4500*^{e}, 55V:*3500*^{e}, 56V:*1200*^{e}, 82V:*23*, 83V:*3320*^{e}