SURVEY OF MOLLUSKS IN SOUTHERN SARASOTA SAY, FLORIDA, EMPHASIZING EDIBLE SPECIES

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Preface

In April of 1986 the Mote Marine Laboratory was asked by the City of Sarasota to perform an inventory of shellfish resources of Sarasota Bay between the Manatee County Line and the Ringling Causeway. The survey was to be a rapid and qualitative mapping of molluscan shellfish only, because crustaceans counted among edible shellfish (shrimps and crabs) are seasonally abundant and highly mobile, characteristics not amenable to rapid survey techniques.

This report is organized into seven parts. Part I describes the bay, defines traditional shellfish, reports historical shellfish landings, and identifies potentially edible species. Part II summarizes the existing literature pertinent to shellfish and the bay. Part III presents and discusses the results of the survey, and considers all mollusks, all potentially edible ones, and the very common hard shell clam. Part IV is a summary. Part V is an annotated bibliography of the references summarized in Part II. The annotations include maps and tables which appeared in the original literature. The final parts contain figures, tables, and listings of all original data.

We believe such surveys are informative and necessary steps in the development of sound resource management programs and look forward to the time when Sarasota Bay's living resources are known more completely and their status monitored on a regular, meaningful basis.

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PART I
Introduction

Goal

The goal of this investigation was to inventory existing and potential shellfish areas in southern Sarasota Bay. Objectives included (a) equitable coverage of natural and political sections of the bay; (b) rapid generation of semi-quantitative data amenable to trend analysis; (c) evaluation of survey results in relation to historical information; and (d) recommendations for future study.

Description of the Study Area

Sarasota Bay is a large lagoon located on the southwest Florida coast south of Tampa Bay (Figure 1). The bay enters Anna Maria Sound at Cortez to the north and Little Sarasota Bay to the south. The bay is connected to the Gulf of Mexico by three tidal inlets, Longboat Pass (between Anna Maria Island and Longboat Key); New Pass (between Longboat Key and Lido Key); and Big Pass (between Lido Key and Siesta Key). Three streams enter the bay. Bowlees Creek is an urbanized waterway. Whitaker Bayou discharges stormwater and the City of Sarasota's sewage treatment plant (STP) effluent. Phillippi Creek, another urbanized waterway, enters the bay near its southern outlet. Other prominent landmarks include Stephens Point near the University of South Florida campus, Bird Key, City Island, Bishop Point on Longboat Key, Buttonwood Harbor behind the point, and channel markers of the inland waterway (Figure 2).

Environmental Characteristics

The bay is wide and shallow. Its widest part is 3.5 miles across and about half of its 22,000 acre expanse is shallower than 6 ft. Seagrasses fringe shorelines and undisturbed shorelines are vegetated by mangroves. Some shallow areas have large accumulations of drift algae. Most bottom areas are

comprised of unconsolidated quartz sediments but patches of oyster shell or other carbonaceous material exist in the bay.

Water quality generally is good, but conditions worsen near shore, especially along the eastern side of the bay. Salinities are usually higher than 30 o/oo, and variation is not great. For this reason the bay should be considered a lagoon rather than an estuary. Surface-to-bottom differences in temperature, salinity, and dissolved oxygen are minimal except near the mouths of tributaries.

Circulation in the bay is dominated by tides and wind. A line connecting Bishop Point to Bowlees Creek is considered to be the node or null zone between influences from Longboat Pass to the north and New and Big Passes to the south. The southern bay currents are dominated by Big Pass, perhaps due to the presence of a large flood-tidal delta just east of New Pass.

Common Shellfish of Florida

According to annual marine landing reports issued by the Florida Department of Natural Resources, shellfish have been defined in a broad sense to include certain sponges, mollusks, crustaceans, and turtles. Molluscan shellfish traditionally landed in Florida include conch (*Strombus gigas*), hard clams (*Mercenaria mercenaria* and *M. campechiensis*), sunrays (*Macrocallista nimbosa*), scallops (*Pecten irradians* and *P. gibbons*), oysters (*Crassostrea virginica*) and squid (*Doryteuthis plei*, *Lolliguncula brevis*, and *Loligo pealei*).

Common Shellfish of Sarasota Bay

Crustacean shellfish known to occur in the bay include blue crab (*Callinectes sapidus*), stone crab (*Menippe mercenaria*), and pink shrimp (*Penaeus setiferus*). Their distribution could not be made part of the present study due to seasonality, mobility and gear-related problems, but crab biology in the bay has been studied (Glinka, 1980). Traditional molluscan shellfish in Sarasota Bay have included hard clams, sunrays, oysters, scallops, and squid.

Historical Shellfish Landings

Except for one small report from Sarasota County in 1980, squid have not been landed in Sarasota or Manatee Counties since 1953 and therefore will not be considered further. Manatee County landings of shellfish also are very limited, because only 2 reports of small landings of oysters have been made between 1953-1981 (see annotated bibliography). Most landings of shellfish from the Sarasota Bay area have been made in Sarasota County, although there have been no commercial landings since 1971 (Figure 3).

Scallops, oysters and hard clams constituted the commercial shellfish resource of Sarasota County. Scallop landings were reported for 7 years and usually ranged between 100-800 pounds. Scallops were last landed in Sarasota County in 1964. Oysters represented the next largest landing, with annual reports of 210-27,639 pounds over a 15 year period which ended in 1967. The largest commercial shellfish resource landed in Sarasota County has been the hard clam. Landings over a 19 year period (1953-1971) ranged from 2,100-95,814 pounds and averaged nearly 16,000 pounds per year.

Other Edible Shellfish in Sarasota Bay

Recreational harvest of mollusks from Sarasota Bay is widespread but very poorly documented. Species collected for consumption probably include several snails and clams not mentioned in traditional landing reports. Raymond (1973), for example, gives recipes for surf clams, coquinas, and pen shells. Gibbons (1964) described the collection and preparation of seventeen species of mollusks, and discussions with local biologists resulted in still other shellfish candidates for recreational harvest and consumption.

Since the goal of this study is to describe the qualitative distribution of molluscan shellfish in Sarasota Bay, we have expanded the traditional definition to include several other species. Our list (see Table 2) is based entirely on earlier reports and personal communications, and must be used only as a guide to the potential shellfish resources of the bay. No recommendations for harvest or consumption of any listed species are intended,

and any species could be a health hazard if collected from particular areas or at certain times, or prepared in the wrong manner.

Acknowledgments

We appreciate help from Sue Hofmann and Jay Sprinkel during field work, and from Jay Sprinkel, Jay Gorzelany and Jim Culter during sample processing. Greg Blanchard assisted with landing reports and Laurie Fraser processed the text. Hal Pelta edited preliminary drafts.

PART II
Literature Review

Introduction

This section summarizes the findings of several reports relevant to the present study. Additional information on each appears in Part V: Annotated Bibliography.

Previous Mollusk Inventories in the Region

The most extensive survey of mollusks conducted in the area was made in 1970-1971 by the Florida Department of Natural Resources (Godcharles and Jaap, 1973a and 1973b). Stations along the entire Florida west coast were sampled by dredges. Use of this gear prevented the survey from entering Sarasota Bay, so their findings are of secondary usefulness. They reported three dozen mollusk species, which is a relatively small number due to the large mesh size of the dredge screens.

Previous Mollusk Inventories in Sarasota Bay

Woodburn (1960) is the earliest report on mollusks from the bay in this collection. The report was one of a series on marine life along the west coast and concerned waters of Sarasota County. Woodburn recommended Buttonwood Harbor as a potentially good site for hard clam cultivation because of favorable environmental conditions. He also noted clam predators, including crown conchs, Florida horse conchs, and banded tulips.

Later in that decade, the Arvida Corporation proposed to develop a large tract of mangroves and shallow waters along the bayshore of Longboat Key, and hired Southern Fish Culturists, Inc. to evaluate the ecological impact of the project. DeQuine (1969) found that mollusk biomass was higher in turtlegrass than in other bottom types of the bay and that shellfish losses due to destruction of natural areas would be offset by new oyster growth on seawalls. DeQuine's report includes an appendix listing mollusks in the bay,

but the appendix was missing from the copy available for inspection.

The first published checklist of invertebrates in Sarasota Bay listed 136 species, of which 80 (54%) were mollusks (Tiffany, 1974). Bucket dredge samples were analyzed to reveal lower species diversity at the Bowlees Creek STP effluent site than at the Whitaker Bayou STP site. Whale Key was the "healthiest" station sampled. The area around Marina Jacks was the 'most unhealthy" site sampled. Tiffany suggested two mollusk species as potential indicators of poor water quality and another species as a clean water species.

In 1976 the U.S. Army Corps of Engineers published a draft Environmental Impact Statement for deepening of the inland waterway through Sarasota Bay. The report includes very lengthy species lists for the whole southwest Florida coast and states that 'waters of the Sarasota Bay system are among the richest on the Florida west coast in terms of invertebrate variety and abundance".

Sewage Impacts on Local Fauna

The first local investigation of sewage impacts on bottom fauna was conducted as a senior thesis project by a New College student (Conner, 1974). Conner compared the polychaetes and mollusks in a "clean area" near Whale Key to an area near the Bowlees Creek STP effluent (a low volume secondary treatment outfall of 0.75 mgd). The percentage of carnivores and scavengers was found to be negatively correlated with distance from the effluent. Conner reported lower densities and species numbers of mollusks in the disturbed area and found no evidence of an enrichment zone.

Enrichment zones are not unusual around point sources of dissolved and particulate nutrients. Dauer and Conner (1976, 1980) documented increased densities, species numbers and biomass of polychaetes around STP effluents in Tampa Bay, especially where sediments were coarse. Indirect evidence for an enrichment zone around the mouth of Whitaker Bayou was presented by Tiffany (1974), Glinka (1980), and Mahadevan et al. (1981). The latter study employed a small number of samples but concluded that the bayou fauna was notably different than bay fauna. Mahadevan et al. also opined that increased

discharge would affect turbidity, plankton, seagrasses, and fish more than the benthic fauna.

Other Sewage Impacts Relevant to this Study

Two other reports bear on the distribution of shellfish in Sarasota Bay. Sauers and Patten (1981) documented a 28.8% decline in seagrass beds in the southern bay area, with up to 100% loss occurring close to the bayou. Since DeQuine (1969) reported that seagrass beds contained the largest shellfish biomass of several bay bottom types, reductions in grassbed area have probably led to declines in shellfish abundance.

Sediment contamination by the sewage tracer coprostanol has been documented by Pierce and Brown (1984). Coprostanol is not directly toxic but does reflect the long term dispersion of particulates (and presumably other sewage constituents). Pierce and Brown reported very high coprostanol concentrations in Whitaker Bayou and a 15.4 km^2 area of the bay centered at the bayou mouth where the tracer was detectable. They also reported a northward drift of coprostanol along the bay's eastern shoreline toward Stevens Point.

Recent Management Decisions

In 1986 the Florida Department of Environmental Regulation recommended to the Environmental Regulation Commission (ERC) that Sarasota Bay be designated as Outstanding Florida Water (OFW), because it is a "thriving estuarine system" and "many shellfish and finfish species rely upon the assets of these bay waters for survival". Designation of the Bay as OFW means that more stringent criteria will be used in issuing state and regional permits. The ERC adopted the recommendation but exempted an area of the bay 1,500 ft in radius from the mouth of Whitaker Bayou.

PART III
Sarasota Bay Shellfish Survey

INTRODUCTION

Sampling Dates and Conditions

All field work was completed during the period April 19 - May 5, 1986. Rainfall during weeks prior to this period was negligible, so waters of the bay were clear. Morning visibility along the west side of the bay was very good, and the bottom could be seen in 10-15 ft of water. Afternoon winds decreased visibility, and water clarity east of the inland waterway was usually poor.

METHODS

Position was determined using LORAN-C and a map of LORAN lines developed by Mote Marine Laboratory for Sarasota Bay. Positions also were determined by taking bearings on prominent landmarks.

Depth was determined with an electronic depthfinder and recorded to the nearest tenth of a foot. Conductivity, salinity, and temperature were measured at the surface and near the bottom with a Beckman SCT meter. Dissolved oxygen was measured at the surface and bottom with a YSI Model 57 dissolved oxygen meter.

Three methods were used to collect mollusks at each station. A diver using SCUBA gear swam in circles around the anchor collecting visible shells, looking for burrows and siphons, and making shallow holes in the bottom in search of mollusks. The diver reported observations to the boat crew and returned specimens which required further identification.

Samples were taken two ways. Three throws of a Petite Ponar grab were pooled on a 2mm sieve and placed in double-labelled plastic bags for return to

the Laboratory. In addition, a bucket dredge was towed behind the boat until full, and its contents were washed on a 10mm sieve and bagged for later inspection. Live specimens of common species were noted in the logbook and returned to the water.

In the Laboratory, bags were emptied one at a time and shells were sorted as live or dead, and to species. Identifications were made using standard literature and the MML Reference Collection.

RESULTS

Stations

A total of 93 stations was sampled in the area from New Pass to Whitaker Bayou and from Big Pass to Manatee County. A few stations were sampled in Manatee County for completeness (Figure 4). Station locations are listed in the Appendix.

Depths

Station depths ranged from the intertidal zone to 15.9 ft. Mean depth for all subtidal stations was 8.0 ft, and 10 stations were intertidal.

Types of Stations

Parts of the study area may be divided into Class 2 and Class 3 waters of the state (Ch 17-3, FAC), and into waters of Longboat Key, the City of Sarasota, or Sarasota or Manatee Counties. In addition, waters may be unclassified, conditionally approved for shellfish harvest, or prohibited (Figure 5).

The distribution of stations is shown in Table 1. More stations were located in the city of Sarasota (55%) than elsewhere, but balance was good between Class 2 and Class 3 waters (54% and 46%, respectively). Most stations were closed to shellfishing (83%).

Physical Factors

Salinity ranged from 25.4 o/oo to 35.6 o/oo throughout the study. The water column was well mixed, with the greatest surface to bottom difference being 8.7 o/oo in Whitaker Bayou. Temperatures were uniform, ranging from 21.5°C to 28.4°C. Bottom dissolved oxygen values ranged from 3.7 mg/l to 13.4 mg/l, with lowest values occurring in the early morning. No bottom dissolved oxygen values were seen which posed a hazard to bottom-dwelling fauna.

Bottom Types

Sediments were categorized as silt, mud, sand, shell, or combinations thereof. The most common bottom type was muddy sand (68%), followed by silty sand (14%), shelly sand (5%), silty mud (4%), sand (3%), and oyster reef (10%). Nine sites (10%) were vegetated by seagrasses, principally Thalassia testudinum and Halodule wrightii.

Mollusks of Sarasota Bay

A total of 196 species of mollusks has been reported from Sarasota Bay or adjacent waters (Table 2). The list has been edited for synonyms but reflects the identifications of several authors. The total number of species from the bay and nearby waters is most probably between 200 and 250.

Species Collected in this Study

Ninety-eight mollusks were recorded, which happens to be one-half of the total number of species known for the area. The twenty most common species (i.e., those occurring at the most stations) are listed in Table 3. The southern quahog (known also as the hard shell clam), Mercenaria campechiensis, was the most common species encountered in the survey.

Distribution of Total Species

On the average, each species occurred in the bay at 6 stations out of 93 stations (i.e., 7%). No strong patterns were evident in the distribution

of species across governments or water-use classifications (Table 4). The largest area with adjacent stations containing 10 or more species crossed the bay south of New Pass, from Pansy Bayou to Indian Beach (Figure 6).

Edible Species

Thirty-four species of mollusks reported from the bay, or likely to occur in it, are considered edible (although any may be unfit for consumption at particular times or places). Seventeen of the potentially edible species have been reported from Sarasota Bay (Table 2). Additional species not reported from the bay so far but which are likely to occur include *Aequipecten gibbus*, *Barnea truncata*, *Busycon caniculatum*, *Cryptopleura costata*, *Littorina irrorata*, *Lolliguncula brevis*, *Macrocallista maculata*, *Modiolus demissus*, *Ostrea frons*, *Pecten ziczac*, *Rangea cuneata*, *Strombus alatus*, *Strombus raninus*, *Strombus pugilis*, and *Turbo castanea*.

Relative Abundance of Edible Species

The most common edible mollusk in the study area was the hard clam, *Mercenaria campechiensis*. Dead specimens were found at 37 stations; live ones were found at 23 others. A total of 60 stations produced live or dead hard clams, or 65% of all stations. Other less common species included, in decreasing order of abundance, *Chione cancellata*, *Macrocallista nimbosa*, *Dinocardium robusturn*, and *Crassostrea virginica* (Table 5).

Distribution of Mercenaria campechiensis

Hard clams were found at numerous sites north of the Ringling Causeway (Figure 7). Recently dead shells outnumbered living ones, and live and dead shells were found together at about 10% of the stations. Half (50%) of all stations in Class 2 waters had hard clams, and 52% of stations in Class 3 water had clams (Table 6). Waters of Sarasota County were relatively more productive than Manatee County or Longboat Key waters. Waters in the city of Sarasota were least productive. One-half of all stations in waters

conditionally approved for shellfish harvest had hard clams, whereas 59% of stations in prohibited water had hard clams.

Distribution of Other Common Edible Mollusks

The next most common edible mollusks were Chione cancellata, Macrocallista nimbosa, Dinocardium robustum and Crassostrea virginica. Chione appeared at 30% of all stations, but none of the others was found at more than 15% of the stations. Distribution of the four species is mapped in Figures 8 through 11. Chione and Dinocardium were found in deeper water than Macrocallista, and live Crassostrea was found only at intertidal stations. Dinocardium occurred along shorelines less frequently than the other common edible shellfish.

Overall Distribution of Edible Mollusks

Live and recently dead shells of the five most common edible mollusks were found at many (66, or 71%) stations in the study area. Evidence of shellfish was lacking in an area between Bird Key and Marina Jack; around the flood-tide delta east of New Pass; and in an area south of Bishop Point on Longboat Key (Figure 12).

Station Location Related to Whitaker Bayou

Influences of Whitaker Bayou on bay shellfish were evaluated by tabulating species as a function of distance from the Bayou and also in relation to documented levels of the sewage indicator, coprostanol (Pierce and Brown, 1984). Distance from the bayou was described as tiers (arcs of increasing radius) which intersected seven different transects and accounted for 61% of all stations (Figure 13). About 56% of all stations occurred in areas where coprostanol concentrations were below detection limits of 10 ng/g dry sediment (Figure 14). The remaining stations were located where coprostanol values ranged from 10 to 2,500 ng/g. Areas of the bay with coprostanol from sources other than Whitaker Bayou were considered in the

analysis.

Effect of Distance on Species Richness

Most tiers in the bay had an average of 4 to 8 species per station (Table 7). Tier 1 had a very low station richness value (1.3 species ± 2.3), indicating an adverse influence of the bayou. Tier 2, the closest station array to the bayou, had an above-average richness value of 12 species per station (t 5.4). Tier 2 had the largest number of unique species and tier 1 had the smallest number, suggesting a "halo effect" of the bayou on the nearby bay.

Effect of Coprostanol on Species Richness

There was no difference in the mean number of species per station in areas affected by coprostanol and areas not affected by the sewage tracer (Table 7).

Effect of Distance on Mercenaria Distribution

No live or dead hard clams were found in Whitaker Bayou or the one station in the bay nearest the bayou (Table 8). Tier 2 near the bayou contained hard clams at 5 or 6 stations (83%) due to the occurrence of young clams. The remainder of the tiers had 43-57% occurrence of hard clams with no pattern related to distance from Whitaker Bayou.

Effect of Coprostanol on Mercenaria Distribution

The number of live clams alone or together with dead shells determined the outcome of this comparison (Table 8), in which stations not affected by coporstanol had more clams than stations affected by the sewage tracer (56% vs. 46%, respectively).

Distribution of Other Water Quality Indicator Species

Tiffany (1974) identified Macoma tenta and Melongena corona as

potential indicators of "poor" water quality, and Noetia ponderosa as a possible sign of "clean" conditions. Melongena was considered an indicator if it occurred in large numbers in the absence of other species, a condition not seen in this survey. Macoma tenta was not collected, and its congener M. constricta was collected at only one station. Noetia occurred at one station only.

DISCUSSION

Sampling

Methods used in this study allowed for a rapid, economical survey of a large area. The bucket dredge yielded fewer specimens than the Ponar grabs or direct observation and its use could be eliminated or replaced with a small scale clam dredge. The point-station method does not work well for intertidal areas, and subsequent studies would benefit by longshore or downshore transects. Where possible, sampling should be repeated to assess seasonal patterns of shellfish abundance. Finally, use of dead shells should be planned on a species-specific basis, and only for areas where transport is unlikely.

Diversity and Distribution

This collection effort resulted in 98 species, or half of the known mollusk fauna of the bay. It is the most diverse collection resulting from a single study to date, but probably would be richer if more grassbeds and intertidal areas could have been sampled. As expected, the dispersion of common species was not so great when based only on live specimens as when dead shells were used, as well.

Effects of Whitaker Bayou

Whitaker Bayou had fewer mollusk species than other parts of the bay, and no specimens of the most common species and dominant edible species,

Mercenaria campechiensis. An area of Sarasota Bay near the mouth of the bayou had an above average number of species and stations with hard clams, which we interpret as evidence for enrichment from the bayou. Areas free of the sewage tracer coprostanol had about 20% more stations with clams than did areas where the tracer could be detected, but the significance of this finding will remain unclear until more is known of the tracer's relationship to sediments and water quality.

CONCLUSION

Hard clams are present at many stations throughout the study area including waters which are closed by testing or because the waters are unclassified. Scallops and oysters are too rare in the area to support a commercial fishery but hard clams may be capable of managed harvest. Quantitative distribution data and life history information on hard clams should be a research priority in the bay, especially if new areas can be opened to shellfishing. The bay supports a diversity of other mollusks which are or could be of recreational importance where water quality allows their harvest.

PART IV
Summary

1. A literature review and field collections were made to assess the historical and present distribution of shellfish. This survey was restricted to mollusks in Sarasota Bay south of Manatee County.
2. Most traditional shellfish species occur or have occurred in the bay. Scallops have not been landed in the county since 1964 and reports of their presence since then have been rare.
3 Oysters were landed in the county until 1967. Hard clams, the largest shellfish resource of the bay, were landed for 19 years of record at an annual rate of nearly 16,000 pounds. Hard clam landings ended in 1971.
4 A variety of non-traditional molluscan shellfish occur in the bay and may be harvested for recreational consumption. A total of 34 species are likely to occur in the bay and surrounding inshore waters.
5 Ninety eight species of mollusks were collected or observed at 93 stations in the southern bay. The listed species represent one half of all mollusk species reported from the bay.
6. Each species occurred at 6 stations, on the average. Above-average species richness was found in an area across the bay, from Pansy Bayou to Indian Beach.
7. Five species were considered both common and edible, or potentially so. The most common of these was the hard clam, followed by the cross-barred venus, sunray venus, cockles, and oysters.
8. A total of 60 stations produced live or dead hard clams. Clam stations were equally common in Class II and Class III waters. Sarasota County and City of Sarasota waters were the most and least productive clam areas, respectively.
9. The cross-barred Venus and cockles occurred in deeper water than sunray venus clams, and oysters were primarily intertidal. For the 5 most common edible species, live or dead specimens were found at 71% of all stations.

10. Poor water quality in Whitaker Bayou was responsible for very low species diversity and the total absence of hard clams. The bayou apparently enriches bay bottoms near its mouth, resulting in a "halo" effect for some parameters.
11. Rapid survey techniques were found to be economical and informative but could be improved by replacement of bucket dredges with small-scale clam dredges. Oyster inventories should be made by transect methods rather than by the point-station approach.

PART V
Annotated Bibliography

This section contains annotated references for eighteen papers and books dealing with shellfish, mollusks, Sarasota Bay, Whitaker Bayou, and effects of sewage treatment plant effluents. Findings of the individual reports have been summarized in Part II: Literature Review.

Each citation is described in a uniform manner, and includes subject,, geographic area, date of sampling, gear, species reported, and relation of the report to this study. References listed in this section may be found at the Mote Marine Laboratory, in either the library or with Dr. Estevez, or in the library of the New College, USF in Sarasota.

Reference: Conner, E.F. 1974. Effects of a domestic sewage outfall on the distribution and abundance of marine benthic Polychaeta and mollusca, with comments on continua and community structure. Senior Thesis, New College USF, Sarasota, Florida.

Subject: Sewage impacts on mollusks.

Geographic Area: Northern Sarasota Bay.

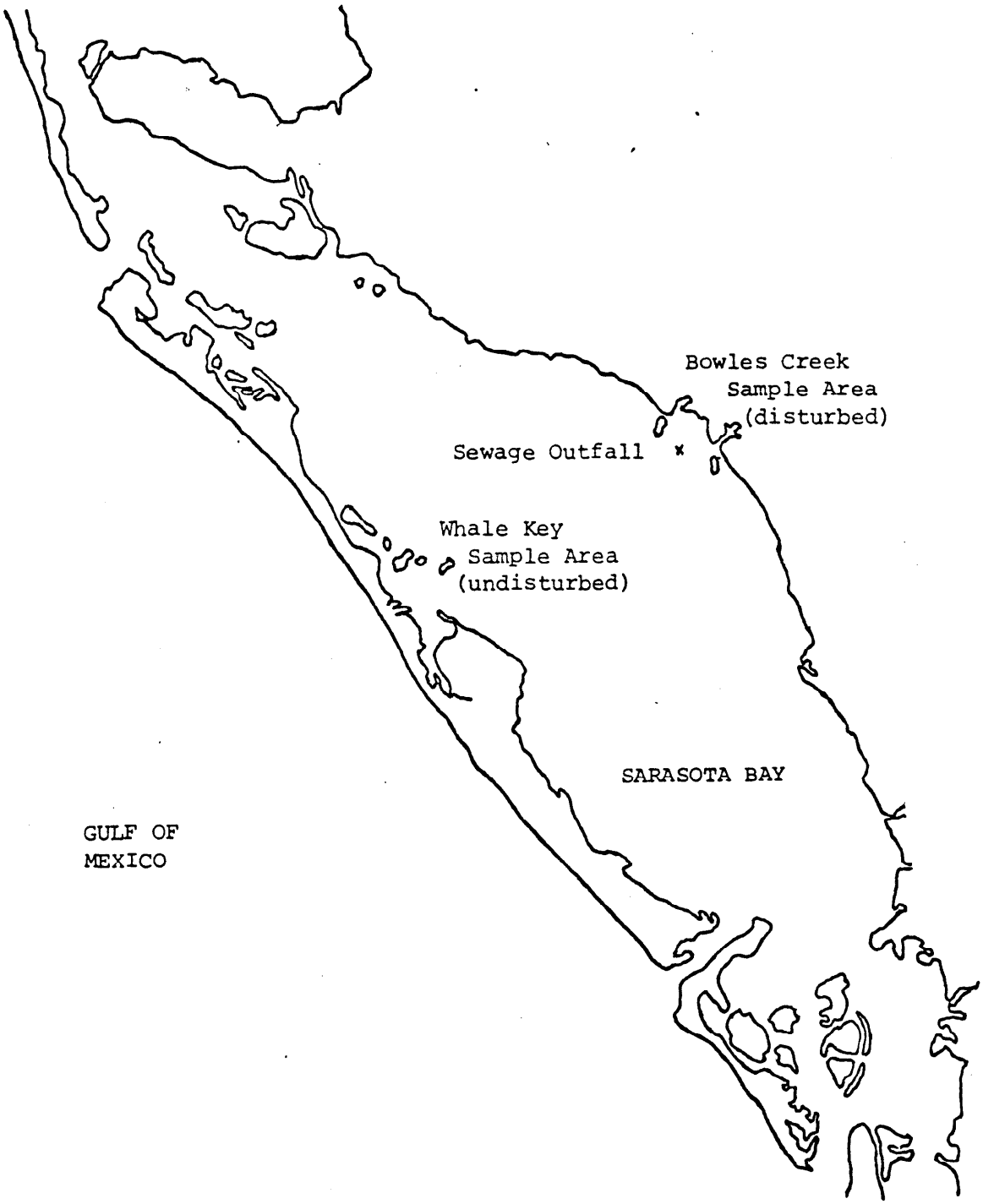
Sampling Date: January and February 1974.

Gear: Hand driven PVC plugs.

Species Reported: 83 species of gastropods and bivalves (see attached list).

Relation to This Study: A low discharge STP near Bowlees Creek was compared to Whale Key. Percentage of carnivores and scavengers was negatively correlated with distance from the outfall, across the bay. For the area nearest the outfall, feeding patterns changed in relation to distance, as did the similarity between dead shells bearing periostracum, and live shells. Community similarity was average (0.50 - 0.69 in a range from zero to 1.0). Results were affected by small sample size and sampling only once. Density and species richness of mollusks were lower in the distributed area. There was no evidence of an enrichment zone. Distribution of mollusk shells had no predictive value in relation to live mollusks.

Attachment: Map of stations and list of mollusks by station.


Bowles Creek
Sample Area
(disturbed)
Sewage Outfall
Whale Key
Sample Area
(undisturbed)
SARASOTA BAY
GULF OF
MEXICO

	Station Codes											
	A_1	B_1	A_2	B_2	A_3	B_3	C_1	D_1	C_2	D_2	C_3	D_3
CLASS PELECYPODA												
Nucula proxima						X						
Anadara ovalis												X
Anadara transversa	X	X	X	P	P	P	P	X	P	X	X	P
Brachidontes exustus	P	P	P	P	P	P	P	P	P	P	P	P
Amygdalum pupyria												P
Musculus lateralis						X						
Aequipecten gibbus		X			X						X	P
Ostrea equestris	P	P	P	P	P	P	P	P	P	P	P	P
Ostrea frons					P							
Crassostrea virginica	P	X	P	P	P		X	P			P	X
Anomia simplex	P	P	P	P	P	P	P	P	P	P	P	P
Pseudocyrena sp.		X										
Cardita floridana	P	P	P	P	X	P	P	P	P	P	X	P
Lucina floridana				X					X	P		P
Lucina multilineata	P	X	P	X	P	X	X	P	X	X	P	X
Lucina nassula	X	P	P	P	P	X	P					X
Aliqena sp.		P	X	X	X	P		X			X	P
Erycina sp.			X	X	X							X
Trachycardium muricatum						X				X		X
Laevicardium pictum	P	P	P	P	P	P	P	P	P	P	X	P
Mercenaria campechiensis	X		X		P		P	P	P	P	P	P
Chione cancellata	P	P	P	P	X	P	P	P	P	P	X	P
Chione grus		P										
Anomalocardia cuneimeris	P	P	X	X		X	P	P	P	X	P	P
Cyclinella tenuis							X					
Transennella cubaniana				P	X	X	X		X			
Pitar simpsoni	P	P	X	P	X	P	X	P	P	X	X	X
												P

Table 3

Mollusc Shell Species Distribution

(Blanks Imply Species Not Present)

P - shell species present with periostracum persistent

X - shell species present without periostracum

	Station Codes											
	A_1	B_1	A_2	B_2	A_3	B_3	C_1	D_1	C_2	D_2	C_3	D_3
CLASS PELECYPODA (Cont.)												
Pitar fulminata		P		X	X				P			
Macrocallista nimbosa								X	X		P	
Parastarte triquetra	P	P	X	P	X	X	P	P	P	P	P	P
Mactra fragilis		X	X	X			P	P	X			
Mulinia lateralis	X	X	X	X	X	X	P	P	X	X	X	X
Tellina lineata		X		X	P	X	P	P	P	P	P	P
Tellina tampaensis			X					P	P			
Tellina texana	P	P	X		X	X		X				
Tellina versicolor	X	X	P	X	P	X	P					
Macoma brevifrons			X	X		X						
Macoma tenta		P			X	X	P	P	P	X		P
Taqelus divisus		X	X	X	X	X	P	P			X	
Semele proficua	P		P									
Cumingia tellinoides	P	P	P	P	P	P	P	P	P	P	P	P
Abra aequalis	P	X	P		X				X	X		
Ensis minor	P	X							P	X		
CLASS GASTROPODA												
Rissoinia catesbyana	P	X					P			P	X	
Turritella exoleta			P				X					
Vermicularia fargoi							X		X			
Modulus carchedonius										X		
Modulus modulus	X	X		X	X	X		X	X		X	P
Batillaria minima	P	X		X	P	P	X		P	X	X	
Cerithium muscarum	P	X	P	X	X	X	X	X	P		X	
Bittium varium	P	P	P	P	P	P	P	P	P	P	P	P
Crepidula aculeata			X			P						
Crepidula fornicata	P	P	P	P	P	P	P	X	P	X	X	X
Crepidula maculosa	P	P	P	P	P	P	P	P	P	P	P	P
Crepidula plana	P	P	X	P	P	P	P	P	P	X	P	X

Table 3 (Con't)

	Station Codes											
	A_1	B_1	B_2	A_3	B_3	C_1	D_1	C_2	D_2	C_3	D_3
CLASS GASTROPODA (Cont.)											
Natica pusilla							P				
Eupleura caudata					X						
Anachis avara		X	X		X	X	X	X	X	X	X	X
Mitrella lunata	P	X	P	X	X	X	X	P	P	P	P	X
Nassarius vibex	P	X	P	P	X	X	P	X	P	P	P	X
Cantharus tinctus	X		X	P		X	X	X	X	X		X
Olivella blanesi	X	P	P	X	P	P	X	P	X	X	X	X
Olivella pusilla	P			P	P	X				X	P	X
Marginella aureocincta	P	P	P		P	P			X			X
Bullata ovuliformis	P	P	P	P	P	P	P	P	P	P	P	P
Prunum apicum	P	P	P	P	P	P	P	P	P		P	P
Prunum guttatum						P						
Persicula lavelleeana	X						P	P	P	P	P	P
Hyalina avenacea	P	P					X	P			X	
Hyalina pallida	P							P		X		
Conus floridanus	P				X							
Terebra protexta	X					X					X	
Crassispira mesoleuca	X		X			P						
Pyramidella crenulata	P	P	X	X	P	X		X	P	X		
Turbonilla conradi	P	P	P	P	P	P	P	P	P	X	P	X
Turbonilla portoricana						X	X		X	X	X	X
Odostomia gibbosa	X				X		X		X			X
Odostomia impressa	X				P		P		P	P	P	P
Acteon punctostriatus	X	P	X				P	X				
Bulla occidentalis	X											
Bulla striata	X	X	P		X		X	P	P		X	
Haminoea succinea	P						X					
Retusa canaliculata	X	P	X	X	P	X	X	P	P	P	X	X
CLASS AMPHINEURANA												
Ischnochiton papillosus									X			

Table 3 (Con't)

Reference: Dauer, D.M. and W.G. Conner. 1976. Organic enrichment effects upon benthic polychaete populations. V.J. Science 27(2):43.

Subject: Effects of sewage on benthic worms.

Geographic Area: Tampa Bay.

Sampling Date: August 1974 - July 1975.

Gear: Cores.

Species Reported: Polychaetes (annelids).

Relation to This Study: Species number and density of worms at a site affected by sewage treatment plant effluent were significantly higher than at a control site. Anaerobic conditions caused by algal blooms reduced species number and density, but at other times the two sites were similar. Where oxygen was not limiting, the enrichment boosted faunal diversity and density among worms.

Attachment: None

Reference: Dauer, D.M. and W.G. Conner. 1980. Effects of moderate sewage input on benthic polychaete populations. Estuar. Coast. Mar. Sci. 10(3)335-346.

Subject: Effects of sewage on benthic worms.

Geographic Area: Tampa Bay *

Sampling Date: September 1974-August 1975

Gear: Cores

Species Reported: Polychaetes (annelids)

Relation to This Study: This study expands findings of Dauer and Conner (1976) to include biomass values, which were greater in areas affected by sewage treatment plant effluent than at a control area. They also demonstrate species-specific responses to the enrichment. Nutrient enrichment enhances benthic productivity more in coarser, sandy sediment than in finer, silty sediment.

Attachment: None

Reference: DeQuine, J.F. 1969. Ecological studies in Sarasota Bay, Florida August 1968-February 1969, with special reference to Arvida Corporation submerged lands on Longboat Key. Southern Fish Culturists, Inc., Leesburg, Florida.

Subject: Water quality and biology of Sarasota Bay in relation to a proposed development.

Geographic Area: Sarasota Bay near Longboat Key, with other stations.

Sampling Date: August 1968-February 1969

Gear: Emery dredge, shovel.

Species Reported: An appendix listing mollusk species from the bay is mentioned in the report but did not accompany the copy available for inspection.

Relation to this Study: Faunal biomass of vegetated areas was greater than unvegetated areas. Turtlegrass beds had higher biomass values than shoalgrass or manatee grass areas. Mollusk biomass was much higher in turtlegrass (645 pounds per acre) than any other bottom type in the bay.

Attachment: Table 2 of Dry Weight Biomass Data.

Table 2. Dry weight of major groups of biomass estimated on and adjacent to Arvida Corporation submerged lands, Longboat Key, Sarasota Bay, Florida in pounds per acre and per zone, August 1968-January 1969.

MAJOR GROUP	Pounds Per Acre Intertidal Zone	Shoalgrass Zone	Turtlegrass Zone	Sandbar Zone	Manateegrass Zone	Open Bay Zone
BENTHIC FLORA						
Algae	--	285	552	--	9	--
Shoalgrass	2	1,757	9	5	232	--
Turtlegrass	--	2	2,293	--	661	--
Manateegrass	--	--	--	--	328	--
BENTHIC FAUNA						
Mollusks:						
Univalves	72	212	460	25	77	35
Bivalves	10	40	185	7	37	15
Peanut Worms	42	94	19	4	2	0.1
Annelid Worms	0.4	0.4	0.3	0.2	0.4	0.4
Crustaceans	51	47	190	3	115	19
Echinoderms	4	1	10	4	1	0.5
NETPLANKTON	3.6	0.6	1.6	1.2	12.5	--
Total Flora/Acre	2	2,044	2,854	5	1,230	--
Total Fauna/Acre	179.4	394.4	864	43	232	71
Total Netplankton/Acre	3.6	0.6	1.6	1.2	13	--
Total Biomass/Acre	185	2,439	3,720	49	1,475	71
Number of Acres/Zone	10	39	137	25	298	--
Total Flora/Zone	20	79,716	390,998	125	336,540	--
Total Fauna/Zone	1,794	15,382	118,368	1,075	69,136	--
Total Netplankton/Zone	36	23	219	30	1,725	
Total Biomass/Zone	1,850	95,121	509,585	1,230	409,401	--

Reference: **Florida Department of Environmental Regulation,** 1986. **Proposed Designation of Sarasota Bay and Lemon Bay as Outstanding Florida Waters. Report to the Environmental Regulation Commission.**

Subject: **Water quality of Sarasota and Lemon Bays.**

Geographic Area: **As noted, except for tributaries, artificial water bodies, and areas near the mouths of Whitaker Bayou and Phillippi Creek.**

Sampling Dates: **Not applicable.**

Gear: **Not applicable.**

Species Reported: **Oysters, clams, scallops, shrimp and crabs.**

Relation to This Study: **Poor water quality in the bayou was recognized. Loss of seagrass around the mouth of the bayou was reported, as were impacts to the benthic faunal communities. The study recommended an exemption in OFW designation for a circle of the bay 1,500 feet in radius from the mouth of the bayou.**

Attachments: **Report elements addressing shellfish and Whitaker Bayou, and water quality maps.**

Shellfish

Shellfish is a broad term that includes many invertebrate species such as oysters, clams, scallops, shrimp, and crabs. There are several portions of both the Sarasota Bay and Lemon Bay estuarine systems that are approved by the Florida Department of Natural Resources for shellfish harvesting. In fact, most of Lemon Bay is approved for this use. Generally, approved areas meet water quality standards consistently (Palik and Lewis, 1983).

Areas that are prohibited for shellfish harvesting have high levels of coliform bacteria. Septic tank effluent, urban run-off, run-off from agricultural areas (such as pastures), and inadequately treated sewage effluent are the primary causes of coliform violations in Sarasota Bay and Lemon Bay.

Both bay systems contain healthy populations of oysters. Oyster populations in prohibited shellfish harvesting areas are important to other bay areas since they produce spat (juvenile oysters) which will colonize and relocate elsewhere. Occasionally, oyster bar (reef) growth may be so vigorous as to pose navigational obstructions.

Shrimp and crab are both common in these estuaries. Pink shrimp (*Penaeus duorarum*) which are found in both bays are the most economically significant shrimp species in the state Palik and Lewis, 1983). Blue crab (*Callinectes sapidus*) is another economically important shellfish species that occurs in these waters.

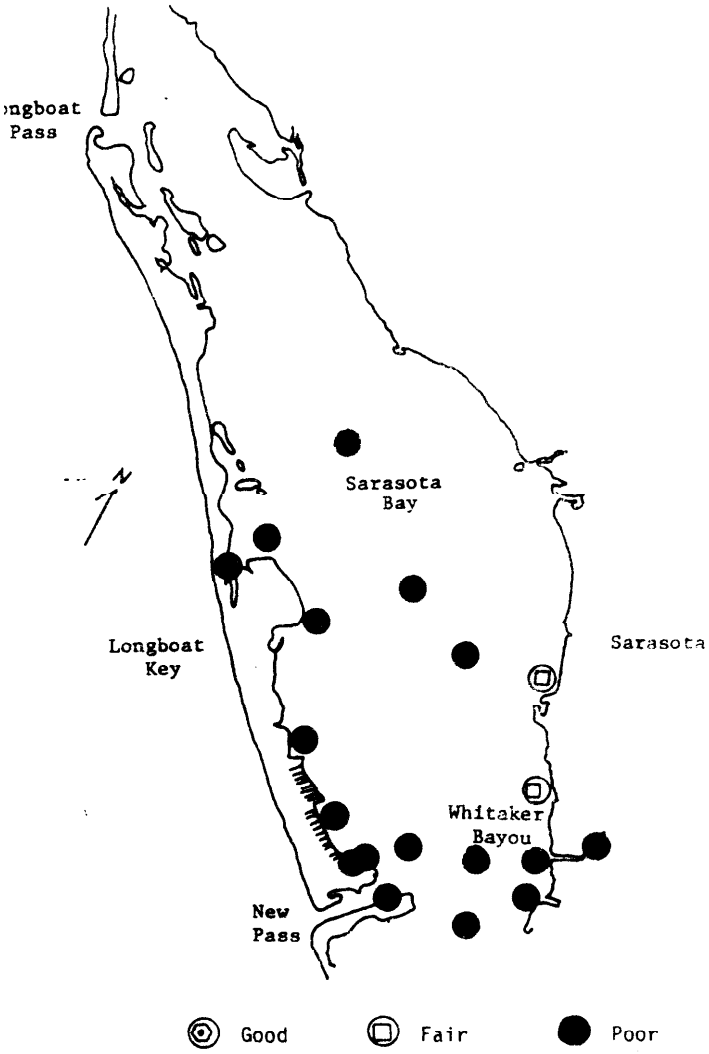
WHITAKER BAYOU

Located in southeastern Sarasota Bay, this tributary runs through the City of Sarasota, collecting some urban and agricultural runoff on its way. It is also the recipient of about 9 m.g.d. of secondarily-treated sewage from the City of Sarasota. The treated sewage discharge, together with the other pollutants contributed to the bayou, creates serious violations of state water quality standards.

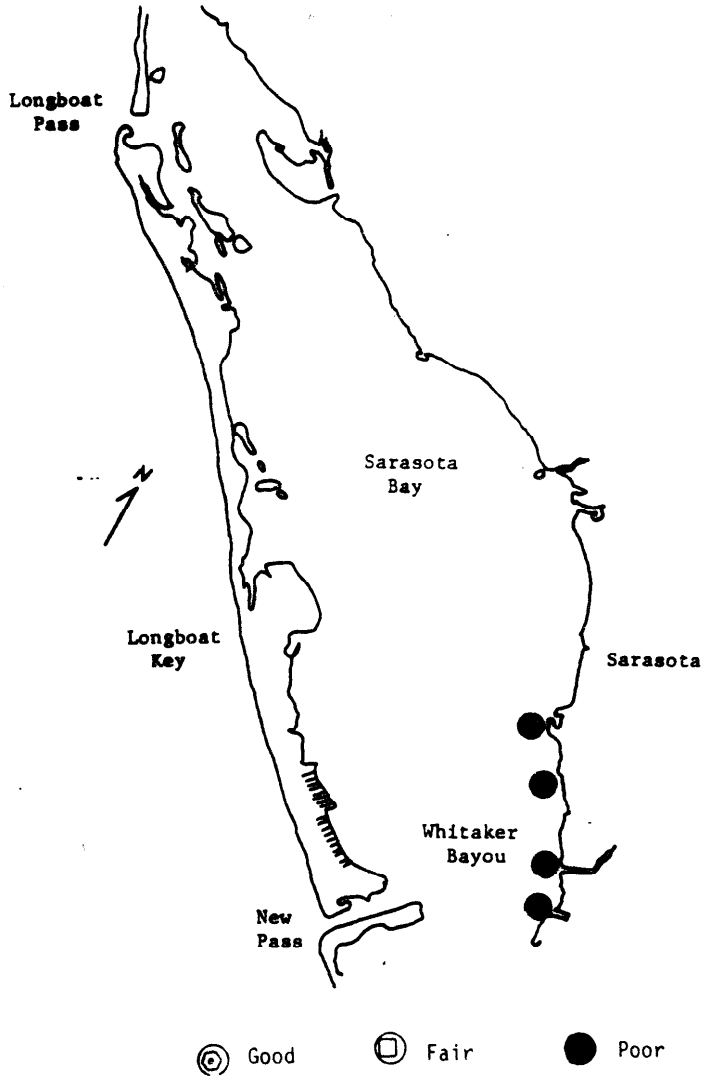
The City of Sarasota is planning to transfer its discharge point to a spray field 18 miles east of the bay. This would be in compliance with a DER enforcement order on the Whitaker Bayou discharge and also consistent with Sarasota County's requirement for a minimum of advanced wastewater treatment of all sewage discharges to surface waters. The planned spray field has been purchased, but the proposal has received considerable opposition from nearby residents.

Whitaker Bayou itself, and possibly an area extending into Sarasota Bay, could be exempted from the OFW designation because of existing degraded conditions. Water quality data analysis indicates an approximately 1500 foot zone of influence in Sarasota Bay from the mouth of Whitaker Bayou.

HISTORICAL COLIFORM CONDITIONS



1985 COLIFORM CONDITIONS



Reference: Florida Department of Natural Resources 1959-1980. Summary of Florida commercial marine landings. Tallahassee, FL. Also, Fla. Board of Conservation, with data before 1964 from University of Miami Marine Laboratory.

Subject: Shellfish landings.

Geographic Area: Manatee and Sarasota Counties.

Sampling Date: 1959-1980.

Gear: Various unspecified commercial equipment.

Species Reported: Oysters, hard clams, scallops and squid.

Relation to This Study: These reports recognize Mercenaria, Crassostrea and Pecten (hard clam, oyster and scallop) as shellfish, and also the gastropod Strombus (conch) and squid (Lolliguncula). The DNR list includes blue and stone crabs, spiny lobster, shrimp, certain turtles and sponges. Oysters and clams have been landed locally up to 1971. Very small amounts of squid and scallop have been landed in the two county area over the period of record. Overall, the hard clam was the largest molluscan shellfish landing.

Attachment: Definition of shellfish and landing summaries for Manatee and Sarasota Counties.

SNAPPER (RED), predominantly the red snappers, *Lutjanus campechanus* and *L. blackfordi;* but includes a minority of silk snapper, *L. vivanus;* blackfin snapper, *L. buccanella;* lane snapper, muttonfish; yellowtail; queen snapper, *Etelis oculatus;* common bigeye, *Priacanthus arenatus* (Priacanthidae) and squirrelfish, *Holocentrus ascensionis* (Holocentridae).

SNAPPER (VERMILLION), *Rhomboplites aurorubens* (Lutjanidae).

SNAPPER (WHITE), porgy, predominantly *Calamus* spp. (Sparidae).

SNAPPER (YELLOWTAIL), yellowtail, *Ocyurus chrysurus* (Lutjanidae).

SPANISH MACKEREL, *Scomberomorus maculatus* (Scombridae).

SPANISH SARDINE, *Sardinella anchovia* (Clupeidae).

SPOT, Butterfish, *Leiostomus xanthurus* (Sciaenidae).

STURGEON, either or both of the two Florida species, the Atlantic sturgeon, *Acipenser oxyrhynchus,* and the shortnose sturgeon, *A. brevirostrum* (Acipenseridae).

TILEFISH, *Lopholatilus chamaeleonticeps* (Branchiostegidae).

TRIGGERFISH, predominantly the common triggerfish, *Balistes capriscus,* and the queen triggerfish, *B. vetula* (Balistidae).

TRIPLETAIL, *Loboles surinamensis* (Lobotidae).

WARSAW, warsaw grouper, black jewfish, *Epinephelus nigritus* (Serranidae).

UNCLASSIFIED: BOTTOMFISH, a species composite which consists of less choice edible fishes here listed, such as barracuda, croaker, spot, pigfish, sheepshead, drum, pinfish, grunts, mojarra, mangrove snapper, tripletail, *et al.*

TRASH FISH, a species composite of nonfood fishes or food fishes which are too small for eating. Consists of whiting, spot, croaker, drums, *et al.* The bulk of this category are by-products from shrimp trawling. Usually used for bait.

MISCELLANEOUS, a species composite of fish not in this list and which are rarely landed. Consists of angelfishes, *Holacanthus* and *Pomacanthus* spp. (Chaetodontidae); moonfish, *Vomer setapinnis* (Carangidae); spadefish, *Chaetodipterus faber* (Ephippidae); wahoo, *Acanthocybium solanderi* (Scombridae) *et. al.*

Non-Food Fish

ALEWIFE, *Alosa pseudoharengus* on the east coast. The west coast fish are close relatives, probably most are thread herring, *Opisthonema oglinum* (Clupeidae).

BALLYHOO, Halfbeak, *Hemiramphus brasiliensis* (Hemiramphidae).

CIGARFISH, predominantly *Decapterus* spp. (Carangidae).

MENHADEN, pogy, bunkers, *Brevoortia tyrannus* on the east coast and *Brevoortia patronus* on the west coast (Clupeidae).

SHARK, predominantly *Carcharhinus* spp. (Carcharhinidae).

TENPOUNDER, Ladyfish, skipjack, bigeye herring, *Elops saurus* (Elopidae).

Shellfish

CLAMS, HARD, *Mercenaria mercenaria* and *M. campechiensis* (Veneridae).

CONCH, *Strombus gigas* (Strombidae).

CRAB, BLUE, *Callinectes sapidus* (Portunidae).

CRAB, STONE, *Menippe mercenaria* (Xanthidae).

LOBSTER, SPINY, Crawfish, *Panulirus argus* (Palinuridae).

OYSTER, *Crassostrea virginica* (Ostreidae).

SCALLOP, *Pecten irradians* and *P. gibbus* (Pectinidae).

SHRIMP,

East Coast, predominantly white shrimp, *Penaeus setiferus,* also brown shrimp, *P. aztecus* (Penaeidae).

Tortguas, exclusively pink shrimp, *Penaeus duorarum* (Penaeidae).

Campeche, predominantly pink shrimp, *Penaeus duorarum,* also brown shrimp, *P. aztecus* (Penaeidae).

Upper West Coast, predominantly white shrimp, *Penaeus setiferus,* also pink shrimp, *P. duorarum;* brown shrimp, *P. aztecus;* and sea bobs, *Xiphopeneus kroyeri* (Penaeidae).

SQUID, *Doryteuthis plei, Lolliguncula brevis,* and *Loligo pealei* (Loliginidae).

TURTLE, GREEN, *Chelonia mydas* (Cheloniidae). Sea turtles not reported by species are put in this category.

TURTLE, LOGGERHEAD, *Caretta caretta* (Cheloniidae). May include some Ridley turtles, *Lepidochelys kempii.*

SPONGES:

YELLOW, *Spongia zimocca* (Spongiidae).

SHEEPSWOOL, *Hippiospongia lachne* (Spongiidae).

GRASS, *Spongia graminea* (Spongiidae).

GLOVE, *Spongia* spp. (Spongiidae).

Summary of Marine Shellfish Landings for Manatee and Sarasota Counties, 1953-1981. **All values in pounds.**

	Manatee			Sarasota		
Year	Oysters	Hard Clams	Scallops	Oysters	Hard Clams	Bay Scallops
1953	0	0	0	2,622	10,090	0
1954	0	0	0	1,587	15,120	0
1955	0	0	0	448	15,264	1,648
1956	0	0	0	554	16,541	0
1957	0	0	0	2,627	23,708	0
1958	0	0	0	210	16,878	144
1959	0	0	0	1,018	16,219	170
1960	0	0	0	131	**18,511**	148
1961	0	0	0	12,473	13,906	750
1962	65	0	0	**13,115**	3,913	384
1963	0	0	0	**10,800**	2,100	0
1964	17	0	0	11,396	17,454	128
1965	0	0	0	27,639	95,814	0
1966	0	0	0	3,763	2,607	0
1967	0	0	0	405	3,541	0
1968	0	0	0	0	7,146	0
1969	0	0	0	0	10,439	0
1970	0	0	0	0	9,484	0
1971	0	0	0	0	4,007	0
1972	0	0	0	0	0	0
1973	0	0	0	0	0	0
1974	0	0	0	0	0	0
1975	0	0	0	0	0	0
1976	0	0	0	0	0	0
1977	0	0	0	0	0	0
1978	0	0	0	0	0	0
1979	0	0	0	0	0	0
1980	0	0	0	0	0	0
1981	0	0	0	0	0	0

Reference: Gibbons, E. 1964. Stalking the blue eyed scallop. David McKay Co., Inc., New York.

Subject: Edible seafood.

Geographic Area: North America

Sampling Date: Not applicable.

Gear: Not applicable.

Species Reported: (among others) Aequipecten irradians, Atrina rigida, Atrina serrata, Barnea truncata, Busycon canaliculatum Busycon contrarium, Busycon spiratum, Chione, Crassostrea virginica, Dinocardium robustum, Donax variabilis, Littorina irrorata, Modiolus demissus, Pecten ziczac, Polinices duplicatus, Tagelus gibbus, Trachycardium egmontianum.

Relevance to This Study Establishes listed species as edible.

Reference: Glinka, C. 1980. Survey of blue crab and stone crab distribution in Sarasota Bay, pp. D-l through D-57 in W.J. Tiffany, III (Editor) Environmental Status of Sarasota Bay: Selected Studies. Published by Mote Marine Laboratory,

Subject: Blue and stone crab distribution.

Geographic Area: Sarasota and Roberts Bay (11 stations).

Sampling Date: April-October 1979.

Gear: Wire mesh traps baited with lobster bait and fish scraps.

Species Reported: Callinectes sapidus, Menippe mercenaria.

Relation to This Study: More stone crabs were caught near Whitaker Bayou than off New College. About the same numbers of blue crabs were caught at these stations. Crabs of commercial and sport value occur throughout the bay, including areas close to the bayou.

Reference: Godcharles, M.F. and W.C. Jaap. 1973a. Fauna and flora in hydraulic clam dredge collections from Florida west and southeast coasts. Fla. Dept. Natural Resources Spec. Sci. Rept. No. 40.

Subject: Shallow water macroinvertebrates and algae.

Geographic Area: Florida west and southeast coast. Waters off Longboat and Lido Keys.

Sampling Dates: November 1970-July 1971.

Gear: Hydraulic Nantucket dredge and Maryland escalator soft-shell clam dredge.

Species Reported: (Shallow or moderate depth water only) Crepidula fornicata, Strombus alatus, Xenophora conchyliophora, Polinices duplicatus, Ficus communis, Eupleura sulcidentata, Murex dilectus, Murex pomum, Murex rubidus, Busycon contrarium, Busycon spiratum, Fasciolaria hunteria, Pleuroploca gigantea, Oliva sayana, Terebra dislocata, Anadara lienosa floridana, Arca zebra, Noetia ponderosa, Arcinella cornuta, Chama nacerophylla, Anodontia alba, Lucina pensylvanica, Dinocardium robustum vanhyningi, Laevicardium laevigatum, Trachycardium egmontianum, Chione intapurpurea, Dosinia discus, Macrocallista maculata, Macrocallista nimbosa, Mercenaria campechiensis, Rupellaria typica.

No. Gastropod Species: 15

No. Bivalve Species: 19

Total Species No.: 34

Relation to This Study: Samples were taken only in Gulf waters, not in Sarasota Bay. List suggests a diverse Gulf fauna but these specimens were retained on very coarse sieves (11.6 to 31.0 mm).

Attachments: Map of station locations.

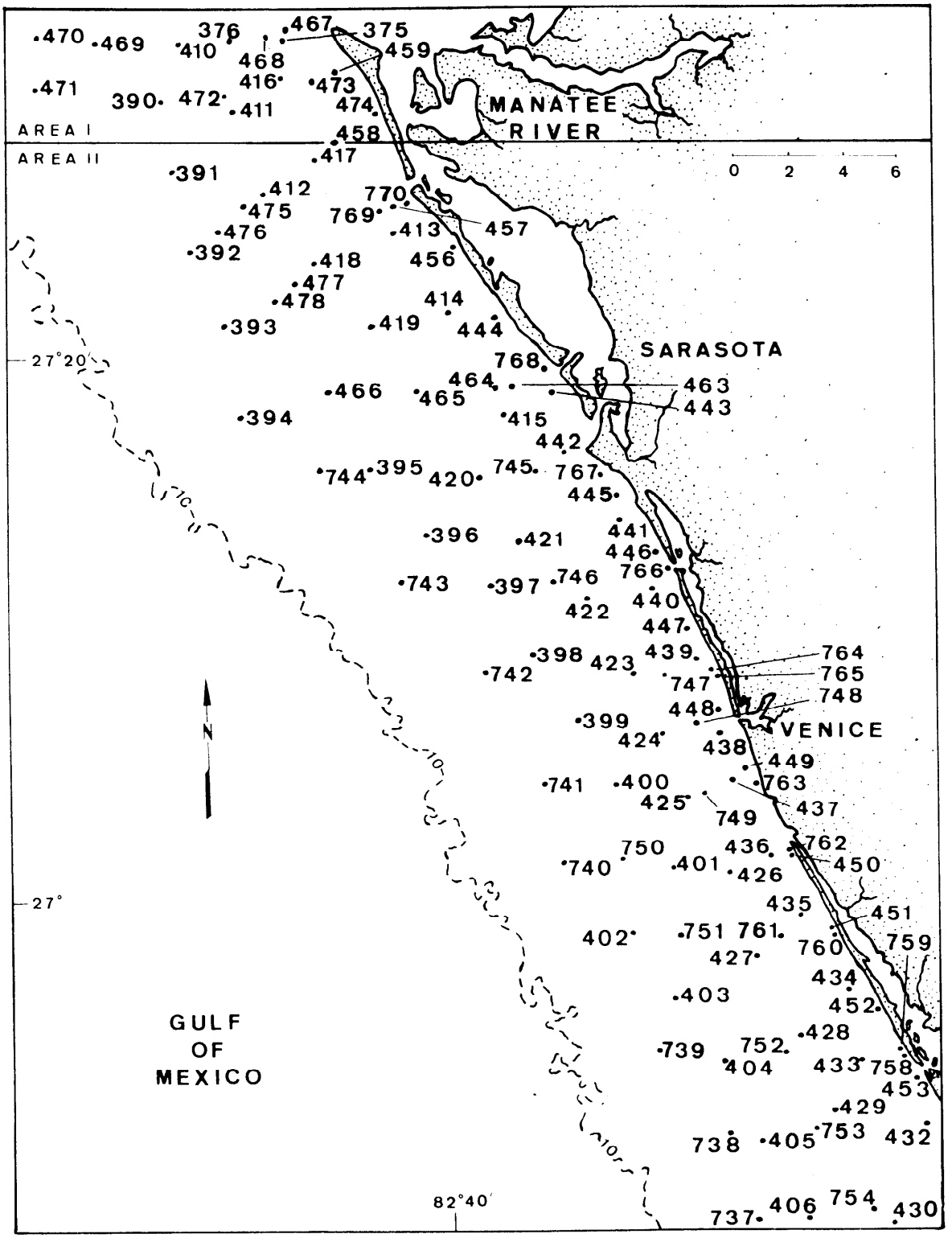


Figure 10. C&GS Chart 1256: Lemon Bay to Passage Key Inlet.

Reference: Godcharles, M.F. and W.C. Jaap. 1973b. Exploratory clam survey of Florida nearshore and estuarine waters with commercial hydraulic dredging gear. Fla. Dept. Nat. Resour. Professional Papers Series No. 21.

Subject: Population structure of selected species.

Geographic Area: Florida south and east coasts and waters off Sarasota County.

Sampling Date: May 1970-September 1971.

Gear: Hydraulic Nantucket clam dredge and Maryland soft shell escalator clam dredge.

Species Reported: Mercenaria mercenaria, M. campechiensis, Macrocallista nimbosa, Rangia cuneata.

Relation to This Study: Hard clams and sunrays are distributed throughout shallow waters of the Florida west coast, sometimes in commercial abundance. They are found in seagrass beds and unvegetated areas. Rangia was confined to river areas and thrives best at lower salinities,

Reference: Heald, E.J. 1970. Fishery Resources Atlas II. West Coast of Florida to Texas. Sea Grant Tech. Bull. No. 4, Univ. of Miami.

Subject: Relative productivity of coastal areas.

Geographic Area: Northeast Gulf coast.

Sampling Date: 1956-1965

Gear: Various unspecified commercial equipment.

Species Reported: (among others) Bay scallop and hard clam.

Relation to This Study: Heald states that hard clam is an important resource in Lemon Bay and Charlotte Harbor, and that "small quantities [are] occasionally taken from Sarasota Bay".

Reference: Mahadevan, S. and others. 1981. A preliminary assessment of the effects of treated sewer discharge on the benthic infaunal communities of Whitaker Bayou and adjoining Sarasota Bay. Mote Marine Laboratory Report to Sarasota County Coastal Zone Management Department.

Subject: Soft bottom macroinvertebrate infauna.

Geographic Area: Whitaker Bayou and Sarasota Bay.

Sampling Date: January 1981.

Gear: 3 inch PVC cores.

Species Reported: Crepidula plana, Epitonium sp., Haminoea succinea, Nassarius vibex, Olivella sp., Nudibranch sp., Lucina radians, Lyonsia hyalina floridana, Mulinia lateralis, Mysella planulata, Nuculana crenulata, Nuculana acuta, Solemya occidentalis, Tagelus divisus, Tellina versicolor.

Relation to This Study: Sample size was shown to be too small to be definitive. Authors concluded that sediments and fauna of the bayou indicated polluted conditions, and that bayou effects into the bay were limited. The fauna of stations in the bayou (#l) and at its mouth (#2) differed from bay stations (#3-7). They also concluded that fauna would not be affected adversely by increased discharge, although adverse affects were expected on turbidity, plankton, seagrasses, and fishes.

Attachment: Map of station locations.

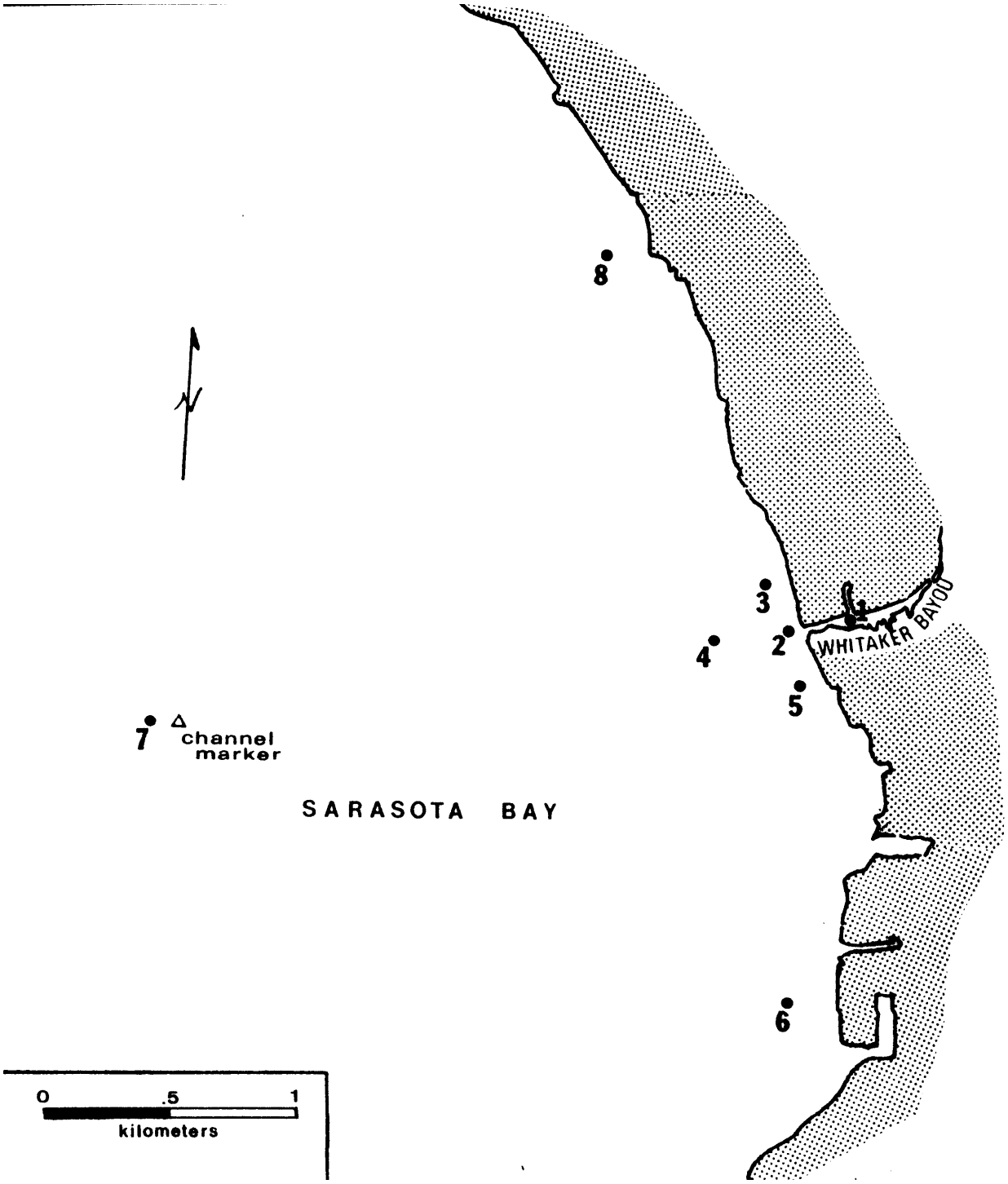


Figure 1. Benthic Sampling Stations in and Near Whitaker Bayou, (Sarasota Bay, Florida).

Reference: Pierce, R.H. and R.C. Brown. 1984. Coprostanol distribution from sewage discharge into Sarasota Bay, Florida. Bull. Environ. Contam. Toxicol. 32:75-79.

Subject: Concentrations of sewage tracers.

Geographic Area: Sarasota Bay.

Sampling Date: 1982.

Gear: Petite Ponar grab.

Species Reported: Not applicable.

Relation to This Study: "An area containing coprostanol that may be considered to originate from the City of Sarasota wastewater discharge into Whitaker Bayou is approximately 7km (N-S) by 2.2km (E-W) or about 15.4 km^2 . . . approximately 20% of the Bay sediment". Concentration contours "exhibited a skewed distribution in a north-south direction along the eastern shoreline" and "very high concentrations (2,500 ng g^{-1} sediment) in Whitaker Bayou", were reported.

Attachments: See Figure 14 of this Report.

Reference: Raymond, D. 1973. Catch and cook shellfish. Great Outdoors Publishing Company, St. Petersburg, Florida. 65 p.

Subject: Collection and preparation of local seafood.

Geographic Area: Florida west coast.

Sampling Dates: Not applicable.

Gear: Not applicable.

Species Reported: Mercenaria campechiensis, Macrocallista nimbosa, Spisula solidissima raveneli, Donax variabilis, Pecten sp., Crassostrea virginica, Strombus gigas, and "pen shells" (Atrina sp.).

Relation to This Study: This cookbook establishes recreational harvest and consumption of these species in local waters.

Reference: Sauers, S.C. and R. Patten. 1981. A comparison of 1948 and 1979 seagrass bed distribution in the vicinity of Whitaker Bayou, Sarasota Bay, Florida. Sarasota County Office of Coastal Zone Management, Sarasota, Florida.

Subject: Sewage impacts on seagrasses.

Geographic Area: Sarasota Bay.

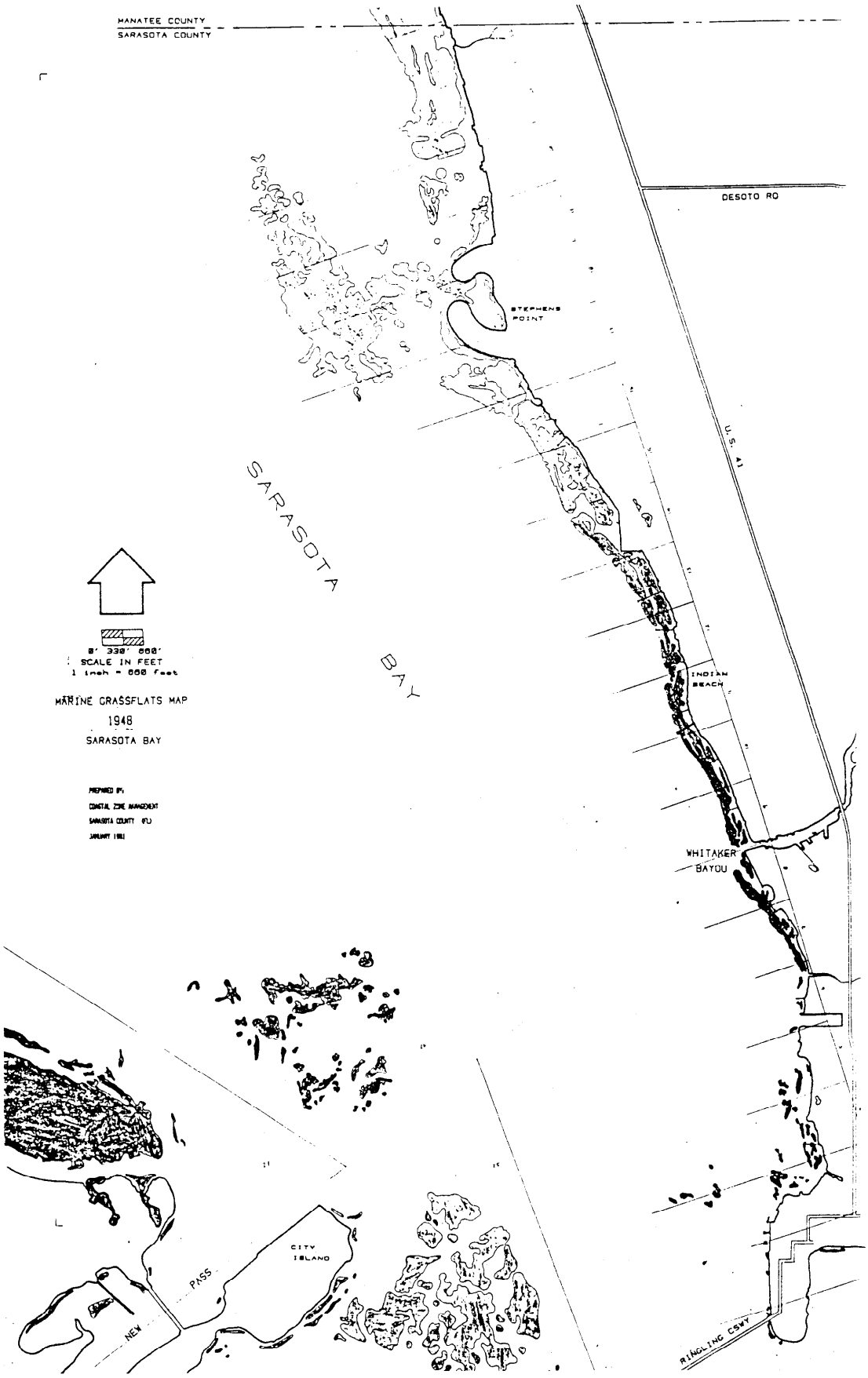
Sampling Date: 1948 and 1971.

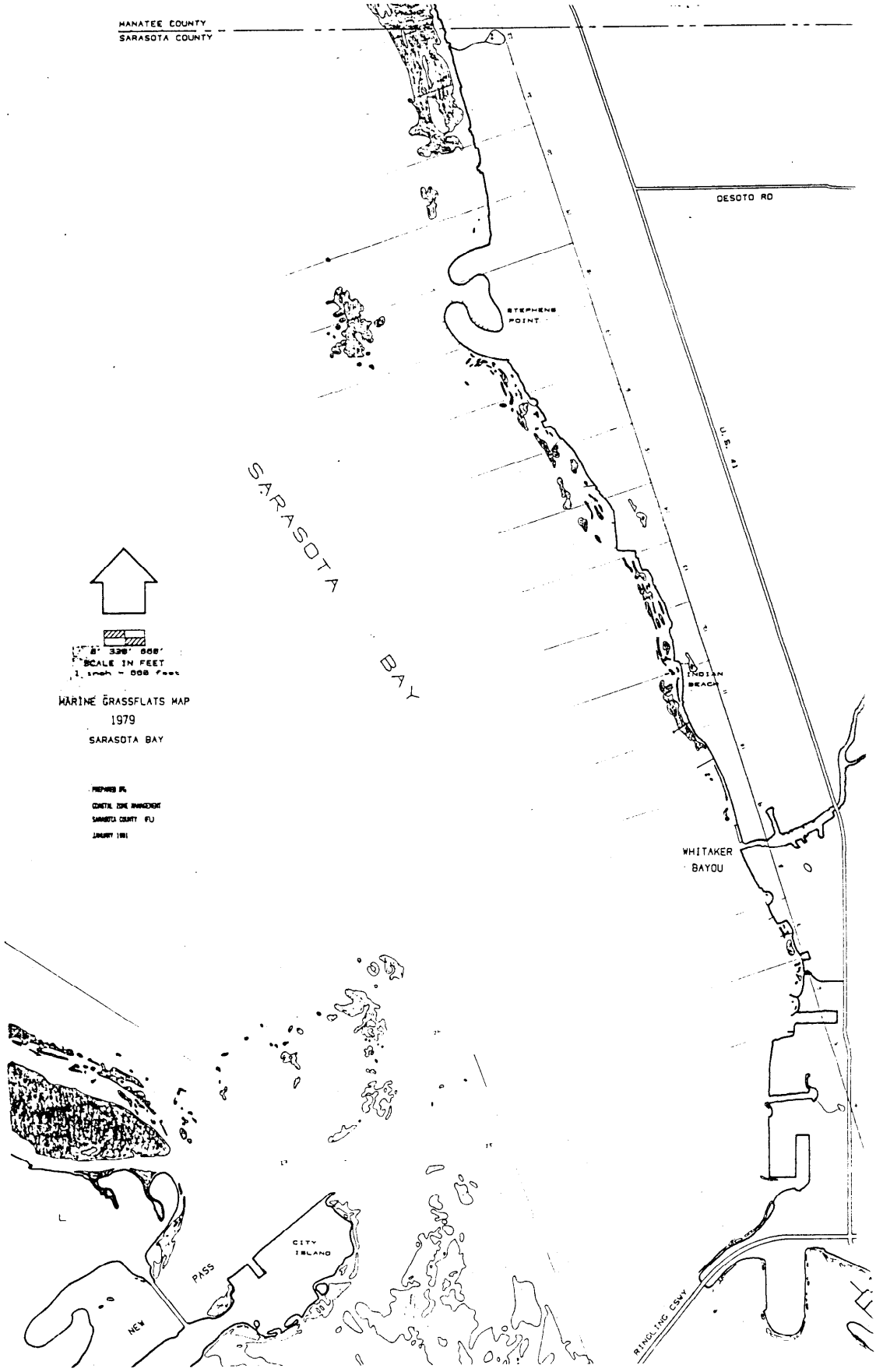
Gear: Aerial photographs.

Species Reported: Halodule wrightii, Thalassia testudinum, Syringodium filiforme, Ulva lactuca.

Relation to this Study: Grassflats loss has been greatest at the mouth of Whitaker Bayou. Percentage loss decreased as distance from the bayou increased. "It appears that the depth distribution of seagrasses is shrinking. Formerly, grasses were limited to the 0-6' contour zone (MLW) but today are seldom seen below the 0-4' contour zone (MLW)."

Attachments: Maps of 1948 and 1979 seagrass beds.


MANATEE COUNTY
SARASOTA COUNTY
DESOTO RD
STEPHENS POINT
U.S. 41
SARASOTA BAY
INDIAN BEACH
WHITAKER BAYOU
CITY ISLAND
PASS
NEW
RINGLING CSWY
0' 330' 660'
SCALE IN FEET
1 inch = 660 feet
MARINE GRASSFLATS MAP
1948
SARASOTA BAY
PREPARED BY:
COASTAL ZONE MANAGEMENT
SARASOTA COUNTY PLU
JANUARY 1981


MANATEE COUNTY
SARASOTA COUNTY
DESOTO RD
STEPHENS POINT
U.S. 41
SARASOTA BAY
INDIAN BEACH
WHITAKER BAYOU
CITY ISLAND
PASS
NEW
RINGLING CSWY
0 330' 660'
SCALE IN FEET
1 inch = 660 feet
MARINE GRASSFLATS MAP
1979
SARASOTA BAY
PREPARED BY:
COASTAL ZONE MANAGEMENT
SARASOTA COUNTY FL
JANUARY 1981

Reference: Stanley, J.G. 1985. Hard clam, a species profile. U.S. Fish and Wildlife Service Biological Report 82(11.41).

Subject: Biology of the hard clam.

Geographic Area: Atlantic and Gulf coasts.

Sampling Dates: Not applicable.

Gear: Not applicable.

Relation to This Study: Mercenaria mercenaria and M. campechiensis hydridize so the latter may be a subspecies of the former. It is intertidal and subtidal. Spawning in temperate water occurs from March through November. Sexual maturity is a function of size, normally corresponding to an age of 2 years. Eggs are buoyant and larvae are planktonic. Clams are very sedentary and prefer protected water of high salinity. The hard clam is more widely distributed than any other commercial clam species in U.S. waters and is the most valuable commercial and sport species. The fishery is characterized by large fluctuations in landings. The potential for colonization of new areas is considered great. Hard clams are filter feeders; crabs and other large mollusks are their principal predators. They are affected more by temperature and salinity than by dissolved oxygen. Sand is preferred over mud as hard clam substratum. Excess turbidity causes death.

Reference: **Tiffany,** W.J., III. 1974. **Checklist of benthic invertebrate communities in Sarasota Bay with special reference to water quality indicator species. Contribution No. 2, Flower Gardens Oceans Research Center, Marine Biomedical Institute, Galveston, TX.**

Subject: **Checklist of macroinvertebrates.**

Geographic Area: **14 stations in Sarasota Bay.**

Sampling Date: June 1973-May 1974.

Gear: **Bucket dredge.**

Species Reported: **136 species, of which 80 (59%) were mollusks (see attached list).**

Relation to This Study: **Species diversity was low at the Bowlees Creek STP site but (relatively) high at the Whitaker Bayou STP site. Whale Key was the healthiest station sampled. The "most unhealthy area sampled" was near Marina** Jacks **and was affected by storm drainage and sanitary sewage.** In **most cases, nutrient enrichment was associated with species enrichment, with extra species known or suggested to be "pollution indicators". Mollusks identified as potential indicators included the bivalve** Macoma tenta **(high silt and organic content) and the gastropod** Melongena corona **(if found by itself in high numbers, an indicator of "low environmental quality in general"). The bivalve** Noetia ponderosa **may indicate "clean" conditions and two other species (**Marginella apicina **and** Tellina lineata**) are widespread but their usefulness as indicators is uncertain.**

Attachments: **Map of station locations and a tabular summary of species, by station.**

APPENDIX A: Location of Sample Sites

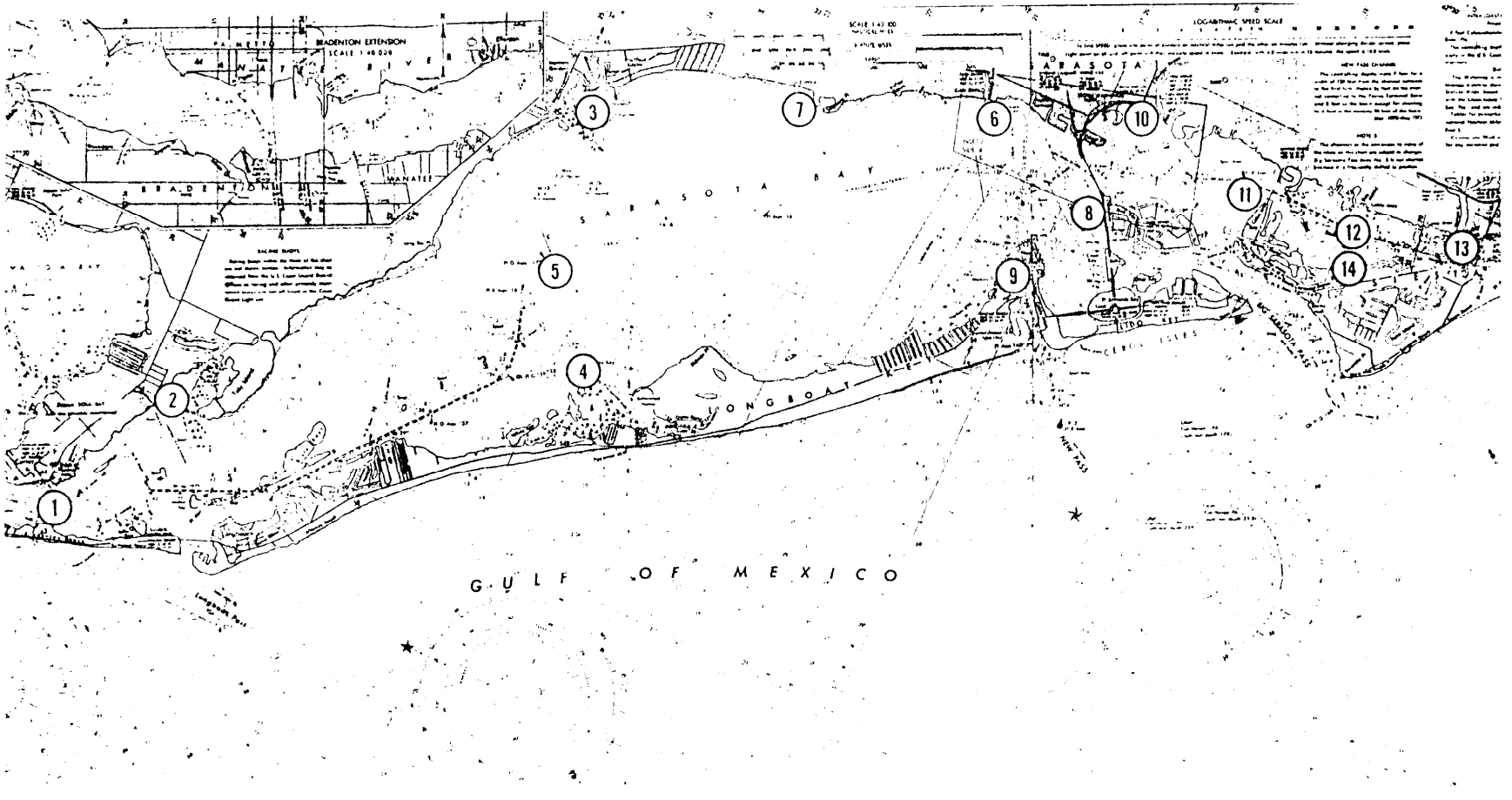


Table 1. Alphabetical list of benthic invertebrates dredged from Sarasota and Roberts Bays.

(Am, Amphineuran; Bi, Bivalve; Br, Bryozoan; Co, Coelenterate; Cr, Crustacean; Ec, Echinoderm; Ga, Gastropod; Po, Polychaete; Sc, Scaphapod; Si, Sipunculid; Sp, Sponge; Tu, Tunicate)

NAME	CLASSIFICATION	STATION												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Abra aequalis	Bi	X						x	x	x			X		
Amphicteis gunneri	Po													X	
Amaroucium pellucidum	Tu				X										
Amnotrypane aulogaster	Po								X		X				
Ampelisca sp.	Cr		x	x			x	x	x	x		X		x	x
Amygdalum papyria	Bi			X						X				x	x
Anachis avara	Ga										X		X		
Anachis obesa	Ga							X							
Anadara transversa	Bi				X						X			x	x
Anomalocardia cuneimeris	Bi		X												
Apseudes sp.	Cr													X	
Atrina rigida	Bi				X										
Barbatia candita	Bi													X	
Botrylus schlosseri	Tu				X										
Brachiodontes exustus	Bi			x	x			X						X	
Branchioma nigromaculata	Po		X							X				x	x
Bugula sp.	Br				X								X		
Bulla striata	Ga												X		
Busycon contrarium	Ga	X													
Callinectes sapidus	Cr									x	x				X
Callocardia texasiana	Bi			x	x								X		
Cantharus multangulus	Ga				X										
Cardita floridana	Bi		X		X										
Cerianthus sp.	Co				X										
Cerithium muscarum	Ga		X		X						X				
Cerithium variabile	Ga									X			X		

NAME	CLASSIFICATION	STATION													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Chione cancellata	Bi	X			X		X					X		X	
Chione grus	Bi	X													
Cirriformia filigera	Po		X						X						
Cirratulus grandis	Po		X												
Cistenides gouldi	Po	X		X	X		X	X	X			X		X	X
Cliona celata	Sp				X										
Conus jaspideus	Ga		X												
Corbula barrattiana	Bi								X			X	X	X	
Crassostrea virginica	Bi				X									X	
Crepidula aculeata	Ga				X										
Crepidula fornicata	Ga				X							X		X	
Crepidula maculosa	Ga		X												
Crepidula plana	Ga				X							X		X	
Cylichna bidentata	Ga		X												
Cyrtopleura costata	Bi				X										
Dendrostomum sp.	Si				X										
Dentalium eboreum	Sc	X					X		X			X			
Dentalium texasianum	Sc											X			
Didemnum albidum	Tu				X										
Diopatra cuprea	Po		X	X	X	X	X	X	X			X	X	X	X
Dosinia elegans	Bi	X													
Ensis minor	Bi								X						X
Epitoneum humphreysii	Ga	X													X
Eteone heteropoda	Po		X						X			X			
Eupleura caudata sulcidentata	Ga						X								
Fabricia sp.	Po														X
Gammarus sp.	Cr				X				X						
Halichondria sp.	Sp				X										
Haminoea succinea	Ga	X				X							X	X	
Ischnochiton papillosus	Am				X							X		X	
Laeonereis culveri	Po				X			X							
Laevicardium mortoni	Bi	X		X	X		X		X	X				X	X
Lepidamitria commensalis	Po								X						

NAME	CLASSIFICATION	STATION													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Libinia dubia	Cr				X									X	
Linga amiantus	Bi	X													
Loemia medusa	Po								X						
Lucina amiantus	Bi								X			X			
Lucina floridana	Bi							X							X
Lucina multilineata	Bi				X	X	X		X	X	X	X			
Lucina nassula	Bi	X					X		X			X			
Lyonsia floridana	Bi	X	X				X		X		X	X		X	
Lysarete brasiliensis	Po								X						
Maçoma tenta	Bi	X									X	X			
Macrocallista nimbosa	Bi							X		X					
Mactra fragilis	Bi					X								X	
Magelona sp.	Po							X							
Maldane sarsi	Po					X				X	X			X	X
Marginella apicina	Ga	X	X		X		X	X	X	X	X	X			X
Megalomma bioculatum	Po													X	
Melinna maculata	Po													X	X
Mellita quinquiesperforata	Ec	X	X						X						
Melongena corona	Ga			X			X								
Membranipora sp.	Br				X										
Menippe mercenaria	Cr				X										
Mercenaria campechiensis	Bi	X		X	X		X	X	X	X		X		X	
Modiolus squamosus	Bi								X						
Mulinia lateralis	Bi			X		X	X	X				X	X	X	X
Nassarius vibex	Ga				X				X	X				X	
Nephtys bucera	Po								X						
Nereis pelagica	Po		X		X				X	X					
Nereis succinea	Po							X							
Neritina reclivata	Ga						X								
Niso interupta	Ga								X						
Noetia ponderosa	Bi				X										
Nucula proxima	Bi	X						X	X			X			
Nuculana acuta	Bi	X				X	X	X				X		X	X

NAME	CLASSIFICATION	STATION													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Olivella blanesi	Ga					X			X			X			
Olivella dealbata	Ga	X													
Olivella floralia	Ga	X													
Olivella minuta	Ga		X												
Olivella pusilla	Ga					X	X	X							
Onuphis eremita	Po			X	X	X		X	X		X			X	X
Onuphis magna	Po		X						X			X		X	
Ophiophragmus filograneus	Ec							X	X	X	X		X	X	X
Ophiophragmus wurdemani	Ec	X						X	X						
Ostrea equestris	Bi				X										
Owenia fusiformis	Po														X
Pagurus longicarpus	Cr		X	X	X	X	X		X	X		X		X	
Panopeus herbstii	Cr									X				X	
Parastarte triquetra	Bi		X	X				X						X	
Phascolion strombi	Si		X	X			X	X						X	
Pista palmata	Po								X					X	X
Pitar fulminata	Bi									X					
Pitar simpsoni	Bi	X						X		X		X			
Polinices duplicatus	Ga			X											
Pyramidella crenulata	Ga	X													
Retusa canaliculata	Ga					X									
Sabella microphthalma	Po		X						X						
Sabellastarte magnifica	Po								X						
Semele ballastriata	Bi													X	
Solemya occidentalis	Bi											X			
Sphaeroma sp.	Cr				X							X		X	X
Spiochaetopterus costarum oculatus	Po	X		X							X				X
Spirorbis spirillum	Po				X										
Strigilla mirabilis	Bi								X						
Styela partita	Tu				X										
Tagelus divisus	Bi											X		X	X
Tagelus plebius	Bi						X		X			X			
Tectonatica pusilla	Ga	X				X	X			X					

NAME	CLASSIFICATION	STATION													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Tellidora cristata	Bi						X		X			X			
Tellina iris	Bi				X							X			
Tellina lineata	Bi	X	X	X	X		X	X	X	X	X	X	X	X	X
Tellina tayloriana	Bi		X												
Tellina texana	Bi	X										X			
Terebellides stroemi	Po						X							X	
Terebra dislocata	Ga	X						X							
Trachycardium egmontianum	Bi							X			X				
Transenella cubaniana	Bi				X		X								
Travisia sp.	Po														X
Turbonilla hemphilli	Ga	X													

Reference: U.S. Army Engineers District. 1976. Final Environmental Impact Statement. Maintenance dredging west coast inland waterway, Caloosahatchee River to Anclote River, Florida. Jacksonville, Florida.

Subject: Existing and proposed conditions in connection with channel improvements.

Geographic Area: Sarasota Bay.

Sampling Date: Variable, by subcontractors.

Gear: Variable, by subcontractors.

Species Reported: Long species lists for west central Florida coastline, including two mollusk lists.

Relation to This Study: The report stated "the consensus expressed in reported cited above was that waters of the Sarasota Bay system are among the richest on the Florida west coast in terms of invertebrate variety and abundance". Scallops and hard clams were noted as local fisheries. In Tampa Bay, the list also included squid (Lolliguncula) and sunray venus (Macrocallista). Early bulkhead surveys in the bay were noted.

Reference: Woodburn, K.D. 1960. Sarasota County Marine Survey. Fla. State Bd. Conserv. Mar. Lab. FSBCML No. 60-15, CS No. 60-l.

Subject: Existing and potential shellfish areas.

Geographic Area: Sarasota County.

Sampling Date: 1960

Gear: Seine and pushnet.

Species Reported: Mercenaria campechiensis, Melongena corona, Strombus alatus, Pleuroploca gigantea, Fasciolaria tulipa.

Relation to This Study: Oyster predators included crown conchs, Florida horse conchs, and banded tulips, and were present throughout the study area. Buttonwood Harbor was recommended as a potentially good northern hard shell clam growing area because of suitable salinities, water depth, favorable bottom types, and limited urbanization.

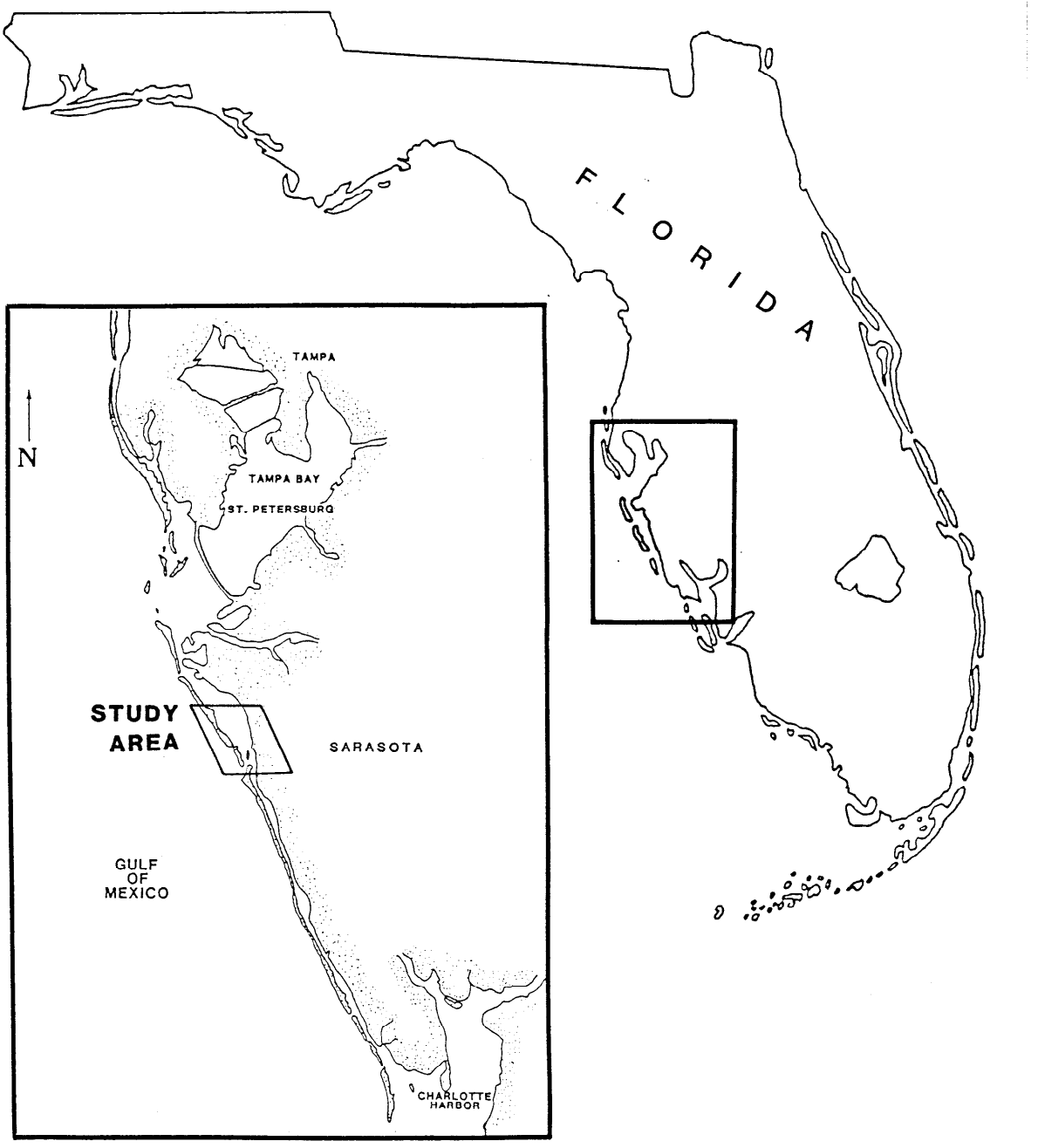


FIGURE 1. LOCATION OF SARASOTA BAY AND THE STUDY AREA

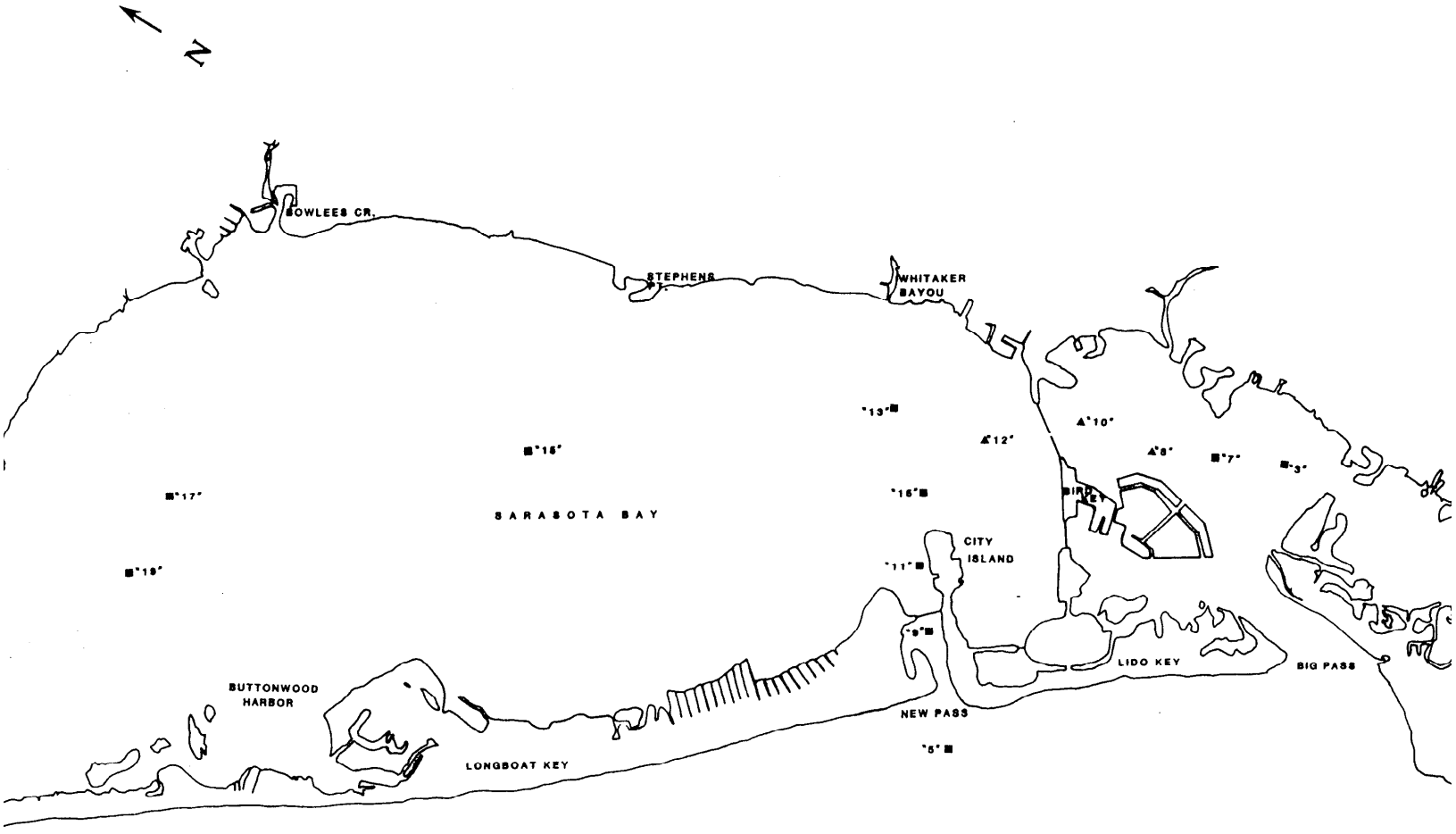


FIGURE 2. SARASOTA BAY AND PROMINENT LANDMARKS.

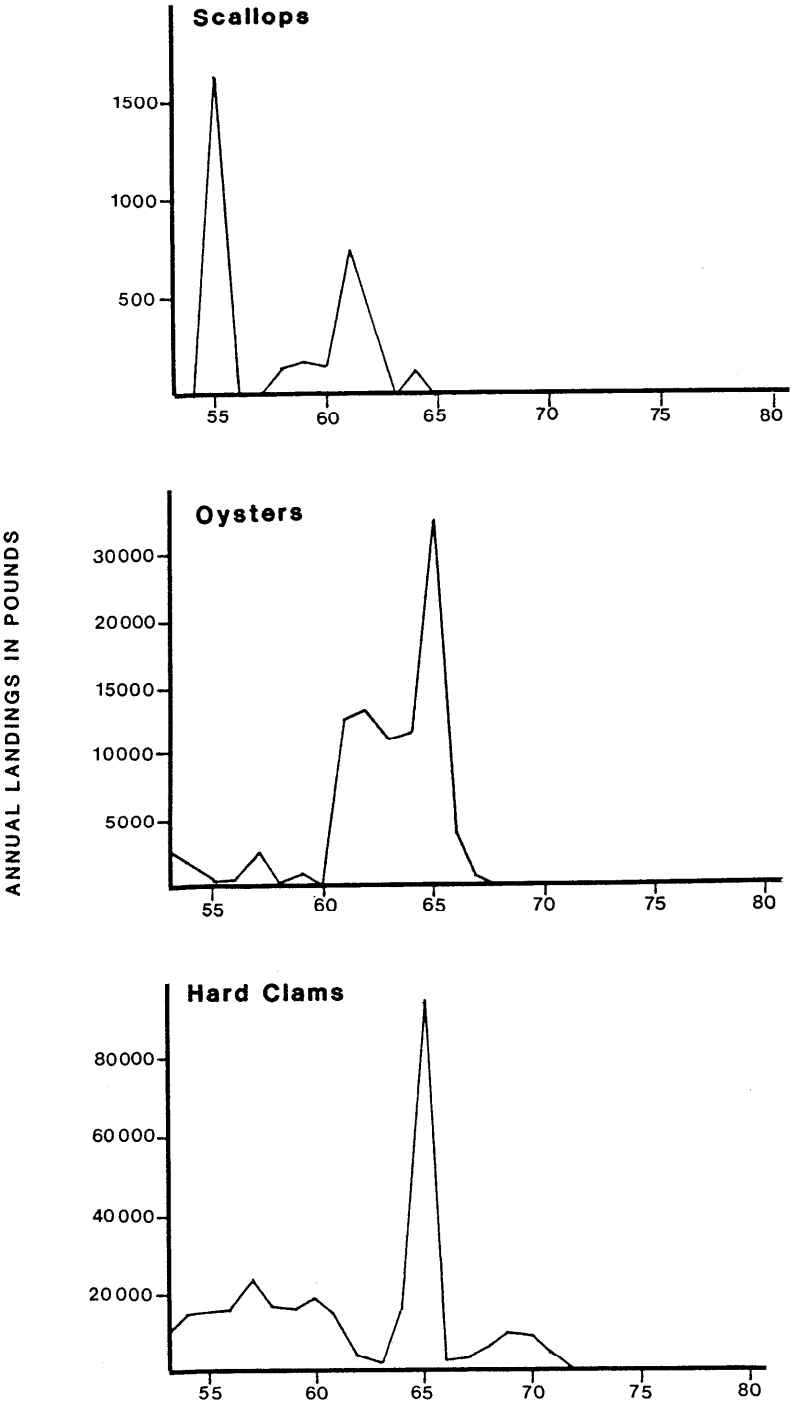


FIGURE 3. SARASOTA COUNTY MARINE LANDINGS, 1953 TO 1981

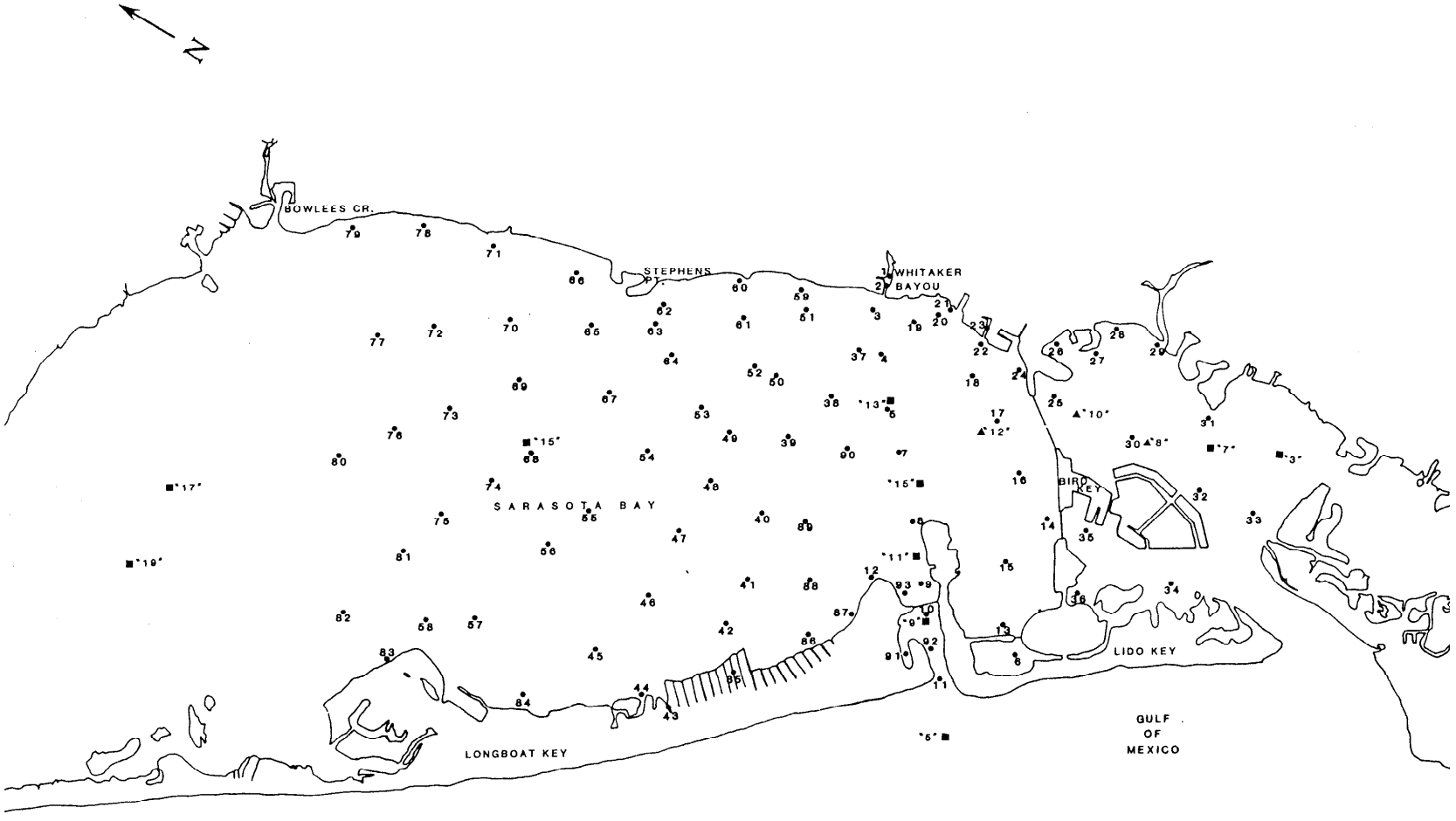


FIGURE 4. LOCATION OF SHELLFISH SURVEY STATIONS.

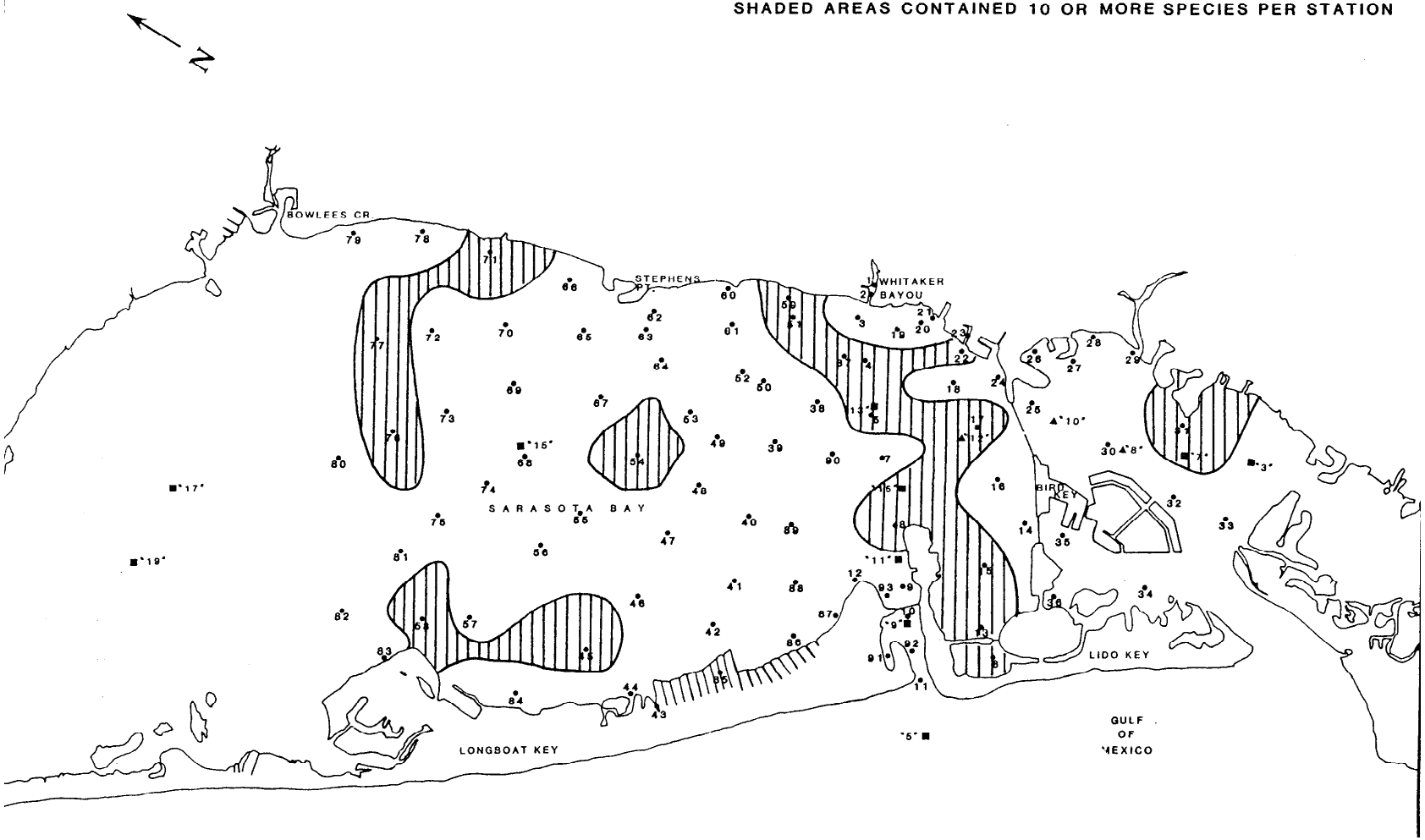


FIGURE 6. OVERALL PATTERN OF SPECIES RICHNESS.

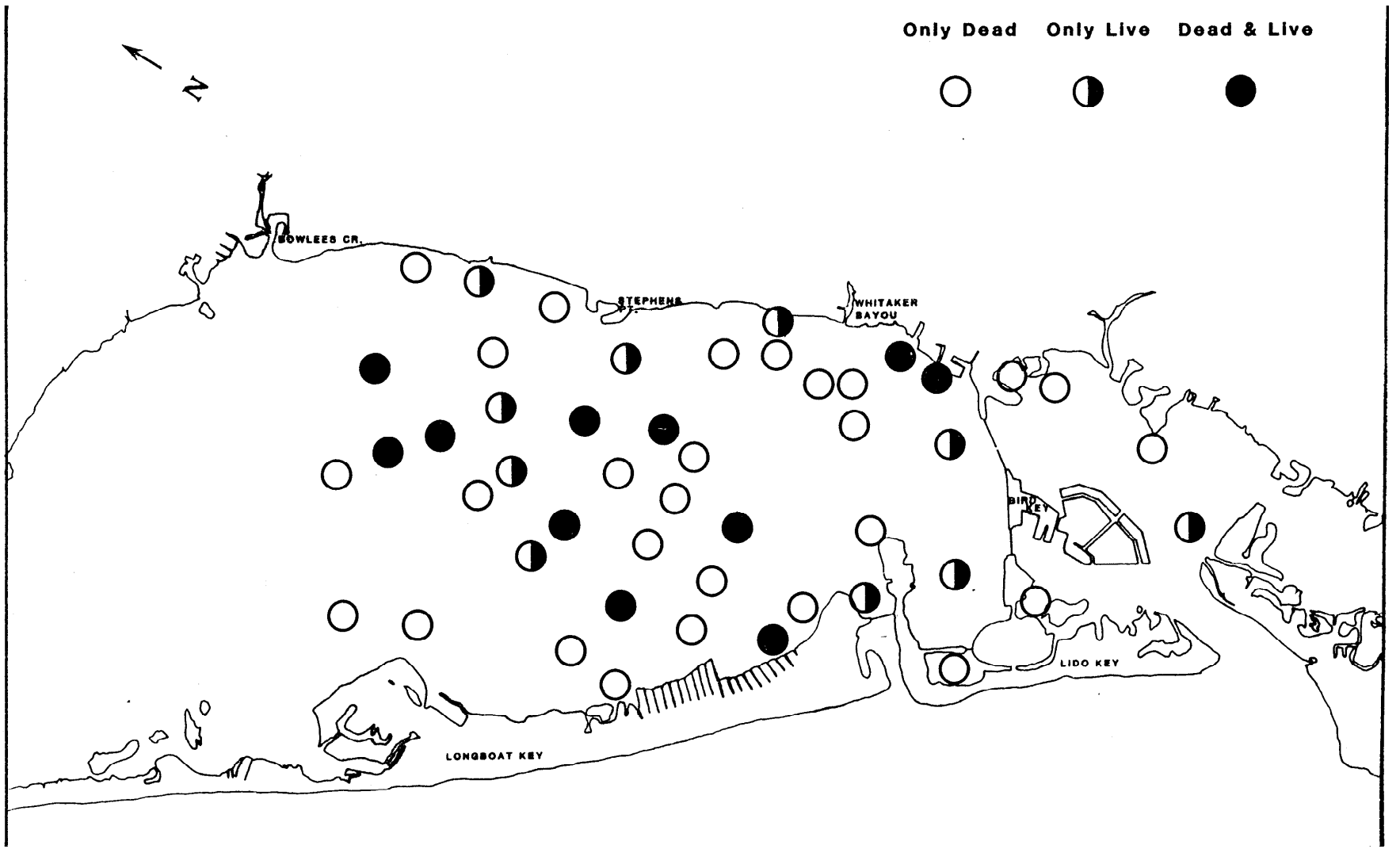


FIGURE 7. DISTRIBUTION OF THE HARD CLAM, MERCENARIA CAMPECHIENSIS.

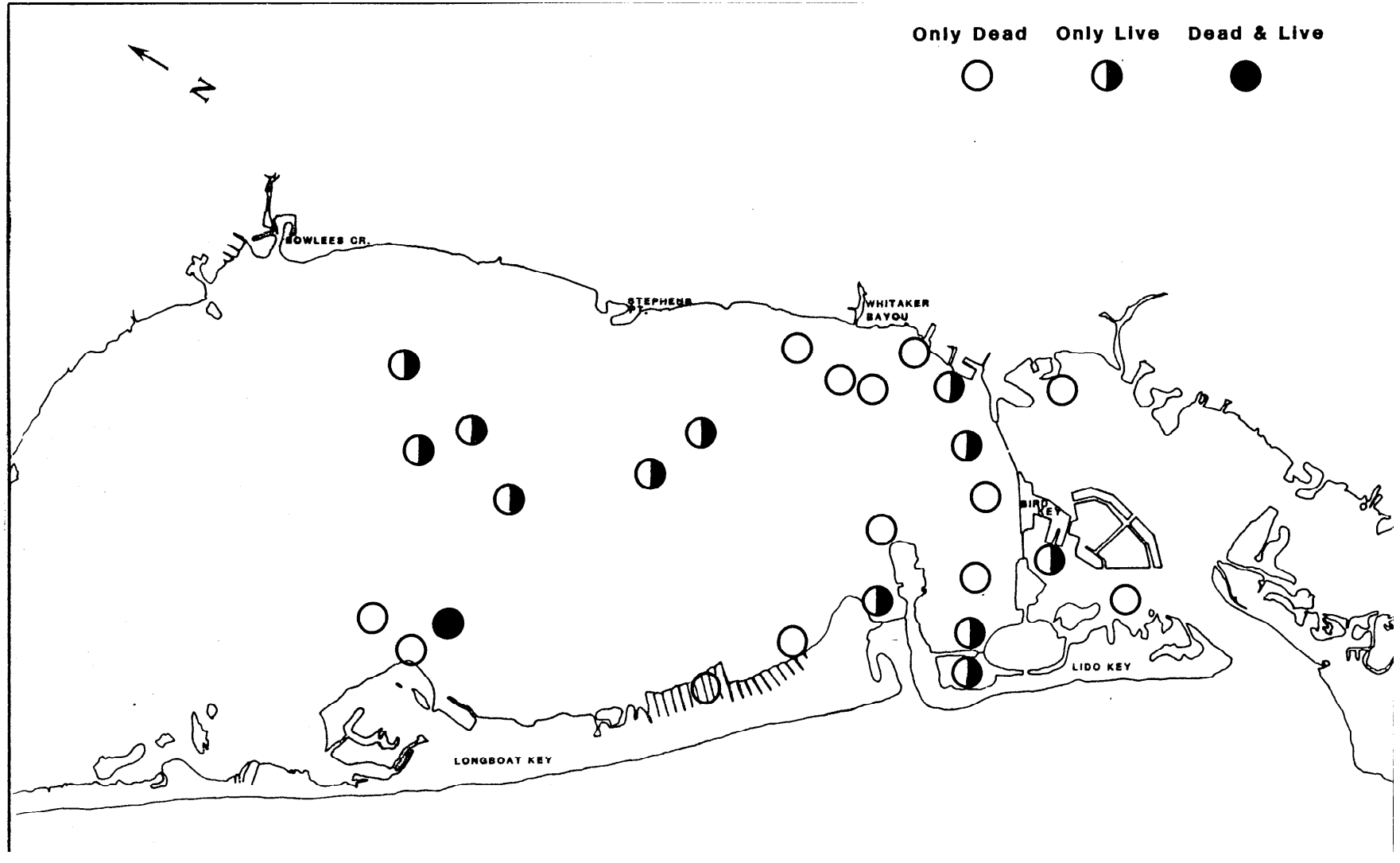


FIGURE 8. DISTRIBUTION OF THE CROSS-BARRED VENUS, CHIONE CANCELLATA.

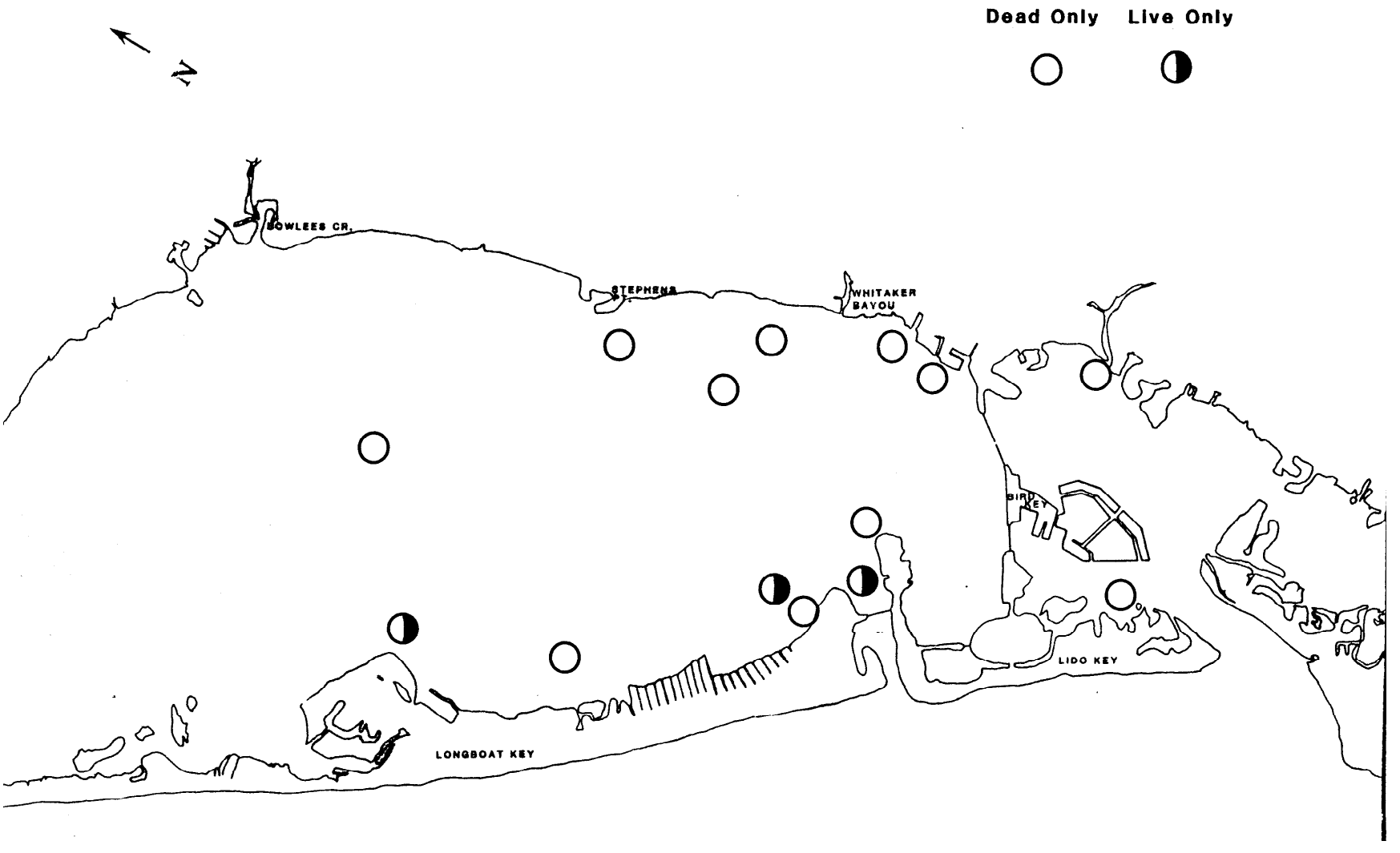


FIGURE 9. DISTRIBUTION OF THE SUNRAY VENUS, MACROCALLISTA NIMBOSA.

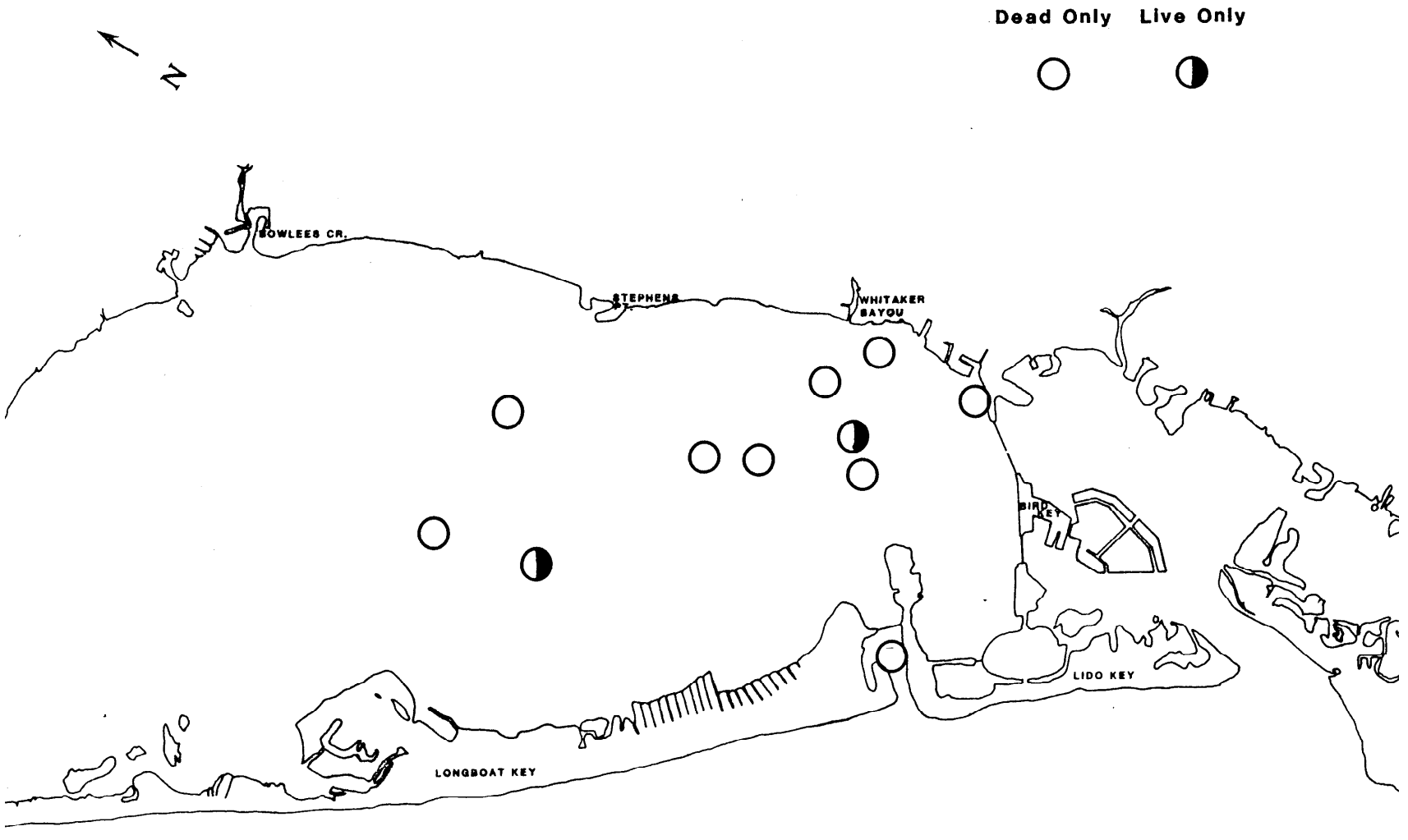


FIGURE 10. DISTRIBUTION OF THE COCKLE, DINOCARDIUM ROBUSTUM.

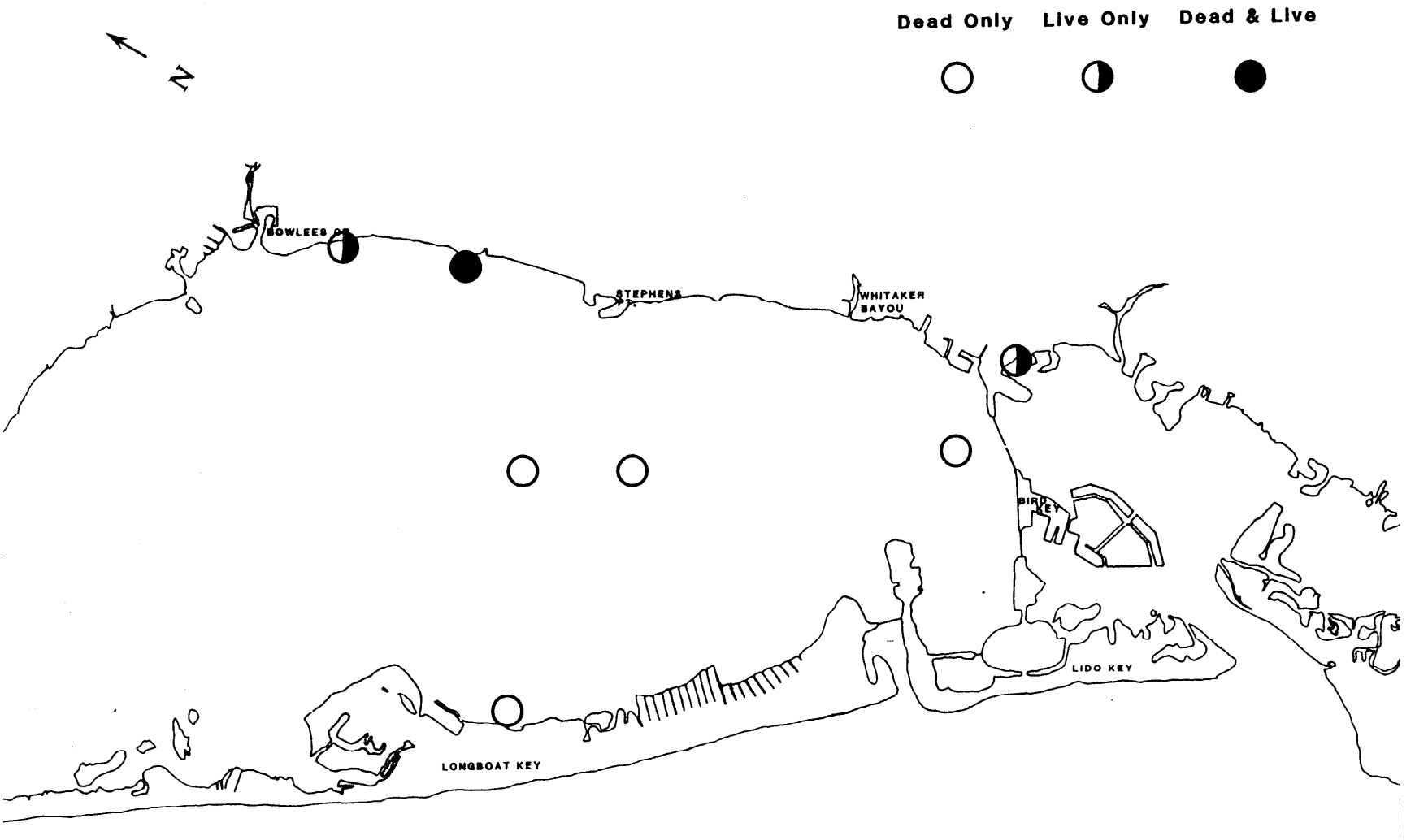


FIGURE 11. DISTRIBUTION OF THE EASTERN OYSTER, CRASSOSTREA VIRGINICA.

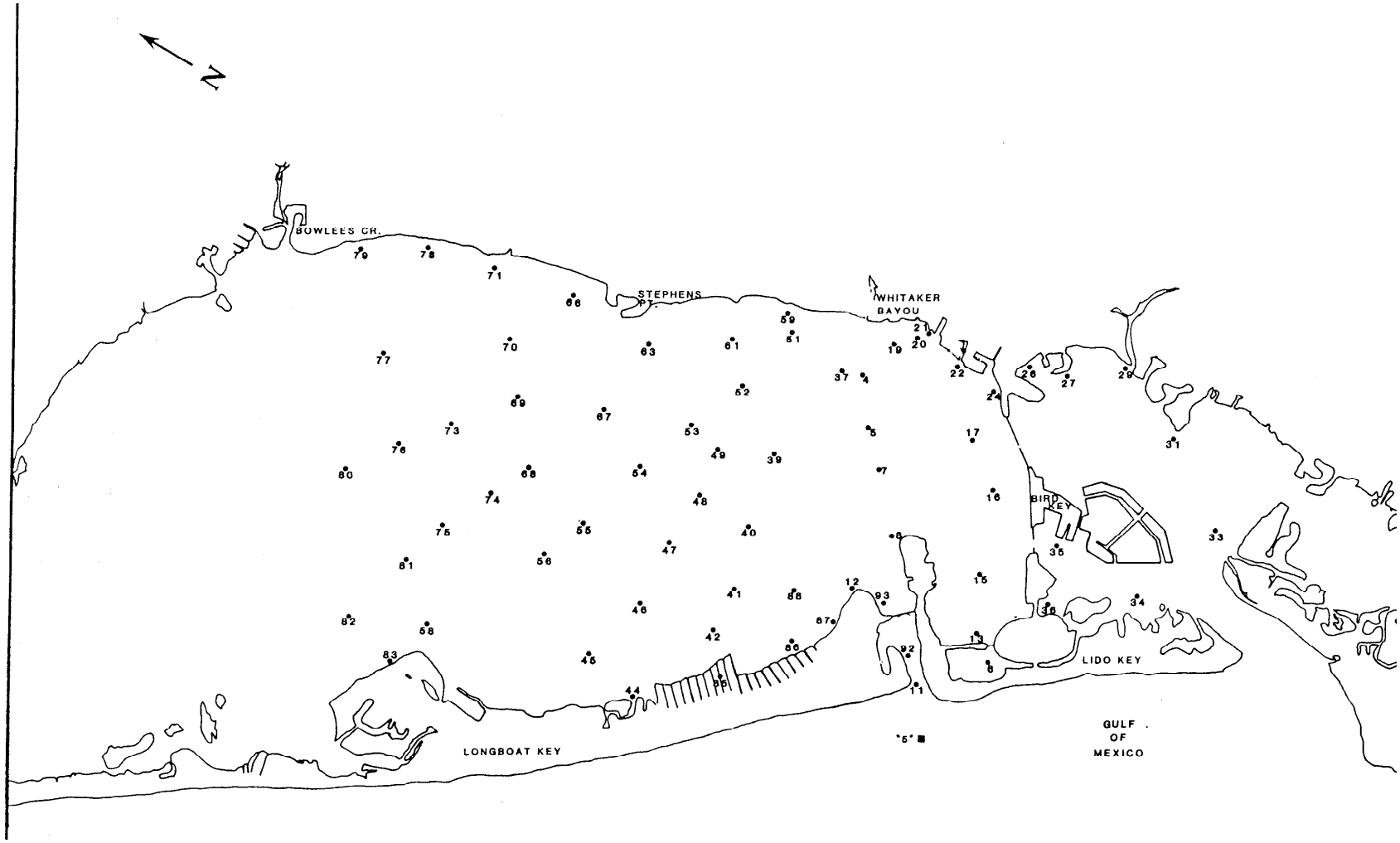


FIGURE 12. STATIONS WITH LIVE OR DEAD SPECIMENS OF COMMON **EDIBLE MOLLUSKS**

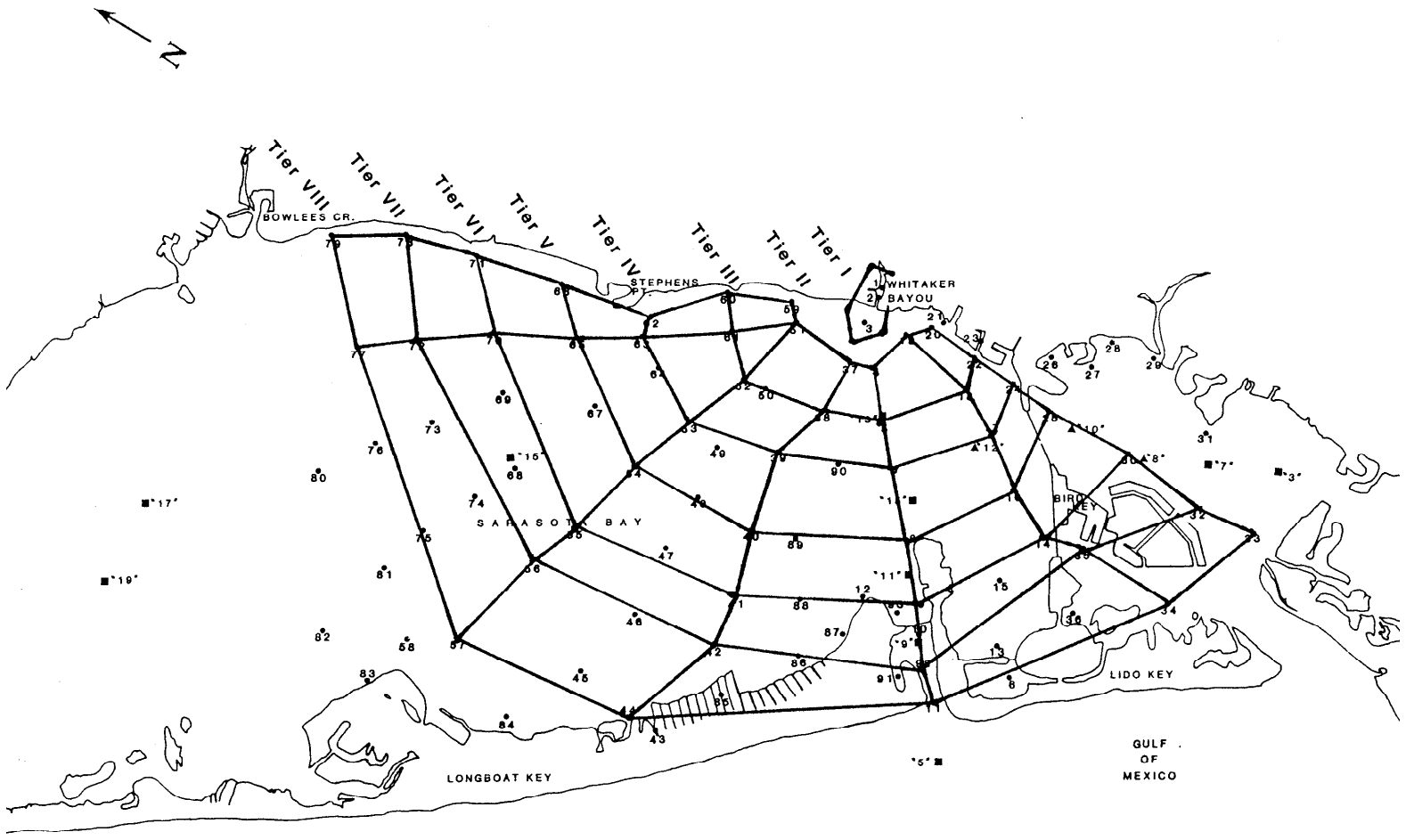


FIGURE 13. STATION NETWORK USED FOR TIER ANALYSES.

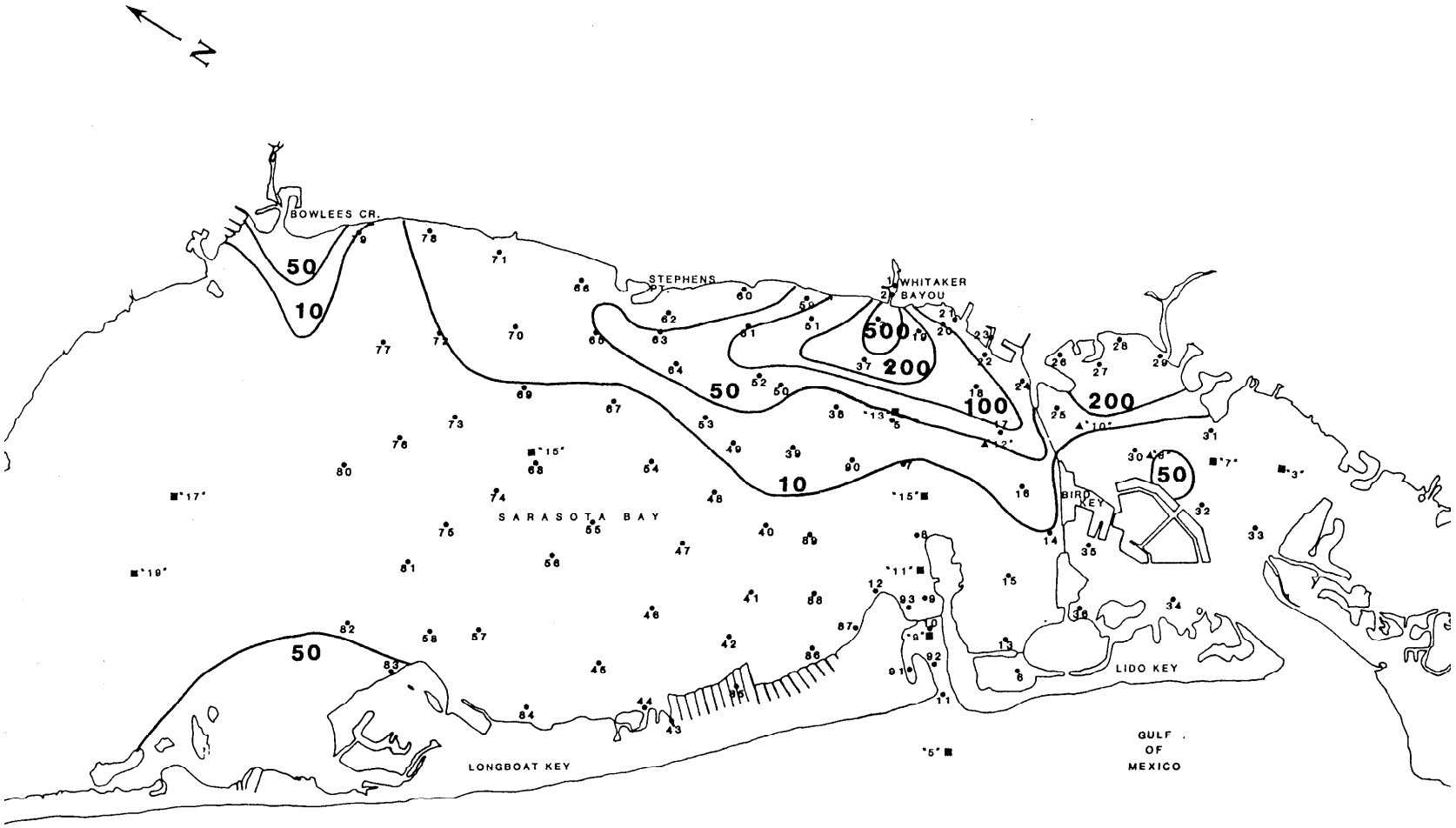


FIGURE 14. ISOPLETH MAP OF COPROSTANOL CONCENTRATION, NG/G DRY SEDIMENT.

Table 1. Distribution of 93 stations by government, water quality, and shellfish classification. All values are percent total.

Political Unit	Class II	Class III	Total
Sarasota County	80%	20%	16%
Longboat Key	100%	Not applicable	22%
City of Sarasota	33%	66%	55%
Manatee County	Not applicable	100%	7%
Overall	54%	46%	100%

Unclassified Stations	28 %
Conditionally Approved Stations	17 %
Prohibited Stations	55 %

Table 2. Molluscs of Sarasota Bay. This list is a compilation of Estevez and Bruzek (1986), Mahadevan et al. (1981), Conner (1974), Tiffany (1974), Godcharles and Jaap (1973) and Williams (no date). Underlined names were collected in this study. Names with an asterisk are considered edible or indicators of water quality. Inclusion of a species as edible does not mean it is safe to eat from any area of Sarasota Bay.

Abra aequalis
Acteocina canaliculata
Acteon punctostriatus
Aequipecten gibbus
**Aequipecten irradians
Amygdalum papyria
Anachis avara
Anachis obesa
Anachis floridana
Anachis sparsa
Anachis semiplicata
Anadara lienosa
Anadara ovalis
Anadara transversa
Anodontia alba
Anomalocardia cuneimeris
Anomia simplex
Arca zebra
Arcopsis adamsi
Atrina rigida
Atrina seminuda
Atrina serrata
**Atrina sp.
Barbatia candida
Batillaria minima
Bittium varium
Brachidontes exustus
Bulla occidentalis
Bulla striata
Bullata ovuliformis
**Busycon contrarium
Busycon spiratum
Callocardia texasiana
Cantharus tinctus
Cantharus multangulus
Cardita floridana
Cerithium floridanum
Cerithium muscarum
Cerithium variabile
Chaetopleura apiculata
Chama macerophylla
**Chione cancellata
Chione grus

Table 2. Molluscs of Sarasota Bay. continued.

Chione pygmaea
Columbella rusticoides
Conus floridanus
Conus jaspideus
Conus spurius
Conus stearnsi
Corbula barrattiana
Corbula contracta
Crassinella lunulata
Crassispira leucocyma
Crassispira mesoleuca
Crassispira tampaensis
**Crassostrea virginica
Crepidula aculeata
Crenidula convexa
**Crepidula fornicata
Crepidula maculosa
Crepidula plana
Cumingia antillarum
Cumingia tellinoides
Cymatoica orientalis
Cyclinella tenuis
Cylichna bidentata
Dentalium pilsbryi
**Dinocardium robustum vanhyningi
Donax variabilis
Dosinia discus
Dosinia elegans
Ensis minor
Epitonium humphreysi
Eupleura caudata
Eupleura sulcidentata
Fasciolaria hunteria
Fasciolaria tulipa
Ficus communis
Haminoea antillarum
Haminoea solitaria
Haminoea succinea
Hyalina avenacea
Hyalina pallida
Hyalina veliei
Ischadium recurvum
Ischnochiton papillosus
Laevicardium laevigatum
Laevicardium mortoni
Laevicardium pictum
Lucina amiantus
Lucina floridana
Lucina multilineata
Lucina nassula
Lucina pensylvanica
Lucina radians

Table 2. Molluscs of Sarasota Bay. continued.

Lyonsia floridana
Lyonsia hyalina
Macoma brevifrons
**Macoma constricta
Macoma tenta
Macrocallista maculata
**Macrocallista nimbosa
Mactra fragilis
Mangelia stellata
Marginella apicina
Marginella aureocincta
Melanella sp.
**Melongena corona
Mercenaria campechiensis
**Mercenaria sp.
Mitrella lunata
Modiolus americanus
Modiolus squamosus
Modulus carchedonius
Modulus modulus
Mulinia lateralis
Murex pomum
**Musculus lateralis
Mysella planulata
Nassarius vibex
Natica canrena
Natica pusilla
Neritina reclivata
Niso interrupta
**Noetia ponderosa
Nucula proxima
Nuculana acuta
Nuculana crenulata
Odostomia bisuturalis
Odostomia impressa
Oliva sayana
Olivella floralia
Olivella blanesi
Olivella minuta
Olivella mutica
Olivella pusilla
Ostrea equestris
Ostrea frons
Pandora bushiana
Parastarte triquetra
Periploma margaritaceum
Persicula lavelleeana
Petaloconchus varians
Pitar simpsoni
Pitar fulminata
**Pleuroploca gigantea
Polinices duplicatus

Table 2. Molluscs of Sarasota Bay. continued.

Polymesoda maritima
Prunum apicinum
Prunum guttatum
Pseudocyrena floridana
Pseudoneptunea multangula
Pteria colymbus
Pyramidella crenulata
Raeta plicatella
Retusa canaliculata
Rissoina catesbyana
Rupellaria typica
Semele bellastriata
Semele proficua
Solemya occidentalis
**Spisula solidissima raveneli
Spisula solidissima similis
Strigilla mirabilis
Tagelus divisus
**Tagelus plebeius
Tectonatica pusilla
Tellidora cristata
Tellina alternata
Tellina iris
Tellina lineata
Tellina magna
Tellina mera
Tellina tampaensis
Tellina tayloriana
Tellina texana
Tellina versicolor
Terebra concava
Terebra dislocata
Terebra protexta
**Trachycardium egmontianum
Trachycardium muricatum
Transennella conradina
Transennella cubaniana
Turbonilla dalli
Turbonilla hemphilli
Turbonilla incisa
Turritella exoleta
Urosalpinx perrugata
Vermicularia fargoi
Vermicularia spirata
Xenophora conchyliophora

Table 3. Most common mollusk species of southern Sarasota Bay, ranked in decreasing order.

1. *Mercenaria campechiensis*
2. *Nassarius vibex*
3. *Tellina lineata*
4. *Chione cancellata*
5. *Mulinea lateralis*
6. *Nuculana acuta*
7. *Lucina radians*
8. *Cardita floridana*
9. *Nucula proxima*
10. *Terebra dislocata*
11. *Macrocallista nimbosa*
12. *Laevicardium mortoni*
13. *Crepidula plana*
14. *Busycon contrarium*
15. *Dosinia discus*
16. *Tellidora cristata*
17. *Crepidula formicata*
18. *Prunum apicinum*
19. *Brachidontes exustus*
20. *Cerithium floridanum*

Table 4. Distribution of all mollusk species in southern Sarasota Bay.

	No. of Stations	Mean No. of Species/Station	S.D.
CLASS II WATERS			
Sarasota County	12	6.7	2.35
Longboat Key	20	4.4	3.39
City of Sarasota	17	7.3	4.50
Class II Overall:	49	6.0	3.78
CLASS III WATERS			
Sarasota County	3	7.0	1.00
City of Sarasota	34	6.6	4.54
Manatee County	7	9.3	4.23
Class III Overall:	44	7.1	4.39
SHELLFISH STATIONS			
Unclassified	26	6.1	4.45
Conditional	16	5.2	3.27
Prohibited	51	7.1	4.11

Table 5. Frequency distribution of potentially edible mollusks in southern Sarasota Bay.

Species	Number of Stations Species Found			
	Dead	Alive	Either	Rank
Mercenaria campechiensis	37	23	60	1
Chione cancellata	16	12	28	2
Macrocallista nimbosa	11	3	14	3
Crepidula fornicata	8	3	11	4
Dinocardium robustum vanhyningi	9	2	11	5
Crassostrea virginica	5	3	8	6
Busycon contrarium	3	3	6	7
Trachycardium egmontianum	3	1	4	8
Polinices duplicatus	2	1	3	9
Pleuroploca gigantea	2	1	3	10
Spisula solidissima raveneli	1	1	2	11
Donax variabilus	1	1	2	12
Busycon spiratum	2	0	2	13
Atrina sp.	2	0	2	14
Macoma constricta	1	0	1	15
Melongena corona	0	1	1	16
Aequipecten irradians	1	0	1	17
Tagelus plebius	1	0	1	18
Noetia ponderosa	1	0	1	19

Table 6. Distribution of the hard clam, Mercenaria campechiensis, in southern Sarasota Bay.

	Number Live	Number Dead	Number Both	All Cases	Percent of Total Stations
CLASS II WATERS					
Sarasota County	2	4	3	9	75%
Longboat Key	1	6	2	9	45%
City of Sarasota	2	5	0	7	41%
Class II Overall:	5	15	5	25	50%
CLASS III WATERS					
Sarasota County	1	0	2	3	100%
City of Sarasota	4	8	3	15	29%
Manatee County	1	2	2	5	71%
Class III Overall:	6	10	7	23	52%
SHELLFISH STATUS					
Unclassified	3	6	1	10	38%
Conditional	0	6	2	8	50%
Prohibited	7	14	9	30	59%

Table 7. Distribution of all mollusk species in southern Sarasota Bay in relation to Whitaker Bayou.

TIER	No. Stations	Mean No. Species/Tier	S.D.	Total No. Unique Species/Tier
1	3	1.33	2.3	4
2	6	12	5.4	41
3	7	7.7	4.15	33
4	7	6.3	4.35	27
5	7	7.4	3.5	35
6	7	5.7	4.5	28
7	7	4.1	2.19	20
8	7	6.6	4.7	32
COPROSTANOL				
>10 ng/g	41	0.7	4.5	
<10 ng/g	52	6.3	3.8	

Table 8. Effect of distance from Whitaker Bayou, and coprostanol, on Mercenaria distribution in southern Sarasota Bay.

Distance Tier	No. of Stations	No. Live	No. Dead	No. Both	Total	Percent
1	3	0	0	0	0	0%
2	6	1	3	1	5	83%
3	7	0	2	1	3	43%
4	7	2	0	1	3	43%
5	7	1	2	1	4	57%
6	7	0	2	1	3	43%
7	7	1	2	0	3	43%
8	7	1	1	1	3	43%
COPROSTANOL						
> 10 ng/g	41	6	10	3	19	46%
< 10 ng/g	52	5	15	9	29	56%

APPENDIX

Table A. LORAN Coordinates for Mollusk Stations Sampled in Sarasota Bay.

Table B. Sarasota Bay Mollusk Study - Abiotic Data.

Table C. Names and Species Codes of Mollusks Collected from Sarasota Bay, May 1986.

Table D. Station Reports. See Table C for species names. D, dead specimen; L, live specimen; P, petite Ponar; D, dredge; 0, observed by diver.

Table A. LORAN coordinates for mollusk stations sampled in Sarasota Bay.

Station	LORAN Coordinates		Station	LORAN Coordinates	
1	14182.0	44432.2	28	14179.3	44409.1
2	14181.8	44423.6	29	14178.6	44407.8
3	14181.6	44424.5	30	14177.1	44413.0
4	14180.7	44425.8	31	14177.1	44406.9
5	14179.5	44427.4	32	14175.6	44410.7
6	14173.7	44427.4	33	14175.1	44408.2
7	14178.5	44428.1	34	14174.0	44416.7
8	14177.0	44429.8	35	14175.1	44418.9
9	14176.0	44430.8	36	14174.5	44421.6
10	14174.9	44433.1	37	14180.9	44427.0
11	14173.6	44433.0	38	14180.1	44430.1
12	14176.2	44434.2	39	14179.4	44434.6
13	14174.2	44427.5	40	14177.9	44439.1
14	14175.8	44421.5	41	14176.9	44442.3
15	14175.7	44426.2	42	14176.0	44445.4
16	14177.1	44421.3	43	14174.8	44450.8
17	14178.4	44421.O	44	14175.2	44451.1
18	14179.0	44420.8	45	14176.1	44454.8
19	14180.5	44422.3	46	14177.0	44448.9
20	14180.8	44420.7	47	14178.0	44445.1
21	14181.0	44419.9	48	14179.0	44441.1
22	14180.1	44419.2	49	14180.0	44438.2
23	14180.5	44418.4	50	14180.9	44433.0
24	14179.2	44417.2	51	14182.0	44428.9
25	14178.2	44416.3	52	14181.3	44434.0
26	14179.6	44415.0	53	14180.7	44439.1
27	14179.2	44411.9	54	14180.1	44444.0

Table **A.** Continued.

Station	LORAN Coordinates		Station	LORAN Coordinates	
55	14179.2	44449.0	82	14178.6	44470.9
56	14178.6	44453.9	83	14177.7	44467.0
57	14177.4	44460.9	84	14175.8	44459.7
58	14177.9	44463.8	85	14175.0	44445.5
59	14182.4	44428.1	86	14175.3	44440.1
60	14183.0	44432.2	87	14175.5	44436.4
61	14182.3	44433.0	88	14176.5	44438.0
62	14183.2	44437.9	89	14177.5	44436.6
63	14182.7	44438.9	90	14178.8	44431.0
64	14182.0	44438.9	91	14174.3	44434.5
65	14183.2	44443.0	92	14174.3	44433.1
66	14184.2	44442.1	93	14175.4	44432.4
67	14181.2	44444.5			
68	14181.0	44450.2			
69	14182.5	44448.9			
70	14183.7	44448.0			
71	14185.3	44446.2			
72	14184.3	44453.1			
73	14182.4	44455.1			
74	14180.5	44455.0			
75	14180.0	44459.0			
76	14182.5	44459.1			
77	14184.4	44456.5			
78	14186.0	44450.0			
79	14186.7	44454.9			
80	14182.4	44464.8			
81	14179.5	44464.1			

Table B. SARASOTA BAY MOLLUSK STUDY - ABIOTIC DATA

STA.	DEPTH (ft)	SUR/BOT	SAL. (ppt)	TEMP. (C)	D.O. (ppm)
1	6.4	S	25.36	24.95	4.6
1	6.4	B	34.05	24.05	6.6
2	I	I	I	I	I
3	5.9	S	34.51	24.35	7.5
3	5.9	B	34.70	24.22	7.6
4	12.0	S	34.70	24.15	7.8
4	12.0	B	35.07	22.50	8.1
5	11.7	S	35.04	23.67	8.1
5	11.7	B	35.25	22.25	8.7
6	2.4	S	35.00	25.58	7.8
6	2.4	B	35.02	25.32	7.8
7	7.0	S	35.27	25.95	9.5
7	7.0	B	35.22	22.62	8.7
8	14.9	S	32.23	22.55	8.3
8	14.9	B	35.44	22.08	8.2
9	10.7	S	35.28	22.30	8.5
9	10.7	B	35.30	21.97	8.6
10	6.2	S	35.03	23.20	8.6
10	6.2	B	35.22	22.35	8.8
11	I	I	I	I	I
12	4.2	S	35.35	25.76	13.4
12	4.2	B	35.36	25.80	13.4
13	2.5	I	35.28	23.16	6.0
13	2.5	B	35.13	21.50	3.7
14	15.9	S	35.16	23.12	8.3
14	15.9	B	35.11	22.78	8.2
15	2.0	S	34.97	22.43	4.9
15	2.0	B	35.15	22.36	5.2
16	6.2	S	35.11	23.82	7.8
16	6.2	B	35.00	23.45	8.0
17	8.5	S	35.19	24.31	8.1
17	8.5	B	34.96	24.06	8.1
18	9.8	S	34.87	24.46	8.1
18	9.8	B	35.00	24.19	7.1
19	9.9	S	34.93	24.73	8.1
19	9.9	B	35.04	23.00	8.2
20	8.5	S	34.86	24.82	8.0
20	8.5	B	34.65	24.66	8.0
21	I	I	I	I	I
22	8.2	S	34.35	25.66	7.8
22	8.2	B	34.27	24.60	7.8
23	3.7	S	34.42	26.71	9.6
23	3.7	B	34.58	25.86	9.8
24	3.9	S	34.85	25.90	7.9
24	3.9	B	34.64	25.81	8.3
25	14.2	S	34.70	25.35	8.0
25	14.2	B	34.94	23.55	8.3
26	I	I	I	I	I

Table B. (cont.) SARASOTA BAY MOLLUSK STUDY - ABIOTIC DATA

STA.	DEPTH (ft)	SUR/BOT	SAL. (ppt)	TEMP. (C)	D.O. (ppm)
27	3.0	S	34.80	26.55	8.9
27	3.0	B	34.68	25.37	9.6
28	4.0	S	34.84	26.15	9.7
28	4.0	B	34.50	26.05	9.7
29	4.6	S	34.75	26.11	8.5
29	4.6	B	34.73	26.00	8.8
30	9.7	S	35.04	23.94	8.4
30	9.7	B	35.25	23.03	8.7
31	5.7	S	35.28	23.92	9.0
31	5.7	B	34.66	23.88	9.2
32	7.8	S	35.28	23.27	8.7
32	7.8	B	35.29	23.05	8.9
33	3.6	S	35.35	23.27	8.5
33	3.6	B	35.33	23.26	8.8
34	12.8	S	35.27	24.90	9.8
34	12.8	B	35.36	22.74	9.5
35	12.9	S	35.25	24.95	9.4
35	12.9	B	35.19	23.26	9.3
36	5.4	S	35.36	24.55	8.8
36	5.4	B	35.24	23.72	9.2
37	10.5	S	35.00	24.31	8.0
37	10.5	B	35.00	24.17	7.9
38	10.8	S	34.97	23.77	8.2
38	10.8	B	35.13	23.01	8.0
39	9.4	S	35.26	23.65	8.3
39	9.4	B	35.07	23.45	8.0
40	10.9	S	35.05	23.02	8.2
40	10.9	B	35.45	21.64	8.3
41	10.0	S	35.17	23.53	8.3
41	10.0	B	35.28	22.64	8.2
42	9.3	S	35.28	24.65	8.0
42	9.3	B	35.23	24.35	7.9
43	9.7	S	34.75	25.34	6.4
43	9.7	B	35.31	24.43	5.6
44	I	I	I	I	I
45	2.1	S	35.16	26.57	11.8
45	2.1	B	35.20	26.48	11.9
46	10.1	S	35.08	25.21	8.0
46	10.1	B	35.15	24.85	8.2
47	11.4	S	34.92	24.76	7.9
47	11.4	B	34.95	24.60	8.1
48	10.6	S	34.92	24.66	8.3
48	10.6	B	34.97	24.28	8.0
49	10.7	S	35.04	24.76	8.2
49	10.7	B	35.03	24.20	8.3
50	11.4	S	35.15	25.00	8.6
50	11.4	B	35.14	24.65	8.8
51	8.0	S	35.02	25.45	8.5

Table B. (cont.) **SARASOTA BAY MOLLUSK STUDY** - ABIOTIC **DATA**

STA.	DEPTH (ft)	SUR/BOT	SAL. (ppt)	TEMP. (C)	D.O. (ppm)
51	8.0	B	35.02	25.45	8.6
52	11.0	S	35.11	25.32	9.0
52	11.0	B	35.26	25.18	8.9
53	11.4	S	35.02	25.18	9.3
53	11.4	B	35.16	24.92	9.4
54	9.4	S	34.98	25.06	8.8
54	9.4	B	35.03	24.92	8.9
55	12.2	S	35.16	25.37	8.4
55	12.2	B	35.28	25.18	8.4
56	10.5	S	35.05	25.55	8.6
56	10.5	B	35.06	24.68	8.7
57	8.1	S	35.20	26.18	9.2
57	8.1	B	35.05	26.02	9.3
58	2.7	S	35.22	27.28	12.7
58	2.7	B	35.36	27.37	13.2
59	2.0	S	33.69	25.55	5.2
59	2.0	B	34.54	25.71	4.7
60	5.5	S	34.28	25.26	6.0
60	5.5	B	34.82	25.44	5.2
61	9.0	S	34.75	25.17	8.0
61	9.0	B	34.94	25.19	7.9
62	5.2	S	34.79	25.55	7.3
62	5.2	B	34.85	25.50	7.2
63	8.2	S	35.05	25.64	8.6
63	8.2	B	35.06	25.64	8.5
64	10.2	S	35.02	25.68	8.5
64	10.2	B	35.00	25.11	8.5
65	6.8	S	35.11	26.05	8.4
65	6.8	B	35.19	25.92	8.4
66	4.6	S	35.02	26.59	8.5
66	4.6	B	34.86	26.31	8.5
67	10.3	S	35.14	25.80	8.8
67	10.3	B	34.84	25.36	8.8
68	11.2	S	35.16	26.14	8.0
68	11.2	B	35.12	25.75	8.2
69	9.2	S	34.80	26.29	8.3
69	9.2	B	34.93	26.29	8.4
70	8.2	S	35.15	26.41	8.2
70	8.2	B	35.25	26.27	8.3
71	2.0	S	35.20	27.90	11.1
71	2.0	B	35.17	27.86	11.1
72	6.9	S	35.34	26.53	8.3
72	6.9	B	35.40	26.48	8.4
73	10.7	S	34.84	26.31	8.2
73	10.7	B	35.16	26.25	8.4
74	12.0	S	35.12	26.22	8.5
74	12.0	B	35.24	26.03	8.4
75	9.0	S	35.18	26.27	8.9

Table B. (cont.) **SARASOTA BAY MOLLUSK STUDY - ABIOTIC DATA**

STA.	DEPTH (ft)	SUR/BOT	SAL. (ppt)	TEMP. (C)	D.O. (ppm)
75	9.0	B	35.25	26.10	8.9
76	10.6	S	35.21	26.28	8.4
76	10.6	B	35.19	26.21	8.5
77	8.3	S	34.90	26.57	8.7
77	8.3	B	35.25	26.64	8.7
78	2.5	S	35.54	28.34	10.7
78	2.5	B	35.37	28.38	10.6
79	I	I	I	I	I
80	11.5	S	35.29	25.33	7.8
80	11.5	B	35.30	25.32	7.9
81	8.2	S	35.45	25.33	8.3
81	8.2	B	35.27	25.22	8.2
82	2.5	S	35.47	25.42	8.0
82	2.5	B	36.36	25.49	8.0
83	I	I	I	I	I
84	2.0	S	35.63	25.11	6.6
84	2.0	B	35.46	25.01	6.6
85	7.5	S	35.03	26.19	6.9
85	7.5	B	35.42	24.87	7.7
86	2.5	S	35.45	25.09	12.0
86	2.5	B	35.27	25.05	12.1
87	I	I	I	I	I
88	7.0	S	35.15	24.13	8.5
88	7.0	B	35.29	23.68	8.8
89	9.3	S	35.31	25.44	9.0
89	9.3	B	35.20	23.30	8.8
90	5.6	S	35.20	24.75	8.8
90	5.6	B	35.49	24.57	8.4
91	15.2	S	35.15	25.00	8.8
91	15.2	B	35.23	23.18	8.2
92	I	I	I	I	I
93	I	I	I	I	I

Table C. Names and species codes of mollusks collected from Sarasota Bay, May 1986.

Name	Species Code
Abra aequalis	1
Acteocina canaliculata	2
Anachis floridana	3
Anachis obesa	4
Anodontia alba	98
Anomia simplex	5
Arcopsis adamsi	6
Aequipecten irradians	7
Atrina sp.	91
Barbatia candida	95
Batillaria minima	8
Bittium varium	9
Brachidontes exustus	88
Bulla striata	10
Busycon contrarium	11
Busycon spiratum	12
Cantharus tinctus	90
Cardita floridana	13
Cerithium floridanum	14
Cerithium muscarum	15
Chione cancellata	16
Chione pygmaea	17
Columbella rusticoides	18
Conus floridana	20
Conus spurius	21
Corbula contracta	22
Crassinella lunulata	23
Crassispira leucocyma	24
Crassospira tampaensis	25
Crassostrea virginica	92
Crepidula aculeata	26
Crepidula convexa	27
Crepidula fornicata	28
Crepidula maculosa	29
Crepidula plana	30
Cymatoica orientalis	31
Dentalium pilsbryi	32
Dinocardium robustum vanhyningi	33
Donax variabilus	34
Dosinia discus	35
Dosinia elegana	36
Fasciolaria hunteri	37
Fasciolaria tulipa	38
Ischadium recurvum	39
Laevicardium mortoni	40
Laevicardium pictum	41
Lucina nassula	43

Table C. Continued.

Name	Species Code
Lucina radians	44
Lyonsia hyalina floridana	45
Macoma constricta	46
Macrocallista nimbosa	86
Mactra fragilis	47
Mangelia stellata	48
Melampus monilus	49
Melanella sp.	50
Melongena corona	96
Mercenaria campechiensis	51
Modiolus americanus	56
Modulus modulus	52
Mulinea lateralis	53
Musculus lateralis	89
Nassarius vibex	54
Natica canrena	55
Noetia ponderosa	94
Nucula proxima	57
Nuculana acuta	58
Odostomia bisuturalis	59
Oliva sayana	60
Olivella mutica	61
Ostrea equestris	62
Pandora bushiana	63
Periploma margaritaceum	64
Pleuroploca gigantea	65
Polinices duplicatus	87
Polymesoda maritima	66
Prunum apicinum	67
Raeta plicatella	68
Solemya occidentalis	69
Spisula solidissima raveneli	70
Tagelus divisuss	71
Tagelus plebius	93
Tellidora cristata	72
Tellina alternata	73
Tellina lineata	74
Tellina magna	97
Tellina mera	75
Tellina versicolor	76
Terebra dislocata	77
Terebra protexta	78
Trachycardium egmontianum	79
Trachycardium muricatum	80
Turbonilla dalli	81
Turbonilla hemphilli	82
Turbonilla incisa	83
Turritella exoleta	84
Vermicularia fargoi	85

Table D. SARASOTA BAY MOLLUSK STUDY STATION DATA

STA.	CODE	COND	GEAR
3	8	D	P
3	54	L	P
3	71	D	P
3	72	L	P
4	6	D	P
4	16	D	D
4	16	D	P
4	21	D	P
4	22	L	P
4	29	L	P
4	30	D	P
4	35	D	P
4	36	D	D
4	36	D	P
4	40	D	P
4	44	D	P
4	51	D	D
4	51	D	P
4	53	L	P
4	54	L	P
4	57	L	P
4	58	D	P
4	61	L	P
4	79	D	P
4	79	D	D
4	89	D	P
5	11	L	O
5	28	L	0
5	32	L	0
5	33	L	D
5	35	L	0
5	36	L	P
5	51	D	0
5	53	D	P
5	54	L	0
5	57	L	P
5	58	L	P
5	68	L	P
5	71	D	0
5	72	L	D
5	87	L	0
6	12	D	0
6	13	D	P
6	16	L	P
6	20	D	P
6	20	L	P
6	35	D	D
6	35	L	P
6	41	L	P
6	51	D	O
6	54	L	P
6	57	L	P
6	65	D	P
6	67	L	P
6	74	L	P
6	84	D	P
6	85	D	P
7	33	D	P
7	44	D	P
7	54	L	P
7	74	D	P
8	13	D	P
8	16	D	0
8	28	D	P
8	37	L	O
8	51	D	0
8	57	D	P
8	66	D	P
8	74	L	P
8	86	D	O
8	88	D	P
8	95	D	P
10	70	L	P
12	47	D	O
12	54	L	P
12	67	L	P
12	91	D	0
13	10	D	O
13	12	D	O
13	13	D	P
13	13	D	O
13	14	L	P
13	16	L	P
13	16	L	O
13	18	D	P
13	29	L	P
13	37	D	O
13	38	L	O
13	52	D	O
13	52	D	P
13	54	L	P
13	67	D	P
13	73	D	P
13	85	D	P
13	85	D	0
13	95	D	0

Table D. (Cont.) SARASOTA BAY MOLLUSK STUDY - STATION DATA

STA.	CODE	COND	GEAR
14	28	D	P
14	44	D	P
14	74	L	P
14	74	D	P
15	5	D	P
15	13	L	0
15	14	L	P
15	16	D	0
15	51	L	0
15	52	D	P
15	52	D	0
15	67	L	P
15	84	D	P
15	85	D	P
15	85	D	0
15	95	L	P
16	14	D	0
16	14	L	P
16	16	D	0
16	35	D	0
16	43	L	0
16	71	L	P
16	74	L	P
16	74	D	0
17	7	D	P
17	11	D	0
17	16	L	0
17	23	D	P
17	28	D	0
17	30	D	P
17	35	L	P
17	43	D	P
17	51	L	P
17	54	L	P
17	55	L	P
17	57	L	P
17	60	D	0
17	87	D	0
17	92	D	0
18	11	L	P
18	57	L	P
18	58	L	P
18	74	L	P
19	16	D	0
19	33	D	0
19	44	L	P
19	57	L	P
19	74	L	P
20	51	L	P
20	51	D	0
20	53	D	P
20	53	D	D
20	53	L	D
20	58	L	P
20	74	D	P
20	82	D	P
20	86	D	P
20	13	D	O
21	16	D	O
21	28	D	O
21	54	L	P
21	14	D	O
22	16	L	P
22	22	L	P
22	35	D	P
22	40	D	P
22	51	L	O
22	51	D	P
22	67	L	P
22	71	D	P
22	71	D	O
22	72	D	P
22	76	L	P
22	86	D	O
24	11	L	O
24	33	D	0
24	54	L	0
24	74	D	O
24	74	L	0
25	74	L	P
25	79	L	P
26	8	D	P
26	28	D	P
26	30	D	P
26	35	D	P
26	40	D	P
26	51	D	O
26	92	L	P
27	14	D	P
27	16	D	O
27	16	D	P
27	51	D	O
27	54	L	P
27	74	L	P
28	5	L	P
28	13	D	P

Table D. (cont.) SARASOTA BAY MOLLUSK STUDY - STATION DATA

STA	CODE	COND	YEAR
28	24	D	P
28	40	L	P
28	46	D	P
28	54	L	P
28	67	L	P
28	74	L	P
28	70	D	P
29	26	L	P
29	45	L	P
29	54	L	P
29	71	D	P
29	72	L	P
29	86	D	0
30	28	L	P
30	74	L	P
30	80	D	P
31	35	D	P
31	40	D	P
31	43	L	P
31	51	D	0
31	53	D	P
31	58	L	P
31	69	D	P
31	72	L	P
31	74	L	P
31	80	D	P
32	9	D	P
32	17	D	P
32	35	D	D
32	36	D	P
32	44	D	P
32	48	D	P
32	53	D	P
32	63	D	P
33	28	L	P
33	35	D	P
33	51	L	P
33	60	L	D
33	74	D	D
33	74	D	P
33	79	D	0
33	98	D	D
34	5	D	P
34	13	D	P
34	16	D	P
34	28	D	P
34	37	L	0
34	74	L	P

STA.	CODE	COND	GEAR
34	86	D	0
34	88	D	P
34	97	D	P
35	16	L	0
35	38	L	0
35	54	L	0
35	74	L	0
36	38	L	O
36	51	D	O
36	54	L	P
37	1	L	P
37	4	L	P
37	5	D	D
37	6	D	P
37	16	D	O
37	16	D	D
37	16	D	P
37	22	L	P
37	29	D	P
37	29	D	D
37	33	D	D
37	4O	D	O
37	51	D	O
37	51	D	P
37	51	D	D
37	54	L	P
37	57	L	P
37	68	D	D
37	68	D	0
37	73	D	0
37	74	L	P
37	94	D	0
38	11	L	O
38	44	D	P
38	72	D	P
39	33	D	0
39	54	L	P
39	58	L	P
39	77	L	P
40	34	L	O
40	44	D	0
40	51	L	O
40	51	D	O
40	57	L	P
40	58	L	P
40	72	D	P
40	74	L	P
41	2	L	P

Table D. (cont.) SARASOTA BAY MOLLUSK STUDY - STATION DATA

STA.	CODE	COND	GEAR
41	22	L	P
41	44	L	P
41	51	D	0
41	60	L	D
41	77	L	D
42	51	D	0
42	55	L	P
43	53	D	P
43	57	D	P
43	70	D	P
44	38	L	O
44	51	D	0
45	13	D	P
45	14	D	P
45	15	D	P
45	29	L	P
45	30	L	P
45	38	L	0
45	51	D	0
45	52	L	P
45	52	D	P
45	54	L	P
45	57	D	P
45	66	D	P
45	86	D	0
46	44	L	P
46	51	D	O
46	51	L	O
46	74	L	P
47	22	L	P
47	47	D	0
47	51	D	0
47	54	L	P
47	57	L	P
47	77	L	0
47	83	L	P
48	22	L	P
48	51	D	0
48	54	L	P
48	57	L	P
48	58	L	P
48	77	L	0
49	33	D	0
49	51	D	0
49	53	L	P
49	60	L	0
49	72	L	D
49	77	L	0
49	77	L	P
50	43	D	P
50	53	L	P
50	54	D	0
50	58	L	P
50	68	D	0
50	77	D	P
50	77	L	P
51	5	L	P
51	5	D	O
51	16	D	P
51	22	D	P
51	25	D	D
51	35	D	P
51	40	D	P
51	51	D	P
51	67	D	P
51	71	D	P
51	72	D	P
51	74	D	P
51	86	D	P
52	11	L	0
52	13	D	0
52	29	D	0
52	55	L	P
52	58	L	P
52	73	D	P
52	86	D	0
53	11	L	0
53	16	L	P
53	28	D	P
53	51	D	0
53	51	L	0
53	54	L	P
53	58	L	P
53	72	L	P
53	89	D	P
54	5	D	D
54	16	L	P
54	28	D	P
54	51	D	P
54	53	D	P
54	54	L	P
54	62	D	D
54	71	D	P
54	74	D	P
54	88	D	P
54	92	D	P

Table D. (cont.) SARASOTA BAY MOLLUSK STUDY - STATION DATA

STA.	CODE	COND	GEAR
54	93	D	D
55	22	L	P
55	26	D	P
55	51	D	O
55	51	L	O
55	54	L	P
55	58	D	P
55	74	L	P
55	88	D	P
56	33	L	P
56	51	L	P
56	53	D	P
56	58	L	P
57	44	L	P
57	53	L	P
57	58	L	P
57	73	D	0
57	77	L	0
58	11	D	0
58	11	L	0
58	13	L	0
58	15	L	0
58	16	L	0
58	16	D	P
58	29	L	0
58	37	L	0
58	40	D	0
58	40	L	P
58	51	D	0
58	52	D	P
58	56	D	0
58	65	D	0
58	74	L	P
58	86	L	0
59	11	L	0
59	14	D	P
59	26	D	P
59	29	D	P
59	30	D	P
59	40	D	P
59	50	L	P
59	51	L	0
59	54	D	P
59	54	L	P
59	61	L	P
59	65	L	0
59	66	D	P
59	76	L	P
59	88	L	P
59	91	D	O
60	1	D	P
60	2	L	P
60	9	D	P
60	53	D	P
60	58	L	P
60	74	D	P
61	9	D	P
61	13	D	O
61	22	L	P
61	31	L	P
61	51	D	0
61	57	L	P
61	68	D	0
61	74	D	P
62	53	L	P
62	77	L	P
63	2	D	P
63	14	D	P
63	51	L	P
63	51	L	0
63	53	L	P
63	71	L	P
63	74	L	P
63	86	D	0
64	54	L	P
64	57	L	P
64	58	L	P
64	67	L	P
65	53	D	P
65	58	L	P
65	67	L	P
65	53	L	P
65	77	L	0
66	9	D	P
66	30	D	P
66	51	L	P
66	53	L	P
66	58	L	P
66	65	L	0
66	66	D	P
66	77	L	P
66	88	L	P
67	1	D	P
67	11	L	0
67	40	D	P
67	51	L	0

Table D. (cont.) SARASOTA BAY MOLLUSK STUDY - STATION DATA

STA.	CODE	COND	GEAR
67	51	D	P
67	53	D	P
67	54	D	P
67	54	L	P
67	66	D	P
67	72	L	P
68	30	D	P
68	51	L	O
68	55	L	P
68	66	D	P
68	67	L	P
68	74	L	P
68	82	D	P
68	92	D	P
69	33	D	0
69	51	L	P
69	53	D	P
69	54	L	P
69	77	D	0
69	87	D	0
70	2	L	P
70	2	D	P
70	9	D	P
70	44	D	P
70	44	L	P
70	51	D	0
70	66	D	P
70	74	L	P
70	77	L	P
71	3	L	0
71	5	L	0
71	11	L	0
71	14	D	0
71	16	D	0
71	29	L	0
71	38	L	0
71	39	L	0
71	40	D	P
71	47	D	0
71	51	L	0
71	52	D	P
71	54	L	P
71	78	L	P
71	92	D	P
71	92	L	0
72	53	D	P
72	54	L	P
72	74	L	P
73	16	L	P
73	44	L	P
73	51	L	0
73	51	D	0
73	53	D	P
73	54	L	P
73	58	L	P
73	88	D	P
74	16	L	P
74	30	D	P
74	41	L	P
74	44	L	P
74	51	L	0
74	51	D	0
74	53	D	P
74	58	L	P
74	73	L	P
74	82	D	P
75	2	L	P
75	33	D	0
75	54	L	P
75	58	L	P
75	74	D	P
75	77	L	0
76	5	D	P
76	16	L	P
76	30	D	P
76	35	D	P
76	40	D	P
76	44	L	P
76	51	D	0
76	51	L	P
76	53	L	P
76	54	D	P
76	71	D	P
76	86	D	0
76	88	D	P
77	2	D	P
77	13	D	0
77	16	L	P
77	30	L	0
77	41	L	P
77	44	L	P
77	51	L	0
77	51	D	0
77	53	L	P
77	58	L	P
77	61	L	P

Table D. (cont.) SARASOTA BAY MOLLUSK STUDY STATION DATA

STA.	CODE	COND	GEAR
77	72	D	P
77	77	L	O
77	81	D	P
77	88	D	O
77	88	D	P
78	15	D	P
78	29	L	P
78	51	D	O
78	54	L	P
78	66	D	P
78	74	D	P
79	8	D	0
79	8	D	P
79	13	D	P
79	27	D	P
79	30	L	O
79	40	L	P
79	54	L	O
79	54	L	P
79	88	D	P
79	92	L	0
79	96	L	0
80	27	D	P
80	45	L	P
80	51	D	P
80	53	D	P
80	54	D	P
80	69	L	P
80	80	L	P
81	55	L	P
81	58	L	P
81	67	L	P
81	74	D	P
81	77	D	P
82	13	D	P
82	16	D	P
82	51	D	O
82	65	L	O
82	90	L	P
82	95	L	P
83	16	D	P
83	34	O	P
84	15	L	P
84	20	L	P
84	49	D	P
84	54	L	P
84	74	L	P
84	92	D	O

STA.	CODE	COND	GEAR
85	16	D	P
85	54	L	P
85	73	D	P
86	10	D	P
86	13	L	P
86	16	D	P
86	51	L	O
86	51	D	O
87	11	L	O
87	44	D	P
87	51	O	O
87	62	D	P
87	66	L	P
87	86	D	P
88	15	L	O
88	44	L	P
88	67	L	P
88	86	L	O
89	1	D	P
89	1	L	P
89	58	L	P
89	74	L	P
30	30	D	P
90	44	L	P
90	54	L	P
90	64	L	P
92	33	D	O
92	34	L	P
93	9	D	P
93	16	L	P
93	44	L	P
93	51	L	O
93	64	L	P
93	73	D	P
93	81	D	P
93	86	L	O