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NOAA Technical Report NMFS CIRC-368

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Cooperative Gulf of Mexico Estuarine Inventory and Study, Florida: Phase I, Area Description

J. KNEELAND McNULTY, WILLIAM N. LINDALL, JR.,
AND JAMES E. SYKES

SEATTLE, WA
November 1972

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COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY AND STUDY, FLORIDA: PHASE I, AREA DESCRIPTION

by

J. Kneeland McNulty,[1] William N. Lindall, Jr.,[1]
and James E. Sykes[2]

ABSTRACT

Newly-developed tables and maps depict the dimensions, submerged vegetation, tidal marshes, mangrove swamps, commercial oyster beds, leased oyster-rearing areas, sources of pollution, drained tidal marshes, and filled areas of Florida's west coast estuaries. Published and unpublished information on temperature, salinity, geology, artificial fishing reefs, stream discharge, human population, commercial fishing, and economic development is presented in new form.

If the total area of estuaries (3,003,312 acres = 1,215,440 ha) is considered to be the area of open water (2,081,525 acres = 842,393 ha) plus the area of mangrove swamps (393,160 acres = 159,112 ha) and tidal marshes (528,528 acres = 213,895 ha), then roughly one-half of the total area of estuaries is unvegetated; the remaining half is about equally divided among mangroves, tidal marshes, and submerged vegetation.

Human population in coastal counties increased from 614,616 persons in 1930 to 3,320,226 persons in 1970, resulting in adverse effects from pollution to 43 percent of estuarine areas, filling of 23,521 acres (9,519 ha) mainly for residential and industrial development, and draining of 26,676 acres (10,796 ha) of tidal marshes for mosquito control. Increasing population correlates directly with the number of sources of pollution, filled area, and the area closed to shellfishing by public health authorities; thus, failure to control the adverse effects of population growth will clearly result in continued rapid degradation of estuarine habitat on Florida's west coast.

INTRODUCTION

Comprehensive description of the natural and man-made features of the Gulf coast of Florida has not been attempted previously even though a large quantity of pertinent information is available. The inventory combines original observations with a review of the literature on dimensions, vegetation, geology, stream discharge, oyster and clam beds, artificial fishing reefs, human population, economic development, pollution and dredging.

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The study is part of the cooperative Gulf of Mexico Estuarine Inventory initiated by the Gulf States Marine Fisheries Commission through its Estuarine Technical Coordinating Committee (ETCC). In the fall of 1965 several members of the Committee agreed that an inventory of estuaries of the Gulf of Mexico was urgently needed. Committee members who discussed the project initially were George W. Allen, Charles Chapman, Theodore B. Ford, Terrance R. Leary, Lyle St. Amant, and James E. Sykes, according to a letter of December 27, 1965, by Dr. Ford. The group recognized the accelerated competition the states were experiencing between fisheries and wildlife on the one hand and industrial

and municipal growth on the other hand. Agreement was reached that the best way to offset such influences was to develop realistic comparable appraisals of estuarine resources along the entire coast. The planners envisioned a broad study that would include physical descriptions of the estuarine basins and the waters within them plus comprehensive biological studies of plant and animal life. Funding was provided through the Commercial Fisheries Research and Development Act (Public Law 88-309, as amended) with which studies in Alabama, Mississippi, and Louisiana were financed in part. This Laboratory and the National Marine Fisheries Service Biological Laboratory, Galveston, Texas, undertook the Florida and Texas portions of the study largely because other uses were made of P.L. 88-309 funds in those states. Members of the ETCC developed work outlines, which all participants agreed to follow so that methods of study would be the same and results would be comparable. J. Y. Christmas chaired the Committee meetings. Work outlines for four phases of the Inventory were developed—Area Description, Hydrology, Sedimentology, and Biology. The approved Area Description outline was the basis for material presented in this paper.

THE COAST

The length and biological diversity of the Florida Gulf coast exceed those of any other Gulf state. Its length, some 770 statute miles (1,240 km) measured headland to headland on the mainland, exceeds the airline distance from New York to Chicago. Its climate varies from subtropical to temperate. The 17-year minimum air temperature of 47°F (8°C) at Key West contrasts strongly with 9°F (—13°C) at Pensacola. These and other air temperatures, which follow, were provided by James T. Bradley, NOAA Climatologist for Florida, National Weather Service, Lakeland, Fla.:

Locality	Air Temperature (°F)*			
	January		July	
	Mean	Extremes	Mean	Extremes
Key West (17 yr)	70	47-85	83	69-95
St. Petersburg (56 yr)	63	28-85	83	63-97
Cedar Key (30 yr)	58	19-88	82	65-102
Pensacola (39 yr)	53	9-76	82	61-99

*°C = 5/9 (°F − 32).

Tidal swamps and marshes fringe the entire coast and submerged vegetation blankets most of the shallow-water bottom. The dense mangrove swamps of the south and central coasts are gradually replaced by tidal marshes north of Cedar Key because hard frosts kill the mangroves (Fig. 1); Davis (1904) concluded that air temperatures below 25°F (—4°C) are lethal. Although sea grasses flourish in shallow water on the entire coast, the northern limit of some tropical algae and the southern limit of some temperate algae is in the vicinity of Tampa Bay.

Four basic coastal types are characteristic (Fig. 1). The southernmost, from Florida Bay to Cape Romano, consists of mangrove swamps, tidal marshes, and mangrove-covered islands interspersed with open-water estuarine areas. Florida Bay consists of a series of circular drowned lake basins (hence the term "lacustrine," Fig. 1) that are divided by shallow flats and interconnected by tidal channels set in a complex of mangrove-rimmed Keys. On the mainland coast the mangroves extend inland 0.5 to 5 nautical miles (0.9 to 9 km) except along rivers where penetration may be up to 10 or 12 nautical miles (19-22 km). Tidal marshes have developed on the relatively high ground between rivers and landward of the mangrove swamps. Underwater vegetation is extensive in Florida Bay, where it consists of predominantly turtle grass (*Thalassium testudinum*) mixed with a rich variety of tropical algae. In shallow water from Cape Sable northward algae are abundant locally in many places, but grass beds are sparse, possibly because of turbidity from suspended materials and discoloration of the water by tannins from the mangroves.

Barrier islands with sandy beaches on the Gulf characterize most of the second type of coast, which extends from about Cape Romano to Anclote Key. The islands separate the Gulf from a series of bays and lagoons that are lined with mangrove swamps except where land elevations preclude their development. The mangroves merge into tidal marshes that are less extensive here than in the two more southerly segments of the coast. Sea grasses and algae are abundant to about 6 feet (2 m) in the bays and lagoons.

The irregular coastline of the third coastal type, from Anclote Key to Lighthouse Point, is the result of rock outcroppings, clusters of islands, and oyster reefs. Beaches and semi-enclosed bays are rare. Salt marshes line its shores and penetrate inland several miles in

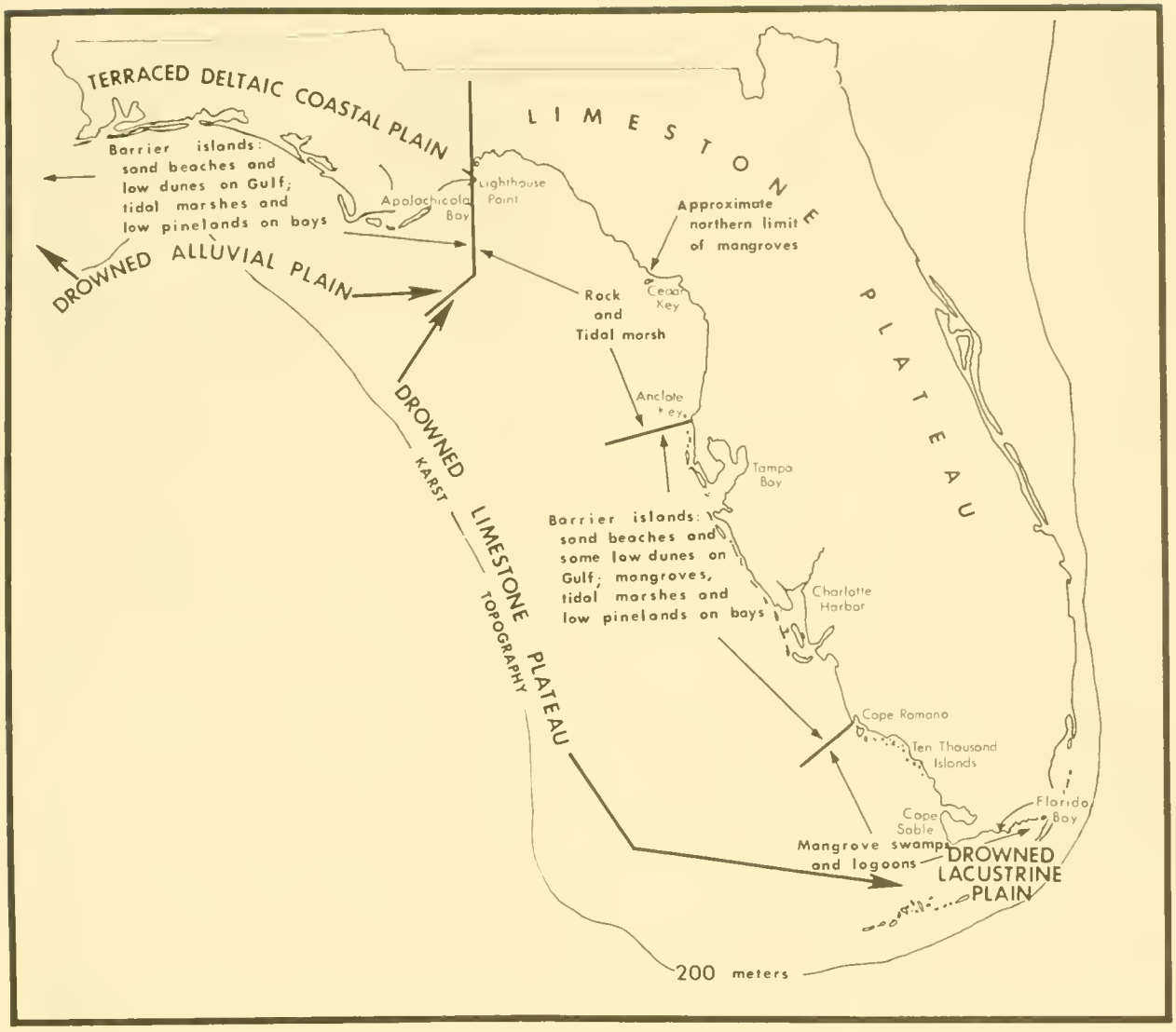


Figure 1.—The major coastal types of the west coast of Florida (modified from Price, 1954; Tanner, 1960).

places. Vast beds of turtle grass mixed with algae extend offshore to at least the 6-foot (2-m) contour, which tends to parallel the coast roughly 2 to 6 nautical miles (4 to 11 km) offshore.

The fourth coastal type occupies the remainder of the coast westward from Lighthouse Point. Similar to the second type, its barrier islands with sandy beaches separate the Gulf from a series of estuaries. Tidal marshes border the bays generally but their development is less extensive than the marshes of the third coastal type. Beds of mixed sea grasses and algae flourish except where water turbidity is high, as in parts of Apalachicola Bay; there vegetation is absent.

DIMENSIONS

Table 1 lists the area, volume, and maximum diurnal tidal range of estuarine study areas. We determined boundaries by using a combination of precedent, Pritchard's definition of an estuary, and the procedures described by Pearcy for delineating the seaward boundary of bays and other indentions of the coastline (Pearcy, 1959; Pritchard, 1967). Pritchard defines an estuary as "A semi-enclosed coastal body of water which has a free connection with the open sea and within which sea water is measurably diluted with fresh water derived from land drainage." Pritchard's definition applies generally to the

Table 1.--Surface area at mean high water, volume at mean high water, and maximum diurnal tidal range of estuarine study areas, west coast of Florida

Study area	Surface area at mean high water	Volume at mean high water	Diurnal tidal range[1]
	Acres[2]	Acre-feet[3]	Feet[4]
Florida Bay	557,528	2,532,790	1.6[5]
Lake Ingraham	2,372	---	---
Whitewater Bay	46,532	180,419	0.8
Cape Sable to Lostmans River	24,067	187,490	4.5
Lostmans River to Mormon Key	7,395	36,433	4.2
Mormon Key to Caxambas Pass	69,824	345,296	4.4
Caxambas Pass to Gordon River	12,522	67,471	4.3
Doctors Pass to Estero Pass	14,000	54,615	2.8
Caloosahatchee River	22,926	131,291	1.2
Pine Island Sound	77,024	434,507	2.6
Charlotte Harbor	121,793	1,727,514	1.9
Lemon Bay	6,042	36,410	1.6
Sarasota Bay System	34,746	192,540	2.2
Tampa Bay	150,485	2,338,905	2.3
Hillsborough Bay	28,900	335,585	2.8
Old Tampa Bay	57,834	616,625	2.8
Boca Ciega Bay	35,424	234,161	2.3
St. Joseph Sound	33,280	161,893	3.0
Baileys Bluff to Saddle Key	16,629	51,447	3.4
Saddle Key to S. Mangrove Pt	71,530	343,643	3.5
Waccasassa Bay	52,586	277,091	3.5
Suwannee Sound	35,424	187,673	3.4
Suwannee Sound to Deadman Bay	4,320	13,430	3.4
Deadman Bay	2,698	15,335	3.4
Deadman Bay to St. Marks River	8,927	17,854	3.4
Apalachee Bay	61,322	264,830	3.3
St. George Sound	87,776	1,005,195	2.6
Apalachicola Bay	82,197	785,038	2.2
St. Joseph Bay	43,872	622,387	1.4[5]
St. Andrew Sound	4,707	---	---
East Bay (St. Andrew)	18,659	231,705	1.6
St. Andrew Bay	26,209	405,512	1.5
West Bay	17,576	136,135	1.5
North Bay	6,676	55,189	1.6
Choctawhatchee Bay	86,295	1,321,106	0.6
Santa Rosa Sound	24,560	217,862	1.4
East Bay (Pensacola)	36,806	364,649	1.6
Escambia Bay	24,085	190,084	1.5
Pensacola Bay	40,581	796,769	1.3[5]
Perdido Bay	25,396	217,724	---
Total	2,081,525	17,134,603	

[1] Source: U.S. Coast and Geodetic Survey (1969), Tide Tables. "Diurnal range" is the difference in height between mean higher high water and mean lower low water. The largest range was used if more than one range appeared for a given bay or segment of coast.

[2] Hectares = acres x 0.4047.

[3] Cubic meters = acre-feet x 1,233.

[4] Meters = feet x 0.3048.

[5] Unsurveyed.

estuaries under consideration except that the term "semi-enclosed" requires interpretation. Pearcy defines the boundary between bays and the territorial sea in geographical terms, and he provides a rationale for determining the coastal boundary where the coast is highly indented and where it has many islands and exposed reefs.

For example, we used Pearcy's western boundary of Florida Bay: the line joining East Cape Sable and Key Vaca—precisely the 24 nautical miles (44 km) that is accepted by geographers as the maximum length of the closing line connecting the natural entrance of a large bay (Pearcy, 1959, p. 965). We also used Pearcy's method of drawing the coastal boundary between headlands, islands, and even low tide elevations such as rocks and oyster reefs along highly indented parts of the coast such as that northward from Cape Sable through the Ten Thousand Islands, and northward from Anclote Key to Lighthouse Point (Pearcy, 1959, p. 967-968; Figs. 2 through 24 below). The rocks and oyster reefs between Anclote Key and Lighthouse Point create many semi-enclosed areas that are distinctly estuarine in character (Figs. 14 through 18). Also, we set the boundary of Apalachee Bay from the St. Marks lighthouse to Lighthouse Point near Alligator Harbor because the water area of a bay should exceed the total area contained in a semicircle whose diameter is the line connecting the natural entrances (Pearcy, 1959, p. 965; Fig. 18).

We defined the landward limit of estuaries as the line of permanent fresh bottom water. Its location was estimated by limited field observations, by noting the landward penetration of salt marshes, by water quality data of streams published by the U.S. Geological Survey, and by published data (Dragovich and May, 1962; Dragovich, Kelly, and Goodell, 1968; and others).

Internal boundaries between parts of estuaries were arbitrarily assigned except where we were aware of historical precedent.

Table 1 lists the area and volume of estuarine study areas. Area was determined with a compensating polar planimeter and the 1,200-Series U.S. Coast and Geodetic Survey Charts, scale 1:80,000. We calculated only the wet surface area at mean high water because the difference between high and low water areas on this coast is slight.

Volume was estimated by the method described by Welch (1948) based on the formula for the volume of the frustum of a cone. Two strata were considered: surface to 6 ft (1.8 m) and 6 ft to the bottom.

The total open water area of all estuaries at high tide is 2,081,525 acres (842,393 ha), which is slightly greater than the area of America's largest estuary, Chesapeake Bay (2,071,680 acres = 838,409 ha).

Table 1 also includes the diurnal (daily) range of the tide for various bays and segments of the coast. We used diurnal ranges rather than mean ranges because the latter are lacking for most of the coast. Tides are of two types: mixed diurnal and semidiurnal, but are predominantly semidiurnal from Florida Bay to Apalachicola Bay and diurnal from St. Joseph Bay to Perdido Bay (Marmer, 1954; Zetler and Hansen, 1970).

The mean diurnal tidal range (4.2-4.5 ft = 1.3-1.4 m) is greater from Cape Sable to the Gordon River (at Naples) than on any other part of the coast; elsewhere, ranges of about 1.5-3.5 ft (0.5-1.1 m) are typical.

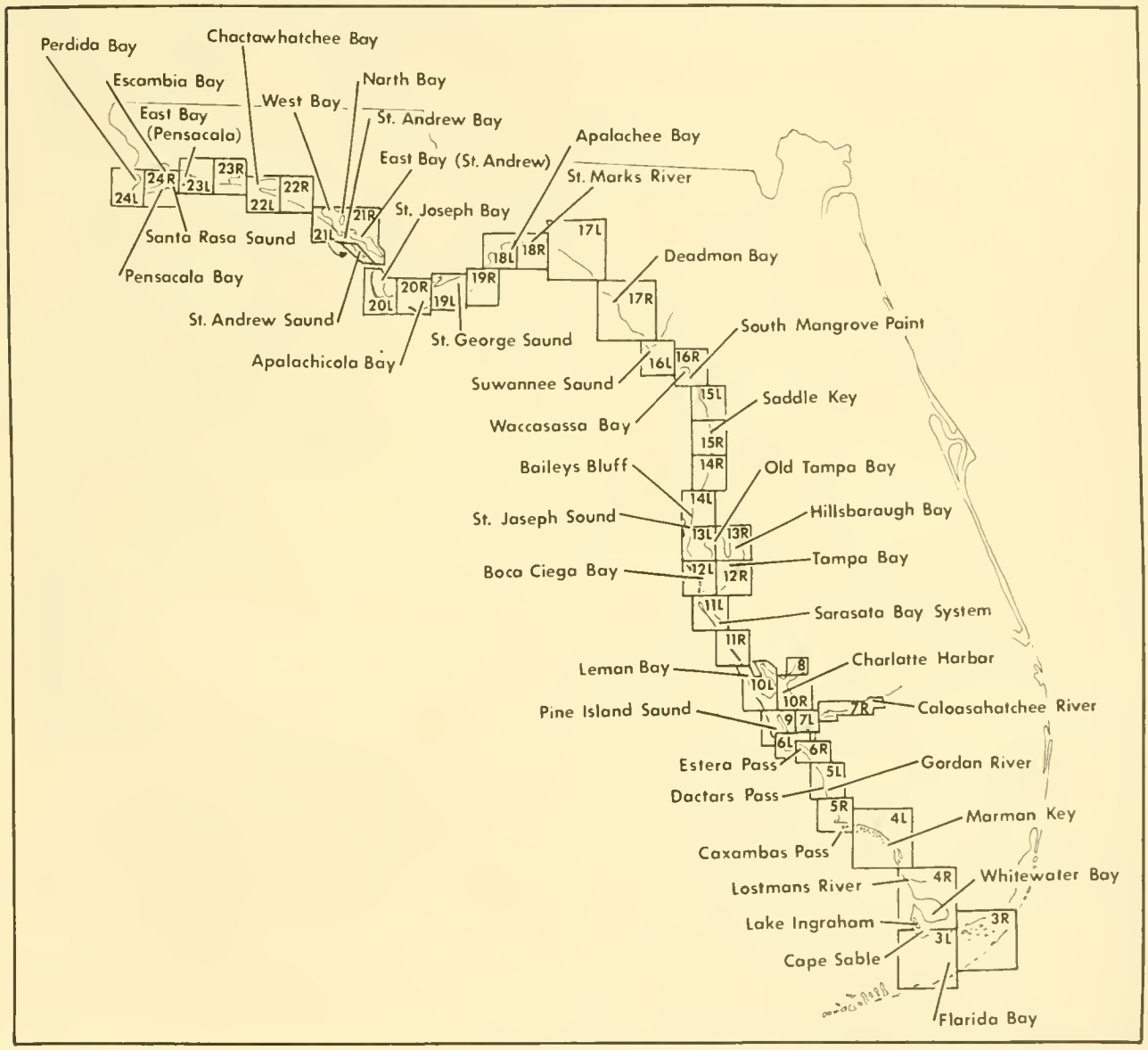
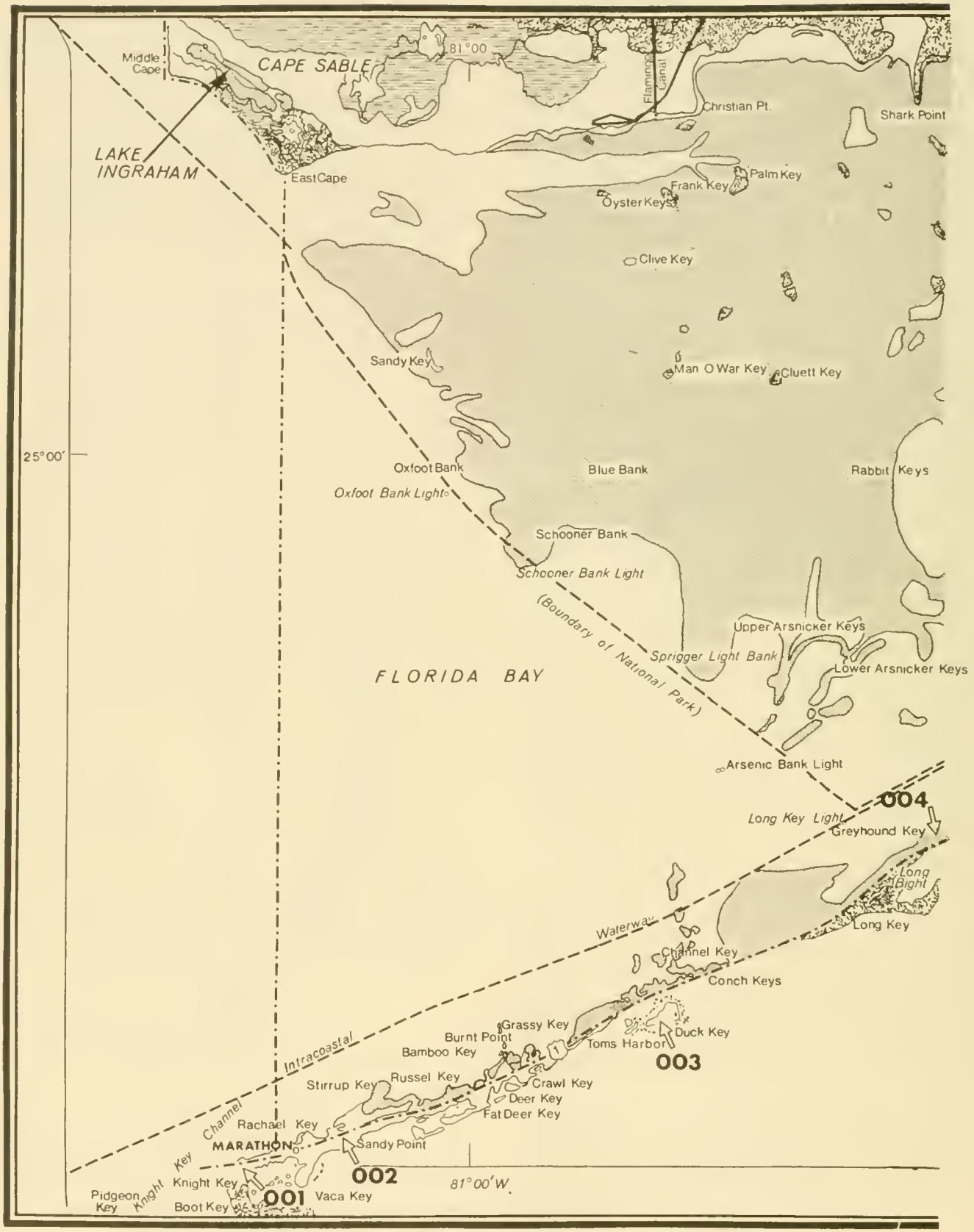
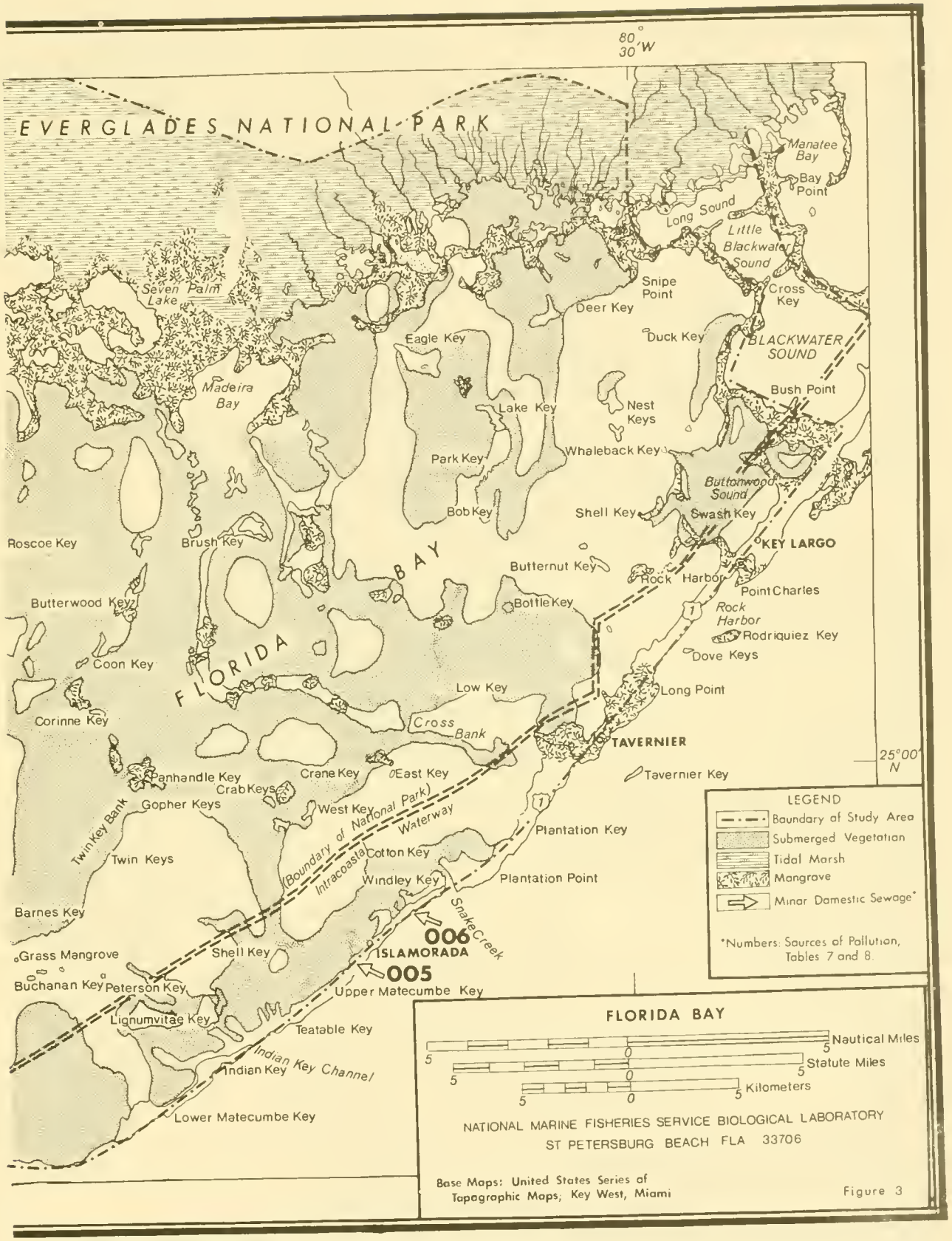
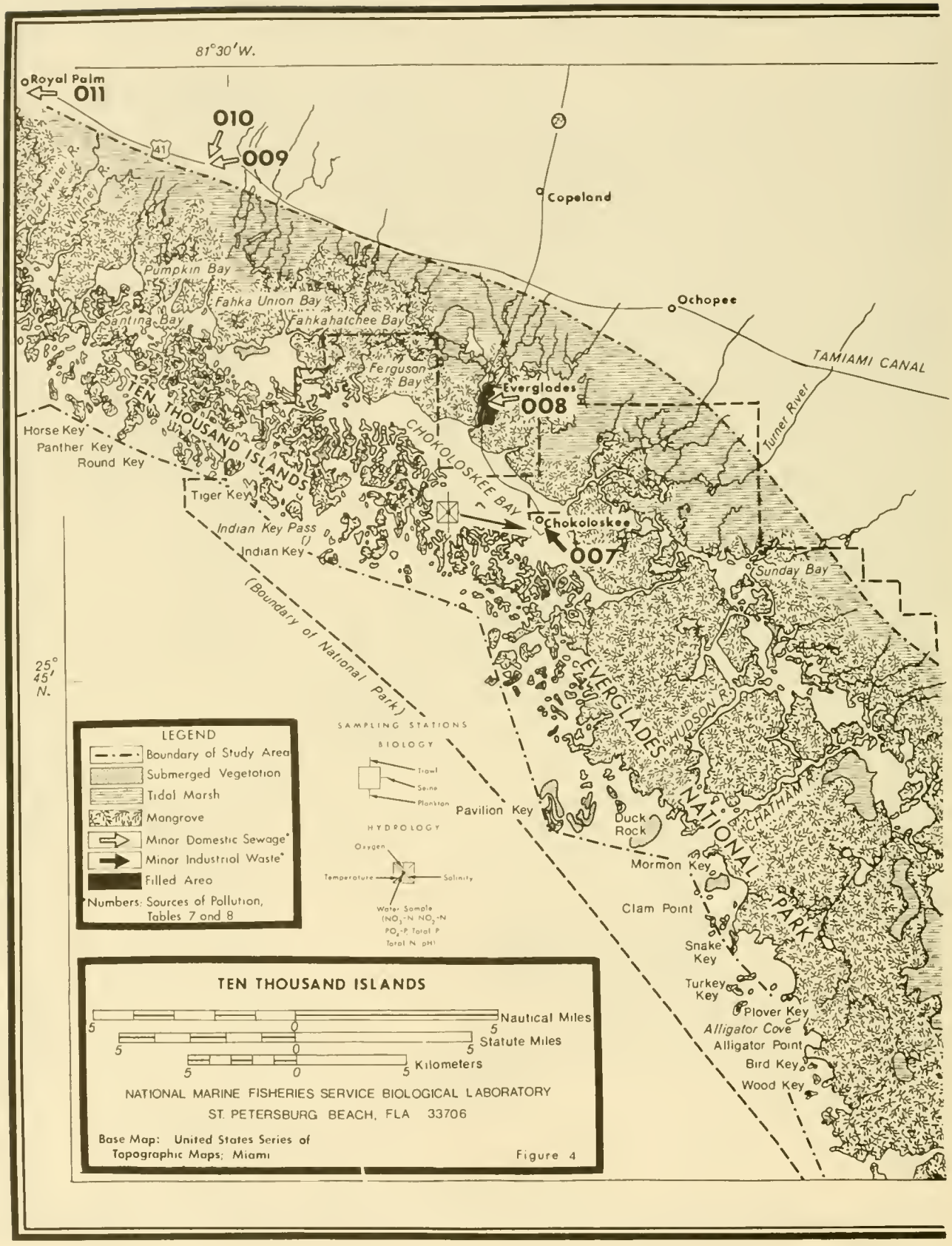
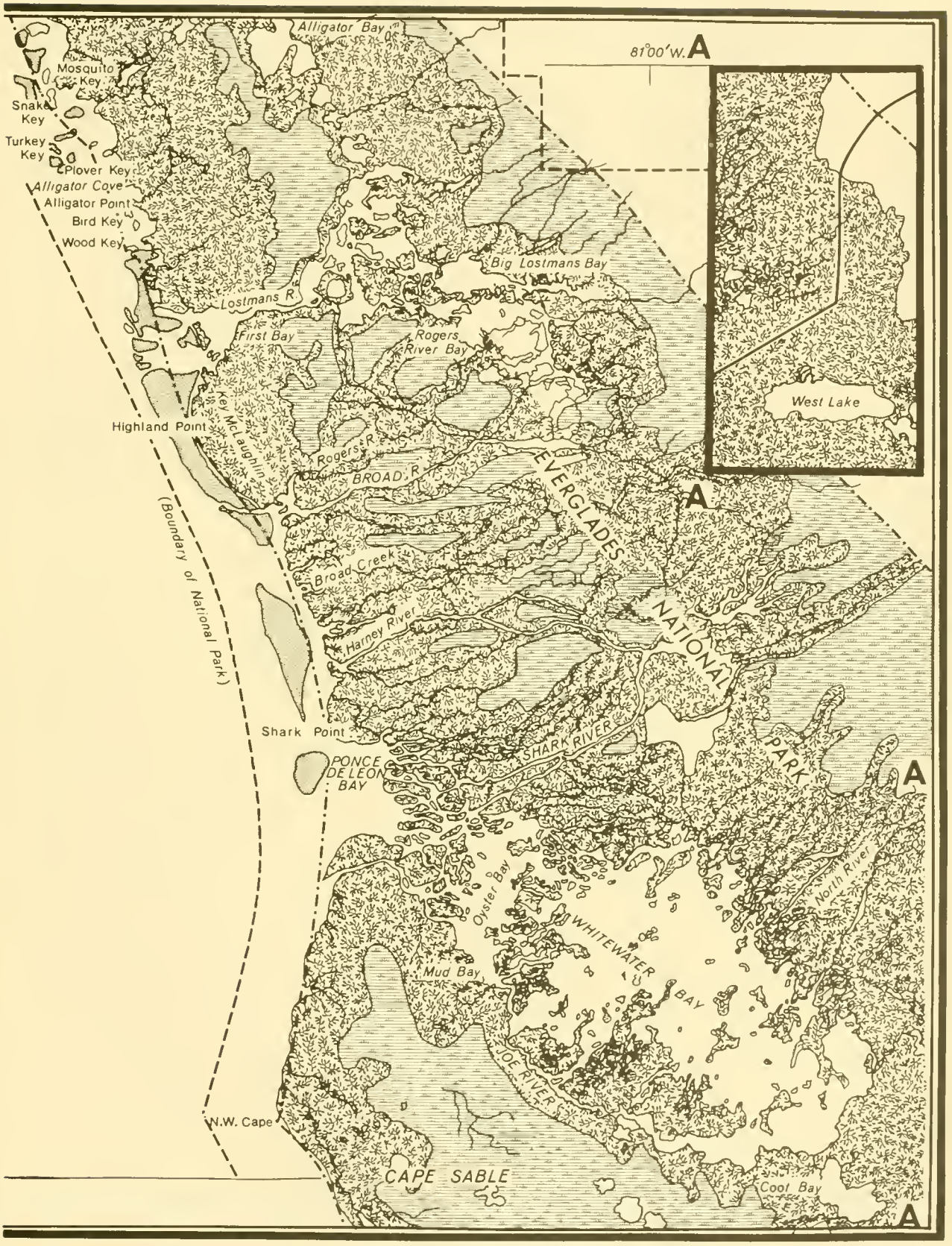


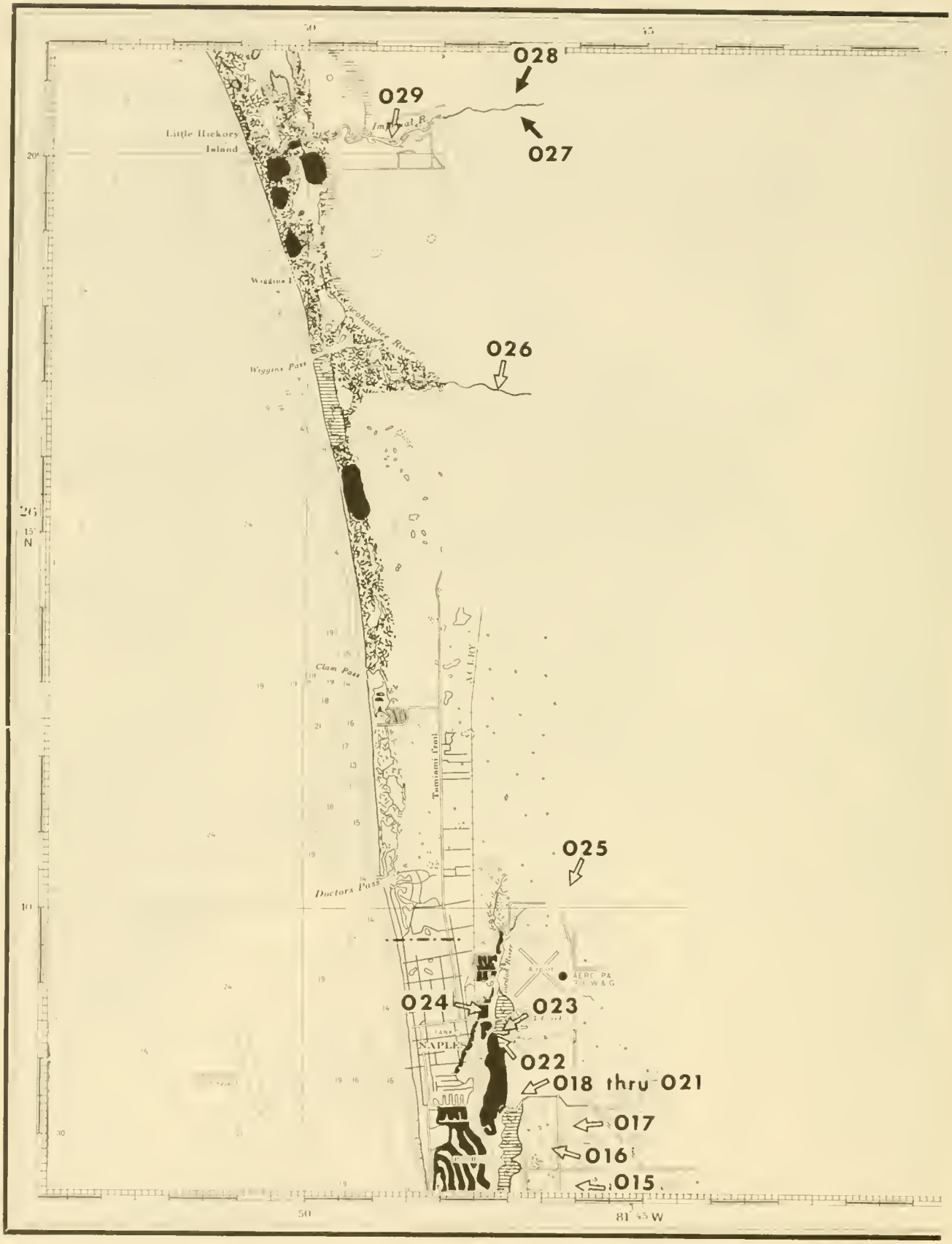
Figure 2.—Index map. Numbers are Figure numbers; letters indicate left or right side of figures.

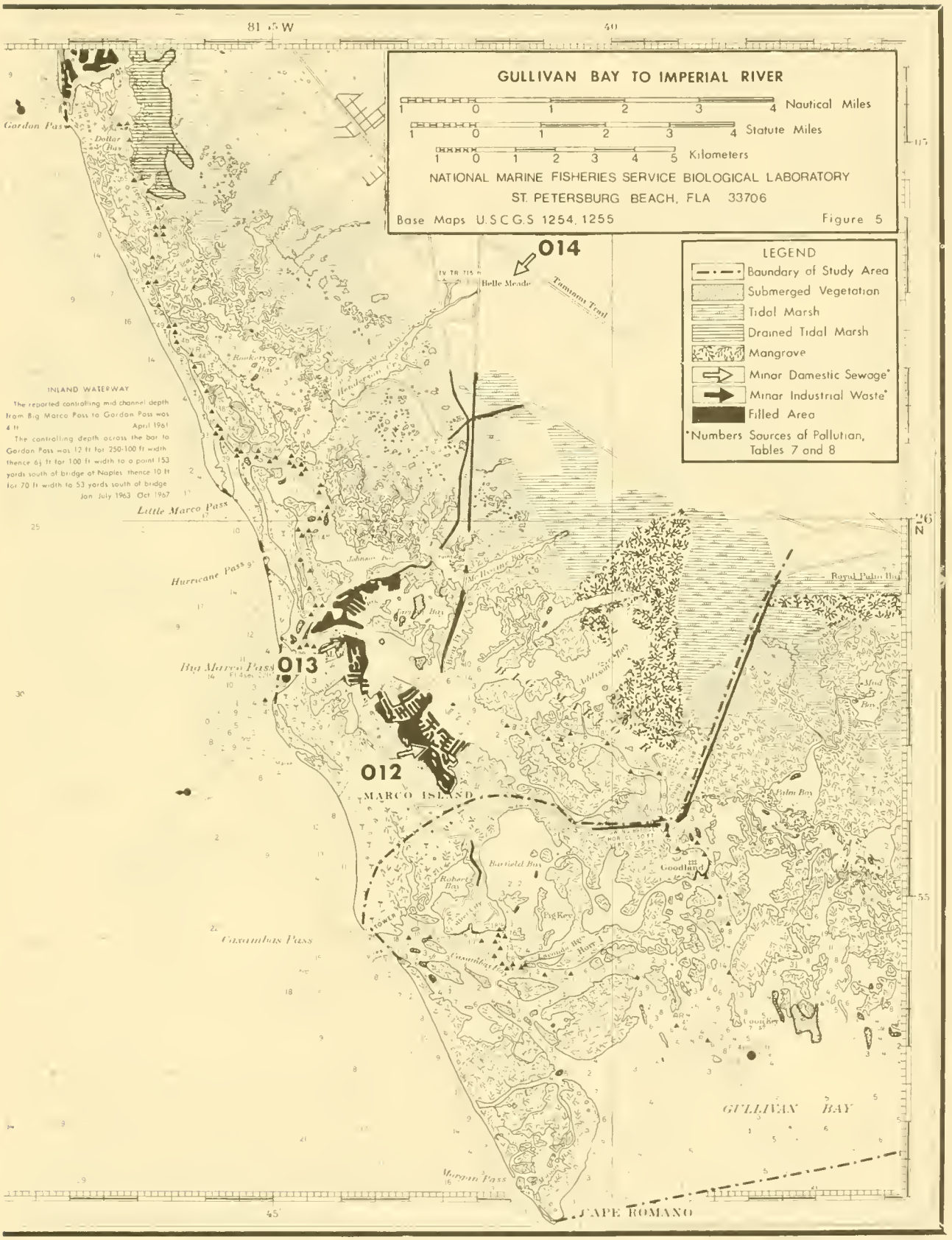

Middle Cape
CAPE SABLE
81°00
Flamingo Canal
Christian Pt.
Shark Point
LAKE INGRAHAM
East Cape
Palm Key
Frank Key
Oyster Keys
Clive Key
Sandy Key
Man O War Key
Cluett Key
25°00'
Oxfoot Bank
Blue Bank
Rabbit Keys
Oxfoot Bank Light
Schooner Bank
Schooner Bank Light
(Boundary of National Park)
Upper Arsnicker Keys
Sprigger Light Bank
Lower Arsnicker Keys
FLORIDA BAY
Arsenic Bank Light
004
Long Key Light
Greyhound Key
Long Bight
Waterway
Long Key
Channel Key
Conch Keys
Grassy Key
Duck Key
Toms Harbor
003
Burnt Point
Bamboo Key
Intracoastal
Stirrup Key
Russel Key
Crawl Key
Deer Key
Fat Deer Key
Channel
Rachael Key
MARATHON
Sandy Point
Knight Key
Knight Key
002
Pidgeon Key
001
Vaca Key
Boot Key
81°00'W.

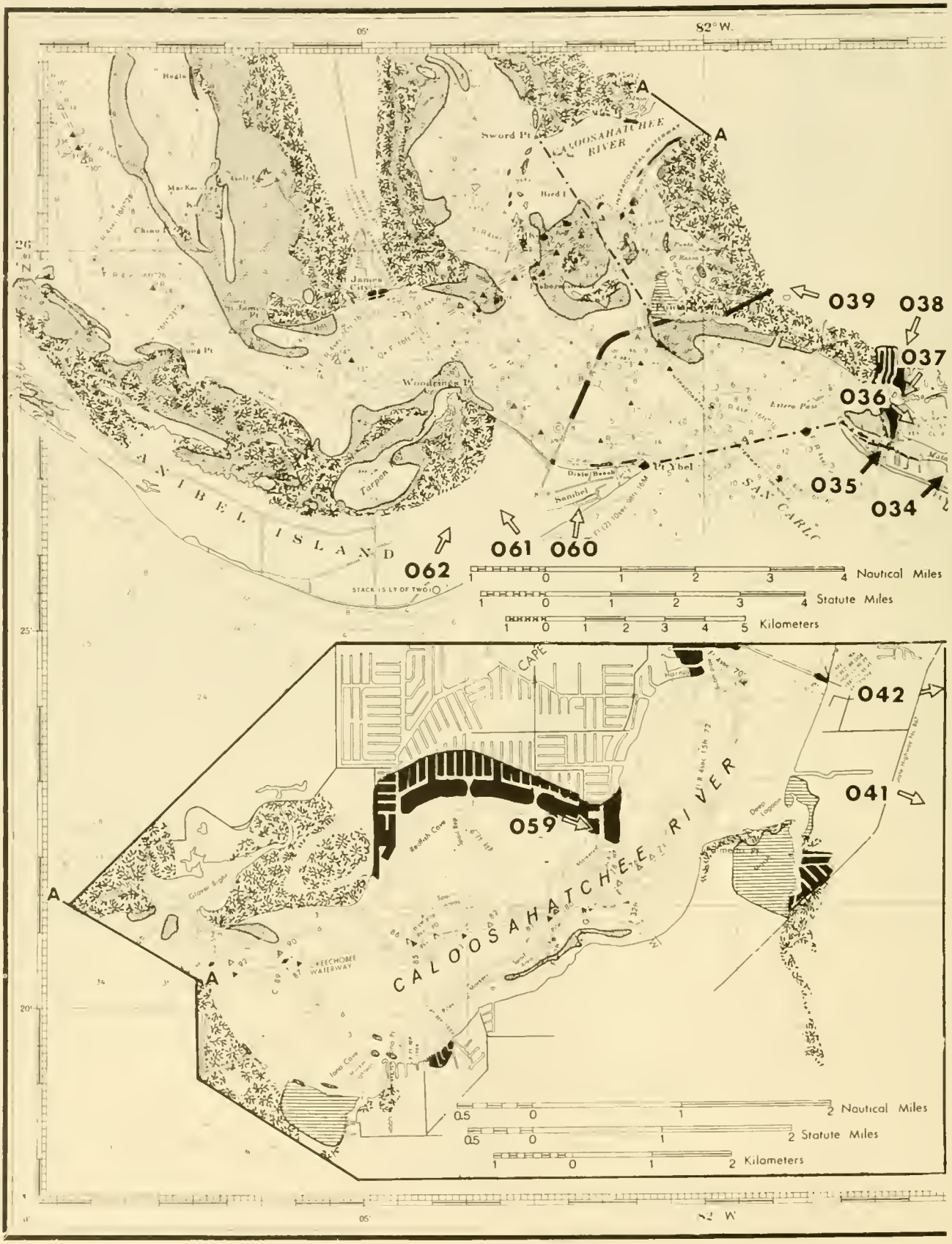

80° 30' W
EVERGLADES NATIONAL PARK
Seven Palm Lake
Madeira Bay
Manatee Bay
Bay Point
Long Sound
Little Blackwater Sound
Snipe Point
Cross Key
Deer Key
Duck Key
BLACKWATER SOUND
Eagle Key
Bush Point
Nest Keys
Lake Key
Whaleback Key
Park Key
Buttonwood Sound
Bob Key
Shell Key
Swash Key
KEY LARGO
Roscoe Key
Brush Key
Butternut Key
Rock Harbor
Point Charles
Butterwood Key
Bottle Key
Rock Harbor
Rodriquiez Key
Dove Keys
FLORIDA BAY
Coon Key
Low Key
Long Point
Corinne Key
Cross Bank
TAVERNIER
25°00' N
Panhandle Key
Crane Key
East Key
Tavernier Key
Crab Keys
Gopher Keys
West Key
Twin Key Bank
Waterway
Plantation Key
(Boundary of National Park)
Intracoastal
Twin Keys
Cotton Key
Windley Key
Plantation Point
Barnes Key
Snake Creek
006
ISLAMORADA
005
Grass Mangrove
Shell Key
Buchanan Key
Peterson Key
Upper Matecumbe Key
Lignumvitae Key
Teatable Key
Indian Key Channel
Indian Key
Lower Matecumbe Key
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Mangrove
Minor Domestic Sewage*
*Numbers: Sources of Pollution, Tables 7 and 8.
FLORIDA BAY
5 0 5 Nautical Miles
5 0 5 Statute Miles
5 0 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH FLA 33706
Base Maps: United States Series of Topographic Maps; Key West, Miami
Figure 3

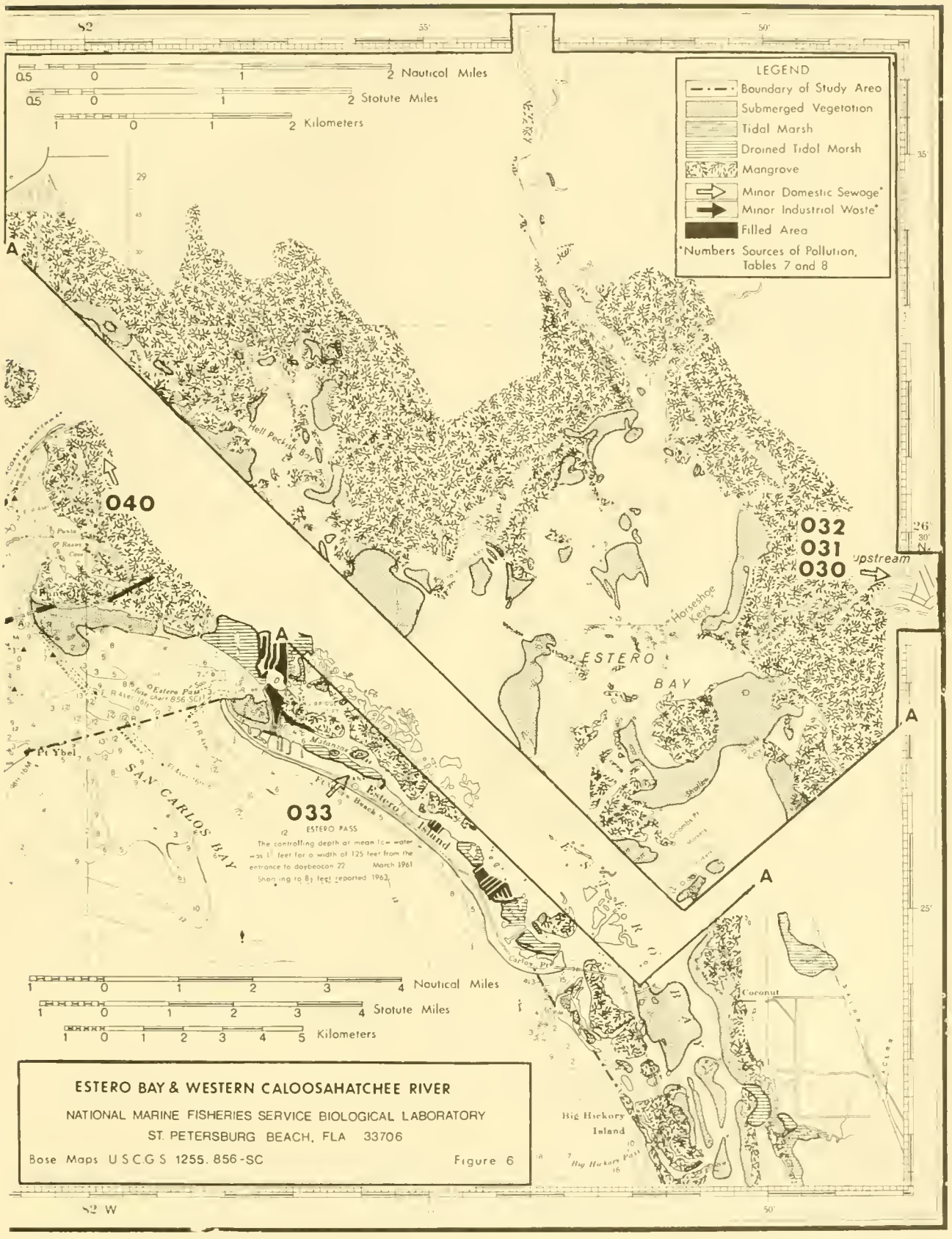

81°30'W.
Royal Palm
011
010
009
Copeland
Ochopee
TAMIAMI CANAL
Blackwater R.
Wilney R.
Pumpkin Bay
Fahka Union Bay
Santina Bay
Fahkahatchee Bay
Ferguson Bay
Everglades
008
Turner River
TEN THOUSAND ISLANDS
Horse Key
Panther Key
Round Key
Tiger Key
CHOKOLOSKEE BAY
Chokoloskee
007
Indian Key Pass
Indian Key
(Boundary of National Park)
Sunday Bay
25° 45' N.
EVERGLADES
HUDSON R.
CHATHAM R.
NATIONAL PARK
Pavilion Key
Duck Rock
Mormon Key
Clam Point
Snake Key
Turkey Key
Plover Key
Alligator Cove
Alligator Point
Bird Key
Wood Key
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Mangrove
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers: Sources of Pollution, Tables 7 and 8
SAMPLING STATIONS
BIOLOGY
Trawl
Seine
Plankton
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
(NO_3)-N NO_2-N
PO_4-P Total P
Total N pH
TEN THOUSAND ISLANDS
Nautical Miles
Statute Miles
Kilometers
5 0 5
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Map: United States Series of Topographic Maps; Miami
Figure 4


Alligator Bay
81°00'W.
A
Mosquito Key
Snake Key
Turkey Key
Plover Key
Alligator Cove
Alligator Point
Bird Key
Wood Key
Big Lostmans Bay
Lostmans R.
First Bay
Rogers River Bay
West Lake
Highland Point
Key McLaughlin
Rogers R.
BROAD R.
EVERGLADES NATIONAL PARK
(Boundary of National Park)
Broad Creek
Harney River
Shark Point
PONCE DE LEON BAY
SHARK RIVER
Oyster Bay
North River
WHITEWATER BAY
Mud Bay
JOE RIVER
W.W. Cape
CAPE SABLE
Cool Bay


028
029
027
Little Hickory Island
Wiggins Pass
026
Clam Pass
Tamiami Trail
025
Doctors Pass
024
023
NAPLES
022
018 thru 021
017
016
015
81 45 W


GULLIVAN BAY TO IMPERIAL RIVER
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S. 1254, 1255
Figure 5
LEGEND
Baundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8
INLAND WATERWAY
The reported controlling mid channel depth from Big Marco Pass to Gordon Pass was 6 ft April 1961
The controlling depth across the bar to Gordon Pass was 12 ft for 250-100 ft width thence 6½ ft for 100 ft width to a point 153 yards south of bridge at Naples thence 10 ft for 70 ft width to 53 yards south of bridge Jan July 1963 Oct 1967
014
013
012
81 45 W
40
Gordon Pass
Dollar Bay
Belle Meade
Tamiami Trail
Little Marco Pass
Hurricane Pass
Big Marco Pass
MARCO ISLAND
Caxambas Pass
Royal Palm Bay
Palm Bay
Goodland
Robert Bay
Barfield Bay
Big Key
GULLIVAN BAY
Morgan Pass
CAPE ROMANO
26
55


82° W.
Sword Pt
CALOOSAHATCHEE RIVER
Woodrings Pt
Tarpon
Pt Ybel
Sanibel
SANIBEL ISLAND
STACK IS LY OF TWO
039
038
037
036
035
034
061
060
062
Nautical Miles
Statute Miles
Kilometers
042
041
059
CAPE
CALOOSAHATCHEE RIVER
Redfish Cove
Glover Bight
OKEECHOBEE WATERWAY
Iona Cove
Deep Lagoon
A
A
A
A
Nautical Miles
Statute Miles
Kilometers

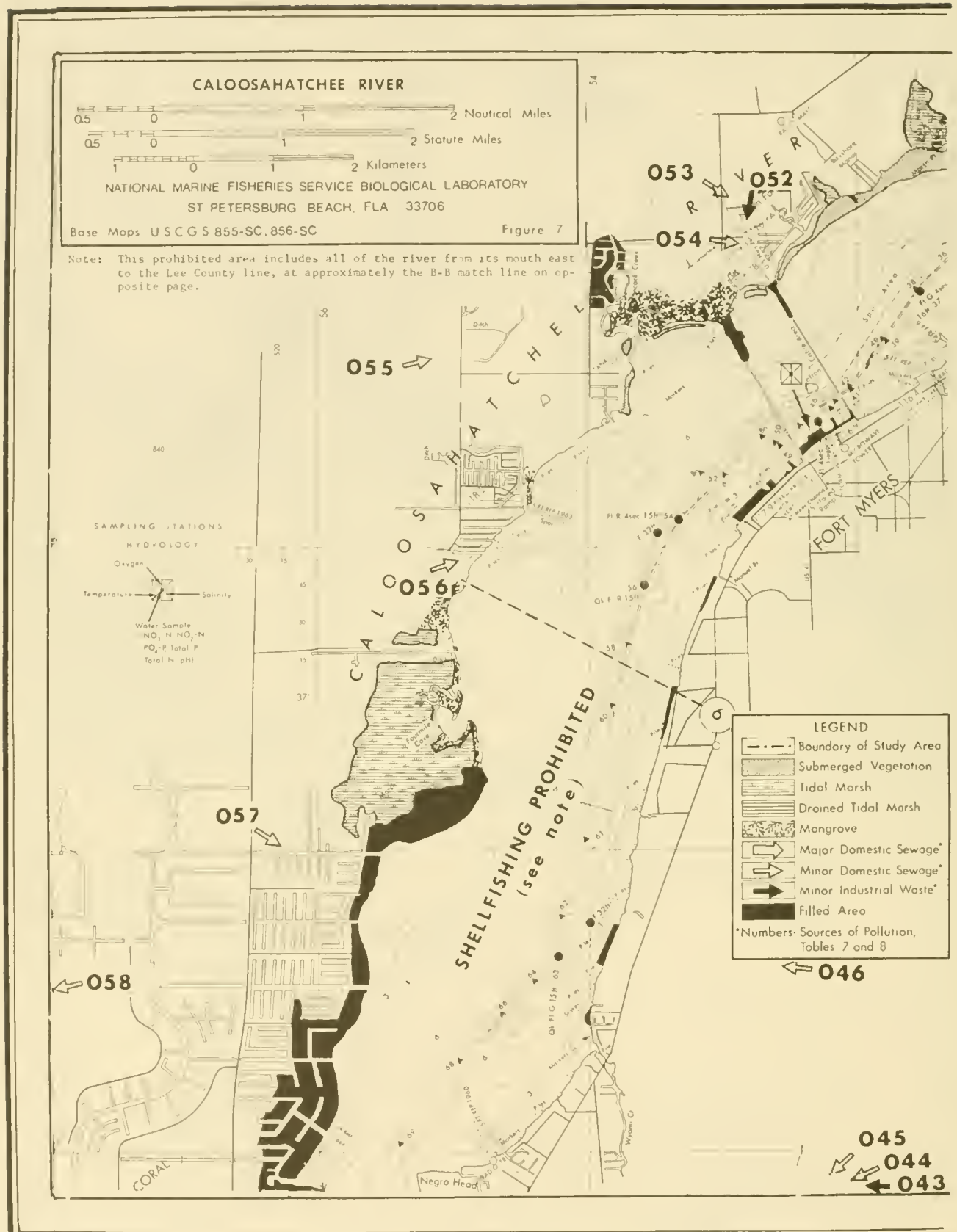


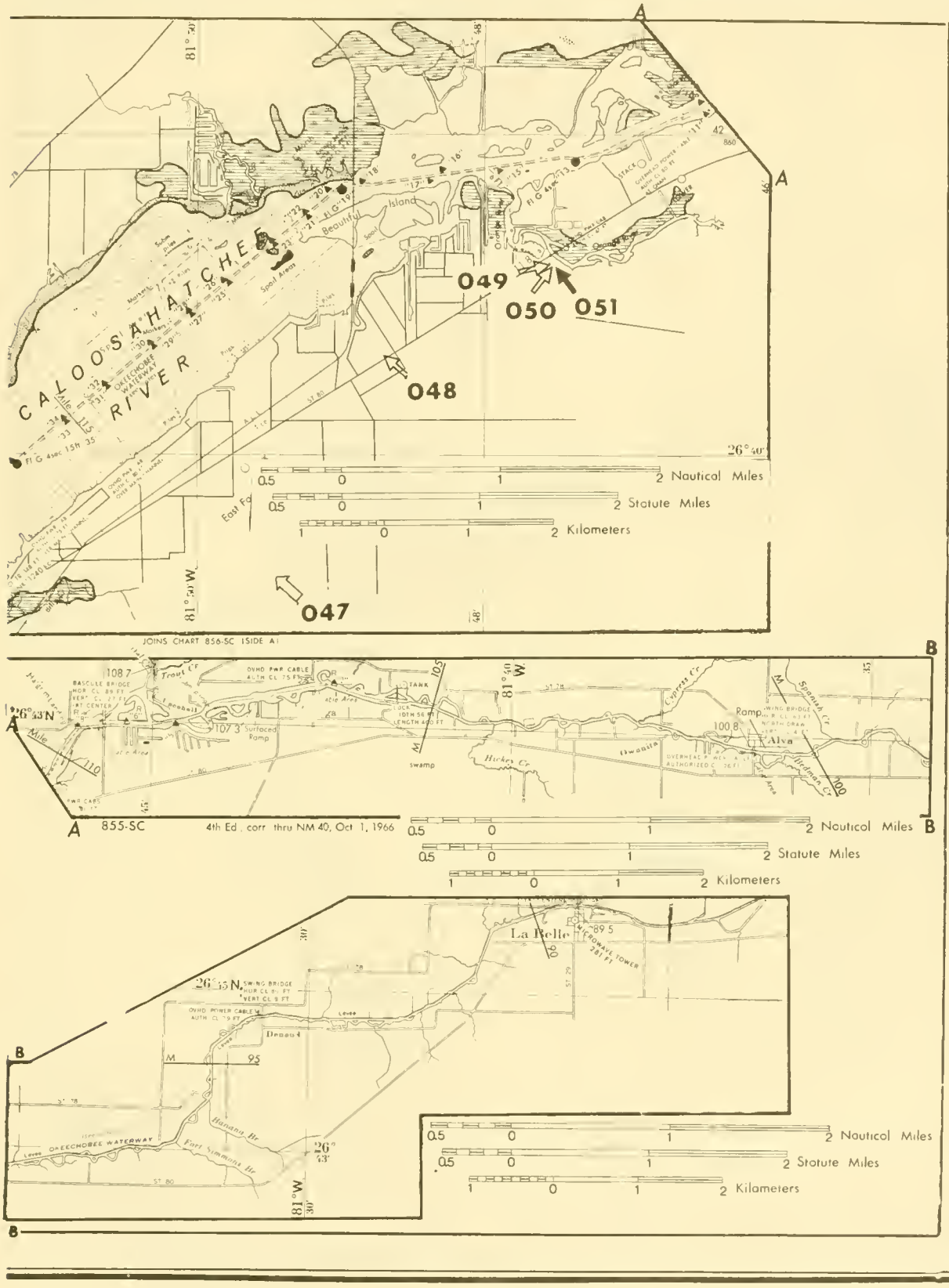
ESTERO BAY & WESTERN CALOOSAHATCHEE RIVER

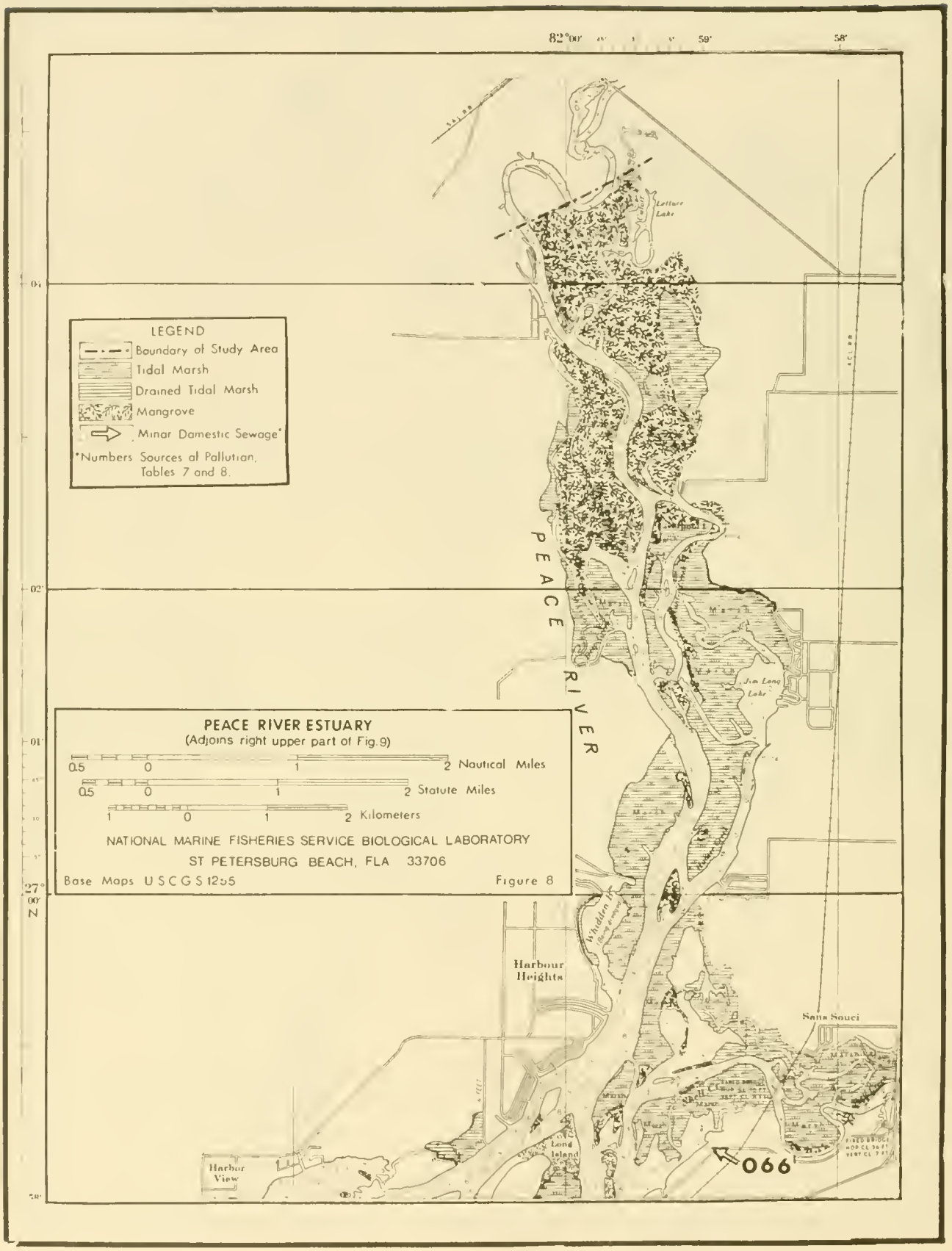
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706

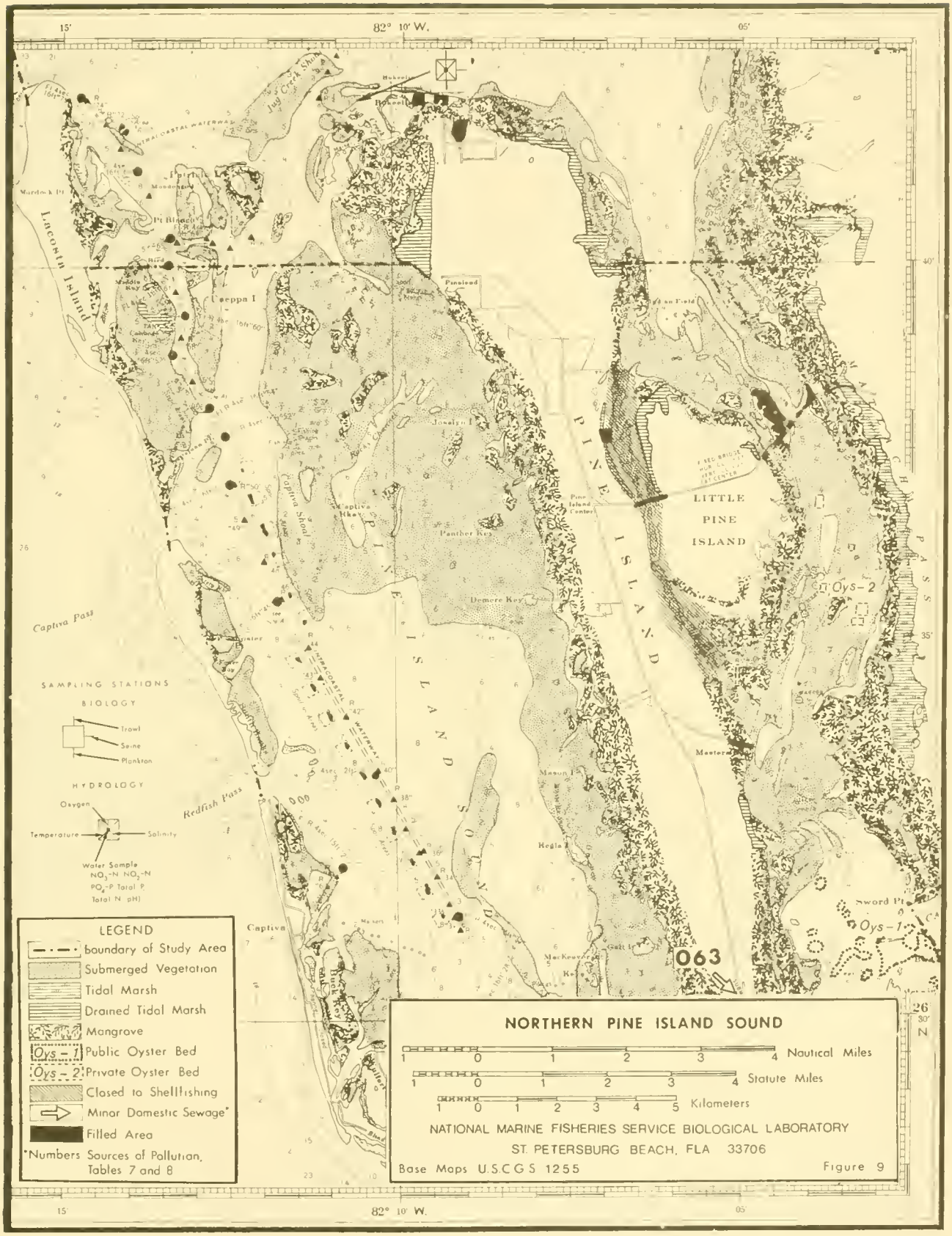
Base Maps U.S.C.G.S. 1255, 856-SC

Figure 6

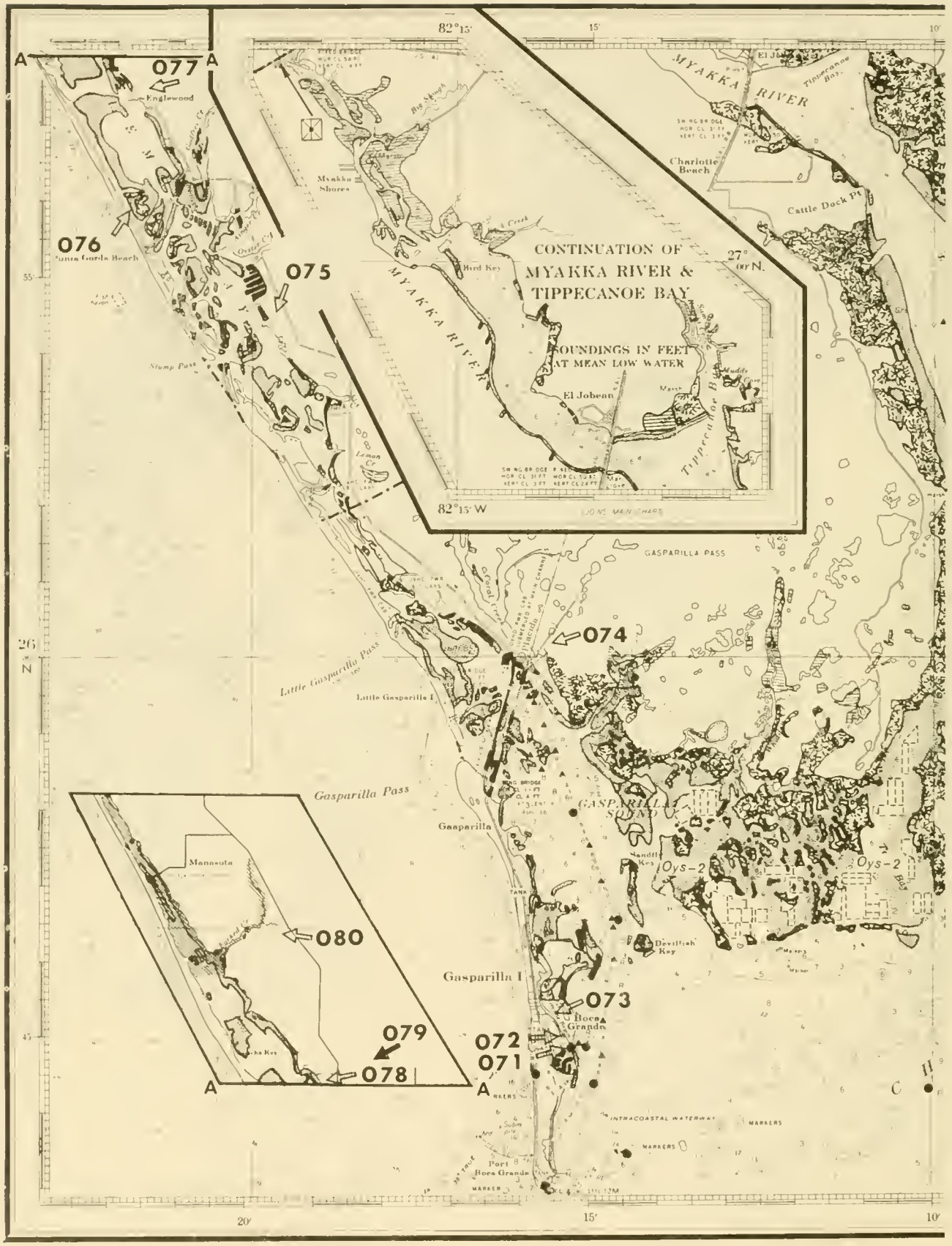

CALOOSAHATCHEE RIVER
0.5 0 1 2 Nautical Miles
0.5 0 1 2 Statute Miles
1 0 1 2 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps U S C G S 855-SC, 856-SC
Figure 7
Note: This prohibited area includes all of the river from its mouth east to the Lee County line, at approximately the B-B match line on opposite page.
053
052
054
055
056
057
058
046
045
044
043
SHELLFISHING PROHIBITED (see note)
SAMPLING STATIONS
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
NO3 N NO2-N
PO4-P Total P
Total N pH
FORT MYERS
CORAL
Negro Head
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Major Domestic Sewage*
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers- Sources of Pollution, Tables 7 and 8


CALOOSAHATCHEE RIVER
Beautiful Island
049
050
051
048
047
JOINS CHART 856-SC (SIDE A)
855-SC
4th Ed., corr. thru NM 40, Oct. 1, 1966
La Belle
Alva
Ramp
Surfaced Ramp
Hickey Cr.
Owanita
Cypress Cr.
Spanish Cr.
Bedman Cr.
Hanana Br.
Fort Simmons Br.
OKEECHOBEE WATERWAY
Nautical Miles
Statute Miles
Kilometers

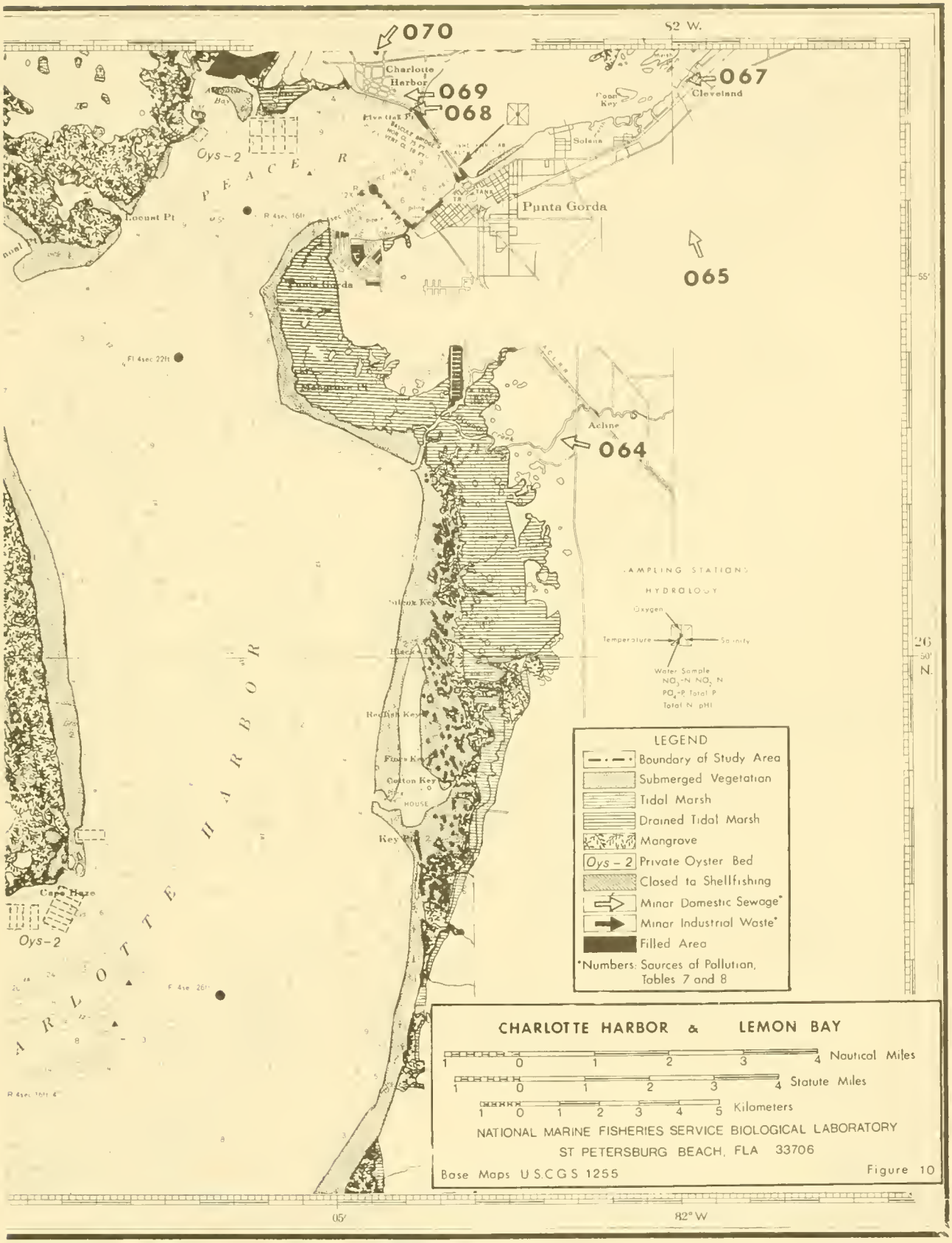

LEGEND
Boundary of Study Area
Tidal Marsh
Drained Tidal Marsh
Mangrove
Minor Domestic Sewage*
*Numbers Sources of Pollution, Tables 7 and 8.
PEACE RIVER ESTUARY
(Adjoins right upper part of Fig. 9)
0.5 0 1 2 Nautical Miles
0.5 0 1 2 Statute Miles
1 0 1 2 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps U S C G S 1255
Figure 8
PEACE RIVER
Harbour Heights
Sans Souci
Harbor View
Long Island
066

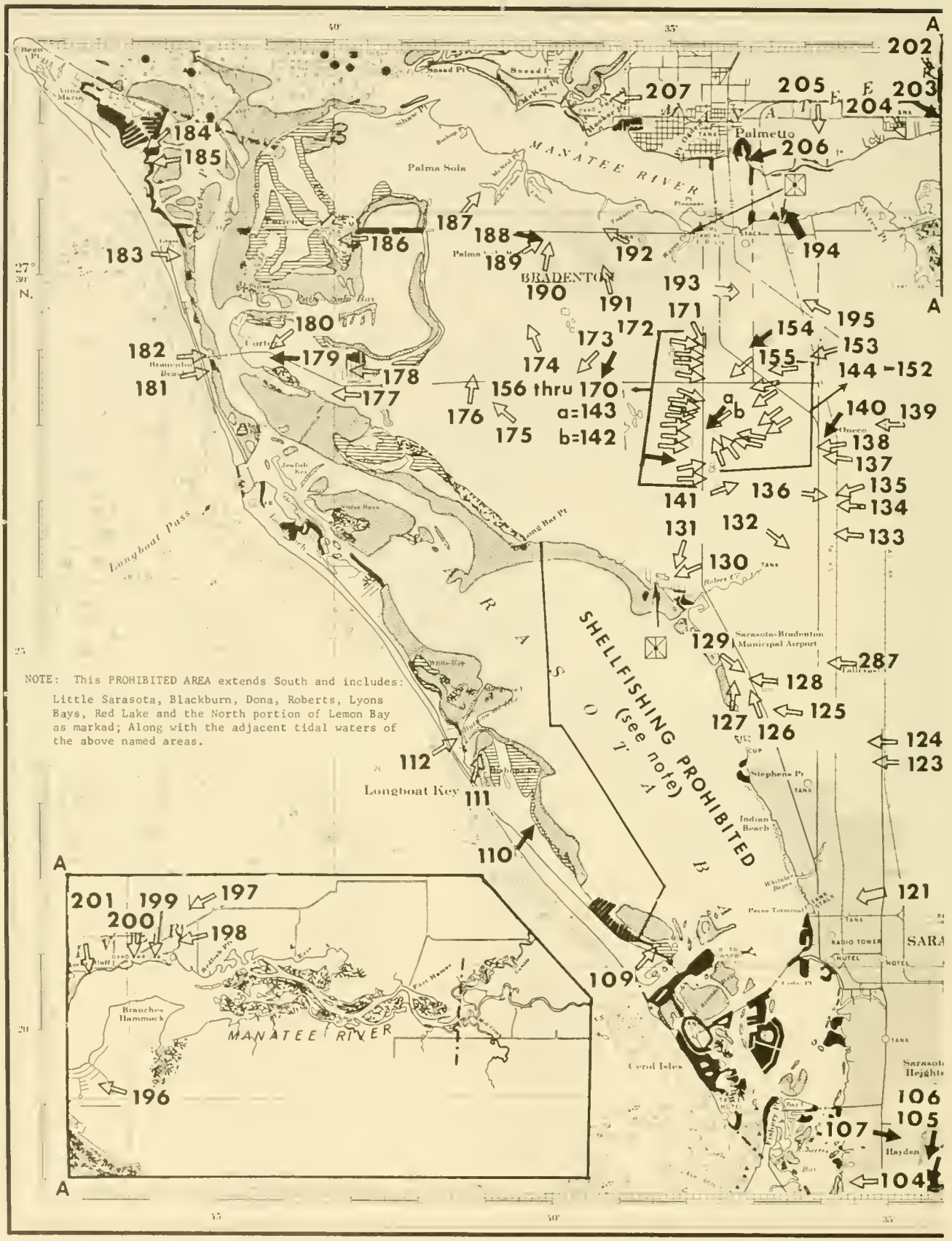


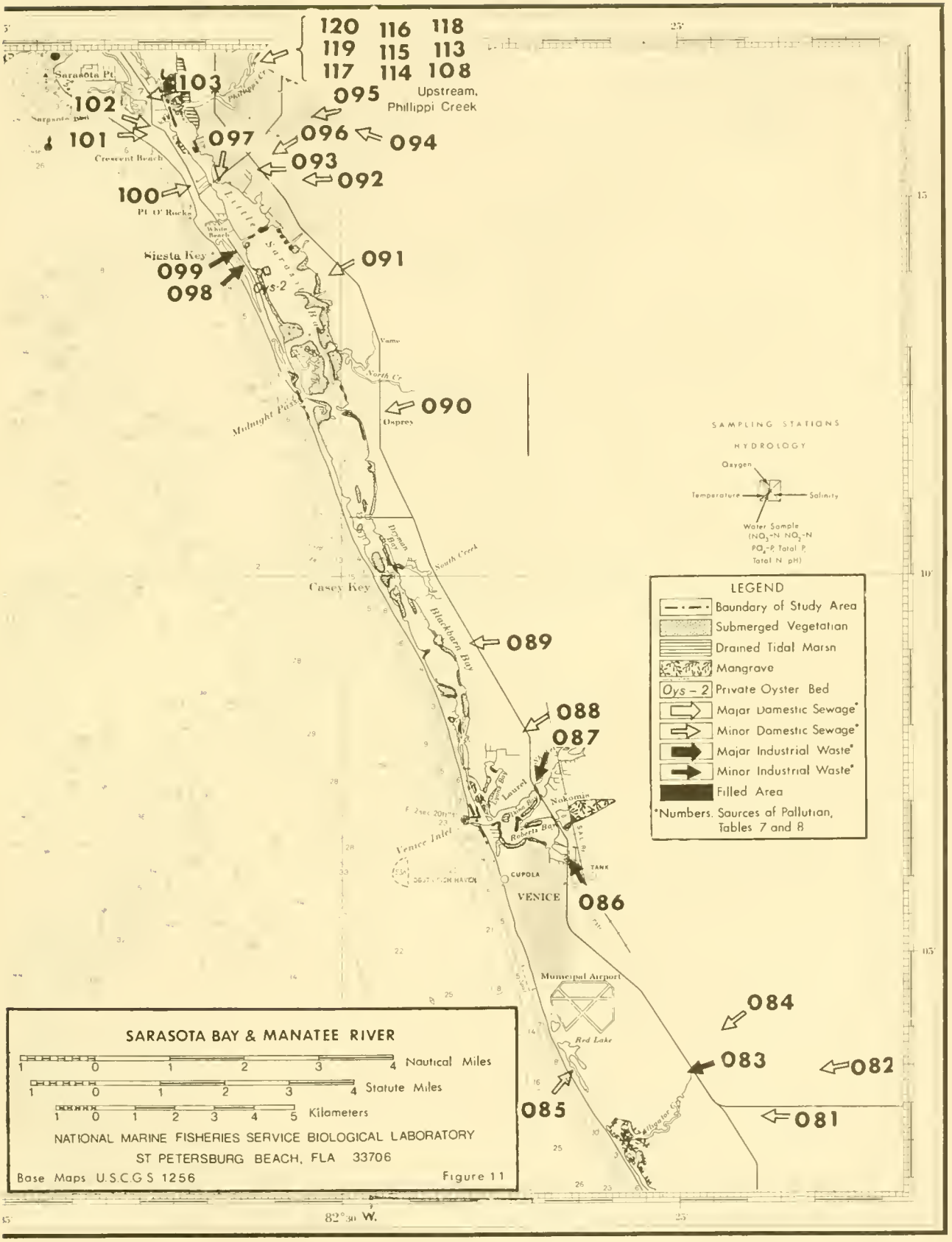
82° 10' W.
15'
05'
Lacosta Island
Useppa I
Pineland
Josslyn I
Captiva Shoal
Captiva Rkey
Panther Key
Demere Key
PINE ISLAND
LITTLE PINE ISLAND
Pine Island Center
Oys-2
Oys-1
Sword Pt
Captiva Pass
Redfish Pass
Captiva
Mason I
Regla I
Mastera
SAMPLING STATIONS
BIOLOGY
Trawl
Seine
Plankton
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
NO_3-N NO_2-N
PO_4-P Total P
Total N pH)
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Oys - 1 Public Oyster Bed
Oys - 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8
063
NORTHERN PINE ISLAND SOUND
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S. 1255
Figure 9

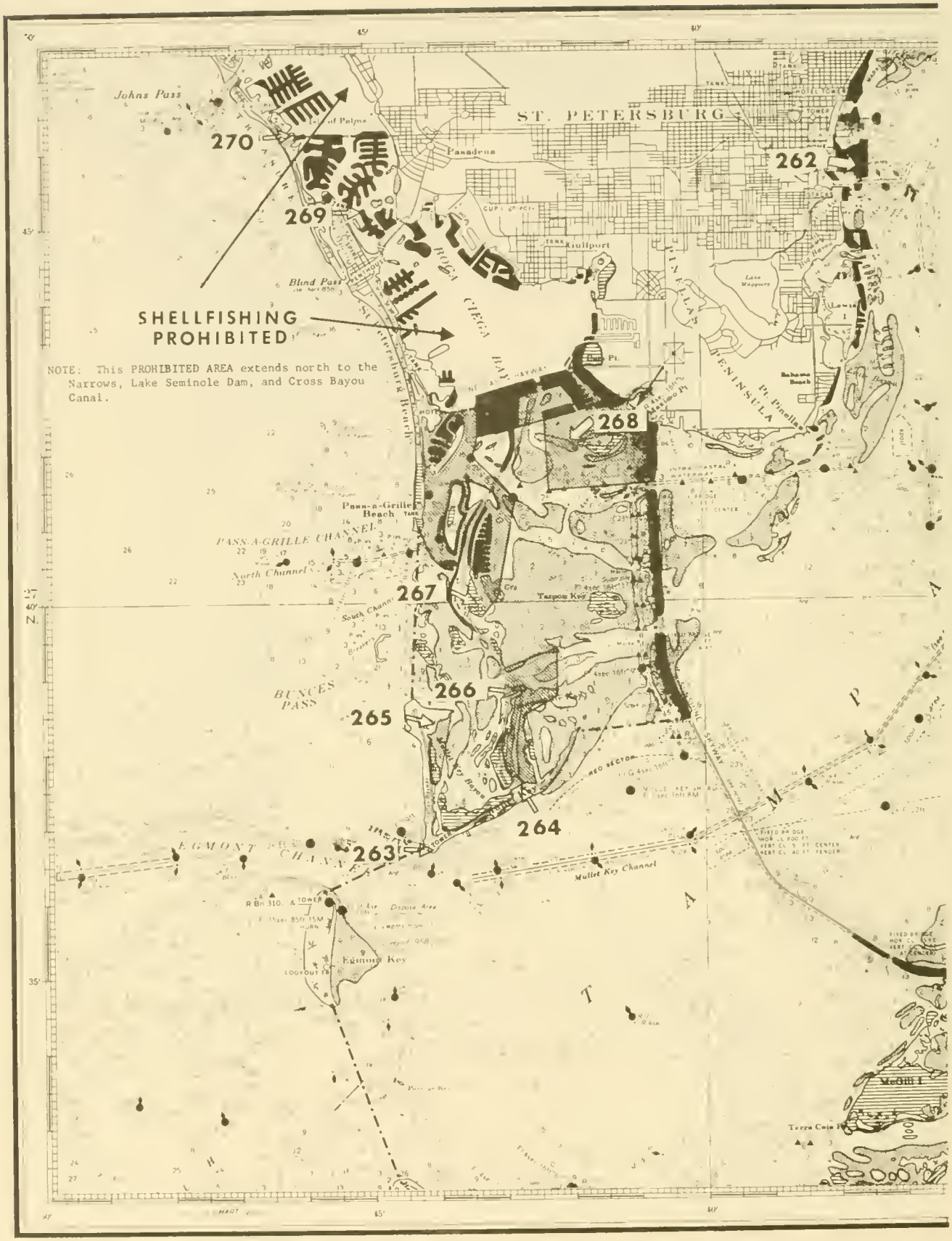


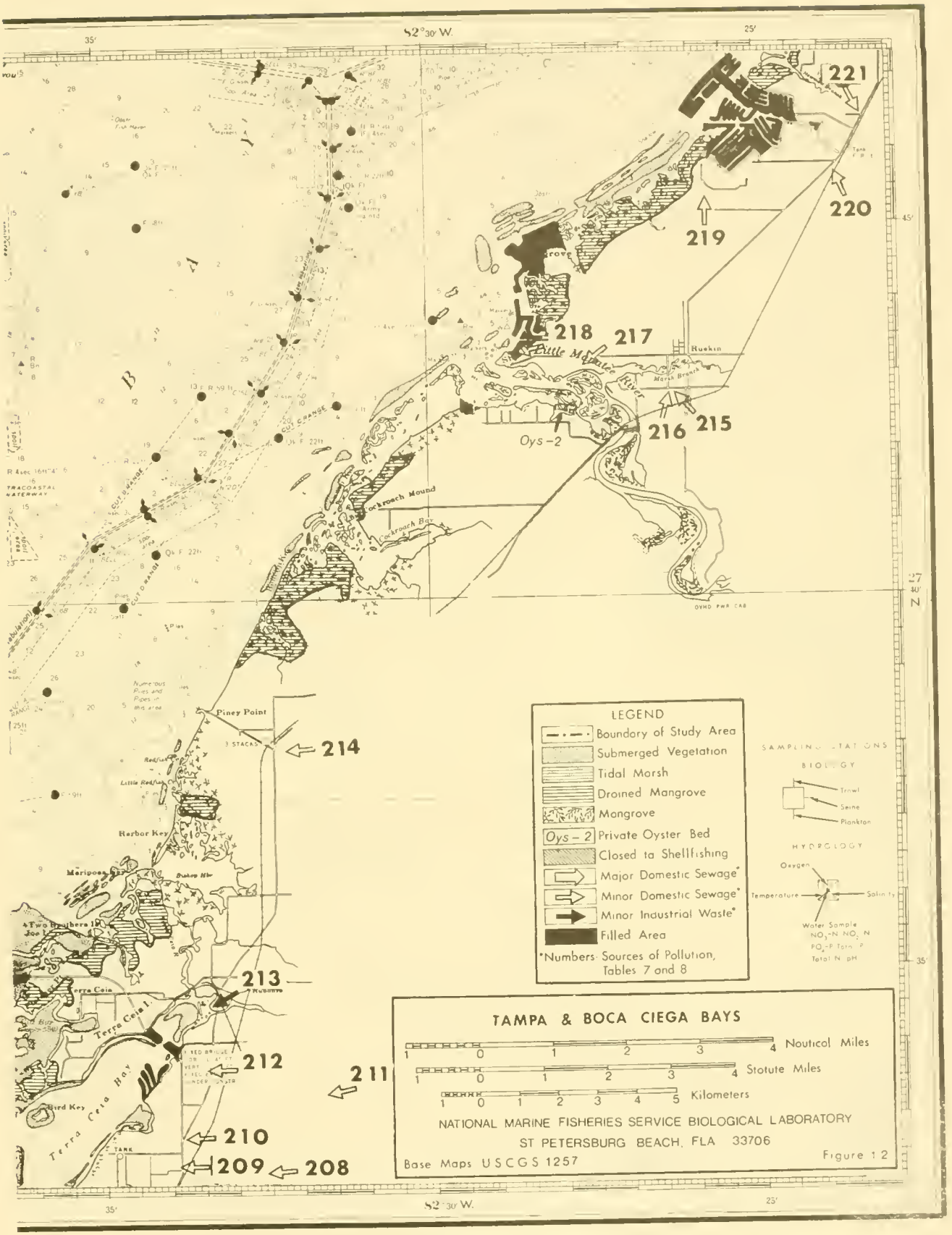
CONTINUATION OF
MYAKKA RIVER &
TIPPECANOE BAY
SOUNDINGS IN FEET
AT MEAN LOW WATER
MYAKKA RIVER
Tippecanoe Bay
El Jobean
Bird Key
Myakka Shores
Charlotte Beach
Cattle Dock Pt
Englewood
Stump Pass
Little Gasparilla Pass
Little Gasparilla I
Gasparilla Pass
Gasparilla
GASPARILLA SOUND
Gasparilla I
Boca Grande
Port Boca Grande
Devillish Key
Sandfly Key
Oys-2
Oys-2
GASPARILLA PASS
INTRACOASTAL WATERWAY
MARKERS
Manasota
077
076
075
074
073
072
071
080
079
078
82°15'
82°15' W
27° 00' N.
26° N
15'
10'
20'
55'
45'


070
069
068
067
065
064
Charlotte Harbor
Cleveland
Punta Gorda
Solana
Acline
Locust Pt
Oys-2
P E A C E R
Cape Haze
Oys-2
CHARLOTTE HARBOR
SAMPLING STATIONS
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Oys - 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers: Sources of Pollution, Tables 7 and 8
CHARLOTTE HARBOR & LEMON BAY
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S. 1255
Figure 10
82 W.
82° W
26 50' N.

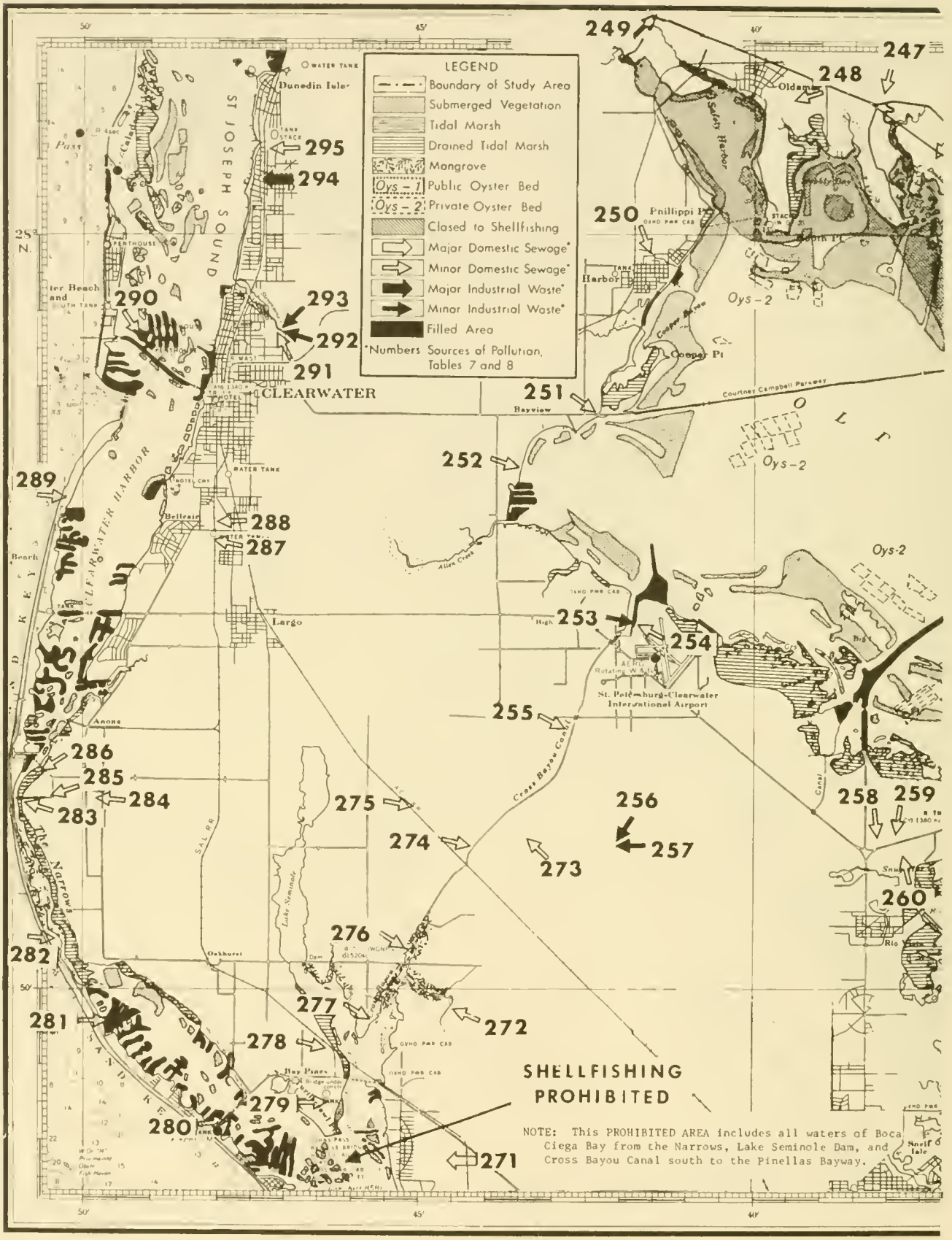

NOTE: This PROHIBITED AREA extends South and includes:
Little Sarasota, Blackburn, Dona, Roberts, Lyons Bays, Red Lake and the North portion of Lemon Bay as markad; Along with the adjacent tidal waters of the above named areas.
SHELLFISHING PROHIBITED (see note)
MANATEE RIVER
Palmetto
BRADENTON
Palma Sola
Longboat Key
Longboat Pass
Sarasota-Bradenton Municipal Airport
Indian Beach
Coral Isles
Branches Hammock
a=143
b=142
156 thru 170

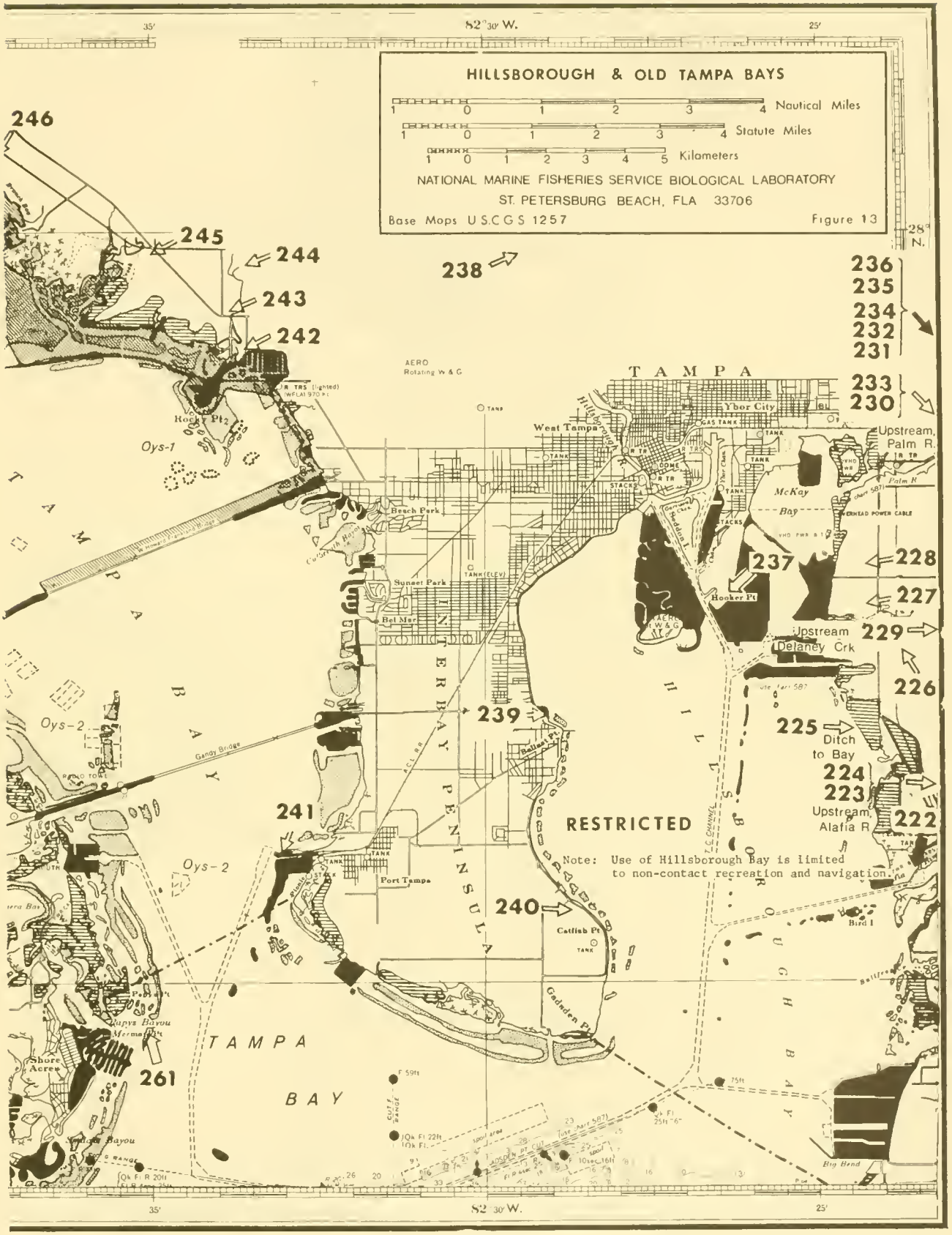

120 116 118
119 115 113
117 114 108
095
Upstream, Phillippi Creek
102
103
101
097
096
094
093
092
100
091
Siesta Key
099
098
090
089
088
087
086
085
084
083
082
081
Sarasota Pt.
Crescent Beach
Pt. O' Rocks
Midnight Pass
Osprey
Casey Key
Blackburn Bay
South Creek
Venice Inlet
Roberts Bay
Laurel
Nokomis
CUPOLA
VENICE
TANK
Municipal Airport
Red Lake
Alligator Cr.
SAMPLING STATIONS
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
(NO_3-N NO_2-N
PO_4-P Total P
Total N pH)
LEGEND
Baundary of Study Area
Submerged Vegetation
Drained Tidal Marsh
Mangrove
Oys – 2 Private Oyster Bed
Major Domestic Sewage*
Minor Domestic Sewage*
Major Industrial Waste*
Minor Industrial Waste*
Filled Area
*Numbers. Sources of Pollution, Tables 7 and 8
SARASOTA BAY & MANATEE RIVER
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S 1256
Figure 11
82°30' W.

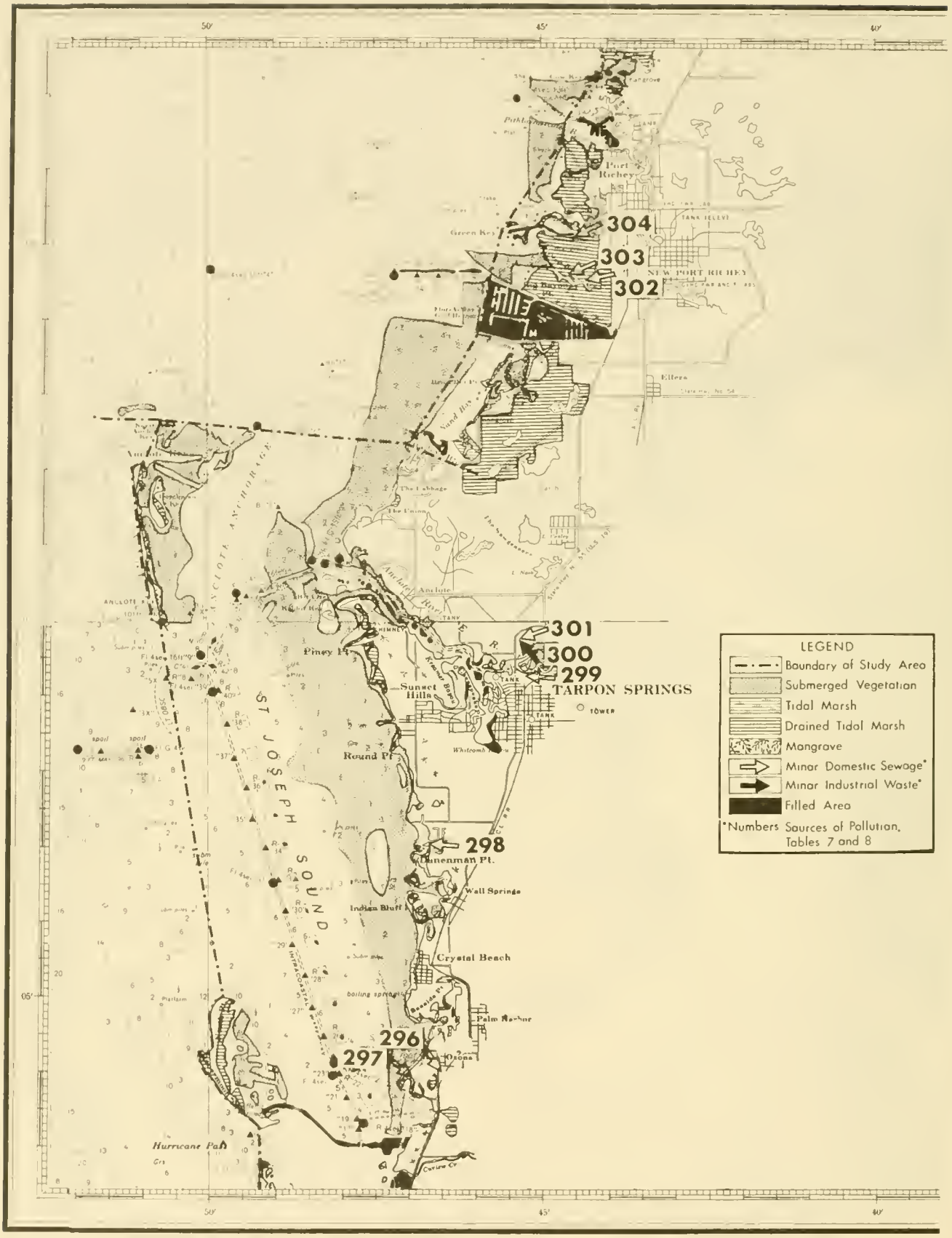

270
269
262
268
267
266
265
264
263
SHELLFISHING PROHIBITED
NOTE: This PROHIBITED AREA extends north to the Narrows, Lake Seminole Dam, and Cross Bayou Canal.
Johns Pass
ST. PETERSBURG
Pasadena
Gulfport
Blind Pass
Boca Ciega Bay
Pass-a-Grille Beach
PASS-A-GRILLE CHANNEL
North Channel
South Channel
Tarpon Key
BUNCES PASS
EGMONT CHANNEL
Egmont Key
Mullet Key Channel
Terra Ceia

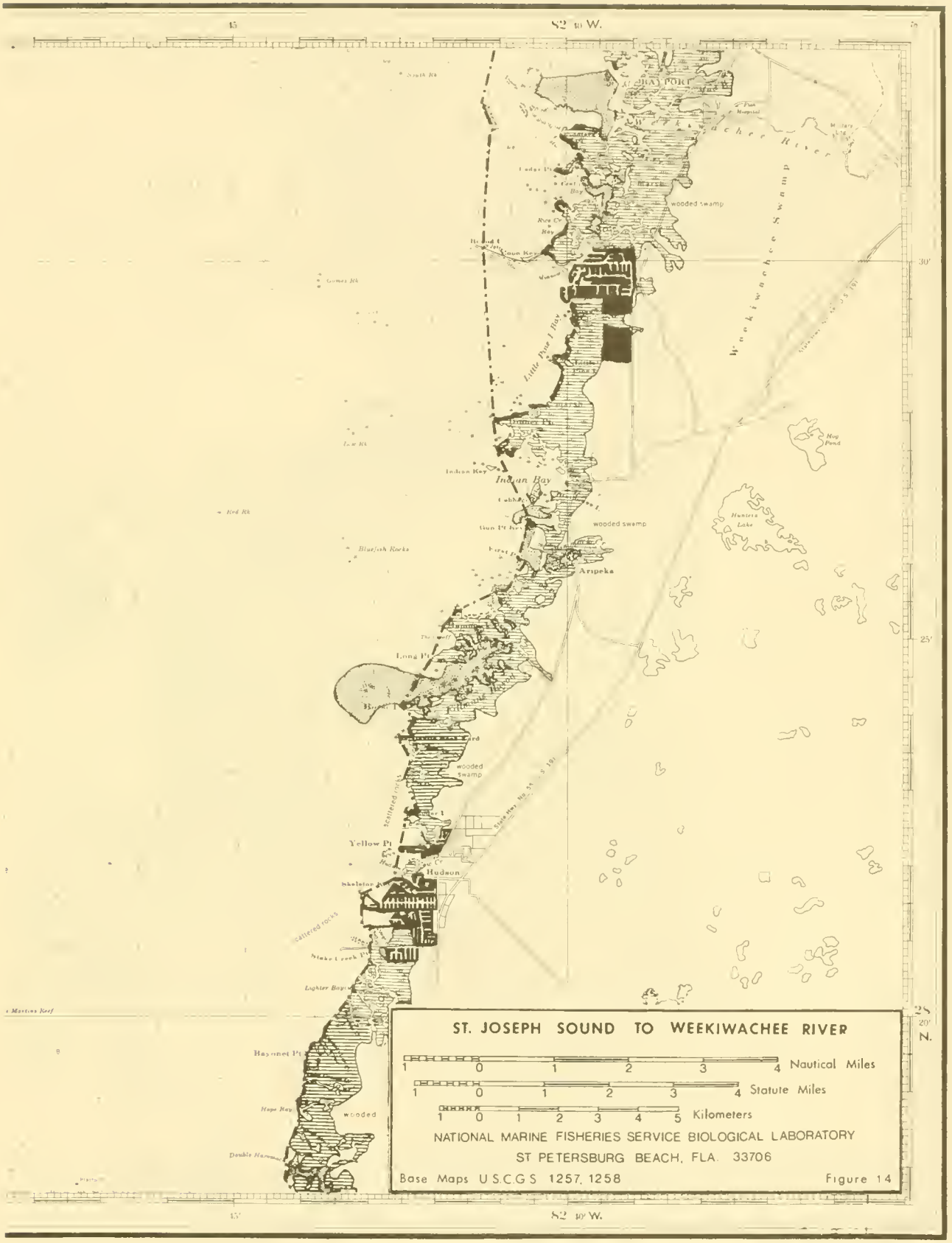


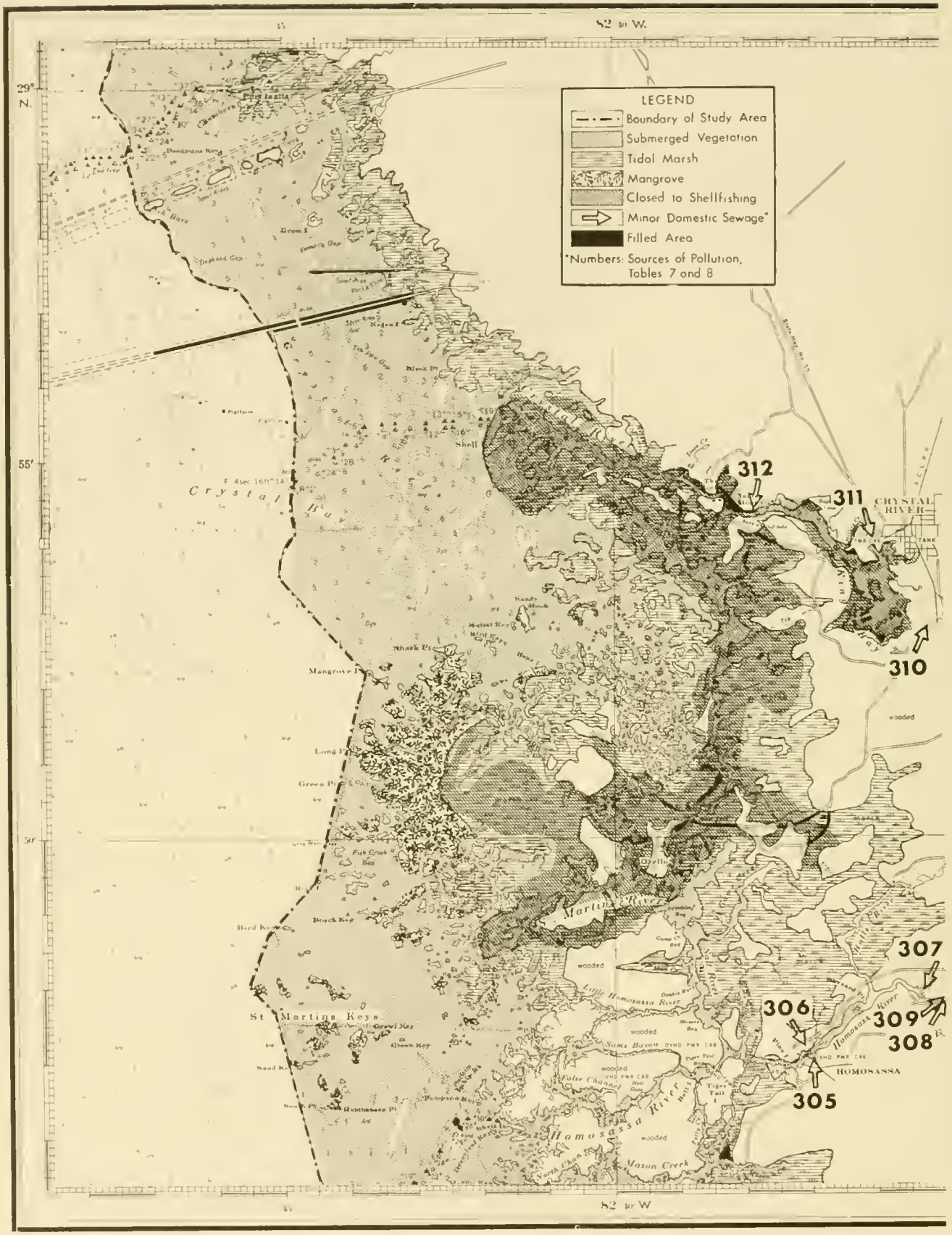
82°30' W.
221
220
219
218
217
216
215
214
213
212
211
210
209
208
Little Manatee River
Ruskin
Oys-2
Cockroach Mound
Cockroach Bay
Piney Point
Harbor Key
Terra Ceia I.
Terra Ceia Bay
Bird Key
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Mangrove
Mangrove
Oys-2 Private Oyster Bed
Closed to Shellfishing
Major Domestic Sewage*
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers: Sources of Pollution, Tables 7 and 8
SAMPLING STATIONS
BIOLOGY
Trawl
Seine
Plankton
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
TAMPA & BOCA CIEGA BAYS
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps USCGS 1257
Figure 1.2

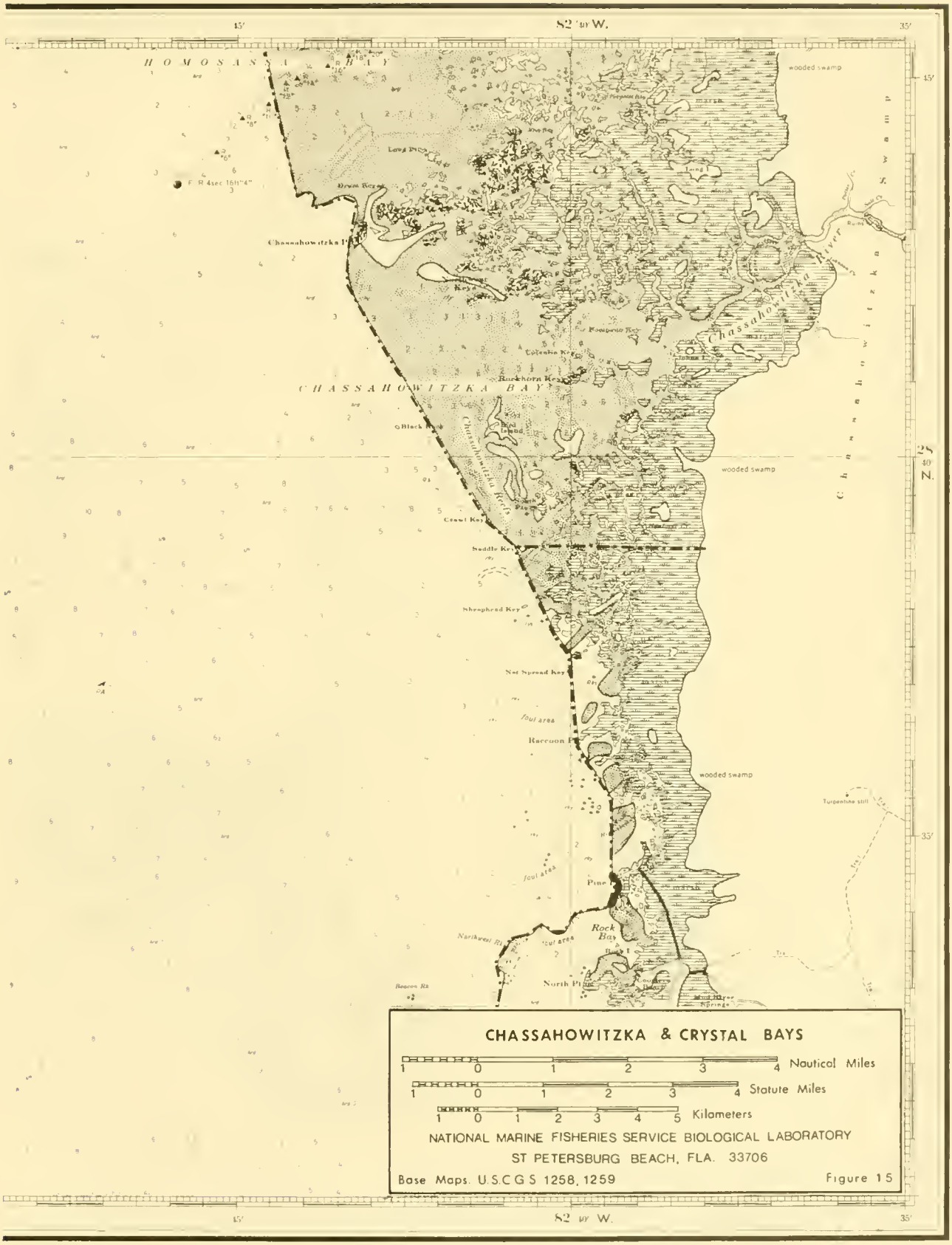

LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Oys – 1 Public Oyster Bed
Oys – 2 Private Oyster Bed
Closed to Shellfishing
Major Domestic Sewage*
Minor Domestic Sewage*
Major Industrial Waste*
Minor Industrial Waste*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8
ST JOSEPH SOUND
CLEARWATER
CLEARWATER HARBOR
Dunedin Isle
Largo
Bellesir
Anona
Oldsmar
Phillippi Pt
Harbor
Cooper Pt
Bayview
Courtney Campbell Parkway
St. Petersburg-Clearwater International Airport
Cross Bayou Canal
Lake Seminole
Oakhurst
Bay Pines
The Narrows
SHELLFISHING PROHIBITED
NOTE: This PROHIBITED AREA includes all waters of Boca Ciega Bay from the Narrows, Lake Seminole Dam, and Cross Bayou Canal south to the Pinellas Bayway.


HILLSBOROUGH & OLD TAMPA BAYS
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S. 1257
Figure 13
82°30' W.
28° N.
246
245
244
243
242
238
236
235
234
232
231
233
230
237
228
227
229
226
225
Ditch to Bay
224
223
Upstream Alafia R.
222
239
241
240
261
Upstream Palm R.
Upstream Delaney Crk
TAMPA BAY
HILLSBOROUGH BAY
TERRA CEIA BAY PENINSULA
McKay Bay
Ybor City
West Tampa
Hooker Pt
Sunset Park
Bel Mar
Beach Park
Rocky Pt
Gandy Bridge
Port Tampa
Catfish Pt
Gadsden Pt
Bird I
Big Bend
Oys-1
Oys-2
RESTRICTED
Note: Use of Hillsborough Bay is limited to non-contact recreation and navigation.

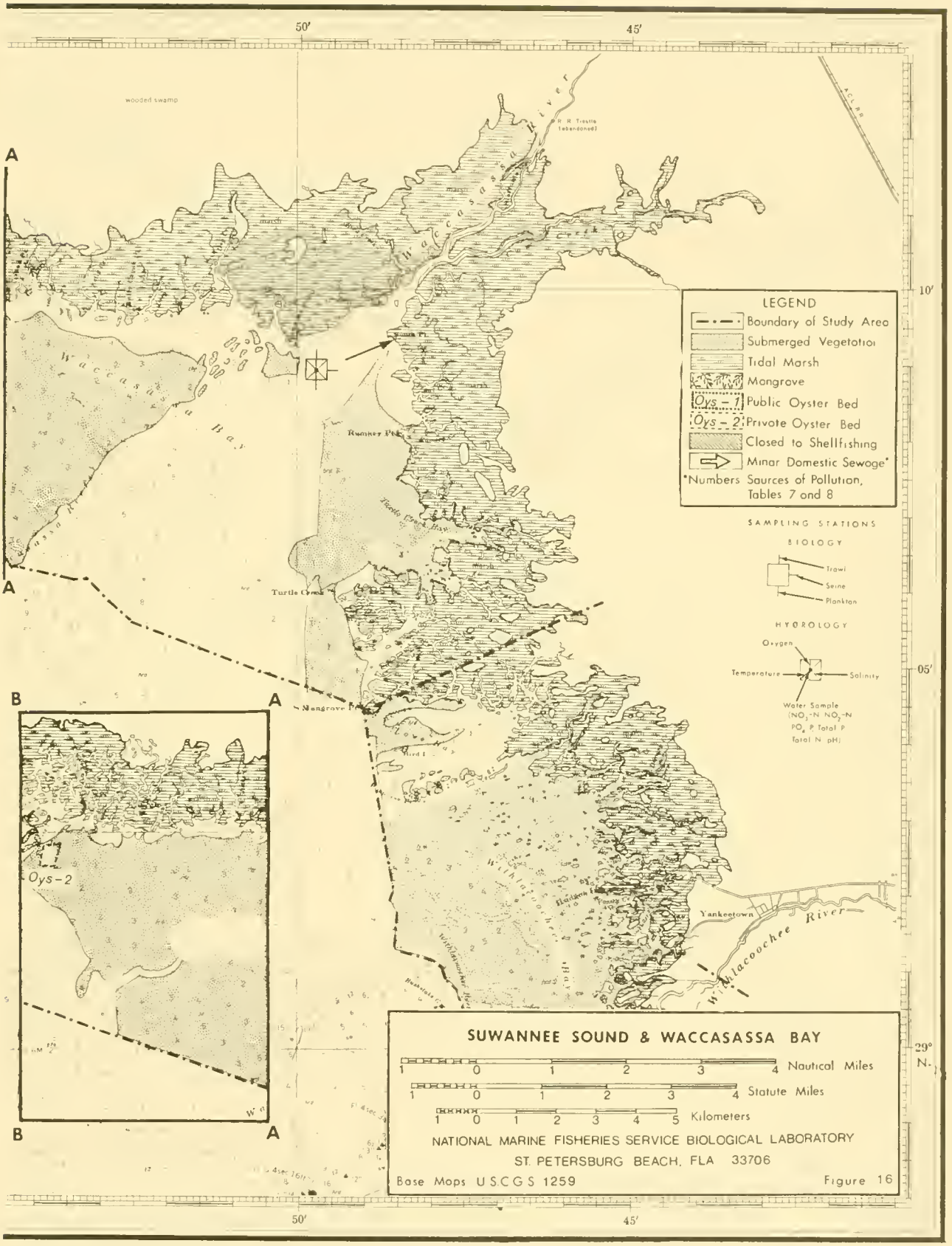

Port Richey
304
303
302
NEW PORT RICHEY
Ellers
301
300
299
TARPON SPRINGS
Sunset Hills
Piney Pt.
Round Pt.
298
Tanenman Pt.
Wall Springs
Indian Bluff
Crystal Beach
Palm Harbor
296
297
Hurricane Pass
ST JOSEPH SOUND
ANCLOTE ANCHORAGE
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8


ST. JOSEPH SOUND TO WEEKIWACHEE RIVER
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA. 33706
Base Maps U.S.C.G.S. 1257, 1258
Figure 14
82 40' W.
Weekiwachee River
Weekiwachee Swamp
wooded swamp
Indian Bay
Aripeka
Long Pt
Yellow Pt
Hudson
Bayonet Pt
Little Pine I Bay
Hunters Lake
Hog Pond
Bluefish Rocks
scattered rocks
Lighter Bay
Hope Bay
Double Harbor
30'
25'
20' N.

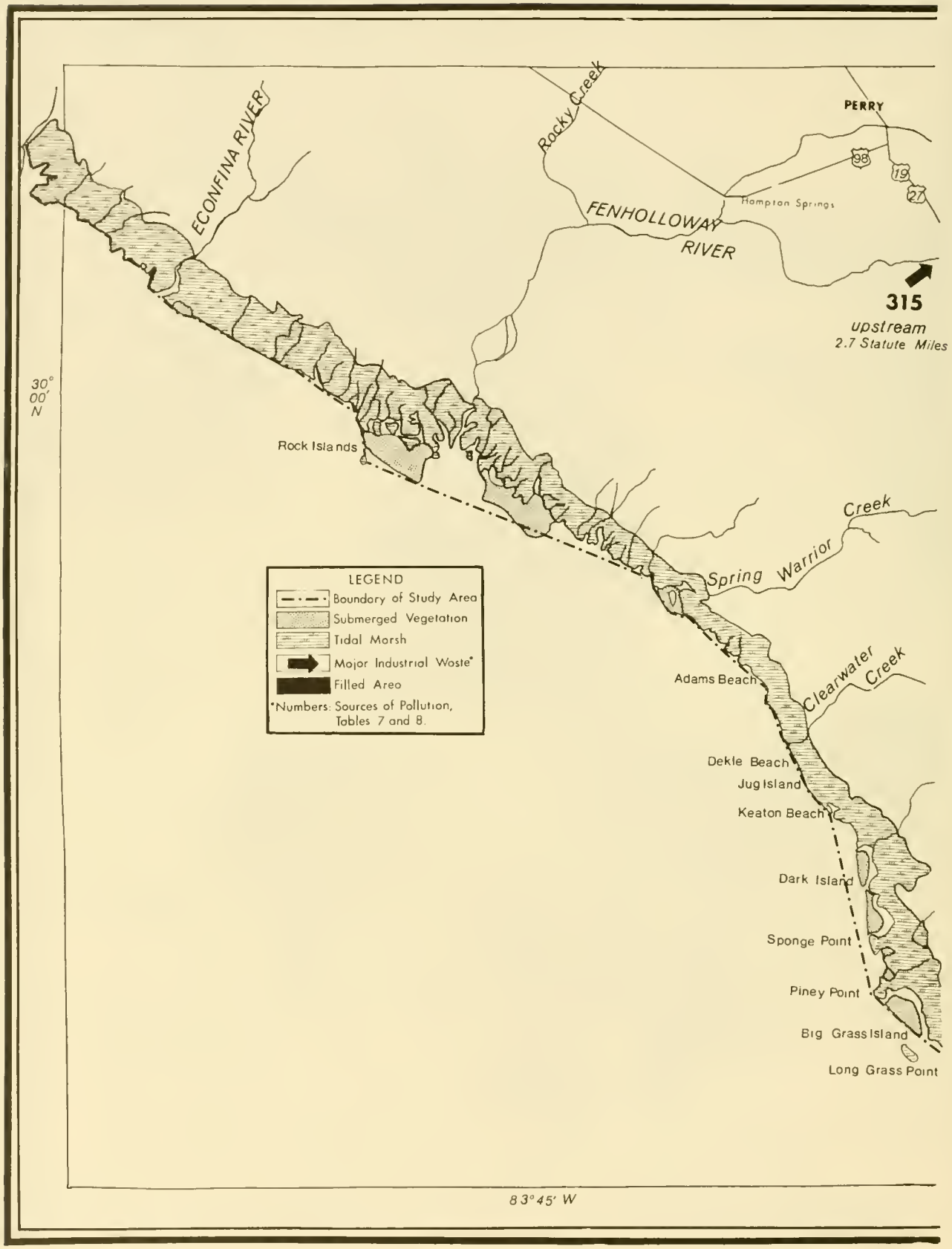

LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Mangrove
Closed to Shellfishing
Minor Domestic Sewage*
Filled Area
*Numbers: Sources of Pollution, Tables 7 and 8
82 40 W.
29° N.
55'
50'
Crystal Bay
Shell
312
311
CRYSTAL RIVER
310
Martins River
St Martins Keys
Little Homosassa River
Homosassa River
Mason Creek
HOMOSASSA
307
306
309
308
305
wooded


82 40' W.
45'
35'
HOMOSASSA BAY
CHASSAHOWITZKA BAY
Chassahowitzka Reefs
Chassahowitzka River
Chassahowitzka Swamp
wooded swamp
Long Pt
Drum Keys
Chassahowitzka Pt
Keys
Rockhorn Key
Black Key
Crawl Key
Saddle Key
Shepherd Key
Net Spread Key
foul area
Raccoon Pt
Pine
Rock Bay
North Pt
Northwest Rk
Beacon Rk
Turpentine still
28 40' N.
CHASSAHOWITZKA & CRYSTAL BAYS
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA. 33706
Base Maps. U.S.C.G.S. 1258, 1259
Figure 15

10'
05'
83° W.
29° 20' N.
15'
10'
05'
Suwannee River
Hog Island
SUWANNEE SOUND
Oys-2
Oys-2
Oys-2
Oys-2
313
B
B



50′
45′
10′
05′
29° N.
wooded swamp
R. R. Trestle (abandoned)
Waccasassa River
Waccasassa Bay
Rumney Pt.
Turtle Creek
Mangrove Pt.
Yankeetown
Withlacoochee River
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Mangrove
Oys – 1 Public Oyster Bed
Oys – 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
*Numbers Sources of Pollution, Tables 7 and 8
SAMPLING STATIONS
BIOLOGY
Trawl
Seine
Plankton
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
(NO3-N NO2-N PO4 P Total P Total N pH)
Oys-2
SUWANNEE SOUND & WACCASASSA BAY
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S. 1259
Figure 16


ECONFINA RIVER
Rocky Creek
PERRY
98
19
27
Hampton Springs
FENHOLLOWAY RIVER
315
upstream
2.7 Statute Miles
30° 00' N
Rock Islands
Spring Warrior Creek
Adams Beach
Clearwater Creek
Dekle Beach
Jug Island
Keaton Beach
Dark Island
Sponge Point
Piney Point
Big Grass Island
Long Grass Point
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Major Industrial Waste*
Filled Area
*Numbers: Sources of Pollution, Tables 7 and 8.
83° 45' W

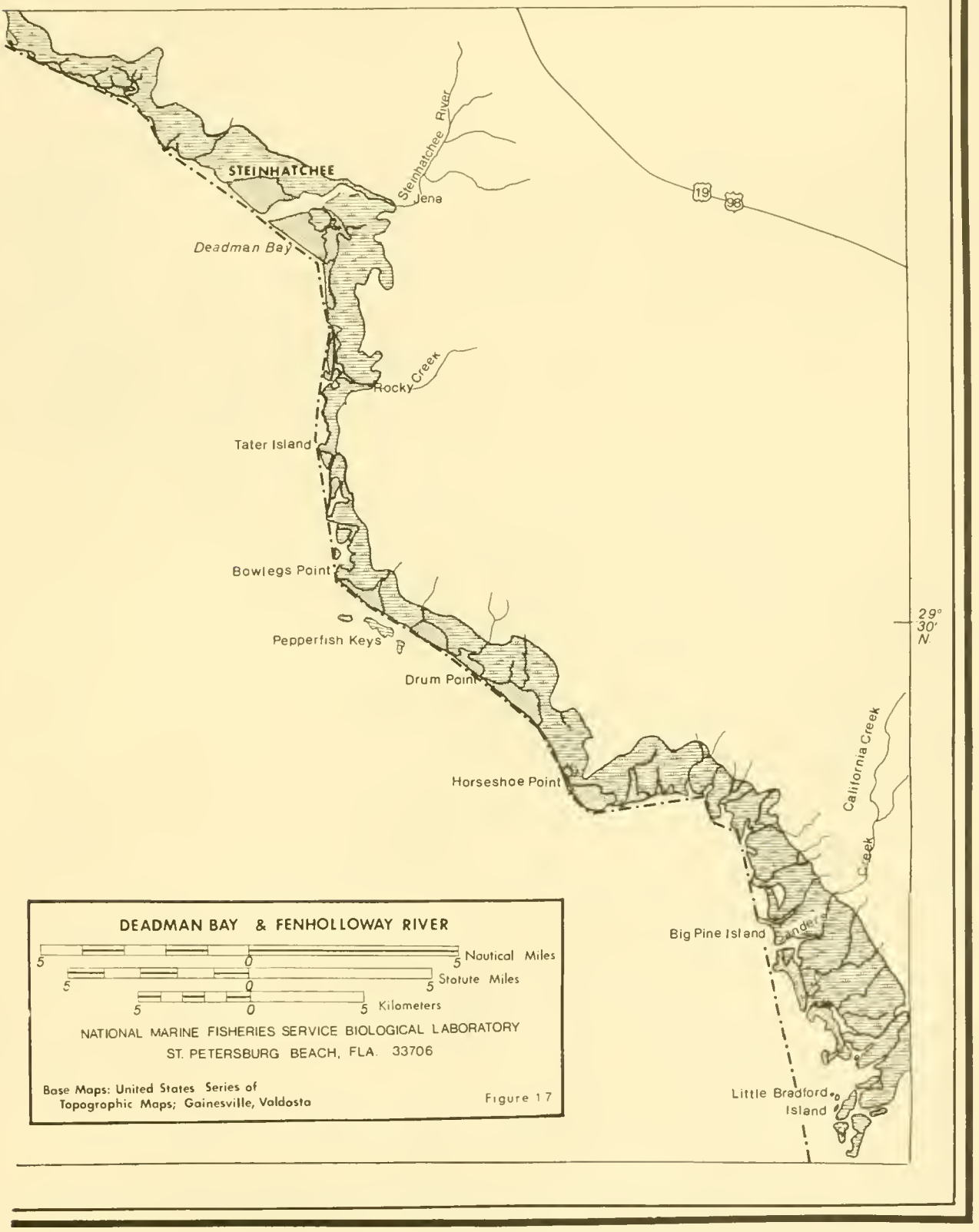
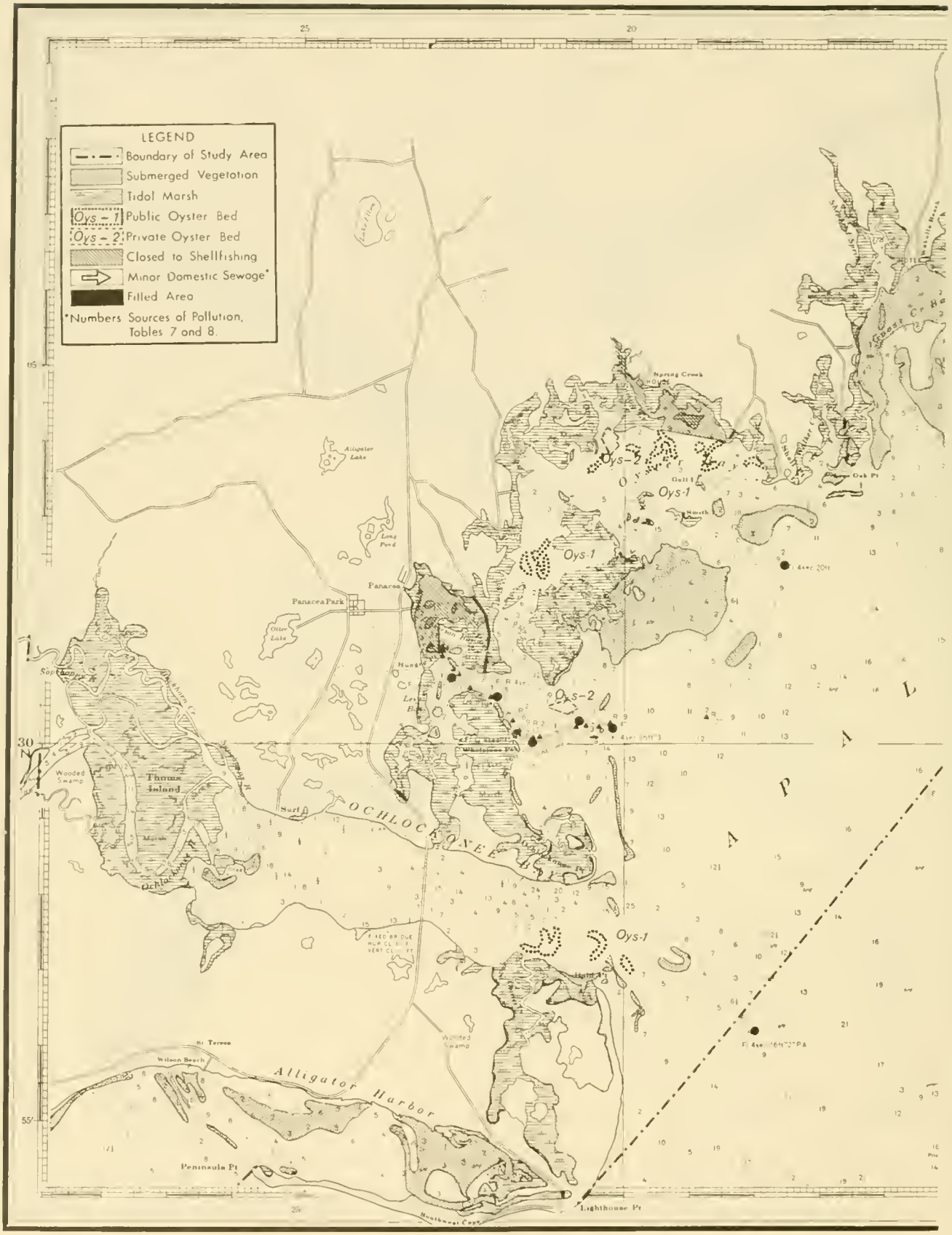
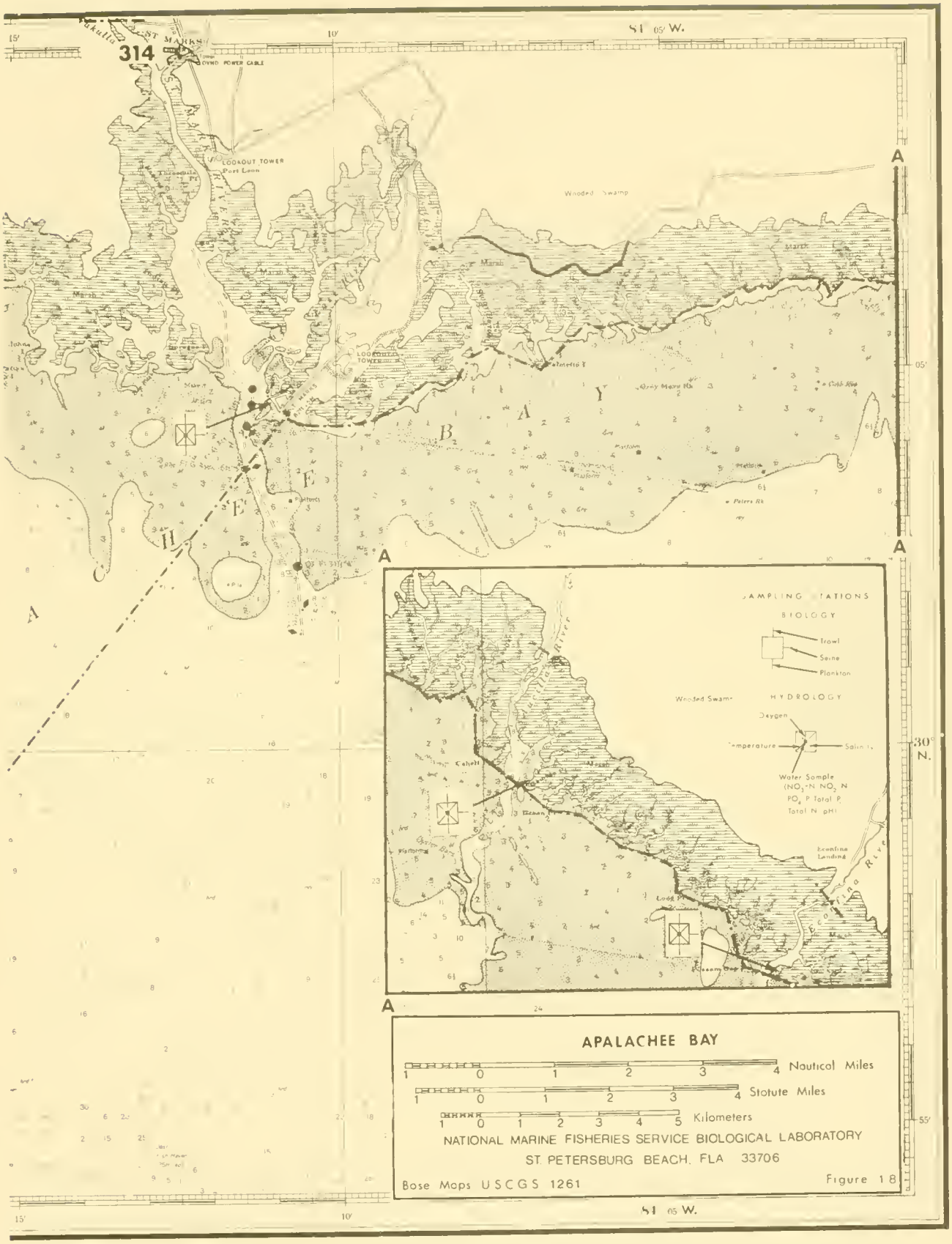
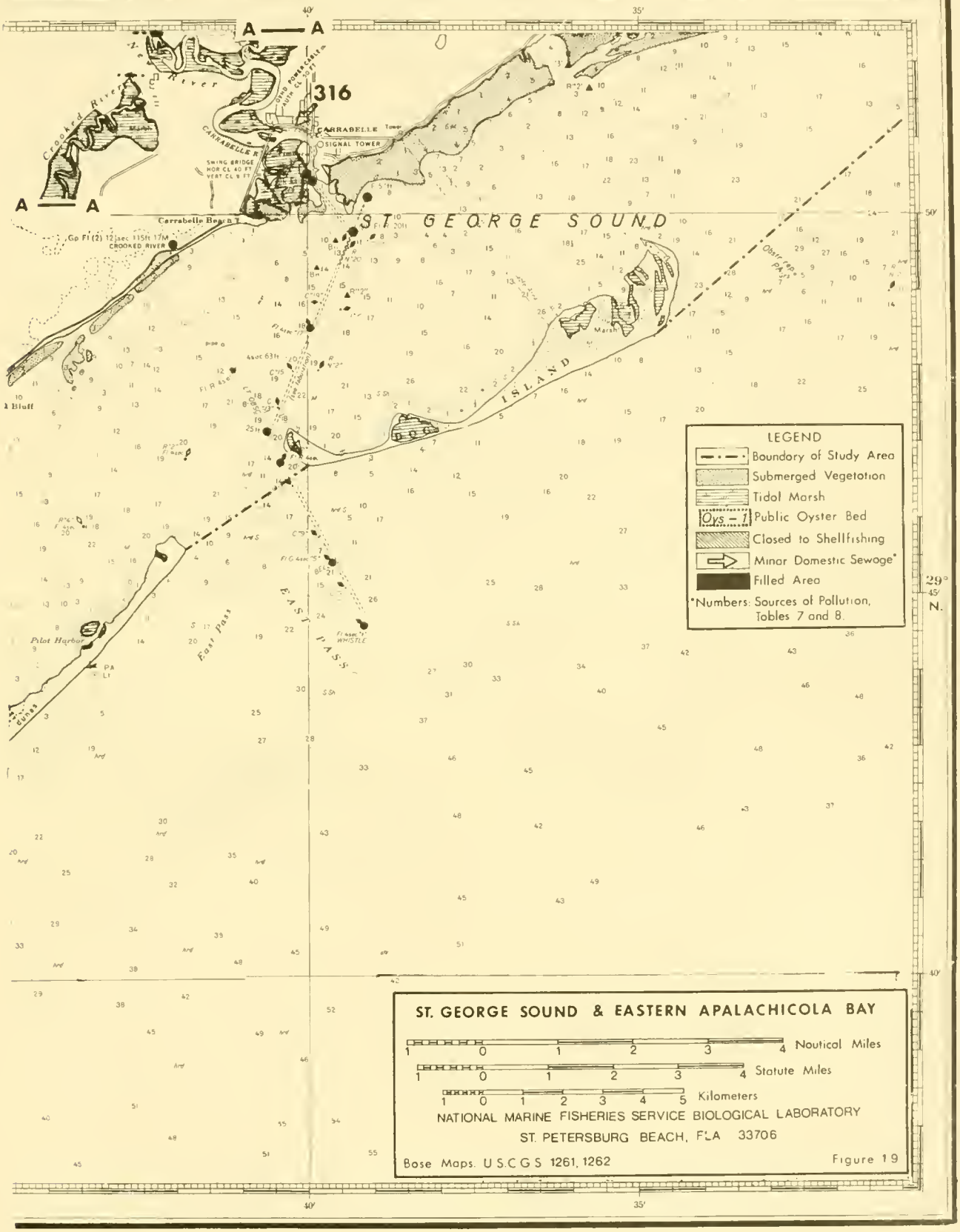

STEINHATCHEE
Steinhatchee River
Jena
19
98
Deadman Bay
Rocky Creek
Tater Island
Bowlegs Point
Pepperfish Keys
Drum Point
29°
30'
N
Horseshoe Point
California Creek
Big Pine Island
Little Bradford
Island
DEADMAN BAY & FENHOLLOWAY RIVER
5 0 5 Nautical Miles
5 0 5 Statute Miles
5 0 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA. 33706
Base Maps: United States Series of
Topographic Maps; Gainesville, Valdosta

Figure 17

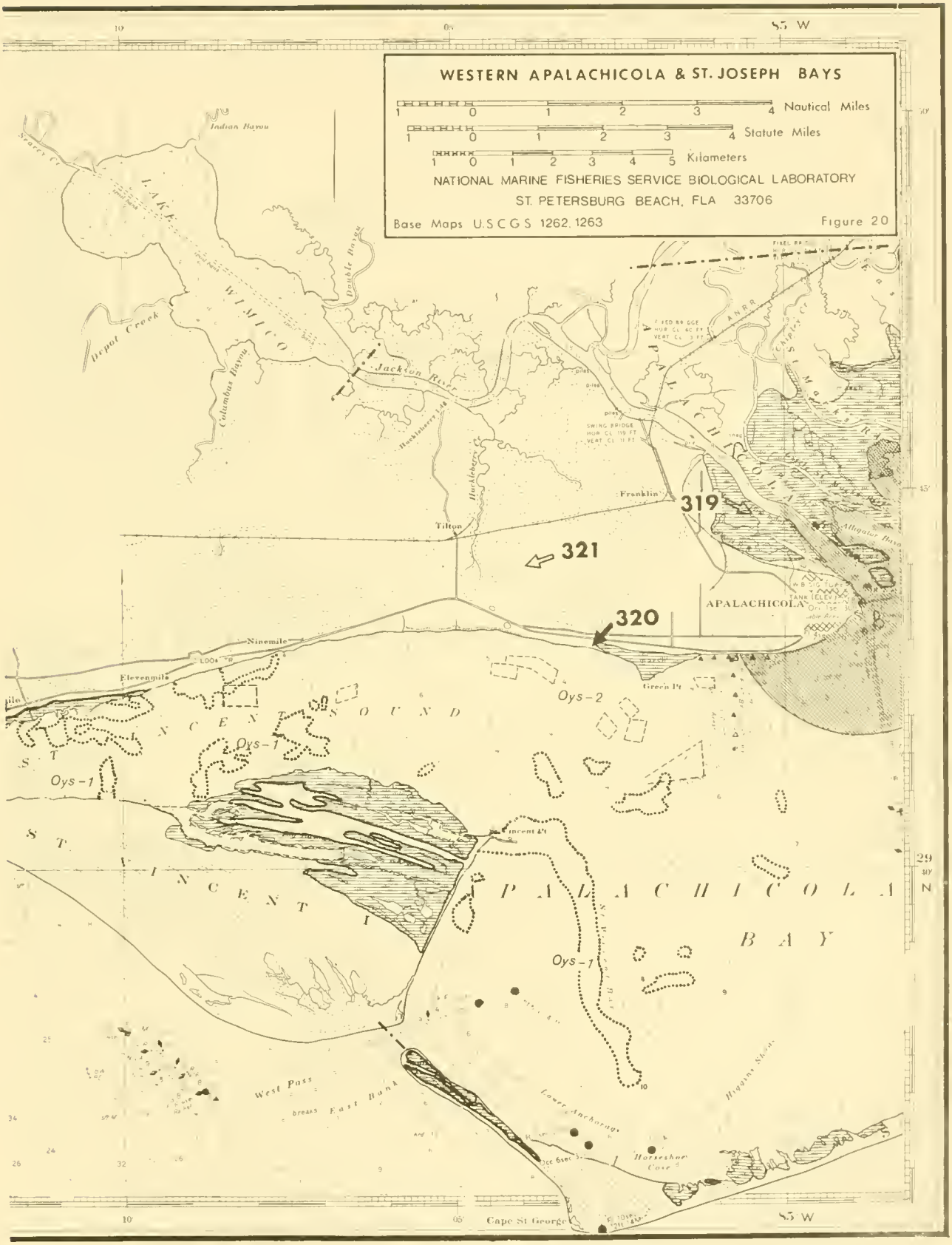

LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Oys - 1 Public Oyster Bed
Oys - 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8.
Oys-1
Oys-2
Panacea
Panacea Park
Alligator Lake
Long Pond
Otter Lake
Thomas Island
Wooded Swamp
OCHLOCKONEE BAY
Alligator Harbor
Peninsula Pt
Lighthouse Pt
Wilson Beach
St Teresa
Spring Creek
Oak Pt
Smith
Gull I
Surf
Hunter
Lake Ellen
Ochlockonee R
Sopchoppy R
Wooded Swamp
Southwest Cape
A P A L

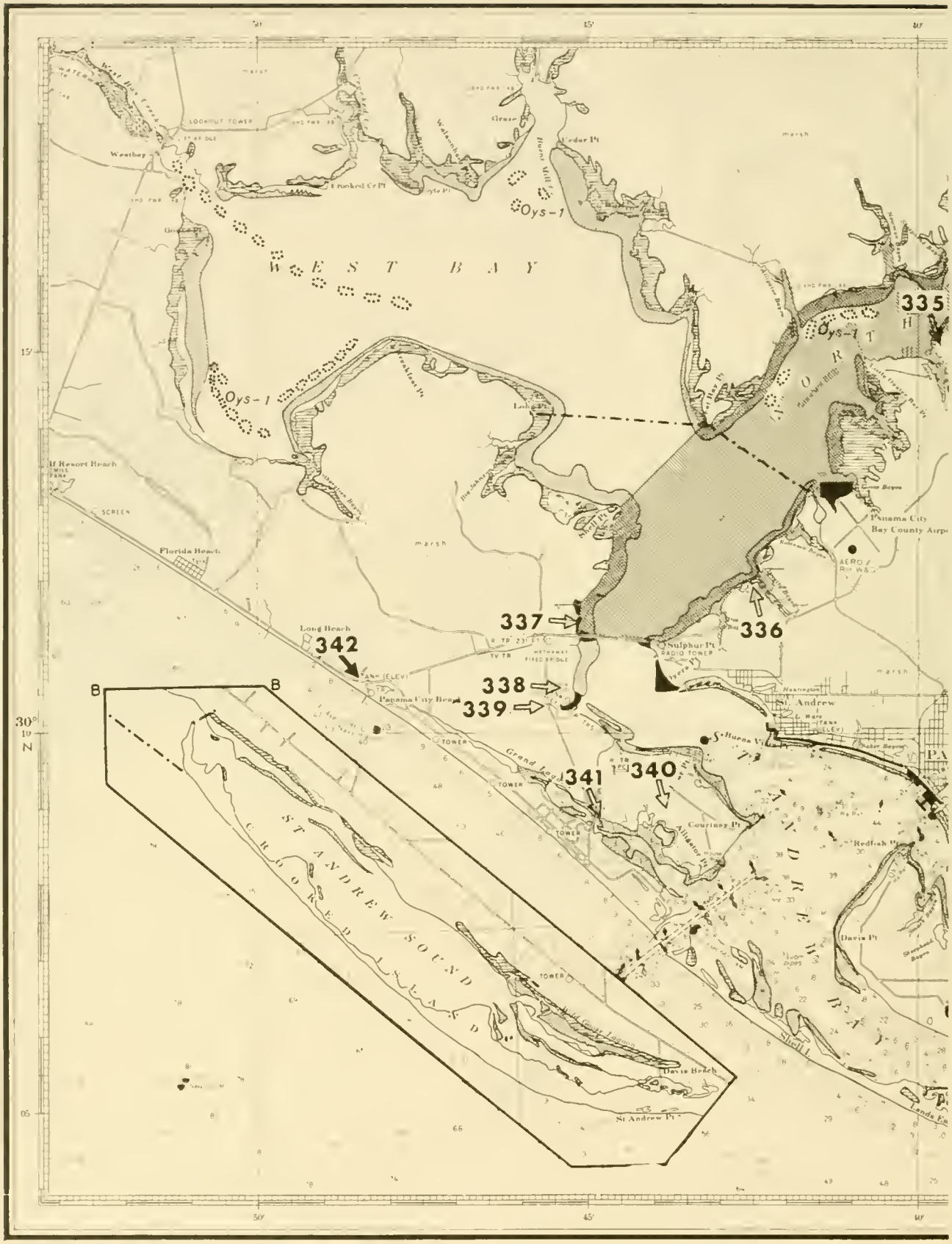

314
ST MARKS
OVHD POWER CABLE
LOOKOUT TOWER
Port Leon
Wooded Swamp
Marsh
A
B
A
Y
A
C
H
E
E
A
A
SAMPLING STATIONS
BIOLOGY
Trawl
Seine
Plankton
Wooded Swamp
HYDROLOGY
Oxygen
Temperature
Salinity
Water Sample
(NO3-N NO2 N
PO4 P Total P
Total N pH)
Econfina Landing
Econfina River
30° N.
APALACHEE BAY
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U S C G S 1261
Figure 18

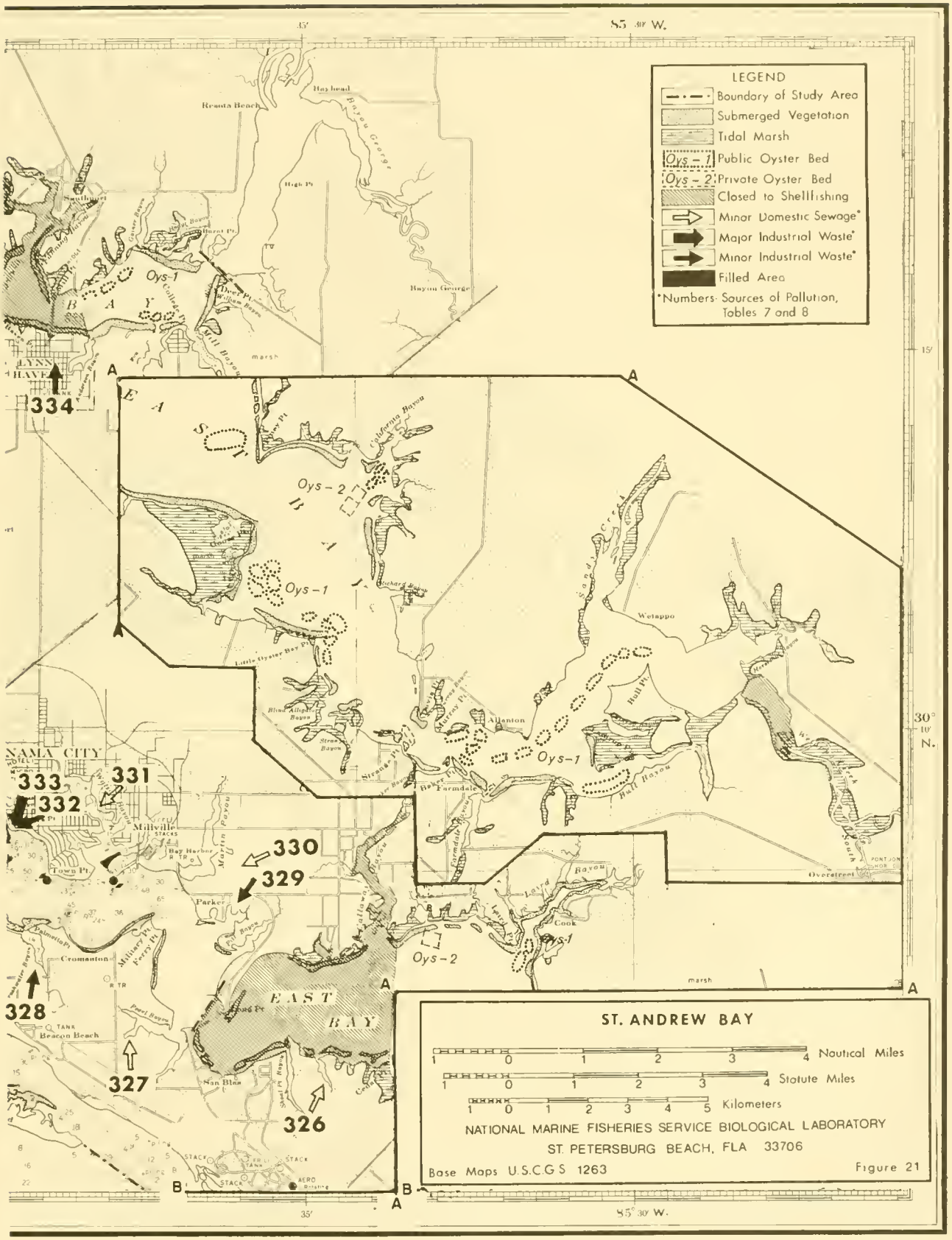
317
318
Marsh Pt
Green Pt
EAST BAY
EAST POINT
Eastpoint
Godleys Bluff
Cat Pt
Oys-1
ST GEORGE SOUND
APALACHICOLA BAY
Bulkhead Shoal
Bulk Pt
East Gap
Cedar Pt
ST GEORGE ISLAND
84°45'
84°45'W.


A — A
316
CARRABELLE
SIGNAL TOWER
ST GEORGE SOUND
ISLAND
Carrabelle Beach
CROOKED RIVER
Pilot Harbor
East Pass
Marsh
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Ovs = 1 Public Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Filled Area
*Numbers: Sources of Pollution, Tables 7 and 8.
29° 45' N.
ST. GEORGE SOUND & EASTERN APALACHICOLA BAY
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps. U.S.C.G.S. 1261, 1262
Figure 19

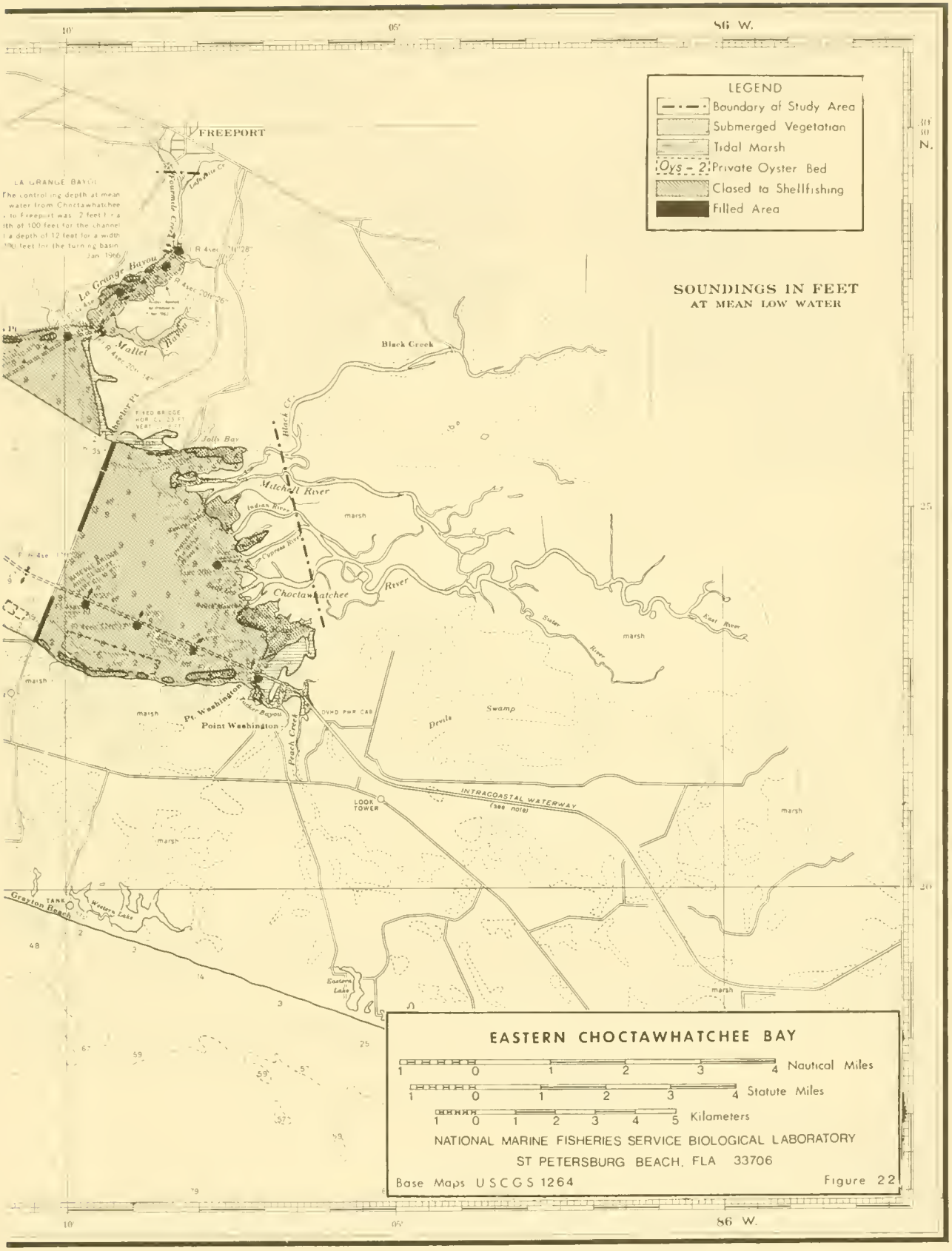
A
A
325
324
323
322
Port St. Joe
ST. JOSEPH BAY
ST. JOSEPH SPIT
Eagle Harbor
Pig I.
Pig Bayou
Blacks I.
CAPE SAN BLAS
R Bn 320
Money Beach
Oys-2
Indian Peninsula
Indian Pass
Thirteenn
St. Joseph Pt.
LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Oys - 1 Public Oyster Bed
Oys - 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Major Industrial Waste*
Minor Industrial Waste*
*Numbers Sources of Pollution, Tables 7 and 8
29
N.

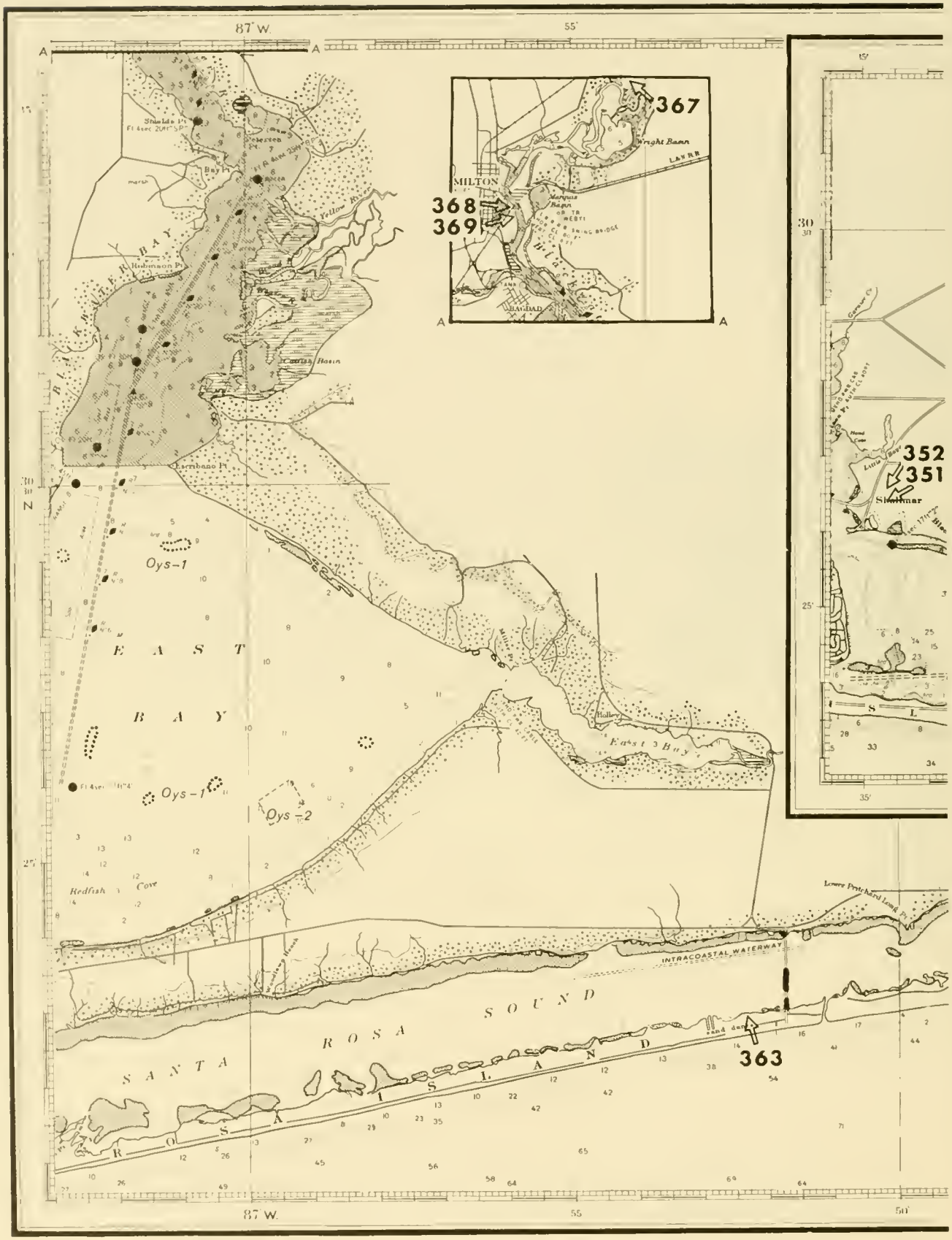

WESTERN APALACHICOLA & ST. JOSEPH BAYS
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S. 1262, 1263
Figure 20
85 W
Indian Bayou
Scarey Cr
LAKE WIMICO
Depot Creek
Columbus Bayou
Double Bridge
Jackson River
Huckleberry Lake
Huckleberry
SWING BRIDGE
Franklin
Tilton
319
321
320
APALACHICOLA
Ninemile
Elevenmile
Green Pt
Oys-2
Oys-1
Oys-1
Oys-1
ST VINCENT SOUND
ST VINCENT I
APALACHICOLA BAY
West Pass
East Bank
Lower Anchorage
Horseshoe Cove
Cape St George
85 W

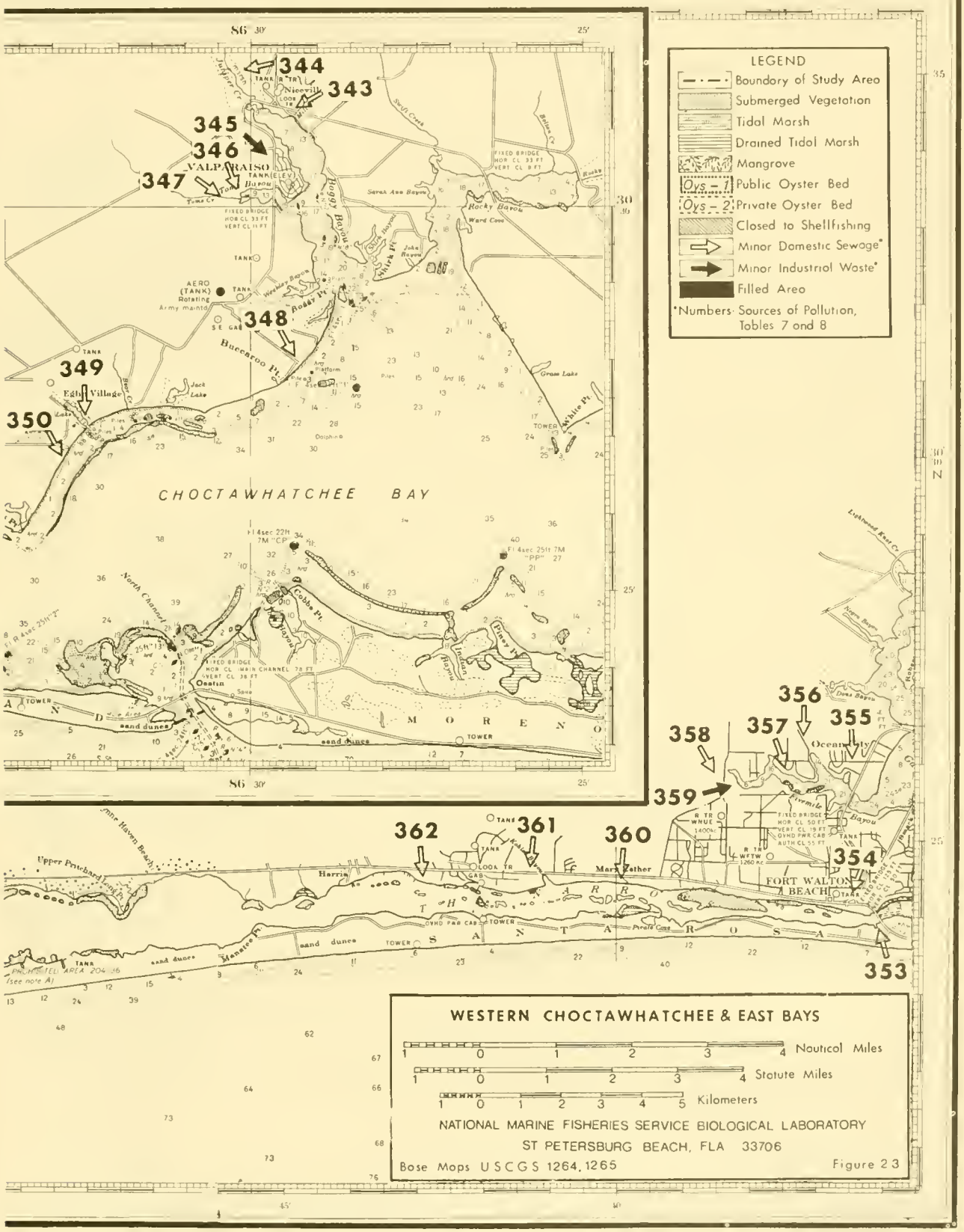

WEST BAY
Oys-1
Oys-1
Oys-1
335
336
337
338
339
340
341
342
Panama City Bay County Airp
Sulphur Pt
St. Andrew
Long Beach
Panama City Beach
Florida Beach
If Resort Beach
Courtney Pt
Redfish Pt
Davis Pt
Davis Beach
St Andrew Pt
ST ANDREW SOUND
CROOKED ISLAND
Grand Lagoon
Shell L
Weatbay
Crooked Cr Pt
Cedar Pt
Grass Pt
Long Pt
Shell Pt
Lookout Tower
Tower
Radio Tower
Alligator Pt
Buena Vista
B
B
30°
N

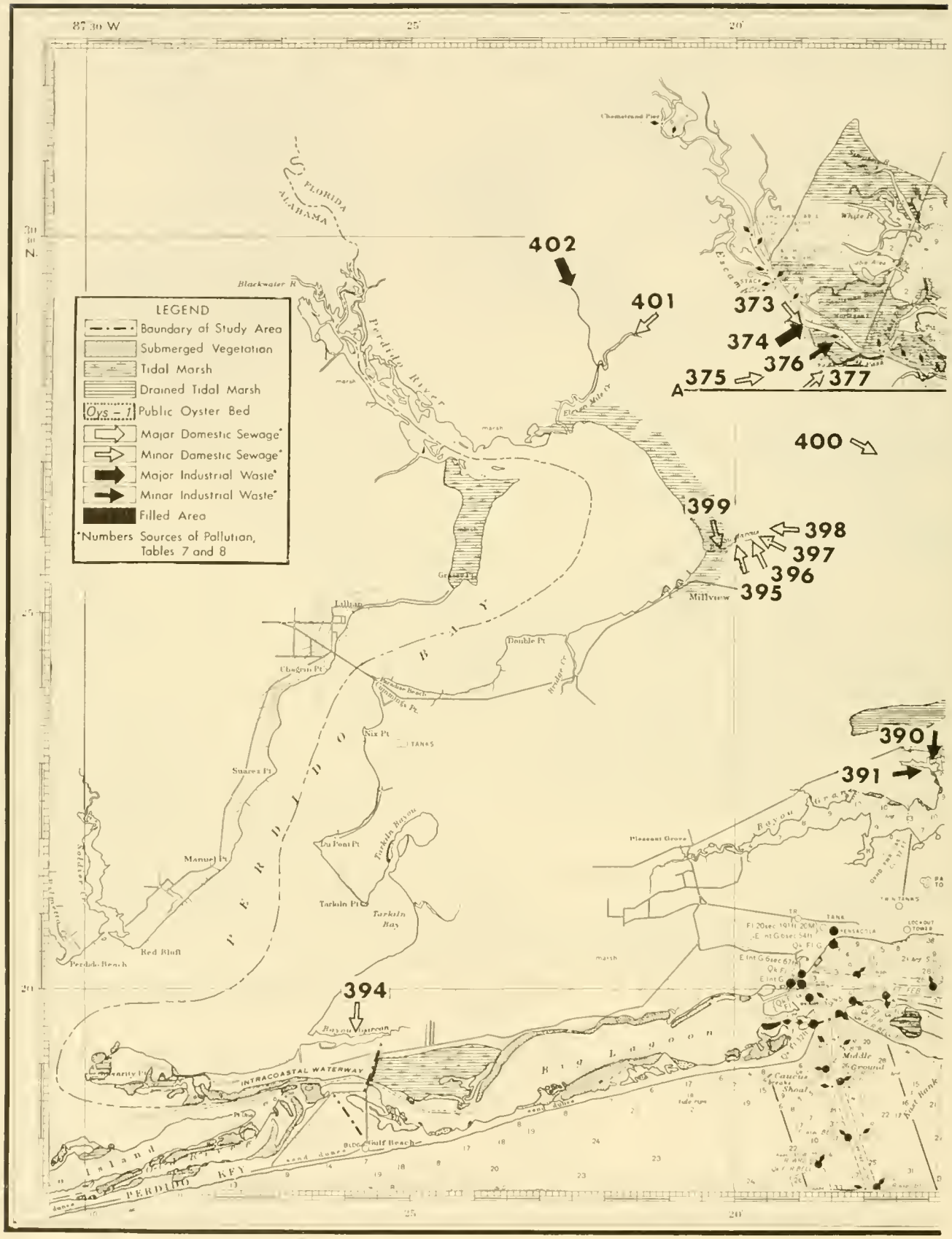

LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Oys – 1 Public Oyster Bed
Oys – 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Major Industrial Waste*
Minor Industrial Waste*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8
85° 30' W.
30° 10' N.
334
333
332
331
330
329
328
327
326
Oys – 1
Oys – 2
EAST BAY
ST. ANDREW BAY
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U.S.C.G.S 1263
Figure 21

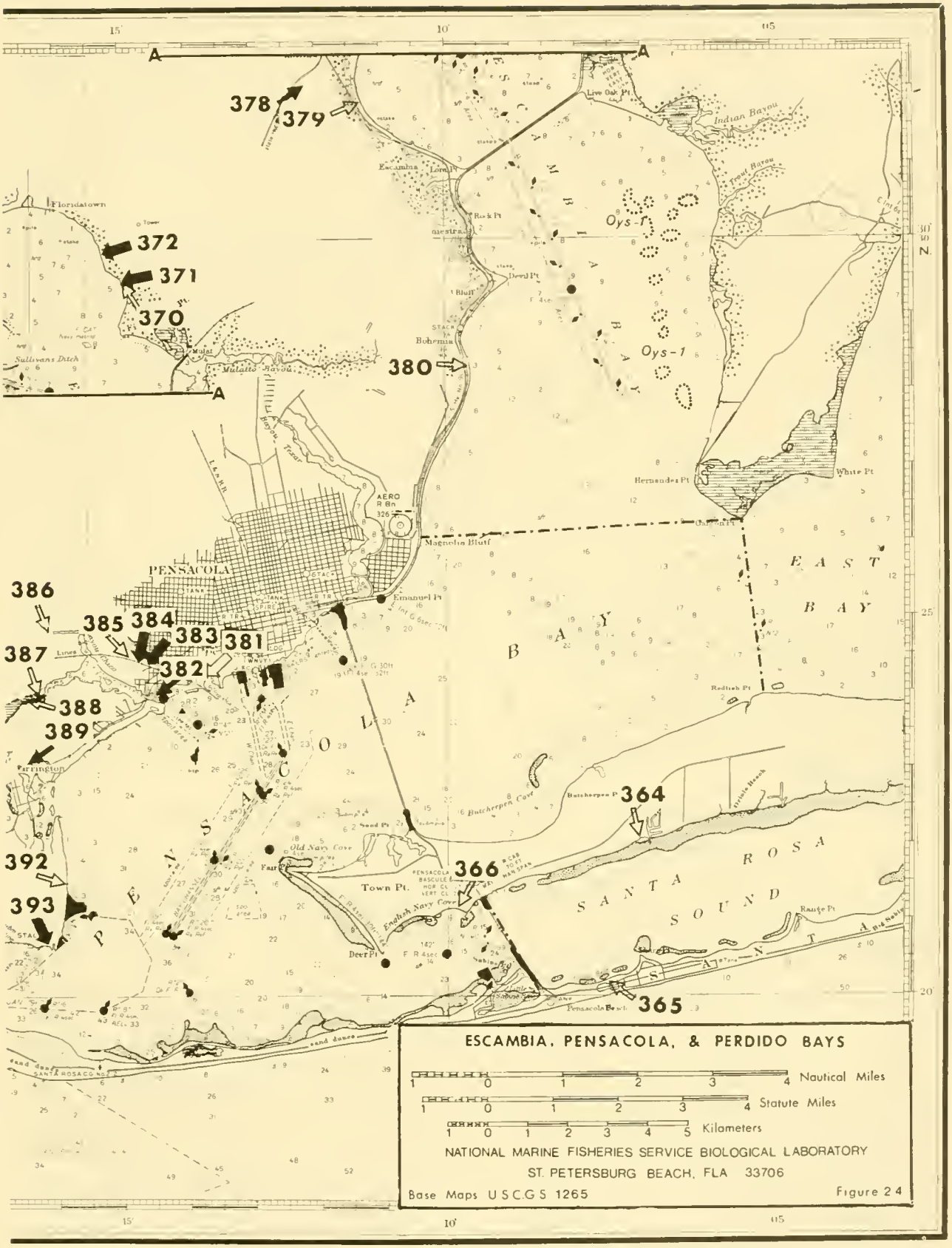
CHOCTAWHATCHEE BAY
Oys-2
Oys-2
Oys-2
Portland
Hammock Pt
Big Hammock Pt
Villa Tasso
Pippin Lake
Stake Pt
Alaqua Pt
Alaqua Bayou
Basin Bayou
Mullet Cr
Grassy Cove
Fourmile Pt
Horseshoe Bayou
Mack Bayou
Hewett Bayou
Lyn Oak Pt
Alligator Pt
SANTA ROSA BEACH
HOUSE
SCHOOL
Four Prong Lake
Stewart Lake
Fuller Lake
Morris Lake
Campbell Lake
Topsail Bluff
Oyster Lake
Draper Lake
Blue Mountain
Big Redfish Lake
marsh
TOWE


LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Oys - 2 Private Oyster Bed
Closed to Shellfishing
Filled Area
SOUNDINGS IN FEET
AT MEAN LOW WATER
FREEPORT
La Grange Bayou
Mallet Bayou
Black Creek
Jolly Bay
Mitchell River
Indian River
Cypress River
Choctawhatchee River
Sister River
East River
marsh
Pt. Washington
Point Washington
Tucker Bayou
Peach Creek
Devils Swamp
INTRACOASTAL WATERWAY
(see note)
LOOK TOWER
Grayton Beach
Western Lake
Eastern Lake
86 W.
EASTERN CHOCTAWHATCHEE BAY
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps U S C G S 1264
Figure 22


87° W.
55'
367
Wright Basin
MILTON
368
369
Marquis Basin
BAGDAD
Yellow River
Robinson Pt
Escribano Pt
Oys-1
Oys-1
Oys-2
EAST BAY
East Bay
Redfish Cove
Holley
INTRACOASTAL WATERWAY
SANTA ROSA SOUND
ROSA ISLAND
363
352
351
Skallmar
87° W.
55
50'


LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Mangrove
Oys – 1 Public Oyster Bed
Oys – 2 Private Oyster Bed
Closed to Shellfishing
Minor Domestic Sewage*
Minor Industrial Waste*
Filled Area
*Numbers - Sources of Pollution, Tables 7 and 8
344
343
345
346
347
348
349
350
356
357
355
358
359
362
361
360
354
353
VALPARAISO
CHOCTAWHATCHEE BAY
MORENO
FORT WALTON BEACH
Okaloosa Island
WESTERN CHOCTAWHATCHEE & EAST BAYS
1 0 1 2 3 4 Nautical Miles
1 0 1 2 3 4 Statute Miles
1 0 1 2 3 4 5 Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST PETERSBURG BEACH, FLA 33706
Base Maps USCGS 1264, 1265
Figure 23


LEGEND
Boundary of Study Area
Submerged Vegetation
Tidal Marsh
Drained Tidal Marsh
Oys - 1 Public Oyster Bed
Major Domestic Sewage*
Minor Domestic Sewage*
Major Industrial Waste*
Minor Industrial Waste*
Filled Area
*Numbers Sources of Pollution, Tables 7 and 8
402
401
373
374
376
375
377
A
400
399
398
397
396
395
390
391
394
FLORIDA
ALABAMA
Blackwater R
Perdido River
Millview
Lillian
Double Pt
Chagrin Pt
Nix Pt
Suarez Pt
Manuel Pt
Du Pont Pt
Tarkiln Pt
Tarkiln Bay
Red Bluff
Perdido Beach
PERDIDO BAY
Pleasant Grove
Bayou Grande
Big Lagoon
INTRACOASTAL WATERWAY
Gulf Beach
PERDIDO KEY
Middle Ground
Caucus Shoal
East Bank
Chemstrand Pier
White R
marsh
25'
20'
87 30 W
30 30 N


ESCAMBIA, PENSACOLA, & PERDIDO BAYS
Nautical Miles
Statute Miles
Kilometers
NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL LABORATORY
ST. PETERSBURG BEACH, FLA 33706
Base Maps U S C.G S 1265
Figure 2 4
PENSACOLA
Magnolia Bluff
Emanuel Pt
Bohemia
Escambia
Floridatown
Sullivans Ditch
Mulatto Bayou
Indian Bayou
Trout Bayou
Live Oak Pt
Rock Pt
Deer Pt
Hernandez Pt
White Pt
Redfish Pt
Butcherpen Cove
Butcherpen Pt
Old Navy Cove
Town Pt.
English Navy Cove
Deer Pt
Range Pt
Pensacola Beach
Farrington
EAST BAY
SANTA ROSA SOUND
Oys-1
Oys-1
378
379
372
371
370
380
386
385
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366
365

MANGROVES

The three common mangroves in the order of their abundance are the red mangrove (*Rhizophora mangle*), the black mangrove (*Avicennia nitida*), and the buttonwood (*Conocarpus erecta*), and their zonation landward is in this same order (Fig. 25A). A fourth and less abundant species, the white mangrove (*Laguncularia racemosa*), generally grows landward of the black mangrove. Their distribution is worldwide on tropical and subtropical shores of oceans and estuaries.

Mangroves grow on peat, muck, marl, sand, or rock; thus, such environmental factors as killing frost and land elevation control their distribution. Their "viviparous" seedlings germinate while attached to the parent tree; seedlings detach and float vertically in salt water, where they remain alive several months, so they can be carried long distances by currents. The red mangrove grows inland along stream banks to fresh water but attains its maximum 83-ft (25-m) height and 6.6-ft (2-m) circumference in brackish water of the Shark River (Davis, 1940).

Heald (1969)[3] found that a mangrove forest of southwest Florida produced 876 grams of dry organic matter per square meter per year (7,779 lb/acre/yr) in the form of leaves and twigs, which together with attached microflora and microfauna become available as food for estuarine organisms.

TIDAL MARSHES

Tidal marshes extend northward the full length of the coast, first as a transition zone between mangroves and freshwater marshes, then as the predominant plant community of the shore north of Tampa Bay. *Juncus roemarianus* predominates, but several species are locally abundant, among them *Spartina alterniflora, Spartina patens, Distichlis spicata, Salicornia perennias, Borrichia frutescens, Batis marina* and *Limonium carolinianum.* Three useful sources of taxonomic information are Small (1933), Eyles and Robertson (1944), and West and Arnold (1946).

A few inches or centimeters of vertical elevation determine the suitability of habitat for a given species or community as indicated in Figure 25B and C. Four major ecological zones are discernible: *Spartina alterniflora, Juncus* marsh, salt flats, and barrens (Martin et al., 1953; Thorne, 1954; Kurz and Wagner, 1957).

The *Spartina alterniflora* zone typically fringes tidal creeks, channels, inlets, and sometimes the outer side of barrier islands. A small landward increase in elevation permits development of the lush *Juncus* marsh that is by far the most extensive and conspicuous feature of the tidal marshes. Its plants grow to 6 or 7 ft (about 2 m) while at the edge of the marsh near the flatwoods their height drops abruptly by one-half or more and they merge with the third ecological zone, the salt flats. Stunted specimens of several genera typify the flats, especially *Spartina patens, Distichlis, Salicornia, Batis, Borrichia, Aster,* and *Limonium.* The fourth zone, the barrens, consists of bare ground flooded by high tides for brief periods of time. The tidal inundation alternating with long exposure to sunlight result in such high salt content of the soil that seed plants are excluded. However, diatoms and blue-green algae abound in prodigious quantities. For details see Jackson (1952) and Kurz and Wagner (1957).

Annual production of dry organic matter by marsh plants is very large, probably about 2,000 g/m^2 (roughly 20,000 lb/acre) (Odum, 1961; Teal, 1962).

SUBMERGED VEGETATION

The distribution of algae is far more interesting and complex than Taylor (1954) believed it to be. Taylor concluded correctly that the algal flora of the Keys is more diverse and spectacular than the flora to the north, but he was unaware of two important facts: the remarkable variety of perennial and annual subtropical and tropical species on the inner continental shelf and the seasonal appearance of temperate forms in winter and spring (Phillips and Springer, 1960a; Humm and Taylor, 1961; Dawes, Earle, and Croley, 1967; Dawes and Van Breedveld, 1969; Earle, 1969). The distribution of the temperate flora is disjunct on either side of the northern Florida peninsula, probably the result of the formation of a strait periodically between the Gulf and the Atlantic Ocean in the Pleistocene (Earle, 1969).

[3] Heald, Eric James. 1969. The production of organic detritus in a south Florida estuary. Ph. D. dissertation, Univ. of Miami, Coral Gables, Fla., ix + 110 p.

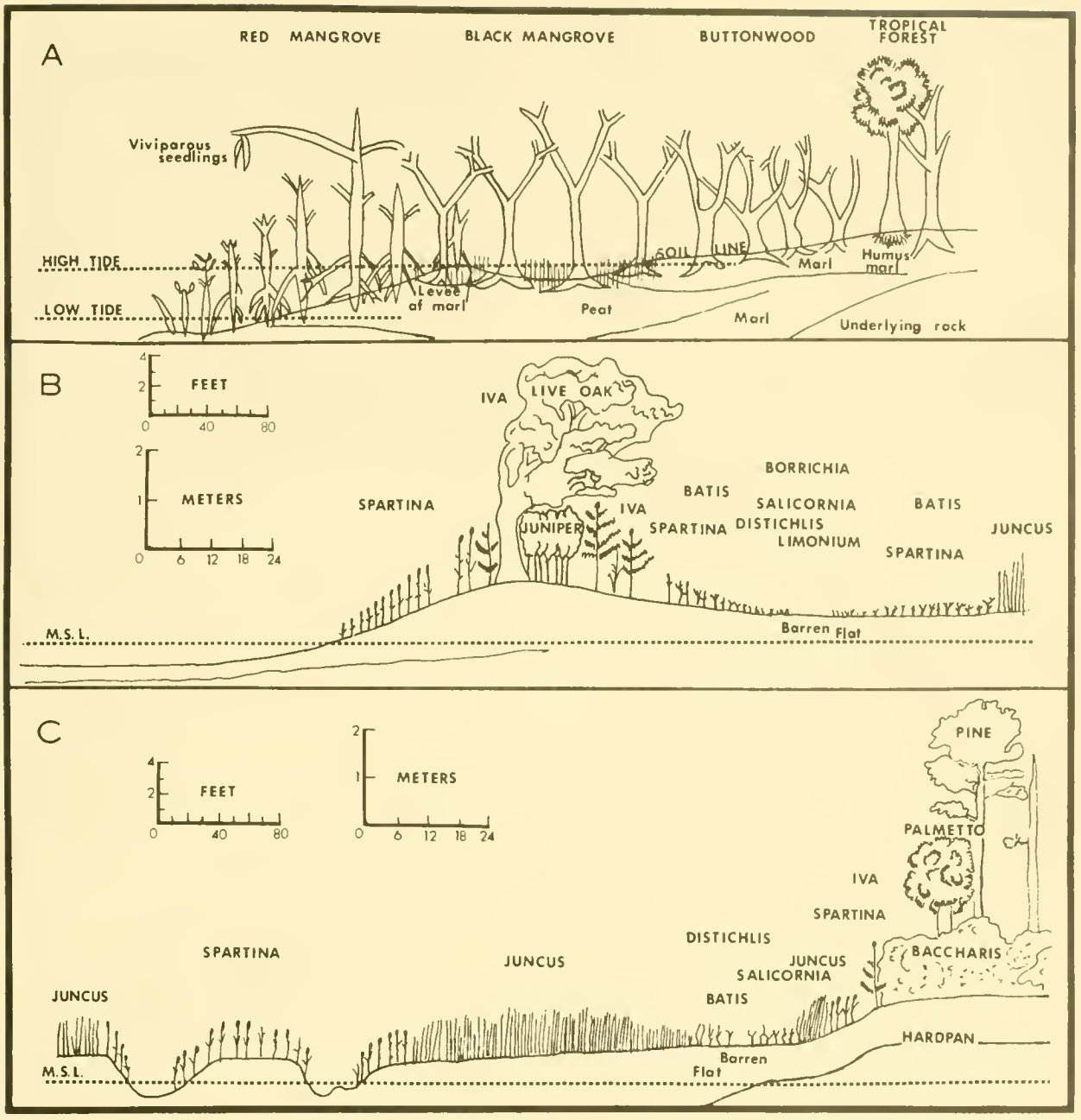

Figure 25.—Diagrammatic cross sections of (A) a mangrove swamp, (B) a barrier island of the north coast, and (C) a transect from tidal channels to flatwoods on the north coast (after Davis, 1940; Kurz and Wagner, 1957).

The distribution of the sea grasses is continuous around the entire Gulf (Humm, 1956; Phillips, 1960b; Moore, 1963). Vertical zonation correlates with tidal level in shallow estuarine water (Fig. 26A). *Diplanthera wrightii* and *Ruppia maritima* are abundant intertidally, the latter preferring a somewhat lower level than *Diplanthera*, whereas *Thalassia testidinum*, *Syringodium filiforme*, *Halophila baillonis*, and *H. engelmannii* are found only below low water levels. *Syringodium* and *Halophila* apparently tolerate no exposure to air. *Diplanthera* and *Ruppia* are often abundant below low water levels, mainly where *Thalassia* and *Syringodium* are sparse or absent. For example, low or unusually high salinity may restrict or eliminate *Thalassia*

and *Syringodium*, which grow best in 20-40‰, but *Diplanthera* and *Ruppia* are euryhaline to about 50‰, so they often take over where the others are unable to survive (Fig. 26B). In Florida estuaries, the sea grasses penetrate generally to about 7 ft (2.1 m) except where the water is exceptionally clear as in parts of Pensacola Bay where penetration attains about 12 ft (3.7 m). Offshore, however, *Thalassia* grows in dense beds to 60 ft (18 m) (Dawes, 1967), and *Halophila baillonis* to 240 ft (73 m) (Dawes and Van Breedveld, 1969).

Algae are frequently the most conspicuous flora in shallow water, and they exist below depths tolerated by sea grasses in our estuaries (Fig. 26A). Dawes and Van Breedveld (1969) found them to 240 ft (73 m) off Tampa Bay. The red algae *Acanthophora, Agardhiella, Gracilaria, Hypnea,* and *Laurencia* and the brown algae *Dictyota* and *Sargassum* are often abundant and

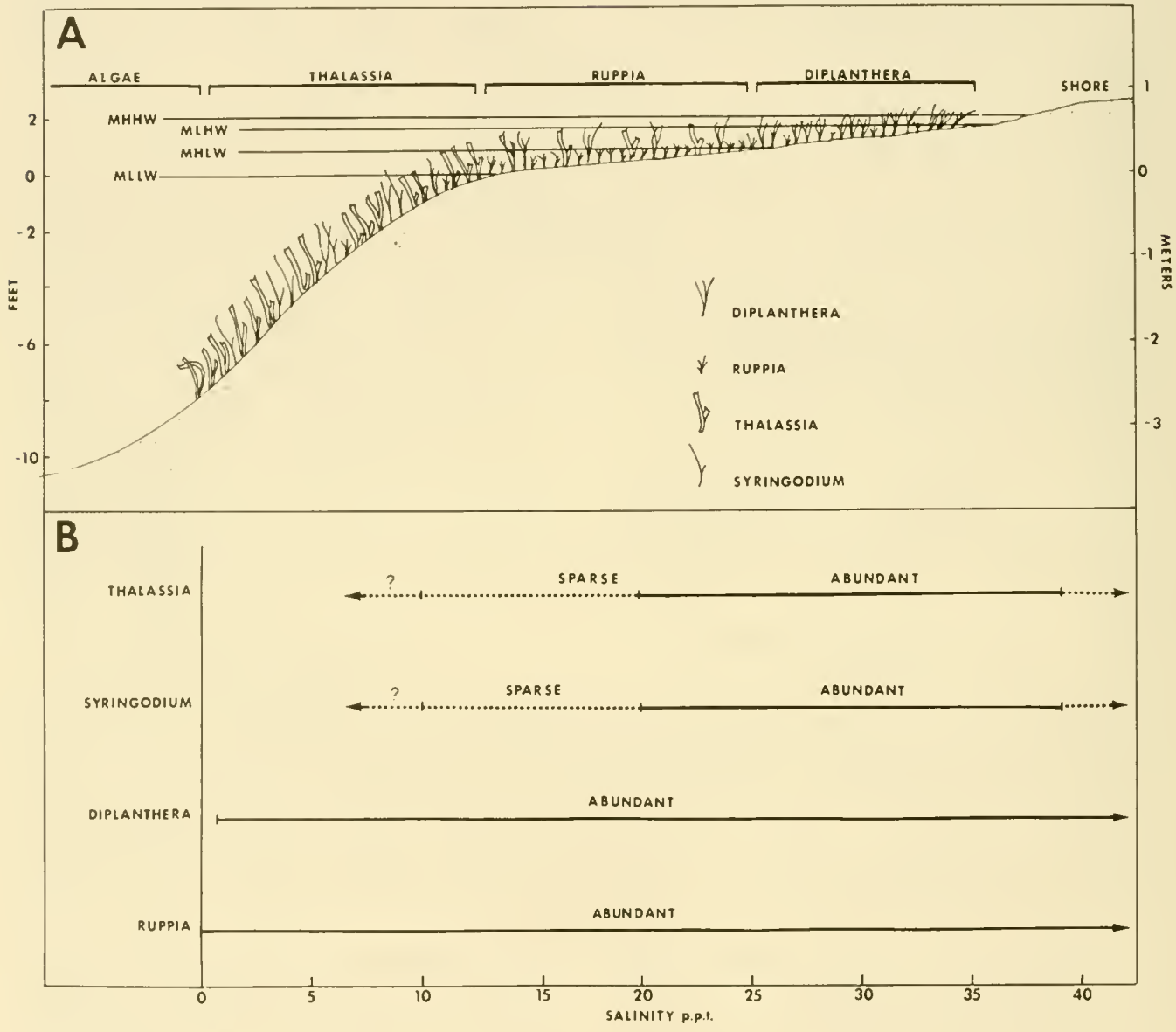

Figure 26.—Schematic drawings of (A) the zonation of sea grasses in shallow water in Boca Ciega Bay just north of the Bayway to St. Petersburg Beach and in Tampa Bay just south of Bayboro Harbor, St. Petersburg, and (B) salinity preferences and tolerances of sea grasses. MHHW = mean higher high water; MLHW = mean lower high water; MHLW = mean higher low water; MLLW = mean lower low water. (Modified from Phillips, 1960b; Moore, 1963.)

conspicuous in shallow turbid waters. Other widespread forms include: green algae (Chlorophyta)—*Acetabularia, Batophora, Caulerpa, Cladophoropsis, Codium, Enteromorpha, Halimeda, Penicillus, Udotea,* and *Ulva*; brown algae (Phaeophyta)—*Ectocarpus* and *Padina*; red algae (Rhodophyta)—*Ceramium, Chondria, Gelidium, Polysiphonia,* and *Spyridia.*

Most studies on the algae were made during the past ten years except for the classic work of Taylor (1928), which was later expanded and revised (Taylor, 1960). In Florida Bay sea grasses and algae carpet the flats, but in the basins, which range from 1 to 10 ft (30 to 305 cm) deep, vegetation decreases markedly with depth and becomes sparse in their deep portions (Hudson, Allen, and Costello, 1970). Intertidal zonation on the rocky shores of the Keys was described by Stephenson and Stephenson (1950). In Whitewater and Coot Bays floral abundance alternates with scarcity depending on the degree of freshwater inflow (Tabb and Manning, 1961; Tabb, Dubrow, and Manning, 1962). Extensive sea grass beds characterize shallow areas near the mouths of the rivers along the southwest tip of the Florida peninsula. The flora of the Caloosahatchee River area and Tampa Bay are known in detail from the work of Phillips (1960a), Phillips and Springer (1960b), Phillips (1962), and Dawes (1967). From Anclote Key to the St. Marks River the rocky bottom, which is covered lightly by sediment, and the relatively clear water permit the luxuriant growth of *Thalassia* and many associated sea grasses and algae. Biologists of the U.S. Fish and Wildlife Service (1967) collected the plants of Chassahowitzka Bay periodically, Phillips (1960c) described the marine plants of Crystal Bay, and Strawn (1961) recorded the zonation of sea grasses at Cedar Key. The flora of the remainder of the coast are known mainly from the work of Madsen and Nielsen (1950), Humm (1953), Humm and Taylor (1961), Van Breedveld (1966), and Earle (1969).

The Tampa Bay area is the zone of separation between tropical and temperate species in one algal group. Earle (1969) found that of 72 species of Phaeophyta (brown algae) in the eastern Gulf the Tampa Bay area was the northern limit of eight tropical species and the southern limit of seven temperate species.

Table 2.--The areas and major species of submerged vegetation, tidal marsh, and mangrove swamps of estuarine study areas, west coast of Florida.

Study area	Submerged vegetation	Emergent vegetation	
		Tidal marsh	Mangrove
	Acres[1]	Acres[1]	Acres[1]
Florida Bay.....	256,609	12,148	36,897
Lake Ingraham.....	1,024	0	891
Whitewater Bay.....	155	68,757	75,976
Cape Sable to Lostmans River.....	789	108,644	49,349
Lostmans River to Mormon Key.....	768	23,840	36,000
Mormon Key to Caxambas Pass.....	4,319	52,181	92,385
Caxambas Pass to Gordon River.....	501	7,445	13,387
Doctors Pass to Estero Pass.....	11	2,959	9,720
Caloosahatchee River.	726	1,698	2,973
Pine Island Sound....	26,966	7,476	18,657
Charlotte Harbor.....	23,383	9,087	23,474
Lemon Bay.....	2,145	331	971
Sarasota Bay System..	7,610	235	3,616
Tampa Bay.....	7,890	843	8,949
Hillsborough Bay.....	383	203	1,077
Old Tampa Bay.....	6,809	533	5,024
Boca Ciega Bay.....	5,800	149	2,464
St. Joseph Sound.....	8,723	608	1,259
Baileys Bluff to Saddle Key.....	4,084	16,683	1,301
Saddle Key to S. Mangrove Pt.....	62,730	32,587	7,915
Waccasassa Bay.....	24,223	30,752	448
Suwannee Sound.....	5,556	17,643	427
Suwannee Sound to Deadman Bay.....	2,420	14,763	0
Deadman Bay.....	1,834	2,549	0
Deadman Bay to St. Marks River....	8,110	14,325	0
Apalachee Bay.....	23,521	55,669	0
St. George Sound.....	8,641	3,605	0
Apalachicola Bay.....	737	17,696	0
St. Joseph Bay.....	6,325	853	0
St. Andrew Sound.....	373	576	0
East Bay (St. Andrew)	1,146	4,597	0
St. Andrew Bay.....	2,540	875	0
West Bay.....	1,542	3,349	0
North Bay.....	1,030	1,664	0
Choctawhatchee Bay...	3,092	2,816	0
Santa Rosa Sound.....	4,683	309	0
East Bay (Pensacola).	310	3,307	0
Escambia Bay.....	43	5,152	0
Pensacola Bay.....	1,547	213	0
Perdido Bay.....	1,333	1,408	0
Total.....	520,431	528,528	393,160

[1] Hectares = acres x 0.4047.

MEASUREMENT OF VEGETATED AREAS

We mapped and planimetered the areas covered by mangrove, tidal marsh, and submerged vegetation (Figs. 2 through 24; Table 2).

Navigation charts, topographic maps, vegetation maps, personal communications, aerial photographs, and field observations were employed to delineate mangrove areas and tidal marshes. We used the vegetation maps in Davis (1940) and U.S. Fish and Wildlife Service (1954) and a special map made for us by William B. Robertson, Jr., Research Biologist, National

Park Service, showing mangrove and tidal marsh areas in Everglades National Park. Most mangrove areas are shown on navigation charts and topographic maps. Tidal marsh is not designated as such on charts and maps; only "marsh" or "swamp" is designated. Tidal marsh was separated from freshwater marsh by assuming that it penetrated inland to less than the 5-ft (1.5-m) contour and that wooded marsh shown on most topographic maps is essentially freshwater habitat. Local field checks verify our assumption. We did not verify the boundaries by field observations along the entire coast.

Submerged vegetation was mapped freehand on 1,200-Series navigation charts by consulting aerial photographs of coastal areas. The photography was made available for study by virtually every county engineering or tax assessor's office on the west coast. The photography was generally 1:400 scale, less than five years old, and of excellent quality for our purpose. Field checks usually verified our interpretation of the photographs.

We calculated the relative areas characterized by mangroves, tidal marsh, submerged vegetation, and unvegetated bottom (Fig. 27). If the total area of estuaries (3,003,213 acres = 1,215,400 ha) is considered to be the area of open water plus the area of mangrove swamps and tidal marshes, approximately one-half of the area is unvegetated; the remaining half is about equally divided among mangrove swamps, tidal marshes, and submerged vegetation. The area of submerged vegetation (520,431 = 210,618 ha) is about one-quarter of the open-water surface area.

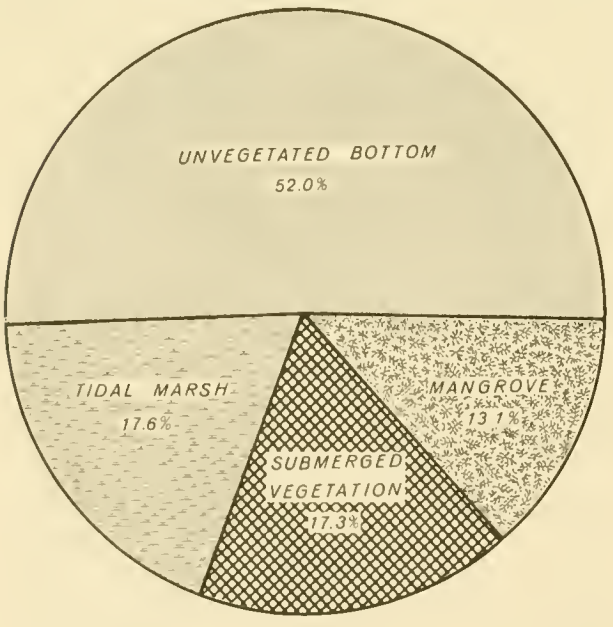

Figure 27.—The percentage of mangrove swamp, tidal marsh, submerged vegetation, and unvegetated bottom.

GEOLOGY

The Floridian Plateau originated as a massive appendage of the North American continent in mid-Triassic time (200 million years ago) when an enormous land mass, Pangaea, began to break up into the continents of today. The southern tip of the Floridian Plateau then occupied a position near the present location of Ascension Island (midway between South America and Africa and just south of the equator) from which it migrated northwesterly some 4,300 nautical miles (8,000 km) to its present position. The entire continent including Florida plus the Gulf of Mexico continues its westerly migration to this day (Dietz and Holden, 1970).

The Florida peninsula represents the above-water portion of the Floridian Plateau, which separates the deep water of the Atlantic Ocean from the deep water of the Gulf of Mexico. The Plateau consists of thick layers of limestone and unconsolidated sediments that rest on a foundation of ancient sandstone and volcanic rock (Fig. 28). The limestones and the sediments accumulated intermittently as the land was alternately covered and uncovered by shallow seas over the past 150 million years. The thickness of the deposits is 3,300 to 16,500 ft (about 1,000 to 5,000 m), the difference correlating with a tilt southward and westward of the underlying ancient rock caused by uplift in northeastern Florida (Cooke, 1945; Lynch, 1954; Puri and Vernon, 1959; Schnable and Goodell, 1968).

Uplift was exerted mainly along two parallel ridges in the northeast—the Peninsular Arch and the Ocala Uplift—and secondarily by the Chattahoochee Arch to the west (Figs. 28 and 29). The Peninsular Arch has acted since Mezozoic time (200 to 75 million years ago) and the Ocala Uplift since Eocene time (50 million years ago). Uplift has accelerated erosion in the northeastern peninsula and the north central panhandle resulting in exposure of much older rock there than elsewhere (Fig. 30).

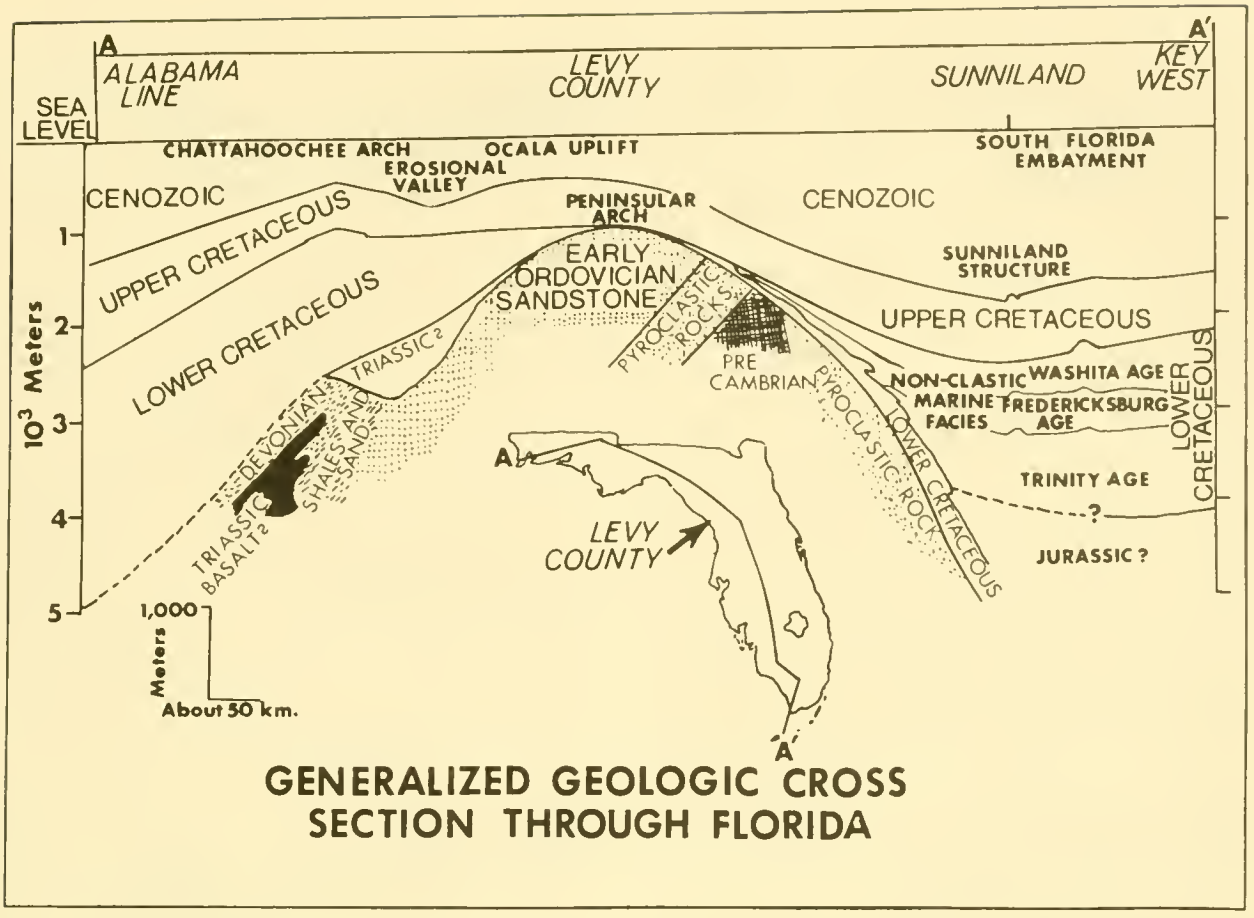

Figure 28.—Geologic cross section through Florida (after Puri and Vernon, 1959).

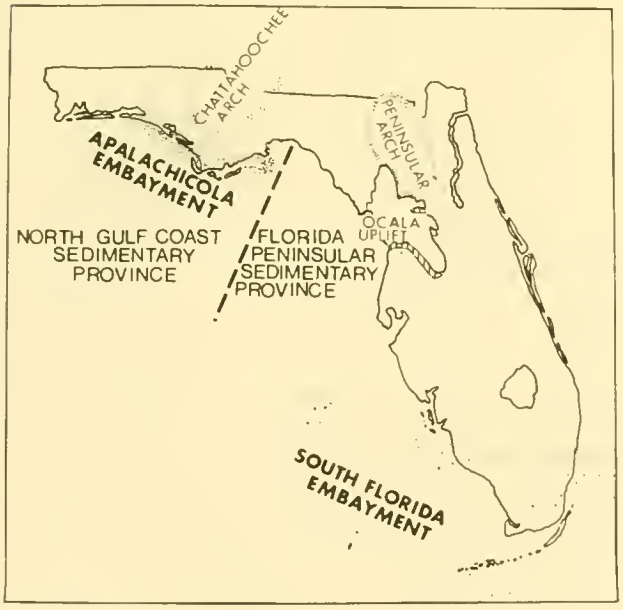

Figure 29.—The principal geologic structures of Florida (after Puri and Vernon, 1959).

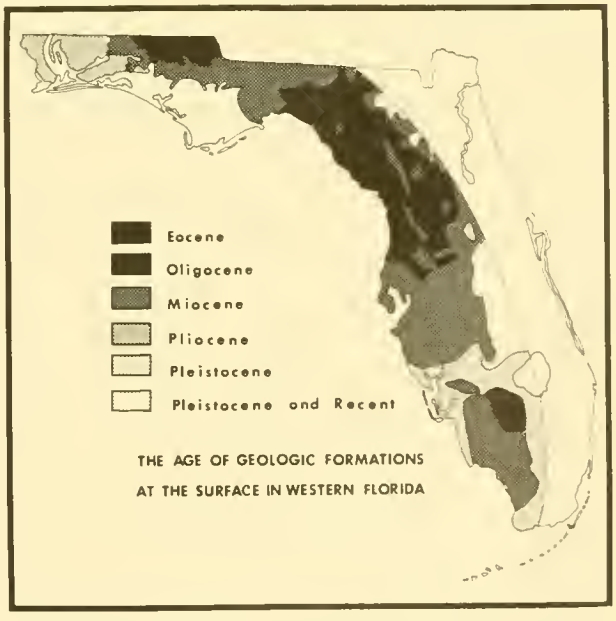

Figure 30.—The age of geologic formations (after Puri and Vernon, 1959).

Sediments of the panhandle and peninsula differ in origin and basic character partly because rivers of the panhandle drain areas in the Appalachian Mountains, the Piedmont Plateau, and the coastal plain whereas those of the peninsula drain only coastal plain areas. Panhandle sediments are mainly clastic; peninsular sediments are mainly nonclastic, predominantly carbonates and anhydrites. The Apalachicola Embayment and the South Florida Embayment are synclines (Fig. 28).

Sea level has varied from +270 to —525 ft (+82 to —160 m) in relation to present sea level. Wave-cut terraces above sea level and relict spits and coral reefs below it have helped geologists to identify ten previous stands of the sea. The terraces were thought to be Pleistocene in age, correlating with glaciations of the past 300,000 years, but evidence exists of pre-Pleistocene origin of the terraces that are at elevations of 100 ft (30 m) and above (Schnable and Goodell, 1968). The earth is currently in an interglacial stage in which the polar ice caps are melting, a process that began most recently about 14,000 years ago when sea level may have been 525 ft (160 m) below the present level (Ballard and Uchupi, 1970). Over the past 4,000 years the rise totaled only 10 ft (3 m), an average flooding of 5 inches (13 cm) per 100 years (Scholl, 1964). The flooding produced Florida Bay, which is a drowned lacustrine plain, and the coastal estuaries such as Tampa Bay, which are drowned river valleys (MacNeil, 1950; Price, 1954).

Florida's topography consists of lowlands and highlands of which the coastal lowlands are most relevant to this discussion. The Terraced Coastal Lowlands with marine terraces at 5, 25, 42 and 70 ft (2, 8, 13 and 21 m) terminate at the 70-ft (21-m) contour. The highlands, maximum elevation 345 ft (105 m), have marine terraces at 100, 170, 215 and 270 ft (30, 52, 66 and 82 m) (Fig. 31).

The prolific ground-water resources of Florida supply wells and some of the world's largest springs. Aquifers are of two types: artesian and nonartesian. The artesian aquifers are those in which the pressure of water is sufficient to force water above a containing formation of relatively impermeable material (rock or clay) whereas no containing formation is present in a nonartesian aquifer, leaving the water level (water table) free to rise and fall. The Floridan

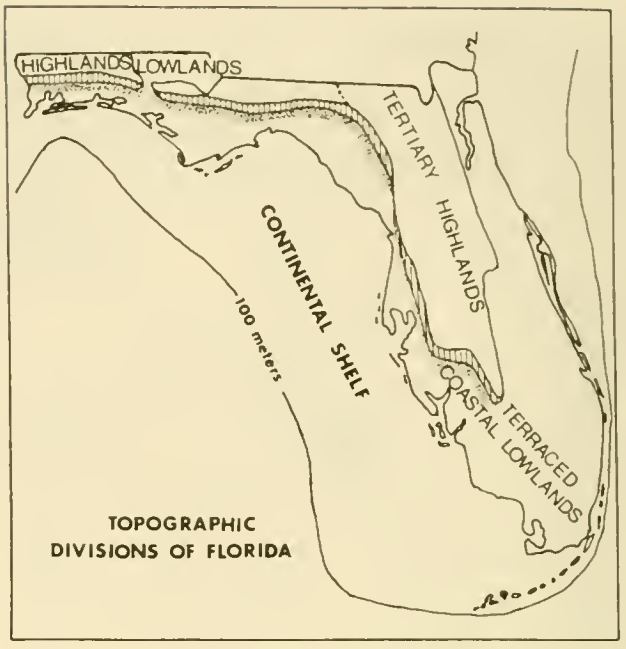

Figure 31.—Topographic divisions (after Puri and Vernon, 1959).

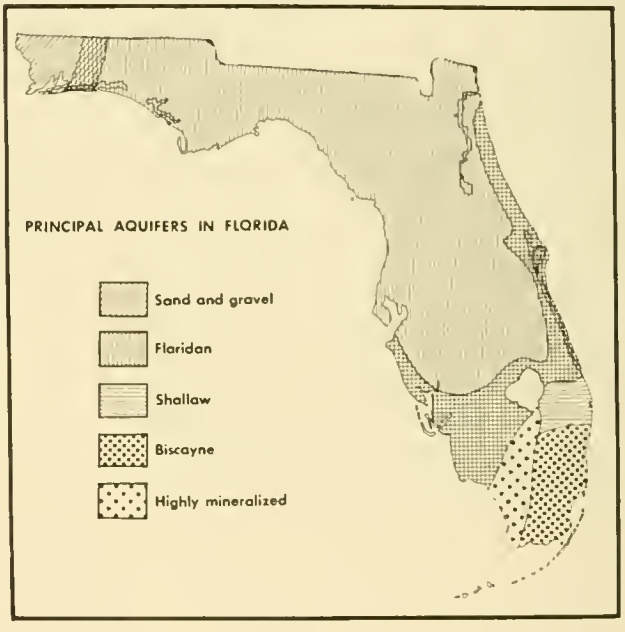

Figure 32.—Principal aquifers (after Hyde, 1965).

Aquifer, the State's largest, is artesian; all others are nonartesian (Figure 32).

STREAM DISCHARGE

Florida is one of the wettest states in the Union with annual rainfall of 50-65 inches (127-

165 cm) over most of it (Raisz, 1964). Much of the rain falls on the peninsula as summer thundershowers that are brief but intense. One effect is that streams that drain the peninsula have pronounced summer and early fall maximum flows whereas the streams of north Florida exhibit relatively uniform seasonal flow. The difference is the result of Florida's position in the transition zone between the tropical weather of the Caribbean and the temperate weather of the southeastern United States.

Tables 3-1 through 3-51 record discharge of all gaged streams that flow into Florida's west coast estuaries. The data are from water supply publications of the U.S. Geological Survey. In each table the data down to the "Mean" line were copied exactly as printed in U.S. Geological Survey publications. We calculated the monthly means, expressing results to the nearest tenth when the mean fell from 10.0 to 99.9, and to the nearest hundredth when the mean fell from 1.00 to 9.99. When the mean was greater than 99.9, we expressed results to the nearest whole number. The number in the lower right corner of each table (under "The year" and to the right of "Mean") is the mean of "The year" column, not the "Mean" line; it differs slightly from the number calculated by averaging monthly means because individual figures in "The year" column are calculated from the sum of daily discharges divided by 365, not from the sum of monthly mean discharges divided by 12.

Table 3-52 summarizes the discharge of all west coast streams including pertinent springs studied by Ferguson et al. (1947). The table is divided into eight arbitrary segments to demonstrate regional differences of water supply. That of north Florida is much greater than that of central and south Florida (Fig. 33). The Apalachicola, Suwannee, Choctawhatchee and Escambia Rivers discharge nearly 70 percent of the total runoff; the Apalachicola River alone accounts for about 35 percent. Its drainage area extends north through Georgia past the Tennessee line. The Suwannee River, with some of its headwaters in the Okefenokee Swamp of southeastern Georgia, accounts for nearly 15 percent of the total flow.

Three recently published maps depict the mean flow to the sea of all U.S. streams (Wilson, 1967), the mean flow of Florida streams (Kenner, Hampton, and Conover, 1969), and the seasonal

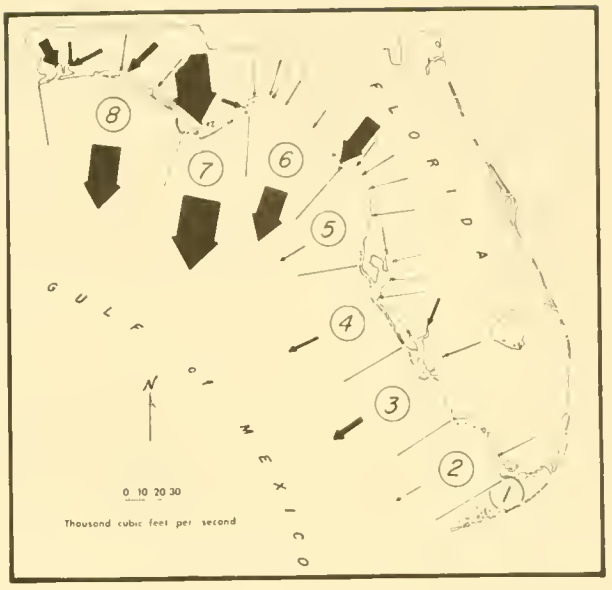

Figure 33.—Mean discharge of the principal gaged streams of the Florida west coast. Liters per second = cubic feet per second × 28.3. (Data from water supply publications of the U.S. Geological Survey.)

flow of Florida streams (Kenner, 1969). They were consulted but not used directly.

WATER TEMPERATURE

Only if daily measurements have been made for several years can the water temperature characteristics of a location be described with confidence. Fortunately, the U.S. Coast and Geodetic Survey began such measurements in the 1920's and the 1940's with the result that Key West Harbor, Tampa Bay at St. Petersburg, Cedar Key Harbor, and Pensacola Bay at Pensacola are adequately characterized. Additional historical data back to the 1870's are available (Bumpus, 1957).

The Key West measurements extended from 1940 to 1962, those at St. Petersburg from 1947 to 1962, those at Cedar Key from 1922 to 1926 and from 1945 to 1962, and those at Pensacola from 1924 to 1962 (U.S. Coast and Geodetic Survey, 1965). Although Key West is several miles west of Florida Bay, we assume that its water temperature is about the same as that at southwestern Florida Bay. Minimum surface water temperatures were 57.0°F (13.9°C) at Key West, 52.3°F (11.3°C) at St. Petersburg, 41.0°F (5.0°C) at Cedar Key, and 39.9°F (4.4°C) at Pensacola. Maxima were about the same at all

Table 3-1.--Stream discharge to the Everglades: U.S. Geological Survey Station 2-2890, Tamiami Canal Outlets, Miami to Monroe, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	968	917	454	89.5	103	6.2	1.22	0.37	18.3	335	518	852	356
1953	2,176	1,788	809	562	577	125	11.4	3.6	35.3	372	746	2,127	777
1954	3,947	3,949	2,743	1,662	574	239	57.7	184	1,572	1,769	1,805	2,635	1,768
1955	2,711	1,857	1,408	744	318	34.2	0	0	148	229	369	1,219	756
1956	753	414	168	53.8	13.3	0.1	0	0	0.8	100	261	543	193
1957	1,406	463	62.6	2.9	2.0	9.5	2.1	181	202	472	786	1,758	448
1958	4,019	2,499	1,380	2,365	2,973	2,526	2,068	2,081	2,513	2,497	1,400	1,194	2,290
1959	933	519	407	330	148	104	36.7	126	1,615	3,049	3,314	3,680	1,194
1960	3,994	4,560	3,741	2,358	1,419	707	350	75.9	335	535	1,055	4,912	2,001
1961	7,267	5,713	3,090	1,707	932	227	10.3	1.4	26.7	301	475	227	1,673
1962	55.5	4.9	0.4	0	0	0	0	0	411	354	377	971	181
1963	1,075	467	171	65.3	64.6	29	1.2	5.8	68.3	75.5	140	563	228
1964	906	133	61.3	245	68.7	21.5	11.4	13.8	234	233	517	343	234
1965	468	483	291	218	131	90.3	25.9	3.9	18.5	256	355	604	246
1966	783	949	278	224	293	800	754	715	1,715	5,531	5,662	3,982	1,819
Mean	2,097	1,648	1,004	708	508	328	222	226	594	1,074	1,185	1,707	944

[1/] Location: Lat. 25°45'40", long. 80°49'40". Station 2890 was divided into Stations 2-2889, 2-2890.4 and 2-2890.6 at the beginning of Water Year 1964. The 1964-66 data are the sums of discharges at Stations 2-2889 (lat. 25°45'50", long. 80°49'50"), 2-2890.4 (lat. 25°45'42", long. 80°43'34"), and 2-2890.6 (lat. 25°45'40", long. 80°37'40").

Drainage area: Not available.
Records available: November 1939 to September 1966.
Mean discharge: 944 c.f.s. (15 years).
Extremes: Maximum daily discharge, 17,000 c.f.s. October 12, 1947; minimum, no flow several days and maximum reverse flow, 2.0 c.f.s. May 1-10, 1949.
Maximum monthly mean discharge for period 1952-66: 7,267 c.f.s. October 1961.
Minimum monthly mean discharge for period 1952-66: No flow several months.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-2.--Stream discharge to Ten Thousand Islands: U.S. Geological Survey Station 2-2910, Barron River Canal near Everglades, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	---	---	---	---	79.0	51.8	27.3	10.3	28.1	74.7	92.4	92.4	---
1953	110	87.7	69.5	61.0	58.0	44.2	44.3	29.1	27.8	56.4	95.5	118	66.9
1954	130	111	99.5	80.4	60.0	71.0	84.9	91.2	102	113	119	114	98.3
1955	123	105	88.6	64.5	48.1	33.7	29.1	19.4	135	198	196	221	105
1956	163	63.8	72.8	29.2	34.6	0.74	0.10	27.8	21.9	11.4	15.1	49.1	40.9
1957	50.1	29.5	23.9	9.6	11.4	80.1	33.8	56.7	73.8	124	167	178	70.2
1958	195	158	124	218	200	204	192	173	194	202	209	197	189
1959	188	142	117	123	97.7	88.3	42.9	68.7	177	171	201	212	136
1960	231	248	220	160	103	89.0	86.5	67.3	94.1	147	168	152	147
1961	144	143	133	125	93.5	44.8	24.7	11.6	19.3	97.9	185	172	99.6
1962	92.2	50.4	27.9	15.8	10.8	2.1	3.8	1.6	38.2	164	179	218	67.3
1963	224	161	116	86.6	107	68.4	29.6	19.7	62.6	41.5	19.8	90.0	85.4
1964	134	64.9	48.2	55.7	57.1	43.9	24.5	12.9	84.0	107	148	190	80.9
1965	177	140	102	46.7	21.2	19.8	5.2	5.0	11.9	73.5	141	183	77.6
1966	192	177	125	99.9	80.7	48.9	28.2	16.6	61.5	229	206	218	124
Mean	154	120	97.7	84.0	70.8	59.4	43.8	40.7	75.4	121	143	160	99.2

[1/] Location: Lat. 25°58', long. 81°21'.
Drainage area: Not available.
Records available: February 1952 to September 1966.
Mean discharge: 99.2 c.f.s. (14 years).
Extremes: Maximum daily discharge, 292 c.f.s. September 25, 1962; minimum, no flow May 17, 18, 1952.
Maximum monthly mean discharge for period 1952-66: 248 c.f.s. November 1959.
Minimum monthly mean discharge for period 1952-66: 0.1 c.f.s. April 1956.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-3.--Stream discharge to Naples Bay via Gordon River: U.S. Geological Survey Station 2-2913, Golden Gate at Naples, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1965	251	140	97.0	84.4	76.9	91.2	56.0	46.3	209	426	609	635	228
1966	555	347	157	135	200	197	157	130	392	1,092	932	693	418
Mean	403	244	127	110	139	144	107	88.2	301	759	771	664	323

1/Location: Lat. 26°10'01", long. 81°46'02".
Drainage area: Not available.
Records available: October 1964 to September 1966.
Mean discharge: 323 c.f.s. (2 years).
Extremes: maximum discharge, 2,390 c.f.s. July 1, 1966; minimum, 39 c.f.s. May 3, 1965.
Maximum monthly mean discharge for period 1964-66: 1,092 c.f.s. July 1966.
Mimimum monthly mean discharge for period 1964-66: 46.3 c.f.s. May 1965.

2/For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

3/Liters per second = c.f.s. x 28.3.

Table 3-4.--Stream discharge to the Caloosahatchee River: U.S. Geological Survey Station 2-2920, Caloosahatchee Canal at Moore Haven, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	2,071	3,818	1,184	110	989	3,178	3,228	2,126	959	10	10	197	1,487
1953	1,636	3,118	43.2	10	2,560	3,369	3,059	1,955	10	89.0	2,648	1,163	1,629
1954	2,477	4,289	4,499	4,499	4,158	3,994	3,984	3,889	3,117	2,733	3,385	933	3,496
1955	1,728	224	10	10	203	441	166	10	541	2,777	2,087	10	693
1956	10	10	10	10	80.0	76.9	79.1	31.3	10	10	10	10	28.7
1957	10	10	10	10	10	10	10	1,458	2,914	2,676	2,964	2,447	1,049
1958	2,352	10	10	2,355	4,040	3,431	3,287	3,539	1,146	956	722	555	1,856
1959	10	10	10	10	44.6	10	2,072	1,222	1,472	3,041	2,868	2,760	1,131
1960	2,321	3,872	3,277	1,287	843	2,805	3,713	3,202	2,026	1,851	2,782	2,012	2,504
1961	3,672	4,302	4,076	3,448	2,212	10	10	76.8	1,052	975	19.0	10	1,654
1962	68.1	64.0	253	65.8	42.1	59.7	5.0	62.6	-190	10	10	10	39.1
1963	10	10	10	10	10	54.8	149	10	10	33.5	31.3	10	29.0
1964	38.7	34.7	34.2	10	10	21.3	171	121	10	10	10	1,950	199
1965	432	56.0	96.1	107	10	10	677	99.0	34.7	89.0	1,436	10	257
1966	10	10	10	10	10	1,863	3,537	1,828	2,758	2,882	3,151	578	1,395
Mean	1,123	1,323	902	797	1,015	1,289	1,610	1,309	1,058	1,210	1,476	844	1,163

1/Location: Lat. 26°50', long. 81°05'.
Records available: October 1938 to September 1966.
Drainage area: Not available.
Mean discharge: 1,057 c.f.s. (28 years).
Extremes: Maximum discharge, 5,930 c.f.s. November 6, 1947; minimum, lock closed and flow consists of leakage and lockage (estimated as 10 c.f.s.) during several periods of each year. Maximum daily reverse flow, 1,130 c.f.s. June 17, 1962.
Maximum monthly mean discharge for period 1952-66: 4,449 c.f.s. December 1953, January 1954.
Minimum monthly mean discharge for period 1952-66: Reverse flow, 190 c.f.s., June 1962.

2/For example, Water Year 1952 began October 1, 1951 and ended September 30, 1952.

3/Liters per second = c.f.s. x 28.3.

Table 3-5.--Stream discharge to Charlotte Harbor: U.S. Geological Survey Station 2-2970, Peace River at Arcadia, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	2,202	716	509	322	492	822	624	253	304	756	946	1,114	757
1953	4,821	1,692	673	1,018	1,300	670	1,062	211	2,600	2,018	3,976	7,589	2,301
1954	6,954	2,121	3,105	1,583	766	584	559	756	3,454	3,045	1,492	1,976	2,213
1955	1,364	590	503	468	549	251	240	133	213	623	942	2,703	714
1956	428	207	194	199	210	125	80.7	269	139	259	718	1,889	392
1957	1,824	457	222	286	386	1,400	1,429	2,597	1,428	1,637	2,498	3,210	1,455
1958	2,615	396	447	2,642	1,519	3,226	2,449	1,195	466	1,210	766	797	1,482
1959	341	420	456	748	598	3,787	1,881	779	4,374	5,149	3,624	6,353	2,381
1960	2,835	1,206	586	471	1,486	2,755	1,756	609	696	2,220	7,439	8,792	2,571
1961	5,002	1,018	438	563	852	619	467	258	396	871	703	921	1,014
1962	181	116	114	159	166	176	303	133	1,533	1,205	1,595	5,287	910
1963	991	444	262	318	1,395	1,570	236	296	1,544	1,243	1,167	1,431	904
1964	506	760	587	1,366	2,231	978	632	691	204	460	876	2,460	972
1965	525	222	297	238	374	1,076	236	94.5	557	2,880	2,700	822	843
1966	1,703	423	278	899	2,417	1,549	417	180	1,061	1,246	3,128	1,676	1,242
Mean	2,153	719	578	752	983	1,306	825	564	1,265	1,655	2,171	3,135	1,343

[1/] Location: Lat. 27°13'19", long. 81°52'34".
Drainage area: 1,370 sq. mi. (3,548 sq. km.), approximately.
Records available: April 1931 to September 1966.
Mean discharge: 1,267 c.f.s. (35 years).
Extremes: Maximum discharge, 36,200 c.f.s., September 9, 1933; minimum, 37 c.f.s. May 28, 1949.
Maximum monthly mean discharge for period 1952-66: 8,792 c.f.s. September 1960.
Minimum monthly mean discharge for period 1952-66: 80.7 c.f.s. April 1956.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-6.--Stream discharge to Charlotte Harbor: U.S. Geological Survey Station 2-2975, Joshua Creek at Nocatee, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	580	105	12.5	7.06	25.9	81.2	16.7	1.54	1.26	---	39.5	72.0	---
1953	857	39.7	9.06	14.5	20.2	6.65	11.8	0.70	419	472	256	654	231
1954	1,067	102	123	12.5	7.69	8.90	7.19	4.46	202	368	98.6	274	192
1955	76.8	14.2	14.8	10.7	12.7	4.61	2.74	1.62	5.25	15.5	30.4	244	36.0
1956	17.6	3.86	1.78	1.95	2.99	0.92	0.60	1.19	0.52	2.16	7.16	211	20.7
1957	56.9	7.31	4.07	7.15	7.71	48.8	63.1	202	69.2	259	379	742	154
1958	320	8.97	16.1	283	52.2	305	115	250	181	280	145	280	188
1959	129	25.2	18.6	34.9	24.0	311	66.4	93.5	619	140	424	597	207
1960	259	36.7	19.0	10.9	58.9	230	64.8	27.5	35.7	263	376	830	184
1961	276	56.9	10.6	112	31.8	16.5	17.1	10.6	26.2	56.5	83.1	91.9	66.3
1962	4.56	3.53	3.05	4.84	3.43	4.46	4.52	1.80	188	181	108	851	112
1963	67.6	45.1	11.2	13.9	89.1	65.1	3.12	4.24	144	84.9	31.8	154	59.0
1964	20.3	15.2	13.4	48.5	158	23.5	5.29	3.27	3.14	24.6	96.6	414	67.9
1965	24.8	7.73	8.23	7.88	21.5	36.5	6.67	2.41	24.0	289	311	40.8	66.0
1966	222	32.0	10.4	31.9	248	56.4	13.0	14.3	139	297	515	303	156
Mean	265	33.6	18.4	40.1	50.9	80.0	26.5	41.3	137	182	193	384	124

[1/] Location: Lat. 27°09'59", long. 81°52'47".
Drainage area: 115 sq. mi. (298 sq. km.), approximately.
Records available: April 1950 to September 1966.
Mean discharge: 119 c.f.s. (16 years).
Extremes: Maximum discharge, 8,670 c.f.s. October 10, 1953; minimum, no flow Nov. 18-20, 22-24, 1953, May 3-12, 14, 15, 1959.
Maximum monthly mean discharge for period 1952-66: 1,067 c.f.s. October 1953.
Minimum monthly mean discharge for period 1952-66: 0.52 c.f.s. June 1956.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-7.--Stream discharge to Charlotte Harbor: U.S. Geological Survey Station 2-2980, Horse Creek near Arcadia, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	640	41.0	17.9	11.0	54.9	96.2	40.6	2.53	5.20	57.6	272	214	122
1953	1,335	297	80.6	163	238	23.7	72.7	4.65	706	387	905	1,427	470
1954	1,026	431	348	183	44.8	45.2	98.9	155	199	471	262	345	303
1955	199	63.9	65.9	41.4	73.6	16.4	15.9	2.07	2.78	10.0	315	701	125
1956	70.9	5.11	4.22	3.78	12.4	3.20	0.63	3.34	0.18	7.29	66.0	292	38.4
1957	247	17.0	2.25	4.62	11.8	200	94.1	338	148	358	612	650	225
1958	639	20.4	66.4	682	334	789	330	137	43.9	346	187	42.4	303
1959	32.8	89.7	61.7	96.5	54.4	712	133	22.0	691	820	1,138	1,616	457
1960	495	87.5	40.5	28.3	181	304	103	34.0	41.4	855	1,571	1,696	454
1961	680	120	21.1	49.8	177	45.0	43.6	3.80	4.71	138	275	264	152
1962	7.78	2.58	2.93	4.40	3.58	4.19	38.6	1.55	186	236	392	1,531	200
1963	192	61.9	18.1	19.7	220	232	6.05	4.58	37.5	143	338	456	143
1964	125	171	65.6	214	337	155	122	13.7	12.4	42.8	179	363	149
1965	27.3	5.93	6.25	7.18	16.5	94.6	5.65	0.63	140	1,003	832	103	190
1966	499	41.7	21.1	107	363	137	38.5	11.0	552	230	345	214	212
Mean	414	97.0	54.8	108	141	190	76.2	48.9	185	340	513	661	236

[1/] Location: Lat. 27°11'57", long. 81°59'19".
Drainage area: 205 sq. mi. (531 sq. km.), approximately.
Records available: April 1950 to September 1966.
Mean discharge: 229 c.f.s. (16 years).
Extremes: Maximum discharge, 11,700 c.f.s. August 1, 1960; minimum, no flow June 7-9, 15, 25-30, July 2, August 7, 1956, February 16-18, 1957.
Maximum monthly mean discharge for period 1952-66: 1,696 c.f.s. September 1960.
Minimum monthly mean discharge for period 1952-66: 0.18 c.f.s. June 1956.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-8.--Stream discharge to Charlotte Harbor: U.S. Geological Survey Station 2-2990, Myakka River near Sarasota, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	831	41.4	15.3	7.64	19.0	42.7	49.9	0.11	0.01	7.78	231	127	116
1953	1,143	298	93.2	189	250	57.7	30.7	10.1	134	345	778	1,347	390
1954	1,144	214	343	234	49.5	34.9	30.0	60.2	141	366	360	522	294
1955	417	60.9	83.5	40.8	129	53.5	37.9	0.003	0	5.21	315	780	160
1956	123	13.0	3.00	4.52	14.5	0.68	0	3.77	2.40	7.30	121	590	73.1
1957	484	31.9	3.97	0.15	6.69	212	123	172	218	321	1,000	989	299
1958	867	48.6	37.5	447	367	1,013	470	120	10.7	324	201	52.7	332
1959	51.2	257	206	262	104	822	164	78.7	458	830	1,744	1,935	579
1960	676	218	66.6	43.3	197	306	103	27.1	39.3	679	1,944	2,247	546
1961	642	107	32.8	57.2	225	43.7	36.0	2.09	0	86.5	238	413	157
1962	37.8	1.24	0.51	0.82	0.78	0.01	76.8	4.24	177	169	944	2,222	302
1963	333	49.7	17.2	20.0	205	252	3.90	0.02	79.2	191	350	583	173
1964	292	125	66.8	271	425	181	154	13.4	2.65	26.6	250	402	183
1965	54.6	3.24	5.77	12.4	25.0	79.4	2.79	0.09	305	1,027	1,370	391	276
1966	409	47.5	21.5	85.2	306	110	58.6	2.28	321	369	467	209	200
Mean	500	101	66.4	112	155	214	89.4	32.9	126	317	688	854	272

[1/] Location: Lat. 27°14'25", long. 82°18'50".
Drainage area: 235 sq. mi. (570 sq. km.), approximately.
Records available: August 1936 to September 1966.
Mean discharge: 264 c.f.s. (30 years).
Extremes: Maximum discharge, 8,670 c.f.s. August 1960; minimum, no flow for many days in some years.
Maximum monthly mean discharge for period 1952-66: 2,247 c.f.s. September 1960.
Minimum monthly mean discharge for period 1952-66: No flow June 1955, April 1956, and June 1961.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-9.--Stream discharge to Charlotte Harbor: U.S. Geological Survey Station 2-2996.5, Big Slough near Murdock, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1963	---	---	---	---	---	31.1	0.75	3.13	108	49.5	129	210	---
1964	40.0	60.2	21.6	75.8	131	52.1	11.1	2.17	2.94	2.96	97.4	265	62.9
1965	22.5	3.16	1.82	0.98	3.66	11.4	1.66	0.87	29.8	424	683	192	112
1966	247	18.0	3.90	30.8	92.1	23.5	6.23	1.73	160	206	243	76.7	92.7
Mean	103	27.1	9.11	35.9	75.6	29.5	4.94	1.98	75.2	171	277	186	89.2

[1/] Location: Lat. 27°04'15", long. 82°13'05".
Drainage area: 87.5 sq. mi. (227 sq. km.), approximately.
Records available: February 1963 to September 1966.
Mean discharge: 89.2 c.f.s. (3 years).
Extremes: Maximum discharge, 2,560 c.f.s. July 31, 1965; minimum, 0.2 c.f.s. April 30, May 14-21, 1963.
Maximum monthly mean discharge for period 1963-66: 638 c.f.s. August 1965.
Minimum monthly mean discharge for period 1963-66: 0.75 c.f.s. April 1963.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-10.--Stream discharge to Sarasota Bay System: U.S. Geological Survey Station 2-2997, Cow Pen Slough near Bee Ridge, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1963	---	---	---	---	47.6	19.9	1.04	0.31	31.6	51.6	83.1	69.7	---
1964	7.46	14.3	11.9	45.8	77.7	24.0	12.3	1.19	0.25	8.92	22.4	101	26.9
1965	4.08	0.88	0.39	0.43	1.23	3.10	0.54	0.04	37.6	317	545	56.8	81.9
1966	28.7	2.34	1.87	12.4	21.3	4.07	3.85	2.03	56.6	---	---	---	---
Mean	13.4	5.84	4.72	19.5	37.0	12.8	4.43	0.89	31.5	126	217	75.8	54.4

[1/] Location: Lat. 27°14'56", long. 82°23'10".
Drainage area: 38 sq. mi. (98 sq. km.), approximately.
Records available: January 1963 to June 1966.
Mean discharge: 54.4 c.f.s. (2 years).
Extremes: Maximum discharge, 2,940 c.f.s. August 1, 1965 (estimated); minimum discharge, no flow at times in most years.
Maximum monthly mean discharge for period 1963-66: 545 c.f.s. August 1965.
Minimum monthly mean discharge for period 1963-66: 0.04 c.f.s. May 1965.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-11.--Stream discharge to Sarasota Bay System: U.S. Geological Survey Station 2-2997.5, Phillippi Creek near Sarasota, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1963	---	---	---	---	56.4	16.0	4.90	3.63	7.22	16.0	25.1	52.4	---
1964	9.72	19.8	21.3	40.3	61.5	25.6	12.9	9.38	6.42	25.9	70.4	131	36.0
1965	10.7	4.48	5.60	4.83	7.69	5.79	3.05	1.68	18.1	91.0	86.9	68.7	25.9
1966	25.0	8.71	6.98	21.9	18.9	9.97	10.1	4.32	10.6	45.2	26.3	15.4	17.0
Mean	15.1	11.0	11.3	22.3	36.1	14.3	7.74	4.75	10.6	44.5	52.2	66.9	26.3

[1/] Location: Lat. 27°18'30", long. 82°27'06".
Drainage area: 24 sq. mi. (62 sq. km.), approximately.
Records available: January 1963 to September 1966.
Mean discharge: 26.3 c.f.s. (3 years).
Extremes: Maximum discharge, 826 c.f.s. July 30, 1965; minimum, 0.3 c.f.s. March 11, 1965.
Maximum monthly mean dishcarge for period 1963-66: 131 c.f.s. September 1964.
Minimum monthly mean dishcarge for period 1963-66: 1.68 c.f.s. May 1965.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-12.--Stream discharge to Tampa Bay: U.S. Geological Survey Station 2-3000, Manatee River near Bradenton, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	179	34.2	17.1	10.9	35.3	33.6	8.83	7.66	23.3	42.9	179	264	69.7
1953	567	71.2	33.0	100	151	13.4	44.6	5.29	91.2	103	375	667	185
1954	137	217	144	97.2	22.6	18.4	22.1	17.6	58.2	103	48.1	232	93.2
1955	47.8	42.8	29.3	32.8	31.9	12.5	12.3	6.94	10.8	39.4	228	231	60.5
1956	21.6	10.9	11.2	10.1	14.9	5.72	5.15	21.1	6.88	26.2	130	218	40.0
1957	150	11.1	8.90	13.2	36.3	128	87.2	78.4	119	275	334	188	120
1958	254	21.6	61.4	346	118	348	150	29.6	29.5	119	28.8	25.5	128
1959	11.4	19.7	59.5	75.8	32.0	348	62.3	92.1	415	303	649	647	227
1960	171	33.6	37.2	21.4	135	170	28.2	10.8	60.3	681	421	856	219
1961	153	20.3	19.8	43.1	128	34.2	15.0	7.93	13.8	54.6	289	71.3	70.8
1962	7.64	5.81	6.33	9.41	7.12	21.9	36.7	7.46	125	101	438	698	122
1963	79.8	37.0	15.3	23.3	251	91.5	8.53	23.5	115	284	180	385	123
1964	39.4	85.2	66.0	147	187	97.5	31.7	21.5	6.44	17.2	150	105	79.1
1965	34.8	14.5	17.4	14.9	30.1	110	9.63	4.77	111	625	242	88.5	110
1966	59.8	14.4	20.5	121	156	26.3	29.6	8.78	---	---	---	---	---
Mean	128	42.6	36.5	71.1	89.1	97.3	36.8	22.9	84.7	198	264	334	118

[1/]Location: Lat. 27°28'30", long. 82°18'05".
Drainage area: 90 sq. mi. (233 sq. km.), approximately.
Records available: April 1939 to September 1966.
Mean discharge: 109 c.f.s. (26 years).
Extremes: Maximum daily discharge, 9,420 c.f.s. September 21, 1962; minimum, 0.6 c.f.s. May 7, 1939.
Maximum monthly mean discharge for period 1952-66: 856 c.f.s. September 1960.
Minimum monthly mean discharge for period 1952-66: 5.15 c.f.s. April 1956.

[2/]For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/]Liters per second = c.f.s. x 28.3.

Table 3-13.--Stream discharge to Tampa Bay: U.S. Geological Survey Station 2-3005, Little Manatee River near Wimauma, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	204	41.5	34.6	22.6	53.0	123	35.7	13.6	37.3	43.8	262	262	94.7
1953	1,160	152	73.9	248	162	34.1	47.9	9.91	55.3	72.4	255	974	271
1954	290	418	290	165	51.1	37.6	48.5	117	163	351	175	525	220
1955	98.9	83.5	64.5	57.0	40.2	25.3	22.1	11.0	26.2	208	650	383	140
1956	36.7	33.4	26.9	21.2	31.3	13.3	10.0	46.0	8.74	17.9	96.2	141	40.2
1957	168	20.8	17.9	30.4	40.0	163	134	176	348	239	476	229	171
1958	306	35.2	75.4	410	220	530	439	81.0	82.9	231	166	70.7	221
1959	76.4	87.5	171	324	71.9	831	221	162	682	553	580	1,153	411
1960	277	56.4	61.9	46.1	208	419	43.7	21.4	53.1	778	594	1,262	319
1961	193	56.1	43.1	60.1	120	81.7	36.6	18.8	16.2	34.3	224	85.3	80.8
1962	18.7	12.1	14.4	33.4	21.7	68.3	69.3	10.8	302	144	527	1,220	203
1963	110	73.5	38.3	60.8	743	205	23.6	31.6	136	277	258	382	191
1964	56.1	128	104	291	362	162	57.1	56.6	13.7	87.8	105	184	133
1965	65.3	20.6	40.5	35.4	44.4	208	27.6	10.0	215	558	487	105	153
1966	115	28.4	47.8	162	162	66.6	54.2	27.2	206	197	254	171	124
Mean	212	83.1	73.6	131	155	198	84.7	52.9	156	253	341	476	185

[1/]Location: Lat. 27°40'15", long. 82°21'10".
Drainage area: 145 sq. mi. (376 sq. km.), approximately.
Records available: March 1939 to September 1966.
Mean discharge: 184 c.f.s. (27 years).
Extremes: Maximum discharge, 14,000 c.f.s. September 11, 1960; minimum, 1.2 c.f.s. June 6, 7, 1945.
Maximum monthly mean discharge for period 1952-66: 1,262 c.f.s. September 1960.
Minimum monthly mean discharge for period 1952-66: 8.7 c.f.s. June 1956.

[2/]For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/]Liters per second = c.f.s. x 28.3

Table 3-14.--Stream discharge to Hillsborough Bay: U.S. Geological Survey Station 2-3015, Alafia River at Lithia, Fla.[1]

Water year[2]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	343	169	120	87.5	166	315	113	42.2	93.6	161	432	209	188
1953	1,271	406	187	380	355	131	119	36.5	254	518	913	1,810	532
1954	774	718	766	353	199	191	130	206	456	968	457	506	480
1955	256	313	180	197	182	113	132	46.2	95.1	355	384	579	236
1956	136	158	110	93.7	135	52.7	47.9	124	57.0	80.6	222	420	136
1957	274	81.1	75.4	114	142	350	444	748	407	514	1,045	1,087	442
1958	607	129	177	622	456	808	775	253	162	316	436	339	424
1959	146	249	257	503	234	1,874	900	378	1,020	1,046	1,037	1,831	792
1960	811	300	273	222	539	1,340	335	120	291	1,395	1,658	2,848	845
1961	718	269	203	249	409	225	172	119	114	153	335	276	270
1962	87.7	83.7	101	133	110	160	137	78.7	500	403	899	1,467	346
1963	323	259	167	207	706	719	139	186	422	559	587	464	393
1964	236	335	246	696	788	397	239	376	138	285	389	481	383
1965	232	168	243	219	253	302	184	144	391	410	1,222	413	350
1966	506	200	258	441	481	366	211	154	496	562	663	402	395
Mean	448	256	224	301	344	490	272	201	326	515	712	875	414

[1] Location: Lat. 27°52'19", long. 82°12'41".
Drainage area: 335 sq. mi. (868 sq. km.), approximately.
Records available: October 1932 to September 1966.
Mean discharge: 384 c.f.s. (34 years).
Extremes: Maximum discharge, 45,900 c.f.s. September 7, 1933; minimum, 6.6 c.f.s. June 5, 6, 1945.
Maximum monthly mean discharge for period 1952-66: 2,848 c.f.s. September 1960.
Minimum monthly mean dishcarge for period 1952-66: 36.5 c.f.s. May 1953.

[2] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3] Liters per second = c.f.s. x 28.3.

Table 3-15.--Stream discharge to Hillsborough Bay: U.S. Geological Survey Station 2-3018, Sixmile Creek at Tampa, Fla.[1]

Water year[2]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	29.6	18.8	15.8	20.5	22.2	33.6	40.7	36.2	44.6	83.0	123	65.2	44.7
1958	71.5	35.7	36.4	47.6	69.0	86.4	53.7	39.0	39.4	71.4	104	37.0	57.7
1959	33.5	28.5	34.9	64.9	31.1	145	113	86.1	116	100	205	145	92.4
1960	87.5	53.3	49.8	44.3	54.5	154	65.4	37.8	32.7	128	167	214	90.9
1961	63.2	46.1	40.4	39.7	45.0	32.4	29.4	27.7	38.1	45.0	49.5	31.0	40.6
1962	26.5	23.3	25.0	22.1	16.6	31.0	26.2	15.0	69.6	22.7	121	204	50.2
1963	62.0	54.1	45.9	44.2	105	64.7	35.0	31.4	26.0	48.8	75.0	76.0	55.4
1964	34.8	59.9	41.5	100	96.1	80.1	50.3	53.4	38.5	94.9	87.6	89.7	68.9
1965	45.1	39.8	40.4	35.9	32.5	36.1	44.2	26.9	54.9	99.1	161	71.4	57.5
1966	59.8	42.3	47.5	62.5	66.2	56.3	44.5	40.5	91.9	102	108	59.3	65.1
Mean	51.4	40.2	37.8	48.2	53.8	72.0	50.2	39.4	55.2	79.5	120.1	99.3	62.3

[1] Location: Lat. 27°57'59",long. 82°22'07".
Drainage area: 28 sq. mi. (73 sq. km.), approximately.
Records available: September 1956 to September 1966.
Mean discharge: 62.3 c.f.s. (10 years).
Extremes: Maximum discharge, 1,290 c.f.s. September 11, 1960; minimum, 4.4 c.f.s. May 27, 1962.
Maximum monthly mean discharge for period 1957-66: 214 c.f.s. September 1960.
Minimum monthly mean discharge for period 1957-66: 15 c.f.s. May 1962.

[2] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3] Liters per second = c.f.s. x 28.3.

Table 3-16.--Stream discharge to Hillsborough Bay: U.S. Geological Survey Station 2-3045, Hillsborough River near Tampa, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	751	221	358	185	169	521	598	80.1	257	226	644	429	371
1953	787	391	141	188	321	171	1,065	217	170	469	1,965	4,371	842
1954	2,795	640	1,795	850	250	177	103	97.8	327	723	1,199	308	781
1955	268	109	129	125	216	76.6	65.1	33.1	34.3	215	800	1,099	264
1956	191	197	120	83.1	174	42.9	13.9	14.8	8.48	31.5	35.9	324	102
1957	742	172	46.1	34.8	49.4	366	759	388	318	528	1,834	1,790	588
1958	1,348	157	119	414	486	1,975	847	204	74.5	494	811	238	601
1959	144	170	134	887	417	3,082	2,022	740	1,853	2,705	2,738	3,597	1,546
1960	1,957	805	217	231	464	4,926	1,358	154	220	1,200	4,713	4,276	1,718
1961	1,871	359	202	236	358	142	72.5	26.7	28.3	80.3	217	315	327
1962	32.4	15	43.2	129	117	13.2	5	5	527	685	1,393	2,860	484
1963	580	196	127	136	662	1,112	53.1	43.7	130	830	820	408	425
1964	295	473	289	1,440	1,697	698	972	387	117	730	1,969	2,869	990
1965	553	163	219	247	255	305	50	5	145	694	3,885	771	614
1966	863	142	184	335	734	1,029	208	7.7	1,030	801	1,816	1,192	696
Mean	878	281	275	368	425	976	546	160	349	694	1,656	1,656	691

[1/] Location: Lat. 28°01'25", long. 82°25'40".
Drainage area: 650 sq. mi. (1,684 sq. km.), approximately.
Records available: October 1938 to September 1966.
Mean discharge: 673 c.f.s. (28 years).
Extremes: Maximum discharge, 14,600 c.f.s. March 21, 1960; minimum, no flow November 30 to December 2, 1945.
Maximum monthly mean discharge for period 1952-66: 4,926 c.f.s. March 1960.
Minimum monthly mean discharge for period 1952-66: 5 c.f.s. April, May 1962 and May 1965.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3. Data are unadjusted for diversion by City of Tampa.

Table 3-17.--Stream discharge to Hillsborough Bay: U.S. Geological Survey Station 2-3060, Sulphur Springs at Sulphur Springs, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	---	---	---	---	---	---	---	---	---	76.3	88.6	83.4	---
1960	72.5	65.7	56.0	49.7	47.9	86.6	80.2	61.9	49.4	58.9	110	71.1	67.6
1961	64.9	59.8	54.4	51.7	52.4	53.0	50.8	43.0	41.9	43.8	48.3	54.4	51.5
1962	48.4	44.1	40.4	37.0	38.7	43.9	44.6	37.7	42.2	47.2	45.5	56.5	43.9
1963	55.9	48.9	45.0	40.9	42.6	49.3	46.9	44.2	40.5	47.2	55.2	61.2	48.2
1964	43.1	35.9	37.4	38.6	61.5	68.4	48.4	51.2	44.5	45.2	57.8	60.3	49.3
1965	52.2	44.2	40.1	35.1	35.4	39.3	34.3	13.4	29.5	47.1	61.6	57.6	40.9
1966	54.3	50.1	47.5	48.3	51.5	51.6	48.3	42.5	45.2	50.3	52.3	52.3	49.5
Mean	55.9	49.8	45.8	43.0	47.1	56.0	50.5	42.0	41.9	52.0	64.9	62.1	50.1

[1/] Location: Lat. 28°01'15", long. 82°27'05".
Drainage area: Not available.
Records available: May 1956 to September 1966 and earlier.
Mean discharge: 50.1 c.f.s. (7 years).
Extremes: Maximum discharge 163 c.f.s. August 3, 1945; minimum, 12.9 c.f.s. February 12, 1934.
Maximum monthly mean discharge for period 1959-66: 88.6 c.f.s. August 1959.
Minimum monthly mean discharge for period 1959-66: 13.4 c.f.s. May 1965.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-18.--Stream discharge to Old Tampa Bay: U.S. Geological Survey Station 2-3065, Sweetwater Creek near Sulphur Springs, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	1.21	1.17	1.17	0.44	0.46	1.97	1.32	0.11	0.30	2.25	5.90	4.94	1.78
1953	6.72	1.71	0.28	0.98	2.05	1.34	2.14	0.57	0.10	1.42	19.2	26.5	5.25
1954	25.6	8.80	9.70	3.55	0.91	0.64	0.16	0.06	0.05	0.28	2.18	7.05	4.96
1955	1.36	1.21	1.16	0.89	1.11	0.27	0.31	0	0	0.05	0.15	3.85	0.86
1956	0.82	0.40	0.15	0.12	0.23	0.03	0	0	0	0.02	0	0	0.15
1957	0.01	D	0	0	0	0.07	0.84	1.12	10.7	11.5	52.1	30.4	8.95
1958	27.4	0.42	0.46	2.56	5.05	14.7	22.2	5.00	0.76	13.9	23.9	9.46	10.6
1959	1.52	1.55	2.78	22.1	4.17	56.4	55.8	27.3	40.8	56.7	80.1	79.6	35.9
1960	42.3	12.9	1.51	1.39	4.94	79.3	28.6	3.42	0.71	20.5	97.5	44.7	28.3
1961	15.7	2.80	0.70	0.52	1.03	0.49	0.25	0.20	1.71	0.63	5.45	2.28	2.67
1962	0.47	0.25	0.22	0.26	0.37	0.46	0.29	0.06	0.53	0.45	12.2	58.5	6.12
1963	11.8	1.13	0.20	0.25	8.49	22.1	0.68	0.41	0.47	6.36	2.69	3.60	4.86
1964	1.80	2.08	1.42	11.7	23.3	24.2	3.56	4.40	0.53	4.11	22.3	39.1	11.5
1965	8.89	0.82	1.00	0.94	0.96	1.15	0.25	0.003	0.03	0.40	24.3	13.7	4.41
1966	4.50	0.34	0.17	1.35	3.05	2.43	0.67	0	0.93	1.00	10.6	10.3	2.95
Mean	10.0	2.37	1.39	3.14	3.74	13.7	7.80	2.84	3.84	7.97	23.9	22.3	8.62

[1/] Location: Lat. 28°02'33", long. 82°30'44".
Drainage area: 6.4 sq. mi. (17 sq. km.), approximately.
Records available: October 1951 to September 1966.
Mean discharge: 8.62 c.f.s. (15 years).
Extremes: Maximum discharge, 438 c.f.s. March 17, 1960; minimum, no flow for many days.
Maximum monthly mean discharge for period 1952-66: 80.1 c.f.s. August 1959.
Minimum monthly mean discharge for period 1952-66: No flow for several months.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-19.--Stream discharge to Old Tampa Bay: U.S. Geological Survey Station 2-3070, Rocky Creek near Sulphur Springs, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1953	---	---	---	7.55	26.2	13.4	25.0	6.42	3.21	22.9	165	180	---
1954	100	24.7	84.0	34.5	9.28	6.85	7.47	9.54	10.3	52.3	68.1	104	42.9
1955	40.8	17.3	9.84	10.3	16.1	5.57	3.63	0.63	0.58	1.86	7.61	60.5	14.5
1956	5.34	7.36	2.73	4.38	10.3	3.43	1.94	1.91	1.30	1.97	4.35	12.2	4.73
1957	5.91	2.67	1.98	2.35	2.48	18.9	78.0	26.7	59.4	79.2	185	127	49.3
1958	78.5	6.29	4.83	20.0	38.2	92.9	47.1	11.2	3.69	37.1	73.3	25.0	36.7
1959	22.6	20.9	22.0	62.0	29.4	238	87.8	61.5	77.8	153	290	243	110
1960	56.2	18.0	10.6	8.91	24.3	298	35.4	5.98	12.8	224	260	201	97.0
1961	36.0	10.1	5.48	5.78	9.11	7.16	2.59	1.80	2.91	27.3	64.8	46.9	18.4
1962	7.67	3.80	7.23	8.82	8.46	11.4	5.87	2.24	27.5	24.0	186	213	42.2
1963	42.9	10.4	7.21	8.01	41.4	68.7	4.73	1.76	3.67	82.7	27.4	19.3	26.6
1964	9.50	20.4	10.8	84.0	129	52.1	58.4	48.5	5.44	96.0	80.7	200	65.8
1965	27.8	5.76	9.83	8.52	9.46	12.7	4.66	3.07	7.73	48.7	209	35.9	32.3
1966	17.4	6.82	7.20	12.4	21.7	33.8	24.5	6.83	9.19	6.61	112	40.2	25.0
Mean	34.7	11.9	14.1	19.8	26.8	61.6	27.7	13.4	16.1	61.3	124	108	43.5

[1/] Location: Lat. 28°02'23", long. 82°34'31".
Drainage area: 35 sq. mi. (91 sq. km.), approximately.
Records available: January 1953 to September 1966.
Mean discharge: 43.5 c.f.s. (13 years).
Extremes: Maximum discharge, 2,840 c.f.s. July 29, 1960; minimum daily, 0.4 c.f.s. May 12-16, June 9, 10, 1955.
Maximum monthly mean discharge for period 1952-66: 298 c.f.s. March 1960.
Minimum monthly mean discharge for period 1952-66: 0.58 c.f.s. June 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-20.--Stream discharge to Old Tampa Bay: U.S. Geological Survey Station 2-3075, Alligator Creek at Safety Harbor, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	3.26	2.71	2.29	1.13	4.02	20.3	2.99	0.17	0.29	2.01	6.95	0.79	3.93
1953	8.04	2.94	0.98	1.88	5.52	1.83	1.59	0.11	0.95	42.1	20.2	46.8	11.1
1954	14.0	13.2	21.8	8.49	3.85	3.87	1.20	1.51	1.82	14.9	5.37	16.0	8.89
1955	2.10	1.56	2.01	2.18	5.09	0.80	0.95	0	0	2.80	8.35	27.7	4.42
1956	5.16	7.45	2.30	2.92	2.71	0.24	0	0	0	0	0	2.09	1.90
1957	4.91	1.03	0.77	0.98	1.36	6.76	13.2	10.5	11.3	7.90	33.0	31.2	10.3
1958	9.91	2.35	2.85	12.1	11.9	17.6	12.1	5.95	1.24	8.34	17.7	4.63	8.91
1959	13.2	5.61	9.85	19.2	8.04	66.4	---	---	---	---	---	---	---
1960	---	---	---	---	---	---	---	---	---	---	---	---	---
1961	12.8	3.86	4.36	3.82	6.06	1.91	0.33	0.27	0.42	3.87	10.2	15.8	5.30
1962	1.63	1.48	2.57	2.66	3.11	3.96	2.36	0.05	8.17	6.68	37.2	33.1	8.60
1963	7.28	4.59	3.25	4.17	18.3	12.8	0.77	0.37	0.66	6.25	7.93	2.33	5.66
1964	1.08	5.78	2.99	13.7	22.3	11.5	4.14	3.55	0.59	7.11	18.2	26.0	9.68
1965	2.40	0.75	3.91	1.85	3.24	4.52	0.32	0	3.67	22.6	29.3	7.85	6.77
1966	2.48	1.95	2.57	4.28	5.22	5.93	6.55	2.20	9.82	12.9	24.5	9.50	7.35
Mean	6.30	3.95	4.46	5.67	7.19	11.3	3.58	1.90	2.99	10.6	16.8	17.2	7.14

[1/]Location: Lat. 27°58'40", long. 82°41'45".
Drainage area: 9.0 sq. mi. (23 sq. km.), approximately.
Records available: October 1949 to April 1959; October 1960 to September 1966.
Mean discharge: 7.14 c.f.s. (13 years).
Extremes: Maximum discharge, 490 c.f.s. September 6, 1950; minimum, no flow for many days in most years.
Maximum monthly mean discharge for period 1952-66: 66.4 c.f.s. March 1959.
Minimum monthly mean discharge for period 1952-66: No flow in several months.

[2/]For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/]Liters per second = c.f.s. x 28.3.

Table 3-21.--Stream discharge to Boca Ciega Bay: U.S. Geological Survey Station 2-3085, Seminole Lake Outlet near Largo, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	25.3	12.0	4.37	1.18	10.6	33.0	8.61	0	0	3.21	13.3	1.96	9.49
1953	35.1	5.74	0.455	6.43	14.7	3.37	2.17	0.01	0.61	8.82	58.7	81.9	18.1
1954	19.6	14.5	35.1	12.9	1.84	0.96	0	0	0	13.1	15.0	30.7	12.1
1955	8.84	1.75	4.28	5.01	10.6	0.977	1.76	0	0	0	0.555	14.6	3.97
1956	0.97	6.60	0.05	0.28	1.08	0	0	0	0	0	0	0	0.74
1957	0	0	0	0	0	11.7	22.1	18.0	25.1	30.6	68.6	80.8	21.5
1958	25.1	1.16	4.57	24.6	24.0	48.4	30.1	13.1	1.08	38.8	48.2	16.0	23.1
1959	11.3	9.94	13.4	33.2	10.3	99.0	46.1	7.33	32.0	39.2	88.6	93.3	40.5
1960	31.1	7.25	12.7	7.26	23.9	90.3	15.4	4.80	0.35	54.8	114	88.1	37.7
1961	20.1	4.90	5.55	9.66	21.6	7.08	0.54	1.17	0.04	9.82	28.3	37.3	12.1
1962	1.04	0	1.35	6.72	5.07	5.73	4.25	0	0.44	0.02	31.8	65.6	10.1
1963	8.90	9.35	4.07	9.83	52.4	28.7	0.24	0	0	4.98	7.48	1.53	10.4
1964	0.63	4.92	2.80	24.0	38.4	16.8	9.31	3.69	0	6.45	16.8	21.3	12.0
1965	3.22	0	7.00	10.2	13.5	17.5	0.67	0	4.59	11.7	55.7	16.0	11.7
1966	7.58	1.93	5.89	15.2	22.8	13.4	8.67	1.43	43.3	19.2	34.9	11.0	15.4
Mean	13.3	5.34	6.77	11.1	16.7	25.1	9.99	3.30	7.17	16.0	38.8	37.3	15.9

[1/]Location: Lat. 27°50'20", long. 82°46'50".
Drainage area: 14 sq. mi. (36 sq. km.), approximately.
Records available: August 1950 to September 1966.
Mean discharge: 15.4 c.f.s. (16 years).
Extremes: Maximum discharge, 539 c.f.s. September 5, 1950; minimum, no flow for many days each year.
Maximum monthly mean discharge for period 1952-66: 114 c.f.s. August 1960.
Minimum monthly mean discharge for period 1952-66: No flow several months.

[2/]For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/]Liters per second = c.f.s. x 28.3.

Table 3-22.--Stream discharge to St. Joseph Sound: U.S. Geological Survey Station 2-3100, Anclote River near Elfers, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	32.0	71.7	37.8	14.0	64.2	167	48.6	4.81	10.0	33.7	118	95.1	58.0
1953	143	38.3	10.8	21.6	46.1	60.5	335	14.5	6.33	40.6	333	310	113
1954	162	61.8	245	67.5	15.6	13.6	8.16	9.12	16.8	98.3	40.2	99.7	70.5
1955	39.1	15.0	18.1	22.0	26.6	4.62	4.50	3.77	2.96	31.6	46.9	175	32.3
1956	9.21	29.3	11.1	8.78	41.1	6.07	4.53	3.73	2.51	3.38	64.4	57.6	20.0
1957	14.7	3.76	3.65	3.11	5.47	17.7	76.7	28.7	161	98.4	342	284	86.8
1958	175	10.5	21.7	138	102	353	127	18.9	5.42	78.6	129	43.3	101
1959	112	71.0	55.4	164	67.2	458	219	148	139	273	427	585	228
1960	166	43.9	24.0	25.9	110	612	87.0	10.3	5.35	424	441	436	200
1961	152	19.7	8.41	16.9	30.0	7.33	3.48	2.83	4.57	40.3	126	108	43.6
1962	6.16	4.46	5.40	10.7	7.40	10.3	4.85	2.48	8.66	19.3	140	216	36.3
1963	37.8	11.0	5.87	33.0	143	213	11.9	4.29	1.74	203	41.1	96.4	66.6
1964	15.4	46.6	23.8	199	223	83.1	64.1	13.5	4.20	155	225	573	135
1965	37.0	5.55	13.8	14.3	16.6	30.0	4.69	3.11	7.48	103	557	118	76.8
1966	62.3	8.64	8.72	23.2	64.6	125	28.1	3.90	50.1	30.5	196	78.3	56.7
Mean	77.6	29.4	32.9	50.8	64.2	144	68.5	18.1	28.4	109	215	218	88.3

[1/] Location: Lat. 28°12'50", long. 82°40'00".
Drainage area: 72.5 sq. mi. (188 sq. km.), approximately.
Records available: May 1946 to September 1966.
Mean discharge: 86.3 c.f.s. (20 years).
Extremes: Maximum discharge, 3,890 c.f.s. July 30, 1960; minimum, 0.4 c.f.s. May 19, 1956.
Maximum monthly mean discharge for period 1952-66: 612 c.f.s. March 1960.
Minimum monthly mean discharge for period 1952-66: 2.48 c.f.s. May 1962.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-23.--Stream discharge to Gulf of Mexico between Bailey's Bluff and Saddle Key: U.S. Geological Survey Station 2-3103, Pithlachascotee River near New Port Richey, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1963	---	---	---	---	---	---	4.59	1.45	3.60	80.6	57.6	53.2	---
1964	19.5	28.7	16.5	96.3	106	48.5	23.7	11.4	3.34	88.1	65.8	291	66.1
1965	51.9	7.46	17.6	14.8	18.7	28.4	4.57	1.53	6.18	41.5	266	76.7	45.0
1966	57.3	10.4	11.5	21.3	39.8	66.3	19.7	2.22	14.8	17.4	99.4	45.3	33.8
Mean	42.9	15.5	15.2	44.1	54.8	47.7	13.1	4.15	6.98	56.9	122	117	48.3

[1/] Location: Lat. 28°15'19", long. 82°39'37".
Drainage area: 182 sq. mi. (471 sq. km.), approximately.
Records available: March 1963 to September 1966.
Mean discharge: 48.3 c.f.s. (3 years).
Extremes: Maximum discharge, 1,410 c.f.s. September 11, 1964; minimum, 0.3 c.f.s. May 26, June 18, 19, 20, 1963.
Maximum monthly mean discharge for period April 1963-September 1966: 266 c.f.s. August 1965.
Minimum monthly mean discharge for period April 1963-September 1966: 1.45 c.f.s. May 1963.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-24.--Stream discharge to Gulf of Mexico between Saddle Key and South Mangrove Point; U.S. Geological Survey Station 2-3107.5, Crystal River near Crystal River, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1964	---	---	---	---	---	1,180	1,020	1,000	550	840	880	670	---
1965	1,070	650	1,130	1,140	1,230	1,260	1,150	1,090	780	720	740	790	980
1966	656	665	923	883	1,047	932	927	965	835	519	466	631	785
Mean	863	658	1,027	1,012	1,139	1,124	1,032	1,018	722	693	695	697	883

[1/] Location: Lat. 28°54'17", long. 82°38'13".
Drainage area: Not available.
Records available: February 1964 to September 1966.
Mean discharge: 883 c.f.s. (2 years).
Extremes: Maximum discharge 4,340 c.f.s. September 11, 1964; Maximum reverse flow, 1,520 c.f.s. September 10, 1964.
Maximum monthly mean discharge for period 1964-66: 1,260 c.f.s. March 1965.
Minimum monthly mean discharge for period 1964-66: 466 c.f.s. August 1966.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-25.--Stream discharge to Gulf of Mexico between Saddle Key and South Mangrove Point: U.S. Geological Survey Station 2-3130, Withlacoochee River near Holder, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	1,187	945	1,145	831	1,001	1,306	1,351	828	746	586	592	716	935
1953	1,013	1,054	727	646	627	635	907	1,264	669	742	1,669	3,309	1,105
1954	4,567	2,674	2,483	2,844	1,672	1,169	777	642	565	569	851	665	1,628
1955	535	491	482	479	525	410	329	248	234	323	508	1,014	464
1956	865	500	377	377	451	281	239	163	132	148	206	269	334
1957	438	829	409	222	223	253	450	466	611	594	1,198	1,648	612
1958	2,026	978	546	832	1,125	2,495	2,662	1,467	790	963	1,208	824	1,328
1959	801	1,158	856	1,309	1,234	2,160	4,203	2,936	2,240	3,110	3,847	4,054	2,328
1960	4,018	2,950	1,807	1,355	1,584	4,197	7,096	2,946	1,819	2,081	5,415	5,221	3,374
1961	6,206	3,068	1,708	1,504	1,473	1,083	776	566	534	645	850	993	1,621
1962	605	586	479	475	463	382	274	169	225	478	508	789	452
1963	884	629	481	496	730	1,252	833	447	429	461	559	541	645
1964	571	483	504	949	1,955	1,553	1,367	1,124	586	688	1,274	2,716	1,142
1965	3,106	1,284	1,114	1,038	1,028	1,162	793	539	639	889	2,648	2,552	1,403
1966	1,822	1,171	984	996	1,339	2,064	1,453	931	1,051	2,132	2,507	2,668	1,595
Mean	1,910	1,253	940	957	1,029	1,360	1,567	982	751	961	1,589	1,865	1,264

[1/] Location: Lat. 28°59'19", long. 82°20'59".
Drainage area: 1,710 sq. mi. (4,429 sq. km.), approximately.
Records available: August 1931 to September 1966 and earlier.
Mean discharge: 1,183 c.f.s. (35 years).
Extremes: Maximum discharge, 8,660 c.f.s. April 5, 1960; minimum, 112 c.f.s. June 18, 1956.
Maximum monthly mean discharge for period 1952-66: 7,096 c.f.s. April 1960.
Minimum monthly mean discharge for period 1952-66: 132 c.f.s. June 1956.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-26.--Stream discharge to Waccasassa Bay: U.S. Geological Survey Station 2-3137, Waccasassa River near Gulf Hammock, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1963	---	---	---	---	---	---	89.3	105	103	117	125	123	---
1964	153	108	151	423	699	411	270	428	89.3	1,169	1,093	2,355	611
1965	377	160	485	707	964	872	256	111	303	739	1,724	846	629
1966	771	161	287	318	686	757	140	259	709	194	1,315	600	516
Mean	434	143	308	483	783	680	189	226	301	555	1,064	981	585

[1/] Location: Lat. 29°11'14", long. 82°46'09".
Drainage area: 400 sq. mi. (1,036 sq. km.), approximately.
Records available: March 1963 to September 1966.
Mean discharge: 585 c.f.s. (4 years).
Extremes: Maximum discharge, 12,200 c.f.s. September 12, 1944; maximum daily reverse flow, 1,810 c.f.s. June 9, 1966.
Maximum monthly mean discharge for period April 1963-September 1966: 2,355 c.f.s. September 1964.
Minimum monthly mean discharge for period April 1963-September 1966: 89.3 c.f.s. April 1963 and June 1964.

[2/] For example, Water Year began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-27.--Stream discharge to Waccasassa Bay: U.S. Geological Survey Station 2-3142, Tenmile Creek at Lebanon Station, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1964	0.93	0.12	0.23	47.7	99.6	67.5	33.3	40.4	0.02	257	339	467	113
1965	24.4	5.21	23.0	13.0	56.7	63.8	2.52	0.19	39.4	40.4	263	152	57.0
1966	98.6	5.18	13.0	13.7	71.0	72.0	12.2	1.19	25.0	47.3	121	68.1	45.7
Mean	41.3	3.50	12.1	24.8	75.8	67.8	16.0	13.9	21.5	115	241	229	71.9

[1/] Location: Lat. 29°09'39", long. 82°38'21".
Drainage area: 26 sq. mi. (67 sq. km.), approximately.
Records available: October 1963 to September 1966.
Mean discharge: 71.9 c.f.s. (3 years).
Extremes: Maximum discharge, 4,290 c.f.s. September 11, 1964; minimum, no flow for many days in 1964.
Maximum monthly mean discharge for period 1964-66: 467 c.f.s. September 1964.
Minimum monthly mean discharge for period 1964-66: 0.02 c.f.s. June 1964.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-28.--Stream discharge to Suwannee Sound: U.S. Geological Survey Station 2-3235, Suwannee River near Wilcox, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	6,987	9,905	10,070	12,190	11,410	15,690	13,190	8,356	7,210	5,331	4,888	5,023	9,179
1953	5,239	4,865	4,590	4,662	7,204	9,212	10,600	9,475	6,132	6,401	8,832	12,860	7,496
1954	17,880	11,030	11,790	17,120	11,680	9,282	7,464	5,955	5,204	5,051	4,594	4,360	9,290
1955	4,263	4,128	4,078	4,088	4,541	4,387	4,742	4,422	4,174	4,104	3,958	4,644	4,291
1956	4,244	3,718	3,575	3,610	4,382	5,582	4,631	7,371	4,924	4,924	4,546	4,122	4,640
1957	4,788	4,399	3,880	3,799	3,602	3,796	6,116	5,691	11,180	10,000	8,690	8,383	6,201
1958	12,710	8,266	12,270	11,220	10,920	15,250	19,560	19,510	12,640	16,380	11,610	7,795	13,210
1959	6,074	5,597	5,273	6,381	10,340	24,910	31,220	16,340	21,690	15,480	13,820	10,820	13,990
1960	9,906	10,440	8,548	9,505	11,350	19,470	24,040	15,800	9,747	11,210	13,670	11,550	12,930
1961	14,120	9,524	7,427	7,773	10,360	11,690	13,650	16,240	9,132	8,180	7,850	11,130	10,590
1962	7,458	5,880	5,343	5,519	5,598	8,087	14,730	9,387	6,174	5,637	5,837	6,049	7,142
1963	5,366	4,589	4,649	5,838	10,550	14,190	10,090	6,345	5,355	7,304	6,739	5,263	7,172
1964	4,865	4,178	4,153	9,774	17,850	25,800	17,790	23,470	13,310	11,630	20,090	27,910	15,050
1965	25,810	17,350	20,970	21,470	20,000	30,300	26,590	15,740	11,550	15,320	14,400	11,470	19,270
1966	11,550	7,935	7,348	10,910	19,270	29,680	19,780	13,040	17,280	15,030	16,520	12,500	15,040
Mean	9,417	7,454	7,598	8,924	10,604	15,155	14,946	11,809	9,713	9,465	9,736	9,592	10,366

[1/] Location: Lat. 29°36', long. 82°56'.
Drainage area: 9,730 sq. mi. (25,201 sq. km.), approximately.
Records available: October 1941 to September 1966 and earlier.
Mean discharge: 10,740 c.f.s. (26 years).
Extremes: Maximum discharge, 84,700 c.f.s. April 14, 1948; minimum daily, 3,270 c.f.s. February 24, 1957.
Maximum monthly mean discharge for period 1952-66: 31,220 c.f.s. April 1959.
Minimum monthly mean discharge for period 1952-66: 3,575 c.f.s. December 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-29.--Stream discharge to Deadman Bay: U.S. Geological Survey Station 2-3240, Steinhatchee River near Cross City, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	129	1,291	400	212	808	413	184	26.2	48.9	31.4	146	402	337
1953	347	35.5	23.7	126	121	53.5	695	96.0	208	476	590	1,453	351
1954	1,021	209	998	560	159	103	153	122	16.1	634	105	97.6	352
1955	66.3	13.0	31.3	61.5	329	59.9	30.3	10.5	9.50	22.0	42.0	174	68.8
1956	16.0	11.2	7.53	14.2	56.9	35.3	15.9	89.6	14.4	82.9	50.8	29.5	35.4
1957	262	51.4	22.4	15.5	13.0	53.9	87.4	137	925	503	478	725	273
1958	1,436	98.5	405	396	390	875	677	99.4	174	717	216	56.0	465
1959	97.5	108	67.8	464	239	1,889	490	611	621	780	585	880	573
1960	973	358	259	220	630	1,356	525	72.3	55.3	547	780	437	519
1961	1,340	83.0	45.0	233	474	214	305	47.3	23.9	51.1	78.7	253	262
1962	18.9	16.9	33.3	62.2	58.6	76.5	45.0	9.09	22.6	22.1	220	471	87.8
1963	90.0	36.9	111	169	716	598	47.8	16.6	35.6	483	217	82.9	215
1964	205	35.0	76.3	819	972	896	253	582	37.3	1,305	1,830	3,820	901
1965	423	90.2	530	247	275	654	145	94.4	106	321	551	249	309
1966	407	74.2	171	524	985	898	164	377	537	167	1,002	572	487
Mean	455	167	212	275	415	545	254	159	189	410	459	647	349

[1/] Location: Lat. 29°47'11", long. 83°19'18".
Drainage area: 350 sq. mi. (907 sq. km.), approximately.
Records available: February 1950 to September 1966.
Mean discharge: 336 c.f.s. (16 years).
Extremes: Maximum discharge, 17,600 c.f.s. September 13, 14, 1964; minimum, 3.4 c.f.s. June 27, 28, 1950.
Maximum monthly mean discharge for period 1952-66: 3,820 c.f.s. September 1964.
Minimum monthly mean discharge for period 1952-66: 7.53 c.f.s. December 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-30.--Stream discharge to Gulf of Mexico between Deadman Bay and Econfina River: U.S. Geological Survey Station 2-3245, Fenholloway River at Foley, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	65.7	310	129	81.8	232	111	50.6	14.3	14.3	11.9	114	63.8	98.9
1953	42.4	15.5	12.8	15.2	55.0	41.6	401	49.8	184	213	324	383	144
1954	210	37.3	180	121	46.9	37.9	33.3	49.9	43.4	75.5	87.3	50.8	81.9
1955	50.7	50.6	39.9	33.3	39.5	33.3	34.0	32.8	33.5	83.9	51.9	126	50.8
1956	61.0	72.0	40.0	43.3	74.3	63.4	49.6	104	41.8	64.1	63.5	48.5	60.4
1957	72.8	51.2	46.7	48.6	42.0	44.5	54.0	95.5	614	115	120	394	141
1958	527	83.2	214	130	114	286	411	80.5	130	210	125	65.1	199
1959	47.7	53.7	51.4	106	115	518	257	193	188	210	156	224	177
1960	190	146	111	118	254	336	243	77.7	74.9	119	365	192	185
1961	417	96.5	75.0	152	211	110	90.8	74.8	79.3	80.8	41.7	80.6	125
1962	71.2	70.6	71.2	69.0	85.7	77.9	84.1	78.7	78.4	58.9	63.7	132	78.2
1963	110	81.3	81.2	182	262	210	78.8	72.9	86.9	97.2	70.6	81.5	117
1964	76.3	64.9	60.7	260	290	378	143	288	82.0	374	654	1,137	317
1965	251	103	269	102	175	273	114	98.3	140	186	219	101	170
1966	110	82.3	82.8	205	346	282	118	151	160	110	445	134	185
Mean	154	87.9	97.6	111	156	187	144	97.4	130	134	193	214	142

1/ Location: Lat. 30°03'53", long. 83°32'01".
Drainage area: 80 sq. mi. (207 sq. km.), approximately.
Records available: September 1946 to September 1966.
Mean discharge: 128 c.f.s. (20 years).
Extremes: Maximum discharge, 4,810 c.f.s. September 12, 1964; minimum, 2.8 c.f.s. August 19, 1961.
Maximum monthly mean discharge for period 1952-66: 1,137 c.f.s. September 1964.
Minimum monthly mean discharge for period 1952-66: 11.9 c.f.s. July 1952.

2/ For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

3/ Liters per second = c.f.s. x 28.3.

Table 3-31.--Stream discharge to Apalachee Bay: U.S. Geological Survey Station 2-3260, Econfina River near Perry, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	38.6	288	195	133	289	259	124	36.3	34.1	25.7	149	184	145
1953	87.9	31.5	27.4	32.7	146	83.3	398	107	359	147	225	285	160
1954	271	76.9	288	180	66.8	45.5	30.7	24.0	26.2	24.4	21.2	18.7	90.2
1955	14.9	11.0	10.7	12.6	21.3	14.5	13.2	7.73	4.80	4.49	28.1	74.8	18.1
1956	24.3	25.7	19.5	20.4	50.5	47.7	29.1	57.5	20.7	40.9	20.7	17.9	31.2
1957	21.2	14.3	12.1	9.47	7.50	9.97	27.0	28.9	432	204	357	1,266	198
1958	772	103	298	208	181	400	604	160	228	381	116	38.0	292
1959	24.6	27.4	20.9	45.0	96.9	746	364	124	207	171	150	185	181
1960	239	182	72.3	99.9	311	486	416	79.5	134	218	186	118	211
1961	450	60.2	53.0	131	209	151	56.5	31.3	31.6	28.4	19.4	23.2	104
1962	13.2	9.86	10.7	17.6	18.0	26.4	354	31.6	21.3	13.6	12.9	26.2	45.9
1963	17.6	9.95	17.2	64.2	106	136	33.7	21.3	26.3	44.1	58.6	25.4	46.5
1964	26.7	18.0	29.6	273	349	494	154	379	80.0	181	476	645	259
1965	242	71.8	292	116	148	514	159	142	230	249	169	56.9	200
1966	91.9	36.7	75.1	175	474	354	94.4	97.3	107	51.5	298	82.0	160
Mean	156	64.4	94.8	101	165	251	191	88.5	129	119	152	203	143

1/ Location: Lat. 30°10'14", long. 83°49'26".
Drainage area: 230 sq. mi. (596 sq. km.), approximately.
Records available: February 1950 to September 1966.
Mean discharge: 136 c.f.s. (16 years).
Extremes: Maximum discharge, 2,540 c.f.s. September 17, 1957; minimum, 2.3 c.f.s. July 8, 1955.
Maximum monthly mean discharge for period 1952-66: 1,266 c.f.s. September 1957.
Minimum monthly mean discharge for period 1952-66: 4.49 c.f.s. July 1955.

2/ For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

3/ Liters per second = c.f.s. x 28.3.

Table 3-32.--Stream discharge to Apalachee Bay: U.S. Geological Survey Station 2-3265, Aucilla River at Lamont, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	10.8	183	285	272	484	855	575	78.6	16.2	11.9	30.0	116	242
1953	40.9	13.9	15.5	21.8	106	138	854	202	381	181	314	380	220
1954	420	112	519	478	185	126	59.5	20.5	13.0	9.03	8.36	5.21	164
1955	3.03	4.36	6.04	4.74	5.71	2.95	2.58	0.89	0.08	0.34	0.13	1.57	2.68
1956	1.25	2.18	2.79	5.67	12.6	13.0	8.52	23.2	4.77	39.1	4.30	2.41	10.0
1957	1.96	0.73	0.58	0.17	0	3.12	38.6	19.1	381	159	167	2,674	284
1958	2,220	272	829	517	467	1,171	1,936	680	703	711	317	95.0	830
1959	30.3	22.4	21.5	60.9	417	2,944	1,194	338	918	486	320	305	589
1960	575	568	210	347	779	1,397	2,121	374	106	158	107	123	569
1961	411	60.8	77.9	275	407	561	569	208	129	124	94.5	128	253
1962	20.4	18.1	22.0	69.7	98.1	178	1,920	125	42.5	18.2	16.8	30.6	211
1963	15.6	13.4	18.4	126	406	566	137	19.6	19.2	14.9	11.1	8.79	111
1964	4.68	1.29	13.9	236	690	1,718	518	2,524	141	606	1,765	1,337	800
1965	707	281	2,923	718	1,460	3,519	1,587	2,137	1,692	1,511	812	237	1,471
1966	311	76.3	236	773	2,260	2,901	442	300	606	312	507	142	731
Mean	318	109	345	260	518	1,073	797	470	344	289	298	372	433

[1/] Location: Lat. 30°22'11", long. 83°48'25".
Drainage area: 680 sq. mi. (1,761 sq. km.), approximately.
Records available: February 1950 to September 1966.
Mean discharge: 407 c.f.s. (16 years).
Extremes: Maximum discharge, 6,580 c.f.s. September 18, 1957; minimum, no flow for many days in 1955, 1957.
Maximum monthly mean discharge for period 1952-66: 3,519 c.f.s. March 1965.
Minimum monthly mean discharge for period 1952-66: No flow February 1957.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-33.--Stream discharge to Apalachee Bay: U.S. Geological Survey Station 2-3269, St. Marks River near Newport, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	449	396	360	345	335	338	410	462	858	581	546	1,563	553
1958	1,375	642	668	585	588	836	1,107	725	800	733	641	541	772
1959	448	423	425	479	633	1,338	976	919	1,169	1,034	838	1,049	811
1960	1,365	976	707	711	857	1,020	1,265	744	564	666	638	756	855
1961	1,032	649	602	633	710	679	606	514	471	561	644	1,152	687
1962	491	410	450	425	400	474	1,070	541	369	388	517	634	514
1963	557	417	497	611	640	650	433	401	430	630	574	477	527
1964	496	388	378	760	712	917	548	946	560	1,304	1,322	970	777
1965	759	637	1,470	885	1,019	1,503	1,076	1,474	1,465	1,379	1,104	715	1,126
1966	804	656	704	885	1,179	1,804	902	697	870	647	769	572	873
Mean	778	559	626	632	707	956	839	742	756	792	759	843	750

[1/] Location: Lat. 30°16'00", long. 84°09'00".
Drainage area: 220 sq. mi. (570 sq. km.), approximately.
Records available: October 1956 to September 1966.
Mean discharge: 750 c.f.s. (10 years).
Extremes: Maximum discharge, 4,010 c.f.s. September 18, 1957; minimum, 310 c.f.s. April 25, 1964.
Maximum monthly mean discharge for period 1957-66: 1,804 c.f.s. March 1966.
Minimum monthly mean discharge for period 1957-66: 335 c.f.s. February 1957.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-34.--Stream discharge to Apalachee Bay: U.S. Geological Survey Station 2-3300, Ochlockonee River near Bloxham, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	146	663	2,208	1,358	3,156	3,605	2,354	1,022	681	115	729	860	1,401
1953	310	209	554	731	2,061	1,502	3,212	649	413	1,671	917	1,045	1,097
1954	949	474	3,557	2,849	1,074	1,252	632	420	260	220	300	170	1,019
1955	50.0	52.5	126	398	592	296	1,036	242	102	321	338	259	315
1956	72.9	62.0	159	427	1,417	974	424	1,398	410	1,401	336	619	640
1957	765	207	265	248	243	682	1,091	943	2,017	1,130	435	3,381	948
1958	3,260	1,383	2,630	2,174	2,351	4,230	6,752	2,377	2,055	2,420	1,732	120	2,626
1959	55.6	76.5	82.6	746	3,815	7,312	3,437	1,350	3,894	2,106	1,466	1,135	2,109
1960	2,314	1,678	1,503	1,982	4,114	3,376	6,541	1,407	1,276	1,716	969	3,586	2,522
1961	2,854	654	687	1,294	2,334	2,738	5,210	1,506	1,031	1,260	1,030	1,195	1,810
1962	377	65.5	650	600	969	1,488	3,757	201	240	214	284	414	766
1963	253	321	870	2,536	3,048	2,415	805	677	638	1,311	624	448	1,153
1964	457	282	964	4,694	4,239	7,003	2,994	4,880	683	2,817	4,028	2,099	2,937
1965	3,792	1,297	8,913	3,614	9,203	7,831	5,162	2,101	4,470	2,944	2,015	858	4,325
1966	1,357	535	1,399	3,845	5,463	6,574	1,366	2,254	2,542	1,448	2,915	1,429	2,583
Mean	1,134	531	1,638	1,833	2,939	3,419	2,985	1,428	1,381	1,406	1,208	1,175	1,750

[1/] Location: Lat. 30°23'00", long. 84°39'15".
Drainage area: 1,660 sq. mi. (4,299 sq. km.), approximately.
Records available: June 1926 to September 1966.
Mean discharge: 1,698 c.f.s. (40 years).
Extremes: Maximum daily discharge, 55,000 c.f.s. September 30, 1957, caused by failure of earth embankment of Jackson Bluff Dam 3,000 ft. upstream; maximum discharge unaffected by embankment failure, 50,200 c.f.s. April 5, 1948; minimum, since October 1954, 1.0 c.f.s. November 1, 2, 1957, caused by closure of breaks in earth embankment of Jackson Bluff Dam.
Maximum monthly mean discharge for period 1952-66: 9,203 c.f.s. February 1965.
Minimum monthly mean discharge for period 1952-66: 50 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-35.--Stream discharge to Apalachee Bay: U.S. Geological Survey Station 2-3301, Telogia Creek near Bristol, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	46.6	170	337	142	384	307	239	102	79.8	62.9	159	113	178
1953	73.0	62.8	71.4	150	200	108	162	74.8	135	149	123	276	131
1954	144	173	487	262	161	175	110	70.7	70.7	75.4	47.0	38.4	152
1955	35.4	53.5	69.7	92.4	91.0	45.1	313	82.5	44.0	76.0	86.7	78.1	88.6
1956	52.4	58.0	69.3	134	222	119	80.6	215	149	510	114	323	171
1957	247	101	101	90.5	81.6	143	127	146	168	159	93.9	433	158
1958	418	346	274	284	256	442	615	327	354	241	168	85.4	318
1959	77.5	137	92.0	167	310	571	284	262	476	337	180	196	257
1960	433	212	196	210	519	256	590	155	171	341	365	471	323
1961	292	132	130	183	254	218	313	138	128	259	228	255	211
1962	75.6	84.8	133	112	143	120	391	58.2	92.4	103	99.0	123	127
1963	82.7	108	231	274	259	158	85.7	111	166	326	171	108	173
1964	92.6	81.1	186	479	392	448	246	188	100	232	337	260	254
1965	743	236	749	352	690	651	459	251	605	373	394	245	478
1966	305	176	249	512	497	592	171	212	191	119	399	311	311
Mean	208	142	225	230	297	290	279	160	195	224	198	221	222

[1/] Location: Lat. 30°25'35", long. 84°55'40".
Drainage area: 126 sq. mi. (326 sq. km.).
Records available: March 1950 to September 1966.
Mean discharge: 216 c.f.s. (16 years).
Extremes: Maximum discharge, 8,280 c.f.s. December 5, 1964; minimum, 28 c.f.s. September 14, October 26, 27, 1954.
Maximum monthly mean discharge for period 1952-66: 749 c.f.s. December 1964.
Minimum monthly mean discharge for period 1952-66: 35.4 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-36.--Stream discharge to St. George Sound: U.S. Geological Survey Station 2-3303, New River near Wilma, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1965	428	45.6	602	173	457	404	73.0	47.3	418	350	298	107	283
1966	329	24.9	166	409	321	370	4.41	235	303	99.9	422	441	261
Mean	379	35.3	384	291	389	387	38.7	141	361	225	360	274	272

1/ Location: Lat. 30°07'40", long. 84°53'15".
Drainage area: 81.7 sq. mi. (212 sq. km.).
Records available: October 1964 to September 1966.
Mean discharge: 272 c.f.s. (2 years).
Extremes: Maximum discharge, 2,720 c.f.s. September 20, 1966; minimum, no flow May 28 to June 8, 1965.
Maximum monthly mean discharge for period 1964-66: 602 c.f.s. December 1964.
Minimum monthly mean discharge for period 1964-66: 4.41 c.f.s. April 1966.

2/ For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

3/ Liters per second = c.f.s. x 28.3.

Table 3-37.--Stream discharge to Apalachicola Bay: U.S. Geological Survey Station 2-3587, Apalachicola River near Blountstown, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	16,564	19,240	25,674	21,426	30,657	49,074	41,720	21,355	16,757	21,664	17,545	11,929	24,439
1959	10,323	9,167	12,068	18,197	37,354	43,542	29,883	19,416	34,383	16,568	12,894	13,226	21,285
1960	15,832	17,355	17,142	26,484	47,814	38,916	66,623	20,745	14,150	13,684	14,519	13,327	25,402
1961	14,225	10,806	12,171	13,268	30,339	50,929	53,920	29,164	19,417	20,106	16,061	15,593	23,833
1962	8,860	9,328	29,613	32,058	30,475	44,371	52,510	18,365	14,853	12,916	10,730	9,747	22,819
1963	9,301	14,451	11,675	28,321	31,216	29,587	18,178	22,125	17,464	20,350	12,567	8,614	18,654
1964	9,334	8,886	16,942	49,445	49,200	65,290	65,053	49,125	16,590	24,929	28,429	17,723	33,394
1965	37,911	20,426	37,657	40,105	50,489	50,907	38,771	19,568	26,070	22,262	16,481	12,658	31,072
1966	17,550	13,420	16,290	32,960	55,290	71,600	25,120	28,000	22,010	13,635	16,840	12,390	26,960
Mean	15,544	13,675	19,915	29,140	40,315	49,357	43,531	25,318	20,188	18,457	16,230	12,801	25,318

1/ Location: Lat. 30°25'30", long. 85°01'53".
Drainage area: 17,600 sq. mi. (45,584 sq. km.), approximately.
Records available: October 1957 to September 1966 and earlier.
Mean discharge: 25,318 c.f.s. (9 years).
Extremes: Maximum discharge, 162,500 c.f.s. April 9, 1960; minimum daily, 6,280 c.f.s. October 29, 1962.
Maximum monthly mean discharge for period 1957-66: 71,600 c.f.s. March 1966.
Minimum monthly mean discharge for period 1957-66: 8,614 c.f.s. September 1963.

2/ For example, Water Year 1952 began October 1, 1951 and ended September 30, 1952.

3/ Liters per second = c.f.s. x 28.3.

Table 3-38.--Stream discharge to Apalachicola Bay: U.S. Geological Survey Station 2-3590, Chipola River near Altha, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	507	907	1,437	1,306	2,229	2,406	1,533	965	785	638	700	785	1,179
1953	589	548	584	833	1,759	1,822	2,621	1,635	903	949	846	860	1,157
1954	896	740	3,303	2,589	1,494	1,659	1,226	867	714	625	553	465	1,264
1955	428	400	450	518	671	540	937	833	573	559	878	574	613
1956	422	389	394	473	1,145	1,340	914	854	720	1,227	792	872	794
1957	1,016	831	909	820	681	957	1,363	1,274	1,390	882	757	1,694	1,048
1958	2,120	1,557	1,910	1,909	2,063	2,859	2,937	1,858	1,610	1,505	1,283	883	1,874
1959	787	763	792	900	1,738	3,032	2,475	1,554	2,090	1,509	1,321	1,120	1,504
1960	1,537	1,776	1,381	1,864	2,472	2,367	4,511	1,562	1,173	1,168	1,067	1,074	1,822
1961	1,199	767	750	998	1,520	1,644	2,769	1,399	1,144	1,153	1,154	1,493	1,329
1962	791	735	1,078	1,419	1,582	1,754	2,870	1,016	810	784	729	633	1,179
1963	674	623	880	1,719	1,881	1,638	1,068	893	932	1,511	1,361	760	1,159
1964	713	594	1,086	4,021	3,064	3,924	2,818	3,890	1,288	1,615	1,993	1,938	2,247
1965	3,125	1,647	2,754	2,637	2,975	3,198	2,283	1,307	2,059	1,746	1,299	893	2,158
1966	1,797	977	1,147	1,775	2,896	4,032	1,468	1,164	910	820	1,267	967	1,597
Mean	1,107	884	1,257	1,585	1,878	2,211	2,120	1,405	1,140	1,113	1,067	1,001	1,395

[1/] Location: Lat. 30°32'02", long. 85°09'55".
Drainage area: 781 sq. mi. (2,023 sq. km.).
Records available: March 1943 to September 1966 and earlier.
Mean discharge: 1,533 c.f.s. (31 years).
Extremes: Maximum discharge, 25,000 c.f.s. September 20, 1926; minimum, 356 c.f.s. November 17, 18, 19. 1955.
Maximum monthly mean discharge for period 1952-66: 4,511 c.f.s. April 1960.
Minimum monthly mean discharge for period 1952-66: 389 c.f.s. November 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-39.--Stream discharge to North Bay: U.S. Geological Survey Station 2-3595, Econfina Creek near Bennett, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	435	495	565	427	533	500	484	416	384	371	452	510	464
1953	433	427	426	424	521	486	538	472	476	488	499	572	480
1954	531	531	742	593	537	545	510	485	462	489	445	431	525
1955	409	405	400	402	398	374	401	359	342	356	352	344	379
1956	337	323	317	350	382	358	332	337	357	544	409	468	376
1957	449	376	400	358	348	379	395	466	522	442	486	793	451
1958	716	598	579	586	574	652	795	742	800	761	686	585	673
1959	541	551	504	514	598	664	656	591	614	662	601	627	593
1960	706	572	597	622	679	605	773	569	564	589	637	605	626
1961	566	495	488	509	508	522	538	505	479	535	584	571	525
1962	460	436	498	429	459	450	551	392	405	407	426	485	450
1963	429	420	426	492	461	432	388	380	413	537	559	513	454
1964	494	455	518	753	671	766	705	634	526	666	719	702	634
1965	769	610	625	574	650	691	657	536	686	650	692	582	644
1966	680	537	565	597	660	745	540	545	537	522	606	612	596
Mean	530	482	510	509	532	545	551	495	504	535	544	560	525

[1/] Location: Lat. 30°23'04", long. 85°33'24".
Drainage area: 182 sq. mi. (471 sq. km.).
Records available: October 1935 to September 1966.
Mean discharge: 537 c.f.s. (31 years).
Extremes: Maximum discharge, 4,860 c.f.s. April 2, 1948; minimum, 307 c.f.s. January 9, 1956.
Maximum monthly mean discharge for period 1952-66: 800 c.f.s. June 1958.
Minimum monthly mean discharge for period 1952-66: 317 c.f.s. December 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-40.--Stream discharge to Choctawhatchee Bay: U.S. Geological Survey Station 2-3665, Choctawhatchee River near Bruce, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	2,191	3,763	5,535	5,037	10,360	12,340	9,008	4,367	3,852	2,373	3,739	4,191	5,541
1953	2,169	2,293	3,084	6,593	9,979	8,857	11,290	9,785	3,376	4,570	3,186	3,019	5,656
1954	9,221	4,275	25,970	13,760	6,691	8,431	6,702	3,181	2,491	2,356	1,862	1,666	7,259
1955	1,582	1,742	2,176	2,721	4,399	2,534	7,695	5,309	3,630	3,526	4,228	2,520	3,493
1956	1,881	1,858	1,945	2,344	6,023	8,032	4,768	2,785	2,619	4,063	2,235	3,010	3,454
1957	10,730	3,069	5,877	7,404	4,591	5,025	14,020	6,708	4,669	3,950	2,182	5,191	6,124
1958	5,485	5,143	7,592	6,915	8,729	13,120	11,010	5,000	4,415	7,384	5,731	3,346	6,986
1959	2,696	2,670	3,161	4,547	11,150	13,410	10,800	5,034	9,842	4,483	4,265	4,550	6,338
1960	7,112	9,060	6,704	7,906	10,960	11,310	26,430	6,514	3,811	3,930	4,181	3,363	8,402
1961	3,464	2,437	3,200	4,277	6,942	11,940	18,590	6,246	6,262	6,340	5,595	9,147	7,015
1962	2,368	2,764	7,249	9,456	10,750	10,940	16,050	4,590	3,116	2,852	2,460	2,427	6,216
1963	2,538	2,475	3,161	9,204	10,680	7,294	4,358	2,647	3,646	6,174	6,434	2,545	5,071
1964	6,144	3,000	7,358	17,290	12,970	18,480	13,180	17,030	4,502	8,485	14,210	8,801	10,980
1965	12,250	5,391	12,410	12,490	14,280	14,280	9,748	5,146	5,346	5,215	5,662	3,180	8,769
1966	6,889	3,368	5,049	10,060	17,220	21,610	6,050	5,216	4,204	3,197	4,125	2,588	7,422
Mean	5,115	3,554	6,698	8,003	9,715	10,507	11,313	5,971	4,385	4,593	4,673	3,970	6,582

[1/] Location: Lat. 30°27'03", long. 85°53'54".
Drainage area: 4,384 sq. mi. (11,355 sq. km.).
Records available: October 1930 to September 1966.
Mean discharge: 7,073 c.f.s. (36 years).
Extremes: Maximum discharge, 69,600 c.f.s. August 19, 20, 1939; minimum, 1,480 c.f.s. October 9, 1954.
Maximum monthly mean discharge for period 1952-66: 26,430 c.f.s. April 1960.
Minimum monthly mean discharge for period 1952-66: 1,582 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-41.--Stream discharge to Choctawhatchee Bay: U.S. Geological Survey Station 2-3670, Alaqua Creek near De Funiak Springs, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	50.9	95.6	127	78.9	218	156	134	86.6	61.4	48.3	176	119	112
1953	68.6	69.7	84.3	153	222	143	309	130	123	118	113	254	148
1954	159	152	517	250	171	203	115	86.5	66.1	77.7	48.4	46.6	158
1955	39.3	43.9	47.1	53.1	78.1	43.4	94.8	40.0	32.6	97.7	126	97.7	66.0
1956	85.5	61.3	58.5	82.2	172	177	112	79.2	171	246	101	242	132
1957	204	105	110	85.0	72.0	98.2	147	102	166	138	106	336	139
1958	212	200	170	250	231	234	254	149	147	141	166	104	188
1959	75.5	76.3	74.3	104	160	302	225	145	260	281	290	266	188
1960	328	202	161	209	233	216	413	143	96.9	126	156	192	206
1961	119	99.0	94.1	112	149	155	186	122	168	171	245	156	148
1962	74.5	82.8	249	279	169	163	201	86.4	91.8	70.4	77.5	88.9	136
1963	58.0	71.4	85.7	198	182	120	80.4	99.5	191	247	226	172	144
1964	121	118	165	361	255	317	357	226	130	207	394	234	241
1965	359	156	255	209	243	266	210	116	215	215	170	115	211
1966	189	116	128	223	371	376	163	148	107	116	93.7	78.4	175
Mean	143	110	155	176	195	198	200	117	135	153	166	167	159

[1/] Location: Lat. 30°37'00", long. 86°09'50".
Drainage area: 65.6 sq. mi. (170 sq. km.).
Records available: April 1951 to September 1966.
Mean discharge: 159 c.f.s. (15 years).
Extremes: Maximum discharge 9,020 c.f.s. September 26, 1953; minimum, 27 c.f.s. June 9, 21, 22, 30, July 1, 1955.
Maximum monthly mean discharge for period 1952-66: 517 c.f.s. December 1953.
Minimum monthly mean discharge for period 1952-66: 32.6 c.f.s. June 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-42.--Stream discharge to East Bay (Pensacola): U.S. Geological Survey Station 2-3680, Yellow River at Milligan, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	270	557	873	715	1,334	1,927	1,130	667	376	315	697	433	773
1953	227	242	422	810	1,293	960	1,572	1,792	544	703	444	2,104	921
1954	1,284	1,094	6,232	2,034	1,121	1,224	987	449	352	401	237	182	1,308
1955	153	201	286	371	786	405	1,773	903	464	667	1,000	320	608
1956	347	329	323	512	1,215	1,656	822	443	610	971	362	1,144	725
1957	1,238	501	2,189	1,053	826	1,201	3,554	1,748	1,107	651	390	870	1,279
1958	695	1,017	1,058	1,125	1,150	1,643	1,164	617	592	1,368	815	633	990
1959	376	407	503	669	1,804	1,641	1,452	838	2,271	893	816	994	1,047
1960	1,379	1,291	1,068	1,159	1,994	1,558	3,979	1,250	754	756	840	710	1,388
1961	633	414	583	896	1,928	2,074	3,766	1,049	1,588	1,059	1,395	1,693	1,414
1962	398	606	1,963	1,347	2,557	1,645	2,800	747	673	486	396	344	1,153
1963	403	384	665	2,109	2,038	1,147	654	410	569	1,069	851	417	888
1964	478	471	1,014	2,474	1,718	2,447	2,415	2,226	618	1,422	2,490	1,208	1,585
1965	1,558	1,023	1,493	1,207	2,345	1,676	1,182	497	611	627	716	444	1,108
1966	1,392	484	777	1,532	2,295	2,653	800	729	436	410	423	249	1,010
Mean	722	601	1,297	1,201	1,627	1,590	1,870	958	771	787	791	783	1,080

[1/] Location: Lat. 30°45'10", long. 86°37'45".
Drainage area: 624 sq. mi. (1,616 sq. km.).
Records available: July 1938 to September 1966.
Mean discharge: 1,151 c.f.s. (28 years).
Extremes: Maximum discharge, 28,000 c.f.s. December 6, 1953; minimum, 143 c.f.s. October 25, 1954.
Maximum monthly mean discharge for period 1952-66: 6,232 c.f.s. December 1953.
Minimum monthly mean discharge for period 1952-66: 153 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-43.--Stream discharge to East Bay (Pensacola): U.S. Geological Survey Station 2-3690, Shoal River near Crestview, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	407	679	696	576	1,188	995	854	610	461	374	789	568	681
1953	344	338	470	741	1,155	803	1,463	680	566	980	700	1,994	848
1954	1,061	932	3,601	1,891	1,182	1,371	944	688	567	753	441	376	1,155
1955	304	331	373	430	640	365	697	1,135	469	637	772	463	551
1956	442	346	345	488	912	1,078	682	481	754	859	497	1,578	703
1957	1,226	626	1,142	713	620	649	1,244	781	967	567	524	1,505	880
1958	873	984	852	993	1,040	1,412	1,264	769	786	1,238	1,097	729	1,004
1959	507	512	511	668	1,245	1,571	1,475	1,202	2,490	1,256	1,294	1,387	1,173
1960	2,155	1,639	1,296	1,493	1,798	1,621	3,056	1,202	797	1,197	1,153	1,169	1,545
1961	1,008	687	785	948	1,564	1,516	1,974	985	1,496	1,149	1,776	1,510	1,279
1962	597	622	1,393	1,499	1,836	1,319	2,125	714	666	605	491	480	1,023
1963	435	469	636	1,236	1,773	893	563	539	1,034	1,120	999	886	876
1964	924	737	1,186	2,282	1,651	2,030	2,743	1,814	1,001	1,295	2,166	1,416	1,605
1965	1,826	1,190	2,170	1,502	1,868	1,553	1,113	638	1,002	973	1,270	804	1,325
1966	1,470	643	804	1,235	1,805	2,194	904	1,125	680	800	615	447	1,058
Mean	905	716	1,084	1,113	1,352	1,291	1,407	891	916	920	972	1,021	1,047

[1/] Location: Lat. 30°41'50", long. 86°34'15".
Drainage area: 474 sq. mi. (1,228 sq. km.).
Records available: July 1938 to September 1966.
Mean discharge: 1,092 c.f.s. (28 years).
Extremes: Maximum discharge, 21,700 c.f.s. July 7, 1940; minimum,.263 c.f.s. May 13, 14, 1955.
Maximum monthly mean discharge for period 1952-66: 3,601 c.f.s. December 1953.
Minimum monthly mean discharge for period 1952-66: 304 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-44.--Stream discharge to East Bay (Pensacola): U.S. Geological Survey Station 2-3700, Blackwater River near Baker, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	75.1	124	204	160	469	527	297	155	100	88.9	146	102	203
1953	72.0	72.0	112	223	456	238	638	506	152	283	149	459	278
1954	183	324	2,029	422	248	403	238	121	92.0	105	75.6	65.9	362
1955	64.0	72.2	79.3	96.8	205	86.1	615	284	102	135	177	78.3	165
1956	75.0	67.8	74.2	119	297	450	144	96.9	142	235	88.8	334	176
1957	196	89.2	560	219	214	283	983	260	195	173	124	344	303
1958	248	310	276	348	337	434	304	162	258	421	259	218	298
1959	111	114	130	172	489	420	423	339	656	227	242	364	305
1960	615	301	251	324	539	426	1,102	325	161	210	155	207	383
1961	266	134	175	271	699	560	1,130	294	634	397	628	426	465
1962	147	256	670	439	1,158	509	784	165	240	167	145	138	396
1963	138	127	212	595	577	292	150	128	208	252	270	118	254
1964	93.5	149	239	750	483	578	879	543	223	537	765	269	460
1965	314	244	506	364	769	476	321	132	210	264	288	325	349
1966	648	140	219	425	656	635	224	338	144	117	179	101	318
Mean	216	168	382	329	506	421	549	257	234	241	246	237	314

[1/] Location: Lat. 30°50'00", Long. 86°44'05".
Drainage area: 205 sq. mi. (531 sq. km.).
Records available: March 1950 to September 1966.
Mean discharge: 305 c.f.s. (16 years).
Extremes: Maximum discharge, 17,200 c.f.s. December 4, 1953; minimum, 60 c.f.s. September 7, 8, 1954.
Maximum monthly mean discharge for period 1952-66: 2,029 c.f.s. December 1953.
Minimum monthly mean discharge for period 1952-66: 64.0 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951 and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-45.--Stream discharge to East Bay (Pensacola): U.S. Geological Survey Station 2-3702, Big Juniper Creek near Munson, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	---	---	---	72.6	63.6	84.5	55.2	37.4	76.3	87.5	44.7	61.1	---
1959	29.3	32.9	36.7	43.0	97.0	71.5	73.5	65.6	89.2	53.7	57.0	65.7	59.6
1960	130	56.2	59.4	70.5	109	96.6	171	68.2	39.5	71.6	47.9	70.1	82.5
1961	---	---	---	---	---	---	---	---	---	---	---	---	---
1962	72.6	42.6	47.8	63.7	128	99.7	172	57.5	156	66.2	105	91.5	91.4
1963	44.8	38.8	62.5	117	107	59.5	37.1	31.9	45.9	59.5	61.4	30.7	57.8
1964	21.5	33.6	44.3	117	84.0	104	167	94.4	47.9	83.5	79.7	41.4	76.5
1965	56.9	49.7	88.8	55.3	115	70.6	45.5	25.0	36.6	42.7	74.0	59.6	59.5
1966	90.6	33.2	48.5	70.9	120	89.4	44.1	66.4	28.7	24.8	42.1	22.2	56.5
Mean	63.7	41.0	55.4	76.3	103	84.5	95.7	55.8	65.0	61.2	64.0	55.3	69.1

[1/] Location: Lat. 30°51'50", long. 86°54'20".
Drainage area: 36 sq. mi. (93 sq. km.), approximately.
Records available: January 1958 to September 1960; October 1961 to September 1966.
Mean discharge: 69.1 c.f.s. (7 years).
Extremes: Maximum discharge, 3,900 c.f.s. June 20, 1961; minimum, 14 c.f.s. July 13, 14, 1966.
Maximum monthly mean discharge for period 1958-66: 172 c.f.s. April 1962.
Minimum monthly mean discharge for period 1958-66: 21.5 c.f.s. October 1963.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-46.--Stream discharge to East Bay (Pensacola): U.S. Geological Survey Station 2-3705, Big Coldwater Creek near Milton, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	273	376	390	209	554	614	501	364	284	267	293	349	380
1953	230	232	297	381	561	409	706	576	356	371	327	552	415
1954	293	438	1,383	572	484	643	414	298	267	323	233	225	466
1955	213	222	234	280	468	253	797	325	225	298	308	217	318
1956	239	206	207	273	431	566	271	223	328	425	208	505	323
1957	340	212	502	297	308	340	1,114	549	552	368	302	832	476
1958	419	528	419	537	472	647	456	365	597	638	453	560	508
1959	321	338	343	376	675	569	526	407	583	407	487	491	458
1960	866	499	502	547	668	651	1,176	556	393	656	490	951	662
1961	547	418	448	564	1,028	936	1,330	546	1,145	785	886	915	792
1962	452	551	797	635	1,159	673	1,002	384	477	401	349	434	605
1963	387	364	442	717	615	463	349	313	445	442	381	310	435
1964	255	311	373	762	569	682	1,061	724	456	593	693	329	573
1965	518	426	626	465	837	594	399	312	519	398	568	418	505
1966	765	353	431	522	769	721	466	523	327	337	379	281	488
Mean	408	365	493	476	640	584	705	431	464	447	424	491	494

1/Location: Lat. 30°42'30", long. 86°58'20".
Drainage area: 237 sq. mi. (614 sq. km.).
Records available: October 1938 to September 1966.
Mean discharge: 532 c.f.s. (28 years).
Extremes: Maximum discharge, 23,100 c.f.s. August 17, 1939; minimum, 156 c.f.s. June 10, 11, 1956.
Maximum monthly mean discharge for period 1952-66: 1,383 c.f.s. December 1953.
Minimum monthly mean discharge for period 1952-66: 206 c.f.s. November 1955.

2/For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

3/Liters per second = c.f.s. x 28.3.

Table 3-47.--Stream discharge to East Bay (Pensacola): U.S. Geological Survey Station 2-3707, Pond Creek near Milton, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	---	---	---	75.5	68.2	88.9	65.5	53.4	78.1	82.0	69.1	67.7	---
1959	51.0	51.9	50.1	54.4	66.7	61.4	74.6	54.3	117	77.8	82.7	90.5	69.2
1960	127	95.5	87.8	94.0	95.7	97.3	166	96.7	74.5	75.4	75.8	212	108
1961	103	80.7	77.5	79.2	143	117	149	83.3	138	112	119	101	108
1962	68.1	80.0	130	98.6	94.1	87.5	98.0	61.4	76.4	64.0	57.7	66.7	81.7
1963	57.1	54.8	60.8	84.8	82.1	65.5	56.5	49.9	73.5	76.3	63.5	51.6	64.6
1964	44.5	52.4	55.7	94.4	77.3	84.6	162	99.8	71.0	74.8	97.3	64.4	81.5
1965	77.8	72.5	88.9	76.3	110	86.4	67.9	53.8	82.6	67.2	73.1	61.5	76.3
1966	79.9	58.4	63.5	70.2	92.3	92.2	71.7	88.3	55.8	53.9	61.3	47.3	69.5
Mean	76.1	68.3	76.8	80.8	92.2	86.8	101	71.2	85.2	75.9	77.7	84.7	82.4

1/Location: Lat. 30°40'50", long. 87°07'55".
Drainage area: 58.7 sq. mi. (152 sq. km.).
Records available: January 1958 to September 1966.
Mean discharge: 82.4 c.f.s. (8 years).
Extremes: Maximum discharge, 3,380 c.f.s. September 16, 1960; minimum, 38 c.f.s. June 14, 15, 1963.
Maximum monthly mean discharge for period 1958-66: 212 c.f.s. September 1960.
Minimum monthly mean discharge for period 1958-66: 44.5 c.f.s. October 1963.

2/For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

3/Liters per second = c.f.s. x 28.3.

Table 3-48.--Stream discharge to Escambia Bay: U.S. Geological Survey Station 2-3755, Escambia River near Century, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	1,199	1,884	3,406	2,915	7,150	13,360	10,470	5,498	4,588	1,365	2,307	1,873	4,653
1953	1,089	1,150	2,630	5,355	7,702	7,288	8,573	10,750	2,434	3,418	1,750	2,156	4,509
1954	3,142	2,472	24,600	8,019	5,746	6,964	4,903	1,953	1,256	1,490	939	708	5,209
1955	666	1,033	1,157	1,925	4,522	1,783	14,780	5,309	3,706	3,533	3,938	1,156	3,601
1956	1,087	1,055	1,295	1,895	6,049	9,178	3,832	2,070	2,098	3,859	1,128	3,245	3,055
1957	3,568	1,755	6,571	4,690	3,588	4,633	18,030	7,105	3,331	2,957	1,221	2,880	5,023
1958	2,135	5,374	5,360	5,367	6,884	11,710	6,743	3,168	2,421	4,634	2,881	3,531	5,007
1959	1,689	1,561	2,017	3,129	11,100	10,590	11,240	3,563	8,910	4,007	3,261	6,037	5,532
1960	7,531	6,971	5,989	9,047	13,560	11,450	26,960	6,344	2,583	3,293	3,306	4,756	8,435
1961	2,451	1,864	2,481	3,916	15,460	19,630	22,790	5,179	7,225	5,221	3,830	5,831	7,913
1962	1,535	3,365	10,880	9,387	9,338	9,693	18,170	3,543	2,769	2,142	1,751	1,652	6,156
1963	1,577	2,432	2,838	10,190	7,126	6,311	2,995	1,556	1,832	2,480	2,246	1,176	3,549
1964	1,012	1,240	3,470	7,780	5,845	12,830	12,220	16,160	2,207	7,022	6,143	2,995	6,602
1965	4,824	3,646	6,859	12,970	21,160	14,440	6,321	2,064	2,147	2,636	3,336	1,654	6,758
1966	8,735	2,359	5,067	7,296	17,880	19,210	4,515	3,325	1,860	1,442	1,435	1,005	6,123
Mean	2,816	2,544	5,641	6,259	9,541	10,605	11,503	5,173	3,291	3,300	2,631	2,710	5,475

[1/] Location: Lat. 30°57'25", long. 87°14'00".
Drainage area: 3,817 sq. mi. (9,886 sq. km.).
Records available: October 1934 to September 1966.
Mean discharge: 6,102 c.f.s. (32 years).
Extremes: Maximum discharge, 77,200 c.f.s. April 5, 1960; minimum, 600 c.f.s. September 15, October 20, 21, 1954.
Maximum monthly mean discharge for period 1952-66: 26,960 c.f.s. April 1960.
Minimum monthly mean discharge for period 1952-66: 666 c.f.s. October 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-49.--Stream discharge to Escambia Bay: U.S. Geological Survey Station 2-3760, Pine Barren Creek near Barth, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1953	75.7	83.1	128	122	232	171	154	145	95.9	124	93.8	107	127
1954	78.0	118	413	131	122	142	105	83.7	78.2	89.2	65.9	64.9	125
1955	65.3	69.0	72.7	81.2	96.9	66.4	465	94.3	82.1	111	127	78.6	117
1956	70.8	64.5	70.8	85.4	148	176	85.6	75.3	85.6	104	65.4	127	96.2
1957	116	78.7	101	85.4	80.2	114	379	149	124	80.6	91.4	186	132
1958	112	157	120	136	144	189	150	118	174	137	112	142	141
1959	92.0	91.2	94.5	101	165	153	170	160	239	143	120	144	139
1960	179	117	122	144	173	146	318	205	120	125	116	177	162
1961	112	110	114	143	271	378	411	172	245	219	233	165	214
1962	122	148	237	218	381	262	380	132	157	155	108	114	200
1963	115	122	125	210	153	123	102	92.4	104	113	114	83.5	121
1964	73.3	90.6	114	161	127	154	409	206	147	259	149	105	166
1965	125	124	147	152	278	165	121	94.6	112	117	140	110	140
1966	182	98.6	115	127	226	204	120	139	95.8	114	116	78.8	134
Mean	108	105	141	136	186	175	241	133	133	135	118	120	144

[1/] Location: Lat. 30°47'55", long. 87°22'05".
Drainage area: 75.3 sq. mi. (195 sq. km.).
Records available: October 1952 to September 1966.
Mean discharge: 144 c.f.s. (14 years).
Extremes: Maximum discharge, 24,800 c.f.s. April 14, 1955; minimum, 51 c.f.s. June 8, 9, 1956.
Maximum monthly mean discharge for period 1953-66: 465 c.f.s. April 1955.
Minimum monthly mean discharge for period 1953-66: 64.5 c.f.s. November 1955 .

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-50.--Stream discharge to Perdido Bay: U.S. Geological Survey Station 2-3765, Perdido River at Barrineau Park, Fla.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	278	469	520	367	981	831	750	710	345	297	356	754	552
1953	266	278	556	698	866	638	1,004	652	427	677	520	388	579
1954	266	543	2,084	669	501	624	415	320	316	363	249	224	550
1955	233	256	302	386	588	269	2,395	376	427	544	609	310	554
1956	271	246	323	446	916	1,199	351	282	351	609	315	653	496
1957	558	279	431	339	343	513	1,717	1,128	793	321	308	929	637
1958	431	913	594	765	628	840	577	375	1,082	728	568	546	670
1959	312	339	362	430	1,069	877	1,006	977	1,568	821	588	953	771
1960	1,234	599	515	816	850	783	1,654	807	438	517	559	779	803
1961	397	393	440	703	1,397	1,331	2,207	698	1,439	1,032	1,092	812	990
1962	412	696	1,445	1,106	1,466	866	1,910	550	625	593	404	627	886
1963	450	487	495	1,108	773	539	392	307	499	858	590	329	569
1964	267	335	566	1,024	630	874	1,750	844	406	1,249	881	407	771
1965	479	515	694	1,024	1,545	907	554	302	555	691	720	464	699
1966	1,629	431	616	647	1,191	1,350	536	751	364	389	510	310	726
Mean	499	452	670	702	916	829	1,081	605	642	646	551	566	684

[1/] Location: Lat. 30°41'25", long. 87°26'25".
Drainage area: 394 sq. mi. (1,020 sq. km.).
Records available: June 1941 to September 1966.
Mean discharge: 760 c.f.s. (25 years).
Extremes: Maximum discharge, 39,000 c.f.s. April 15, 1955; minimum, 207 c.f.s. September 15, 1954.
Maximum monthly mean discharge for period 1952-66: 2,395 c.f.s. April 1955.
Minimum monthly mean discharge for period 1952-66: 224 c.f.s. September 1954.

[2/] For example, Water Year 1952 began October 1, 1951, and ended SEptember 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-51.--Stream discharge to Perdido Bay: U.S. Geological Survey Station 2-3775, Styx River near Loxley, Ala.[1/]

Water year[2/]	Monthly and yearly mean discharge in cubic feet per second (c.f.s.)[3/]												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1952	43.1	106	135	75.5	246	161	202	183	55.7	48.1	93.5	289	136
1953	36.6	47.3	169	183	257	207	296	112	122	239	171	93.4	160
1954	42.5	153	718	154	100	126	65.8	42.7	41.4	50.6	25.8	26.6	130
1955	27.3	36.9	52.4	92.1	163	56.8	204	55.9	24.2	109	171	43.9	85.9
1956	41.1	26.9	46.8	84.6	259	306	67.8	44.9	82.3	178	148	246	127
1957	189	54.9	116	74.6	82.2	180	548	258	116	55.7	87.9	353	176
1958	101	287	136	238	178	340	150	88.9	343	392	222	244	227
1959	80.2	128	109	149	353	241	268	317	438	368	227	357	252
1960	488	141	168	225	262	219	427	206	71.0	75.9	334	241	238
1961	111	88.5	112	231	504	310	412	106	506	182	303	325	263
1962	83.3	215	458	339	321	182	299	85.4	134	117	57.4	105	199
1963	81.1	140	106	375	196	118	59.0	40.5	79.8	120	99.8	45.6	121
1964	24.9	43.2	130	308	178	247	546	207	80.0	272	218	48.3	192
1965	96.5	104	143	158	360	174	81.4	35.9	80.6	218	409	187	170
1966	430	79.0	145	183	363	286	93.1	140	113	75.8	206	93.7	184
Mean	125	110	183	191	255	210	248	128	152	167	185	180	177

[1/] Location: Lat. 30°39'50", long. 87°38'20".
Drainage area: 93.2 sq. mi. (241 sq. km.).
Records available: October 1951 to September 1966.
Mean discharge: 177 c.f.s. (15 years).
Extremes: Maximum discharge, 14,000 c.f.s. December 6, 1953; minimum, 16 c.f.s. June 22, 1955.
Maximum monthly mean discharge for period 1952-66: 718 c.f.s. December 1953.
Minimum monthly mean discharge for period 1952-66: 24.2 c.f.s. June 1955.

[2/] For example, Water Year 1952 began October 1, 1951, and ended September 30, 1952.

[3/] Liters per second = c.f.s. x 28.3.

Table 3-52.--Summary of mean discharge of major streams including springs to estuarine study areas and to segments of coast, west coast of Florida

[Dashes (---) indicate no data available]

Segment of coast, estuarine study area, and stream[1/]	Mean discharge C.f.s.[2/]	C.f.s.[2/]
SEGMENT 1		
Florida Bay:	---	
SEGMENT 2		
Lake Ingraham:	---	
Whitewater Bay:	---	
Cape Sable to Lostmans River:		
Tamiami Canal Outlets, Miami to Monroe	906	
Barron River Canal near Everglades	99	
Subtotal, Cape Sable to Lostmans River.		1,005
Lostmans River to Mormon Key:	---	
Mormon Key to Caxambas Pass:	---	
Total, Segment 2		1,005
SEGMENT 3		
Caxambas Pass to Gordon River:		
Golden Gate Canal at Naples	338	
Doctors Pass to Estero Pass:	---	
Caloosahatchee River:		
Caloosahatchee Canal at Moore Haven	1,057	
Pine Island Sound:	---	
Subtotal, Caxambas Pass to Pine Island Sound		1,395
Charlotte Harbor:		
Peace River at Arcadia	1,267	
Joshua Creek at Nocatee	119	
Horse Creek near Arcadia	229	
Myakka River near Sarasota	264	
Warm Mineral Spring near Murdock	11	
Big Slough near Murdock	89	
Subtotal, Charlotte Harbor		1,979
Total, Segment 3		3,374
SEGMENT 4		
Lemon Bay:	---	
Sarasota Bay system:		
Cow Pen Slough near Bee Ridge	54	
Phillippi Creek near Sarasota	26	
Subtotal, Sarasota Bay system		80
Tampa Bay:		
Manatee River near Bradenton	109	
Little Manatee River near Wimauma	184	
Subtotal, Tampa Bay		293
Hillsborough Bay:		
Alafia River at Lithia	384	
Buckhorn Spring near Riverview	11	
Sixmile Creek at Tampa	62	
Hillsborough River near Tampa	673	
Sulphur Springs at Sulphur Springs	50	
Subtotal, Hillsborough Bay		1,180
Old Tampa Bay:		
Sweetwater Creek near Sulphur Springs	9	
Rocky Creek near Sulphur Springs	43	
Alligator Creek at Safety Harbor	7	
Subtotal, Old Tampa Bay		59
Boca Ciega Bay:		
Seminole Lake outlet near Largo	15	
Subtotal, Boca Ciega Bay		15
Total, Segment 4		1,627

See footnotes at end of table.

Segment of coast, estuarine study area, and stream[1/]	Mean discharge C.f.s.[2/]	C.f.s.[2/]
SEGMENT 5		
St. Joseph Sound:		
Anclote River near Elfers	86	
Subtotal, St. Joseph Sound		86
Baileys Bluff to Saddle Key:		
Pithlachascotee River near New Port Richey	48	
Weekiwachee Springs at Weeki Wachee	174	
Subtotal, Baileys Bluff to Saddle Key.		222
Saddle Key to South Mangrove Point:		
Chassahowitzka Springs near Chassahowitzka	81	
Homosassa Springs near Homosassa Springs	185	
Crystal River near Crystal River	785	
Withlacoochee River near Holder	1,183	
Rainbow Springs near Dunnellon	722	
Subtotal, Saddle Key to South Mangrove Point		2,956
Waccasassa Bay:		
Waccasassa River near Gulf Hammock	585	
Tenmile Creek at Lebanon Station	72	
Wekiva Springs near Gulf Hammock	73	
Subtotal, Waccasassa Bay		730
Total, Segment 5		3,994
SEGMENT 6		
Suwannee Sound:		
Suwannee River near Wilcox	10,740	
Fanning Spring near Wilcox	108	
Manatee Spring near Chiefland	168	
Subtotal, Suwannee Sound		11,016
Suwannee Sound to Deadman Bay	---	
Deadman Bay:		
Steinhatchee River near Cross City	336	
Subtotal, Deadman Bay		336
Deadman Bay to St. Marks River:		
Fenholloway River at Foley	128	
Waldo Springs near Perry	5	
Econfina River near Perry	136	
Aucilla River at Lamont	407	
Subtotal, Deadman Bay to St. Marks River		686
Apalachee Bay:		
St. Marks River near Newport	750	
Wacissa Springs near Wacissa	97	
Wakulla Spring near Crawfordville	283	
Ochlockonee River near Bloxham	1,698	
Telogia Creek near Bristol	216	
Subtotal, Apalachee Bay		3,044
Total, Segment 6		15,082
SEGMENT 7		
St. George Sound:		
New River near Wilma	272	
Subtotal, St. George Sound		272
Apalachicola Bay:		
Apalachicola River near Blountstown	25,180	
Chipola River near Altha	1,533	
Subtotal, Apalachicola Bay		26,713
Total, Segment 7		26,985

See footnotes at end of table.

Table 3-52.--(Continued)

Segment of coast, estuarine study area, and stream[1/]	Mean discharge	
	C.f.s.[2/]	C.f.s.[2/]
SEGMENT 6		
St. Joseph Bay:	---	
St. Andrew Sound:	---	
East Bay (St. Andrew):	---	
West Bay:	---	
North Bay:		
Econfina Creek near Bennett	537	
Subtotal, North Bay		537
Choctawhatchee Bay:		
Choctawhatchee River near Bruce	7,073	
Alaqua Creek near De Funiak Springs	159	
Subtotal, Choctawhatchee Bay		7,232
Santa Rosa Sound:	---	
East Bay (Pensacola):		
Yellow River at Milligan	1,151	
Shoal River near Crestview	1,092	
Blackwater River near Baker	305	
Big Juniper Creek near Munson	70	
Big Coldwater Creek near Milton	532	
Pond Creek near Milton	82	
Subtotal, East Bay (Pensacola)		3,232
Escambia Bay:		
Escambia River near Century	6,102	
Pine Barren Creek near Barth	144	
Subtotal, Escambia Bay		6,246
Perdido Bay:		
Perdido River at Barrineau Park	760	
Styx River near Loxley, Alabama	177	
Subtotal, Perdido Bay		937
Total, Segment 8		18,184
Grand total, Florida West coast		70,251

[1/] Segment I = Florida Bay; Segment II = East Cape Sable to Caxambas Pass; Segment III = Caxambas Pass to northern Gasparilla Sound; Segment IV = northern Gasparilla Sound to northern Boca Ciega Bay; Segment V = northern Boca Ciega Bay to Cedar Keys; Segment VI = Cedar Keys to Light-house Point; Segment VII = Lighhouse Point to Cape San Blas; Segment VIII = Cape San Blas to Alabama boundary.

[2/] Liters per second = c.f.s. x 28.3.

stations; they were 91.9°F (33.3°C) at Key West, 90.1°F (32.3°C) at St. Petersburg, 92.1°F (33.4°C) at Cedar Key, and 91.9°F (33.3°C) at Pensacola.

Figure 34 demonstrates the decreasing winter temperature northward and the greater range of temperature at northerly stations. Voluminous additional data are available from other sources because temperature measurement is standard in biological and hydrological field studies, but we have not attempted to include such data because generally they fit within the variations at the four stations of Figure 34. The reader may wish to consult references cited under *Salinity*, which follow; most of the references contain temperature as well as salinity data.

Fish kills often accompany rapid temperature decreases that result from the sudden arrivals of cold fronts in late fall and winter. The shallow-water temperature under such conditions drops below the minima reported above (Storey and Gudger, 1936; Storey, 1937; Springer and Woodburn, 1960; Rinckey and Saloman, 1964; Stone and Azarovits, 1968).

SALINITY

We have mapped typical salinities in estuarine areas (Figs. 35, 36, and 37). Hypersalinity in Florida Bay from drought and diversion of normal freshwater flow is a serious recurring problem. Tabb (1963) observed that salinity greater than 45‰ harmed the biota. The Florida Bay data (Fig. 35-1) are from Finucane and Dragovich (1959)—circles; Dragovich, Finucane and May (1961)—squares; and Goodell and Gorsline (1961)—triangles. The Whitewater Bay data (Fig. 35-2a, 2b) from Tabb, Dubrow, and Manning (1962) demonstrate the variations due to excessive rainfall and drought. From Ten Thousand Islands to Charlotte Harbor (Fig. 35-3) hypersalinity has occurred south of Naples (Finucane and Dragovich, 1959)—circles, and essentially fresh water was found near the mouth of the Caloosahatchee River during periodic releases of fresh water from Lake Okeechobee (Gunter and Hall, 1965)—triangles. The Charlotte Harbor data are from Dragovich, Kelly and Finucane (1966). From Lemon Bay to Sarasota Bay (Fig. 35-4) salinity remains high except after heavy rain because of the absence of rivers (Finucane and Dragovich, 1959). The Tampa Bay salinities (Fig. 35-5) are based on observations from 1954 to 1965 (Carl H. Saloman—personal communication). The Homosassa Bay and other data (Fig. 35-6) were collected by personnel at the Chassahowitzka National Wildlife Refuge (U.S. Fish and Wildlife Service, 1967).

Figure 36-1 of Crystal Bay is based on Dawson (1955b). This portion of the coast is unique in its low salinity several miles offshore despite

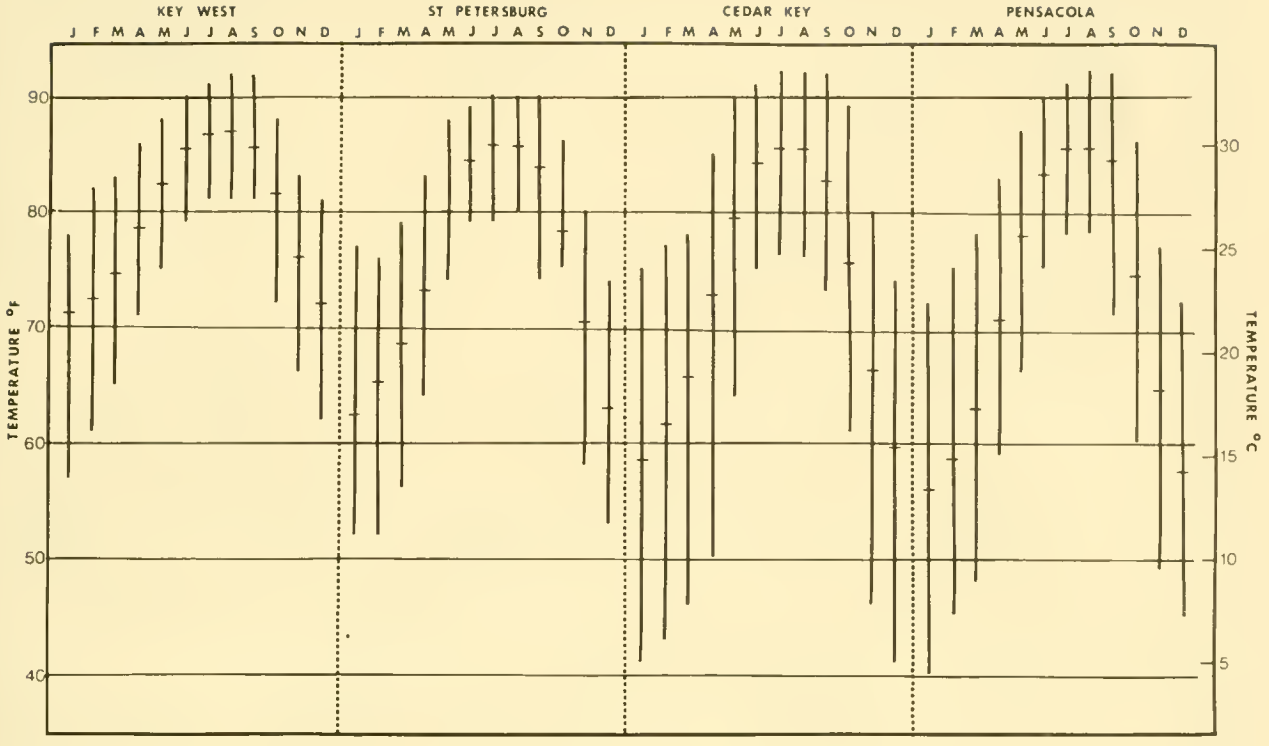

Figure 34.—Monthly range and mean of water temperature at four locations (data from U.S. Coast and Geodetic Survey, 1965).

the absence of large rivers, possibly because of the existence of offshore springs. The Waccasassa Bay and Fenholloway River data (Figs. 36-2 and 36-4) are from Saville (1966). The Cedar Keys data (Fig. 36-3) are from 21 years of observations by the U.S. Coast and Geodetic Survey (1965).

Ochlockonee Bay and Alligator Harbor (Fig. 37-1) were studied by Ichiye et al. (1961). We based the salinities in Apalachicola Bay (Fig. 37-2) on the study of Gorsline (1963); they are consistent with results obtained by Dawson (1955a). The St. Andrew Bay data (Fig. 37-3) are from Futch and Martina (1967). Choctawhatchee Bay is typically stratified, hence we depicted surface salinities (Fig. 37-4a) separate from bottom salinities (Fig. 37-4b) as done by Ritchie (1961). The data for Pensacola Bay and vicinity (Fig. 37-5) are from two sources—U.S. Coast and Geodetic Survey (1965) for the 38-year mean and range at the city of Pensacola, and Nelson R. Cooley for the remainder from unpublished ecological studies.

Over 100 additional papers include salinity data that were recorded in connection with biological and geological studies but add little to the characterization of estuaries attempted here, and hence are not cited.

OYSTERS AND CLAMS

The southernmost oyster reef in the United States is in Oyster Bay, which is immediately north of Cape Sable between Whitewater Bay and the mouth of the Shark River (Tabb, Dubrow, and Manning, 1962). From that reef north, *Crassostrea virginica* grows nearly everywhere—on pilings, red mangrove roots, sea walls and as reefs ranging in shape and size from small mounds to long ridges extending several miles. Commercial oystering is practiced where salinities range from about 10 to 30‰. Where mean salinity is about 25‰, growth and maturation are rapid, but predation, parasitism, and disease are high; growers plant cultch or medium-sized seed oysters and try to harvest before excessive damages occur (Butler, 1954). Where salinity

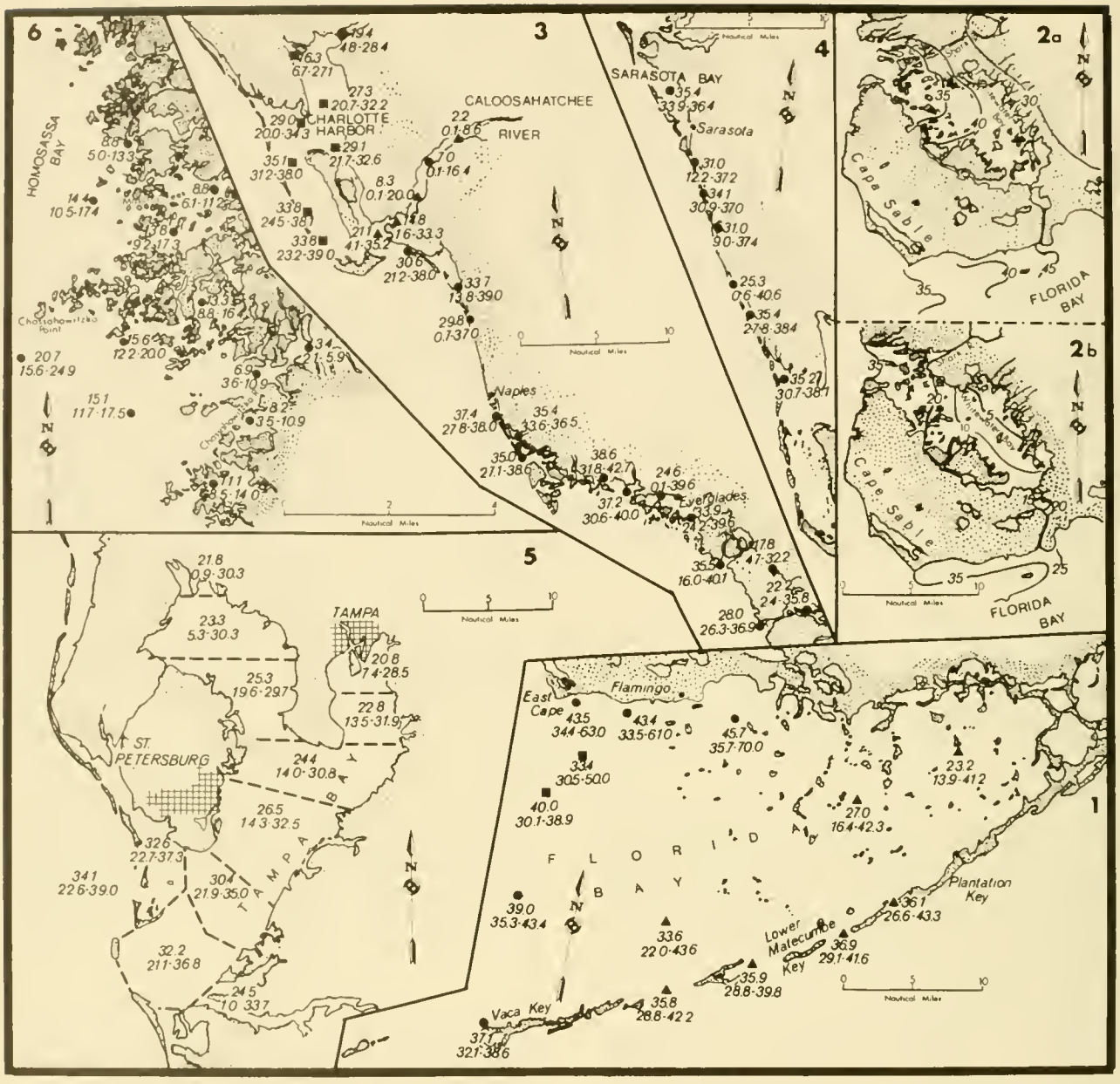

Figure 35.—Mean salinity (single figure) and salinity range (two figures) in estuaries from Florida Bay to Homosassa Bay. See text for sources of data.

remains generally below 15‰, yet well above 5‰, as in most of Apalachicola Bay, pests are effectively excluded (Galtsoff, 1964—p. 406).

Apalachicola Bay has 83 percent of the natural public beds on the coast and is foremost in commercial production. Swift (1898) found that oystering had been practiced since 1836. His survey produced a map of natural beds and the relative abundance of oysters on the beds, which is still in use with modifications. Subsequently Danglade (1917), Ingle (1951), Ingle and Dawson (1953b), and Menzel, Hulings, and Hathaway (1966) conducted biological studies there, and Colberg and Windham (1966) described the economics of the oyster industry. The Cedar Keys region contains several miles of oyster bars that are exposed at low tide, but the oysters are crowded and stunted; however, at one time shellstock and shucked oysters were shipped to all of the southeast (Ingle and Dawson, 1953a).

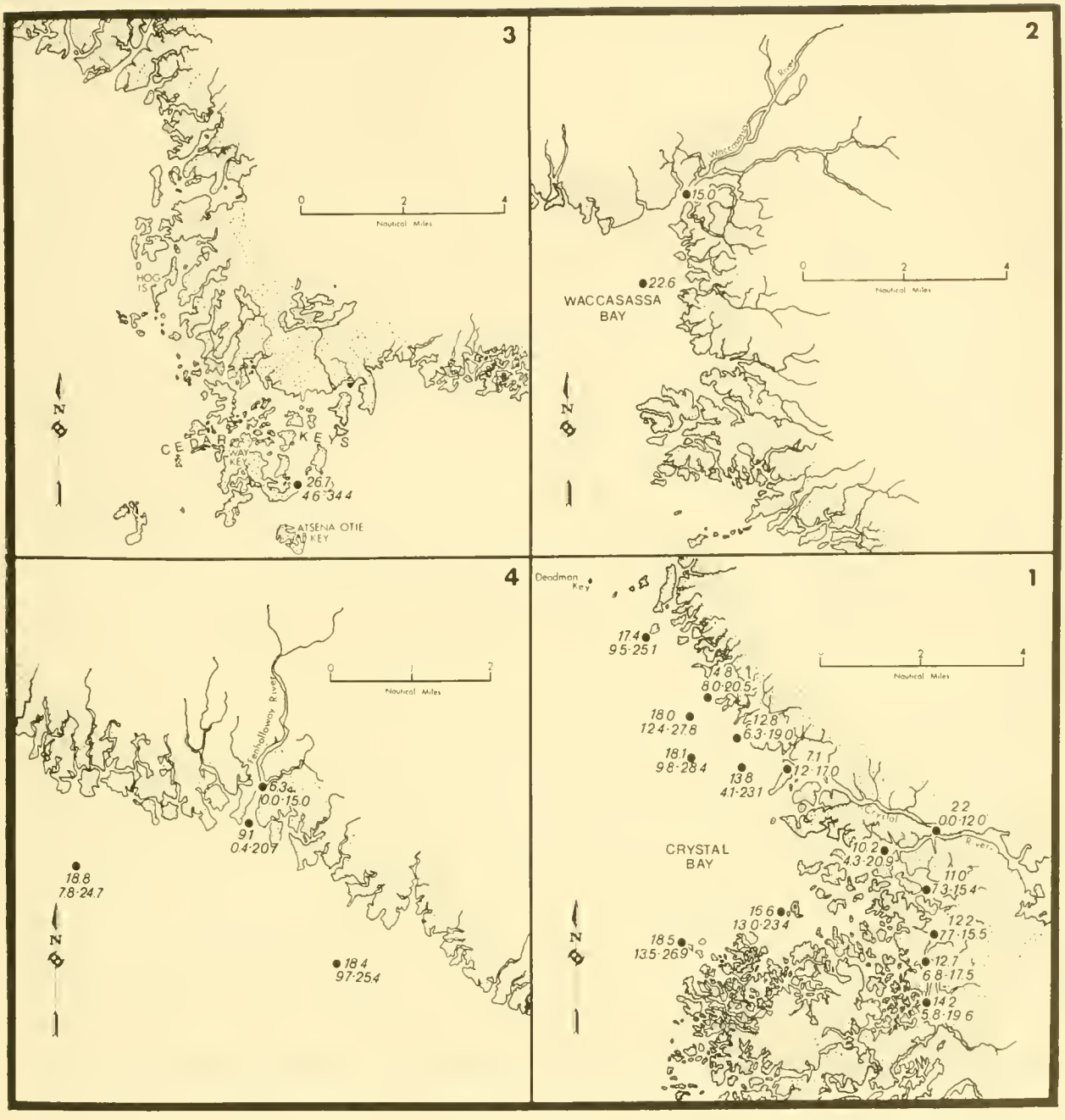

Figure 36.—Mean salinity (single figure) and salinity range (two figures) in estuaries from Crystal Bay to Cedar Keys. See text for sources of data.

Elsewhere, oyster growers lease large acreages in Charlotte Harbor, Old Tampa Bay and Choctawatchee Bay. Biologists have compiled pertinent ecological data on Charlotte Harbor (Woodburn, 1962), Old Tampa Bay (Dawson, 1953; Finucane and Campbell, 1968), St. Andrews Bay and vicinity (Futch and Martina, 1967), and Choctawhatchee Bay (Ritchie, 1961). The growth of oysters in Apalachicola Bay is rapid. They attain a length of 3 to 4 inches (7.6 to 10.2 cm) in six months whereas the same growth in Chesapeake Bay and waters north of it requires three to four years (Ingle and Dawson, 1952). Mortality results from predation by

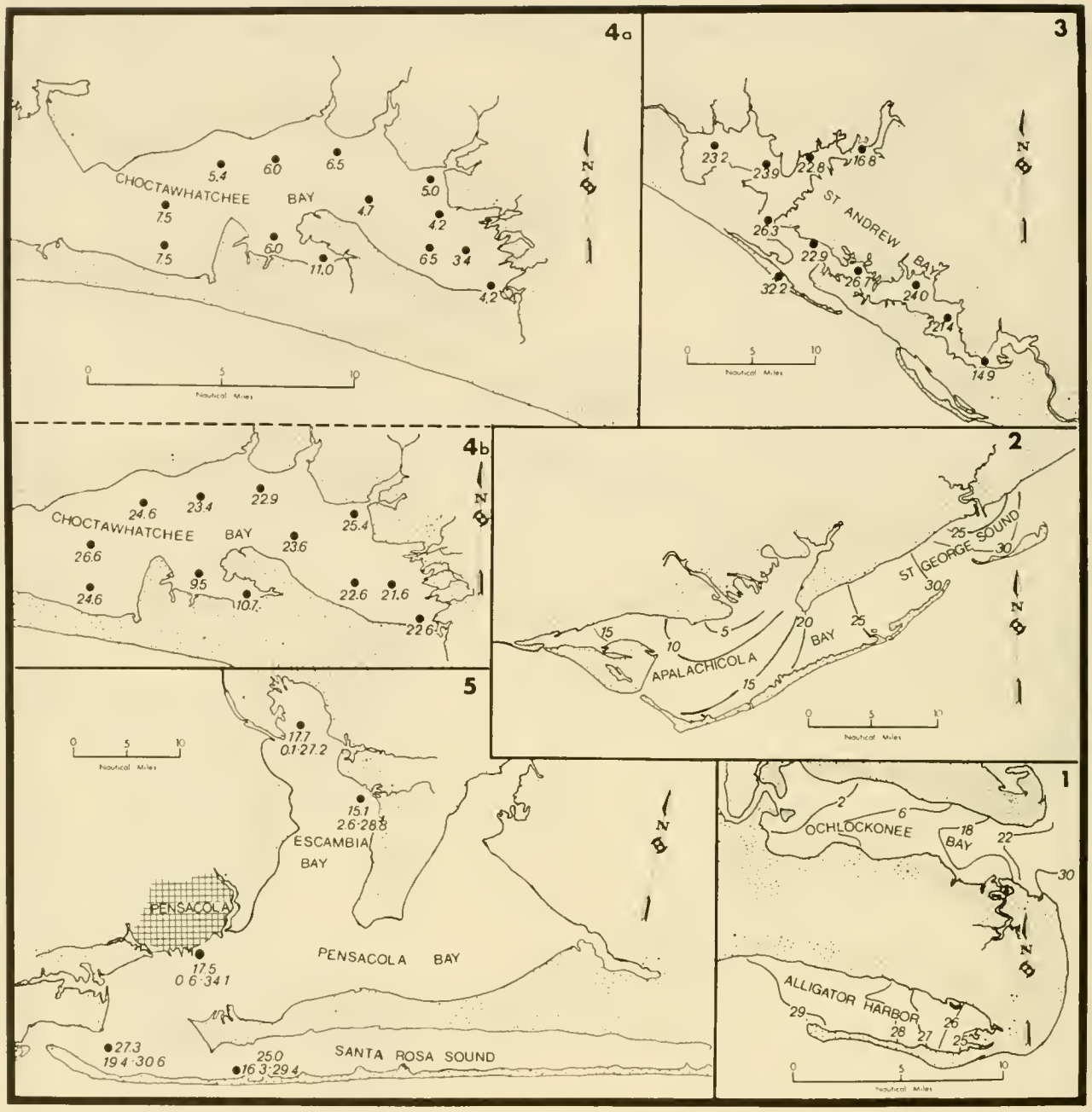

Figure 37.—Mean salinity (single figure) and salinity range (two figures) in estuaries from Ochlockonee Bay to Pensacola Bay. See text for sources of data.

the southern oyster drill, *Thais haemastoma*, and several other invertebrates (Chapman, 1955; Menzel and Nichy, 1958; Nichy and Menzel, 1960). Infestation by the fungus *Dermocystidium marinum* also causes mortality under certain conditions (Dawson, 1955c). The prospective oyster grower can find answers to many questions in a State of Florida manual on oyster culture that describes the oyster's life history, its natural enemies and diseases, legal aspects of leasing bay bottoms, and estimated costs of the business (Ingle and Whitfield, 1962).

The Oyster Division of the Florida Department of Natural Resources provided us with maps of oyster beds in Apalachicola Bay and St. George Sound, legal descriptions of oyster

leases, and professional assistance with the task of compiling the data of Table 4. We interviewed oystermen to obtain estimates of the location and acreage of public beds in estuaries other than Apalachicola Bay. The Florida State Board of Health maintains a constantly updated book of maps showing the results of surveys of the abundance of coliform bacteria, which are the basis for approval, conditional approval or disapproval of areas for oyster harvesting (Fla. State Board of Health, 1966b). The maps were used for our compilation of acreage that is "Closed to shellfishing." In addition, we mapped all commercial or potentially commercial oyster beds and all areas leased for oyster cultivation from the State (Figs. 8-12, 15, 17-23).

Commercial production of the clam, *Mercenaria campechiensis*, began in about 1880 and increased in 1900 when vast beds near the Ten Thousand Islands were discovered (Schroeder, 1924). Commercial production reached a peak in 1932 and remained high until it declined sharply from 1945 to 1950 because of overfishing (Tiller, Glude, and Stringer, 1952). Intensive harvesting of beds in Charlotte County in 1962-1964 provided a short-lived spurt in production (Futch and Torpey, 1966). Clams are widespread on this coast in salinities of 20-35‰ and from mean high tide to over 50 ft (15 m); yet, we are unaware of commercial concentrations anywhere. Another species, the sunray venus clam (*Macrocallista nimbosa*), however, has been harvested commercially since 1967 near St. Joseph Bay (Stokes, Joyce, and Ingle, 1968).

Research on Florida west coast clams was active over the past 10 years. Menzel (1962) described growth, and Saloman and Taylor (1969) correlated growth with age. Surprisingly few surveys of distribution and abundance are available. Woodburn (1962) surveyed the waters of Charlotte County, Sims and Stokes (1967) Tampa Bay, and recently the Florida Department of Natural Resources (1970) reported on quantitative sampling in the Tampa Bay and Cedar Keys areas using a hydraulic clam dredge of the conveyor type. Hybrids from crosses of northern and southern quahogs have been successfully reared and their average growth was superior to native stock (Menzel, 1962; Woodburn, 1963; Menzel, 1966). Despite the presence of vast areas that are well suited to clam farming, only Woodburn (1961) and Menzel and Sims (1962) have reported farming experiments. Predation on juveniles by the blue crab, *Callinectes sapidus*, makes it necessary to fence off experimental plots.

Table 4.--Area of oyster beds (public and private) and area closed to shellfishing by State and County governments in estuarine study areas, west coast of Florida

Study area	Public		Private[1]	Closed to shellfishing
	Natural	Planted		
	Acres[2]	Acres[2]	Acres[2]	Acres[2]
Florida Bay	0	0	0	0
Lake Ingraham	0	0	0	0
Whitewater Bay	0	0	0	0
Cape Sable to Lostmans River	0	0	0	0
Lostmans River to Mormon Key	0	0	0	0
Mormon Key to Caxambas Pass	0	0	0	0
Caxambas Pass to Gordon River	0	0	19	0
Doctors Pass to Estero Pass	0	0	0	0
Caloosahatchee River	0	0	0	22,926
Pine Island Sound	200	0	72	1,834
Charlotte Harbor	200	0	1,434	0
Lemon Bay	5	0	0	530
Sarasota Bay System	110	0	2	18,533
Tampa Bay	250	0	7	0
Hillsborough Bay	0	0	0	28,900
Old Tampa Bay	10	3	1,097	8,202
Boca Ciega Bay	0	0	0	29,648
St. Joseph Sound	0	0	0	0
Baileys Bluff to Saddle Key	0	0	0	0
Saddle Key to S. Mangrove Pt.	30	0	0	16,938
Waccasassa Bay	80	0	28	3,893
Suwannee Sound	110	0	58	7,786
Suwannee Sound to Deadman Bay	0	0	0	0
Deadman Bay	0	0	0	0
Deadman Bay to St. Marks River	0	0	0	0
Apalachee Bay	68	8	47	970
St. George Sound	3,365	31	0	0
Apalachicola Bay	3,600	290	762	12,160
St. Joseph Bay	0	0	0	0
St. Andrew Sound	0	0	0	0
East Bay (St. Andrew)	40	4	70	0
St. Andrew Bay	0	0	0	0
West Bay	16	1	0	0
North Bay	4	11	0	0
Choctawhatchee Bay	0	3	1,391	10,208
Santa Rosa Sound	0	0	0	0
East Bay (Pensacola)	80	0	138	8,170
Escambia Bay	200	0	0	0
Pensacola Bay	0	0	0	0
Perdido Bay	0	0	0	0
Total	8,368	351	5,125	170,698

[1] Leased from State.

[2] Hectares = acres x 0.4047.

ARTIFICIAL FISHING REEFS

Of 20 artificial fishing reefs constructed in Florida west coast waters up to 1966, only three were in estuaries (Woodburn, 1966). State permits have been issued for others, but we know of only one more built in a west coast estuary.

Location, depth, construction materials, sponsor, and date of construction of reefs are listed below.

1. Sarasota Bay, 1 nautical mile (1.9 km) west of Bolees Creek; depth 9 ft (2.7 m); tire-concrete units (Woodburn, 1966); sponsored by Manatee County, 1964-65.

2. Manatee River, 100 yards (91 m) south of Snead Point; depth 15 ft (4.6 m); tire-concrete units (Woodburn, 1966); sponsored by Manatee County, 1964.

3. Tampa Bay, 2.8 nautical miles (5.2 km) east of downtown St. Petersburg; depth 17 ft (5.2 m).

4. Pensacola Bay, off Escambia County end of old bay bridge that is converted to a fishing pier by removal of center span; 18 ft (5.5 m); metal junk; sponsored by Fiesta of Five Flags Association.

Two comprehensive guides to the design, construction and use of artificial reefs are those of Carlisle, Turner, and Ebert (1964) and Unger (1966). Diver-scientists documented the attraction of bait fish and jacks to artificial structures in shallow coastal waters off Panama City, Fla. The structure that attracted most fish was shaped like a pup tent—geometrically, a right prism—and was suspended at mid-depth (Klima and Wickham, 1971).

POPULATION

The 1970 census showed that Americans continued to move toward warmer climates and toward the shore. The trend is illustrated vividly by total population of the counties bordering estuaries of the Florida Gulf coast.

1930	614,616
1940	847,896
1950	1,338,359
1960	2,448,210
1970	3,320,226

The year 1930 is listed first, above, because the U.S. census of 1930 was the first to include all of the counties under consideration.

We have compiled the available population data by county, city, and estuarine study area (Table 5). Note that Dade County is included because it borders Florida Bay.

Figure 38 illustrates the distribution of population in 1960. Population density was greatest in the Tampa Bay area and next greatest in the Pensacola Bay area, a pattern maintained by results of the 1970 census. Pinellas County gained far more residents than any other west coast county making it the most populous county on the Gulf coast of Florida for the first time.

Figure 38.—The distribution of population on the west coast of Florida, 1960 (after Raisz, 1964).

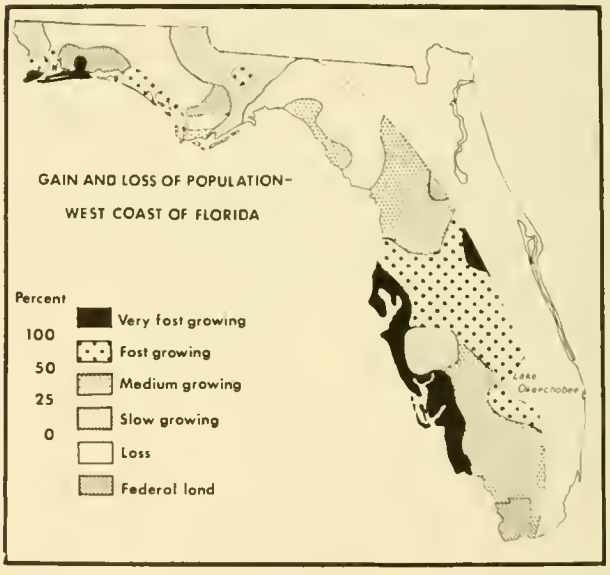

Figure 39.—The gain and loss of population on the west coast of Florida from 1950 to 1960 (after Raisz, 1964).

Growth was most rapid from the vicinity of Tampa Bay southward (Fig. 39). The pattern of growth remained the same from 1960 to 1970 except that growth slowed somewhat in the coastal communities of the western panhandle.

Table 5.--Human population of counties, estuarine study areas and cities that border estuarine study areas, west coast of Florida[1/]

County, estuarine study area and city[2/]	1960 Population	1970 Population	Land area Sq.mi.[3/]	1970 Population density Population per sq.mi.
Dade County.....	935,047	1,267,792	2,054	617
Monroe County.....	47,921	52,586	994	53
Florida Bay:				
Marathon.....	[4/]950	---	---	---
Islamorada.....	[4/]700	---	---	---
Tavernier.....	[4/]800	---	---	---
Key Largo.....	[4/]900	---	---	---
Total.....	3,350	---	---	---
Collier County.....	15,753	38,040	2,032	19
Mormon Key to Caxambas Pass:				
Chokoloskee.....	[4/]155	---	---	---
Everglades.....	[4/]552	---	---	---
Goodland.....	[4/]100	---	---	---
Total.....	807	---	---	---
Caxambas Pass to Gordon River:				
Marco.....	[4/]250	---	---	---
Naples.....	4,655	---	---	---
Total.....	4,905	---	---	---
Lee County.....	54,539	105,216	786	134
Doctors Pass to Estero Pass:				
Bonita Springs..	[4/]356	---	---	---
Estero.....	[4/]300	---	---	---
Fort Myers Beach	2,463	---	---	---
Total.....	3,119	---	---	---
Caloosahatchee River:				
Cape Coral.....	---	---	---	---
Fort Myers.....	22,523	---	---	---
Tice.....	4,377	---	---	---
Total.....	26,900			
Pine Island Sound:				
Sanibel.....	[4/]250	---	---	---
St. James City..	[4/]130	---	---	---
Captiva.....	[4/]200	---	---	---
Total.....	580	---	---	---
Charlotte County....	12,594	27,559	705	39
Charlotte Harbor:				
Bokeelia (L)....	[4/]150	---	---	---
Boca Grande (L).	[4/]400	---	---	---
Punta Gorda.....	3,157	---	---	---
Solana.....	[4/]309	---	---	---
Cleveland.....	[4/]200	---	---	---
Port Charlotte..	3,197	---	---	---
Charlotte Harbor	[4/]500	---	---	---
Placida.....	[4/]150	---	---	---
Total.....	9,063	---	---	---
Lemon Bay:				
Englewood.....	1,043	---	---	---
Englewood (S)...	1,834	---	---	---
Total.....	2,877	---	---	---

See footnotes at end of table.

County, estuarine study area and city[2/]	1960 Population	1970 Population	Land area Sq.mi.[3/]	1970 Population density Population per sq.mi.
Sarasota County.....	76,895	120,413	529	228
Sarasota Bay System:				
Venice.....	3,444	---	---	---
Nokomis.....	[4/]2,253	---	---	---
Laurel.....	[4/]1,000	---	---	---
Osprey.....	[4/]800	---	---	---
Sarasota.....	34,083	---	---	---
Longboat Key....	469	---	---	---
Total.....	42,049	---	---	---
Manatee County.....	69,168	97,115	688	141
Sarasota Bay System:				
Tallevast.....	[4/]500	---	---	---
Whitfield Estates.....	[4/]600	---	---	---
Oneco.....	1,530	---	---	---
Bayshore Gardens	2,297	---	---	---
Trailer Estates.	1,562	---	---	---
Longboat Key....	[4/]531	---	---	---
Cortez.....	[4/]900	---	---	---
Bradenton Beach.	1,124	---	---	---
Holmes Beach....	1,143	---	---	---
Anna Maria.....	690	---	---	---
Total.....	10,877	---	---	---
Hillsborough County.	397,788	490,265	1,040	471
Hillsborough Bay:				
Gibsonton.....	1,673	---	---	---
Tampa.....	274,970	---	---	---
Temple Terrace..	3,812	---	---	---
Total.....	280,455	---	---	---
Pinellas County.....	374,665	522,329	264	1,979
Tampa Bay:				
Samoset (M).....	[4/]4,824	---	---	---
Bradenton (M)...	19,380	---	---	---
Ellenton (M)....	[4/]950	---	---	---
Palmetto (M)....	5,556	---	---	---
Ruskin (H).....	1,894	---	---	---
St. Petersburg..	181,298	---	---	---
Total.....	213,902	---	---	---
Old Tampa Bay:				
Port Tampa (H)..	1,764	---	---	---
Safety Harbor...	1,787	---	---	---
Oldsmar.....	878	---	---	---
Total.....	4,429	---	---	---
Boca Ciega Bay:				
St. Petersburg Beach.....	6,268	---	---	---
South Pasadena..	651	---	---	---
Gulfport.....	9,730	---	---	---
Treasure Island.	3,506	---	---	---
Madeira Beach...	3,943	---	---	---
Redington Shores	917	---	---	---
N. Redington Beach.....	346	---	---	---
Total.....	25,361	---	---	---

See footnotes at end of table.

Table 5.--(Continued)

County, estuarine study area and city[2/]	1960 Population	1970 Population	Land area Sq.mi.[3/]	1970 Population density Population per sq.mi.
St. Joseph Sound:				
Indian Rocks Beach South Shore	296	---	---	---
Indian Rocks Beach	1,940	---	---	---
Belleair Shores	61	---	---	---
Belleair Beach	563	---	---	---
Belleair	2,456	---	---	---
Clearwater	34,653	---	---	---
Dunedin	[4/]8,444	---	---	---
Crystal Beach	[4/]1,000	---	---	---
Tarpon Springs	6,768	---	---	---
Total	56,181	---	---	---
Pasco County	36,785	75,955	751	101
Baileys Bluff to Saddle Key:				
Elfers	[4/]450	---	---	---
New Port Richey	3,520	---	---	---
Port Richey	[4/]1,931	---	---	---
Hudson	[4/]800	---	---	---
Aripeka	[4/]250	---	---	---
Total	6,951	---	---	---
Hernando County	11,205	17,004	488	35
Citrus County	9,268	19,196	570	34
Saddle Key to S. Mangrove Pt.:				
Homosassa	[4/]700	---	---	---
Crystal River	1,423	---	---	---
Total	2,123	---	---	---
Levy County	10,364	12,756	1,103	12
Saddle Key to S. Mangrove Pt.:				
Inglis	250	---	---	---
Yankeetown	425	---	---	---
Total	675	---	---	---
Waccasassa Bay:				
Gulf Hammock	[4/]350	---	---	---
Cedar Key	668	---	---	---
Total	1,018	---	---	---
Dixie County	4,479	5,480	688	8
Suwannee Sound:				
Suwannee	[4/]200	---	---	---
Total	200	---	---	---
Suwannee Sound to Deadman Bay:				
Horseshoe Beach	1,857	---	---	---
Total	1,857	---	---	---
Taylor County	13,168	13,400	1,032	13
Deadman Bay:				
Steinhatchee	[4/]325	---	---	---
Total	325	---	---	---
Deadman Bay to St. Marks River:				
Perry	8,030	---	---	---
Total	8,030	---	---	---
Jefferson County	9,543	8,778	598	15
Wakulla County	5,257	6,308	614	10
Apalachee Bay:				
Newport	[4/]150	---	---	---
St. Marks	[4/]350	---	---	---
Panacea	[4/]600	---	---	---
Total	1,100	---	---	---
Franklin County	6,576	7,065	544	13
St. George Sound:				
Carrabelle	1,146	---	---	---
Total	1,146	---	---	---
Apalachicola Bay:				
East Point	[4/]700	---	---	---
Apalachicola	3,099	---	---	---
Total	3,799	---	---	---
Gulf County	9,937	10,096	557	18
St. Joseph Bay:				
Port St. Joe	4,217	---	---	---
Total	4,217	---	---	---
Bay County	67,131	75,283	753	100
East Bay (St. Andrew):				
Overstreet	[4/]100	---	---	---
Parker	2,669	---	---	---
Calloway	950	---	---	---
Total	3,719	---	---	---
St. Andrew Bay:				
Springfield	4,628	---	---	---
Cedar Grove	676	---	---	---
Panama City	33,275	---	---	---
Bayview	422	---	---	---
Panama City Beach	36	---	---	---
Total	39,037	---	---	---
North Bay:				
Lynn Haven	[3/]078	---	---	---
Southport	[4/]900	---	---	---
Total	3,978	---	---	---
West Bay:				
West Bay	[4/]600	---	---	---
Total	600	---	---	---
Walton County	15,576	16,087	1,046	15

See footnotes at end of table.

Table 5.--(Continued)

County, estuarine study area and city[2]	1960 Population	1970 Population	Land area Sq.mi.[3]	1970 Population density Population per sq.mi.
Okaloosa County.....	61,175	88,187	944	93
Choctawhatchee Bay:				
Point Washington (W).....	[4]90	---	---	---
Santa Rosa Beach (W).....	[4]300	---	---	---
Freeport (W)....	---	---	---	---
Portland (W)....	[4]200	---	---	---
Destin.....	[4]900	---	---	---
Niceville.....	4,517	---	---	---
Valparaiso.....	5,975	---	---	---
Shalimar.....	754	---	---	---
Cinco Bayou.....	643	---	---	---
Total.....	13,379	---	---	---
Santa Rosa County...	29,547	37,741	1,024	37
Santa Rosa Sound:				
Fort Walton Beach.....	12,147	---	---	---
Mary Esther (O).	[4]780	---	---	---
Florosa (O).....	[4]150	---	---	---
Total.....	13,077	---	---	---
Escambia Bay:				
Bagdad.....	[4]900	---	---	---
Milton.....	4,108	---	---	---
Total.....	5,008	---	---	---
Escambia County.....	173,829	205,334	657	313
Pensacola Bay:				
Gulf Breeze.....	---	---	---	---
Pensacola.....	56,752	---	---	---
Brownsville.....	38,417	---	---	---
Warrington.....	16,752	---	---	---
Total	111,921	---	---	---
Perdido Bay:				
Myrtle Grove....	[4]3,000	---	---	---
Total.....	3,000	---	---	---
Total, coastal counties.....	2,448,210	3,320,226	20,461	162
Total, cities and towns on estuaries.....	910,015			

[1] Source: Florida Development Commission (1968) and the U. S. census of 1970, except as noted below. Dashes (---) indicate data not available or not applicable.

[2] (H)--in Hillsborough County; (L)--in Lee County; (M)--in Manatee County; (O)--in Okaloosa County; (S)--in Sarasota County; (W)--in Walton County.

[3] Sq. kilometers = sq. mi. x 2.59.

[4] From Rand McNally International Atlas, Rand McNally & Co., New York. 1964.

ECONOMIC DEVELOPMENT

The purpose of this section is to identify the principal socio-economic activities in and around Florida's west coast estuaries and to estimate their relative economic importance. Manufacturing, tourism, construction, sport fishing, agriculture, phosphate mining and commercial fishing are the major activities. We assigned the values that appear below from information in sources that are readily available. The figures are for 1963 unless otherwise noted because that is the last year for which compilations by county are available in most categories.

Manufacturing (value added)	$550	million
Tourism (amount spent by tourists)	500	"
Construction (contracts)	300	"
Sport fishing (amount spent by fishermen)	150	"
Agriculture (value to farmers)	130	"
Phosphate mining (value at mines)	100	"
Commercial fishing (value to fishermen)	20	"

Sources of the data are: manufacturing—Forstall (1970); tourism—Florida Department of Commerce (1970); construction—Raisz (1964) extrapolated to 1963 on the basis of growths of population and tourism; sport fishing—Ellis, Rosen, and Moffet (1958) extrapolated to 1963; agriculture—University of Florida (1970); phosphate mining—Raisz (1964) extrapolated to 1963.

The distribution of major industries reflects the availability of resources, supplies of labor, transportation facilities and local demand for products (Fig. 40). Food processing is the largest single industry. It includes canning plants for citrus concentrates and vegetables, dairy and ice cream plants, bakeries, breweries, and meat packing plants. Large paper mills are located at Foley-Perry, Port St. Joe, Panama City, and Pensacola where the necessary large supplies of timber and fresh water are available. The chemical plants of the St. Andrew Bay and Escambia Bay area—also dependent on ample fresh water—produce acrylic fibers, fertilizer, ammonia, nitric acid, and paints.

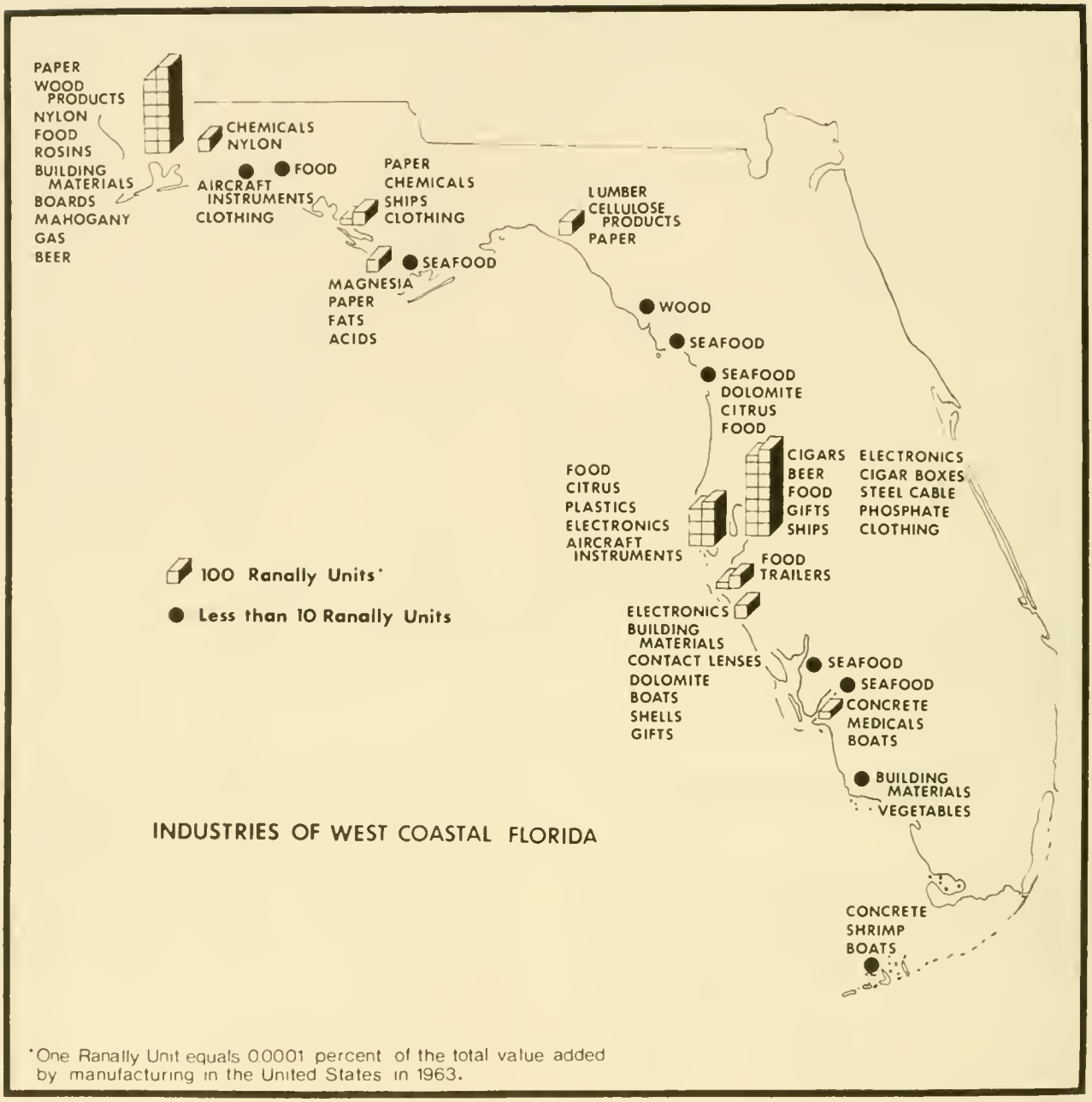

Figure 40.—The major products of industry (modified from Raisz, 1964; Forstall, 1970).

Although citrus is the most valuable crop of Florida, vegetables and cattle are important products as well. The Caloosahatchee River, Charlotte Harbor, and Tampa Bay areas, especially the latter, support groves. Vegetables are grown principally in these three areas and near the shores of St. Andrew Bay and greater Pensacola Bay.

Phosphate mines are located just east and southeast of Tampa Bay. Runoff from mined areas (and processing plants) drains to the Peace, Myakka, and Alafia Rivers.

The true value of commercial fishing exceeds the money paid the fishermen (ex-vessel value) by at least two to three times because of the value added by processing, distributing, and

Table 6.--Commercial fisheries shore plant installati[illegible], Fl rida [illegible] [illegible]ast, 1[illegible][1]

County	Number of firms			Employees at peak of season	Man years	Value of processed products	Value [illegible]f landings
	Wholesale only	Wholesale and processing	Total				
Bay.....	9	10	19	131	11[illegible]	$27[illegible],6[illegible]	[2] $1,471,208
Charlotte.....	4	3	7	65	58	16[illegible],9[illegible]	[illegible]8,2[illegible]
Collier.....	12	0	12	54	3[illegible]	[illegible]	9[illegible],322
Citrus.....	2	1	3	19	1[illegible]	[3] ---	[illegible] 322,913
Dixie.....	11	3	14	85	74	495,[illegible]	[4] 232,89[illegible]
Escambia.....	7	7	14	74	7[illegible]	21[illegible],[illegible]	923,668
Franklin.....	11	55	66	693	560	3,[illegible]21,1[illegible]	[illegible],119,51[illegible]
Gulf.....	2	3	5	42	32	5[illegible],[illegible]	266,442
Hillsborough...	21	12	33	1,329	1,299	46,588,[illegible]	1,98[illegible],35[illegible]
Lee.....	22	4	26	166	131	360,30[illegible]	[illegible],5[illegible]8,80[illegible]
Leon.....	0	1	1	40	33	[5] ---	[6] ---
Levy.....	4	10	14	46	42	238,000	266,349
Manatee.....	8	0	8	31	25	[illegible] ---	[illegible]94,769
Monroe.....	36	1	37	193	148	[7] ---	[illegible],655,34[illegible]
Okaloosa.....	5	3	8	27	26	43,300	4[illegible]3,800
Pasco.....	1	1	2	4	3	[8] ---	[illegible] 4[illegible],627
Pinellas.....	23	6	29	196	157	1,317,3[illegible]	1,324,489
Polk.....	0	1	1	56	48	[8] ---	[6] ---
Santa Rosa.....	9	2	11	12	12	[10] ---	42,491
Sarasota.....	11	0	11	23	22	---	27[illegible],[illegible]97
Taylor.....	3	1	4	44	16	[5] ---	[11] ---
Wakulla.....	2	13	15	216	190	1,152,6[illegible]	175,[illegible]22
Walton.....	2	1	3	3	3	[12] ---	3[illegible],[illegible]19
Total.....	205	138	343	3,549	3,114	53,924,[illegible]	23,117,31[illegible]

[1] Source: U. S. Department of the Interior, Fish and Wildlife Service, Bureau [illegible] Fisheries, Branch of Fishery Statistics -- Region 2, Gulf and South Atlantic Regi[illegible].
[2] Combined with Washington County.
[3] Combined with Levy County.
[4] Combined with Taylor County.
[5] Combined with Wakulla County.
[6] No landings.
[7] Combined with Lee County.
[8] Combined with Hillsborough County.
[9] Combined with Hernando County.
[10] Combined with Escambia County.
[11] Combined with Dixie County.
[12] Combined with Okaloosa County.

marketing. Table 6 records the value of processed products as well as several other aspects of the industry. Tampa in Hillsborough County is by far the major processing center. An interesting and important feature of the commercial fisheries is the much greater diversity of species[4] from Tampa Bay southward (Fig. 41), a reflection of the subtropical conditions of the southwest coast. Also, the high productivity, location of processing plants and the high local demand for seafood combine to support greater landings on the southwest coast than at ports to the north (Fig. 42).

Deepwater ports are located at Boca Grande (mouth of Charlotte Harbor), Port Manatee and Tampa (Tampa Bay), Port St. Joe (St. Joseph Bay), Panama City (St. Andrew Bay), and Pensacola (Pensacola Bay). Tampa handles by far the greatest volume of shipping (U.S. Army, Corps of Engineers, 1969) and was the seventh busiest port in the United States in 1968 in tonnage handled—27,436,709 short tons (24,890,164 metric tons). The major exports were phosphate rock, superphosphate, fertilizer, and scrap iron and steel; principal imports included petroleum products, coal, sulfur, fruits, and grains.

[4] We use the word "species" in its commercial sense rather than in its biological sense. Ingle (1970) included a list of common and scientific names of species landed in Florida in his annual summary of commercial marine landings.

POLLUTION

The State has classified its waters in five categories ranging in purity from drinking water, Class I, to grossly polluted, Class V, (Florida State Board of Health, 1967b; U.S. Federal Water Pollution Control Administration, 1967; Ch. 28-5, Supp. 52, Fla. Statutes). The only coastal waters in Class V are the Fenholloway River, Eleven Mile Creek discharging to Perdido Bay, and Hillsborough Bay (including McKay Bay), although the Gulf County Canal connecting St. Joseph Bay with the Intracoastal Water-

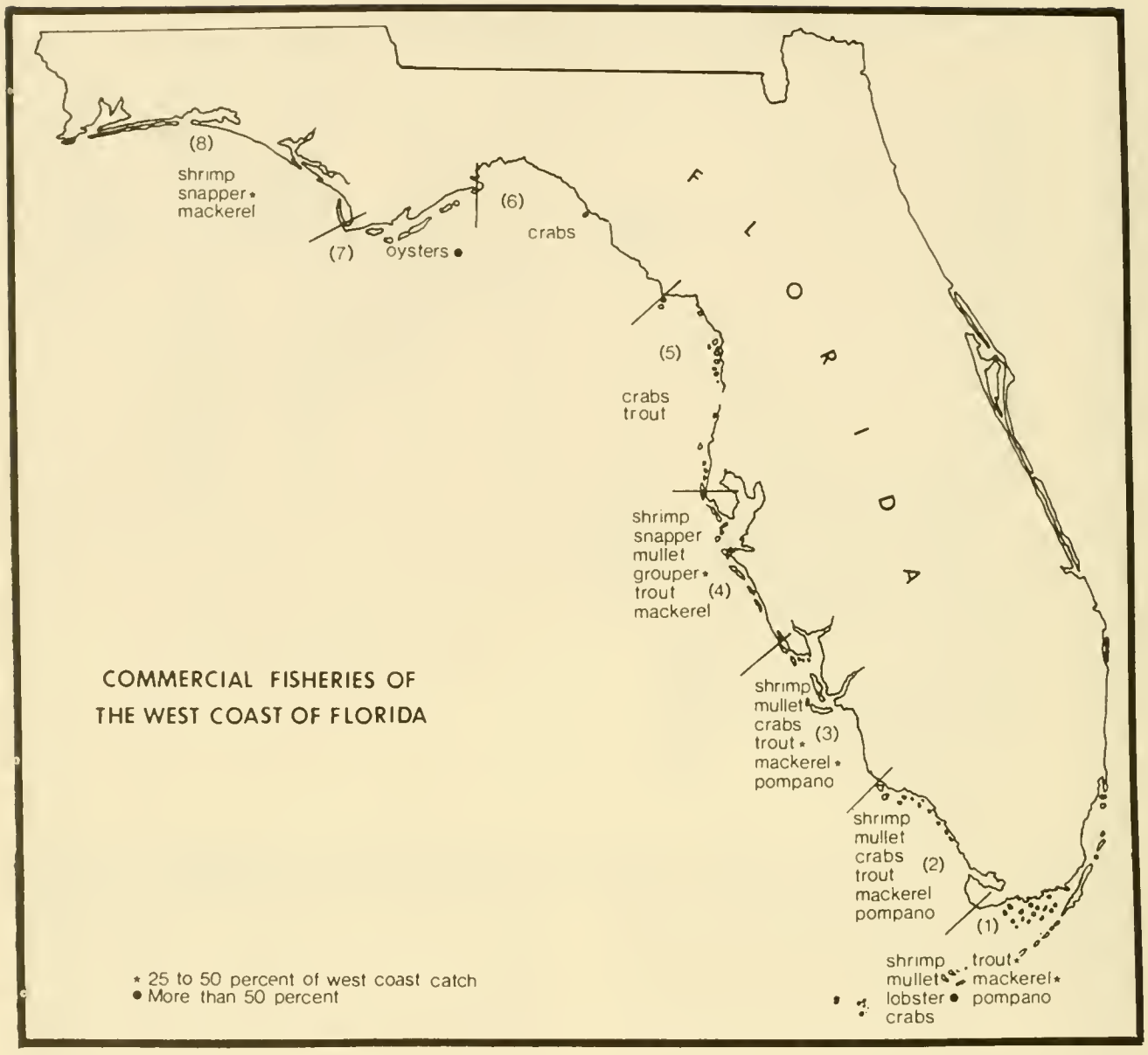

Figure 41.—The major west coast species landed in the commercial fisheries in 1967 by coastal segment. Numbers in parentheses are coastal segment numbers. Species are listed in order of value. (Data from Ingle, 1968.)

way is in Class IV, agricultural and industrial water supply. All other west coast waters are in Class III—for recreation and the propagation and management of fish and wildlife, or Class II —suitable for shellfish harvesting.

Pollution coexists generally with sizable communities and large industries. The quantity of domestic waste is greatest in Tampa Bay and vicinity whereas that of industrial waste is greatest in northern estuaries (Fig. 43). We constructed the figure by totaling the flow of pollutants in each of eight segments of the coast from data provided by State, County and Federal pollution-control agencies (Tables 7 and 8). The Florida State Board of Health (abbreviated hereafter FSBH) provided most of the data, updated to 1970, part of which has been published (FSBH, 1966b, 1967c). Supplemental data were provided by County pollution authorities and the Corps of Engineers (U.S. Army, Corps of Engineers, 1967a,b). We mapped the location of pollution sources, classified them in major or

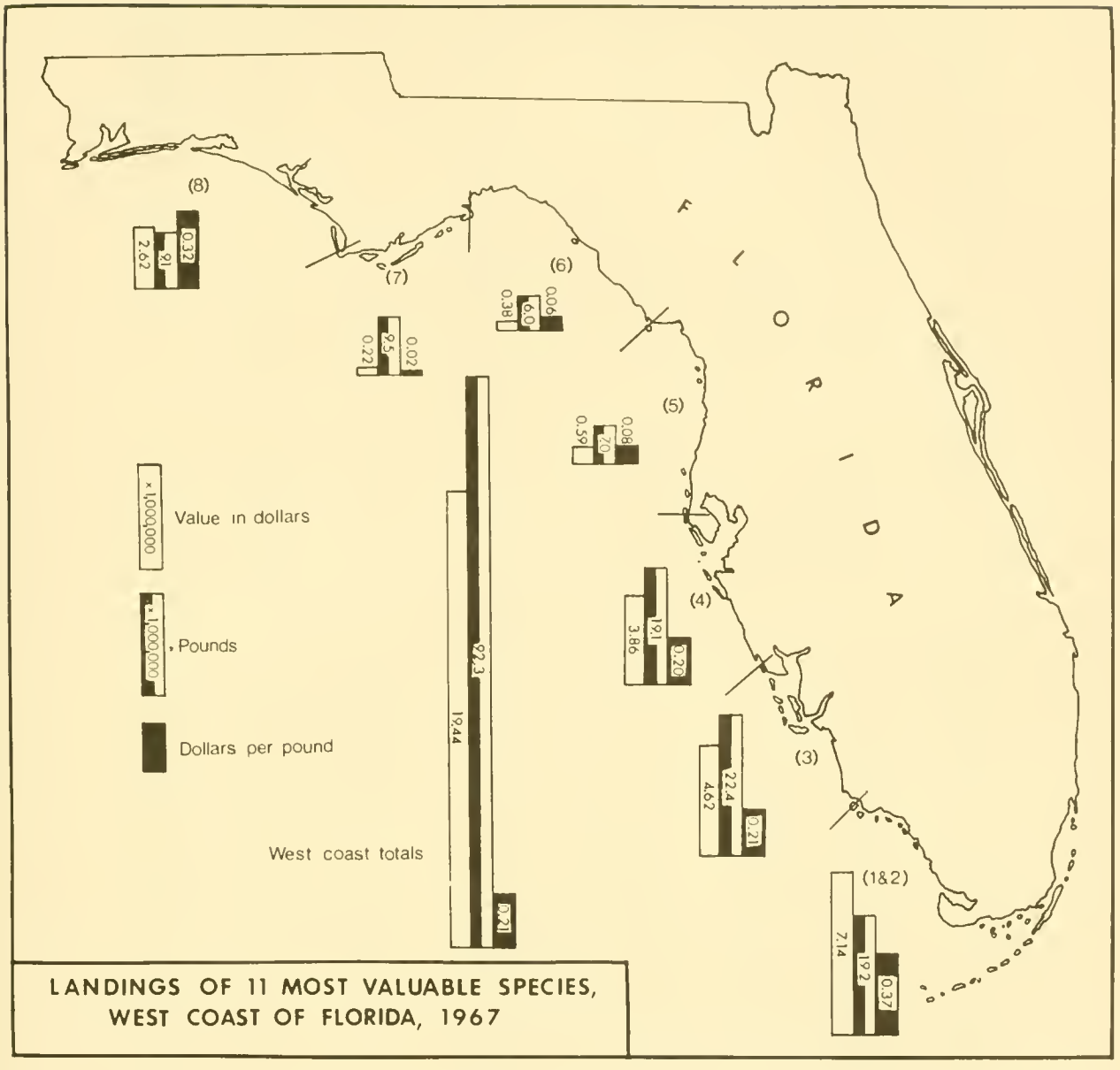

Figure 42.—Landings of the most valuable west coast species in the commercial fisheries in 1967 by coastal segment. Numbers in parentheses are coastal segment numbers. Kg = lb × 0.454. (Data from Ingle, 1968.)

minor domestic or industrial waste categories, and mapped the areas that are closed to shellfishing (Figs. 2-24). Major sources of industrial waste were considered to be those with a strength of effluent exceeding 8,000 population equivalents (see footnotes, Tables 7 and 8, for definitions); major domestic wastes were those with a flow in excess of four million gallons per day (15 million liters per day).

Figure 44 illustrates the distribution of pollution sources. Underlined place names and solid black indicate areas that are closed to shellfishing and major sources of pollution are shown by arrows with numbers keyed to Tables 7 and 8. Only estuaries that are affected by pollution are named. They total 20 of the 40 estuarine study areas listed previously. Their combined area is 31 percent of the area of all west coast estuaries (Table 1), but if Florida Bay is excluded from consideration because most of it lies in Everglades National Park, their combined area is 43 percent of the total. Ten

Table 7.--Location, source, receiving waters, discharge, treatment, B.O.D. (Biochemical Oxygan Demand), and population equivalent of domestic waste discharged to estuarine study areas, west coast of Florida, 1968[1/]

Estuarine study area and map key[2/]	Source of waste[3/]	Receiving waters	Average daily discharge or capacity[4/]	Treatment[5/]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6/]
			M.g.d.[7/]		P.p.m.	
Florida Bay:						
001.....	U.S.C.G. Station, Marathon	Florida Bay	*0.003	EA Ech	Unknown	Unknown
002.....	Cobb's Country Restaurant & Gift Shoppe	Florida Bay	0.003	EA Ech	40	6
003.....	Duck Key	Tom's Harbor to Atlantic Ocean	[8/]0.030	EA	20	29
004.....	Holiday Travel Tr. Pk.	Florida Bay	*0.040	CS Ecg	20	39
005.....	Jerry's Sunset Inn Motel & Restaurant	Florida Bay	*0.030	CS Ech	40	59
006.....	Howard Johnson Motor Lodge	Atlantic Ocean	*0.020	EA N	40	39
Total.....			0.126			
Mormon Key to Caxambas Pass:						
008.....	Everglades (city)	Barron River to Chokoloskee Bay	Unknown	Untreated	Unknown	Unknown
009.....	Remuda Ranch Est. (South)	Pond to Faka Union Bay	*0.050	CS CpEcg DopLc	Unknown	Unknown
010.....	Remuda Ranch Est. (North)	Pond to Faka Union Bay	*0.035	CS	Unknown	Unknown
011.....	Collier Seminole State Park	Canal to Addison Bay	*0.005	EA CpDopEch Lc	Unknown	Unknown
Total.....			0.090			
Caxambas Pass to Gordon River:						
012.....	Marco Beach S/D	Big Marco River	0.060	CpLcDoEcg	30	88
013.....	Old Marco Apts.	Marco River	*0.010	EA CpDcpEch Fts,	Unknown	Unknown
014.....	Kenyon Tr. Pk.	Henderson Creek	*0.009	EA Ech Cp DcpLc	Unknown	Unknown
015.....	Avalon Elementary Sch. E. Naples	Pond to ditch to Cypress Head to Naples Bay	*0.008	EA CpDopEch Lc	Unknown	Unknown
016.....	Moorhead Manor Tr. Pk.	Ditch to Halderman Creek to Naples Bay	*0.010	EA CpEchLc	Unknown	Unknown
017.....	Enchanting Acres Tr. Pk.	Halderman Creek to Naples Bay	*0.025	CS Ech	Unknown	Unknown
018.....	Royal Park Villas Apts.	Halderman Creek to Naples Bay	*0.025	CS CpDaEch	Unknown	Unknown
019.....	Naples Land & Yacht Harbor	Halderman Creek to Naples Bay	*0.025	CS EchCpDop	13	16
020.....	Riviera Colony Mob. Hm.	Halderman Creek to Naples Bay	*0.040	CS CpDopEch Lc	Unknown	Unknown
021.....	Anchorage Trailer Port	Halderman Creek to Naples Bay	*0.0117	EA	Unknown	Unknown
022.....	Naples Shopping Plaza	Canal to Naples Bay	*0.005	EA	Unknown	Unknown
023.....	Naples Bowling Alley	Canal to Naples Bay	*0.0026	EA	Unknown	Unknown
024.....	Naples (city)	Gordon River to Naples Bay	0.900	AaCmAaCmEcg DfpBo	2	88
025.....	Golden Gate S/D	Canal to Gordon River to Naples Bay	0.070	CS CmDopSC EcLcBo	4	14
Total.....			1.2013			

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
Doctors Pass to Estero Pass:						
026.....	Palm River Tr. Pk.	Cocohatchee River (Horse River)	*0.0042	EA	Unknown	Unknown
029.....	Anglers Paradise Tr. Pk.	Imperial River to Estero Bay	*0.0108	EA Ech	Unknown	Unknown
030.....	Estero River Groves Tr. Pk.	Estero River to Estero Bay	*0.005	EA Ech	Unknown	Unknown
031.....	Alfonse Herold Mob. Hm. Pk.	Estero River to Estero Bay	0.015	EA Ech	10	7
032.....	River Garden Trailer Port	Estero River to Estero Bay	*0.0148	CiFthCpEch	Unknown	Unknown
033.....	Red Cocoanut Tr. Pk.	Canal to Estero Bay	*0.020	EA Ech	Unknown	Unknown
036.....	Port Carlos Tr. Pk.	Canal to Hurricane Bay to San Carlos Bay	*0.020	EA Ech	Unknown	Unknown
037.....	Cocoanut Cove Tr. Pk.	Canal to Hurricane Bay to San Carlos Bay	*0.015	EA	16	12
038.....	Bassett Bowling Alley	Pond to ditch to Caloosahatchee River	*0.008	EA	Unknown	Unknown
Total.....			0.1128			
Caloosahatchee River:						
039.....	McGregor Mob. Hm. Pk.	Pond to ditch to San Carlos Bay	*0.050	CS EcgLc	20	49
040.....	Shell Point Village	Pond to lagoon to Caloosahatchee River	*0.200	CsEcgLc	Unknown	Unknown
041.....	Fiesta Village S/D	Canal to creek to Caloosahatchee River	0.005	CfFthCmEcg LcBo	18	4
042.....	Hideaway Restaurant (Shipwreck Inn)	Creek to Caloosahatchee River	*0.0115	EA	Unknown	Unknown
044.....	J.F. Pate Sh. Cen.	Canal to Caloosahatchee River	*0.0025	EA EchH	Unknown	Unknown
045.....	Trailwinds S/D	Canal to Caloosahatchee River	0.020	CiLcEhBo	16	16
046.....	Page Mobile Village	Ditch to Caloosahatchee River	0.030	CfFthCpEch Xd	34	50
047.....	Ft. Myers (city)	Creek to Caloosahatchee River	4.100	CmSchCmFth CmEcgDfrhtBo	34	6,839
048.....	Riverview Restorium	Canal to Caloosahatchee River	*0.003	EA Ech	Unknown	Unknown
049.....	Orange Harbor Mob. Hm. Pk.	Canal to Orange River to Caloosahatchee River	*0.025	EA Ech	Unknown	Unknown
050.....	Sun-N-Fun	Orange River to Caloosahatchee River	*0.025	EA EchLc	Unknown	Unknown
053.....	Star Sh. Cen.	Canal to Caloosahatchee River	*0.003	EA	Unknown	Unknown
054.....	Cabover Diner	Storm drain to Caloosahatchee River	*0.002	EA	Unknown	Unknown
055.....	Waterway Estates S/D	Canal to Caloosahatchee River	*0.270	CmAmCmEcgDo	10	132
056.....	Tropic Isles	Canal to Caloosahatchee River	0.079	CmFthCmEcg LcBo	26	101
057.....	Cape Coral S/D	Dilido Canal to Caloosahatchee River	0.080	CS	2	8
058.....	Cape Coral Block 1625	Canal to Caloosahatchee River	0.040	Ft	30	59
059.....	Cape Coral No. 3	Flamingo Canal to Caloosahatchee River	*0.075	EA	2	7
Total.....			5.0210			

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
Pine Island Sound:						
060.....	Beachcomber Motel	Canal to San Carlos Bay	*0.0018	EA	Unknown	Unknown
061.....	Golden Sands Restaurant	Canal to Pine Island Sound	*0.005	EA	Unknown	Unknown
062.....	Periwinkle Way Tr. Pk.	Sanibel River to San Carlos Bay	0.010	EA Ech	14	7
063.....	Pine Island Tr. Pk.	Canal to San Carlos Bay	*0.020	EA CpLoEch	2	2
Total.....			0.0368			
Charlotte Harbor:						
064.....	Parkhill Manor Tr. Pk.	Alligator Creek to Charlotte Harbor	0.005	EA	12	3
065.....	Punta Gorda (city)	Drainage ditch to Peace River to Charlotte Harbor	0.300	CFtL	54	795
066.....	Lazy Lagoon Tr. Pk.	Peace River to Charlotte Harbor	0.0014	EA	10	1
067.....	Palm & Pines Tr. Pk. & Cottages	Peace River to Charlotte Harbor	*0.015	EA Ech	Unknown	Unknown
068.....	Rogan's Motel	Peace River to Charlotte Harbor	*0.002	EA Ech	Unknown	Unknown
069.....	Moretti Restaurant	Ditch to Peace River to Charlotte Harbor	*0.001	EA Ech	Unknown	Unknown
070.....	Port Charlotte (city)	Canal to Peace River to Charlotte Harbor	0.650	2 Plants: CpEchBoLc Df and CFL CmSchFtch	12	383
071.....	Boca Grande (city)	Charlotte Harbor	Unknown	Cs	Unknown	Unknown
072.....	Gasparilla Inn	Boca Grande Bayou to Gasparilla Sound	0.035	CiFthCpEch	12	21
073.....	Thompson Waterfront Motel	Boca Grande Bayou to Gasparilla Sound	*0.003	EA	Unknown	Unknown
074.....	Gasparilla Mobile Estates	Salt Water Canal to Gasparilla Sound	0.005	EA Ech	10	2
Total.....			1.0174			
Lemon Bay:						
075.....	Grove City Tr. Pk.	Lagoon to Lemon Bay	*0.008	EA	Unknown	Unknown
076.....	Gulf to Bay Tr. Pk.	Lemon Bay	*0.003	EA	Unknown	Unknown
077.....	Englewood Shopping Center	Lemon Bay	*0.010	EA Ech Fs	Unknown	Unknown
078.....	Shady Haven Tr. Pk.	Lemon Bay	*0.006	EA	Unknown	Unknown
080.....	Oak Grove Tr. Pk.	Forked Creek to Lemon Bay	*0.018	EA	Unknown	Unknown
081.....	Sarasota County Court House (South Annex) and Welcome Station	Pond to ditch to Alligator Creek to Lemon Bay	*0.004	EA Ech	Unknown	Unknown
082.....	Venice East S/D	Alligator Creek to Lemon Bay	*0.070	CiLcEcg	Unknown	Unknown
084.....	Venice Gardens S/D	Alligator Creek to Lemon Bay	0.200	CS LcEcg	4	39
Total.....			0.319			
Sarasota Bay:						
085.....	Venice Beach Campground	Red Lake to Intracoastal Waterway	*0.010	EA CpEch	Unknown	Unknown
088.....	Palm & Pine Trailer Village	Pond to Dona Bay	*0.0075	EA	Unknown	Unknown
089.....	Sorrento	Canal to Blackburn Bay	*0.015	EA CpFsEch	Unknown	Unknown
090.....	Happy Haven Tr. Pk.	Ditch to Little Sarasota Bay	*0.009	EA EchLc	Unknown	Unknown
091.....	Floridaland West	Ditch to creek to Little Sarasota Bay	*0.020	EA Lc	Unknown	Unknown
092.....	Royal Palms Tr. Pk.	Creek to Little Sarasota Bay	*0.009	EA	Unknown	Unknown

See footnotes at end of table.

Table 7.--(Continued)

Estaurine study area and map key[2/]	Source of waste[3/]	Receiving waters	Average daily discharge or capacity[4/]	Treatment[5/]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6/]
			M.g.d.[7/]		P.p.m.	
093.....	Buckingham Tr. Pk.	Creek to Little Sarasota Bay	*0.0162	CACAp	Unknown	Unknown
094.....	Southeast Shopping Plaza & Apts.	Ditch to Phillippi Creek	0.050	EA Ech	10.0	25
095.....	The Barclay House, Inc.	Lake to ditch to Little Sarasota Bay	*0.008	EA Ech	Unknown	Unknown
096.....	Gulf Gate S/D	Pond to creek to Little Sarasota Bay	0.168	CS LcEcg	4	33
097.....	Ward's Restaurant	Sarasota Bay	0.0024	CAaCpHoEch	Unknown	Unknown
100.....	Oasis Apts.	Canal to Sarasota Bay	*0.100	EA	Unknown	Unknown
101.....	Gulf and Bay Club	Drainage ditch to Sarasota Bay	0.0027	CFCShCiFth Cp	22	3
102.....	Casa Mar Apts.	Grand Canal to Little Sarasota Bay	0.0091	EA	Unknown	Unknown
103.....	Siesta Isles S/D	Grand Canal to Little Sarasota Bay	0.100	EA LmCm	16	78
104.....	Field Club, Inc.	Sarasota Bay	*0.006	EA	Unknown	Unknown
108.....	Southgate S/D	Phillippi Creek to Sarasota Bay	0.120	CS EcgBo	16	94
109.....	Longboat Utility Co., Inc.	Mosquito ditch to Sarasota Bay	0.034	EA EcgLc	10	17
111.....	Buttonwood Harbor Apts.	Buttonwood Harbor	*0.005	EA CpEchH	Unknown	Unknown
112.....	Twin Shores Apts. & Tr. Pk.	Buttonwood Harbor	0.010	CsCmEcg	10	5
113.....	Sun 'N Fun Club	Phillippi Creek to Sarasota Bay	*0.005	ShAmCpEch	Unknown	Unknown
114.....	Sarasota Juvenile Detention Home	Canal to Phillippi Creek to Sarasota Bay	*0.0033	EA Ech	Unknown	Unknown
115.....	Burzenski Nursing Home	Phillippi Creek to Sarasota Bay	*0.008	EA	Unknown	Unknown
116.....	Kensington Park S/D	Phillippi Creek to Sarasota Bay	0.250	AGCmFthCm BoEcLc	4	49
117.....	Electro Mechanical Research, Inc.	Fruitville Drain to Phillippi Creek	0.013	CiFthCpEcg Lc	20	13
119.....	Bahia Vista Tr. Pk. Estates	Fruitville Drain to Phillippi Creek	*0.048	CmFthEcgDop	Unknown	Unknown
120.....	Wilhelm Nursing Home	Pond to Phillippi Creek	*0.015	EA Ech	Unknown	Unknown
121.....	Sarasota (city)	Canal to Whitaker Bayou	6.200	CFCDEgGhSc CmFthCm DfpBoXd	46	13,992
122.....	American Beryllium	Ditch to Bolees Creek to Sarasota Bay	*0.005	EA EchLc	Unknown	Unknown
123.....	Tri Park Estates Mob. Hm.	Canal to Whitaker Bayou	*0.0345	CfFthLcEcg	Unknown	Unknown
124.....	Dolomite Industrial Park	Creek to Whitaker Bayou	*0.0026	EA Ech	Unknown	Unknown
125.....	Sarasota-Bradenton Airport	Bolees Creek to Sarasota Bay	0.0156	CsFs	Unknown	Unknown
126.....	Rip Van Winkle Bowladrome	Storm drain to Sarasota Bay	*0.0038	CsFs	Unknown	Unknown
127.....	Happiness House	Storm drain to Sarasota Bay	*0.002	CsFs	Unknown	Unknown
128.....	Bay College Apts.	Storm drain to Sarasota Bay	*0.0019	GEA EchH	Unknown	Unknown
129.....	Golden Buddha Restaurant	Storm drain to Sarasota Bay	*0.0026	EA	Unknown	Unknown

See footnotes at end of table.

Table 7.--(Continued)

Authorized study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
1[illegible].....	[illegible] Gardens	Sarasota Bay	[illegible].401	ShCmFthCm EcDBo	36	708
131.....	[illegible] Estates S/D	Sarasota Bay	*0.238	CFCGpCfFth CmEgXd	50	584
132.....	Our Lady Queen of Martyrs Church	Little Pittsburgh Drain to Oneco Drain to Bolees Creek to Sarasota Bay	*0.0026	EA Ip	Unknown	Unknown
13[illegible].....	Villa Del Sol Tr. Pk.	Oneco Drain to Bolees Creek to Sarasota Bay	*0.0045	EA Ech	Unknown	Unknown
134.....	Champion Home Builders	Oneco Drain to Bolees Creek to Sarasota Bay	*0.0015	CFs	Unknown	Unknown
13[illegible].....	[illegible]n Trailer Mfg.	Oneco Drain to Bolees Creek to Sarasota Bay	*0.001	CFs	Unknown	Unknown
136.....	J-J Mobile Park	Oneco Drain to Bolees Creek to Sarasota Bay	*0.015	EA Ech	Unknown	Unknown
13[illegible].....	Kountry Kitchen Restaurant	Oneco Drain to Bolees Creek to Sarasota Bay	*0.006	EA CpEchLc	Unknown	Unknown
138.....	Ta Ho Lounge	Borrow pit to Oneco Drain to Bolees Creek to Sarasota Bay	*0.0017	EA Ech	Unknown	Unknown
139.....	Oneco Elem. Sch.	Ditch to Oneco Drain Bolees Creek to Sarasota Bay	*0.0065	EA	Unknown	Unknown
141.....	Blanche H. Daughtrey Elem. Sch.	Canal to Bolees Creek to Sarasota Bay	*0.0075	G EA EchH	Unknown	Unknown
153.....	Southeast Jr. Sr. High School	Ditch to Oneco Drain to Bolees Creek to Sarasota Bay	*0.0243	CsFs	Unknown	Unknown
156.....	Luxor Mobile Park	Storm drain to Cedar Hammock Drain to Sarasota Bay	*0.010	EA Ech	Unknown	Unknown
157.....	Kash and Karry	Storm drain to canal to Sarasota Bay	*0.0026	G EA EchH	Unknown	Unknown
159.....	Try-More Tr. Village	Storm drain to Cedar Hammock Drain to Sarasota Bay	*0.0065	EA Ech	Unknown	Unknown
16[illegible].....	Avon Air Tr. Ct.	Storm drain to canal to Sarasota Bay	*0.0191	EA	Unknown	Unknown
173.....	Windsor Park--Cortez Utilities (temporary plant)	Cedar Hammock Drain to Palma Sola Bay	*0.035	CiFthCEch CsFs	Unknown	Unknown
174.....	Windsor Park--Cortez Utilities (permanent plant)	Cedar Hammock Drain to Palma Sola Bay	*0.0875	CmDoLcEg	Unknown	Unknown
17[illegible].....	Cortez Estates S/D	Creek to Palma Sola Bay	*0.091	CiFthCpEcg Lc	Unknown	Unknown
176.....	Royal Gardens Tr. Pk.	Canal to creek to Palma Sola Bay	*0.015	EA EchH	Unknown	Unknown
[illegible].....	Paradise Bay Tr. Pk.	Sarasota Bay	0.0125	EA Ech	Unknown	Unknown
1[illegible].....	San Remo Shores S/D	Canal to Palma Sola Bay	*0.053	G EA EchH	Unknown	Unknown
1[illegible].....	Bus's Tr. Pk.	Canal to Sarasota Bay	*0.0033	EA Ech	Unknown	Unknown
181.....	Pines Tr. Pk.	Sarasota Bay	*0.005	EA EchGa	Unknown	Unknown
182.....	Imperial House Condominium	Sarasota Bay	*0.040	EA CpDcp EhFp	Unknown	Unknown
18[illegible].....	Gulf Park Tr. Pk.	Sarasota Bay	*0.020	EA Ech	Unknown	Unknown
184.....	Holmes Beach (city)	Canal to Sarasota Bay	0.020	ShEA Ech	Unknown	Unknown
18[illegible].....	Seaside Gardens S/D	Sarasota Bay	*0.009	EA Ech H	Unknown	Unknown
186.....	Flamingo Cay S/D	Canal to Palma Sola Bay	0.0185	G EA EchHCs	3	3
Total.....			8.3798			

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2/]	Source of waste[3/]	Receiving waters	Average daily discharge or capacity[4/]	Treatment[5/]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6/]
			M.g.d.[7/]		P.p.m.	
Tampa Bay:						
142.....	Magic Mile Sh. Cen.	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	*0.0017	G EA Is	Unknown	Unknown
144.....	Trailer Villa	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	0.0112	EA	6	3
145.....	Fairlane Acres	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	*0.035	EA	Unknown	Unknown
146.....	Vic's Mob. Hm. Court	Storm drain to Cedar Hammock Drain to Wares Creek to Manatee River	0.0077	EA EchLc	15	6
147.....	Trailer Park Construction Co.	Canal to Cedar Hammock Drain to Wares Creek to Manatee River	*0.018	G EA Ech	Unknown	Unknown
148.....	Golf Lake Mobile Estates	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	0.0126	CsCpDopEch	8	49
149.....	Heather Hills Mob. Hm. S/D	Cedar Hammock Drain to Wares Creek to Manatee River	*0.020	EACpEchLc	Unknown	Unknown
150.....	El Ranch Mobile Village	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	*0.030	EA	Unknown	Unknown
151.....	Chalet Maxine Restaurant	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	*0.0026	EA Ech	Unknown	Unknown
152.....	Crews Tr. Pk.	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	*0.018	EA	Unknown	Unknown
155.....	Colony Plaza Condominium Apts.	Cedar Hammock Drain to Wares Creek to Manatee River	*0.008	EA Ech	Unknown	Unknown
161.....	Ritz Tr. Ct.	Cedar Hammock Drain to Wares Creek to Manatee River	*0.015	EA CpEchLc	Unknown	Unknown
162.....	Lincoln Arms Tr. Pk.	Cedar Hammock Drain to Wares Creek to Manatee River	*0.004	EA GhEch	Unknown	Unknown
163.....	K&K Tr. Pk.	Cedar Hammock Drain to Wares Creek to Manatee River	*0.020	EA Ech	Unknown	Unknown
164.....	McDonald's	Storm drain to Cedar Hammock Drain to Wares Creek to Manatee River	*0.006	EA Eh	Unknown	Unknown
165.....	Eagle Village	Cedar Hammock Drain to Wares Creek to Manatee River	*0.010	EA	Unknown	Unknown
166.....	Cortez Plaza Sh. Cen.	Cedar Hammock Drain to Wares Creek to Manatee River	*0.040	EA	Unknown	Unknown
167.....	Cortez Road Sh. Cen. (Montgomery Ward)	Cedar Hammock Drain to Wares Creek to Manatee River	0.0038	EA Ech	15	3
168.....	Sunset Trailer Village	Cedar Hammock Drain to Wares Creek to Manatee River	0.015	EA Ech	Unknown	Unknown
169.....	Plaza Mobile Court	Cedar Hammock Drain to Wares Creek to Manatee River	*0.015	EA	Unknown	Unknown
170.....	Trail Motel & Tr. Pk.	Cedar Hammock Drain to Wares Creek to Manatee River	*0.0123	EA	Unknown	Unknown

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
171.....	Palm Village Mobile Park	Ditch to Cedar Hammock Drain to Wares Creek to Manatee River	*0.015	EA EchIs	Unknown	Unknown
187.....	Palma Sola School	Ditch to Wares Creek to West Bayou to Manatee River	*0.006	EA	Unknown	Unknown
189.....	Fairway Sh. Cen.	Storm drainage to Warner East Bayou to Manatee River	*0.010	EA	Unknown	Unknown
190.....	Bradenton Country Club	County drainage to Warner East Bayou to Manatee River	*0.0033	EA Eg	Unknown	Unknown
191.....	West Bradenton Baptist Church	Storm drain to Manatee River	*0.0017	CsFs	Unknown	Unknown
192.....	Manatee Ave. Sh. Cen.	Ditch to Manatee River	*0.014	EA Ech	Unknown	Unknown
193.....	Bradenton (city)	Robinson Ditch to storm drain to Braden River	1.930	GhCmFthEcg CmDfhrBo Xd	17	1,610
195.....	Fruit Growers Express	Ditch to Manatee Hammock Drain to Braden River	*0.010	GCFthCEh	Unknown	Unknown
196.....	Manatee Manor	Canal to Manatee River	*0.035	C EA Ech	Unknown	Unknown
197.....	Terra Siesta Mob. Hm. Pk.	Creek to Manatee River	0.0235	EA Ech	Unknown	Unknown
198.....	Holiday Shores Mobile Estates	Creek to Manatee River	*0.0022	C EA Ech	Unknown	Unknown
199.....	Palm Grove Tr. Pk.	Canal to Manatee River	*0.015	EA	Unknown	Unknown
200.....	Manatee River Tr. Pk.	Manatee River	*0.005	AaCpHoEch	Unknown	Unknown
201.....	Hiway Shores Tr. Pk.	Manatee River	*0.005	C EA Ech	Unknown	Unknown
202.....	Tidevue Estates S/D	Canal to Manatee River	0.014	CfFthCmEcg Lc	49	34
204.....	Ellenton (former city)	Manatee River	Unknown	Untreated	Unknown	Unknown
205.....	Still Motel	Creek to Manatee River	*0.0012	CsFs	Unknown	Unknown
207.....	Palmetto (city)	Terra Ceia Bay	0.853	GpScCmFthCm LcEcgBoDF	16	670
208.....	Washington Park Elem. Sch.	Canal to Manatee River	*0.010	EA	Unknown	Unknown
209.....	Leisure Lake Mob. Hm. Village	Canal to Terra Ceia Bay	*0.035	EA	Unknown	Unknown
210.....	Ramada Inn	State Road Dept. drain to ditch to Terra Ceia Bay	*0.0144	CsFs	Unknown	Unknown
211.....	Coach House Mob. Hm. Pk.	Canal to creek to Terra Ceia Bay	*0.0413	CfFthCpEcg Lc	Unknown	Unknown
212.....	Carlyn Estates Tr. Pk.	Creek to Terra Ceia Bay	*0.014	EA AaCpHo	Unknown	Unknown
214.....	Borden Chemical Co.	Drainage ditch to Tampa Bay	*0.006	Sh EA Ech Lc	Unknown	Unknown
215.....	Spade Engineering Office & Warehouse	Drainage to Little Manatee River to Tampa Bay	*0.0005	EA Ech	Unknown	Unknown
216.....	W.D. Miller Sh. Cen.	Little Manatee River to Tampa Bay	*0.008	EA Ech	Unknown	Unknown
217.....	Renshaw Tr. Pk.	Little Manatee River to Tampa Bay	0.003	EA EchLc	Unknown	Unknown
218.....	Bahia Beach	Tampa Bay	*0.035	EA	Unknown	Unknown
219.....	Apollo Beach S/D	Canal to Tampa Bay	*0.104	CiFthCpEc	17	87
220.....	Ruskin Tomato Growers Assoc.	Pond to ditch to Tampa Bay	*0.0045	EA Lc	Unknown	Unknown
221.....	Ruskin Vegetable Corp.	Polishing pond to canal to Tampa Bay	*0.0065	EA EchLc	Unknown	Unknown
Total.....			3.5320			

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
Hillsborough Bay:						
223.....	Oakside Tr. Pk.	Ditch to Alafia River to Hillsborough Bay	*0.012	EA	Unknown	Unknown
224.....	Riverview Sh. Cen.	Ditch to Alafia River to Hillsborough Bay	*0.010	EA EchLc	Unknown	Unknown
225.....	Progress Village	County drainage to Hillsborough Bay	0.217	ShCmFthCm HBoLcEcg	9	96
226.....	Nitram Chemical, Inc.	Delaney Creek to Hillsborough Bay	*0.0045	ShEA EchLc	Unknown	Unknown
227.....	Yocam Battery Plant	Delaney Creek to Hillsborough Bay	*0.009	ACpEch	Unknown	Unknown
228.....	Rebel Acres Tr. Pk.	Ditch to McKay Bay	*0.0035	EA Ech	Unknown	Unknown
229.....	Clair-Mel City S/D	Delaney Creek to Hillsborough Bay	0.381	SchGhCmFth CmEgDopBo	7	131
230.....	Adamo Acres S/D	Palm River to McKay Bay	0.045	CsCpFsXCm FthCmEcg DepBo	18	40
233.....	Florida Steel Corp.	Canal to Six Mile Creek to Palm River to McKay Bay	*0.010	EA	Unknown	Unknown
237.....	Tampa (city)	McKay Bay and Hillsborough Bay	28.217	SmgGmwCmEg SimDfert BoXd	24	33,224
238.....	Pinecrest Villa S/D	Drainage canal to Sweetwater Creek to Hillsborough Bay	*0.525	FtDpfLcEcg	Unknown	Unknown
239.....	Tampa Yacht & Golf Club	Hillsborough Bay	*0.0025	AaCpEchHo	Unknown	Unknown
240.....	MacDill AFB	Hillsborough Bay	0.650	Primary	75	2,392
Total.....			30.0865			
Old Tampa Bay:						
241.....	National Gypsum Co.	Old Tampa Bay	*0.0075	EA	Unknown	Unknown
242.....	Tampa Egypt Temple (Shriners)	Sweetwater Creek to Old Tampa Bay	*0.0015	EA CpEch	Unknown	Unknown
243.....	Town & Country Park S/D	Sweetwater Creek to Old Tampa Bay	0.500	CmFthCmDop EcBo	30	736
244.....	Tampa Suburban Utilities	Sweetwater Creek to Old Tampa Bay	0.287	SchGmCmFth CmEcgDopBo	27	380
245.....	Bay Crest Park	Canal to Old Tampa Bay	0.210	EA Cm	11	113
246.....	Tampa Shores	Canal to Old Tampa Bay	0.031	CiLcBo	29	44
247.....	Troy Veller Tr. Ct.	Double Branch Creek to Old Tampa Bay	*0.010	EA ShCpEch	Unknown	Unknown
248.....	Oldsmar (city)	Creek to Old Tampa Bay	0.D62	CmFthCmEgc LcDopBo	12	37
250.....	Safety Harbor (city)	Mullet Creek to Old Tampa Bay	0.144	GmFthCmEch DcBo	30	212

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
251.....	Clearwater (city--East Plant)	Old Tampa Bay	0.861	ScCmHoAmCmDfrEcgLc	39	1,647
252.....	Shore Lanes Bowling Alley	Drainage ditch to Old Tampa Bay	*0.0055	CFthCpEch	Unknown	Unknown
254.....	Fairchild Hiller Corp.	Ditch to Cross Bayou Canal to Old Tampa Bay	*0.006	EA CpEhHoSh	Unknown	Unknown
255.....	Holiday Harbor Trailer Court	Cross Bayou Canal to Old Tampa Bay	*0.045	EA	Unknown	Unknown
258.....	Gateway Mob. Hm. Park	Canal to Old Tampa Bay	*0.050	ShEA EchLc	Unknown	Unknown
259.....	Tri-City Industrial Park	Pond to canal to Tampa Bay	*0.005	EA Ech	Unknown	Unknown
260.....	Derby Lane Dog Track	Canals to Old Tampa Bay	*0.001	EA	10	1
261.....	St. Petersburg (city--Northeast Plant)	Tampa Bay	4.980	GmSchCmEg DfhrBoSc AmCmEcg	12	2,932
262.....	St. Petersburg (city--Albert Whitted Plant)	Tampa Bay	11.700	ScCS Dcimr Vc	145	83,230
263.....	Ft. DeSoto No. 2	Tampa Bay	0.0034	EA Cp	13	2
Total.....			18.9099			
Boca Ciega Bay:						
264.....	Ft. DeSoto No. 3	Boca Ciega Bay	0.0015	EA	3	1
265.....	Ft. DeSoto No. 1	Mullet Key Bayou	0.0046	ScEA Ech	3	1
266.....	Ft. DeSoto No. 4	Boca Ciega Bay	0.0076	EA CpEch	10	4
267.....	Tierra Verde S/D	Boca Ciega Bay	*0.080	EA	Unknown	Unknown
268.....	St. Petersburg (city--Southwest Plant)	Boca Ciega Bay	5.880	SchGmCmEg DfhrBoSc AmCmEcg	10	2,885
269.....	St. Petersburg Beach (city)	Boca Ciega Bay	1.350	ScCmAaCmEcg DfgEhtVv XdDaSmZi	12	795
270.....	Treasure Island (city)	Boca Ciega Bay	0.945	ScCmAaCm EcgDfg EhtVvXd DaSmZi	11	510
271.....	St. Petersburg (city--Northwest Plant)	Ditch to Boca Ciega Bay	5.860	ScGmEgCm DfhrBo	135	38,811
272.....	South Cross Bayou--Sanitary District	Joe's Creek	2.850	SchCmFthCm VvEcg	41	5,733
273.....	Northfield Manor Tr. Pk.	Ditch to Cross Bayou Canal	*0.015	ACpEcgDg	Unknown	Unknown
274.....	Pinellas Park (city)	Cross Bayou Canal to Boca Ciega Bay	0.950	CACDScGmCm AaCmEg DfpBo	9.0	419
275.....	General Electric	Ditch to Cross Bayou Canal	*0.0795	EA EcgCm	Unknown	Unknown
276.....	Cross Bayou Estates	Cross Bayou Canal to Boca Ciega Bay	0.750	CFShCfFth EcgBo	15.0	552
277.....	Seminole Lake Golf & Country Club Estates	Cross Bayou to Boca Ciega Bay	0.015	EA	Unknown	Unknown
278.....	Bay Pines S/D	Ditch to Boca Ciega Bay	*0.240	CfFthCm EcgBo	Unknown	Unknown
279.....	Bay Pines Veterans Hospital	Boca Ciega Bay	*0.020	Pumped to County System	Unknown	Unknown
280.....	Madeira Beach (city)	Boca Ciega Bay	1.330	SchCmEcg DfpBoXd	1	65
281.....	Parsley's Tr. Pk.	Boca Ciega Bay	*0.048	CiFtrCmEcgX	Unknown	Unknown
282.....	Indian Rocks Beach South Shore (city)	Boca Ciega Bay	0.042	SchCmAmCm EcgDfpBo	4	8
Total.....			20.4682			

See footnotes at end of table.

Table 7.--(Continued)

Estaurine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
St. Joseph Sound:						
283.....	Coquina Cove Tr. Pk.	Ditch to Intra-coastal Waterway	*0.0083	EA Ech	Unknown	Unknown
284.....	Gulf Vu Tr. Pk.	Ditch to Intra-coastal Waterway	*0.0218	EA Lc	Unknown	Unknown
285.....	Woodland Hills	Ditch to Clearwater Harbor	0.004	EA Ech	Unknown	Unknown
286.....	McKay Creek Sanitary District	Clearwater Harbor	1.020	ScGamCmAmCm DfhEcg	9	450
287.....	Belleair (town)	Ditch to Clearwater Harbor	0.153	ScShCmAmCm Df	16	120
2B8.....	Kakusha Mob. Hm.	Ditch to Clearwater Harbor	0.0016	EA Ech	Unknown	Unknown
2B9.....	Belleview--Biltmore Hotel Cabana Club	Clearwater Harbor	*0.003	EA Ech	Unknown	Unknown
290.....	Clearwater (City--Marina Plant)	Clearwater Harbor	0.832	ScCmHoAmCm DfrEcgLc	27	1,102
291.....	Clearwater (city--Marshall St. Plant)	St. Joseph Sound	1.970	SchCmAmCm EcgDfbBoXd	32	3,093
295.....	Dunedin (city)	Clearwater Bay	1.144	GmScGsDFr VvEcg	95	5,332
296.....	Plasti Kraft Corp.	Mosquito ditch to St. Joseph Sound	*0.0035	EA Ech	Unknown	Unknown
297.....	Ozona Shores S/D	Smith Bayou to St. Joseph Sound	*0.0083	EA CpDopEch	Unknown	Unknown
298.....	Baywood Village	St. Joseph Sound	*0.149	CfFthCmEcg	Unknown	Unknown
299.....	Tarpon Springs (city)	Anclote River	0.842	ShCmEcgDfp BoXdSc	98	4,048
301.....	Pappas Plaza Sh. Cen.	Anclote River to St. Joseph Sound	*0.006	EA EchLc	12	4
Total.....			6.1665			
Baileys Bluff to Saddle Key:						
302.....	Flor-A-Mar S/D #2	Cross Bayou	0.010	CILcEH	32	16
303.....	Flor-A-Mar S/D #1	Cross Bayou	0.030	CfFthCmEcg	12	18
304.....	New Port Richey (city)	Canal to Gulf of Mexico	0.338	SchGahCmFth CmDfcgpBoEcg	2	33
Total.....			0.3783			
Saddle Key to S. Mangrove Point:						
305.....	Riverside Villas Apts.	Canal to Homosassa River	*0.006	EA Ech	20	6
306.....	Sportsman's Apts.	Homosassa River	*0.003	EA CpEchH	20	3
307.....	Homosassa Springs Tourist Attraction--Spring	Homosassa River	*0.015	EA Ech	20	14
308.....	Homosassa Springs Tourist Attraction--U.S. 19	Drainage canal to Homosassa River	*0.004	EA Ech	20	4
309.....	Spring Village Tr. Pk.	Drainage canal to Homosassa River	*0.003	EA Ech	20	3
310.....	Paradise Plantation Motel	Canal to Crystal River	*0.035	CS	20	34
311.....	Crystal River (city)	Crystal River	0.250	ScEA CmEgLc	Unknown	Unknown
312.....	Crystal River Mob. Hm. Pk.	Crystal River	*0.005	EA Ech	20	5
Total.....			0.071			
Waccasassa Bay:						
313.....	Cedar Key (city)	Waccasassa Bay	Unknown	Septic tanks	Unknown	Unknown
Suwannee Sound:						
No data....	---	---	---	---	---	---
Apalachee Bay:						
314.....	St. Marks (city)	St. Marks River	Unknown	Untreated	Unknown	Unknown

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[3]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
St. George Sound:						
316.....	Carrabelle (city)	St. George Sound	*0.200	C ShCiEcg	Unknown	Unknown
317.....	Gulf Terrace S/D	St. George Sound	*0.070	CiEcg	Unknown	Unknown
318.....	Lanark Village S/D	Ditch to St. George Sound	*0.200	CiFthCmEcg	Unknown	Unknown
Total.....			0.470			
Apalachicola Bay:						
319.....	Apalachicola (city)	Creek to Apalachicola River	*0.400	ScGnCmFthCm EgDgmBo	Unknown	Unknown
321.....	Gulf Colony S/D	Ditch to creek to Apalachicola River	*0.081	CiEchLc	Unknown	Unknown
Total.....			0.481			
St. Joseph Bay:						
324.....	Port St. Joe (city)	St. Joseph Bay	*0.350	ShGpCmEcgBo Dcp	Unknown	Unknown
East Bay:						
326.....	Tyndall AFB #2	East Bay	*0.409	Unknown	Unknown	Unknown
St. Andrew Bay:						
327.....	Tyndall AFB #1	St. Andrew Bay	*0.750	Unknown	Unknown	Unknown
330.....	Crews Mob. Hm. Ct.	Parker Bayou to St. Andrew Bay	*0.023	EA	Unknown	Unknown
331.....	Panama City--Plant No. 1 (Millville)	Watson Bayou to St. Andrew Bay	1.400	CmFthCmEg Dghr8oXd	Unknown	Unknown
Total.....			2.173			
North Bay:						
335.....	Lynn Haven (city)	North Bay	0.160	GhScCmFth CmBoDf	Unknown	Unknown
336.....	Panama City--Plant No. 2 (St. Andrew)	North Bay	1.750	ScGamCsEcg	70	6,010
337.....	Woodlawn S/D	North Bay	0.055	CiEcgBo	Unknown	Unknown
Total.....			1.965			
St. Andrew Bay:						
338.....	U.S. Mine Defense Laboratory	St. Andrew Bay	*0.300	EA	Unknown	Unknown
339.....	Privett's KOA Kampground	Alligator Bayou to St. Andrew Bay	*0.005	EA CpEchHo	Unknown	Unknown
340.....	Point Royal S/D	St. Andrew Bay	*0.070	EA	Unknown	Unknown
341.....	Capt. Anderson's Restaurant	Ditch to Grand Lagoon	*0.015	EA Ech	Unknown	Unknown
Total.....			0.390			

See footnotes at end of table.

Table 7.--(Continued)

Estuarine study area and map key[2/]	Source of waste[3/]	Receiving waters	Average daily discharge or capacity[4/]	Treatment[5/]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6/]
			M.g.d.[7/]		P.p.m.	
Choctawhatchee Bay:						
343.....	Niceville (city)	Boggy Bayou	*0.500	ShCmFthCm EgDopBo	33	809
344.....	Road Camp Prison	Juniper Creek to Boggy Bayou	*0.004	CmFthCmEc	Unknown	Unknown
346.....	Valparaiso (city)	Tom's Bayou to Boggy Bayou	*0.300	CmFthCmEc	33	486
347.....	Marion Heights S/D	Tom's Bayou to Boggy Bayou	*0.070	CfFtrCmEcg	Unknown	Unknown
348.....	Eglin AFB (Main Field)	Choctawhatchee Bay	*1.500	ShCmFtrCm DcpBoEc GhXd	Unknown	Unknown
349.....	Eglin AFB (Ben's Lake)	Choctawhatchee Bay	*0.540	CmFthCmEg DftBoXd	Unknown	Unknown
350.....	Eglin AFB (Hospital)	Choctawhatchee Bay	*0.350	CmFthCmEg DftBoXd	Unknown	Unknown
351.....	Shalimar School	Garnier Bayou	*0.009	EA Ech	Unknown	Unknown
352.....	Michael Monty Tr. Ct. (Shalimar Mob. Hm. Pk.)	Garnier Bayou	*0.025	EA Ech	Unknown	Unknown
355.....	Walton Arms Apts.	Five Mile Bayou	*0.005	EA Ech	Unknown	Unknown
356.....	Warrington Homes S/D	Five Mile Bayou	*0.140	EA Ech	Unknown	Unknown
357.....	Colony Estates S/D	Five Mile Bayou	*0.150	CS	Unknown	Unknown
358.....	Ft. Walton Beach to Golf Course	Five Mile Bayou	*0.170	EA Ech	10	83
Total.....			3.763			
Santa Rosa Sound:						
353.....	Okaloosa Island Authority	Santa Rosa Sound	0.200	SctAmCmEc	22	216
354.....	Ft. Walton Beach	Santa Rosa Sound	1.850	GhShCmFth CmEgDft BoXd	10	908
360.....	Mary Esther (town)	Santa Rosa Sound	0.150	CmAaCmDfrEL Bo	4	29
361.....	Hurlburt Field (USAF)	Santa Rosa Sound	*0.500	CmFtrCmDcp Bo	Unknown	Unknown
362.....	Master's Tr. Pk.	Santa Rosa Sound	*0.006	EA CpDcpEch	Unknown	Unknown
363.....	Santa Rosa County Beach Administration	Santa Rosa Sound	*0.210	EA	Unknown	Unknown
364.....	Santa Rosa Shores S/D	Santa Rosa Sound	*0.035	CiEcgLc	Unknown	Unknown
365.....	Santa Rosa Island Authority	Santa Rosa Sound	*0.288	ChScEgCm FthEgCm DpmBoXd	Unknown	Unknown
366.....	Gulf Breeze (city)	Santa Rosa Sound	0.032	CfFthCBoEcg	18	28
Total.....			3.271			

See footnotes at end of table.

Table 7.--(Continued)

Estaurine study area and map key[2]	Source of waste[3]	Receiving waters	Average daily discharge or capacity[4]	Treatment[5]	Estimated average 5-day B.O.D. in discharge	Estimated population equivalent in discharge[6]
			M.g.d.[7]		P.p.m.	
East Bay:						
367.....	Whiting Field (U.S.N.A.S.)	Blackwater River	*0.700	SchEgGhCm FtrCmEcg DcpBo	Unknown	Unknown
368.....	Milton (city)	Blackwater River	1.000	CmFthCmEcg BoDirtDo	38	1,864
369.....	East Milton Elem. Sch.	Ditch to Blackwater River	*0.005	EA	Unknown	Unknown
Total.....			1.705			
Escambia Bay:						
370.....	American Cyanamid Co.	Escambia Bay	*0.055	EA Ech	Unknown	Unknown
373.....	Chemstrand (Monsanto)	Escambia River	*0.350	EA Ech	Unknown	Unknown
375.....	Scenic Hills Country Club	Escambia River	*0.020	Cs	Unknown	Unknown
377.....	Univ. of West Florida	Escambia River	*0.125	EA Ech	Unknown	Unknown
379.....	Ellyson Field (U.S.N.A.S.)	Escambia Bay	*0.125	SchEgCmFth GmEcgDcBo	Unknown	Unknown
380.....	Pensacola (city-- Plant No. 3)	Escambia Bay	0.230	ScGmCmFthCm DfVvXd	Unknown	Unknown
Total.....			.905			
Pensacola Bay:						
381.....	Pensacola (city)	Pensacola Bay	4.000	EgCmSchAa CmEcgDch mrtDgXdVv	Unknown	Unknown
385.....	Moreno Courts	Bayou Chico	*0.210	ScGhCpAmCp DfEgBo	Unknown	Unknown
386.....	Pen Haven S/D	Creek to Bayou Chico	0.360	GhShCmFth CmEcgDfpBo	25	442
387.....	Warrington (area)	Bayou Chico	0.020	CfFthCmEcgX	57	56
388.....	Corey Field (U.S.N.A.S.)	Bayou Chico	*0.210	SchEgCmFth CmEcgDcBo	Unknown	Unknown
392.....	Pensacola (U.S.N.A.S.)	Pensacola Bay	*1.700	EgSchGhCmEg DfBoXd	Unknown	Unknown
Total.....			6.500			
Perdido Bay:						
394.....	Perdido Bay Country Club Estates	Perdido Bay	*0.035	CiLcE	Unknown	Unknown
395.....	Devonshire S/D	Bayou Marcus Creek to Perdido Bay	*0.017	EA Ech	Unknown	Unknown
396.....	Mayfair S/D	Bayou Marcus Creek to Perdido Bay	0.055	CfFthCmEcgX	17	46
397.....	Montclair S/D	Bayou Marcus Creek to Perdido Bay	*0.350	ShGhCmFt2h CmEcgDfp BoLc	67	Unknown
398.....	Wedgewood S/D	Bayou Marcus Creek to Perdido Bay	0.004	CsCmDcpEcg Lc	13	3
399.....	Avondale S/D	Bayou Marcus Creek to Perdido Bay	0.182	CfFthCmEcgX	40	357
400.....	Fairway Mob. Hm. Pk.	Bayou Marcus River	*0.030	Ea CpEch	Unknown	Unknown
401.....	Lincoln Park S/D	Eleven Mile Creek to Perdido Bay	*0.025	CS Ecg	Unknown	Unknown
Total.....			0.698			
Grand Total			117.3925			

[1] Sources: Florida State Board of Health and pertinent County health departments.

[2] See figs. 2-24 for locations of sources of pollution.

[3] Apt(s). = Apartment(s); Elem. Sch. = Elementary School; Est. = Estates; Mob. Hm. = Mobile Homes; S/D = Subdivision; Sh. Cen. = Shopping Center; Tr. Ct. = Trailer Court; Tr. Pk. = Trailer Park.

[4] Asterisk (*) indicates capacity; no asterisk indicates average daily discharge.

Table 7.--(Continued)

5/ In the key to symbols below, capital letters stand for major types of treatment; lower case letters show methods of treatment; sequence of letters indicate sequence of operations in the treatment processes.

EA Extended aeration package plant that has units for aeration, settling, aerobic digestion, chlorination and sludge holding.

CS Contact stabilization package plant that has units for mixing, reaeration, settling chlorination an aerobic digestion.

A Aeration
- a activated sludge, diffused air aeration
- c Contact aerators
- m activated sludge, mechanical aeration

B Sludge beds
- o open

C Settling tanks
- f Spirahoff
- i two story (Imhoff)
- m mechanically equipped
- p plain, hopper bottom or intermittently cleaning
- s septic tank

D Digester, separate sludge
- a aerobic
- c with cover (fixed if not otherwise specified)
- e gas used in engines (heat usually recovered)
- f with floating cover
- h gas used in heating
- m stirring mechanism
- o open top
- p unheated
- r heated
- t stage digestion

E Chlorination
- c with contact tank
- g by chlorine gas
- h by hypochlorite

F Filters
- h high capacity
- 2h high capacity, two stages
- r rotary distributor
- s intermittent sand
- t trickling

G Grit chambers
- a aerated
- h without continuous removal mechanism
- m with continuous removal mechanism
- p grit pocket at screen chamber
- w separate grit washing device

H Sludge storage tanks (not second stage digestion units)
- o open

I Sewage application to land
- p percolation beds
- s subsurface application

L Lagoons
- c oxidation lagoons or ponds

N Ocean outfall sewer

S Screens
- c comminutor (screenings ground in sewage stream)
- i intermediate screens (1/8 to 1/2-inch openings)
- g screenings ground in separate grinder and returned to sewage flow
- h bar rack (1/2 to 2-inch openings), hand cleaned
- m bar rack (1/2 to 2-inch openings), mechanically cleaned
- t garbage ground at plant and added to sewage flow

V Mechanical sludge dewatering
- c centrifuge
- v rotary vacuum filter

X Sludge disposal
- d used for fertilizer
- p used for fill

6/ Population equivalent = mg./l. 5-day B.O.D. x m.g.d. x $\frac{8.34}{0.17}$

7/ Million liters per day = m.g.d. x 3.79.

8/ Winter (annual maximum).

of the 20 estuarine areas can be considered to be strongly affected by pollution. They are the Caloosahatchee River, Sarasota Bay system, Hillsborough Bay, Old Tampa Bay, Boca Ciega Bay, St. Joseph Bay, St. Andrew Bay, Escambia Bay, Pensacola Bay, and Perdido Bay (plus the Fenholloway River, not listed separately in Table 1). Their combined area is 16 percent of the west coast total, or 22 percent if Florida Bay is excluded.

Nationwide, some 62 percent of the estuarine zone is damaged by pollution, 20 percent of it heavily (U.S. Federal Water Pollution Control Administration, 1969a—vol. 3, p. iv-413). Thus, the extent of pollution in Florida's west coast estuaries appears to be slightly less overall than the extent of estuarine pollution nationwide.

Figure 45 illustrates the distribution of clean-water areas. They are Class II waters, suitable for shellfishing; as such they pass the most stringent bacteriological tests of any waters in the state.

Many waters are classified neither as polluted, Fig. 44, nor as clean, Fig. 45. They exhibit the intermediate condition designated Class III—for recreation and the propagation and management of fish and wildlife. Most of Tampa Bay, coastal waters from Boca Ciega Bay to Crystal River, St. Joseph Bay, much of greater St. Andrew Bay and parts of greater Pensacola Bay and Escambia Bay are so designated.

Details of pollution and its effects in specific areas are provided in several useful publications, some of which are mentioned below. Coliform bacterial counts of sufficient magnitude to cause concern were demonstrated in the Keys several years ago (FSBH, 1963), a situation which, in general, has improved little with time. Two recurring problems in Manatee County, the proliferation of small domestic sewage treatment plants and industrial wastes discharged to Bishop Harbor, were investigated by the Manatee County Health Department (1967a,b). A compilation of facts for regional planning in Sarasota, Manatee, Hillsborough, and Pinellas Counties was provided by Briley, Wild and Associates (1967) in its inventory of water, sewer, and solid waste systems. Effective pressure by citizen groups and mass media have contributed to the recent decision of Tampa voters to replace the

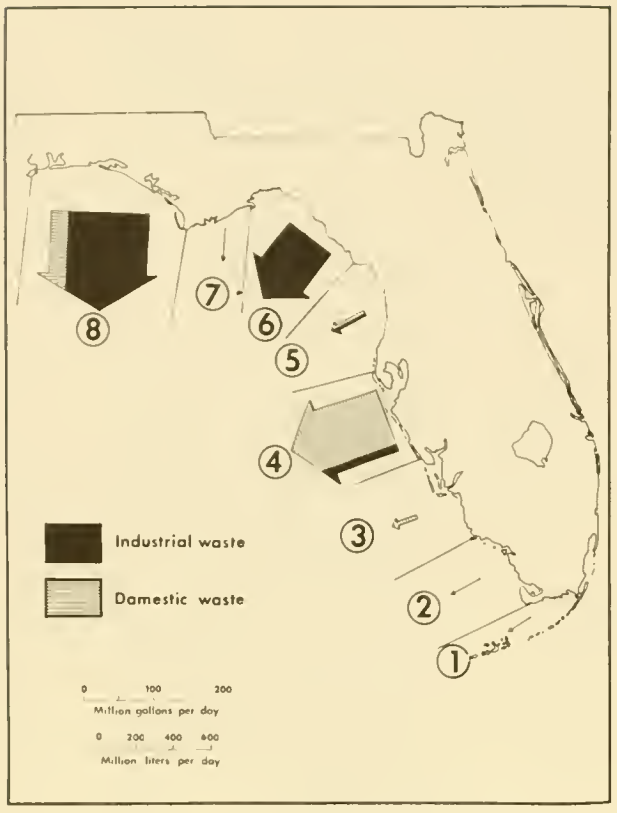

Figure 43.—The flow of pollutants into estuarine areas by coastal segment. Circled numbers are coastal segment numbers.

inadequate Hooker Point sewage treatment plant, the major source of sewage in Tampa Bay, with a tertiary treatment plant at a cost of about $84 million. The obnoxious odor emanating from Hillsborough Bay due mainly to decomposition of the red alga, *Gracilaria*, has been thoroughly investigated (FSBH, 1965; U.S. Federal Water Pollution Control Administration, 1969b). Other effects of pollution in Tampa Bay include reduction of the number of species of mollusks in Hillsborough Bay from over 20 to 4 (Taylor, Hall, and Saloman, 1970) and evidence of eutrophication in Boca Ciega Bay (Taylor and Saloman, 1968). A special act of the Florida legislature in 1947 made the Fenholloway River a waste depository stream for Taylor County. It was surveyed twice in the early 1950's when it was a good fishing stream and eminently unsuited to receive wastes because of its limited quantity of dissolved oxygen (FSBH, 1951, 1954). Saville (1966) confirmed its degradation. It remains unsuited either as a waste depository stream or as a fishing stream and is today a vile-smelling open sewer for the transport of paper mill wastes to the Gulf. The St. Marks River is subject to domestic sewage pollution and occasional oil spills (FSBH, 1964a). To the west a small industrial complex that includes a paper mill has altered the water quality and biota of St. Joseph Bay (FSBH, 1962b; Copeland, 1966). In St. Andrew Bay, a sanitary survey demonstrated polluted conditions (FSBH, 1962a). Fish kills and other evidences of gross pollution in Pensacola and Escambia Bays have been investigated by de Sylva (1955), Murdock (1955), FSBH (1964b), Croker and Wilson (1965), FSBH (1966a). A recent study showed that the entire upper section of Escambia Bay is in a state of accelerated eutrophication (U.S. Federal Water Pollution Control Administration, 1970a); local residents have experienced poor fishing for years in areas that once were bountiful (Toner, 1971). The results of two comprehensive surveys of Perdido Bay are available (FSBH, 1967a; U.S. Federal Water Pollution Control Administration, 1970b); both surveys document heavy pollution in the northern part of the bay.

The States in cooperation with the Federal government set the water quality standards of estuaries under the Water Quality Act portion of the Federal Water Pollution Control Act (33 U.S.C. 466 et seq.). When approved, the standards constitute both enforceable State and Federal law because estuaries are interstate waters (See Ch. 28-5, Supp. 52, Fla. Statutes). Counties and municipalities do not set water quality standards, but they may determine the water use of specific areas (Wendell and Schwan, 1969). For example, County governments have closed certain parts of Sarasota Bay and Boca Ciega Bay to shellfish harvesting and all of Hillsborough Bay to water contact activities.

Oil pollution is illegal. Stiff penalties were enacted in mid-1970 making the polluter liable to the State for all costs of cleanup or other damages. In addition, the pilot and the master of the vessel or the person in charge of a terminal facility who fails to give immediate notification of an oil spill to the port manager and the U.S. Coast Guard shall be guilty of a felony and subject to two years in prison and a fine of $10,000 (Ch. 70-376, Fla. Statutes). The law was passed soon after a tanker spilled 5,000-10,000 gal.

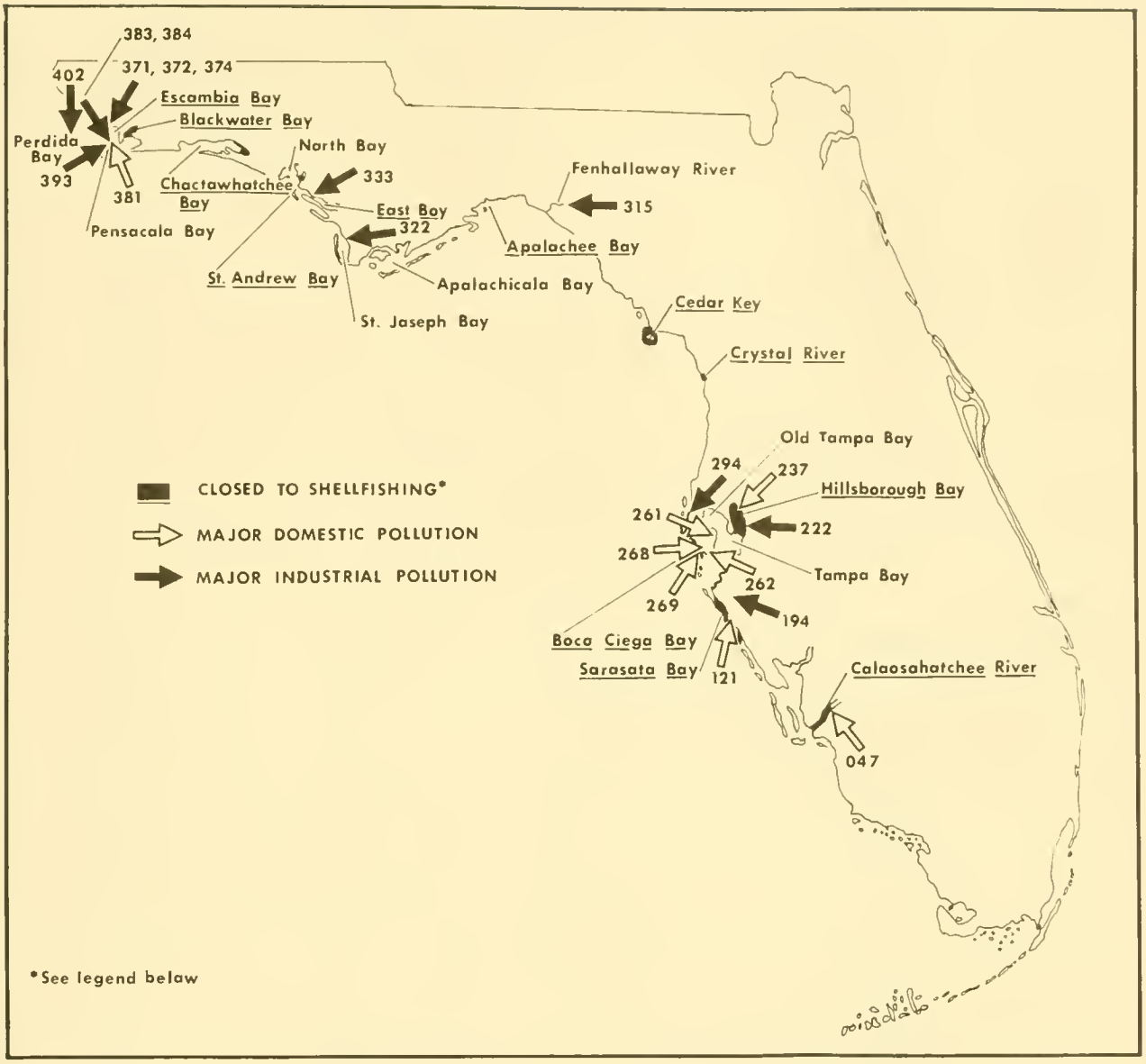

Figure 44.—The distribution of major sources of pollution and areas that are closed to shellfishing. Only estuarine areas that are affected by pollution are named. Underlined place names are those places where at least some part is closed to shellfishing.

(19-38 m³) of Bunker C type crude oil in Tampa Bay on February 13, 1970 (Anonymous, 1970).

Waste heat from cooling waters of power plants has not yet become a serious problem. The law sets 93°F (34°C) as the upper limit for cooling water returned to the environment (Ch. 28-5.05 g, Supp. 52, Fla. Statutes). Under *Water Temperature* above, we showed that a maximum of about 92°F (33°C) was recorded at several estuarine stations. The only proposed nuclear power plant on this coast is under construction on the Gulf shore near Crystal River (Anonymous, 1969). The site is about 7 statute miles (11 km) northeast of the city of Crystal River near the place in Fig. 15 marked "stack."

Although pesticides, polychlorinated biphenyls (PCB's), other chlorinated compounds (see Abelson, 1970), heavy metals such as mercury and lead, and radionuclides are not specifically mentioned, the Florida Statutes prohibit the introduction of deleterious or toxic substances into the water (Ch. 28-5.02, Supp. 52). The eggshells

Table 8.--Location, source and type, receiving waters, discharge, treatment, B.O.D. (Biochemical Oxygen Demand), and population equivalent of industrial wastes discharged to estuarine study areas, west coast of Florida, 1968[1/]

Estuarine study area and map key[2/]	Source of waste; principal products (where applicable); and waste produced	Receiving waters	Average daily discharge or capacity[3/]	Treatment[4/]	Estimated pounds of B.O.D. discharged daily	Estimated population equivalent in discharge[5/]
			M.g.d.[6/]		Lb./day[7/]	
Mormon Key to Caxambas Pass:						
007.....	Shell Mound Coin Laundry; detergents.	Chokoloskee Bay	0.018	SiCFtCE	Unknown	Unknown
Doctors Pass to Estero Pass:						
027.....	Paul Mitchell's Coin Laundry; detergents.	Imperial River to Estero Bay	Unknown	Ft	Unknown	Unknown
028.....	Bonita Coin Laundry; detergents.	Imperial River to Estero Bay	Unknown	Ft	Unknown	Unknown
034.....	Ft. Myers Beach Laundromat; detergents.	Estero Bay	Unknown	Ft	Unknown	Unknown
Caloosahatchee River:						
035.....	Island Shore Coin Laundry; detergents.	San Carlos Bay	Unknown	Ft	Unknown	Unknown
043.....	Ft. Myers Villas Laundry; detergents.	Creek to Caloosahatchee River	Unknown	Ft	Unknown	Unknown
051.....	Smithy's Coin Laundry; detergents.	Ditch, Orange River to Caloosahatchee River	Unknown	FtL	Unknown	Unknown
052.....	Star Plaza Laundry; detergents.	Powell Creek to Caloosahatchee River	Unknown	Ft	Unknown	Unknown
Sarasota Bay System:						
079.....	Englewood Shopping Center Laundry; detergents.	Canal to Lemon Bay	0.001	SiCFtCE	Unknown	Unknown
083.....	Trail Coin-O-Mat; detergents.	Alligator Creek to Lemon Bay	0.008	SiCFtCE	Unknown	Unknown
086.....	Flamingo Cleaners Bayside; detergents.	Roberts Bay	0.008	SiCFtCE	Unknown	Unknown
087.....	Tharrington Coin Laundry; detergents.	Shockett Creek to Dona Bay	0.0075	SiCFtCE	Unknown	Unknown
098.....	Village Laundry; detergents.	Canal to Sarasota Bay	0.0078	SiCFtCE	Unknown	Unknown
099.....	Tropical Cleaners; detergents.	Canal to Sarasota Bay	0.0053	SiCFtCE	Unknown	Unknown
105.....	Olin's Car Wash; detergents.	Canal to Phillippi Creek to Sarasota Bay	0.005	SiCFtCE	Unknown	Unknown
106.....	Spain's Laundry; detergents.	Canal to Phillippi Creek to Sarasota Bay	0.008	SiCFtCE	Unknown	Unknown
107.....	Washing Well Laundry; detergents.	Canal to Phillippi Creek to Sarasota Bay	0.008	SiCFtCE	Unknown	Unknown
110.....	Easy Wash Laundry; detergents.	Sarasota Bay	0.0067	SiCFtCE	Unknown	Unknown
118.....	E.M.R.; television and communication equipment; chrome and cyanide.	Fruitville drainage to Phillippi Creek	0.020	Kp (completely treated)	Unknown	Unknown
140.....	Edwards Laundry; detergents.	Ditch to Oneco Drain to Bowles Creek to Sarasota Bay	*0.0118	SiCFthCLc	Unknown	Unknown
158.....	Eslinger Laundry (Baywood); detergents.	Storm drain to Cedar Hammock Drain to Sarasota Bay	*0.021	SiCFthCEch	Unknown	Unknown
172.....	Barney's Washhouse #3; detergents.	Cedar Hammock Drain to Palma Sola Bay	*0.026	SiCFthC	Unknown	Unknown

See footnotes at end of table.

Table 8.--(Continued)

Estuarine study area and map key[2]	Source of waste; principal products (where applicable); and waste produced	Receiving waters	Average daily discharge or capacity[3]	Treatment[4]	Estimated pounds of B.O.D. discharged daily	Estimated population equivalent in discharge[5]
			M.g.d.[6]		Lb./day[7]	
179.....	Guthrie Laundry; detergents.	Ditch to Sarasota Bay	*0.015	SiCFthCEh	Unknown	Unknown
Tampa Bay:						
143.....	Barney Edwards Laundromat #2; detergents.	Ditch to Cedar Hammock Drain, Wares Creek to Manatee River	*0.0118	SiCFthC	Unknown	Unknown
154.....	Hood's Dairy; milk; dairy wash waste.	Ditch to Cedar Hammock Drain, Wares Creek to Manatee River	*0.038	EAEchH	Unknown	Unknown
188.....	Highlander Laundrey; detergents.	Storm drain to Warners East Bayou to Manatee River	*0.016	SiCFthCEh	Unknown	Unknown
194.....	Tropicana Products, Inc.; juices, industrial concentrates, citrus pulp; citrus waste.	Conduit to Manatee River	10.000	Untreated	5,000	30,000
203.....	Liner Laundry; detergents.	Canal to Manatee River	*0.014	SiCFthCEh	Unknown	Unknown
206.....	Southern Dolemite; dolemite; PO_4.	Manatee River	Unknown	Unknown	Unknown	Unknown
213.....	Mead Smith Laundrey; detergents.	Terra Ceia Bay	*0.016	SiCFtCEh	Unknown	Unknown
Hillsborough Bay:						
222.....	U.S. Phosphoric; Phosphates, sulfuric acid, other chemicals; ammonia, PD_4.	Hillsborough Bay	Unknown	Unknown	Unknown	Unknown
226.....	Nitram Chemical Inc.; fertilizer; nitrogen.	Delaney Creek to Hillsborough Bay	Unknown	Lp	Unknown	Unknown
231.....	Herman Sausage Co.; meat products; processing wastes.	Six Mile Creek to Palm River to McKay Bay	Unknown	Cp	Unknown	Unknown
232.....	Florida Nitrogen Co.; fertilizer and chemicals; NaOH.	Six Mile Creek to Palm River to McKay Bay	Unknown	Unknown	Unknown	Unknown
234.....	Tampa Soap and Chemical; soap products; grease, tallow.	Six Mile Creek to Palm River to McKay Bay	Unknown	Untreated	Unknown	Unknown
235.....	Stauffer Chemical Co.; insecticides, chemicals; chemicals, grease.	Palm River to McKay Bay	Unknown	Lp	Unknown	Unknown
236.....	Flag Chemical Co.; agricultural insecticides; oil, grease.	Six Mile Creek to Palm River to McKay Bay	Unknown	Untreated	Unknown	Unknown
Old Tampa Bay:						
249.....	Sperry Microwave Electronics Co.; electric components; chrome.	Moccasin Creek to Old Tampa Bay	Unknown	CpKpLc	Unknown	Unknown
253.....	Fairchild-Hiller Corp.; aircraft maintenance; acids, solvents, oils, detergents.	Cross Bayou Canal to Old Tampa Bay	0.060	KfAaCLcLc	Unknown	Unknown
256.....	Modern Plating Corp.; metal finishing; chrome.	Ditch to Cross Bayou Canal	Unknown	Untreated	Unknown	Unknown
257.....	Modern Tool & Die; metal stampings, tools, dies; chrome.	Two lagoons to ditch to Cross Bayou Canal	Unknown	Fs	Unknown	Unknown

See footnotes at end of table.

Table 8.--(Continued)

Estuarine study area and map key[2]	Source of waste; principal products (where applicable); and waste produced	Receiving waters	Average daily discharge or capacity[3]	Treatment[4]	Estimated pounds of B.O.D. discharged daily	Estimated population equivalent in discharge[5]
			M.g.d.[6]		Lb./day[7]	
St. Joseph Sound:						
292.....	Scott Metal Finishing; metal finishing; chrome, cyanide.	Stephenson's Creek to St. Joseph's Sound	Unknown	No approved treatment	Unknown	Unknown
293.....	Clearwater Plating; plated metal; chrome, cyanide.	Stephenson's Creek to St. Joseph Sound	Unknown	Untreated	Unknown	Unknown
294.....	Hood Citrus Processors; citrus products; citrus waste.	St. Joseph Sound	3.000	Ma	Unknown	100,000
300.....	Pappas Plaza Coin Laundry; detergents.	Anclote River to St. Joseph Sound	0.0079	SiCFtCEL	3	18
Deadman Bay to St. Marks River:						
315.....	Buckeye Cellulose Corp.; dissolving pulp; wood residue.	Fenholloway River	50.000	Lp	Unknown	Unknown
Apalachicola Bay:						
320.....	Shellfish Processing Co.; shellfish meat; shellfish remains.	Ditch to creek to Apalachicola Bay	0.010	Untreated	425	2,500
St. Joseph Bay:						
322.....	St. Joe Paper Co.; kraft board, corrugated containers;, wood fibers, chips, bark.	St. Joseph Bay	32.000	Untreated	33,320	196,000
323.....	Glidden Co.; tall oil, fatty acids, tall oil rosin; oils, grease, resinous materials.	St. Joseph Bay	0.002	Untreated	9	53
325.....	Michigan Chemical Co.; magnesium; high pH.	St. Joseph Bay	Unknown	Unknown	Unknown	Unknown
East Bay (St. Andrew):						
328.....	Tyndall AFB; aircraft maintenance; oil, solvents, grease.	East Bay	Unknown	Unknown	Unknown	1,000
St. Andrew Bay:						
329.....	Round the Clock Laundry; detergents.	Parker Bayou to St. Andrew Bay	0.012	SiCFtCEL	24	141
332.....	Arizona Chemical Co.; tall oil, fatty acids, tall oil rosin; oils, tars.	St. Andrew Bay	0.002	Unknown	4	24
333.....	International Paper Co.; paper, kraft board; lignin, resins, sulfides.	St. Andrew Bay	50.000	No approved treatment	20,400	120,000
North Bay:						
334.....	Golden and Kelly Laundry; detergents.	North Bay	0.005	SiCFtCEL	10	60
Choctawatchee Bay:						
342.....	Longbeach Resort Laundry; detergents.	Grand Lagoon	0.008	SiCFtCEL	17	100
345.....	C.C. Speedwashers; detergents.	Boggy Bayou	0.004	SiCFtCEL	10	59
359.....	C.W. Riggs Laundry; detergents.	Five Mile Bayou	0.004	SiCFtCEL	10	59
Escambia Bay:						
371.....	American Cyanamid Co.; acrylic fiber; ammonia, nitrates.	Escambia Bay	3.000	Kp	3,000	18,000
372.....	Escambia Chemical Corp.; agricultural and industrial chemicals; ammonia.	Escambia Bay	3.000	Kp	7,480	44,000

See footnotes at end of table.

Table 8.--(Continued)

Estuarine study area and map key[2]	Source of waste; principal products (where applicable); and waste produced	Receiving waters	Average daily discharge or capacity[3]	Treatment[4]	Estimated pounds of B.O.D. discharged daily	Estimated population equivalent in discharge[5]
			M.g.d.[6]		Lb./day[7]	
374.....	Chemstrand (Monsanto); synthetic fibers; organic acids, nitrates, sulfates, suspended solids.	Escambia River	Unknown	Untreated Is	5,500	32,000
376.....	Gulf Power Corp.; electricity; thermal load only.	Escambia River	Unknown	Unknown	Unknown	Unknown
378.....	Goodens Laundry (Nine Mile Road); detergents.	Storm sewer to Escambia Bay	0.004	SiCFtCEL	10	59
Pensacola Bay:						
382.....	Archer-Daniel-Midland various chemicals; phenols, oils, tars; suspended solids.	Bayou Chico	0.175	KpMo	111	653
383.....	Newport (Tenneco); various chemicals; phenols, oils, tars, suspended solids.	Bayou Chico	Unknown	KpC	2,500	15,000
384.....	Armstrong Cork; Mineral fiberboard; suspended solids (clay).	Bayou Chico	1.400	Unknown	1,500	8,800
389.....	Coin-o-Matic (Warrington); detergents.	Ditch to Bayou Grande	0.006	SiCFtCEL	15	88
390.....	A & B Cleaners; detergents.	Ditch to Bayou Grande	0.004	SiCFtCEL	10	59
391.....	Navy Point Laundry; detergents.	Storm sewer to Bayou Grande	0.005	SiCFtCEL	13	76
393.....	U.S.N.A.S. Pensacola; aircraft maintenance; oil, solvents, grease.	Pensacola Bay	Unknown	Untreated	Unknown	10,000
Perdido Bay:						
402.....	St. Regis Paper Co.; folded food cartons; wood fibers, suspended solids.	Eleven Mile Creek to Perdido Bay	30.0	Lcp	32,300	190,000

[1] Source: Florida State Board of Health and pertinent County health departments.

[2] See figs. 2-24 for locations of sources of pollution.

[3] Asterisk (*) indicates capacity; no asterisk indicates average daily discharge.

[4] In the key to symbols below, capital letters stand for major types of treatment; lower case letters show methods of treatment; sequence of letters indicates sequence of operations in the treatment processes.

EA Extended aeration package plant that has units for aeration, settling, aerobic digestion, chlorination, and sludge holding.

A Aeration
- a activated sludge, diffused air aeration

C Settling tanks
- p plain, hopper bottom or intermittently cleaning

E Chlorination
- c with contact tank
- h by hypochlorite

F Filters
- h high capacity
- s sand
- t trickling (no further details)

H Sludge storage tanks (not second stage digestion units)

I Sewage application to land
- s subsurface application

K Chemical Treatment
- f flocculation
- p pH adjustment

L Lagoons
- c oxidation lagoons or ponds
- p lagoon for settling

M Miscellaneous
- a working with Florida Department of Air and Water Pollution Control
- o oil separtion

S Screens
- i intermediate screens (1/8 to 1/2-inch openings)

[5] Population equivalent = lb./day B.O.D. x 1/0.17.

[6] Million liters per day = m.g.d. x 3.79.

[7] kg./day = lb./day x 0.454

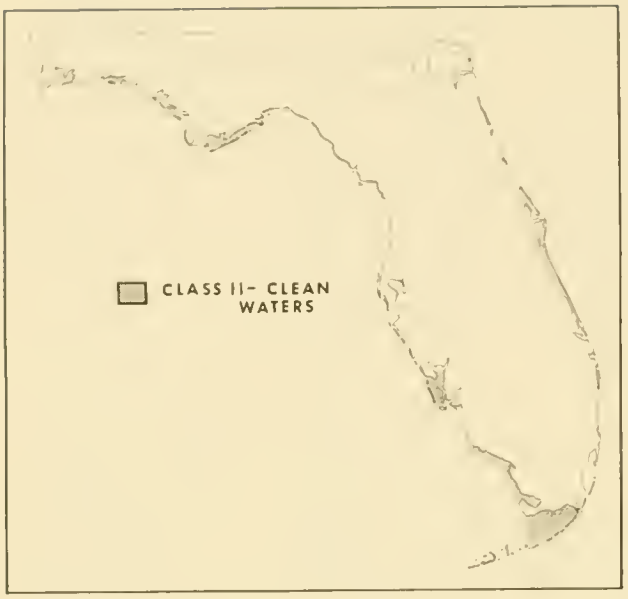

Figure 45.—The distribution of Class II waters—those suitable for shellfish harvesting.

of Florida's Gulf coast pelicans have thinned less as a result of metabolic effects of DDT than the shells of Atlantic coast pelicans, yet nearly all of the Gulf coast eggshells are thinner than pre-1947 shells, especially those from Pinellas County (Blus, 1970). A PCB has been detected in the biota, water, and sediment of Escambia Bay (Duke, Lowe, and Wilson, 1970), and there is reason to believe that such compounds are widespread in the marine environment (Risebrough, 1969). Thus, the estuarine-dependent life of Florida's Gulf coast estuaries suffers damages from the ubiquitous pollutants being found everywhere, and concerned people here as elsewhere are looking for the means to prevent disastrous results to fish, wildlife and perhaps ultimately man himself.

DREDGING

Recent legislation has established the means to abolish indiscriminate dredging and filling in Florida. The voters approved a constitutional amendment in November 1970 that prohibits the sale of submerged land except when clearly in the public interest. Earlier in 1970 the legislature authorized the Trustees of the Internal Improvement Fund (the Cabinet) to buy back submerged land (Section 253.02, 1970 Supplement to the 1969 Fla. Statutes), and it prohibited the practice of issuing "after-the-fact" dredge and fill permits (Section 253.124, 1970 Supplement to the 1969 Fla. Statutes). In 1969, 14 aquatic preserves in west coast estuaries were established within which various activities including dredging and filling are controlled (Florida Inter-Agency Advisory Committee on Submerged Land Management, 1968). The Randell Act of 1967 requires that a biological survey be made in connection with application for dredging (Ch. 67-393, Fla. Statutes) and The Bulkhead Act of 1957 provides for the setting of bulkhead lines (the future shore line) by counties and cities (Ch. 57-362, Fla. Statutes).

Recent Federal actions parallel those of the State. In July 1970 a Federal Court of Appeals upheld the right of the Corps of Engineers to deny a dredge-fill permit on the grounds that the work was not in the general public interest (Zabel-Russell case, Boca Ciega Bay). The denial was based on damages to fish and wildlife resources. The court's action was consistent with provisions of the Environmental Policy Act of 1969 (P.L. 91-190), which requires Federal agencies to consider environmental matters in the administration of public laws, and the Fish and Wildlife Coordination Act of 1958 (P.L. 85-624), which requires consideration of fish and wildlife in the issuance of Federal permits for construction in navigable waters. Under its original authorization to issue permits, the Corps of Engineers was required to consider navigation only (River and Harbor Act of 1899). Zabel and Russell appealed the decision of the Federal Court of Appeals to the U.S. Supreme Court, which in February 1971 declined to review the case, thereby confirming by its silence the constitutionality of the denial.

We have mapped filled areas by comparing modern charts and photographs with charts made before dredging was done, and we have planimetered the area of land made by filling (Figs. 2-24, Table 9). The U.S. Coast and Geodetic Survey provided charts published from 1883 to 1930, and the National Archives sent us photocopies of the earliest charts, dated 1858-1888.

The Corps of Engineers has designed 42 navigation channels along the west coast of Florida over the years, most of which are short access channels from the Gulf to coastal communities; nearly all have been completed (Table 10).

Table 9.--Filled and drained areas, Florida west coast, 1967[1/]

Study area	Filled areas			Drained tidal marsh
	Emergent spoil banks	Causeways	Housing, industry and other	
	Acres[2/]	Acres[2/]	Acres[2/]	Acres[2/]
Florida Bay.....	41	565	480	267
Lake Ingraham....	0	0	0	0
Whitewater Bay...	0	0	0	0
Cape Sable to Lostmans River..	0	0	0	0
Lostmans River to Mormon Key.....	0	0	0	0
Mormon Key to Caxambas Pass...	12	309	651	0
Caxambas Pass to Gordon River....	0	411	2,350	1,589
Doctors Pass to Estero Pass.....	5	30	750	555
Caloosahatchee River.....	32	65	745	[3/]634
Pine Island Sound	120	117	120	[4/]1,248
Charlotte Harbor.	50	118	530	6,950
Lemon Bay.....	32	10	329	318
Sarasota Bay System.....	160	85	868	1,732
Tampa Bay.....	75	760	2,280	3,780
Hillsborough Bay.	95	40	2,517	1,442
Old Tampa Bay	0	660	1,040	3,302
Boca Ciega Bay...	0	77	2,997	1,058
St. Joseph Sound.	96	213	1,280	465
Baileys Bluff to Saddle Key.....	53	10	1,248	2,304
Saddle Key to S. Mangrove Pt..	181	0	0	456
Waccasassa Bay...	0	0	0	0
Suwannee Sound...	21	0	0	0
Suwannee Sound to Deadman Bay.....	0	0	0	0
Deadman Bay.....	28	0	0	0
Deadman Bay to St. Marks River.	0	0	0	0
Apalachee Bay....	0	0	0	0
St. George Sound.	75	128	0	0
Apalachicola Bay.	0	0	0	0
St. Joseph Bay...	16	0	0	171
St. Andrew Sound.	0	0	0	0
East Bay (St. Andrew)....	0	0	0	0
St. Andrew Bay...	0	53	85	0
West Bay.....	0	0	0	0
North Bay.....	0	0	0	0
Choctawhatchee Bay.....	0	128	0	0
Santa Rosa Sound.	0	85	0	0
East Bay (Pensacola).....	0	0	0	192
Escambia Bay.....	0	0	0	2
Pensacola Bay....	43	53	139	195
Perdido Bay.....	0	60	0	16
Total.....	1,135	3,977	18,409	26,676

[1/] Sources: filled areas--comparison of navigation charts of the late 1800's with current navigation charts and topographic maps; drained tidal marsh--mosquito control authorities of pertinent Counties.

[2/] Hectares = acres x 0.4047.

[3/] Does not include 52 acres of mosquito control impoundment adjoining the Caloosahatchee River.

[4/] Does not include 1,824 acres of mosquito control impoundments on Sanibel and Pine Islands.

Much has been published on dredges (Herbich and Snider, 1969) and dredging (University of Maryland, Natural Resources Institute, 1970), but little on the effects of dredging in the estuaries under consideration (Woodburn, 1965). Only Boca Ciega Bay has been studied. There, the benthic oozes that have collected in the canals of finger-fills support few macro-invertebrates (Taylor and Saloman, 1968; Sykes and Hall, 1970), man-made fills cover large areas that were originally vegetated shallows (Hutton et al., 1956; Sykes, 1967), and sea walls have replaced mangroves that formerly provided cover among their prop roots and food in the form of organic detritus (Odum, 1970).

SUMMARY

1. The Gulf States Marine Fisheries Commission initiated a cooperative inventory of estuaries of the U.S. Gulf of Mexico in 1965. This paper constitutes the Area Description phase of the Florida inventory. Similar studies were done simultaneously in Alabama, Louisiana, Mississippi, and Texas.

2. The inventory combines original observations with a review of the literature on dimensions, vegetation, geology, stream discharge, oyster and clam beds, artificial fishing reefs, human population, economic development, pollution, and dredging. Much of the data is summarized in Table 11.

3. The length and biological diversity of Florida's west coast exceed those of any other Gulf state. Its length measured from headland to headland is some 770 statute miles (1,240 km), and its climate varies from subtropical to temperate.

4. Four coastal types are characteristic: The first, from Florida Bay to Cape Romano, consists of mangrove swamps, tidal marshes and mangrove-covered islands interspersed with open-water estuarine areas; the second, from Cape Romano to Anclote Key, contains barrier islands with sandy beaches that separate the Gulf from a series of mangrove-fringed bays and lagoons; the third, from Anclote Key to Lighthouse Point, encompasses the gradual disappearance of mangroves and their replacement by tidal marshes, clusters of islands and oyster reefs, but few semi-enclosed bays and beaches; the fourth coastal type from Lighthouse Point westward is similar to the second type in that barrier islands with sandy beaches separate the Gulf from a series of estuaries, some large, that are fringed by tidal marshes.

5. The open water area of Florida west coast estuaries (2,081,525 acres = 842,393 ha) is

Table 10.--Navigation channels designed by the U. S. Army Corps of Engineers, west coast of Florida, 1968[1/]

Name and location	Length	Controlling depth	Stage of completion
	Miles[2/]	Feet[3/]	
Intracoastal Waterway (Miami to Key West)	158.0	7.0	Partly completed[4/]
Everglades Harbor (Gulf of Mexico to Everglade)	9.2	8.0	Planning stages
Naples (Naples to Big Marco Pass)	14.2	10.0	Completed
Fort Myers Beach (San Carlos Bay to Matanzas Pass)	2.1	12.0	Completed
Okeechobee Waterway (San Carlos Bay to Indian River)	154.6	8.0	Completed
Intracoastal Waterway (Caloosahatchee River to Anclote River)	160.0	4.0	99% Completed
Charlotte Harbor (Gulf of Mexico to Punta Gorda)	29.5	[5/] 32.0	Completed
New Pass (Gulf of Mexico to Sarasota)	4.0	8.0	Completed
Manatee River (Tampa Bay to Rye)	23.8	[6/] 7.0	90% Completed
Little Manatee River (Tampa Bay to Ruskin)	5.4	6.0	Completed
Tampa Harbor (Gulf of Mexico to Port Tampa and Tampa)	67.0	[7/] 29.0	Completed
Pass-A-Grille Pass (Gulf of Mexico to Boca Ciega Bay)	2.9	8.0	Completed
St. Petersburg Harbor (Tampa Bay to St. Petersburg)	6.6	[8/] 17.0	Completed[9/]
Johns Pass (Gulf of Mexico to Boca Ciega Bay)	2.2	8.0	Completed
Clearwater Pass (Gulf of Mexico to Clearwater Harbor)	3.0	8.2	Completed
Ozona Channel (Intracoastal Waterway to Ozona)	1.3	6.0	Completed
Anclote River (Gulf of Mexico to Tarpon Springs)	8.5	9.0	Completed
Pithlachascotee River (Gulf of Mexico to Port Richey)	3.2	6.0	Proposed
Hudson River (Gulf of Mexico to Hudson)	3.3	6.0	Proposed
Homosassa River (Gulf of Mexico to mouth of river)	0.8	5.0	Completed
Crystal River (Gulf of Mexico to Crystal River)	9.0	[10/] 6.0	Completed
Withlacoochee River (Gulf of Mexico to Croom)	89.1	6.5	88% Completed
Florida Power Corp. Channel (Gulf of Mexico to FPC Power Plant, near Crystal River)	10.0	15.0	Completed
Cross Florida Barge Canal (Gulf of Mexico to St. Johns River)	107.0	12.0	24% Completed
Cedar Keys Harbor (Gulf of Mexico to Cedar Key)	11.0	8.0	Completed[11/]
Suwannee River (Suwannee Sound to Ellaville)	139.0	[12/] 5.0	Unknown
Horseshoe Cove (Gulf of Mexico to Horseshoe Beach)	1.8	6.0	Completed
Steinhatchee River (Gulf of Mexico to Steinhatchee)	4.8	6.0	Unknown
Gulf Intracoastal Waterway (Apalachee Bay to Mexican Border)	379.0	[13/] 11.0	Completed[14/]
St. Marks River (Apalachee Bay to St. Marks)	12.7	11.5	Completed
Panacea Harbor (Apalachee Bay to Panacea)	3.7	8.0	Completed
Carrabelle Harbor (Gulf of Mexico to Carrabelle)	8.7	7.0	Completed
Apalachicola Bay (Gulf of Mexico to Apalachicola)	13.0	7.5	Completed
Port St. Joe (Gulf of Mexico to Port St. Joe)	15.4	[15/] 28.0	Completed
Panama City Harbor (Gulf of Mexico to Panama City)	4.4	[16/] 32.0	Completed
Grand Lagoon at Panama City (St. Andrew Bay to Grand Lagoon)	2.1	8.0	Planning Stages
Choctawhatchee River (Mouth to Newton, Alabama)	146.0	2.0	Completed
LaGrange Bayou (Choctawhatchee Bay to Freeport)	6.1	10.0	Completed
East Pass Channel (Gulf of Mexico to Choctawhatchee Bay)	1.8	9.2	Completed[17/]
Blackwater River (East Bay to Milton)	12.0	9.0	Completed
Escambia & Conecuh River (Escambia Bay to Andalusia, Alabama)	142.9	[18/] [20/] 10.0	Completed[19/]
Pensacola Harbor (Gulf of Mexico to Pensacola)	13.7	32.0	Completed

[1/] Sources: U. S. Army, Corp of Engineers (1966; 1968a,b).

[2/] Kilometers = statute miles x 1.61.

[3/] Meters = feet x 0.305.

[4/] Miami to Cross Bank completed; Cross Bank to Key West unimproved.

[5/] Except 9 ft. from Boca Grande to Punta Gorda.

[6/] Except 2 ft. from Rocky Bluff to Rye.

[7/] Except 28 ft. in Port Tampa Channel, 23 ft. in Garrison Channel (just north of Seddon Island), and 9 ft. in Hillsborough River.

[8/] Except 12 ft. in Bayboro Harbor and 14.5 ft. east of the Point Pinellas lighted beacon.

Table 10.--(Continued)

9/ Except for the 24-ft. channel from Tampa Bay to Bayboro Harbor, which is considered inactive.

10/ Except 2 ft. in river upstream from power plant at Inglis.

11/ Except for removal of rock from Middle Ground Channel.

12/ Except for 6 ft. through Derrick Island Gap in Suwannee Sound, and 4 ft. from Branford to Ellaville.

13/ Except 3 ft. from St. Marks to Carrabelle, 9.2 ft. from Apalachicola Bay to St. Andrew Sound, 8.0 ft. in Gulf County Canal, and 8.4 ft. from St. Andrew Bay to Choctawhatchee Bay.

14/ Florida portion completed except for 35 mi. of the part from St. Marks River to Carrabelle, and deepening to 12 ft. and widening the Gulf County Canal.

15/ Main channel.

16/ Between jetties; 10 ft. in Watson Bayou near Millville.

17/ Except jetties, unconstructed.

18/ At mouth of Escambia River and upstream for 7 mi.

19/ Conecuh River portion recommended for abandonment.

20/ Except 9 ft. in Bayou Chico.

Table 11.--Summary of data on estuarine study areas, Florida west coast

Characteristic of estuarine study area	Total
Surface area (open water), MHW[1/], acres[2/] ...	2,081,525
Volume, MHW, acre-feet[3/] ...	17,134,603
Vegetation:	
Submerged, acres ...	520,431
Emergent--tidal marshes, acres ...	528,528
Emergent--mangroves, acres ...	393,160
Area of estuarine study areas including tidal marshes and mangrove swamps, acres ..	3,003,213
Stream discharges, c.f.s.[4/] ...	70,251
Clam beds, acres ...	[5/] ---
Oyster beds (live), acres ...	13,844
Closed to shellfishing, acres ...	170,698
Population:	
Coastal counties (1960) ...	2,448,210
Coastal counties (1970) ...	3,320,226
Cities and towns on estuaries (1960) ...	910,015
Commercial fishery development (1967)	
Number of firms ...	343
Employees at peak of season ...	3,549
Man years ...	3,114
Value of landings (ex-vessel value) ...	$23,117,317
Value of processed products ...	$53,924,900
Filled areas, acres ...	23,521
Drained areas, acres ...	26,676

1/ MHW = mean high water.

2/ Hectares = acres x 0.4047.

3/ Cubic meters = acre-feet x 1,233.

4/ Total average annual discharge of all streams. Liters per second = c.f.s. x 28.3.

5/ 10,823 lb. (4,909 kg.) of hard clam meats (Mercenaria campechiensis) worth $6,247 were landed in Sarasota County in 1969 and 635,684 lb. (288,340 kg.) of sunray venus clam meats (Macrocallista nimbosa) from St. Josephs Bay worth $64,522 were landed in Gulf County in 1969. Exact location and size of beds are unknown.

slightly greater than the area of America's largest estuary, Chesapeake Bay (2,071,680 acres = 838,409 ha).

6. The area of submerged vegetation (520,431 acres = 210,618 ha) is about one-quarter of the open-water surface area.

7. If the total area of estuaries (3,003,312 acres = 1,315,400 ha) is considered to be the area of open water plus the area of mangrove swamps and tidal marshes, roughly one-half of the area is unvegetated; the remaining half is about equally divided among mangrove swamps, tidal marshes, and submerged vegetation.

8. Geologically, Florida's Gulf coast estuaries are drowned river valleys except Florida Bay, which is a drowned lacustrine plain. Sea level rose 10 ft (3 m) over the past 4,000 years, an average rise of 5 inches (13 cm) per 100 years.

9. Stream discharge in north Florida is much greater than that in central and south Florida. The Apalachicola, Suwannee, Choctawhatchee and Escambia Rivers discharge nearly 70 percent of the total west coast runoff; the Apalachicola River alone accounts for about 35 percent of total stream discharge.

10. Minimum water temperature varies from 56.0°F (13.3°C) at Key West to 39.9°F (4.4°C) at Pensacola, according to records of the U.S. Coast and Geodetic Survey. Maximum water temperatures are about the same at all stations, approximately 91.9°F (33.3°C).

11. Salinities range from 0 to 36‰ (the approximate salinity of Gulf of Mexico surface water) except in northern Florida Bay and Ten Thousand Islands, where hypersalinity is common. In some locations between Anclote Keys and Cedar Keys, offshore springs depress salinity.

12. Oyster production is foremost in Apalachicola Bay where 83 percent of natural public beds are located. The area of live oyster beds

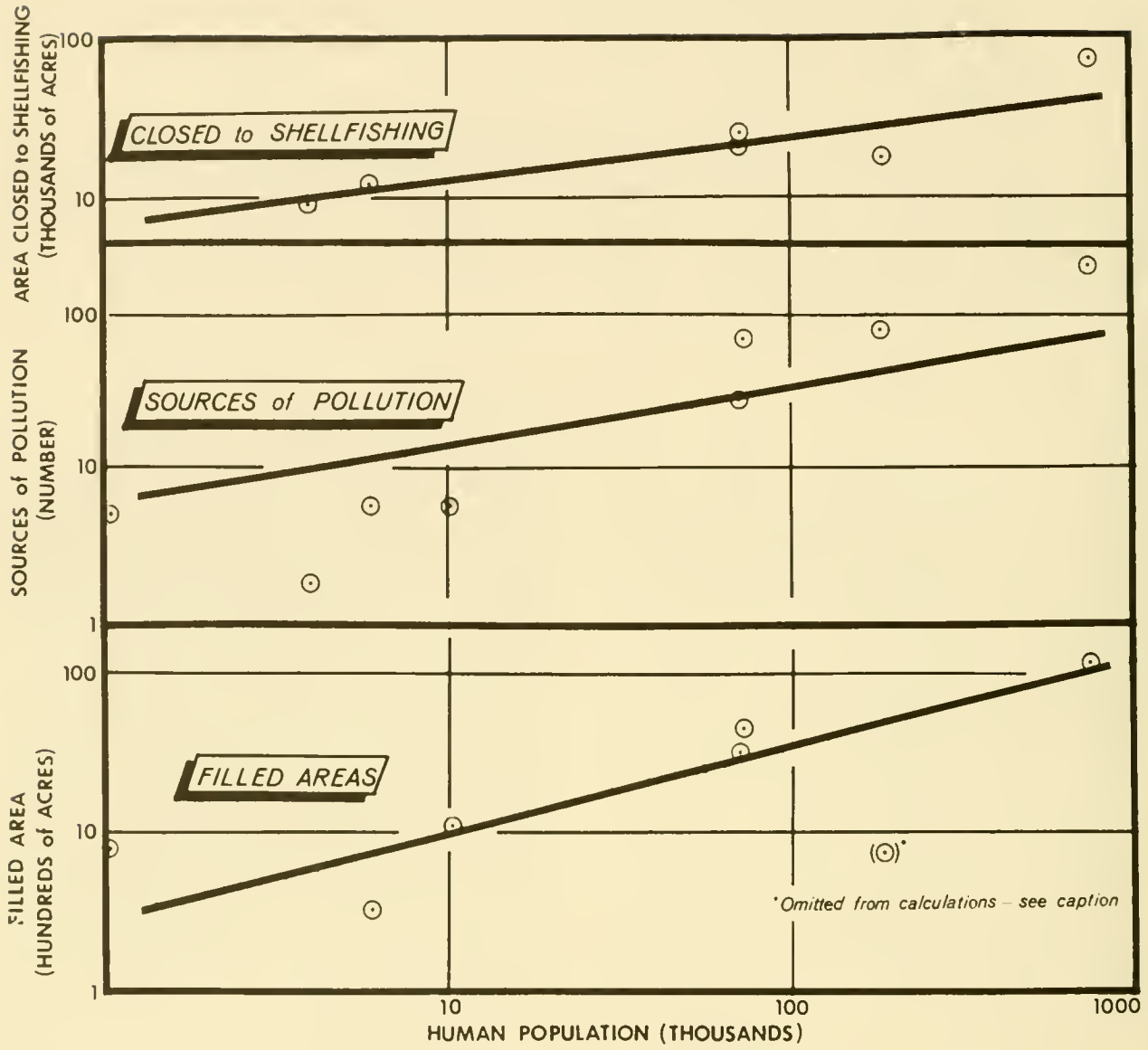

Figure 46.—The relations between the human population in communities bordering estuaries and the filled area, the number of pollution sources, and the area closed to shellfishing in the eight segments of coast in Figures 41-43. Trend lines were computed by the method of least squares. Two segments were omitted from calculation of the trend line of filled areas because they differed widely from the other six. One appears in parentheses; the other fell slightly below the base line, so is not shown.

that are producing commercially on Florida's west coast is about 13,844 acres (5,603 ha); 170,698 acres (69,081 ha) are closed to shellfishing by public health authorities.

13. Human population increased from 614,616 persons in 1930 to 3,320,226 persons in 1970 in counties of Florida's Gulf coast. Dade County (1,267,792 persons in 1970) is included because it borders Florida Bay.

14. The principal industries of Florida's west coast in decreasing order of their economic value appear to be manufacturing, tourism, construction, sport fishing, agriculture, phosphate mining and commercial fishing. The port of Tampa ranked seventh in the United States in 1968 based on tonnage handled, 27,436,709 short tons (24,890,164 metric tons).

15. About 43 percent of the area of Florida's

west coast estuaries is adversely affected by pollution, omitting the area of Florida Bay because it lies mainly within Everglades National Park. Over one-half of the 402 point sources of pollution are located in Sarasota and Tampa Bays. The eleven estuarine areas most affected by pollution are the Caloosahatchee River, Sarasota Bay system, Hillsborough Bay, Old Tampa Bay, Boca Ciega Bay, Fenholloway River, St. Joseph Bay, St. Andrew Bay, Escambia Bay, Pensacola Bay, and Perdido Bay.

16. The area of filled land in estuaries of Florida's west coast is 23,521 acres (9,519 ha). Drainage of tidal marshes for mosquito control involves 26,676 acres (10,796 ha).

17. As might be expected a direct relation exists between the human population in communities bordering estuaries and areas closed to shellfishing, number of sources of pollution, and areas of filled land (Fig. 46). The obvious implication is that the trends will continue unabated unless controls are initiated.

ACKNOWLEDGMENTS

We acknowledge especially the help received from the following individuals: Ernest A. Anthony of this Laboratory's staff has assisted selflessly and consistently in every possible way; Philip A. Butler and Nelson R. Cooley for salinity and other unpublished data on the Pensacola Bay area; William B. Robertson, Jr., for his unpublished map of coastal vegetation in Everglades National Park; John H. Davis, Jr., for counsel on mangroves and marshes; Olga Lakela for assistance with the nomenclature of marsh vegetation; Robert E. Gilmore for unpublished ecological data on Chassahowitzka National Wildlife Refuge; William K. Whitfield, Jr., and Joseph Martina, Jr., for information on oyster leases and the location of oyster beds in Apalachicola Bay; James H. Hartwell, Aaron L. Higer, and Milton C. Kolipinski for aerial photographs of Florida Bay and vicinity; James E. Santarone, Vernon Keys, H. L. Fincher, Harold Leadbetter, Frank L. Cross, Jr., and Roy L. Parham for data on pollution; and to W. Scott Davis, J. Alan Huff, and Jeffrey B. Miller, work-study students at the University of South Florida, for making several illustrations in this publication. Many other individuals have given substantial help in various ways; our appreciation is very real even though we have not mentioned each individual by name.

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