United States Coast Pilot 4
Atlantic Coast Cape Henry to Key West

THIRTEENTH EDITION—JULY 1975

Corrected through:

Local Notices to Mariners issued by Coast Guard District Commanders, April 16, 1975.

Weekly Notice to Mariners published by Defense Mapping Agency Hydrographic Center, No. 22, May 31, 1975.

Next edition, about July 1976.

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LIMITS OF UNITED STATES COAST PILOTS

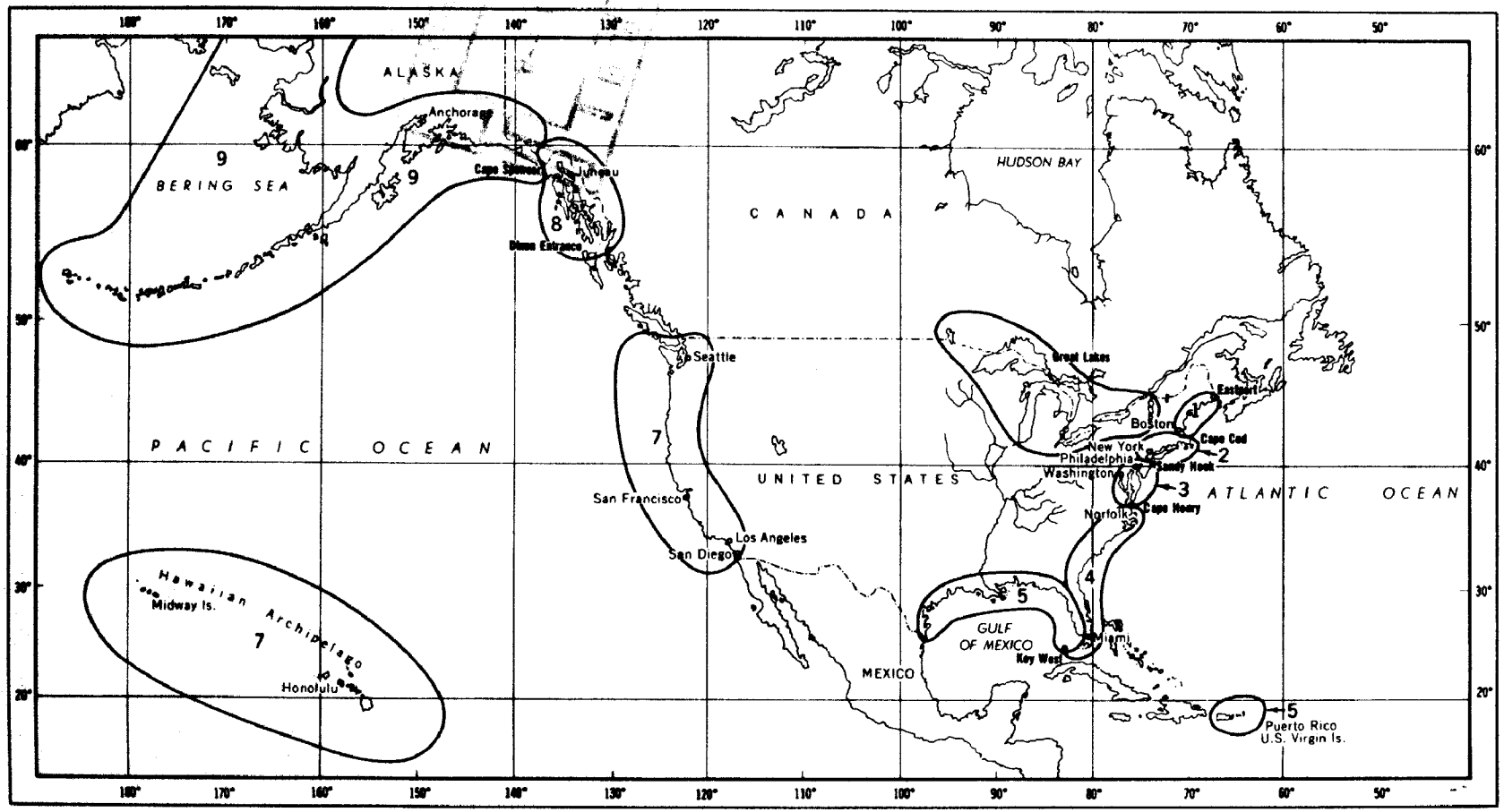
Atlantic Coast

1 Eastport to Cape Cod
2 Cape Cod to Sandy Hook
3 Sandy Hook to Cape Henry
4 Cape Henry to Key West
5 Gulf of Mexico, Puerto Rico, and Virgin Islands

Pacific Coast

7 California, Oregon, Washington, and Hawaii
8 Alaska - - Dixon Entrance to Cape Spencer
9 Alaska - - Cape Spencer to Beaufort Sea

Great Lakes Pilot
The Lakes and Their Connecting Waterways



Preface

United States Coast Pilots are published by the National Ocean Survey pursuant to the Act of 6 August 1947 (33 USC 883a and b), and to the Act of 2 July 1958 (PL 85-480; 72 Stat. 279). The functions of the former Coast and Geodetic Survey are now carried out by the National Ocean Survey in accordance with Reorganization Plan No. 4 of 1970.

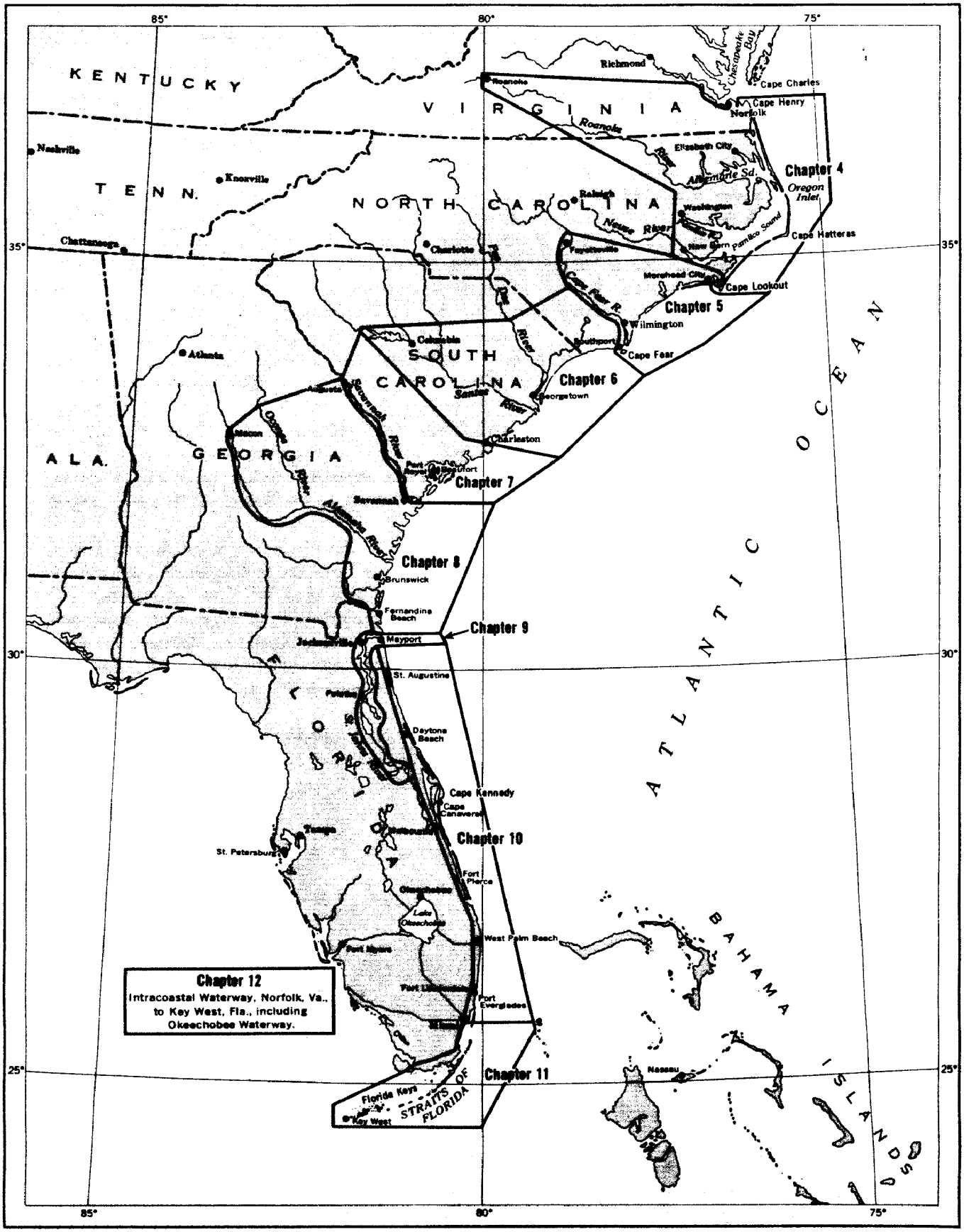
Coast Pilots supplement the navigational information shown on the nautical charts and are based upon field inspections conducted by the National Ocean Survey, information published in Notices to Mariners, and reports from NOAA survey vessels, other Government agencies, State and local governments, maritime and pilotage associations, port authorities and others. The tables which follow the appendix are usually revised about every 5 years.

This volume of Coast Pilot 4, Atlantic Coast, Cape Henry to Key West, cancels the Twelfth (July 1974) Edition.

Caution: The Coast Pilot is corrected through the dates of Notices to Mariners shown on the title page, and should not be used without reference to the Notices to Mariners issued subsequent to those dates.

Mariners and others are urged to report promptly to the National Ocean Survey errors, omissions, or any conditions found to differ from or to be additional to those published in the Coast Pilot or shown on the charts in order that they may be fully investigated and proper corrections made. A Coast Pilot Report form is included in the back of this book, and a Marine Information Report form is published in the Weekly Notice to Mariners for your convenience. These reports and/or suggestions for increasing the usefulness of the Coast Pilot should be sent to Director, National Ocean Survey, Attention C324, Rockville, Maryland 20852.

The information published in this book has been computerized and printed by an automatic photocomposition process. The magnetic tape will be revised each year, and a new edition of Coast Pilot 4 will be published annually.



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1. GENERAL INFORMATION

UNITED STATES COAST PILOTS.-The National Ocean Survey Coast Pilots are a series of eight nautical books that cover a wide variety of information important to navigators of United States coastal and intracoastal waters. Most of this book information cannot be shown graphically on the standard nautical charts and is not readily available elsewhere. Coast Pilot subjects include navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities.

When new editions of Coast Pilots are published, they will be printed annually by an automatic photocomposition process, thus eliminating the yearly supplements. Coast Pilots 1, 2, 3, 4, 5, and 7 have been computerized and are now published on an annual basis.

Cumulative supplements, containing changes reported since dates of editions, will continue to be published early each year for the other Coast Pilots until they are due for new editions. Eventually all Coast Pilots will be computerized and new editions will be printed on an annual basis.

Caution.-The Coast Pilot is corrected through the dates of Notices to Mariners shown on the title page, and should not be used without reference to the Notices to Mariners issued subsequent to those dates.

The **Great Lakes Pilot** is published annually by the National Ocean Survey and contains similar information for the Great Lakes.

Bearings.-These are true, and when given in degrees are clockwise from 000° (north) to 359°. Light-sector bearings are toward the light.

Bridges and cables.-Vertical clearances of bridges and overhead cables are in feet above mean high water unless otherwise stated; clearances of drawbridges are for the closed position, although the open clearances are also given for vertical-lift bridges. Clearances given in the Coast Pilots are those approved for nautical charting, and are supplied by the U.S. Coast Guard (bridges) and U.S. Army Corps of Engineers (cables); they may be as-built (verified by actual inspection after completion of structures) or authorized (design values specified in permit issued prior to construction). No differentiation is made in the Coast Pilots between as-built and authorized clearances. (See charts for horizontal clearances of bridges, as these are given in the Coast Pilots only when they are less than 50 feet.) Submarine cables are rarely mentioned.

Courses.-These are true and are given in degrees clockwise from 000° (north) to 359°. The courses given are the courses to be made good.

Currents.-Stated current velocities are the averages at strength. Velocities are in knots, which are nautical miles per hour. Directions are the true directions to which the currents set.

Depths.-Depths are in feet or fathoms below the low-water tidal datum of the charts unless otherwise stated. The **controlling depth** of a channel is the least depth within the limits of the channel; it restricts the safe use of the channel to drafts of less than that depth. The **centerline controlling depth** of a channel applies only to the channel centerline; lesser depths may exist in the remainder of the channel. The **midchannel controlling depth** of a channel is the controlling depth of only the middle half of the channel. **Federal project depth** is the design dredging depth of a channel constructed by the Corps of Engineers, U.S. Army; the project depth may or may not be the goal of maintenance dredging after completion of the channel, and, for this reason, project depth must not be confused with controlling depth. **Depths alongside wharves** usually have been reported by owners and/or operators of the waterfront facilities, and have not been verified by Government surveys; since these depths may be subject to change, local authorities should be consulted for the latest controlling depths.

In general, the Coast Pilots give the project depths for deep-draft ship channels maintained by the Corps of Engineers. The latest controlling depths are usually shown on the charts and published in the Notices to Mariners. For other channels, the latest controlling depths available at the time of publication are given.

Under-keel clearances.-It is becoming increasingly evident that economic pressures are causing mariners to navigate through waters of barely adequate depth, with under-keel clearances being finely assessed from the charted depths, predicted tide levels, and depths recorded by echo sounders.

It cannot be too strongly emphasized that even charts based on modern surveys may not show all sea-bed obstructions or the shoalest depths, and actual tide levels may be appreciably lower than those predicted.

In many ships an appreciable correction must be applied to shoal soundings recorded by echo sounders due to the horizontal distance between the transducers. This separation correction, which is the amount by which recorded depths therefore exceed true depths, increases with decreasing depths to a maximum equal to half the distance apart of the transducers; at this maximum the transducers are aground. Ships whose transducers are more than 6 feet apart should construct a table of true and recorded depths using the Traverse Ta-

bles. (Refer to discussion of echo soundings elsewhere in chapter 1.)

Other appreciable corrections, which must be applied by many ships, are for settlement and squat. These corrections depend on the depth of water below the keel, the hull form, and speed of the ship.

Settlement causes the water level around the ship to be lower than would otherwise be the case. It will always cause echo soundings to be less than they would otherwise be. Settlement is appreciable when the depth is less than seven times the draft of the ship, and increases as the depth decreases and the speed increases.

Squat denotes a change in trim of a ship underway, relative to her trim when stopped. It usually causes the stern of a vessel to sit deeper in the water. However, it is reported that in the case of mammoth ships squat causes the bow to sit deeper. Depending on the location of the echo sounding transducers, this may cause the recorded depth to be greater or less than it ought to be. **Caution and common sense are continuing requirements for safe navigation.**

Distances.-These are in nautical miles unless otherwise stated. A nautical mile is 1 minute of latitude, or approximately 2,000 yards, and is about 1.15 statute miles.

Heights.-These are in feet above the tidal datum used for that purpose on the charts, usually mean high water. However, the heights of the decks of piers and wharves are given in feet above the chart datum for depths.

Light and fog signal characteristics.-These are not described, and light sectors and visible ranges are normally not defined. (See Coast Guard Light Lists.)

Obstructions.-Wrecks and other obstructions are mentioned only if of a relatively permanent nature and in or near normal traffic routes.

Radio aids to navigation.-These are seldom described. (See Coast Guard Light Lists and Defense Mapping Agency Hydrographic Center Radio Navigational Aids publications.)

Ranges.-These are not fully described. **"A 339° Range"** means that the rear structure bears 339° from the front structure. (See Coast Guard Light Lists.)

Reported information.-Information received by NOS from various sources concerning depths, dangers, currents, facilities, and other subjects, which has not been verified by Government surveys or inspections, is often included in Coast Pilots; such **unverified information** is qualified as "reported", and should be regarded with caution.

Time.-Unless otherwise stated, all times are given in local standard time in the 24-hour system. (Noon is 1200, 2:00 p.m. is 1400, and midnight is 0000.)

Winds.-Directions are the true directions from which the winds blow. Unless otherwise indicated, speeds are given in knots, which are nautical miles per hour.

NOTICES TO MARINERS

Notices to Mariners are published by Federal agencies to advise operators of vessels of marine information affecting the safety of navigation. The notices include changes in aids to navigation, depths in channels, bridge and overhead cable clearances, reported dangers, and other useful marine information. They should be used routinely for updating the latest editions of nautical charts and related publications.

Local Notice to Mariners is issued by each Coast Guard District Commander for the waters under his jurisdiction. (See appendix for Coast Guard district(s) covered by this volume.) These notices are usually published weekly and may be obtained without cost by making application to the appropriate District Commander.

Notice to Mariners, published weekly by the Defense Mapping Agency Hydrographic Center, is prepared jointly with NOS and the Coast Guard. These notices contain selected items from the Local Notices to Mariners and other reported marine information required by oceangoing vessels operating in both **foreign** and **domestic** waters, except the Great Lakes. Special items covering a variety of subjects and generally not discussed in the Coast Pilot or shown on nautical charts are published annually in Notice to Mariners 1. These items are important to the mariner and should be read for future reference. The weekly notices may be obtained by operators of oceangoing vessels, without cost, by making application to Defense Mapping Agency Hydrographic Center, Washington, D.C. 20390.

Notice to Mariners, relating to the **Great Lakes** and tributary waters west of Montreal, is published weekly by the U.S. Coast Guard. These notices contain selected items from the Local Notices to Mariners and other reported marine information, and are intended primarily for use in correcting Great Lakes charts and related publications. Application for these free notices should be made to Commander, 9th Coast Guard District, Federal Building, Cleveland, Ohio, 44199.

Notices and reports of **improved channel depths** are also published by district offices of the Corps of Engineers, U.S. Army. (See appendix for districts covered by this volume.) Although information from these notices/reports affecting NOS charts and related publications is usually published in the Notices to Mariners, the local district engineer office should be consulted where depth information is critical.

Marine Broadcast Notices to Mariners are made by the Coast Guard through Coast Guard, Navy, and some commercial radio stations to report deficiencies and important changes in aids to navigation. (See Radio Warnings and Weather, this chapter.)

Vessels operating within the limits of the Coast Guard districts can obtain information affecting

NOS charts and related publications from the Local Notices to Mariners. Small craft using the Intracoastal Waterway and other waterways and small harbors within the United States that are not normally used by oceangoing vessels will require the Local Notices to Mariners to keep charts and related publications up-to-date. Information for oceangoing vessels can be obtained from the Notice to Mariners published by the Defense Mapping Agency Hydrographic Center.

Notices to Mariners may be consulted at Coast Guard district offices, NOS field offices, Defense Mapping Agency Hydrographic Center offices and depots, most local marine facilities, and sales agents handling charts and related publications.

U.S. GOVERNMENT AGENCIES PROVIDING MARITIME SERVICES

Animal and Plant Health Inspection Service , Department of Agriculture.-The Agricultural Quarantine Inspection Program and Animal Health Programs of this organization are responsible for protecting the Nation's animal population, food and fiber crops, and forests from invasion by foreign pests. They administer agricultural quarantine and restrictive orders issued under authority provided in various acts of Congress. The regulations prohibit or restrict the importation or interstate movement of live animals, meats, animal products, plants, plant products, soil, injurious insects, and associated items that may introduce or spread plant pests and animal diseases which may be new to or not widely distributed within the United States or its territories. Inspectors examine imports at ports of entry as well as the vessel, its stores, and crew or passenger baggage.

The Service also provides an inspection and certification service for exporters to assist them in meeting the quarantine requirements of foreign countries. (See appendix for a list of ports where agricultural inspectors are located and inspections conducted.)

Customs Service, Department of the Treasury.-The U.S. Customs Service administers certain laws relating to: entry and clearance of vessels and permits for certain vessel movements between points in the United States; prohibitions against coastwise transportation of passengers and merchandise; salvage, dredging and towing by foreign vessels; certain activities of vessels in the fishing trade; regular and special tonnage taxes on vessels; the landing and delivery of foreign merchandise (including unlading, appraisement, lighterage, drayage, warehousing, and shipment in bond); collection of customs duties, including duty on imported pleasure boats and yachts and 50% duty on foreign repairs to American vessels engaged in trade; customs treatment of sea and ship's stores while in port and the baggage of crewmen and passengers; illegally imported merchandise; and remission of penalties or forfeiture if customs or navigation laws have been violated. The Customs Service also cooperates with many other Federal agencies in the enforcement of statutes they are responsible for. Customs districts and ports of entry, including customs stations, are listed in the appendix.

The Customs Service may issue, without charge, a **cruising license,** valid for a period of up to 6 months and for designated U.S. waters, to a yacht of a foreign country which has a reciprocal agreement with the United States. A foreign yacht holding a cruising license may cruise in the designated U.S. waters and arrive at and depart from U.S. ports without entering or clearing at the customhouse, filing manifests, or obtaining or delivering permits to proceed, provided it does not engage in trade or violate the laws of the United States and does, upon arrival at each port or place in the United States, report the fact of arrival to the nearest customhouse. Countries which have reciprocal agreements granting these privileges to United States yachts are Argentina, Australia, Bahama Islands, Bermuda, Canada, Great Britain, Greece, Honduras, Jamaica, Liberia, and the Netherlands. Further information concerning cruising licenses may be obtained from the headquarters port for the customs district in which the license is desired. U.S. yacht owners planning cruises to foreign ports may contact the nearest customs district headquarters as to customs requirements.

National Ocean Survey (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.-The National Ocean Survey, established by joining the former Coast and Geodetic Survey with elements of the U.S. Lake Survey, provides charts and related publications for the safe navigation of marine and air commerce, and provides basic data for engineering and scientific purposes and for other commercial and industrial needs. The principal marine facilities of NOS are located in the Washington, D.C. area (headquarters); in Norfolk, Va. (Atlantic Marine Center); in Detroit, Mich. (Lake Survey Center); and in Seattle, Wash. (Pacific Marine Center). NOAA ships are based at the marine centers. These offices maintain files of charts and other publications which are available for the use of the mariner, who are invited to avail themselves of the facilities afforded. (See appendix for addresses.)

The distribution center for NOS charts and publications is at 6501 Lafayette Avenue, Riverdale, Md. 20840. Orders mailed to headquarters should be accompanied by a check or money order made payable to National Ocean Survey, Department of Commerce.

Sales agents for Charts, Coast Pilots, Tide Tables, Tidal Current Tables, Tidal Current Diagrams, and Tidal Current Charts of the National Ocean Survey are located in many U.S. ports and

in some foreign ports. A list of authorized sales agents and chart catalogs may be had free upon request from National Ocean Survey, Distribution Division (C44), 6501 Lafayette Avenue, Riverdale, Md. 20840.

Nautical charts are published primarily for the use of the mariner, but serve the public interest in many other ways. They are compiled principally from NOS basic field surveys, supplemented by data from other Government organizations.

Tide Tables are issued annually by NOS in advance of the year for which they are prepared. These tables include predicted times and heights of high and low waters for every day in the year for a number of reference stations and differences for obtaining similar predictions for numerous other places. They also include other useful information such as a method of obtaining heights of tide at any time, local mean time of sunrise and sunset for various latitudes, reduction of local mean time to standard time, and time of moonrise and moonset for various ports.

Caution.-In using the Tide Tables, slack water should not be confused with high or low water. For ocean stations there is usually little difference between the time of high or low water and the beginning of ebb or flood currents; but for places in narrow channels, landlocked harbors, or on tidal rivers, the time of slack current may differ by several hours from the time of high or low water. The relation of the times of high or low water to the turning of the current depends upon a number of factors, so that no simple general rule can be given. To obtain the times of slack water, reference should be made to the Tidal Current Tables.

Tidal Current Tables for the coasts of the United States are issued annually by NOS in advance of the year for which they are prepared. These tables include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb currents for a number of waterways, together with differences for obtaining predictions for numerous other places. Also included is other useful information such as a method for obtaining the velocity of current at any time, duration of slack, coastal tidal currents, wind currents, combination of currents, and current diagrams. Some information on the Gulf Stream is included in the tables for the Atlantic coast.

Tidal Current Charts are published by NOS for various localities. These charts depict the direction and velocity of the current for each hour of the tidal cycle. They present a comprehensive view of the tidal current movement in the respective waterways as a whole and when used with the proper current tables or tide tables supply a means for readily determining for any time the direction and velocity of the current at various localities throughout the areas covered.

Tidal Current Diagrams, published annually by NOS, are a series of 12 monthly computer constructed diagrams used in conjunction with the Tidal Current Charts for a particular area. The diagrams present an alternate but more simplified method for calculating the speed and direction of the tidal currents in bays, estuaries, and harbors.

Coast Guard, Department of Transportation.-The Coast Guard has among its duties the enforcement of the laws of the United States on the high seas and in coastal and inland waters of the U.S. and its possessions; enforcement of navigation and neutrality laws and regulations; establishment and enforcement of navigational regulations upon the Inland Waters of the United States, including the establishment of a demarcation line separating the high seas from waters upon which U.S. navigational rules apply; administration of the Oil Pollution Act of 1961, as amended; establishment and administration of water vessel anchorages; approval of bridge locations and clearances over navigable waters; administration of the alteration of obstructive bridges; regulation of drawbridge operations; inspection of vessels of the Merchant Marine; admeasurement of vessels; documentation of vessels; preparation and publication of merchant vessel registers; registration of stack insignia; port security; issuance of Merchant Marine licenses and documents; search and rescue operations; investigation of marine casualties and accidents, and suspension and revocation proceedings; destruction of derelicts; operation of aids to navigation; publication of Light Lists and Local Notices to Mariners; and operation of icebreaking facilities.

The Coast Guard operates the **Automated Mutual-assistance Vessel Rescue System (AMVER).** It is an international maritime mutual assistance program which provides important aid to the development and coordination of search and rescue (SAR) efforts in many offshore areas of the world. Merchant ships of all nations making offshore passages are encouraged to voluntarily send sailing reports and periodic position reports to the AMVER Center at Coast Guard New York via selected radio stations. Information from these reports is entered into an electronic computer which generates and maintains dead reckoning positions for the vessels. Characteristics of vessels which are valuable for determining SAR capability are also entered into the computer from available sources of information.

Information concerning the predicted location and SAR characteristics of each vessel known to be within an area of interest, called a Surface Picture (SURPIC), is made available upon request to recognized SAR agencies or vessels needing assistance regardless of nationality for use during emergencies.

Instructions guiding participation in the AMVER System are available in the following 13 languages: Danish, Dutch, English, French, German, Greek, Italian, Japanese, Norwegian, Portuguese, Rus-

sian, Spanish, and Swedish. They are available from: Commander, Eastern Area, U.S. Coast Guard, Governors Island, N.Y. 10004; Commander, Western Area, U.S. Coast Guard, 630 Sansome Street, San Francisco, Calif. 94126; and at U.S. Coast Guard District Offices, Marine Inspection Offices, and Captain of the Port Offices in major U.S. ports.

The Coast Guard conducts and/or coordinates **search and rescue** operations for surface vessels and aircraft that are in distress or overdue. (See Distress Signals and Communication Procedures this chapter.)

Light Lists, published by the Coast Guard, describe aids to navigation, consisting of lights, fog signals, buoys, lightships, daybeacons, and electronic aids, in United States (including Puerto Rico and U.S. Virgin Islands) and contiguous Canadian waters. Light Lists are for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, and by sales agents in the principal seaports. Mariners should refer to these publications for detailed information regarding the characteristics and visibility of lights, and the descriptions of light structures, lightships, buoys, fog signals, and electronic aids.

Documentation (issuance of certificates of registry, enrollments, and licenses), admeasurements of vessels, and administration of the various navigation laws pertaining thereto are functions of the Coast Guard. Yacht commissions are also issued, and certain undocumented vessels required to be numbered by the Federal Boat Safety Act of 1971 are numbered either by the Coast Guard or by a State having an approved numbering system (the latter is most common). Owners of vessels may obtain the necessary information from any Coast Guard District Commander or Marine Inspection Office. Coast Guard District Offices, Coast Guard Stations, Captain of the Port Offices, and Marine Inspection Offices are listed in the appendix.

Corps of Engineers, Department of the Army.-The Corps of Engineers has charge of the improvement of the rivers and harbors of the United States and of miscellaneous other civil works which include the administration of certain Federal laws enacted for the protection and preservation of navigable waters of the United States, the establishment of regulations for the use, administration, and navigation of navigable waters, the establishment of harbor lines, the removal of sunken vessels obstructing or endangering navigation, and the granting of permits for structures or operations in navigable waters, and for discharges and deposits of dredged and fill materials in these waters.

Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the areas under their jurisdiction may be obtained direct from the District Engineer offices. (See appendix for addresses.)

Restricted areas in most places are defined and regulations governing them are established by the Corps of Engineers. The regulations are enforced by the authority designated in the regulations, and the areas are shown on the large-scale charts of NOS. Copies of the regulations may be obtained at the District offices of the Corps of Engineers. The regulations also are included in the appropriate Coast Pilots.

Fishtraps.-The Corps of Engineers has general supervision of location, construction, and manner of maintenance of all traps, weirs, pounds, or other fishing structures in the navigable waters of the United States. Construction permits issued by the Engineers specify the lights and signals required for the safety of navigation.

Fish havens, artificial reefs constructed to attract fish, can be established in U.S. coastal waters only as authorized by a Corps of Engineers permit; the permit specifies the location, extent, and depth over these "underwater junk piles".

Environmental Protection Agency (EPA).-The ocean dumping permit program of the Environmental Protection Agency provides that except when authorized by permit, the dumping of any material into the ocean is prohibited after April 23, 1973, by the "Marine Protection, Research, and Sanctuaries Act of 1972, Public Law 92-532."

Ocean dumping permits for dredged spoil will be issued by the Corps of Engineers, and all other ocean dumping permits will be issued by the Environmental Protection Agency.

The regulations to implement this law were published in the Federal Register on April 5, 1973.

Persons or organizations who want to file for an application for an ocean dumping permit should write the Environmental Protection Agency Regional Office for the region in which the port of departure is located. (See appendix for addresses of regional offices and States in the EPA coastal regions.)

The letter should contain the name and address of the applicant; name and address of person or firm; the name and usual location of the conveyance to be used in the transportation and dumping of the material involved; a physical description where appropriate, and the quantity to be dumped and proposed dumping site.

Everyone who writes EPA will be sent information about a final application for a permit as soon as possible. This final application is expected to include questions about the description of the process or activity giving rise to the production of the dumping material; information on past activities of applicant or others with respect to the disposal of the type of material involved; and a description about available alternative means of disposal of the material with explanations about why an alternative is thought by the applicant to be inappropriate.

Federal Communications Commission.-The Federal Communications Commission controls non-Government radio communications in the United States and in all possessions except the Panama Canal Zone. Commission inspectors have authority to board ships to determine whether their radio stations comply with international treaties, Federal Laws and Commission regulations. The commission has field offices in the principal U.S. ports. (See appendix for addresses.) Information concerning ship radio regulations and service documents may be obtained from the Federal Communications Commission, Washington, D.C. 20554, or from any of the field offices.

Immigration and Naturalization Service, Department of Justice.-The Immigration and Naturalization Service administers the laws relating to admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

The designated ports of entry for aliens are divided into three classes. Class A is for all aliens. Class B is only for aliens who at the time of applying for admission are lawfully in possession of valid resident aliens' border-crossing identification cards or valid non-resident aliens' border-crossing identification cards or are admissible without documents under the documentary waivers contained in 8 CFR 212.1 (a). Class C is only for aliens who are arriving in the United States as crewmen as that term is defined in Section 101 (a) (10) of the Immigration and Nationality Act. [The term "crewman" means a person serving in any capacity on board a vessel or aircraft.] No person may enter the United States until he has been inspected by an immigration officer. A list of the offices covered by this Coast Pilot is given in the appendix.

Defense Mapping Agency Hydrographic Center (DMAHC), Department of Defense.-The Defense Mapping Agency Hydrographic Center provides accurate charts and related information for foreign waters. Publications include Sailing Directions (pilots), Light Lists, Table of Distances, Radio Navigational Aids, International Code of Signals, American Practical Navigator (Bowditch), and the Notice to Mariners published weekly.

Public Health Service, Department of Health, Education, and Welfare.-The Public Health Service administers hospitalization and outpatient treatment to legal beneficiaries of the government, administers foreign quarantine procedures at U.S. ports of entry, and conducts medical examinations of aliens.

All vessels arriving in the United States are subject to public health inspection. Only the following vessels are subject to **routine boarding** for quarantine inspection upon arrival: (a) vessels which have been in a smallpox-infected country in the 15 days prior to arrival; (b) vessels which have been in a plague-infected country within 60 days prior to arrival; (c) vessels which have had on board during the 15 days preceeding arrival any of the following signs of **illness:**

1. Temperature of 100°F (38°C) or greater which was accompanied or followed by any one or all of the following: rash, jaundice, glandular swelling; or
2. Diarrhea severe enough to interfere with work or normal activity.
3. Death, regardless of the foregoing criteria.

Masters of vessels having illness aboard compatible with the above criteria must provide radio notification of the illness through their agent to the quarantine station at the intended U.S. port of arrival.

Vessels arriving at ports under control of the United States are subject to **sanitary inspection** to determine whether measures should be applied to prevent the introduction, transmission, or spread of communicable disease.

Specific public health laws, regulations, policies, and procedures may be obtained by contacting U. S. Quarantine Stations, U.S. Consulates or the Chief, Quarantine Branch, Bureau of Epidemiology, Center for Disease Control, Atlanta, Ga. 30333.

U.S. merchant seamen are entitled to **medical relief** obtainable through the Public Health Service. A U.S. seaman is one engaged on board in care, preservation, or navigation of any registered, enrolled, or licensed vessel of the United States, or in the service, on board, of those so engaged. Hospitals, outpatient clinics, and contract physician's offices of the Public Health Service are located at the addresses given in the appendix. Free **medical advice** is furnished to seamen by radio through the cooperation of Governmental and commercial radio stations whose operators receive and relay messages from ships at sea to Public Health Service stations and then radio the medical advice back to the ships. (See appendix for list of radio stations that provide this service.)

National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.-The National Weather Service, formerly the Weather Bureau, makes forecasts and gives warnings of approaching storms over land and ocean areas to navigation, commerce, agriculture, and the general public. Other warnings cover cold waves, frost, forest-fire hazard, tornadoes, and floods. Meteorological information is collected and transmitted at 1-hour, 3-hour, and 6-hour intervals from land stations, ships at sea, and aircraft. These reports form a basis for the forecasting service, and for research basic to improvement of the NWS.

National Weather Service offices are in many ports and other places in the United States and possessions. Stations in the area of concern to this

Coast Pilot, where the public may compare barometers against NWS barometers and discuss weather information with service officials, are listed in the appendix.

The collection of **marine meteorological observations** from ships at sea is conducted on a purely voluntary and cooperative basis. NWS supplies shipmasters with blank forms, printed instructions, and such other materials that are essential to the making and recording of observations. In the course of an average peacetime year, more than 400,000 observations are received from vessels representing every maritime nation and reaching every quarter of the globe.

The **hurricane and storm warning service** was established primarily to aid marine interests. Warnings are issued whenever winds, weather, sea conditions, storm surge, or other conditions are expected that will be a hazard to marine operations. These warnings are given wide distribution by commercial radio and television, Coast Guard radio, daily newspapers, and by visual warning displays. Storm information is also broadcast over National Bureau of Standards Time and Frequency Radio Stations WWV, Ft. Collins, Colo., and WWVH, Kauai, Hawaii. (See Time Signals this chapter.) During the hurricane season, June through November, ships are asked to be especially watchful for signs of hurricanes and report by radio immediately. Satellite weather pictures are also used to locate hurricanes; these pictures are especially useful in areas of the ocean infrequently crossed by ships. Special reports are obtained from weather reconnaissance planes dispatched to keep track of hurricanes. Coastal radar reports are extremely valuable in defining the size and intensity of hurricanes when they are within about 200 miles of the station.

A **hurricane watch** is an announcement by the NWS to the public and all other interests via press, radio, and television whenever a tropical storm or hurricane becomes a threat to a coastal area. The "hurricane watch" announcement is not a warning; it indicates that the hurricane is near enough that everyone in the "watch" area should listen for subsequent advisories and be ready to take precautionary action in case hurricane warnings are issued.

NWS, along with the Coast Guard, state and local governments, and private interests, cooperate in operating a **coastal warning display system** to warn pleasure boatmen, and other marine interests lacking radio-receiving equipment, of impending hazardous weather and sea conditions on coastal and inland waters. There are about 500 of these flag or light display stations. The storm warning display stations are listed on NOS charts and included on the Marine Weather Services Charts published periodically by NWS.

Environmental Data Service (EDS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce. - Among its functions, EDS archives, processes, and disseminates the non-realtime meteorological and oceanographic data collected by government agencies and private institutions. Marine weather observations are collected from ships at sea on a voluntary basis. More than one-half million observations are received annually at EDS's National Climatic Center. They come from vessels representing every maritime nation. These observations, along with land data, are returned to the mariners in the form of climatological summaries and atlases for coastal and ocean areas. They are available in such NOAA publications as the **U.S. Coast Pilots, Mariners Weather Log,** and **Local Climatological Data, Annual Summary.** They also appear in the Defense Mapping Agency Hydrographic Center's **Pilot Charts** and **Sailing Directions Planning Guides.**

DISTRESS SIGNALS AND COMMUNICATION PROCEDURES

Coast Guard search and rescue operations.-The Coast Guard conducts and/or coordinates search and rescue operations for surface vessels or aircraft that are in distress or overdue. Search and Rescue vessels and aircraft have special markings, including a wide slash of red-orange and a small slash of blue on the forward portion of the hull or fuselage. Other parts of aircraft, normally painted white, may have other areas painted red to facilitate observation. The cooperation of vessel operators with Coast Guard helicopters, fixed-wing aircraft, and vessels may mean the difference between life and death for some seaman or aviator; such cooperation is greatly facilitated by the prior knowledge on the part of vessel operators of the operational requirements of Coast Guard equipment and personnel, of the international distress signals and procedures, and of good seamanship.

International distress signals.-(1) A signal made by radiotelegraphy or by any other signalling method consisting of the group "SOS" in Morse Code.

(2) A signal sent by radiotelephony consisting of the spoken word "MAYDAY".

(3) The International Flag Code Signal of NC.

(4) A signal consisting of a square flag having above or below it a ball or anything resembling a ball.

(5) Flames on the craft (as from a burning oil barrel, etc.)

(6) A rocket parachute flare or hand flare showing a red light.

(7) Rockets or shells, throwing red stars fired one at a time at short intervals.

(8) Orange smoke, as emitted from a distress flare.

(9) Slowly and repeatedly raising and lowering arms outstretched to each side.

(10) A gun or other explosive signal fired at intervals of about 1 minute.

(11) A continuous sounding of any fog-signal apparatus.

Radio distress procedures.-Distress calls are made on 500 kHz (SOS) for radiotelegraphy and on 2182 kHz or channel 16 (156.80 MHz) VHF-FM (MAYDAY) for radiotelephony. For less serious situations than warrant the distress procedure, the urgency signal (PAN for radiotelephony) or the safety signal (SECURITY for radiotelephony) are used as appropriate. Since radiotelegraph transmissions are normally made by professional operators, and urgency and safety situations are less critical, only the distress procedures for voice radiotelephone are described. For complete information on emergency radio procedures, see H.O. Pubs. 117A, 117B, or Part 83, Title 47, Code of Federal Regulations. **(See appendix for a list of Coast Guard Stations which guard 2182 kHz and 156.80 MHz.)** Complete information on distress guards can be obtained from Coast Guard District Commanders.

Distress calls indicate a vessel or aircraft is threatened by grave and imminent danger and requests immediate assistance. They have absolute priority over all other transmissions. All stations which hear a distress call must immediately cease any transmission capable of interfering with the distress traffic and shall continue to listen on the frequency used for the emission of the distress call. This call shall not be addressed to a particular station, and acknowledgement of receipt shall not be given before the distress message which follows it is sent.

Radiotelephone distress communications include the following actions:

(1) The **radiotelephone alarm signal** (if available): The signal consists of two audio tones, of different pitch, transmitted alternately; its purpose is to attract the attention of persons on radio watch or to actuate automatic alarm devices. It may only be used to announce that a distress call or message is about to follow.

(2) The **distress call**, consisting of:-the distress signal MAYDAY (spoken three times);

the words THIS IS (spoken once);

the call sign or name of the vessel in distress (spoken three times).

(3) The **distress message** follows immediately and consists of:

the distress signal MAYDAY:

The call sign and name of the vessel in distress;

particulars of its position (latitude and longitude, or true bearing and distance from a known geographical position);

the nature of the distress;

the kind of assistance desired;

the number of persons aboard and the condition of any injured;

present seaworthiness of vessel;

description of the vessel (length, type; cabin, masts, power; color of hull, superstructure, trim; etc.);

any other information which might facilitate the rescue, such as display of a surface-to-air identification signal or a radar reflector;

your listening frequency and schedule;

THIS IS (call sign and name of vessel in distress). OVER.

(4) **Acknowledgement of receipt of a distress message:** If a distress message is received from a vessel which is definitely in your vicinity, immediately acknowledge receipt. If it is not in your vicinity, allow a short interval of time to elapse before acknowledging, in order to permit vessels nearer to the vessel in distress to acknowledge receipt without interference. However, in areas where reliable communications with one or more shore stations are practicable, all vessels may defer this acknowledgement for a short interval so that a shore station may acknowledge receipt first. The acknowledgement of receipt of a distress is given as follows:

the call sign or name of the vessel sending the distress (spoken three times);

the words THIS IS;

the call sign or name of acknowledging vessel (spoken three times);

The words RECEIVED MAYDAY.

After the above acknowledgement, allow a momentary interval of listening to insure that you will not interfere with another vessel better situated to render immediate assistance; if not, with the authority of the person in charge of the vessel, transmit:

the word MAYDAY;

the call sign and name of distressed vessel;

the words THIS IS;

the call sign and name of your vessel;

your position (latitude and longitude, or true bearing and distance from a known geographical position);

the speed you are proceeding towards, and the approximate time it will take to reach, the distressed vessel. OVER.

(5) **Further distress messages and other communications:** Distress communications consist of all messages relating to the immediate assistance required by the distressed vessel. Each distress communication shall be preceded by the signal MAYDAY. The vessel in distress or the station in control of distress communications may **impose silence** on any station which interferes. The procedure is:-the words SEELONCE MAYDAY (Seelonce is French for silence). Silence also may be imposed by nearby mobile stations other than the vessel in distress or the station in control of distress communications. The mobile station which believes that silence is essential may request silence by the following procedure:-the word SEELONCE, followed by the word DISTRESS, and its own call sign.

(6) **Transmission of the distress procedure by a vessel or shore station not itself in distress:** A vessel or a shore station which learns that a vessel is in

distress shall transmit a distress message in any of the following cases:

(a) **When the vessel in distress is not itself able to transmit the distress message.**

(b) When a vessel or a shore station considers that further help is necessary.

(c) When, although not in a position to render assistance, it has heard a distress message that has not been acknowledged.

In these cases, the transmission shall consist of:

the radiotelephone alarm signal (if available);

the words MAYDAY RELAY (spoken three times);

the words THIS IS;

the call sign and name of vessel (or shore station), spoken three times.

When a vessel transmits a distress under these conditions, it shall take all necessary steps to contact the Coast Guard or a shore station which can notify the Coast Guard.

(7) **Termination of distress:** When distress traffic has ceased, or when silence is no longer necessary on the frequency used for the distress traffic, the station in control shall transmit on that frequency a message to all stations as follows:

the distress signal MAYDAY;

the call TO ALL STATIONS, spoken three times;

the words THIS IS;

the call sign and name of the station sending the message;

the time;

the name and call sign of the vessel in distress;

the words SEELONCE FEENEE (French for silence finished).

DISTRESS ASSISTANCE AND COORDINATION PROCEDURES

Surface ship procedures for assisting distressed surface vessels.

(1) The following immediate action should be taken by each ship on receipt of a distress message:

(a) Acknowledge receipt and, if appropriate, retransmit the distress message;

(b) Immediately try to take D/F bearings during the transmission of the distress message and maintain a D/F watch on 500 kHz and/or 2182 kHz;

(c) Communicate the following information to the ship in distress:

(i) identity;

(ii) position;

(iii) speed and estimated time of arrival (ETA);

(iv) when available, true bearing of the ship in distress.

(d) Maintain a continuous listening watch on the frequency used for the distress. This will normally be:

(i) 500 kHz (radiotelegraphy) and/or

(ii) 2182 kHz (radiotelephony).

(e) Additionally, maintain watch on VHF-FM Channel 16 (156.80 MHz) as necessary;

(f) Operate radar continuously;

(g) If in the vicinity of the distress, post extra lookouts.

(2) The following action should be taken when proceeding to the area of distress:

(a) Plot the position, course, speed, and ETA of other assisting ships.

(b) Know the communication equipment with which other ships are fitted. This information may be obtained from the International Telecommunication Union's List of Ship Stations.

(c) Attempt to construct an accurate "picture" of the circumstances attending the casualty. The important information needed is included under Distress Signals and Communication Procedures, this chapter. Should the ship in distress fail to transmit this information, a ship proceeding to assist should request what information is needed.

(3) The following on-board preparation while proceeding to the distress area should be considered:

(a) A rope (guest warp) running from bow to quarter at the waterline on each side and secured by lizards to the ship's side to assist boats and rafts to secure alongside;

(b) A derrick rigged ready for hoisting on each side of the ship with a platform cargo sling, or rope net, secured to the runner to assist the speedy recovery of exhausted or injured survivors in the water;

(c) Heaving lines, ladders and scramble net placed ready for use along both sides of the ship on the lowest open deck and possibly crew members suitably equipped to enter the water and assist survivors;

(d) A ship's liferaft made ready for possible use as a boarding station;

(e) Preparations to receive survivors who require medical assistance including the provision of stretchers;

(f) When own lifeboat is to be launched, any means to provide communications between it and the parent ship will prove to be of very great help;

(g) A line throwing appliance with a light line and a heavy rope, ready to be used for making connection either with the ship in distress or with survival craft.

Aircraft procedures for directing surface craft to scene of distress incident.–The following procedures performed in sequence by an aircraft mean that the aircraft is directing a surface craft toward the scene of a distress incident,

(a) Circling the surface craft at least once.

(b) Crossing the projected course of the surface craft close ahead at low altitude, opening and closing the throttle, or changing the propeller pitch.

(c) Heading in the direction in which the surface craft is to be directed. The surface craft should acknowledge the signal by changing course

and following the aircraft. If, for any reason, it is impossible to follow, the surface craft should hoist the international code flag NOVEMBER, or use any other signaling means available to indicate this.

The following procedures performed by an aircraft mean that the assistance of the surface craft is no longer required:

(a) Crossing the wake of the surface craft close astern at a low altitude opening and closing the throttle or changing the propeller pitch.

Since modern jet-engined aircraft cannot make the characteristic sound associated with opening and closing the throttle, or changing propeller pitch, ships should be alert to respond to the signals without the sounds, when jets or turboprop aircraft are involved.

Surface ship procedures for assisting aircraft in distress. - 1. When an aircraft transmits a distress message by radio, the first transmission is generally made on the designated air/ground enroute frequency in use at the time between the aircraft and aeronautical station. The aircraft may change to another frequency, possibly another enroute frequency or the aeronautical emergency frequencies of 121.50 MHz or 243 MHz. In an emergency, it may use any other available frequency to establish contact with any land, mobile, or direction-finding station.

2. There is liaison between Coast Radio Stations aeronautical units, and land-based search and rescue organizations. Merchant ships will ordinarily be informed of aircraft casualties at sea by broadcast messages from Coast Radio Stations, made on the international distress frequencies of 500 kHz and 2182 kHz. Ships may, however, become aware of the casualty by receiving:

(a) An SOS message from an aircraft in distress which is able to transmit on 500 kHz or a distress signal from an aircraft using radiotelephone on 2182 kHz.

(b) A radiotelegraphy distress signal on 500 kHz from a hand-operated emergency transmitter carried by some aircraft.

(c) A message from a SAR aircraft.

3. For the purpose of emergency communications with aircraft, special attention is called to the possibility of conducting direct communications on 2182 kHz, if both ship and aircraft are so equipped.

4. An aircraft in distress will use any means at its disposal to attract attention, make known its position, and obtain help, including some of the signals prescribed by the International Regulations for Preventing Collisions at Sea.

5. Aircraft usually sink quickly (e.g. within a few minutes). Every endeavor will be made to give ships an accurate position of an aircraft which desires to ditch. When given such a position, a ship should at once consult any other ships in the vicinity on the best procedure to be adopted. The ship going to the rescue should answer the station sending the broadcast and give her identity, position and intended action.

6. If a ship should receive a distress message direct from an aircraft, she should act as indicated in the immediately preceding paragraph and also relay the message to the nearest Coast Radio Station. Moreover, a ship which has received a distress message direct from an aircraft and is going to the rescue should take a bearing on the transmission and inform the Coast Radio Station and other ships in the vicinity of the call sign of the distressed aircraft and the time at which the distress message was received, followed by the bearing and time at which the signal ceased.

7. When an aircraft decides to ditch in the vicinity of a ship, the ship should:

(a) Transmit homing bearings to the aircraft, or (if so required) transmit signals enabling the aircraft to take its own bearings.

(b) By day, make black smoke.

(c) By night, direct a searchlight vertically and turn on all deck lights. Care must be taken not to direct a searchlight toward the aircraft, which might dazzle the pilot.

8. Ditching an aircraft is difficult and dangerous. A ship which knows that an aircraft intends to ditch should be prepared to give the pilot the following information:

(a) Wind direction and force.

(b) Direction, height, and length of primary and secondary swell systems.

(c) Other pertinent weather information.

The pilot of an aircraft will choose his own ditching heading. If this is known by the ship, she should set course parallel to the ditching heading. Otherwise the ship should set course parallel to the main swell system and into the wind component, if any.

9. A land plane may break up immediately on striking the water, and liferafts may be damaged. The ship, should, therefore, have a lifeboat ready for launching, and if possible, boarding nets should be lowered from the ship and heaving lines made ready in the ship and the lifeboat. Survivors of the aircraft may have bright colored lifejackets and location aids.

10. The method of recovering survivors must be left to the judgment of the master of the ship carrying out the rescue operation.

11. It should be borne in mind that military aircraft are often fitted with ejection seat mechanisms. Normally, their aircrew will use their ejection seats, rather than ditch. Should such an aircraft ditch, rather than the aircrew bail out, and it becomes necessary to remove them from their ejection seats while still in the aircraft, care should be taken to avoid triggering off the seat mechanisms. The activating handles are invariably indicated by red and or black/yellow coloring.

12. A survivor from an aircraft casualty who is recovered may be able to give information which will assist in the rescue of other survivors. Masters

are therefore asked to put the following questions to survivors and to communicate the answers to a Coast Radio Station. They should also give the position of the rescuing ship and the time when the survivors were recovered.

(a) What was the time and date of the casualty?

(b) Did you bail out or was the aircraft ditched?

(c) If you bailed out, at what altitude?

(d) How many others did you see leave the aircraft by parachute?

(e) How many ditched with the aircraft?

(f) How many did you see leave the aircraft after ditching?

(g) How many survivors did you see in the water?

(h) What flotation gear had they?

(i) What was the total number of persons aboard the aircraft prior to the accident?

(j) What caused the emergency?

Helicopter evacuation of personnel.-Helicopter evacuation, usually performed by the Coast Guard, is a hazardous operation to the patient and to the flight crew, and should only be attempted in event of very serious illness or injury. Provide the doctor on shore with all the information you can concerning the patient, so that an intelligent evaluation can be made concerning the need for evacuation. Most rescue helicopters can proceed less than 150 miles offshore (a few new helicopters can travel 250 miles out to sea), dependent on weather conditions and other variables. If an evacuation is necessary, the vessel must be prepared to proceed within range of the helicopter, and should be familiar with the preparations which are necessary prior to and after its arrival.

When requesting helicopter assistance:

(1) Give the accurate position, time, speed, course, weather conditions, sea conditions, wind direction and velocity, type of vessel, voice and CW frequency for your ship.

(2) If not already provided, give complete medical information including whether or not the patient is ambulatory.

(3) If you are beyond helicopter range, advise your diversion intentions so that a rendezvous point may be selected.

(4) If there are changes to any items reported earlier, advise the rescue agency immediately. Should the patient die before the arrival of the helicopter, be sure to advise those assisting you.

Preparations prior to the arrival of the helicopter:

(1) Provide continuous radio guard on 2182 kHz or specified voice frequency, if possible. The helicopter normally cannot operate CW.

(2) Select and clear the most suitable hoist area, preferably aft on the vessel with a minimum of 50 feet radius of clear deck. This must include the securing of loose gear, awnings, and antenna wires. Trice up running rigging and booms. If hoist is aft, lower the flag staff.

(3) If the hoist is to take place at night, light the pickup areas as well as possible. Be sure you do not shine any lights on the helicopter, so that the pilot is not blinded. If there are any obstructions in the vicinity, put a light on them so the pilot will be aware of their positions.

(4) Point searchlights vertically to aid the flight crew in locating the ship and turn them off when the helicopter is on the scene.

(5) Be sure to advise the helicopter of the location of the pickup area on the ship before the helicopter arrives, so that the pilot may make his approach to aft, amidships, or forward, as required.

(6) There will be a high noise level under the helicopter, so voice communications on deck are almost impossible. Arrange a set of hand signals among the crew who will assist.

Hoist operations:

(1) If possible, have the patient moved to a position as close to the hoist area as his condition will permit-**time is important**.

(2) Normally, if a litter (stretcher) is required, it will be necessary to move the patient to the special litter which will be lowered by the helicopter. Be prepared to do this as quickly as possible. Be sure the patient is strapped in, face up, and with a life jacket on (if his condition will permit).

(3) Be sure that the patient is tagged to indicate what medication, if any, was administered to him and when it was administered.

(4) Have patient's medical record and necessary papers in an envelope or package ready for transfer with the patient.

(5) Again, if the patient's condition permits, be sure he is wearing a life jacket.

(6) Change the vessel's course to permit the ship to ride as easily as possible with the wind on the bow, preferably on the port bow. Try to choose a course to keep the stack gases clear of the hoist area.

(7) Reduce speed to ease ship's motion, but maintain steerageway.

(8) If you do not have radio contact with the helicopter, when you are in all respects ready for the hoist, signal the helicopter in with a "come on" with your hand, or at night by flashlight signals.

(9) **Allow basket or stretcher to touch deck prior to handling to avoid static shock.**

(10) If a trail line is dropped by the helicopter, guide the basket or stretcher to the deck with the line; keep the line free at all times. This line will not cause shock.

(11) Place the patient in basket, sitting with his hands clear of the sides, or in the litter, as described above. Signal the helicopter hoist operator when ready for the hoist. Patient should signal by a nodding of the head if he is able.

(12) If it is necessary to take the litter away from the hoist point, unhook the hoist cable and keep it free for the helicopter to haul in. **Do not**

secure cable or trail line to the vessel or attempt to move stretcher without unhooking.

(13) When patient is strapped into the stretcher, signal the helicopter to lower the cable, attach cable to stretcher sling (bridle), then signal the hoist operator when the patient is ready to hoist. Steady the stretcher so it will not swing or turn.

(14) If a trail line is attached to the basket or stretcher, use it to steady the patient as he is hoisted. Keep your feet clear of the line, and keep the line from becoming entangled.

Coast Guard droppable, floatable pumps.-The Coast Guard often provides vessels in distress with emergency pumps by either making parachute drops by lowering on helicopter hoist, or by delivering by vessel. The most commonly used type of pump comes complete in a sealed aluminum drum about half the size of a 50-gallon oil drum. One single lever on top opens it up. Don't be smoking as there may be gas fumes inside the can. The pump will draw about 90 gallons per minute. There should be a waterproof flashlight on top of the pump for night use. Operating instructions are provided inside the pump container.

Preparations for being towed by Coast Guard:

(1) Clear the forecastle area as well as you can.

(2) If a line-throwing gun is used, keep everyone out of the way until line clears the boat. The Coast Guard vessel will blow a police whistle or otherwise warn you before firing.

(3) Have material ready for chafing gear.

Radar reflectors on small craft.-Operators of disabled wooden craft and persons adrift in rubber rafts or boats that are, or may consider themselves to be, the object of a search, should hoist on a halyard or otherwise place aloft as high as possible any metallic object that would assist their detection by radar. Coast Guard cutters and aircraft are radar equipped and thus are able to continue searching in darkness and during other periods of low visibility. It is advisable for coastal fishing boats, yachts, and other small craft to have efficient radar reflectors permanently installed aboard the vessel.

Filing Cruising schedules.-Small-craft operators should prepare a cruising plan before starting on extended trips and leave it ashore with a yacht club, marina, friend, or relative. It is advisable to use a checking-in procedure by telephone for each point specified in the cruising plan. Such a trip schedule is vital for determining if a boat is overdue and will assist materially in locating a missing craft in the event search and rescue operations become necessary.

RADIO WARNINGS AND WEATHER

Marine radio warnings and weather forecasts are available from many sources and through several types of transmissions. Only voice radiotelephone broadcasts are described in the Coast Pilots. Radiotelegraph (CW), radioteletype, radiofacsimile, and CW broadcasts of navigational warnings and other advisories are not described, since these transmissions are normally copied only by professional radio operators. (For complete information on radio warnings and weather, see H.O. Pubs. 117A, 117B, and the Department of Commerce publication, Worldwide Marine Weather Broadcasts.)

Frequency units.-Hertz (Hz), a unit equal to one cycle per second, has been generally adopted for radio frequencies; accordingly, frequencies formerly given in the Coast Pilots in kilocycles (kc) and megacycles (mc) are now stated in **kilohertz (kHz)** and **Megahertz (MHz),** respectively.

Coast Guard radio stations.-Coast Guard radio stations provide urgent, safety, and scheduled marine information broadcasts with virtually complete coverage of the approaches and coastal waters of the United States, Puerto Rico, and the U.S. Virgin Islands.

Scheduled radiotelephone broadcasts include routine weather, small-craft warnings, storm warnings, navigation information, and other advisories on **2670 kHz,** following a preliminary call on **2182 kHz.** (See the appendix for a list of the stations and their broadcast times for the area covered by this Coast Pilot.)

Urgent and safety radiotelephone broadcasts of important Notice to Mariners items, storm warnings, and other vital marine information are transmitted upon receipt, and urgent broadcasts are repeated 15 minutes later; additional broadcasts are made at the discretion of the originator. **Urgent** broadcasts are preceded by the urgent signal PAN. **Both the urgent signal and message are transmitted on 2182 kHz. Safety** broadcasts are preceded by the safety signal SECURITY. **The safety signal is given on 2182 kHz, and the message is given on 2670 kHz.** At the discretion of the originator, urgent and safety broadcasts may also be made on VHF-FM channel 16 (156.80 MHz).

The National Weather Service operates **VHF-FM radio stations,** usually on frequencies **162.40 or 162.55 MHz,** to provide continuous recorded weather broadcasts. These broadcasts are available to those with suitable receivers within about 40 miles of the antenna site. (See the appendix for a list of these stations in the area covered by this Coast Pilot.)

Commercial radiotelephone coast stations.-Broadcasts of coastal weather and warnings are made by some commercial radiotelephone coast stations (marine operators) on the normal transmitting frequencies of the stations. Vessels with suitable receivers and desiring this service may determine the frequencies and schedules of these broadcasts from their local stations or from the series of Marine Weather Services Charts published by NWS.

Local broadcast-band radio stations.-Many local radio stations in the standard AM and FM broadcast band give local marine weather forecasts from the NWS on a regular schedule. These stations are listed on the series of Marine Weather Services Charts published by the NWS.

Reports from ships.-The master of every U.S. ship equipped with radio transmitting apparatus, on meeting with a tropical storm, dangerous ice, subfreezing air temperatures with gale force winds causing severe ice accretion on superstructures, derelict, or any other direct danger to navigation, is required to cause to be transmitted a report of these dangers to ships in the vicinity and to the appropriate Government agencies.

During the West Indies hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea area, southern North Atlantic Ocean, and the Pacific waters west of Central America and Mexico are urged to cooperate with NWS in furnishing these special reports in order that warnings to shipping and coastal areas may be issued.

TIME SIGNALS.-The U.S. system of broadcasting time signals begins at 55 minutes 0 second of some hour and continues for 5 minutes. Signals are transmitted on every second of this period except the 29th of each minute, the 51st of the first minute, the 52d of the second minute, the 53d of the third minute, the 54th of the fourth minute, the last 4 seconds of the first 4 minutes, and the last 9 seconds of the last minute. The hour signal is a 1.3-second dash, which is much longer than the others.

In all cases the beginning of the dashes indicates the beginnings of the seconds, and the ends of the dashes are without significance. The number of dashes sounded in the group at the end of any minute indicates the number of minutes of the signal yet to be sent. In case of signal failure or error, the signal is repeated 1 hour later.

Time corrections (DUT 1=UT1-UTC) will be transmitted in standard Morse Code (15 wpm) during each minute between seconds 56 and 59. The code will give the letter "A" for add and one digit to designate a positive DUT1 and the letter "S" with a digit to designate a negative correction.

The U.S. Naval Observatory, Washington, D.C., makes time signal broadcasts for the Atlantic area from Navy Radio Station NSS, Annapolis, Md., as follows: frequencies-88, 5870, 8090, 12135, 16180, 20225, and 25590 kHz; hours of transmission-0455-0500, 1055-1100, 1655-1700, and 2255-2300 Greenwich Mean Time, except that on Tuesday the frequency 185 kHz replaces 88 kHz from 1655-1700 and frequencies 20225 and 25590 kHz are used only from 1655-1700 and 2255-2300.

WWV-WWVH BROADCASTS.-The National Bureau of Standards broadcasts time signals continuously, day and night, from its radio stations **WWV**, near Fort Collins, Colo. (40°40′49″N., 105°02′27″W.), and **WWVH**, Kauai, Hawaii (21°59′26″N., 159°46′00″W.,) on radio frequencies of 2.5, 5, 10, 15, and 20 MHz, and also 25 MHz from Fort Collins only. Services include standard time signals and time intervals, time corrections, standard radio frequencies, standard audio frequencies, standard musical pitch, a slow time code, propagation forecasts, geophysical alerts, and storm warnings.

Special Publication 236 describes in detail the standard frequency and time service of the National Bureau of Standards. Single copies may be obtained upon request from the National Bureau of Standards, Boulder, Colo. 80302. Quantities may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NAUTICAL CHARTS

Reporting chart deficiencies.-Users are requested to report all significant observed discrepancies in and desirable additions to NOS nautical charts, including depth information in privately maintained channels and basins; obstructions, wrecks, and other dangers; new landmarks or the nonexistence or relocation of charted ones; uncharted fixed private aids to navigation; and deletions or additions of small-craft facilities. All such reports should be sent to The Director (C322), National Ocean Survey, Rockville, Md. 20852.

Chart symbols and abbreviations.-The standard symbols and abbreviations approved for use on all regular nautical charts published by the Defense Mapping Agency Hydrographic Center and NOS are contained in **Chart No. 1**, United States of America **Nautical Chart Symbols and Abbreviations.** The publication is available at all Defense Mapping Agency Hydrographic Center and NOS sales agents.

On certain foreign charts reproduced by the United States, and on foreign charts generally, the symbols and abbreviations used may differ from U.S. approved standards. It is, therefore, recommended that navigators who acquire and use foreign charts and reproductions procure the symbol sheet or Chart No. 1 produced by the same foreign agency.

The tidal datum for depths on NOS charts is the mean of all low waters for the Atlantic coast of the United States, including the West Indies, and the mean of the lower low waters for the Pacific coast, including the Hawaiian Islands and Alaska. The plane most frequently used on foreign charts is mean low water springs. The effect of strong winds, in combination with the regular tidal action, may at times cause the water level to fall considerably below the reference plane.

Accuracy of a nautical chart.-The value of a nautical chart depends upon the accuracy of the surveys on which it is based. The chart reflects what was found by field surveys and what has been reported to NOS Headquarters. The chart represents

general conditions at the time of surveys or reports and does not necessarily portray present conditions. Significant changes may have taken place since the date of the last survey or report.

Each sounding represents an actual measure of depth and location at the time the survey was made, and each bottom characteristic represents a sampling of the surface layer of the sea bottom at the time of sampling. Areas where sand and mud prevail, especially the entrances and approaches to bays and rivers exposed to strong tidal current and heavy seas, are subject to continual change.

In coral regions and where rocks and boulders abound, it is always possible that surveys may have failed to find every obstruction. Thus, when navigating such waters, customary routes and channels should be followed and areas avoided where irregular and sudden changes in depth indicate conditions associated with pinnacle rocks, coral heads, or boulders.

Information charted as "reported" should be treated with caution in navigating the area because the actual conditions have not been verified by government surveys.

The **date of a chart** is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. Announcements of new editions of nautical charts are usually published in notices to mariners. A quarterly list of the latest editions is distributed to sales agents; free copies may be obtained from the sales agents or by writing to Distribution Division (C44), National Ocean Survey, 6501 Lafayette Avenue, Riverdale, Md. 20840.

NOTE: Effective July 1, 1974, the National Ocean Survey and the Defense Mapping Agency Hydrographic Center adopted a uniform **U.S. Nautical Chart Numbering System.** Prefix C&GS and suffix SC, for charts published by NOS, and prefix N.O., for charts published by the Defense Mapping Agency Hydrographic Center, are not used in the new numbering system. The Coast Pilot reflects the new numbers followed by the former C&GS and/or N.O. numbers in parentheses as appropriate. However, until further notice, users of NOS charts are requested to order by the former numbers from NOS and/or its authorized sales agents. Any changes in chart ordering procedures will be announced in the Weekly Notice to Mariners and Local Notices to Mariners. Charts mentioned in the Coast Pilot that are published and sold by the Defense Mapping Agency Hydrographic Center and its authorized sales agents are preceded by an asterisk.

Corrections to charts.-It is essential for navigators to keep charts corrected through information published in the notices to mariners, especially since the NOS no longer hand-corrects charts prior to distribution.

Caution in using small-scale charts.-Dangers to navigation cannot be shown with the same amount of detail on small-scale charts as on those of larger scale. Therefore, the largest scale chart of an area should always be used.

The **scales of nautical charts** range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scales of 1:80,000 or larger, and numerical scales are given on smaller scale charts. NOS charts are classified according to scale as follows:

Sailing charts, scales 1:600,000 and smaller, are for use in fixing the mariner's position as he approaches the coast from the open ocean, or for sailing between distant coastwise ports. On such charts the shoreline and topography are generalized and only offshore soundings, and the principal lights, outer buoys, and landmarks visible at considerable distances are shown.

General charts, scales 1:100,000 to 1:600,000, are for coastwise navigation outside of outlying reefs and shoals.

Coast charts, scales 1:50,000 to 1:100,000 are for inshore navigation leading to bays and harbors of considerable width and for navigating large inland waterways.

Harbor charts, scales larger than 1:50,000, are for harbors, anchorage areas, and the smaller waterways.

Special charts, various scales, cover the Intracoastal waterways and miscellaneous small-craft areas.

Blue tint in water areas.-A blue tint is shown in water areas on many charts to accentuate shoals and other areas considered dangerous for navigation when using that particular chart. Since the danger curve varies with the intended purpose of a chart a careful inspection should be made to determine the contour depth of the blue tint areas.

Caution on bridge and cable clearances.-For bascule bridges whose spans do not open to a full vertical position, unlimited overhead clearance is not available for the entire charted horizontal clearance when the bridge is open, due to the inclination of the drawspans over the channel.

The charted clearances of overhead cables are for the lowest wires at normal high water unless otherwise stated. **Vessels with masts, stacks, booms, or antennas should allow sufficient clearance under power cables to avoid arcing.**

Submarine cables and pipelines cross many waterways used by both large and small vessels, but all of them may not be charted. For inshore areas, they usually are buried beneath the seabed, but for offshore areas, they may lie on the ocean floor. Warning signs are often posted to warn mariners of their existence.

The installation of submarine cables or pipelines in U.S. waters or the continental shelf of the United States is under the jurisdiction of one or more Federal agencies, depending on the nature of the installation. They are shown on the charts when the necessary information is reported to NOS and they have been recommended for charting by the cognizant agency. The chart symbols for

submarine cable and pipeline areas are usually shown for inshore areas, whereas, chart symbols for submarine cable and pipeline routes may be shown for offshore areas. Submarine cables and pipelines are not described in the Coast Pilots.

In view of the serious consequences resulting from damage to submarine cables and pipelines, vessel operators should take special care when anchoring, fishing, or engaging in underwater operations near areas where these cables or pipelines may exist or have been reported to exist.

Certain cables carry high voltage, while many pipelines carry natural gas under high pressure or petroleum products. Electrocution, fire, or explosion with injury, loss of life, or a serious pollution incident could occur if they are broached.

Vessels fouling a submarine cable or pipeline should attempt to clear without undue strain. Anchors or gear that cannot be cleared should be slipped, but no attempt should be made to cut a cable or pipeline.

Artificial obstructions to navigation.-Disposal areas are designated by the Corps of Engineers for depositing dredged material where existing depths indicate that the intent is not to cause sufficient shoaling to create a danger to surface navigation. The areas are charted without blue tint, and soundings and depth curves are retained.

Dumping grounds are areas established by Federal regulation (Part 205, Title 33, Code of Federal Regulations) in which dumping of dredged material and other nonbuoyant objects is prohibited or in which such dumping is allowed with the permission of and under the supervision of the Corps of Engineers.

Spoil areas are for the purpose of depositing dredged material, usually near and parallel to dredged channels; they are usually a hazard to navigation. Spoil areas are usually charted from survey drawings from Corps of Engineers after-dredging surveys, though they may originate from private or other Government agency surveys. Spoil areas are tinted blue on the charts and labeled, and all soundings and depth curves are omitted. Navigators of even the smallest craft should avoid crossing spoil areas.

Fish havens are established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk ranging from old trolley cars and barges to scrap building material in areas which may be of very small extent or may stretch a considerable distance along a depth curve; old automobile bodies are a commonly used material. The Corps of Engineers must issue a permit, specifying the location and depth over the reef, before such a reef may be built. However, the reefbuilders' adherence to permit specifications can be checked only with a wire drag. Fish havens are outlined and labeled on the charts, but soundings and depth curves are usually retained and blue tinting is seldom used. Navigators should be cautious about passing over fish havens or anchoring in their vicinity.

Fishtrap areas are areas established by the Corps of Engineers in which traps may be built and maintained according to established regulations. The areas and regulations are in Part 206, Title 33, Code of Federal Regulations. The fish stakes which may exist in these areas are obstructions to navigation and may be dangerous. The limits of fishtrap areas and a cautionary note are usually charted. Navigators should avoid these areas.

Local magnetic disturbances.-If measured values of magnetic variation differ from the expected (charted) values by several degrees, a magnetic disturbance note will be printed on the chart. The note will indicate the location and magnitude of the disturbance, but the indicated magnitude should not be considered as the largest possible value that may be encountered. Large disturbances are more frequently detected in the shallow waters near land masses than on the deep sea. Generally, the effect of a local magnetic disturbance diminishes rapidly with distance, but in some locations there are multiple sources of disturbances and the effects may be distributed for many miles.

Compass roses on charts.-Each compass rose shows the date, magnetic variation, and the annual change in variation. Prior to the new edition of a nautical chart, the compass roses are reviewed. Corrections for annual change and other revisions may be made as a result of newer and more accurate information. On some general and sailing charts, the magnetic variation is shown by isogonic lines in addition to the compass roses.

The **Mercator projection** used on most nautical charts has straight-line meridians and parallels that intersect at right angles. On any particular chart the distances between meridians are equal throughout, but distances between parallels increase progressively from the equator toward the poles, so that a straight line between any two points is a rhumb line. This unique property of the Mercator projection is one of the main reasons why it is preferred by the mariner.

Echo soundings.-Ship's echo sounders may indicate small variations from charted soundings; this may be due to the fact that various corrections (instrument corrections, settlement and squat, draft, and velocity corrections) are made to echo soundings in surveying which are not normally made in ordinary navigation, or to observational errors in reading the echo sounder. Instrument errors vary between different equipment and must be determined by calibration aboard ship. Most types of echo sounders are factory calibrated for a velocity of sound in water of 800 fathoms per second, but the actual velocity may differ from the calibrated velocity by as much as 5 percent, depending upon the temperature and salinity of the waters in which the vessel is operating; the highest velocities are found in warm, highly saline water, and the lowest in icy, fresh water. Velocity cor-

rections for these variations are determined and applied to echo soundings during hydrographic surveys. All echo soundings must be corrected for the vessel's draft, unless the draft correction has been set on the echo sounder.

Observational errors include misinterpreting false echos from schools of fish, seaweed, etc., but the most serious error which commonly occurs is where the depth is greater than the scale range of the instrument; a 400-fathom scale indicates 15 fathoms when the depth is 415 fathoms. Caution in navigation should be exercised when wide variations from charted depths are observed.

AIDS TO NAVIGATION

Reporting of defects in aids to navigation.-Promptly notify the nearest Coast Guard District Commander if an aid to navigation is observed to be missing, sunk, capsized, out of position, damaged, extinguished, or showing improper characteristics.

Radio messages should be prefixed "Coast Guard" and transmitted directly to any U.S. Government shore radio station for relay to the Coast Guard District Commander. If the radio call sign of the nearest U.S. Government radio shore station is not known, radiotelegraph communication may be established by the use of the general call "NCG" on the frequency of 500 kHz. Merchant ships may send messages relating to defects noted in aids to navigation through commercial facilities only when they are unable to contact a U.S. Government shore radio station. Charges for these messages will be accepted "collect" by the Coast Guard.

Lights.-The visibility of lights is given in the Light Lists and on the charts. The Light Lists give both the nominal range and geographic range, whereas the charts show only the shorter range (charts with edition or revision dates prior to July 1969 may not conform to this policy). **Nominal range** is the luminous range (a function of light intensity) in clear weather (meteorological visibility 10 miles), and **geographic range** is the maximum distance at which a light can be seen with perfect visibility (without regard to light intensity) with the observer's eye 15 feet above sea level. The actual luminous range for meteorological visibilities other than 10 miles may be determined graphically. (See the Light List.) Geographic range is a function of only the curvature of the earth and is determined solely from the heights above sea level of the light and the observer's eye; therefore, to determine the actual geographic range for a height of eye other than 15 feet, the geographic range from the Light List or chart must be corrected by a distance corresponding to the height difference, the distance correction being determined from a table of "distances of visibility for various heights above sea level." (See Light List or Coast Pilot table following appendix.) The maximum distances at which lights can be seen may at times be increased by abnormal atmospheric refraction and may be greatly decreased by unfavorable weather conditions, such as fog, rain, haze, or smoke. All except the most powerful lights are easily obscured by such conditions. In some conditions of the atmosphere white lights may have a reddish hue. During weather conditions which tend to reduce visibility, colored lights are more quickly lost to sight than are white lights. Navigational lights should be used with caution because of the following conditions that may exist:

A light may be extinguished and the fact not reported to the Coast Guard for correction, or a light may be located in an isolated area where it will take time to correct.

In regions where ice conditions prevail the lantern panes of unattended lights may become covered with ice or snow, which will greatly reduce the visibility and may also cause colored lights to appear white.

Brilliant shore lights used for advertising and other purposes, particularly those in densely populated areas, make it difficult to identify a navigational light.

At short distances flashing lights may show a faint continuous light between flashes.

The distance of an observer from a light cannot be estimated by its apparent intensity. The characteristics of lights in an area should always be checked in order that powerful lights visible in the distance will not be mistaken for nearby lights showing similar characteristics at low intensity such as those on lighted buoys.

The apparent characteristic of a complex light may change with the distance of the observer, due to color and intensity variations among the different lights of the group. The characteristic as charted and shown in the Light List may not be recognized until nearer the light.

Motion of a vessel in a heavy sea may cause a light to alternately appear and disappear, and thus give a false characteristic.

Where lights have different colored sectors, be guided by the correct bearing of the light; do not rely on being able to accurately observe the point at which the color changes. On either side of the line of demarcation of colored sectors there is always a small arc of uncertain color.

On some bearings from the light, the range of visibility of the light may be reduced by obstructions. In such cases, the obstructed arc might differ with height of eye and distance. When a light is cut off by adjoining land and the arc of visibility is given, the bearing on which the light disappears may vary with the distance of the vessel from which observed and with the height of eye. When the light is cut off by a sloping hill or point of land, the light may be seen over a wider arc by a ship far off than by one close to.

Arcs of circles drawn on charts around a light are not intended to give information as to the

distance at which it can be seen, but solely to indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation of visibility or obscuration of the light occurs.

Lights of equal candlepower but of different colors may be seen at different distances. This fact should be considered not only in predicting the distance at which a light can be seen, but also in identifying it.

Lights should not be passed close aboard, because in many cases riprap mounds are maintained to protect the structure against ice damage and scouring action.

Many prominent towers, tanks, smokestacks, buildings, and other similar structures, charted as landmarks, display flashing and/or fixed red aircraft obstruction lights. Lights shown from landmarks are charted only when they have distinctive characteristics to enable the mariner to positively identify the location of the charted structure.

Lights and clearance gages on bridges.-The Coast Guard regulates marine obstruction lights and clearance gages on bridges across navigable waters. Where installed, clearance gages are generally vertical numerical scales, reading from top to bottom, and show the actual vertical clearance between the existing water level and the lowest point of the bridge over the channel; the gages are normally on the right-hand pier or abutment of the bridge, on both the upstream and downstream sides.

Bridge lights are fixed red or green, and are privately maintained; they are generally not charted or described in the text of the Coast Pilots. All bridge piers (and their protective fenders) and abutments which are in or adjacent to a navigation channel are marked on all channel sides by red lights. On each channel span of a fixed bridge, there is a range of two green lights marking the center of the channel and a red light marking both edges of the channel, except that when the margins of the channel are confined by bridge piers, the red lights on the span are omitted, since the pier lights then mark the channel edges; for multiplespan fixed bridges, the main-channel span may also be marked by three white lights in a vertical line above the green range lights.

On all types of drawbridges, one or more red lights are shown from the drawspan (higher than the pier lights) when the span is closed; when the span is open, the higher red lights are obscured and one or two green lights are shown from the drawspan, higher than the pier lights. The number and location of the red and green lights depend upon the type of drawbridge.

A complete description of bridge lighting is contained in Coast Guard Publication 208. Bridges and their lighting, construction, maintenance, and operation are set forth in the Code of Federal Regulations, Title 33, Parts 68 and 114-117. Aircraft obstruction lights, prescribed by the Federal Aviation Administration, may operate at certain bridges. Drawbridge operation regulations are published in chapter 2 of the Coast Pilots.

Fog signals.-Caution should be exercised in the use of sound fog signals for navigation purposes. They should be considered solely as warning devices.

Sound travels through the air in a variable manner, even without the effects of wind; therefore, the hearing of fog signals cannot be implicitly relied upon.

Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a fog signal in which it is not heard; and that fog may exist not far from a station, yet not be seen from it, so the signal may not be operating. It is not always possible to start a fog signal immediately when fog is observed.

Avoidance of collision with lightships, ocean station vessels, offshore light stations, and large navigational buoys (LNB).-Courses should invariably be set to pass these aids with sufficient clearance to avoid the possibility of collision from any cause. Errors of observation, current and wind effects, other vessels in the vicinity, and defects in steering gear may be, and have been the cause of actual collisions, or imminent danger thereof, needlessly jeopardizing the safety of these facilities and their crews, and of all navigation dependent on these important aids to navigation.

Experience shows that lightships and offshore light stations cannot be safely used as leading marks to be passed close aboard, but should always be left broad off the course, whenever sea room permits. When approaching lightships, ocean station vessels, fixed offshore light structures, and large navigational buoys (LNB) on radio bearings, the risk of collision will be avoided by insuring that radio bearing does not remain constant.

It should be borne in mind that most lightships and large buoys are anchored to a very long scope of chain and, as a result, the radius of their swinging circle is considerable. The charted position is the location of the anchor. Furthermore under certain conditions of wind and current, they are subject to sudden and unexpected sheers which are certain to hazard a vessel attempting to pass close aboard.

During extremely heavy weather and due to their exposed locations, lightships may be carried off station without the knowledge and despite the best efforts of their crews. The mariner should, therefore, not implicitly rely on a lightship maintaining its precisely charted position during and immediately following severe storms. A lightship known to be off station will secure her light, fog signal, and radiobeacon and fly the International Code signal "LO" signifying "I am not in my correct position".

Watch (station) buoys are sometimes moored near lightships and seacoast buoys to mark the ap-

proximate station should these important aids be carried away or temporarily removed. The lightship watch buoy also gives the crew an indication of dragging.

Since these uncharted buoys are always unlighted and, in some cases, moored as much as a mile from the lightship or seacoast buoy, the danger of a closely passing vessel colliding with them is always present-particularly so during darkness or periods of reduced visibility.

Buoys.-The aids to navigation depicted on charts comprise a system consisting of fixed and floating aids with varying degrees of reliability. Therefore, prudent mariners will not rely solely on any single aid to navigation, particularly a floating aid.

The buoy symbol is used to indicate the approximate position of the buoy body and the sinker which secures the buoy to the seabed. The approximate position is used because of practical limitations in positioning and maintaining buoys and their sinkers in precise geographical locations. These limitations include, but are not limited to, inherent imprecisions in position fixing methods, prevailing atmospheric and sea conditions, the slope of and the material making up the seabed, the fact that buoys are moored to sinkers by varying lengths of chain, and the fact that buoy body and/or sinker positions are not under continuous surveillance but are normally checked only during periodic maintenance visits which often occur more than a year apart. The position of the buoy body can be expected to shift inside and outside the charting symbol due to the forces of nature. The mariner is also cautioned that buoys are liable to be carried away, shifted, capsized, sunk, etc. Lighted buoys may be extinguished or sound signals may not function as the result of ice, running ice or other natural causes, collisions, or other accidents.

For the foregoing reasons, a prudent mariner must not rely completely upon the position or operation of floating aids to navigation, but will also utilize bearings from fixed objects and aids to navigation on shore. Further, a vessel attempting to pass close aboard always risks collision with a yawing buoy or with the obstruction the buoy marks.

Buoys may not always properly mark shoals or other obstructions due to shifting of the shoals or of the buoys. Buoys marking wrecks or other obstructions are usually placed on the seaward or channelward side and not directly over a wreck. Since buoys may be located some distance from a wreck they are intended to mark, and since sunken wrecks are not always static, extreme caution should be exercised when operating in the vicinty of such buoys.

Caution, channel markers.-Lights, daybeacons, and buoys along dredged channels do not always mark the bottom edges. Due to local conditions, aids may be located inside or outside the channel limits shown by dashed lines on a chart. The Light List tabulates the offset distances for these aids in many instances.

Aids may be moved, discontinued, or replaced by other types to facilitate dredging operations. Mariners should exercise caution when navigating areas where dredges with auxiliary equipment are working.

Temporary changes in aids are not included on the charts.

Radiobeacons.-A map showing the locations and operating details of marine radiobeacons is given in each Light List. This publication describes the procedure to follow in using radiobeacons to calibrate radio direction-finders as well as listing special radio direction-finder calibration stations.

A vessel steering a course for a radiobeacon should observe the same precautions as when steering for a light or any other mark. If the radiobeacon is aboard a lightship, particular care should be exercised to avoid the possibility of collision, and sole reliance should never be placed on sighting the lightship or hearing its fog signal. If there are no dependable means by which the vessel's position may be fixed and the course changed well before reaching the lightship, a course should be selected that will insure passing the lightship at a distance, rather than close aboard, and repeated bearings of the radiobeacon should show an increasing change in the same direction.

Radio bearings.-No exact data can be given as to the accuracy to be expected in radio bearings taken by a ship, since the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information for themselves by taking frequent radio bearings, when their ship's position is accurately known, and recording the results.

Radio bearings obtained at twilight or at night, and bearings which are almost parallel to the coast, should be accepted with reservations, due to "night effect" and to the distortion of radio waves which travel overland. Bearings of aircraft ranges and standard broadcast stations should be used with particular caution due to coastal refraction and lack of calibration of their frequencies.

Conversion of radio bearings to Mercator bearings.-Radio directional bearings are the bearings of the great circles passing through the radio stations and the ship, and, unless in the plane of the Equator or a meridian, would be represented on a Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on a Mercator chart, so it is necessary to apply a correction to a radio bearing to convert it into a Mercator bearing, that is, the bearing of a straight line on a Mercator chart laid off from the sending station and passing through the receiving station.

A table of corrections for the conversion of a radio bearing into a Mercator bearing follows the

appendix. It is sufficiently accurate for practical purposes for distances up to 1,000 miles.

The only data required are the latitudes and longitudes of the radiobeacons and of the ship by dead reckoning. The latter is scaled from the chart, and the former is either scaled from the chart or taken from the Light List.

The table is entered with the differences of longitude in degrees between the ship and station (the nearest tabulated value being used), and opposite the middle latitude between the ship and station, the correction to be applied is read.

The sign of the correction (bearings read clockwise from the north) will be as follows: In north latitude, the minus sign is used when the ship is east of the radiobeacon and the plus sign used when the ship is west of the radiobeacon. In south latitude, the plus sign is used when the ship is east of the radiobeacon, and the minus sign is used when the ship is west of the radiobeacon.

To facilitate plotting, 180 degrees should be added to or subtracted from the corrected bearing, and the result plotted from the radiobeacon.

Should the position by dead reckoning differ greatly from the true position of the ship as determined by plotting the corrected bearings, retrial should be made, using the new value as the position of the ship.

Radio bearings from other vessels.-Any vessel with a radio direction-finder can take a bearing on a vessel equipped with a radio transmitter. These bearings, however, should be used only as a check, as comparatively large errors may be introduced by local conditions surrounding the radio direction-finder unless known and accounted for. Although any radio station, for which an accurate position is definitely known, may serve as a radiobeacon for vessels equipped with a radio direction-finder, extreme caution must be exercised in their use. Stations established especially for maritime services are more reliable.

Loran.-A list of stations and descriptive details of the Loran System are given in the Light Lists. Instructions, tables, and charts of the Loran System are published by the Defense Mapping Agency Hydrographic Center. NOS shows Loran lines on general charts of the U.S. coasts.

Exact data cannot be given as to the accuracy to be expected in loran positions since the accuracy depends to a large extent on the skill of the operator, the condition and type of receiving equipment, and the area of operation. The accuracy of a loran fix is determined by the accuracy of the individual lines of positions used to establish the fix and by their angle of intersection.

Loran position determinations on or near the baseline extensions are subject to geometric errors exceeding 2 nautical miles per microsecond and, therefore, should be avoided whenever possible. Loran is a long-range aid to navigation and should not normally be used in pilot waters. The use of skywaves is not recommended within 250 miles of either station.

Caution must be used in matching loran signals to insure that the ground wave signal of one station is not unknowingly matched with a skywave signal of the other station of the pair, or a one-hop skywave signal from a station with a two-hop skywave signal from the other.

Uniform State Waterway Marking System.-Many bodies of water used by boatmen are located entirely within the boundaries of a State. The Uniform State Waterway Marking System (USWMS) has been developed to indicate to the small-boat operator hazards, obstructions, restricted or controlled areas, and to provide directions. Although intended primarily for waters within the State boundaries, USWMS is suited for use in all water areas, since it supplements and is generally compatible with the Coast Guard lateral system of aids to navigation. The Coast Guard is gradually employing more aids bearing the USWMS geometric shapes described below.

Two categories of waterway markers are employed. Regulatory markers, buoys, and signs use distinctive standard shape marks to show regulatory information. The signs are white with black letters and have a wide orange border. They signify speed zones, restricted areas, danger areas, and directions to various places. Aids to navigation on State waters use red and black buoys to mark channel limits. Red and black buoys are generally used in pairs. The boat should pass between the red buoy and its companion black buoy. If the buoys are not placed in pairs, the distinctive color of the buoy indicates the direction of dangerous water from the buoy. White buoys with red tops should be passed to the south or west, indicating that danger lies to the north or east of the buoy. White buoys with black tops should be passed to the north or east. Danger lies to the south or west. Vertical red and white striped buoys indicate a boat should not pass between the buoy and the nearest shore. Danger lies inshore of the buoy.

DESTRUCTIVE WAVES.-Unusual sudden changes in water level can be caused by tsunamis or violent storms. These two types of destructive waves have become commonly known as **tidal waves,** a name which is technically incorrect as they are not the result of tide-producing forces.

Tsunamis (seismic sea waves) are setup by submarine earthquakes. Many such seismic disturbances do not produce sea waves and often those produced are small, but the occasional large waves can be very damaging to shore installations and dangerous to ships in harbors.

These waves travel great distances and can cause tremendous damage on coasts far from their source. The wave of April 1, 1946, which originated in the Aleutian Trench, demolished nearby Scotch Cap Lighthouse and caused damages of $25 million in the Hawaiian Islands 2,000 miles away. The wave of May 22-23, 1960, which originated off southern Chile, caused

widespread death and destruction in islands and countries throughout the Pacific.

The speed of tsunamis varies with the depth of the water, reaching 300 to 500 knots in the deep water of the open ocean. In the open sea they cannot be detected from a ship or from the air because their length is so great, sometimes a hundred miles, as compared to their height, which is usually only a few feet. Only on certain types of shelving coasts do they build up into waves of disastrous proportions.

There is usually a series of waves with crests 10 to 40 minutes apart, and the highest may occur several hours after the first wave. Sometimes the first noticeable part of the wave is the trough which causes a recession of the water from shore, and people who have gone out to investigate this unusual exposure of the beach have been engulfed by the oncoming crest. Such an unexplained withdrawal of the sea should be considered as nature's warning of an approaching wave.

Improvements have been made in the quick determination and reporting of earthquake epicenters, but no method has yet been perfected for determining whether a sea wave will result from a given earthquake. The Honolulu Observatory of the National Oceanic and Atmospheric Administration is headquarters of a warning system which has field reporting stations (seismic and tidal) in most countries around the Pacific. When a warning is broadcast, waterfront areas should be vacated for higher ground, and ships in the vicinity of land should head for the deep water of the open sea.

Storm surge.-A considerable rise or fall in the level of the sea along a particular coast may result from strong winds and sharp change in barometric pressure. In cases where the water level is raised, higher waves can form with greater depth and the combination can be destructive to low regions, particularly at high stages of tide. Extreme low levels can result in depths which are considerably less than those shown on nautical charts. This type of wave occurs especially in coastal regions bordering on shallow waters which are subject to tropical storms.

Seiche is a stationary vertical wave oscillation with a period varying from a few minutes to an hour or more, but somewhat less than the tidal periods. It is usually attributed to external forces such as strong winds, changes in barometric pressure, swells, or tsunamis disturbing the equilibrium of the water surface. Seiche is found both in enclosed bodies of water and superimposed upon the tides of the open ocean. When the external forces cause a short-period horizontal oscillation of the water, it is called **surge.**

The combined effect of seiche and surge sometimes makes it difficult to maintain a ship in its position alongside a pier even though the water may appear to be completely undisturbed, and heavy mooring lines have been parted repeatedly under such conditions. Pilots advise taut lines to reduce the effect of the surge.

SPECIAL SIGNALS FOR CERTAIN VESSELS

Special signals for surveying vessels.-Pilot Rules for Inland Waters, §80.33, state that by day a surveying vessel of the National Ocean Survey (NOS), underway and employed in hydrographic surveying, may carry in a vertical line, one over the other not less than 6 feet apart where they can best be seen, three shapes not less than 2 feet in diameter of which the highest and lowest shall be globular in shape and green in color and the middle one diamond in shape and white.

(a) Vessels of NOS shall carry the above-prescribed marks while actually engaged in hydrographic surveying and underway, including drag work. Launches and other boats shall carry the prescribed marks when necessary.

(b) It must be distinctly understood that these special signals serve only to indicate the nature of the work upon which the vessel is engaged and in no way give the surveying vessel the right-of-way over other vessels or obviate the necessity for a strict observance of the rules for preventing collision of vessels.

(c) By night a surveying vessel of NOS, underway and employed in hydrographic surveying, shall carry the regular lights prescribed by the rules of the road.

(d) A vessel of NOS, when at anchor in a fairway on surveying operations, shall display from the mast during the daytime two black balls in a vertical line and 6 feet apart. At night two red lights shall be displayed in the same manner. In the case of a small vessel the distance between the balls and between the lights may be reduced to not less than 3 feet if necessary.

(e) Such vessels, when at anchor in a fairway on surveying operations, shall have at hand and show, if necessary, in order to attract attention, a flare-up light in addition to the lights which are, by this section required to be carried.

International Rules of the Road, Part B, Rule 4 (c), states that a vessel engaged in laying or in picking up a submarine cable or navigation mark, or a vessel engaged in surveying or underwater operations, or a vessel engaged in replenishment at sea, or in the launching or recovery of aircraft when from the nature of her work she is unable to get out of the way of approaching vessels, shall carry in lieu of the lights prescribed in Rule 2 (a) (i) and (ii), or Rule 7 (a) (i), three lights in a vertical line one over the other so that the upper and lower lights shall be the same distance from, and not less than 6 feet above or below, the middle light. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all round the horizon at a distance of at least 2 miles. By day, she shall carry in a vertical line one over the other not less than 6 feet apart, where they can best be seen, three shapes each not less than 2 feet in diameter, of which the highest and lowest shall be

globular in shape and red in color, and the middle one diamond in shape and white.

The **wire drags** used by NOS in sweeping for dangers to navigation may be crossed by vessels without danger of fouling at any point except between the towing launches and the large buoys near them, where the towline approaches the surface of the water. Vessels passing over the drag are requested to change course so as to cross it approximately at right angles, as a diagonal course may cause the propeller to foul the supporting buoys and attached wires. No attempt should be made to pass between the drag launches while the wire is being set out or taken in, unless it would endanger a vessel to do otherwise, because the bottom wire is slack and the floats at each 100-foot section may lift it nearly to the surface; at this time the launches usually are headed directly toward or away from each other and the operation may be clearly seen.

Warning signals for Coast Guard vessels while handling or servicing aids to navigation:

Inland waters (Inland Rules):

DAY, two orange and white vertically striped balls in a vertical line not less than 3 feet nor more than 6 feet apart displayed from the yardarm.

NIGHT, two red lights in a vertical line not less than 3 feet nor more than 6 feet apart.

Vessels, with or without tows, passing Coast Guard vessels displaying this signal shall reduce speed sufficiently to insure the safety of both vessels, and when passing within 200 feet of the Coast Guard vessel displaying this signal, their speed shall not exceed 5 miles per hour.

High seas (International Rules):

DAY, three shapes each not less than 2 feet in diameter in a vertical line not less than 6 feet apart, the highest and lowest being red globular shapes and the middle being a white diamond shape.

NIGHT, three lights in a vertical line not less than 6 feet apart, the highest and lowest being red and the middle being white in color.

Minesweeper signals.-U.S. vessels engaged in minesweeping operations or exercises are hampered to a considerable extent in their maneuvering powers. With a view to indicating the nature of the work on which they are engaged, these vessels will show the signals hereinafter mentioned. For the public safety, all other vessels, whether steamers or sailing craft, must endeavor to keep out of the way of vessels displaying these signals and not approach them inside the distances mentioned herein, especially remembering that it is dangerous to pass between the vessels of a pair or group sweeping together.

All vessels towing sweeps are to show: **By day,** a black ball at the fore truck and a black ball at the fore yard on the side or sides on which it is dangerous to pass; there may be thus two or three black balls displayed; **By night,** all around green lights instead of the black balls, and in a similar manner.

Vessels or formations showing these signals are not to be approached nearer than 1,500 feet on either beam and vessels are not to cross astern closer than 3,000 feet. Under no circumstances is a vessel to pass through a formation of minesweepers. Minesweepers should be prepared to warn merchant vessels which persist in approaching too close by means of any of the appropriate signals from the International Code of Signals. In fog, mist, falling snow, heavy rainstorms, or any other condition similarily restricting visibility, whether by day or night, minesweepers while towing sweeps when in the vicinity of other vessels will sound whistle signals for a vessel towing (one prolonged blast followed by two short blasts).

Submarine emergency identification signals.-U.S. submarines are equipped with signal ejectors which may be used to launch identification signals, including emergency signals. Two general types of signals may be used: smoke floats and flares or stars. The smoke floats, which burn on the surface, produce a dense colored smoke for a period of 15 to 45 seconds. The flares or stars are propelled to a height of three hundred to four hundred feet from which they descend by small parachute. The flares or stars burn for about 25 seconds. The color of the smoke or flare/star has the following meaning:

Green or black is used under training exercise conditions only to indicate that a torpedo has been fired or that the firing of a torpedo has been simulated.

Yellow indicates the submarine is about to rise to periscope depth. Surface craft terminate antisubmarine counterattack and clear vicinity of submarine. Do not stop propellers.

Red indicates an emergency inside the submarine; she will try to surface immediately. Surface ships clear the area and stand by to assist. In case of repeated red signals, or if the submarine fails to surface in a reasonable time, she may be presumed disabled. Buoy the location, look for submarine buoy, and attempt to establish sonar communications. Advise U.S. Navy authorities.

Submarine marker buoys consist of 2 spheres 3 feet in diameter with connecting structure, painted international orange. The buoy has a wire cable to the submarine, to act as a downhaul line for a rescue chamber. The buoy may be accompanied by an oil slick release to attract attention. A submarine on the bottom in distress may release this buoy. If sighted, such a buoy should be investigated and reported immediately to U.S. Navy authorities.

The submarine may transmit the International Distress Signal (SOS) on its sonar gear independently or in additional to the red signal. Submarine also may use these other means of attracting attention: release of dye marker or air bubble; ejection of oil; pounding on hull; ejection of lifejackets and other floating objects; ejection of emergency

transmitter buoy, which sends the CW coded signal "SOS SUB SUNK SOS" on 121.5 MHz.

Special signals for deep-draft ships in narrow channel.-The following "Recommendation on Additional Signals for Deep-Draught Ships in Narrow Channels" was adopted by the Inter-Governmental Maritime Consultative Organization (IMCO) on November 26, 1968:

"A power-driven vessel under way in a narrow channel which, owing to its draught, can navigate only inside such channel, may carry in addition to the lights prescribed in Rule 2 (a) (i), (ii), (v) and Rule 10 (a) of the International Regulations for Preventing Collisions at Seas and during the same circumstances as prescribed in the Regulations for these lights, three red lights in a vertical line one over the other so that the upper and lower lights shall be the same distance from and not less than 6 feet (1.83 meters) above or below the middle light. They shall be carried where they can best be seen and visible all around the horizon at a distance of at least 2 miles. By day such a vessel may carry, where it can best be seen, a black cylinder of not less than two feet (0.61 meters) in diameter and a height of not less than 3.5 feet (1.07 meters)."

The recommendation is not mandatory but may be used on an optional basis. Familiarity with the signals is necessary as it may be encountered in use by U.S. and/or foreign flag vessels throughout the world. The night signal recommended above is similar to the U.S. Pilot Rules provisions for vessels engaged in underwater construction and related operations, but confusion between these vastly different situations is considered unlikely.

NAVIGATION RESTRICTIONS AND REQUIREMENTS

Traffic Separation Schemes.-To increase the safety of navigation, particularly in areas of high shipping density, routes incorporating traffic separation have, with the approval of the Inter-Governmental Maritime Consultative Organization (IMCO), been established in certain areas of the world. In the interest of safe navigation, it is recommended that through traffic should use such routes, as far as circumstances permit, by day and by night and in all weather conditions. The routes which are intended for use by all vessels are **not mandatory**, and do not give any special rights to vessels using them.

General principles for navigation in Traffic Separation Schemes are as follows:

(1) The International Regulations for Preventing Collisions at Sea and the Inland Rules of the Road, as appropriate, must be observed at all times.

(2) Ships navigating in lanes should keep to starboard of the separation line or separation (buffer) zone.

(3) Ships entering or leaving traffic lanes should normally do so at the ends of the lanes. When necessary to enter or leave lanes from the sides, ships should do so at as small an angle as practicable.

(4) Ships navigating in lanes should insure, as far as possible, that their courses conform with the axis of the lanes.

(5) Ships should avoid crossing traffic lanes.

(6) When necessary to cross traffic lanes, ships should, as far as practicable, do so at right angles.

(7) Other than by crossing ships, the separation (buffer) zone should not be crossed except in cases of emergency to avoid immediate danger.

(8) The arrows printed in the tracks shown on charts are intended only to give the general direction of traffic, and ships need not set their courses strictly along the arrows; the full width of each lane should be considered as available for navigation.

When approved or established, traffic separation scheme details are announced in Notice to Mariners, and later depicted on appropriate charts and included in Coast Pilots and Sailing Directions.

Oil Pollution.-The Oil Pollution Act, 1961, as amended, provides for **prohibited zones** throughout the world within which the discharge of oil or any oily mixture is unlawful. The prohibited zones for the United States, Puerto Rico, the U.S. Virgin Islands, and adjacent foreign territory include sea areas within 50 miles from the nearest land and the following sea areas extending more than 50 miles from the nearest land: North-West Atlantic Zone, comprising the sea areas within a line drawn from 38°47'N., 73°43'W., to 39°58'N., 68°34'W., thence to 42°05'N., 64°37'W., thence along the east coast of Canada at a distance of 100 miles from the nearest land. Canadian Western Zone (Pacific Ocean), extending for a distance of 100 miles from the nearest land along the west coast of Canada.

The law applies (with the exceptions stated below) to any seagoing vessel of any type whatsoever of American registry or nationality, including floating craft towed by another vessel making a sea voyage; this includes a **"tanker"**, defined as a type of ship in which the greater part of the cargo space is constructed or adapted for the carriage of liquid cargoes in bulk and which is not, for the time being, carrying a cargo other than oil in that part of its cargo space. The excepted categories of vessels are: tankers of under 150 gross tons, and other ships of under 500 gross tons; ships for the time being engaged in the whaling industry when actually employed on whaling operations; ships for the time being navigating the Great Lakes of North America and their connecting and tributary waters as far east as the lower exit of St. Lambert Lock at Montreal in the Province of Quebec, Canada; naval ships and ships for the time being used as naval auxiliaries.

Foreign vessels to which the International Convention for the Prevention of the Pollution of the Sea by Oil (1954, as amended) applies, while in the territorial waters of the United States, may be

boarded, examined, and required to produce records as provided in Section 11 of the Oil Pollution Act of 1961, as amended. (For a complete discussion of the Oil Pollution Regulations, see the Code of Federal Regulations, Title 33, Part 151.)

The Federal Water Pollution Control Act, as amended, prohibits the discharge of harmful quantities of oil into the navigable waters of the United States, the contiguous zone, or onto adjoining shorelines. Discharges that do occur must be reported to the Coast Guard by the most rapid available means. If the spiller or other industry organization, or State or local government, does not clean up the spill, the Federal Government may. The spiller will be liable for the cleanup costs. A harmful discharge of oil has been defined as one which causes a film or sheen upon or discoloration of the surface of the water, violates applicable State water quality standards, or causes a sludge or emulsion to be deposited beneath the surface of the water. (For regulations pertaining to this Act, see the Code of Federal Regulations, Title 33, Part 153.)

Other requirements for the protection of navigable waters.-U.S. laws prohibit discharge from any vessel or shore establishment of any refuse matter, other than that flowing from streets and sewers in a liquid state, into any navigable water. It is not lawful to tie up or anchor vessels or to float lografts in navigable channels in such manner as to obstruct normal navigation. When a vessel or raft is wrecked and sunk in a navigable channel it is the duty of the owner to immediately mark it with a buoy or beacon during the day and a light at night until the sunken craft is removed or abandoned.

Obligation of deck officers.-Licensed deck officers are required to acquaint themselves with the latest information published in Notice to Mariners regarding aids to navigation.

Improper use of searchlights prohibited.-No person shall flash or cause to be flashed the rays of a searchlight or other blinding light onto the bridge or into the pilothouse of any vessel underway. The International Code Signal "PG2" may be made by a vessel inconvenienced by the glare of a searchlight in order to apprise the offending vessel of the fact.

Unnecessary whistling prohibited.-The unnecessary sounding of the vessel's whistle is prohibited within any harbor limits of the United States.

Use of Radar while underway in low visibility.-Failure on the part of a vessel equipped with radar to make use of it while underway in low visibility has been held by a court to be directly contributory to a collision in which the vessel was involved. Rule 29 of the International Rules of the Road and Article 29 of the Inland Rules of the Road are applicable. This decision places an additional responsibility on vessels which are equipped and manned to use radar, to do so while underway during periods of reduced visibility without in any way relieving commanding officers of the responsibility of carrying out normal precautionary measures.

Recommendations on the use of radar during restricted visibility are included within the Annex of the International Rules of the Road.

Danger signal.-It is stated in the **Pilot Rules for Inland Waters,** §80.1, if, when steam vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam whistle, the danger signal. Article 18, Rule III, of the **Inland Rules of the Road** also contains this provision. The **International Rules of the Road**, Part D, Rule 28 (b), states, in part, that, whenever a power-driven vessel which, under these Rules is to keep her course and speed, is in sight of another vessel and is in doubt whether sufficient action is being taken by the other vessel to avert collision, she may indicate such doubt by giving at least five short and rapid blasts on the whistle.

Narrow channels.-Sailing vessels and power-driven vessels of less than 65 feet in length shall not hamper the safe passage of larger steam vessels which can navigate only inside that channel.

Control of shipping in time of emergency or war.-In time of war or national emergency, merchant vessels of the United States and those foreign flag vessels, which are considered under effective U.S. control, will be subject to control by agencies of the U.S. Government. The allocation and employment of such vessels, and of domestic port facilities, equipment, and services will be performed by appropriate agencies of the War Transport Administration. The movement, routing, and diversion of merchant ships at sea will be controlled by appropriate naval commanders. The movement of merchant ships within domestic ports and dispersal anchorages will be coordinated by the U.S. Coast Guard. The commencement of naval control will be signalled by a general emergency message. (See H.O. Publication 117A or 117B for emergency procedures and communication instructions.)

BRIDGE-TO-BRIDGE RADIOTELEPHONE COMMUNICATION.-Voice radio bridge-to-bridge communication between vessels is an effective aid in the prevention of collisions where there is restricted maneuvering room and/or visibility. VHF-FM radio is used for this purpose, due to its essentially line-of-sight characteristic and relative freedom from static. As VHF-FM has increasingly come into use for short-range communications in U.S. harbors and other high-traffic waters, so has the number of ships equipped with this gear increased.

The Vessel Bridge-to-Bridge Radiotelephone Regulations, effective January 1, 1973, require vessels subject to the Act while navigating to be equipped with at least one single channel trans-

ceiver capable of transmitting and receiving on VHF-FM channel 13 (156.65 MHz), the Bridge-to-Bridge Radiotelephone frequency. Vessels with multichannel equipment are required to have an additional receiver so as to be able to guard VHF-FM channel 13 (156.65 MHz),the Bridge-to-Bridge Radiotelephone frequency, in addition to VHF-FM channel 16 (156.80 MHz), the National Distress, Safety and Calling frequency required by Federal Communications Commission regulations. (See **26.01 through 26.10,** chapter 2, for Vessel Bridge-to-Bridge Radiotelephone Regulations.)

Mariners are reminded that the use of bridge-to-bridge voice communications in no way alters the obligation to comply with the provisions of the RULES OF THE ROAD.

2. NAVIGATION REGULATIONS

This chapter contains the sections of **Code of Federal Regulations, Title 33, Navigation and Navigable Waters,** that are of most importance in the areas covered by Coast Pilot 4. These sections are from Part 26, Vessel Bridge-to-Bridge Radiotelephone Regulations; Part 82, Boundary Lines of Inland Waters; Part 110, Anchorage Regulations; Part 117, Drawbridge Operation Regulations: Part 124, Control Over Movement of Vessels; Part 160, Ports and Waterways Safety; Part 204, Danger Zone Regulations; Part 205, Dumping Grounds Regulations; Part 207, Navigation Regulations.

Part 26-Vessel Bridge-to-Bridge Radiotelephone Regulations:

§26.01 Purpose.

(a) The purpose of this part is to implement the provisions of the Vessel Bridge-to-Bridge Radiotelephone Act. This part-

(1) Requires the use of the vessel bridge-to-bridge radiotelephone;

(2) Provides the Coast Guard's interpretation of the meaning of important terms in the Act;

(3) Prescribes the procedures for applying for an exemption from the Act and the regulations issued under the Act and a listing of exemptions.

(b) Nothing in this part relieves any person from the obligation of complying with the rules of the road and the applicable pilot rules.

§26.02 Definitions.

For the purpose of this part and interpreting the Act-

"Secretary" means the Secretary of the Department in which the Coast Guard is operating:

"Length" is measured from end to end over the deck excluding sheer;

"Navigable waters of the United States inside the lines established pursuant to section 2 of the Act of February 19, 1895 (28 Stat. 672), as amended." means those waters governed by the Navigation Rules for Harbors, Rivers, and Inland waters (33 U.S.C. sec. 151 et seq.), the Navigation Rules for Great Lakes and their Connecting and Tributary Waters (33 U.S.C. sec. 241 et seq.), and the Navigation Rules for Red River of the North and Rivers emptying into Gulf of Mexico and Tributaries (33 U.S.C. sec. 301 et seq.);

"Power-driven vessel" means any vessel propelled by machinery; and

"Towing vessel" means any commercial vessel engaged in towing another vessel astern, alongside, or by pushing ahead.

§26.03 Radiotelephone required.

(a) Unless an exemption is granted under §26.09 and except as provided in subparagraph (4) of this paragraph, section 4 of the Act provides that-

(1) Every power-driven vessel of 300 gross tons and upward while navigating;

(2) Every vessel of 100 gross tons and upward carrying one or more passengers for hire while navigating;

(3) Every towing vessel of 26 feet or over in length while navigating; and

(4) Every dredge and floating plant engaged in or near a channel or fairway in operations likely to restrict or affect navigation of other vessels: Provided, that an unmanned or intermittently manned floating plant under the control of a dredge need not be required to have separate radiotelephone capability; Shall have a radiotelephone capable of operation from its navigational bridge, or in the case of a dredge, from its main control station, and capable of transmitting and receiving on the frequency or frequencies within the 156-162 Mega-Hertz band using the classes of emissions designated by the Federal Communications Commission, after consultation with other cognizant agencies, for the exchange of navigational information.

(b) The radiotelephone required by paragraph (a) of this section shall be carried on board the described vessels, dredges, and floating plants upon the navigable waters of the United States inside the lines established pursuant to section 2 of the Act of February 19, 1895 (28 Stat. 672), as amended.

§26.04 Use of the designated frequency.

(a) No person may use the frequency designated by the Federal Communications Commission under section 8 of the Act, 33 U.S.C.A. section 1207 (a), to transmit any information other than information necessary for the safe navigation of vessels or necessary tests.

(b) Each person who is required to maintain a listening watch under section 5 of the Act shall, when necessary, transmit and confirm, on the designated frequency, the intentions of his vessel and any other information necessary for the safe navigation of vessels.

(c) Nothing in these regulations may be construed as prohibiting the use of the designated frequency to communicate with shore stations to obtain or furnish information necessary for the safe navigation of vessels.

Note: The Federal Communications Commission has designated the frequency 156.65 MHz for the use of bridge-to-bridge radiotelephone stations.

§26.05 Use of radiotelephone. Section 5 of the Act states-

(a) The radiotelephone required by this Act is for the exclusive use of the master or person in charge of the vessel, or the person designated by the master or person in charge of the vessel, or the person designated by the master or person in charge to pilot or direct the movement of the vessel, who shall maintain a listening watch on the designated frequency. Nothing contained herein shall be interpreted as precluding the use of portable radiotelephone equipment to satisfy the requirements of this Act.

§26.06 Maintenance of radiotelephone; failure of radiotelephone. Section 6 of the Act states-

(a) Whenever radiotelephone capability is required by this Act, a vessel's radiotelephone equipment shall be maintained in effective operating condition. If the radiotelephone equipment carried aboard a vessel ceases to operate, the master shall exercise due diligence to restore it or cause it to be restored to effective operating condition at the earliest practicable time. The failure of a vessel's radiotelephone equipment shall not, in itself, constitute a violation of this Act, nor shall it obligate the master of any vessel to moor or anchor his vessel; however, the loss of radiotelephone capability shall be given consideration in the navigation of the vessel.

§26.07 English language. No person may use the services of, and no person may serve as a person required to maintain a listening watch under section 5 of the Act, 33 U.S.C.A. section 1204 unless he can speak the English language.

§26.08 Exemption procedures.

(a) Any person may petition for an exemption from any provision of the Act or this part:

(b) Each petition must be submitted in writing to U.S. Coast Guard (M), 400 Seventh Street SW., Washington, DC 20590, and must state-

(1) The provisions of the Act or this part from which an exemption is requested; and

(2) The reasons why marine navigation will not be adversely affected if the exemption is granted and if the exemption relates to a local communication system how that system would fully comply with the intent of the concept of the Act but would not conform in detail if the exemption is granted.

§26.09 List of exemptions. (a) All vessels navigating on those waters governed by the navigation rules for Great Lakes and their connecting and tributary waters (33 U.S.C. 241 et seq.) are exempt from the requirements of the Vessel Bridge-to-Bridge Radiotelephone Act and this part until May 6, 1975.

§26.10 Penalties. Section 9 of the Act states-

(a) Whoever, being the master or person in charge of a vessel subject to the Act, fails to enforce or comply with the Act or the regulations hereunder; or whoever, being designated by the master or person in charge of a vessel subject to the Act to pilot or direct the movement of a vessel fails to enforce or comply with the Act or the regulations hereunder-is liable to a civil penalty of not more than $500 to be assessed by the Secretary.

(b) Every vessel navigated in violation of the Act or the regulations hereunder is liable to a civil penalty of not more than $500 to be assessed by the Secretary, for which the vessel may be proceeded against in any District Court of the United States having jurisdiction.

(c) Any penalty assessed under this section may be remitted or mitigated by the Secretary, upon such terms as he may deem proper.

Part 82-Boundary Lines of Inland Waters:

§82.1 General basis and purpose of boundary lines. Under section 2 of the act of February 19, 1895, as amended (28 Stat. 672, 33 U.S.C. 151), the regulations in this part are prescribed to establish the lines dividing the high seas from rivers, harbors, and inland waters in accordance with the intent of the statute and to obtain its correct and uniform administration. The waters inshore of the lines described in this part are "inland waters," and upon them the inland rules and pilot rules made in pursuance thereof apply. The waters outside of the lines described in this part are the high seas and upon them the international rules apply. The regulations in this part do not apply to the Great Lakes or their connecting and tributary waters.

§82.2 General rules for inland waters. At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not described in this part, the waters inshore of a line approximately parallel with the general trend of the shore, drawn through the outermost buoy or other aid in navigation of any system of aids, are inland waters, and upon them the inland rules and pilot rules made in pursuance thereof apply, except that Pilot Rules for Western Rivers apply to the Red River of the North, the Mississippi River and its tributaries above Huey P. Long Bridge, and that part of the Atchafalaya River above its junction with the Plaquemine-Morgan City alternate waterway.

§82.30 Chesapeake Bay and tributaries. A line drawn from Cape Henry Light to Cape Henry Buoy 1; thence to Chesapeake Bay Entrance Lighted Bell Buoy CBC; thence to North Chesapeake Entrance Lighted Gong Buoy NCD; thence to Cape Charles Light.

§82.35 Charleston Harbor. A line drawn from Charleston Light on Sullivans Island to Charleston Lighted Whistle Buoy 2C; thence to Folly Island loran tower.

§82.40 Savannah Harbor. A line drawn from the southwesternmost extremity of Braddock Point to Tybee Lighted Whistle Buoy T; thence to the southernmost point of Savannah Beach, bearing approximately 278° true.

§82.45 St. Simons Sound, St. Andrew Sound, and Cumberland Sound. A line drawn from the tower located 1,700 yards, bearing 068° true from St. Simons Light to St. Simons Lighted Whistle Buoy St. S; thence to St. Andrew Sound Outer En-

trance Buoy; thence to St. Marys Entrance Lighted Whistle Buoy STM; thence to Amelia Island Light.

§82.50 St. Johns River, Fla. A line drawn from the east end of the north jetty to the east end of the south jetty.

§82.55 Florida Reefs and Keys from Miami to Marquesas Keys. A line drawn from the east end of the north jetty at the entrance to Miami Harbor, to Miami Lighted Whistle Buoy M; thence to Fowey Rocks Light; thence to Pacific Reef Light; thence to Carysfort Reef Light; thence to Molasses Reef Light; thence to Alligator Reef Light; thence to Tennessee Reef Light; thence to Sombrero Key Light; thence to American Shoal Light; thence to Key West Entrance Lighted Whistle Buoy; thence to Sand Key Light; thence to Cosgrove Shoal Light; thence to westernmost extremity of Marquesas Keys.

§82.60 Florida Keys from Marquesas to Cape Sable. A line drawn from the northwesternmost extremity of Marquesas Keys to Northwest Channel Entrance Lighted Bell Buoy 1; thence to the southernmost extremity of East Cape, Cape Sable.

Part 110-Anchorage Regulations:

§110.1 General. (a) The areas described in Subpart A of this part are designated as special anchorage areas pursuant to the authority contained in an act amending laws for preventing collisions of vessels approved April 22, 1940 (54 Stat. 150); Article 11 of section 1 of the act of June 7, 1897, as amended (30 Stat. 98; 33 U.S.C. 180), Rule 9 of section 1 of the act of February 8, 1895, as amended (28 Stat. 647; 33 U.S.C. 258), and Rule Numbered 13 of section 4233 of the Revised Statutes as amended (33 U.S.C. 322). Vessels not more than 65 feet in length, when at anchor in any special anchorage area shall not be required to carry or exhibit the white anchor lights required by the Navigation Rules.

(b) The anchorage grounds for vessels described in Subpart B of this part are established, and the rules and regulations in relation thereto adopted, pursuant to the authority contained in section 7 of the act of March 4, 1915, as amended (38 Stat. 1053; 33 U.S.C. 471).

(c) All bearings in the part are referred to true meridian.

Subpart A-Special Anchorage Areas:

§110.73 St. Johns River, Fla. (a) Area A. The waters lying within an area bounded by a line beginning at a point located at the west bank of St. Johns River at latitude 30°15′11″, longitude 81°41′23″; thence to latitude 30°15′13″, longitude 81°41′14″; thence to latitude 30°15′03″, longitude 81°41′11″; thence to latitude 30°15′04″, longitude 81°41′20″; and thence to the point of beginning.

(b) Area B. The waters lying within an area bounded by a line beginning at latitude 30°15′03″, longitude 81°41′28″; thence to latitude 30°15′02″, longitude 81°41′10″; thence to latitude 30°14′56″, longitude 81°41′08″; thence to latitude 30°14′54.5″, longitude 81°41′10.5″; and thence to the point of beginning.

§ 110.73a Indian River at Sebastian, Florida. Beginning at a point on the shoreline at latitude 27°49′40″N., longitude 80°28′26″W.; thence 060° to latitude 27°49′46″N., longitude 80°28′13″W.; thence 156° to latitude 27°49′31″N., longitude 80°28′05″W.; thence 242° to latitude 27°49′25″N., longitude 80°28′18″W.; thence northerly along the shoreline to the point of beginning.

Note: This area is principally for use by commercial fishing vessels less than 65 feet in length.

Subpart B-Anchorage Grounds:

§110.170 Lockwoods Folly Inlet, N.C. (a) Explosives Anchorage. Beginning at a point southeast of Shallotte Inlet at latitude 33°52′31″, longitude 78°18′49″; thence south to latitude 33°51′31″, longitude 78°18′42″; thence east to latitude 33°51′51″, longitude 78°14′35″; thence north to latitude 33°52′52″, longitude 78°14′40″; thence west to the point of beginning.

(b) General regulations. (1) This anchorage is reserved for the exclusive use of vessels carrying explosives.

(2) Vessels in this anchorage shall not anchor closer than 1,500 yards to one another. This provision is not intended to prohibit barges or lighters from lying alongside vessels for transfer of cargo.

(3) The maximum quantity of explosives aboard any vessel that may be in this anchorage is 8,000 tons.

(4) Nothing in this section shall be construed as relieving the owner, master, or person in charge of any vessel from the penalties of the law for obstructing navigation or for not complying with the navigation laws in regard to lights, fog signals, etc.

§110.173 Port of Charleston, S.C. (a) The anchorage grounds. The anchorage grounds for general use shall include all the navigable portions of the harbor and the portions of Cooper, Ashley, and Wando Rivers adjacent thereto, except the following:

(1) Areas of prohibited anchorage. (i) A ship channel 1,000 feet wide between the jetties, thence 800 to 400 feet wide (or as much wider as an improved channel may hereafter be dredged), following the established ranges and usual courses and passing east of Drum Island to Goose Creek. Between the north Customhouse Wharf and the northernmost building ways of the Todd Shipyard Corporation, this shall include all the area between the western limit of the Channel and the eastern waterfront of Charleston.

(ii) A ship channel 500 feet wide from the northernmost building ways of the Todd Shipyards Corporation north through Town Creek, following the established ranges and usual courses and connecting at both ends with the main channel.

(iii) A ship channel in Ashley River from its mouth to Standard Wharf 300 feet wide following the established ranges and usual courses and widened at bends and at the upstream and downstream ends.

(iv) The commonly used channel in Wando River, with width of 200 feet.

(v) The commonly used channel in Hog Island Channel with a width of 200 feet from Cooper River to the area opposite Shem Creek.

(2) (Reserved)

(3) Special anchorages. Two special anchorages are provided in Cooper River along the eastern waterfront of Charleston. The use of these special anchorages is limited to loaded vessels for a period of not more than 72 hours. The bearings and distances for the centers of these special anchorages are from the tank atop the Fort Sumter Hotel on the Battery at Charleston:

(i) 30°30′ true; 2,687 yards; diameter of anchorage, 1,400 feet.

(ii) 37°00′ true; 2,017 yards; diameter of anchorage, 1,400 feet.

(b) The regulations. (1) Except in cases of great emergency, no vessel shall be anchored in the prohibited areas described in paragraph (a) of this section, nor shall any vessel be so anchored that it can swing within 400 feet of any wharf or pier on the eastern waterfront of Charleston.

(2) Vessels using the two special anchorages opposite the eastern waterfront of Charleston shall place their anchors as near as possible in the center of the anchorage. Vessels not using a special anchorage shall not place their anchors within the areas of prohibited anchorage, but vessels may be so anchored as to swing into these areas: Provided, That they are so placed, with reference to the customary winds, tides, and currents of the harbor, that they will swing only during slack water, and at this period there shall remain in the waters adjacent to the channel an area providing sufficient depth so as to permit the safe passage of loaded vessels.

(3) Vessels must be anchored in such a way as not to interfere with the free navigation of channels of the port, including Cooper, Ashley, and Wando Rivers, Town Creek, and Hog Island Channel, or to obstruct the approach to any pier or entrance to any slip, or to impede the movement of any vessel or craft.

(4) Dragging of anchors in or across the areas of prohibited anchorage is prohibited.

(5) Vessels which, through force of great emergency, are anchored contrary to the foregoing regulations in this section shall be shifted to new berths in accordance with such regulations at the earliest opportunity.

(6) A vessel, upon notification from the Captain of the Port to shift its position in anchorage grounds or out of areas of prohibited anchorage, must get under way at once or signal for a tug, and must change position as directed with reasonable promptness.

(7) (Reserved)

(8) (Reserved)

(9) Nothing in this section shall be construed as relieving the owner or person in charge of any vessel from the penalties of law for obstructing navigation, or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, etc.

§110.179 Skidaway River, Isle of Hope, Ga. (a) The anchorage ground. An area in Skidaway River beginning at a point on the mean low water line 400 feet south of Brady Boat Works, thence 76°30′, 300 feet to a buoy; thence 152°30′, 900 feet to a buoy; thence 251°00′, 450 feet to the mean low water line at Wymberly Yacht Club dock.

(b) The regulations. (1) Except in cases of great emergency, no vessels shall anchor in Skidaway River between the north end of Barbee's dock and southward to Day Marker 48 except in the anchorage area hereby defined and established: Provided, however, That vessels may moor to any lawfully constructed wharf.

(2) Except in cases of great emergency, no vessel shall be anchored where it can swing within 50 feet of any lawfully constructed wharf or within 50 feet of the mean low water line, nor shall any vessel be so anchored that any portion of the hull or rigging shall at any time extend outside the boundary of the anchorage area.

(3) Any vessel anchoring under circumstances of great emergency outside the anchorage area should be placed in such a position as not to interfere with the free navigation of the channel nor obstruct the approach to any lawfully constructed wharf nor impede the movement of any boat, and shall move away immediately after the emergency ceases or upon notification of the District Commander.

(4) No vessels with an overall length greater than 65 feet will use the anchorage area except in cases of great emergency.

(5) Vessels operating within the anchorage area will not exceed a speed of five (5) miles per hour.

§110.182 Atlantic Ocean off Fort George Inlet, near Mayport, Fla. (a) The Anchorage areas-(1) Anchorages for aircraft carriers and other deep draft vessels. Four circular areas each with a radius of 600 yards and with their centers located at: "A"-latitude 30°25′35″, longitude 81°21′23″; "B"-latitude 30°26′13″, longitude 81°21′13″; "C"-latitude 30°26′19″, longitude 81°20′27″; "D"-latitude 30°26′55″, longitude 81°20′47″.

(2) Anchorages for destroyers and other ships of similar size. Six circular areas each with a radius of 300 yards and with their centers located at: "1"-latitude 30°24′38″, longitude 81°21′57″; "2"-latitude 30°24′57″, longitude 81°21′58″; "3"-latitude 30°24′56″, longitude 81°21′38″; "4"-latitude 30°25′13″, longitude 81°22′05″; "5"-latitude 30°25′13″, longitude 81°21′43″; "6"-latitude 30°25′07″, longitude 81°21′24″.

(3) Explosives anchorage. The circular area "A" described in paragraph (a) (1) of this section is also designated as an explosives anchorage for use during periods when ammunition must be handled outside the limits of the U.S. Naval Station, Mayport, Fla.

(b) The regulations for all designated areas. (1) Usage of these areas by naval vessels shall predominate only when necessary for military requirements; at such times other vessels shall remain clear of the areas.

(2) Prudent assignment of the anchorage areas shall be made by the Commanding Officer, U.S. Naval Station, Mayport, Fla.

(c) Additional regulations for Explosives Anchorage Area "A". (1) When occupied by a vessel handling explosives, no other vessel may enter the area unless authorized by the enforcing agency.

(2) Only one vessel handling explosives may anchor in the area at one time. A patrol craft shall be utilized to assure that other vessels remain clear when explosives are exposed or being transferred to and from the anchorage.

(3) No more than 500,000 pounds net high explosives or equivalent may be exposed in the area at any one time.

(d) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Station, Mayport, Fla., or other agencies that he may designate.

§110.183 St. Johns River, Fla. (a) The anchorage grounds-(1) (Reserved)

(2) (Reserved)

(3) Anchorage C. Shoreward of a line located as follows:

Beginning at a point on the south shore westerly of the entrance to Miller Creek at longitude 81°38′15″; thence north 300 yards; thence east to longitude 81°37′40″; thence to latitude 30°19′06″, longitude 81°37′27″; thence east to longitude 81°37′02″; thence south to Empire Point.

(4) Anchorage D. Bounded on the west by a line along the easterly side of Terminal Channel and bounded on the east by a line along the westerly side of Arlington Cut. Beginning at a point at latitude 30°19′30″, longitude 81°37′25″; thence to latitude 30°20′07″, longitude 81°37′18″; thence to latitude 30°20′00″, longitude 81°37′05″; thence to latitude 30°19′20″, longitude 81°37′17″; thence to the point of beginning. No vessels shall anchor within 300 feet of Terminal Channel or Arlington Cut.

(5) Anchorage E. Beginning at a point near the easterly shore of the river at latitude 30°21′42″, longitude 81°36′52″; thence west to longitude 81°37′15″; thence north to latitude 30°22′07″; thence to the point of beginning.

(6) Anchorage F. Shoreward of a line located as follows: Beginning at a point on the east shore at latitude 30°21′42″, longitude 81°36′45″; thence west to longitude 81°36′52″; thence to latitude 30°22′07″, longitude 81°37′15″; thence N. 56°15′E. to the east shore.

(b) The regulations. (1) Anchorages D and F are permanent anchorages. Anchorage D is reserved for light-draft barges and schooners, and Anchorage F is reserved for deep-draft barges and schooners.

(2) Anchorage C is a temporary anchorage for deep-draft vessels. This anchorage shall be an anchorage for vessels exceeding 24 feet in draft. No vessel shall remain in the anchorage more than 24 hours without obtaining a permit from the Captain of the Port.

(3) Anchorage E shall be used only by vessels awaiting quarantine inspection, or by special permit from the Captain of the Port.

§110.188 Atlantic Ocean off Miami and Miami Beach, Fla. (a) The anchorage grounds. The area to the eastward of a line bearing 12°(N.12°E.) through a point X, which is 1½ nautical miles due east of the intersection of the Miami Beach shoreline with the north jetty; to the northward of a line bearing 102° (S. 78°E.) and intersecting the 12° line at a point A, one-half nautical mile north of the said point X; and to the southward of a line bearing 102° (S. 78°E.) and intersecting the 12° line at a point B, 2½ nautical miles north of the said point X. The northern and southern extremities of the 12° line are marked by spar buoys. The entire anchorage area lies north of the entrance channel to Miami Harbor.

(b) The rules and regulations. (1) except in cases of great emergency, no vessel shall be anchored in the Atlantic Ocean in the vicinity of the entrances to the approach channels leading to the cities of Miami Beach and Miami, Fla., outside of the anchorage area hereby defined and established-that is, they shall not anchor shoreward of the line first named nor southward of the second nor northward of the third line-but may anchor as far to the eastward as may be desired.

(2) Any vessel anchoring under circumstances of great emergency outside of the anchorage area shall be shifted to new berths within the area immediately after the emergency ceases.

(3) All vessels shall lie at anchor with as short a cable as conditions will permit.

(4) A vessel upon being notified to move into the anchorage limits or to shift its position on the anchorage ground must get under way at once or signal for a tug, and must change position as directed with reasonable promptness.

(5) Whenever the maritime or commercial interests of the United States so require, the Captain of the Port, U.S. Coast Guard, Miami, Fla., is hereby empowered to shift the position of any vessel anchored on the anchorage ground or outside thereof, or of any vessel moored or anchored so as to impede or obstruct vessel movements or obstruct or interfere with range lights.

(6) Vessels carrying explosives shall be anchored only under a written permit issued by the

Captain of the Port and at such point as he may direct.

(7) Vessels carrying explosives shall be at all times in charge of a competent person, and must display by day a red flag, of not less than 16 square feet, at the masthead, or not less than 10 feet above the upper deck if the vessel has no mast; at night a red light shall be displayed in the positions specified for the red flag.

(8) Nothing in this paragraph shall be construed as relieving the owner or person in charge of any vessel from the penalties of the law for obstructing navigation, or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, or other aids to navigation, or for otherwise violating law.

§110.189a Key West Harbor, Key West, Fla.; naval explosives anchorage area. (a) The anchorage ground. A circular area with its center at latitude 24°30′50.6″, longitude 81°50′31.6″ with a radius of 300 yards, for use for ammunition exceeding the prescribed limits for pier-side handling.

(b) The regulations. (1) When occupied by a vessel handling explosives, no other vessel may enter the area unless authorized by the enforcing agency.

(2) Only one vessel handling explosives may anchor in the area at one time.

(3) No more than 300,000 pounds net of high explosives or equivalent may be handled in the area at any one time.

(4) The regulations in this section shall be enforced by the Commander, U.S. Naval Base, Key West, Fla., and any other agencies he may designate.

Part 117-Drawbridge Operation Regulations:

§117.1 General. (a) The operation of drawbridges, in the absence of specific regulations in this part, shall be as required by section 5 of the act of August 18, 1894, as amended (28 Stat. 362; 33 U.S.C. 499). It shall be the duty of persons owning, operating, and tending drawbridges built across navigable waters of the United States, to open, or cause to be opened, the draws of such bridges under such rules and regulations as in the opinion of the Commandant the public interests require. Insofar as criminal liability on the part of the bridge owner is concerned, the Commandant is of the opinion that, in the absence of Federal regulations, there is no Federal authority requiring the opening of any drawbridge to which the General Bridge Act of March 23, 1906, does not apply. With reference to the civil liability of the bridge owner, however, it has been held that the duty to take proper care of a bridge includes the duty to make proper provision for the passage of vessels through the draw. In constructing a bridge with a draw, and in undertaking to open and manage the draw so as to allow vessels to pass, the owner has recognized the right of vessels to pass through without any appeal to the national authority to protect that right. Having thus recognized the rights of commerce, and undertaken to provide accommodations for the passage of vessels, the owner is bound that the custodians of the bridge shall use ordinary diligence to avoid accidents to vessels going through the draw at customary hours, and in the customary manner, as one of the incidents of the care, management, and control of the bridge itself. The owner is responsible, therefore, for the want of ordinary care and diligence in his servants, and for the consequent damage.

(b) The Attorney General has held (Jan. 28, 1899; 22 Opin. 314) that the first part of section 5 of the 1894 act is merely declaratory of the legal duty of the owners or operators which attaches to the maintenance and operation of a drawbridge across navigable waters. "It is the duty of all persons operating such drawbridges to open or cause them to be opened in a reasonable manner and at a reasonable time, consistent with the uses for which drawbridges are constructed, for the passage of vessels. The repair of such draws and of the bridges with which they are connected is also necessary for their maintenance. It is reasonable that a sufficient time should be allowed for such repairs and if they cannot be prosecuted without closing the bridge for a number of successive days, such closing cannot be considered an unreasonable interference with navigation." "It is entirely competent for the Secretary of the Army to make rules and regulations governing this subject, but in the absence of such rules and regulations the law is as I have above stated it." (The Commandant prescribes these rules and regulations.)

(c) Notwithstanding any general or special regulation heretofore or hereafter prescribed, drawbridges across navigable waters of the United States will not be opened to navigation for certain periods determined by the proper civil defense authorities to be in the interest of public safety during a major disaster or civil defense emergency indicated by a civil defense condition of "Air Raid Warning" (attack by enemy aircraft probable, imminent, or taking place).

(d) As used in this part, the term "long blast" means a distinct blast of a whistle, horn, siren, or other efficient sound producing device, of approximately three (3) seconds' duration. The term "blast" or "short blast" means a distinct blast of one (1) second's duration, or where specified, a distinct stroke of a bell.

(e) The Commandant may require the owner or operator to install and operate a radiotelephone station or stations of appropriate characteristics on a drawbridge when he finds that for navigation or safety it is essential that in addition to the use of sound or visual signals prescribed a supplemental means be available by which vessels may communicate to confirm requests for opening of the draw as well as exchange information with the drawtender concerning the condition of the draw or governing its operation.

(1) The Commandant's determination is based on such factors as location and navigational clearance of the particular bridge, character and volume of marine traffic, configuration of the navigational channel, restrictions in channel approaches, currents in the approaches to or through the drawbridge, obstructions and conditions limiting visibility, and similar conditions affecting navigation or safety through or in the vicinity of the drawbridge.

(2) Each station shall be subject to the rules and regulations of the Federal Communications Commission or the Director of Telecommunications Management as applicable governing the assignment of operating frequencies, licensing, and operation of radiotelephone stations.

(3) When the Commandant proposes that a radiotelephone station, or stations, be installed and operated on a specific drawbridge, he gives written notice of the proposed requirement to the bridge owner (or operator as appropriate) who shall have 30 days in which to submit comments or objections to the proposal. If the Commandant determines that such installation is necessary the bridge owner (or operator) shall have a reasonable time, but normally not more that 6 months, in which to effect installation and commence operation.

(4) Radiotelephone communications pursuant to this section supplement the sound and visual signals prescribed elsewhere in this part for the operation of drawbridges in general or for specific bridges and do not alter any obligation with respect to their use. The provisions of this section are not intended to restrict the voluntary installation and operation of radiotelephone stations on drawbridges.

§117.1a Temporary departures from regulations in this part. (a) Temporary closures of drawbridges. Notwithstanding any general or special regulation in this part, heretofore or hereafter prescribed, a specific drawbridge across navigable waters of the United States need not be open to navigation for specified periods of time when such a bridge may be undergoing repairs or maintenance work or when the public interest, health, or safety so requires.

(b) Delegation to District Commanders. The Commandant further delegates pursuant to 49 CFR 1.4 (g) to District Commanders authority to place in effect the provisions of paragraph (a) of this section with respect to drawbridges in their respective Coast Guard Districts for periods of time determined to be necessary but in no event to exceed 15 calendar days. For a specific drawbridge the District Commander having jurisdiction may suspend any drawbridge operation regulations applicable thereto and if necessary establish other operational requirements without prior notice and public procedures thereon for such actions. Where practicable notice of the District Commander's actions taken pursuant to this section shall be disseminated in Notices to Mariners, or otherwise, for the information of all concerned.

(c) Closure for repairs or maintenance. (1) When a draw must be closed for scheduled repairs or maintenance work, approval of the District Commander should be obtained at least 10 days prior to the date of the intended closure by the owners of or the agency controlling the drawbridge. The request for approval of the proposed closure shall include a brief description of the nature of the work to be performed and the times and dates of such closure. The granting of the approval will depend upon the necessity for the closure, the reasonableness of the time(s) and date(s) requested, and the overall effect on navigation.

(2) When a draw is closed for repairs in case of emergency or damage to the structure or for vital maintenance that may not be delayed, the owners of or the agency controlling the drawbridge shall immediately inform the District Commander concerned of the closure, the reasons for the closure, and the expected completion date of the emergency repairs. Normally, the extension of any period of emergency closure to include the accomplishment of routine maintenance or for other nonemergency purposes will not be authorized.

(d) Closure for public interest, health, and safety. In situations where the public interest, health, or safety so requires, including the holding of public functions or events such as street parades and marine regattas, the District Commander may authorize the temporary closure of a drawbridge. A request for approval of a temporary closure of a drawbridge for a street parade or marine regatta or otherwise should include a brief description of the proposed event or reason why closure of the drawbridge is desired, and the time and date of such closure. The closure of a drawbridge for public interest, health, or safety will depend upon the necessity for the closure, the reasonableness of the time and date (if requested), and the overall effect on navigation.

(e) Closure of draw for emergency vehicles. When a drawtender is informed by a reliable source that an emergency vehicle is due to cross the draw, he shall take all reasonable measures necessary to have the draw closed at the time the emergency vehicle arrives at the bridge.

§117.240 Navigable waters discharging into the Atlantic Ocean south of Delaware Bay (including the Lewes and Rehoboth Canal, Del.), and into the Gulf of Mexico (including coastal waterways contiguous thereto and tributaries to such waterways and the Lower Atchafalaya River, La.), except the Mississippi River and its tributaries and outlets; bridges. (a) Corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(b) If the weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through

the draw, three distinct blasts of a whistle or horn shall be sounded or three calls through a megaphone shall be made from the vessel when within reasonable hearing distance of the bridge.

(1) When the draw of the bridge can be opened immediately, the drawtender shall reply by three distinct blasts of a whistle or horn, by three calls through a megaphone, or by three loud and distinct strokes of a bell.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by four or more short, distinct blasts of a whistle or horn, by four or more calls through a megaphone, or by four or more loud and distinct strokes of a bell (danger signal).

(c) When weather conditions prevent hearing the sound signals when a vessel approaches a drawbridge and desires to pass through the draw, signals shall be made from the vessel by swinging in circles at arm's length a lighted lantern at night and a flag by day.

(1) When the draw of the bridge can be opened immediately, the drawtender shall reply by raising and lowering in vertical plane a number of times a lighted lantern at night and a flag by day.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by swinging to and fro horizontally a number of times a lighted lantern at night and a flag by day.

(d) When a vessel wishes to pass two or more bridges close together or crossing a section of the waterway less than 500 feet in length, signals as prescribed above shall be given from the vessel for opening the first bridge, followed at an interval of about five seconds by the same signals for the second bridge, and so on, thus giving, at intervals of about five seconds, separate signals for each bridge the vessel desires to pass.

(e) When two or more vessels are approaching a bridge at nearly the same time from the same or opposite directions with the draw opened or closed, each of these vessels shall signal independently for the opening of the draw, and the drawtender shall reply as prescribed and in turn to the signal of each vessel.

(f) Where bridges are less than 500 feet apart, the signals to govern the movements of the approaching vessel shall be given from the bridge nearest the vessel. If the bridge can be opened immediately, the bridgetender shall await the reply signals from the other bridges and then give the signal circumstances require. If the nearest bridge cannot be opened immediately, the prescribed signal shall be given the approaching vessel at once to be followed as soon as possible by the signal from that bridge that the draws are about to open.

(g) The draw shall be opened with the least possible delay upon receiving the prescribed signal: Provided, That the drawspan shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the operator of the drawspan.

(h) When a bridgetender is about to close a draw, he shall sound four or more short, distinct blasts of a whistle or horn, four or more calls through a megaphone, or four or more loud and distinct strokes of a bell (danger signal).

(i) Trains, wagons, and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall watercraft be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or under a drawbridge shall be prompt, to prevent delay to either land or water traffic.

(j) The following provisions shall not relieve the owner of or agency controlling a drawbridge from opening the draw for the passage of vessels in accordance with paragraphs (a) through (i) of this section.

(1) A vessel shall not require the opening of the draw when such opening is needed only to provide additional clearance for appurtenances unessential to navigation of the vessel, or for appurtenances essential to navigation but which may be altered by hinging, telescoping, collapsing, or otherwise, so as to require no greater clearance than the highest fixed and essentially unalterable point of the vessel.

(2) Appurtenances unessential to navigation shall include but not be limited to fishing outriggers, radio antennae which are or can reasonable be made flexible or collapsible, television antennae, false stacks, and masts purely for ornamental purposes. Appurtenances unessential to navigation shall not include radar antennae, flying bridges, sailboat masts, piledriver leads, spud frames on hydraulic dredges, drilling derricks, derrick substructures and/or buildings, cranes on drilling or construction vessels, or other items of permanent and fixed equipment clearly necessary to the intended use of the vessel.

(3) Owners of or agencies controlling drawbridges shall report to the District Commander in charge of the locality the names of any vessels causing bridge openings considered to be in violation of this paragraph. The District Commander may at any time cause an inspection to be made of any craft so reported and is empowered to decide in each case whether or not the appurtenances are unessential to navigation. If the District Commander decides a vessel has appurtenances unessential to navigation, he shall notify the vessel owner of his decision, specifying a reasonable time for making necessary alterations. If the vessel owner is aggrieved by the decision of the District Commander, he may within 30 days after receipt of the request to perform necessary alterations appeal the decision to the Commandant in writing. If the Commandant rules that an appurtenance is

unessential to navigation, the District Commander shall again specify to the vessel owner a reasonable time for making necessary alterations to the appurtenance, and after the expiration of the time specified, any operation of the vessel in such a manner as to require drawbridge openings shall be deemed in violation of the regulations of this paragraph unless the necessary alterations shall have been made.

(4) The provisions of subparagraphs (1), (2), and (3) of this paragraph shall not be applicable to ocean or coastwise vessels engaged in foreign or domestic commerce.

(k) Clearance gages, of a type to be approved by the Commandant, shall be installed on the upstream and downstream sides of each drawbridge by and at the expense of the owner of or agency controlling the bridge and such gages shall be kept in good repair and legible condition.

Note: The special regulations contained in §117.245 to §117.462, prescribed where local conditions require to govern the operation of certain bridges, supplement the general regulations contained in §117.240.

§117.245 Navigable waters discharging into the Atlantic Ocean south of and including Chesapeake Bay and into the Gulf of Mexico, except the Mississippi River and its tributaries and outlets; bridges where constant attendance of draw tenders is not required. (a) The owners of or agencies controlling certain bridges will not be required to keep draw tenders in constant attendance. The bridges to which this section applies are listed, and the special regulations applicable in each case are set forth, in paragraphs (f) to (j) inclusive, of this section. At all times not covered by the regulations in this section, and in all other respects, the regulations contained in §117.240 shall govern the operation of these bridges.

(b) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice, as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(c) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain the machinery is in proper order for satisfactory operation.

(f) (1-26) applies to waters not covered by this volume.

(26-a) Elizabeth River, Southern Branch, Va.; Virginia Department of Highways bridge at Chesapeake. A 24-hour advance notice is required at all times.

(26-b) Elizabeth River, Southern Branch, Va. The draw of the Norfolk and Western Railroad bridge at mile 3 shall be maintained in the fully open position except the draw may close for the crossing of trains and the maintenance of the bridge. When the draw is closed, there shall be a drawtender present and the provisions of §117.240 shall apply to this bridge.

(g) Waterways discharging into Atlantic Ocean between Chesapeake Bay and Charleston-(1) Pasquotank River, N.C.; Norfolk Southern Railway Company bridge at Elizabeth City; from 3:30 p. m. to 11:30 p. m., the bridge will be operated in full open position. Between 11:30 p.m. and 3:30 p.m., the regulations prescribed in §117.240 shall govern the operation of the drawspan.

(2) Kendrick (Mackay) Creek, N.C.; Norfolk Southern Railway Company bridge at Mackeys. The draw need not be opened for the passage of vessels, and paragraphs (b) to (d), inclusive, of this section shall not apply to this bridge: Provided, That the bridge owner will restore attendance, when, in the opinion of the Commandant, U.S. Coast Guard, vessel traffic warrants service.

(2-a) Seaboard Coast Line railroad bridge across the Roanoke River near Palmyra, N.C. The draw need not be opened for the passage of vessels and paragraphs (a) through (e) of this section shall not apply to this bridge provided that the draw shall be returned to full operation within 6 months after notification of the owner by the Commandant to take such action.

(3) Scuppernong River; North Carolina State Highway Commission bridge at Columbia.

(i) The draw shall open on signal if at least 24 hours notice is given. However, the draw shall open as soon as possible in case of an emergency involving danger to life or property and for commercial fishing vessels unable to pass under the closed draw.

(ii) The owner of or agency controlling the bridge shall keep conspicuously posted on both sides of the bridge, in such a manner that they can easily be read at anytime from an approaching vessel, a resume of these regulations, together with a notice stating exactly how and to whom requests for draw openings shall be made.

(iii) The draw of the bridge shall be returned to unrestricted operation within 6 months after notification to the owners by the Commandant to take such action.

(3-a) (Revoked)

(3-b) Blackwater River, Va.; Virginia Department of Highways bridge on Route 189 at South Quay. At least 24 hours' advance notice required.

(4) Pamlico and Tar Rivers, N.C., North Carolina State Highway Commission bridges at Washington and near Grimesland. At least 24 hours' advance notice required: Provided, That the bridge owner will restore constant attendance when, in the opinion of the District Commander, river traffic warrants additional service.

(5) Neuse River, N.C.; Atlantic and East Carolina Railway Company bridge at Kinston and drawbridges upstream therefrom. At least 24 hours' advance notice required.

(6) Seaboard Coast Line railroad bridge across the Trent River near Pollocksville, N.C. The draw need not be opened for the passage of vessels and paragraphs (a) through (e) of this section shall not apply to this bridge provided that the draw shall be returned to full operation within 6 months after notification of the owner by the Commandant to take such action.

(7) Newport River, N.C.; Atlantic and East Carolina Railway Company bridge at Newport. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(8) New River, N.C.; Atlantic Coast Line Railroad Company bridge at Jacksonville. At least 24 hours' advance notice required.

(9) Smiths Creek, N.C.; North Carolina State Highway and Public Works Commission bridge in Wilmington. At least 24 hours' advance notice required.

(10) Northeast River, N.C.; Atlantic Coast Line Railroad Company bridge at Castle Hayne. Between 7:30 a.m. and 4:30 p.m. Monday through Friday of each week, the draw will be opened for the passage of vessels on signal. At all other times, the draw will be closed and the bridge unattended: Provided, That the draw will be opened for tugs with tows upon 24 hours' advance notice.

(11) (Reserved)

(12) Pee Dee River, S.C.; Seaboard Air Line Railway Company bridge near Poston. The draw need not be opened for the passage of vessels, and the special regulations contained in paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(12-a) Pee Dee River, S.C.; Seaboard Coastline Railroad bridge at Pee Dee, S.C. The draw need not be opened for the passage of vessels, and paragraphs (b) through (e) of this section shall not apply to this bridge.

(13) (Reserved)

(14) Black River, S.C.: (i) South Carolina State Highway Department bridge near Georgetown. The draw shall open on signal if at least 12 hours' notice has been given.

(15) Congaree River, S.C., Southern Railroad swing span at Moye's Station. At least 24 hours notice is required.

(16) Wando River, S.C.; South Carolina State Highway Department bridge near Cainhoy. At least 12 hour's advance notice required.

(17) Cooper River, S.C.; Seaboard Coast Line Railroad bridge near Cordesville. The draw shall open on signal from 7 a.m. to 12 noon and from 1 p.m. to 4 p.m. At all other times the draw shall open on signal if at least 24 hours notice is given.

(17-a) Durham Creek, S.C., South Carolina Electric & Gas Co. railroad bridge. The removable span shall be removed to allow the passage of dredges and construction equipment provided 20 days advance notice has been given. When notified by the city of Charleston, S.C., of an emergency in the Bushy Park Reservoir the span shall be removed as soon as possible to permit the passage of dredges and construction equipment.

(18) Ashley River, S.C.; South Carolina State Highway Department bascule bridges at mile 2.4 and mile 2.5 above the mouth of the river at Charleston. Between 7:00 a.m., and 9:00 a.m., Monday through Friday, and between 4:00 p.m., and 7:00 p.m., daily, at least 12 hours' advance notice required: Provided, That the draw shall be opened at any time for a vessel in an emergency involving danger to life and property. Such emergency shall be indicated by four blasts of the signalling device.

(h) Waterways discharging into Atlantic Ocean south of Charleston. (1) Rantowles Creek, S.C.; Atlantic Coast Line Railroad Company bridge near Rantowles. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(2) (Reserved)

(3) Ashepoo River, S.C.; South Carolina State Highway Department bridge at Brickyard Ferry near Bennetts Point. At least 24 hours' advance notice required. Any vessel navigating Ashepoo River with the intention of making repeated trips shall notify the authorized representative of the owner of or agency controlling the bridge of the expected frequency of such trips. The bridge shall then be maintained in readiness to open promptly upon signal from the vessel without any further notice. Repeated trips shall be understood to mean trips not more than 24 hours apart.

(4) Ashepoo River, S.C.; Seaboard Coast Line drawbridge, mile 32.0. The draw need not open for the passage of vessels and paragraphs (b) through (e) of this section shall not apply to the bridge. However, the draw shall be returned to full operation within 6 months after notification to the owner by the Commandant to take such action if there is a change in navigational requirements.

(5) Harbor River, a tidal estuary in St. Helena Sound, S.C.; South Carolina State Highway Department bridge on State Highway No. 285 (U.S. Route 21) at Hunting Island. At least 24 hours' advance notice required.

(6) (Reserved)

(7) (Reserved)

(8) Coosaw River (Whale Branch). (i) The draw of the Seaboard Coast Line Railroad bridge, mile 5.3, shall open on signal from 6 a.m. to 8 p.m., Monday through Saturday. At all other times the

draw shall open on signal if at least 24 hours notice is given.

(ii) The draw of the U.S. Highway 21 bridge, mile 7.0, shall open on signal from 6 a.m. to 8 p.m., Monday through Friday, if at least 24 hours notice is given. At all other times the draw need not open for the passage of vessels.

(9) Battery Creek, S.C.; South Carolina State Highway Department bridge between Beaufort and Parris Island. At least 24 hours' advance notice required.

(10) Broad River, S.C.; South Carolina State Highway Department bridge near Beaufort. At least 24 hours' advance notice required.

(11) Broad River, S.C.; Seaboard Air Line Railway Company bridge near Whale Branch. At least 24 hours' advance notice required.

(12) Savannah River, S.C., and Ga.; Charleston & Western Carolina Railway Company bridge near Augusta, Ga. At least three hours' advance notice required.

(13) Ogeechee River, Ga. The Atlantic Coast Line Railroad Company bridge near Richmond Hill (Ways Station). At least 15 days' advance notice required.

(14) Ogeechee River, Ga. The State Highway Department of Georgia bridge near Richmond Hill. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(15) Altamaha River, Ga.; all drawbridges except the Atlantic Coast Line Railroad Company bridge at Doctortown. At least 24 hours' advance notice required. The Atlantic Coast Line Railroad Company bridge at Doctortown. At least seven days' advance notice required: Provided, That the bridge owner will restore constant attendance, when in the opinion of the District Commander, river traffic warrants additional service.

(16) Oconee River, Ga.; drawbridges downstream from Central of Georgia Railroad Company bridge at Oconee. At least 24 hours' advance notice required.

(17) Oconee River, Ga.; Central of Georgia Railway Company bridge at Oconee. At least seven days' advance notice required. Paragraph (e) of this section shall not apply to this bridge.

(18) Ocmulgee River, Ga.; all drawbridges. At least 24 hours' advance notice required.

(19) Satilla River, Ga.; Seaboard Air Line Railroad bridge at Woodbine. At least 24 hours' advance notice required.

(20) (Reserved)

(21) St. Marys River, Ga. and Fla.; State Road Department of Florida and Seaboard Air Line Railway Company bridges at Kingsland, Ga. At least 48 hours' advance notice required.

(22) Nassau Sound, Fla.: Fernandina Port Authority bridge across Nassau Sound. From 6 a.m. to 6 p.m. the draw shall open on signal if at least 6 hours' notice has been given. The draw need not open from 6 p.m. to 6 a.m.

(23) (Reserved)

(23-a) Broward River, Fla.; Seaboard Coast Line Railroad Co. bridge near Heckscher Drive, Duval County. At least 24 hours' advance notice required.

(24) Trout River, Fla.; Seaboard Air Line Railroad Company bridge at Panama. Between 10:00 p.m. and 6:00 a.m., at least 12 hours' advance notice required. At all other times the regulations contained in §117.240 shall govern the operation of this bridge.

(25) Dunns Creek, Fla.; State Road Department of Florida bridge across Dunns Creek near Palatka. At least 3 hours' advance notice required.

(26) Kissimmee River, Florida:

(i) State Road 78 bridge 0.5 mile above mouth and State Road 70 bridge 19.5 miles above mouth. At least 72 hours' advance notice required.

(ii) Seaboard Coast Line Railroad bridge, Fort Basinger, Fla. The draw of this bridge shall be opened upon 72 hours' advance notice for the passage of floating equipment employed in flood control work under the jurisdiction of the Central and Southern Florida Flood Control District or the U.S. Army Corps of Engineers. The draw need not be opened for other vessels.

(27) Kissimmee River, Fla.; State Road Department of Florida bridge near Basinger (at Fort Bassenger). At least 96 hours' advance notice required. Paragraph (e) of this section shall not apply to this bridge.

(28) Bell Glade Dike Bridge, Fla.; Florida State Road Department bridge on State Road 717 across the navigation channel, Lake Okeechobee between Torrey Island and the lake shore near Bell Glade, Fla. The draw need not be opened for the passage of vessels between 7 p.m. and 7 a.m. daily.

(29) Taylor Creek, Fla.; Florida State Road 15 (U.S. Route 441) across Taylor Creek, Fla. At least 24 hours' advance notice required.

(i) Waterways discharging into Gulf of Mexico east of Mississippi River. (1) Caloosahatchee Canal, Fla.: Atlantic Coast Line Railroad Company bridge at Moore Haven. Between 10:00 p.m. and 6:00 a.m., the draw need not be opened for the passage of vessels.

(1-a) Florida State Road Department Bridges at Olga, Alva, Fort Denaud, La Belle, and Moore Haven. The draws shall be opened promptly on signal from 6 a.m. to 10 p.m. At least 3 hours' advance notice is required from 10 p.m. to 6 a.m.

(2) Orange River, Florida; Florida State Road Department bridge mile 0.9. The draw shall open on signal if at least 24 hours notice is given. However, during a hurricane alert for the Caloosahatchee and Orange Rivers area issued by the National Weather Service a draw tender shall be constantly on duty and the draw shall open at any time for the passage of vessels giving the signals set forth in §117.240.

§117.350 Albemarle and Chesapeake Canal (AIWW), Va.: U.S. Government bridge at Great Bridge. (a) The agency operating the bridge shall

not be required to open the drawspan for pleasure craft between the hours of 7:30 a.m. and 8:30 a.m. and between the hours of 5 p.m. and 6 p.m., Monday through Friday, State and Federal holidays excepted. All commercial water traffic and all vessels of the United States shall be passed at all times. Other vessels shall be passed during restricted hours if life or property are endangered.

(b) Mooring facilities are provided for pleasure craft awaiting passage during the hours of restricted operation. These vessels shall be allowed to pass whenever the drawspan is opened for commercial or Federal traffic.

(c) During all other hours not specifically noted in this section, the drawspan of the bridge shall be opened for any vessel requiring passage.

(d) Signs shall be posted on both the upstream and downstream sides of the bridge regarding the hours of restricted operation in such a manner that they can easily be read at any time.

§117.352 Neuse River, N.C.; U.S. 17 highway bridge at New Bern. (a) The draw shall open on signal as prescribed in §117.240, except that the draw may remain closed-(1) From Monday through Friday from 6:30 a.m. to 7:30 a.m. and 4:30 p.m. to 5:30 p.m. and (2) Sundays and Federal holidays from May 24 through September 8, from 2 p.m. to 7 p.m. except that the draw shall open at 4 p.m. and 6 p.m. for any vessels waiting to pass.

(b) The draw shall open at any time on the signal of four blasts for public vessels of the United States, State, or local vessels used for public safety, tugs with tows and vessels in distress.

§117.353 Trent River, N.C.: U.S. 70 highway bridge at New Bern. (a) The draw shall open on signal as prescribed in §117.240, except that the draw may remain closed-(1) From Monday through Friday from 6:30 a.m. to 7:30 a.m. and 4:30 p.m. to 5:30 p.m. and (2) Sundays and Federal holidays from May 24 through September 8, from 2 p.m. to 7 p.m. except that the draw shall open at 4 p.m. and 6 p.m. for any vessels waiting to pass.

(b) The draw shall open at any time on the signal of four short blasts for public vessels of the United States, State, or local vessels used for public safety, tugs with tows and vessels in distress.

§117.355 Bogue Sound (Atlantic Intracoastal Waterway), N.C.: North Carolina State Highway Commission bridge at Atlantic Beach. (a) The draw shall open on signal except-(1) From May 1 through June 14, on Saturdays, Sundays, and national holidays, from 1 p.m. to 7 p.m., the draw need not open for the passage of vessel except that the draw shall open on the hour for any vessel; and (2) From June 15 through Labor Day, on Saturdays, Sundays, and the Fourth of July from 1 p.m. to 7 p.m. the draw need not open for the passage of vessels except that the draw shall open at 3 p.m. and 5 p.m. for any vessels.

(b) The draw shall open on signal at any time, not withstanding the provisions of paragraph (a) of this section for the passage of vessels of the United States, towboats with tows, commercial vessels, and any vessel in an emergency involving danger to life or property. An emergency shall be indicated by four blasts of a whistle, horn, or similar device.

(c) The owner of or agency controlling the bridge shall erect and maintain on the upstream and downstream sides of the bridge, on the bridge or elsewhere, signs acceptable to the District Commander setting forth the regulations in this section.

§117.356 AIWW, Mile 311.8, Fort Caswell Bridge, Yaupon, N.C. (a) The draw shall open on signal, except that from June 15 through Labor Day on Saturdays and Sundays and on Independence Day and Labor Day the draw need not open for the passage of vessels from 1 p.m. to 7 p.m., local time, except at 3 p.m. and 5 p.m. when the draw shall open to allow all accumulated vessels to pass.

(b) The drawspan shall open at all times promptly on signal for the passage of towboats with tows, freight boats, public vessels of the United States, and any vessel in an emergency involving danger to life or property. Such vessels shall sound four blasts of a whistle, horn, or similar device.

(c) The owner of or agency controlling the bridge shall erect and maintain, on both sides of the bridge, signs acceptable to the District Commander setting forth the regulations in this section.

§117.360 U.S. 17 Bridge across Atlantic Intracoastal Waterway near Little River, S.C. The draw shall be opened promptly on signal except that from the hours of 11 a.m. to 5 p.m. on Sundays during June, July, and August the draw need be opened only on the hour to all vessels waiting to pass. This restriction shall not apply to tugs or public vessels of the United States which shall be passed on signal at any time.

§117.365 Atlantic Intracoastal Waterway (mile 462.2), South Carolina State Highway Department Ben M. Sawyer Swing Bridge (State Road 703) between Sullivan's Island and Mount Pleasant. (a) The owner of or agency controlling the bridge shall not be required to open the draw between 7 a.m. and 9 a.m. and between 4 p.m. and 6 p.m. daily, except as provided in paragraph (b) of this section.

(b) The draw shall be opened promptly upon the prescribed signal being given for the passage of tug boats, freight boats, commercial fishing boats, vessels owned and operated by the United States, and boats or vessels in distress.

(c) The owner of or agency controlling the bridge shall erect and maintain adjacent to the channel, on both sides of the bridge, signs acceptable to the Commandant, U.S. Coast Guard setting forth the salient features of the regulations in this section.

§117.370 Wappoo Creek (Atlantic Intracoastal Waterway), S.C.; South Carolina State Highway Department bridge (State Route 700) at Charleston. (a) The owner of or agency controlling the bridge shall not be required to open the draw between 7 a.m. and 9 a.m. and between 4 p.m. and 6 p.m. daily, excluding Sundays and Federal holidays, except as provided in paragraph (b) of this section.

(b) The draw shall be opened promptly upon the prescribed signal being given for the passage of tugboats, freight boats, commercial fishing boats, vessels owned and operated by the United States, and boats or vessels in distress.

(c) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof the salient features of the regulations in this section.

§117.380 Ladies Island drawbridge, Beaufort River, AIWW, S.C. (a) The draw need not open from 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m., Monday through Saturday, except legal holidays, except that the draw shall open at 8 a.m. and 5 p.m. if any vessels are waiting to pass the closed draw.

(b) The draw shall open at any time for the passage of public vessels of the United States, commercial tows, and vessels in distress. The opening signal from such vessels shall be four blasts of a whistle or horn or by shouting.

§117.408 Back River, Ga.: drawbridge in the causeway between Brunswick and St. Simons Island. (a) The owner of or agency controlling the bridge shall not be required to open the drawspan between the hours of 6 a.m. and 9 a.m. and between the hours of 4 p.m. and 6 p.m., daily, except on the hour when the bridge shall be opened to allow all accumulated vessels to pass, and except as provided in paragraph (b) of this section.

(b) The draw shall be opened to allow the passage of a vessel in distress, a commercial tow or a Government vessel at any time upon sounding by the vessel of four blasts of a whistle or horn.

(c) The owner of or agency controlling the bridge shall keep a copy of the regulations in this section conspicuously posted on both the upstream and downstream sides of the bridge in such a manner that it can be easily read at any time.

§117.430 St. Johns River, Fla.; Main Street, Acosta and Fuller Warren bridges, Jacksonville. (a) Between 7:30 a.m. and 9:00 a.m., and between 4:30 p.m. and 6:00 p.m., on all days other than Sundays and legal holidays, the draws need not be opened for the passage of vessels: Provided, That the draws shall be opened at any time for the passage of a vessel in an emergency involving danger of life or property, which shall be indicated by four blasts of a whistle, horn, or megaphone.

(b) In all other respects, the regulations contained in §117.240 of this part shall govern the operation of these bridges.

§117.430a St. Johns River, Fla.; Florida State Road Department bridge between Sanford and Osteen. (a) The owner of or agency controlling the bridge will not be required to keep a draw tender in attendance or to open the drawspan between the hours of 7:00 p.m. and 7:00 a.m. except on 12 hours' advance notice to be given to the authorized representative of the owner of the bridge. Regular draw tender service will be maintained between 7:00 a.m. and 7:00 p.m.

(b) The owner of or the agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such a manner that they can easily be read at any time, signs setting forth the salient features of the regulations and stating exactly how the authorized representative specified in paragraph (a) of this section may be reached for opening the bridge.

§117.431 (Reserved)

§117.431a (Revoked)

§117.431b (Revoked)

§117.432 Matanzas River (Intracoastal Waterway), Fla.; Bridge of Lions (State Road No. A1A) in St. Augustine. (a) Except as otherwise provided in paragraph (b) of this section, the owners or agency controlling this bridge need not open the draw for the passage of vessels Monday through Friday from 7:30 a.m. to 8:15 a.m., 11:50 a.m. to 12:20 p.m., and 5 p.m. to 5:45 p.m.

(b) The drawspan shall be opened promptly at any time to allow the passage of tugboats with tows, vessels owned or operated by the United States, and vessels in distress. Such vessels desiring to pass shall so indicate by four blasts of a whistle or similar device.

(c) The owners of or agency controlling the bridge shall keep a copy of the regulations in this section conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time.

§117.433 Ormond Beach Bridge (State Road 40) and Port Orange Bridge (U.S. AIA), AIWW, Volusia County, Fla. (a) The draws of these bridges shall open on signal except that from 7:30 a.m. to 8:30 a.m. and 4:30 p.m. to 5:30 p.m., Monday through Saturday, the draws may remain closed to the passage of vessels. The draws shall open at 8 a.m. and 5 p.m. during this period, if necessary, to assure the safety of vessels. The draws shall open on signal on Federal and Florida State holidays.

(b) Public vessels of the United States, tug with tows, and vessels in distress shall be passed at any time. The opening signal from these vessels is four blasts of a whistle, horn, or other sound-producing device or by shouting.

(c) During periods when storm signals are displayed in the Daytona Beach area, the draws shall open on signal. Storm signals are displayed upon notification by the National Weather Service that winds of up to 33 knots or more and/or sea conditions considered dangerous to small craft are expected. The opening signal is three blasts of a whistle, horn, or other sound-producing device or by shouting.

(d) The owners of or agencies controlling these bridges shall post signs on both the upstream and downstream sides of the bridges or adjacent to the bridges, that can be easily read at any time from an approaching vessel, stating the regulations in this section.

§117.434 Oklawaha River, Fla. (a) From 7 a.m. to 7 p.m. the draws of each bridge shall open on signal. From 7 p.m. to 7 a.m. the draws of each bridge shall open on signal if at least 3 hours notice has been given.

(b) The owner of or agency controlling each bridge shall conspicuously post notices containing these regulations both upstream and downstream of each bridge, on the bridge or elsewhere, in such a manner that they can easily be read at all times from an approaching vessel. The notice shall state how the authorized representative may be reached.

§117.434a Haines Creek, Fla., State Road 44 near Lisbon. (a) The draw shall open on signal if at least 3 hours' notice has been given.

(b) The owner of or agency controlling this bridge shall conspicuously post notices containing the substance of these regulations both upstream and downstream of the drawbridge on the bridge or elsewhere in such a manner that they can easily be read at all times from an approaching vessel. The notice shall state how the authorized representative may be reached.

§117.434b Dead River, Fla., Seaboard Coast Line railroad bridge. (a) From 6 a.m. to 10 p.m., the draw shall open on signal. From 10 p.m. to 6 a.m., the draw need not open for the passage of vessels.

§117.435 Indian River (Intracoastal Waterway), Fla.; automatic operation of Florida East Coast Railway bridge near Jay Jay north of Titusville. (a) The bridge will not be manned by a regular attendant.

(b) The bascule span will normally be in the open position, displaying flashing green signals, to allow the movement of water traffic.

(c) When a train approaches the bridge, the navigation signals will go to flashing red, and a horn starts four blasts, pauses and then continues four blasts, etc.

(d) After an eight (8) minute time delay, the bridge will lower and lock providing the scanning equipment reveals nothing under the bridge.

(e) After the train has cleared, the bridge will raise and the signals will return to flashing green for navigation.

(f) Train crews can hold the bridge down by pushing a hold button, and the bridge will remain down for a period of eight (8) minutes or while the approach track circuit is occupied.

§117.435a Banana River, Fla.; NASA Causeway Bridge near Orsino. (a) Any authorized vessel or person requiring the drawspan to be opened for the passage of navigation shall give the NASA Security Office by telephone at least 4 hours' advance notice of the time at which such opening will be required.

(b) The owner of or operator of the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that they can easily be read at any time, copies of the regulations together with a notice stating exactly how the Security Office specified in paragraph (a) of this section may be reached for opening the drawspan.

§117.436 Indian River, Fla.; Florida State Road Department bridges at Titusville, Eau Gallie, and Melbourne, and the National Aeronautics and Space Administration bridge at Addison Point. (a) The draw of the bridge at Titusville shall open on signal, except on Monday through Friday, from 6:45 a.m. to 7:45 a.m. and from 4:15 p.m. to 5:45 p.m., the draw may remain closed.

(b) The draws of the bridges at Eau Gallie and Melbourne shall open on signal, except on Monday through Friday, from 6:45 a.m. to 8:15 a.m. and from 4:15 p.m. to 5:45 p.m., the draws may remain closed.

(c) The draw of the John F. Kennedy Space Center (NASA) bridge at Addison Point shall open on signal except on Monday through Friday from 6:45 a.m. to 8 a.m. and from 4:15 p.m. to 5:45 p.m., the draw may remain closed.

(d) The draws of each bridge in this section shall open at any time for public vessels of the United States, tow boats with tows, and vessels in an emergency situation upon four blasts of a whistle, horn, or similar device.

(e) The owner of or agency controlling each bridge shall post a copy of this section in such a manner that it can be read from an approaching vessel, on both the upstream and downstream sides of the bridge.

§117.436a Loxahatchee River at Jupiter, St. Lucie River (Okeechobee Waterway) at Stuart and St. Lucie Canal (Okeechobee Waterway) at Port Mayaca, Fla.; automatic operation of Florida East Coast Railway bridges. (a) The bridges will not be manned by a regular attendant.

(b) The spans will normally be in open position, displaying flashing green signals, to allow the movement of water traffic.

(c) When a train approaches one of the bridges the navigation signals will go to flashing red, and a horn starts four blasts, pauses and then continues four blasts, etc.

(d) After an eight (8) minute time delay, the bridge will lower and lock providing the scanning equipment reveals nothing under the bridge.

(e) After the train has cleared, the bridge will raise and the signals will return to flashing green for navigation.

(f) Train crews can hold the bridge down by pushing a hold button, and the bridge will remain down for a period of eight (8) minutes or while the approach track circuit is occupied.

§117.437 Canaveral Harbor Barge Canal, Fla.; Florida State Road A1A bridge on Merritt Island. (a) From 6:45 a.m. to 7:45 a.m. and from 4:15 p.m.

to 5:45 p.m. Monday through Friday, excluding National holidays, the draw need not be opened except for the passage of towboats with tows, public vessels, and vessels in distress.

(b) From 10 p.m. to 6 a.m. constant attendance of the draw is not required, and at least 3 hours' advance notice to the authorized representative is required for the opening of the draw.

(c) At all other times, the draw shall be opened promptly on signal.

(d) The owner of or agency controlling this bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such a manner that they can easily be read at any time, copies of the regulations in this section together with directions stating how the authorized representative may be contacted.

§117.438 Canaveral Harbor Barge Canal, Fla.; Florida State Road 401 at Canaveral Harbor. (a) From 6:30 a.m. to 8 a.m. and from 3:30 p.m. to 5:15 p.m. Monday through Friday, excluding National holidays, the draw need not be opened except for the passage of towboats with tows, public vessels, and vessels in distress.

(b) From 10 p.m. to 6 a.m. constant attendance of the draw is not required, and at least 3 hours' advance notice to the authorized representative is required for the opening of the draw.

(c) At all other times, the draw shall be opened promptly on signal.

(d) The owner of or agency controlling this bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such a manner that they can easily be read at any time, copies of the regulations in this section together with directions stating how the authorized representative may be contacted.

§117.438a State Road 60 Bridge, AIWW, Vero Beach, Fla.

(a) Except as provided in paragraph (b) of this section, the draw shall be opened on signal for the passage of vessels.

(b) From 7:45 to 9 a.m., 12 noon to 1:15 p.m., and 4 p.m. to 5:15 p.m. Monday through Friday, except national holidays, the draw need not open for the passage of vessels. However, the draw shall open at 8:30 a.m., 12:30 p.m., and 4:30 p.m. if any vessels are waiting to pass.

(c) The draw shall open at any time for the passage of public vessels of the United States, State, or local government vessels used for public service, tugs with tows, and vessels in distress. The opening signal from these vessels is four blasts of a whistle or horn or by shouting.

(d) The owner of or agency controlling the bridge shall conspicuously post notice containing the substance of these regulations, both upstream and downstream, on the bridge or elsewhere, in such a manner that they can easily be read at all times from an approaching vessel.

(e) During periods when storm signals are displayed in the Vero Beach area, the draw shall open on signal. Storm signals are displayed upon notification by the National Weather Service that winds of up to 33 knots or more and/or sea conditions considered dangerous to small craft are expected. The opening signal is three blasts of a whistle, horn, or other sound-producing device, or by shouting.

§117.439 St. Lucie Canal, Fla.; Seaboard Air Line Railroad Co. bridge near Indiantown. (a) The owner of or agency controlling the bridge shall not be required to keep a drawtender in constant attendance or to open the drawspan between the hours of 10 p.m. and 6 a.m. except as provided in paragraph (b) of this section.

(b) Owners and operators of vessels unable to pass under the bridge in a closed position are urged to schedule their trips to pass the bridge between the hours of 6 a.m. and 10 p.m. The drawspan will be opened between the hours of 10 p.m. and 6 a.m., however, for the passage of commercial tows when it can be shown that the passage could not be scheduled during regular hours of operation without extreme inconvenience and added cost: Provided, That at least 3 hours' advance notice of the time at which such opening will be required is given to the Chief Dispatcher, Seaboard Air Line Railroad Co., Jacksonville, Fla.

(c) The owner of or agency controlling the bridge shall keep conspicuously posted on both sides of the bridge, in such manner that they can easily be read at any time, signs setting forth the salient features of the regulations and the current telephone number of the authorized representative specified in paragraph (b) of this section, and shall keep the District Commander and the Locktender at St. Lucie Lock notified of the current telephone number.

§117.439a St. Lucie Canal, Fla.; the Martin County bridge on State Road 76A near the Arundel Shops (Palm City Farms). (a) The owner of or agency controlling the bridge shall not be required to keep a drawtender in constant attendance or to open the drawspan between the hours of 10 p.m. and 6 a.m., except upon 3 hours' advance notice for the passage of commercial tows. Regular drawtender service will be maintained between the hours of 6 a.m. and 10 p.m.

(b) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in a manner that they can easily be read at any time, signs setting forth the salient features of the regulations and stating exactly how the representative currently designated to receive the advance notice for opening the bridge may be reached.

§117.439b Lake Worth (Intracoastal Waterway), Fla.; Singer Island bridge at Riviera Beach. (a) The owner of or agency controlling the bridge shall not be required to open the drawspan between the hours of 8 a.m. and 6 p.m., daily, except on the hour and half-hour when the bridge shall be opened to allow all accumulated vessels to

pass, and except as otherwise provided in paragraph (b) of this section.

(b) The drawspan shall be opened to allow the passage of a vessel in distress, a cruise boat operating on regular schedule, a commercial tow, or a vessel owned and operated by the United States at any time upon sounding by the vessel of four blasts of a whistle or horn.

(c) The owner of or agency controlling the bridge shall place conspicuously on both sides of the bridge signs of such size that they can be easily read at any time, clearly indicating the nature of the regulations.

§117.440 Lake Worth (Intracoastal Waterway), Fla.; Flagler Memorial and Royal Park bridges, Palm Beach, Florida. (a) From December 1 through April 30 between the hours of 7:30 a.m. and 6 p.m. the draws of these bridges need not be opened for the passage of vessels except that the Flagler Memorial draw shall be opened on the hour and half hour and the Royal Park draw shall be opened on the quarter hour and three-quarter hour during this period to permit any waiting vessel to pass. At all other times the draws shall be opened promptly on signal.

(b) The draws shall be opened to allow the passage of a vessel in distress, a public vessel of the United States or of a commercial tow at any time upon the sounding by the vessel of four blasts of a whistle or horn.

(c) The owner of or agencies controlling the bridges shall place conspicuously on both sides of each bridge signs of such size that they can be easily read at any time, clearly indicating the nature of the regulations.

§ 117.440a Southern Boulevard bridge, A.I.W.W., Palm Beach, Fla. (a) The draw shall open on signal except that from 7:30 a.m. to 9 a.m. and 4:30 p.m. to 6:30 p.m., Monday through Friday, except Federal and State holidays, the draw need not open for the passage of vessels. However, the draw shall open at 8:15 a.m. and 5:30 p.m. if any vessels are waiting to pass.

(b) The draw shall open at any time to allow the passage of public vessels of the United States, tugs with tows, and vessels in distress. The opening signal from these vessels is four blasts of a whistle, horn, or by shouting.

The owner of or agency controlling the bridge shall place conspicuously on both sides of the bridge, signs of such size that they can easily be read at any time from an approaching vessel, clearly indicating the nature of these regulations.

§117.441 (Revoked)

§117.441a West Palm Beach Canal, Florida; U.S. 1 bridge. The draw shall open on signal from 9:00 a.m. to 5:00 p.m. From 5:00 p.m. to 9:00 a.m. the draw need not open for the passage of vessels.

§ 117.442 Hillsboro Inlet, Fla., AIA bridge. (a) From 7 a.m. to 6 p.m. the draw need open on signal of 3 blasts or a whistle, horn or by shouting on each quarter hour. However, the draw shall open at any time for the passage of public vessels of the United States, tugs with tows or vessels in distress, and the opening signal from these vessels is 4 blasts or a whistle, horn or by shouting.

(b) From 6 p.m. to 7 a.m. the draw shall open on signal. The signal is 3 blasts of a whistle, horn or by shouting.

(c) The owner of or agency controlling this bridge shall conspicuously post notices containing the provisions of this regulation on the upstream and downstream sides of the drawbridge or elsewhere in a manner that they may be easily read at all times from an approaching vessel.

§ 117.442a AIWW, NE 14th Street bridge, Pompano, Fla. (a) From 7 a.m. to 6 p.m. the draw need open on signal of 3 blasts of a whistle, horn or by shouting only 15 minutes after and 15 minutes before the hour. However, the draw shall open at any time for the passage of public vessels of the United States, tugs with tows or vessels in distress, and the opening signal from these vessels is 4 blasts of a whistle, horn or by shouting.

(b) From 6 p.m. to 7 a.m. the draw shall open on signal. The signal is 3 blasts of a whistle, horn or by shouting.

(c) The owner of or agency controlling this bridge shall conspicuously post notices containing the provisions of this regulation on the upstream and downstream sides of the drawbridge or elsewhere in a manner that they may be easily read at all times from an approaching vessel.

§ 117.443 AIWW, Atlantic Boulevard bridge, Pompano, Fla. (a) From 7 a.m. to 6 p.m. the draw need open on signal of 3 blasts of a whistle, horn or by shouting only on the hour and half hour. However, the draw shall open at any time for the passage of public vessels of the United States, tugs with tows or vessels in distress, and the opening signal from these vessels is 4 blasts of a whistle, horn or by shouting.

(b) From 6 p.m. to 7 a.m. the draw shall open on signal. The opening signal is 3 blasts of a whistle, horn or by shouting.

(c) The owner of or agency controlling this bridge shall conspicuously post notices containing the provisions of this regulation on the upstream and downstream sides of the drawbridge or elsewhere in a manner that they may be easily read at all times from an approaching vessel.

§ 117.446 New River Sound and Stranahan River (Intracoastal Waterway), Fort Lauderdale, Fla., bridges. (a) East Las Olas Boulevard Bridge across New River Sound. The draw shall open promptly on signal.

(b) Sunrise Boulevard Bridge across New River Sound.

(1) From November 15 through May 15 the draw need not open from 7:15 a.m. to 6:15 p.m. except on the quarter hour and three quarters hour. At all other times the draw shall open on signal.

(2) Public vessels of the United States, tugs with tows, and vessels in distress shall be passed

at any time upon a signal of four short blasts of a whistle, horn, or by shouting.

(c) (Deleted)

(d) The owner of or agency controlling the bridges shall place signs, of a size and description designated by the District Commander, at each side of these bridges and at a distance of one-half mile above and below each bridge indicating the regulations.

(e) Southeast 17th Street bridge across the Stranahan River (A.I.W.W.). (1) From 7 p.m. to 7 a.m. the draw shall open on signal. From 7 a.m. to 7 p.m. the draw shall open on signal, however, the draw need not reopen for a period of 15 minutes after each closure. The owner of or agency controlling the bridge will display on both sides thereof a time clock acceptable to the District Commander which will indicate to approaching waterway traffic the number of minutes remaining before the bridge will be available for opening.

(2) Upon receipt of the proper signal the draw shall be opened at any time to allow the passage of a tug with a tow, a vessel owned and operated by the United States or a vessel in distress. The proper signal for such an opening shall be indicated by four blasts of a whistle, horn, or similar device.

(3) The owner of or agency controlling the bridge shall erect and maintain conspicuously on both sides thereof signs acceptable to the District Commander, setting forth the salient features of the regulations in this paragraph.

§117.446a Intracoastal Waterway, Fla.; Hollywood Boulevard bridge, Hollywood, Fla. (a) During the period November 15 to May 15, inclusive, the owner of or agency controlling the Hollywood Boulevard bridge will not be required to open the drawspan between the hours of 10:00 a.m. and 6:00 p.m., except on half-hour intervals, on the hour and half-hour when the bridge shall be opened to allow all accumulated vessels to pass, and except as provided in paragraph (c) of this section.

(b) During the period May 16 to November 14, inclusive, on Saturdays, Sundays, Memorial Day, Independence Day, Labor Day and Veterans Day, the owner of or agency controlling the bridge will not be required to open the drawspan between the hours of 9:00 a.m. and 7:00 p.m., except on the hour and half-hour when the bridge shall be opened to allow all accumulated vessels to pass, and except as provided in paragraph (c) of this section.

(c) Upon receipt of the proper signal the draw shall be opened at any time to allow the passage of a tow, sailing vessel, vessel in distress, and cruise boats operating on regular schedule. The proper signal for such openings shall be indicated by four blasts of a whistle, horn or similar device.

(d) The owner or agency controlling the bridge shall keep a copy of the regulations of this section conspicuously posted on both the upstream and downstream sides thereof in such manner that it can be easily read at any time.

§117.446b Intracoastal Waterway, Fla.; Hallandale bridge at Hallandale, Fla. (a) During the period November 15, to May 15, both dates inclusive, the owner or agency controlling this bridge will not be required to open the drawspan between the hours of 10:15 a.m., and 6:15 p.m., except on half-hour intervals, on the quarter-hour and three quarter-hour when the bridge shall be opened to allow all accumulated vessels to pass, and except as provided in paragraph (b) of this section.

(b) Upon receipt of proper signal the draw shall be opened at any time to allow the passage of a tow, sailing vessel, vessel in distress, and cruise boats operating on regular schedule.

(c) The owner of or agency controlling this bridge shall erect and maintain, on both sides thereof, signs acceptable to the District Commander, setting forth the salient features of the special regulations of this section.

§ 117.446c New River and South Fork of New River, Fort Lauderdale, Fla.; bridges. (a) Southeast 3rd Avenue bridge across New River, mile 1.4.

(1) The draw shall open on signal except that from 7:30 a.m. to 8:30 a.m., and 4:30 to 5:30 p.m. Monday through Friday, the draw need not open for the passage of vessels.

(2) The draw shall open at any time for the passage of public vessels of the United States, tugs with tows, regularly scheduled cruise boats, and vessels in distress. The opening signal from these vessels shall be four blasts of a whistle, horn, other sound producing device or by shouting.

(3) The owner of or agency controlling the bridge shall erect and maintain conspicuously on both sides thereof signs acceptable to the District Commander, setting forth the salient features of the regulations in this paragraph and paragraph (b) of this section.

(b) Andrews Avenue bridge over New River. Except as provided in subparagraphs (2) and (3) of paragraph (c) of this section, the owner of or agency controlling this bridge will not be required to open the drawspan for an upbound boat when the nearby Florida East Coast Railroad bridge is in a down position.

(c) Southwest 12th Street Bridge across South Fork of New River, mile 0.9.-(1) The draw shall open on signal except than from 7:30 a.m., to 8:30 a.m., and 4:30 p.m., to 5:30 p.m., Monday through Friday, the draw need not open for the passage of vessels.

(2) The draws shall open at any time for the passage of public vessels of the United States, tugs with tows, regularly scheduled cruise boats and vessels in distress. The opening signal from these vessels shall be 4 blasts of a whistle, horn, other sound producing device or by shouting.

(3) The owner of or agency controlling the bridge shall erect and maintain conspicuously on both sides thereof signs acceptable to the District Commander, setting forth the salient features of the regulations in this paragraph and paragraph (b) of this section.

(d) State Road No. 84 bridge at Mile 4.4 over South Fork of New River. The owner of or agency controlling this bridge will not be required to keep a draw tender constantly on duty. An advance notice of at least 24 hours will be required to open the drawspan.

§117.446d Indian Creek, Fla.; bridge at 63d Street, Miami Beach. (a) The owners of or agencies controlling this drawbridge from December 1 to April 15 need not open the draw for the passage of vessels from 11 a.m. to 6 p.m. except that on the hour the draw shall be opened for any vessels waiting to pass. At all other times the draw shall be opened on signal.

(b) The drawspan shall be opened promptly for passage of a vessel in an emergency involving danger to life or property, cruise boats operating on regular schedules and vessels owned and operated by the United States. The proper signal for such openings shall be indicated by four blasts of a whistle, horn or similar device.

(c) The owner of or agency controlling the bridge shall keep a copy of the regulations of this section conspicuously posted on both the upstream and downstream sides of the bridge in such manner that it can be easily read at any time.

§117.446e Broad Causeway, Biscayne Bay, Fla. (a) Except as provided in paragraph (b) of this section, the draw shall open on signal.

(b) From November 1 through April 30 from 8 a.m. to 6 p.m. the draw need open only on the hour and half hour, except that the draw shall open on four blasts of a whistle at any time for a public vessel of the United States, commercial tows, regularly scheduled cruise boats, and vessels in distress.

§117.446f Dodge Island bridges. (a) Except as provided in paragraphs (b) and (c) of this section the draws shall open on signal for the passage of vessels.

(b) From 7:30 a.m. to 9 a.m., 11:30 a.m. to 1:30 p.m., and 4:30 p.m. to 6 p.m., Monday through Saturday except legal holidays, the draws need open only on the quarter and three-quarter hour.

(c) The draws shall open on four blasts of a whistle at any time for the passage of public vessels of the United States, commercial tows, regularly scheduled cruise boats, or vessels in distress.

§117.447 Biscayne Bay, Fla., MacArthur Causeway, and east and west spans of the Venetian Causeway; bridges. (a) MacArthur Causeway: The draws shall open promptly on signal; however, from November 1 through April 30 from 7 a.m. to 9 a.m. and 4:30 p.m. to 6:30 p.m. the draws need open only on the hour and half hour if any vessels are waiting to pass.

(b) West span Venetian Causeway: The draws shall open promptly on signal; however, from November 1 through April 30, from 7 a.m. to 9 a.m. and 4:30 p.m. to 6:30 p.m., Monday through Friday, the draws need open only on the hour and half hour if any vessels are waiting to pass. The draws shall open promptly on signal on Thanksgiving, Christmas, New Year's Day, and Washington's Birthday.

(c) East Span Venetian Causeway: The draws shall open promptly on signal; however, the draws need not open from November 1 through April 30, from 7:15 a.m. to 8:45 a.m. and 4:45 p.m. to 6:15 p.m., Monday through Friday, except that the draws shall open at 7:45 a.m., 8:15 a.m., 5:15 p.m., and 5:45 p.m., if any vessels are waiting to pass during this period. The draws shall open promptly on signal on Thanksgiving, Christmas, New Year's Day, and Washington's Birthday.

(d) The draws of these bridges shall open at any time for passage of public vessels of the United States, tugs with tows, regularly scheduled cruise boats and vessels in distress. The opening signal from these vessels shall be four blasts of a whistle, horn, other sound producing device, or by shouting.

(e) The owner of or agency controlling the bridges shall post notices containing the substance of these regulations, both upstream and downstream, on the bridges or elsewhere, in such a manner that they can easily be read at all times from an approaching vessel.

§117.447a Biscayne Bay, Fla., Rickenbacker Causeway Bridge. (a) The draw shall open on signal except that-(1) From 7:30 a.m. to 9 a.m. and 4:30 p.m. to 6 p.m., Monday through Friday, except legal holidays, the draw need open only on the hour and half-hour for vessels; and (2) From 11 a.m. to 6p.m. on Saturdays, Sundays, and legal holidays, the draw need open only on the hour and half-hour for vessels.

(b) (Reserved)

(c) During the display of small craft warnings or warnings for winds of greater force by the United States Weather Bureau affecting the area, the bridge shall be opened for the passage of vessels giving the usual signal at any time.

(d) The draw shall open at any time for the passage of a public vessel of the United States, tugs with tows, cruise boats operating on a regular schedule, or a vessel in an emergency involving danger to life or property. The opening signal from these vessels shall be 4 blasts of a whistle, horn, other sound producing device, or by shouting.

(e) The owner of or agency controlling the bridge shall keep a copy of the regulations in this section conspicuously posted on both sides thereof, in such manner that it can be easily read at any time.

§117.448 Miami River, Fla.; highway bridges from mouth to and including city of Miami bridge at Northwest 27th Avenue, Miami. (a) Except as otherwise provided in paragraphs (b), (c), and (d) of this section, the owners of or agencies controlling these bridges shall not be required to open the drawspans for the passage of vessels from 7:30 a.m. to 9:00 a.m. and from 4:30 p.m. to 6:00 p.m. on all days other than Sundays and the following

legal holidays: New Year's Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day.

(b) This section shall not apply to vessels owned or operated by the United States. All such vessels shall be passed without delay through the draw of any bridge at any time on giving the usual signal.

(c) During the existence of a hurricane alert duly issued by the United States Weather Bureau affecting the Miami area, all of the bridges shall be opened for the passage of vessels giving the usual signal at any time.

(d) The draw of any bridge shall be opened at any time for the passage of a vessel in an emergency involving danger to life or property. Such an emergency shall be indicated by four blasts of a whistle, horn, or megaphone.

(e) The owners of or agencies controlling the bridges shall keep a copy of the regulations of this section conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time.

(f) This section shall remain in full force and effect until revoked or modified by the Commandant.

§117.449 Miami River, Fla.; Seaboard Air Line Railroad Co. bridge, Miami. The owner of or agency controlling the bridge will be required to provide bridge tender service only between the hours of 8:30 a.m. and 5:30 p.m., Monday through Friday. At all other times the draw will be opened for the passage of vessels upon three hours' advance notice.

§117.462 Caloosahatchee River, Fla.; Florida State Road Department bridge (Edison Bridge) at Fort Myers. (a) Except as otherwise provided in paragraphs (b) and (c) of this section, the owner of or agency controlling the bridge shall not be required to open the drawspan between the hours of 4:30 p.m., and 5:30 p.m., daily except on Sundays and the following legal holidays: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day.

(b) The regulations in this section shall not apply to vessels owned or operated by the United States. All such vessels shall be passed without delay through the draw of the bridge at any time on giving the usual signal.

(c) The draw of the bridge shall be opened at any time for the passage of a tow or of a vessel in an emergency involving danger of life or property. Such an emergency shall be indicated by four blasts of a whistle, horn, or megaphone.

(d) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in a manner that they can easily be read at any time, signs setting forth the salient features of the regulations in this section.

Part 124–Control Over Movement of Vessels:

§124.10 Advance notice of vessel's time of arrival to Captain of the Port. (a) The master or agents of every registered vessel of the United States, and every foreign vessel arriving at a United States port or place from a port or place outside the United States, or any such vessel destined from one port or place in the United States to another port or place in the United States, shall give at least 24 hours advance notice of arrival to the Captain of the Port at every port or place where the vessel is to arrive, except as follows:

(1) Registered United States pleasure vessels and registered United States fishing vessels are not required to submit advance notice of arrival report.

(2) When the port of arrival is not located within the geographical area assigned to a particular Captain of the Port, this advance notice of time of arrival shall be made to the Commander of the Coast Guard District in which such port or place is located.

(3) When the arrival is a direct result of the operation of "force majeure," and it is not possible to give at least 24 hours' advance notice of time of arrival, then advance notice as early as practicable shall be furnished.

(4) When the vessel, while in United States waters, does not navigate any portion of the high sea, i.e. does not navigate beyond the low water mark along the coasts or beyond the waters contained within the headlands of the United States.

(5) When a vessel is engaged upon a scheduled route if a copy of the schedule is filed with the Captain of the Port for each port of call named in the schedule and the times of arrival at each such port are adhered to.

(6) When the master of a merchant vessel (except on a coastwise voyage of 24 hours or less) reports in accordance with the U.S. Coast Guard's voluntary Automated Merchant Vessel Report (AMVER) System, he shall be considered to be in constructive compliance with the requirements of paragraph (a) of this section and no additional advance notice of vessel's arrival reports to the Captain of the Port is required. The master or agent of a vessel on coastwise voyages of 24 hours or less shall report the advance notice of vessel's arrival to the Captain of the Port at next port of call prior to or upon departure from port.

(7) For that vessel which is engaged in operations in and out of the same port to sea and return without entering any other port, or on coastwise voyages between ports in the same Coast Guard District, or on voyages between ports in the First, Ninth, Thirteenth, or Seventeenth Coast Guard Districts and adjacent Canadian ports, or between ports of the Commonwealth of Puerto Rico and ports in the Lesser Antilles, or between ports in the Lesser Antilles or between ports on the east coast of Florida and the Bahama Islands, the Coast Guard District Commander having jurisdiction

may, when no reason exists which renders such action prejudicial to the rights and interests of the United States, prescribe conditions under which such vessels may be considered by the Captains of the Port as being in constructive compliance with requirements of this section.

(8) A westbound vessel which is to proceed to or through United States waters of the St. Lawrence River and/or the Great Lakes shall be subject to compliance with paragraph (b) of this section.

(b) The master or agent of every vessel other than vessels of United States or Canadian nationality engaged in the coastal trade of their respective countries or in trade between their two countries without calling at any other country en route, when proceeding westbound to United States waters of the St. Lawrence River and/or the Great Lakes shall:

(1) At least 24 hours in advance of the vessel's arrival at the Snell Lock, Massena, New York, advise the Commander, Ninth Coast Guard District, Cleveland, Ohio, of estimated time of arrival of such vessel at the Snell Lock.

(2) In addition, at least 24 hours in advance of the vessel's arrival at the first United States port-of-call, advise the Commander, Ninth Coast Guard District, Cleveland, Ohio, of the estimated time of arrival at that port.

(3) (Reserved)

(4) A master of a vessel who reports in accordance with the U.S. Coast Guard's voluntary Automated Merchant Vessel Report (AMVER) System and who includes in this report an estimated time of arrival at the Snell Lock, Massena, New York, shall be considered to be in constructive compliance with the requirements of subparagraph (1) of this paragraph and no additional advance notice of vessel's arrival at the Snell Lock is required. Likewise a master of such vessel who indicates in this report the name of the first intended United States port of call and estimated time of arrival at that port shall be considered in constructive compliance with subparagraph (2) of this paragraph and no additional advance notice of arrival is required.

(5) A master or agent of a vessel who files a copy of the scheduled route with the Commander, Ninth Coast Guard District, Cleveland, Ohio, at least 24 hours prior to arrival at Snell Lock, and who includes in the schedule the estimated time of arrival at the Snell Lock, Massena, N.Y., shall be considered to be in constructive compliance with requirements of subparagraph (1) of this paragraph and no additional advance notice of the vessel's arrival at the Snell Lock is required. Likewise, a master or agent of such vessel who indicates in this schedule the name of the first intended United States port of call and estimated time of arrival at that port shall be considered in constructive compliance with subparagraph (2) of this paragraph and no additional advance notice of arrival is required.

(6) When the arrival is a direct result of the operation of "force majeure," and it is not possible to give at least 24 hours advance notice of time of arrival, then advance notice as early as practicable shall be furnished.

§124.14 Advance notice of arrival of vessel laden with explosives or certain specified dangerous cargoes. (a) The master, agent, or person in charge of any domestic or foreign vessel which is bound for a port or place in the United States and which is carrying as cargo any of the dangerous cargoes described in this paragraph, whether for discharge in the United States or not, shall at least 24 hours in advance of arrival at each port or place, notify the Captain of the Port or the Commander of the Coast Guard District in which such port or place is located concerning the amount and location of stowage on board the vessel of any of the following:

(1) Explosives, class A (commercial or military).

(2) Oxidizing materials for which a special permit for water transportation is required by 46 CFR 146.22.

(3) Radioactive materials for which a special approval by the Commandant for water transportation is required by 46 CFR 146.25-30.

(4) Any dangerous cargo considered to involve a particular hazard, when transported or handled in bulk quantities, as further described in paragraph (b) of this section.

(b) (1) A dangerous cargo considered to involve a particular hazard, when transported in bulk quantities on board vessels, or when handled in bulk qunatities on waterfront facilities, is any commodity which by virtue of its properties would create an unusual hazard if released. The commodities subject to this section are:

Acetaldehyde	Ethylenimine
Acetone Cyanohydrin	Ethyl Ether
Acrolein	Hydrofluoric Acid, aqueous (70 percent)
Acrylonitrile	Hydrogen Chloride, anhydrous
Allyl chloride	Hydrogen Fluoride, anhydrous
Ammonia, anhydrous	Methane
Butadiene	Methyl Acetylene, Propadiene Mixture, stabilized
Butane	Methyl Bromide
Butene	Methyl Chloride
Butylene Oxide	Motor Fuel Antiknock Compounds containing Lead Alkyls
Carbon Disulfide	Oleum
Chlorine	Phosphorus, elemental
Chlorosulfonic Acid	Propane
Dimethylamine	Propylene
Epichlorohydrin	Propylene Oxide
Ethane	Sulfur Dioxide
Ethylene	Toluene Diisocyanate
Ethylene Oxide	Vinyl Chloride

(2) Each commodity listed in subparagraph (1) of this paragraph is considered to possess one or more of the following properties:

(i) Is highly reactive or unstable; or

(ii) Has severe or unusual fire hazards; or

(iii) Has severe toxic properties; or

(iv) Requires refrigeration for its safe containment; or

(v) Can cause brittle fracture of normal ship structural materials or ashore containment materials by reason of its being carried at low temperatures, or because of its low boiling point at atmospheric pressure (unless uncontrolled release of the cargo is not a major hazard to life).

(c) For U.S. vessels, this section is applicable to such vessels on international voyages, coastwise voyages, or Great Lakes voyages. For foreign vessels this section is applicable to such vessels when bound to a port or place in the United States, or a port or place under the jurisdiction of the United States.

(d) When the arrival is a direct result of "force majeure" and it is not possible to give at least 24 hours advance notice, then advance notice as early as possible will be given.

§124.16 Advance notice of fire or other abnormal condition on arriving vessel. (a) The master, agent, or person in charge of any domestic or foreign vessel which is bound for a port or place in the United States shall give notice to the Captain of the Port or the Commander of the Coast Guard District in which such port or place is located as early as possible in advance of arrival of any fire or other abnormal condition which may jeopardize the vessel's safety or that of other vessels or facilities in port.

§124.20 Penalties for violations. Failure to give advance notice will subject the master or agents of a vessel to the penalties of fine and imprisonment, as well as subject the vessel to seizure and forfeiture, as provided in section 2, Title II of the Act of June 15, 1917, as amended, 50 U.S.C. 192. In addition, such failure may result in delay in the movement of the vessel from the harbor entrance to her facility destination within the particular port.

Part 160-Ports and Waterways Safety:

Subpart A-General:

§ 160.1 Purpose.

Part 160 contains regulations implementing Title I of the Ports and Waterways Safety Act of 1972.

§ 160.11 Definitions.

For the purpose of this part:

(a) "United States" includes the fifty States, the District of Columbia, Puerto Rico, the territories and possessions of the United States, and the Trust Territory of the Pacific Islands.

(b) "Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water.

(c) "Commandant" means the Commandant of the U.S. Coast Guard.

(d) "District Commander" means the Coast Guard officer designated by the Commandant to command a Coast Guard District described in the Code of Federal Regulations, Title 33, Chapter 1, Part 3.

(e) "Captain of the Port" means the Coast Guard officer, under the command of a District Commander, designated by the Commandant for the purpose of giving immediate direction to Coast Guard law enforcement activities within his assigned area as described in the Code of Federal Regulations, Title 33, Chapter 1, Part 3.

(f) "Person" includes an individual, firm, corporation, association, governmental entity, and a partnership.

§ 160.15 Penalties.

33 U.S.C. 1226 prescribes that whoever violates a regulation issued under Title I of the Ports and Waterways Safety Act of 1972 is liable to a civil penalty of not more than $10,000. A vessel used or employed in a violation of these regulations is liable in rem. 33 U.S.C. 1227 prescribes that whoever willfully violates a regulation issued under Title I of the Ports and Waterways Safety Act of 1972 shall be fined not less than $5,000 or more than $50,000 or imprisoned for not more than five years, or both.

Subpart B-Orders and Directions of the Captain of the Port and District Commander:

§ 160.31 Applicability.

This subpart applies to all vessels on the navigable waters of the United States, except the Saint Lawrence Seaway and the Panama Canal.

§ 160.35 Delegations.

To prevent damage to, or the destruction or loss of any vessel, bridge, or other structure on or in the navigable waters of the United States, or any land structure or shore area immediately adjacent to those waters and to protect the navigable waters and the resources therein from environmental harm resulting from vessel or structure damage, destruction, or loss-

(a) Each District Commander, Captain of the Port, or their authorized representative may direct the anchoring, mooring, or movement of a vessel when necessary to prevent damage to or by that vessel or her cargo, stores, supplies, or fuel; and

(b) Each District Commander, Captain of the Port, or their authorized representative may temporarily control vessel traffic in an area which he determines to be especially hazardous, or under conditions of reduced visibility, adverse weather, vessel congestion, or other hazardous circumstances by issuing orders.

(1) Specifying times of vessel entry, movement, or departure to, from, within, or through ports, harbors, or other waters;

(2) Establishing vessel traffic routing schemes;

(3) Establishing vessel size and speed limitations and vessel operating conditions; and

(4) Restricting vessel operation, in a hazardous area or under hazardous conditions, to vessels which have particular operating characteristics and capabilities which he considers necessary for safe operation under the circumstances.

§ 160.39 Compliance with directions and orders.

Each person who has notice of the terms of an order or direction issued under § 160.35 shall comply with that order or direction.

§ 160.45 Appeals.

(a) Any person directly affected by an order or direction issued under this part may request reconsideration by the official who issued the order or direction and may appeal the order or direction through the Captain of the Port to the District Commander and then to the Commandant, whose decision shall be final.

(b) Requests for reconsideration and appeals may be written or oral, but if oral must be followed by no less than a written outline of the key points made. The Coast Guard official to whom the request or appeal is made will provide a written decision if requested.

(c) While any request or appeal is pending the order or direction remains in effect.

Part 204-Danger Zone Regulations:

§204.51a Atlantic Ocean south of entrance to Chesapeake Bay off Dam Neck, Virginia Beach, Virginia, naval firing range. (a) The danger zone. All of the water area within a sector extending seaward a distance of 5,000 yards between radial lines bearing 35° true and 92° true, respectively, from a point on the shore at latitude 36°47′33″, longitude 75°58′23″.

(b) The regulations. (1) During the period from sunrise to sunset vessels shall proceed through the area with caution and shall remain therein no longer than necessary for purposes of transit.

(2) When firing is in progress, red flags will be displayed at conspicuous locations on the beach.

(3) Firing on the ranges will be suspended as long as any vessel is within the danger zone.

(4) Lookout posts will be maintained by the Fleet Anti-Air Warfare Training Center, Dam Neck, Virginia Beach, Virginia.

(5) There shall be no firing on any of the ranges between sunset and sunrise, nor during other periods of low visiblity.

(6) The regulations in this section shall be enforced by the Commanding Officer of the Fleet Anti-Air Warfare Training Center, Dam Neck, Virginia Beach, Virginia, and such agencies as he may designate.

§204.52 Atlantic Ocean south of entrance to Chesapeake Bay; firing range. (a) The danger zone. A sector extending seaward for a distance of 12,000 yards between two radial lines bearing 30° true and 75° true, respectively, from a point on the shore at latitude 36°46′48″, longitude 75°57′24″; and an adjacent sector extending seaward for a distance of 15 miles between two radial lines bearing 75° true and 150° true, respectively, from the same shore position.

(b) The regulations. (1) During the period from sunrise to sunset vessels shall proceed through the area with caution and shall remain therein no longer than necessary for purposes of transit.

(2) When firing is in progress, red flags will be displayed at conspicuous locations on the beach.

(3) Firing on the ranges will be suspended as long as any vessel is within the danger zone.

(4) Lookout posts will be maintained by the activity or agency operating the firing range at Fleet Combat Direction Systems Training Center, Atlantic, Dam Neck, Virginia Beach, Virginia.

(5) There shall be no firing on any of the ranges between sunset and sunrise, nor during other periods of low visibility.

(6) The regulations in this section shall be enforced by the Commanding Officer of the Fleet Anti-Air Warfare Training Center, Dam Neck, Virginia Beach, Virginia, and such agencies as he may designate.

§204.53 Atlantic Ocean south of entrance to Chesapeake Bay off Camp Pendleton, Virginia; naval prohibited area. (a) The area. Beginning at a point on the shore at Camp Pendleton at latitude 36°48′19″N, longitude 75°57′49″W; thence easterly 200 yards to latitude 36°48′20″N, longitude 75°57′42″W; thence northerly 400 yards to latitude 36°48′32″N, longitude 75°57′45″W: thence westerly 200 yards to latitude 36°48′31″N, longitude 75°57′53″W; and thence southerly 400 yards along the shore to the point of beginning.

(b) The regulations. (1) Vessels other than those owned and operated by the United States shall not enter the area except by permission of the Commanding Officer, U.S. Naval Amphibious Base, Little Creek, Norfolk, Virginia.

(2) This section shall be enforced by the Commanding Officer, U.S. Naval Amphibious Base, Little Creek, Norfolk, Virginia, and such agencies as he may designate.

§204.54 Albemarle Sound, Pamlico Sound, and adjacent waters, N.C.; danger zones for naval aircraft operations. (a) Target areas-(1) North Landing River (Currituck Sound). The waters of North Landing River within a radius of 1,000 yards from a target located at latitude 36°31′00″, longitude 76°01′40″.

(2) Northern part of Currituck Sound. Beginning at a point bearing 65°30′, 1,025 yards, from Currituck Sound Light 69; thence 86°, 6,000 yards; thence 193°, 4,425 yards; thence 267°30′, 2,775 yards; and thence to the point of beginning. The target is located at latitude 36°27′16″, longitude 75°56′30″.

(3) (Revoked)

(4) (Revoked)

(5) (Revoked)

Note: All bearings in this section are referred to true meridian.

(b) Target and bombing areas-(1) Along north shore of Albemarle Sound-(i) The area. Beginning on the north shore of Albemarle Sound at the easternmost tip of Harvey Point; thence southeasterly to Day Beacon Number 3; thence southeasterly to latitude 36°03′06″, longitude 76°16′43″; thence southwesterly to latitude 36°02′18″, longitude 76°19′30″; thence northwesterly to latitude 36°04′18″, longitude 76°20′20″; thence 23°15′ true to the shore; and thence northeasterly along the shore to the point of beginning.

(2) Along south shore of Albemarle Sound-(i) The area. Beginning at latitude 36°00′43″, longitude 76°19′20″; thence to latitude 36°02′40″, longitude 76°04′26″, thence to latitude 36°00′12″, longitude 76°04′26″; thence to latitude 35°59′35″, longitude 76°19′20″, and thence to the point of beginning. This area is divided into three subareas A, B, and C as follows: Area A, beginning at latitude 36°00′43″, longitude 76°19′20″; thence to latitude 36°01′20″, longitude 76°14′30″; thence to latitude 35°59′45″, longitude 76°14′30″; thence to latitude 35°59′35″, longitude 76°19′20″, and thence to the point of beginning. Area B, beginning at latitude 36°01′20″, longitude 76°14′ 30″; thence to latitude 36°02′18″, longitude 76°07′15″; thence to latitude 36°00′05″, longitude 76°07′15″; thence to latitude 35°59′45″, longitude 76°14′30″; and thence to the point of beginning. Area C, beginning at latitude 36° 02′18″, longitude 76°07′15″; thence to latitude 36°02′40″, longitude 76°04′26″; thence to latitude 36°00′12″, longitude 76°04′26″; thence to latitude 36°00′05″, longitude 76°07′15″; and thence to the point of beginning.

(c) Naval Aviation Ordnance test area in Pamlico Sound in vicinity of Long Shoal. A circular area with radius of one and one-half miles having its center at latitude 35°32′18″, longitude 75°40′39″.

(d) The regulations-(1) Target areas. The area described in paragraph (1)(a) of this section will be used as a dive bombing target by naval aircraft. In peacetime, munitions will be limited to miniature bombs which contain only small explosive charges for producing smoke puffs to mark points of impact. All operations will be conducted during daylight hours, and the area will be open to navigation at night. No vessel shall enter this area during the hours of daylight without special permission from the enforcing agency. The area will be patrolled and vessels will be warned not to enter. "Buzzing" by plane will warn vessels that they are in a danger zone, and upon being so warned vessels which have inadvertently entered the area shall immediately leave the area.

(2) Target and bombing areas. The areas described in paragraph (b) (1) and (2) of this section will be used as a target and bombing area for both day and night operations. No use will be made of the area described in paragraph (b) (1) of this section for target and bombing operations during the period 30 days prior to and during the annual duck hunting season as established by the State of North Carolina. Dummy ammunition, waterfilled or smoke bombs, and inert rockets will be used, except during wartime when live ammunition, bombs, and rockets may be used. The areas will be open to navigation except for periods when ordnance exercises are being conducted by naval aircraft. In area B described in paragraph (b) (2) of this section the placing of nets, traps, buoys, pots, fishponds, stakes, or other equipment which may interfere with target vessels operating in the area shall not be permitted. The areas will be patrolled and vessels shall clear the area under patrol upon being warned by the surface patrol craft or when "buzzed" by patrolling aircraft. As a further means of warning vessels of naval aircraft operations in the area described in paragraph (b) (1) of this section, a cluster of flashing red lights at night and a large red flag by day will be displayed from the range observation tower located in the approximate center of the shore side of this area.

(3) Naval Aviation Ordnance test area. The area described in paragraph (c) of this section shall be closed to navigation except for such military vessels as may be directed by the enforcing agency to enter on assigned duties.

(4) Enforcing agency. The regulations in this section shall be enforced by the Commander Fleet Air Norfolk, and such agencies as he may designate.

§204.55 Pamlico Sound and adjacent waters, N.C.; danger zones for Marine Corps operations. (a) Bombing and rocket firing area in Pamilico Sound in vicinity of Brant Island-(1) The area. The waters within a circular area with a radius of 3.0 statute miles having its center on the southern side of Brant Island at latitude 35°12′30″, longitude 76°26′30″.

(2) The regulations. The area shall be closed to navigation at all times except for vessels engaged in operational and maintenance work as directed by the enforcing agency. Prior to bombing or firing operations the area will be "buzzed" by plane. Upon being so warned vessels working in the area shall leave the area immediately.

(b) Bombing, rocket firing, and strafing areas in Pamlico Sound and Neuse River-(1) The areas. (i) The waters within a circular area with a radius of 1.8 statute miles having its center at latitude 35°02′12″, longitude 76°28′00″.

(ii) The waters within a circular area with a radius of 0.5 statute mile having its center at latitude 35°00′30″, longitude 76°29′50″.

(iii) The waters within a circular area with a radius of 0.5 statute mile having its center at latitude 35°04′12″, longitude 76°28′24″.

(iv) The waters within a circular area with a radius of 0.5 statute mile having its center at latitude 35°01′42″, longitude 76°25′48″.

(v) The waters within a circular area with a radius of 0.5 statute mile having its center at latitude 34°58′48″, longitude 76°26′12″.

(2) The regulations. (i) The areas described in subparagraph (1) (i) and (ii) of this paragraph will be used as bombing, rocket firing, and strafing areas. Live and dummy ammunition will be used. The areas shall be closed to navigation at all times except for such vessels as may be directed by the enforcing agency to enter on assigned duties. The areas will be patrolled and vessels "buzzed" by the patrol plane prior to the conduct of operations in the areas. Vessels which have been inadvertently entered the danger zones upon being so warned shall leave the area immediately.

(ii) The areas described in subparagraph (1) (iii), (iv), and (v) of this paragraph will be used as bombing, rocket firing, and strafing areas. Practice and dummy ammunition will be used. All operations will be conducted during daylight hours, and the areas will be open to navigation at night. No vessel shall enter these areas during the hours of daylight without special permission from the enforcing agency. The areas will be patrolled and vessels "buzzed" by the patrol plane prior to the conduct of operations in the areas. Vessels which have inadvertently entered the danger zones upon being so warned shall leave the areas immediately.

(c) Enforcing agency. The regulations of this section shall be enforced by the Commander, Marine Corps Air Bases, East, Cherry Point, North Carolina, or his authorized representatives.

§204.56 New River, N.C., and vicinity; Marine Corps Firing Ranges. (a) Atlantic Ocean east of New River Inlet. The waters of the Atlantic Ocean within a sector bounded on the north by a line bearing 105° from latitude 34° 37′25″, longitude 77°10′35″; on the east and south by the arc of a circle having a radius of 25,000 yards centered at latitude 34°34′15″, longitude 77°16′10″; on the west by a line bearing 205° from latitude 34°32′37″, longitude 77°18′34″, and on the northwest by the shore.

Note: All bearings in this section are referred to true meridian.

(b) New River. The firing ranges include all waters to the high waterline within eight sections described as follows:

(1) Trap Bay Sector. Bounded on the south by a line running from Cedar Point 280° to New River Light 70, thence 254° to Hatch Point; and on the northwest by a line running from Wilkins Bluff 232° to Hall Point.

(2) Courthouse Bay Sector. Bounded on the southeast by the northwest boundary of the Traps Bay Sector and on the west by Sneads Ferry Bridge.

(3) Stone Bay Sector. Bounded on the east by Sneads Ferry Bridge and on the north by a line running from a point on the east side of New River opposite the head of Sneads Creek 291°30′ to the south side of the mouth of Stone Creek.

(4) Stone Creek Sector. The northwest portion of Stone Bay, bounded on the south by the north boundary of the Stone Bay Sector; and on the east by longitude 77°26′.

(5) Grey Point Sector. Bounded on the south by the north boundary of the Stone Bay Sector; on the west by the east boundary of the Stone Creek Sector; and on the northeast by a line running from Town Point 113° to the south side of the mouth of French Creek.

(6) Farnell Bay Sector. Bounded on the south by the northeast boundary of the Grey Point Sector, including French Creek up to longitude 77°20′; and on the north by a line running from Hadnot Point 285°30′ to Holmes Point.

(7) Morgan Bay Sector. Bounded on the south by the north boundary of the Farnell Bay Sector, including Wallace Creek up to longitude 77°22′; and on the northwest by a line running from Paradise Point 243°30′ to Ragged Point.

(8) Jacksonville Sector. Bounded on the southeast by the northwest boundary of the Morgan Bay Sector, including Southwest Creek up to the point where it narrows to 200 feet in width, and Northeast Creek up to longitude 77°23′30″; and on the north by an east-west line passing through New River Day Beacon 41.

(c) The regulations. (1) Sailing vessels and any watercraft having a speed of less than 5 knots shall keep clear of any closed sector at all times after notice of firing therein has been given. Vessels propelled by mechanical power at a speed greater than 5 knots may enter the sectors without restriction except when the firing signals are being displayed. When these signals are displayed, vessels shall clear the closed sectors immediately and no vessels shall enter such sectors until the signals indicate that firing has ceased.

(2) Firing will take place both day and night at irregular periods throughout the year. Insofar as training requirements will permit, underwater explosions will be restricted in the Atlantic Ocean sector (described in paragraph (a) of this section) during the periods May 1 and June 5, inclusive, and November 22 to December 15, inclusive.

(3) Two days in advance of the day when firing in any sector except the Stone Creek sector is scheduled to begin, the enforcing agency will warn the public of the contemplated firing, stating the sector or sectors to be closed, through the public press and the United States Coast Guard and, in the case of the Atlantic Ocean sector, the Cape Fear Pilots Association at Southport, and the pilots Association at Morehead City, North Carolina. The Stone Creek sector may be closed without advance notice.

(4) Towers at least 50 feet in height will be erected near the shore at the northeast and southwest limits of the Atlantic Ocean sector, and towers at least 25 feet in height will be erected near the easterly shore at the upper and lower limits of each New River sector. On days when firing is to take place a red flag will be displayed on each of the towers marking the sector or sectors to be closed. These flags will be displayed by 8:00 a.m., and will be removed when firing ceases for

the day. Suitable range markers will be erected indicating the bearings of the north and west limits of the Atlantic Ocean sector.

(5) During the night firing, red lights will be displayed on the towers; and, in the case of the Atlantic Ocean sector, searchlights will be employed as barrier lights to enable safety observers to detect vessels which may attempt to enter the danger zone.

(d) Target and bombing area in Atlantic Ocean in vicinity of Bear Inlet-(1) The Area. The waters within an area described as follows: Beginning at latitude 34°37′32″, longitude 77°12′03″; thence to latitude 34°36′58″, longitude 77°11′25″; thence to latitude 34°37′44″, longitude 77°10′35″; thence to latitude 34°32′27″, longitude 77°06′30″; thence to latitude 34°30′50″, longitude 77° 10′20″; thence to latitude 34°36′00″, longitude 77°14′00″; and thence to the point of beginning.

(2) The regulations. Vessels may proceed along established waterways except during military training periods. Warning of military training periods will be given through Notices to Mariners and by displaying one hour prior to commencement a red danger streamer during daylight hours or a red light at night, from a flag pole 40 feet in height located at the U.S. Coast Guard Life Boat Station, Bogue Inlet, Swansboro, North Carolina, and from observation tower 40 feet in height located at the northern end of Onslow (Hurst) Beach. Prior to bombing and firing operations, the area will be searched by plane. Watercraft in the area will be warned by aircraft "buzzing" of the impending target practice. Upon being so warned, vessels shall leave the area as quickly as possible by the most direct route.

(e) Inland waters in the Browns Inlet area between Bear Creek and Onslow Beach Bridge over the Atlantic Intracoastal Waterway-(1) The area. Navigable waters between Bear Creek and Onslow Beach Bridge to include all inlets, streams, bays, and water therein contained, bounded on the north by Bear Creek, on the east and south by the Atlantic Ocean, to the meridian 77°16′ 20″; thence by this meridian to latitude 34°34′31″; and thence by a line bearing 44° from this point until the line intersects Bear Creek.

(2) The regulations. (i) Vessels may proceed through the Atlantic Intracoastal Waterway in the area without stopping except in cases of extreme emergencies.

(ii) All navigable waters in the area between the south bank of Bear Creek and the north bank of the north connecting channel between the Atlantic Intracoastal Waterway and Browns Inlet shall be closed to navigation at all times. There are highly sensitive unexploded projectiles within the limits of this area.

(iii) Vessels may proceed through the north connecting channel and the south connecting channel (Banks Channel) in the area between the Atlantic Intracoastal Waterway and Browns Inlet to the Atlantic Ocean without stopping during periods of nonmilitary use. Caution should be used when proceeding through these waters due to the presence of unexplored projectiles lying in this area.

(iv) Navigable waters in the area between the south connecting channel (Banks Channel) leading to Browns Inlet and Onslow Beach Bridge on both sides of the Atlantic Intracoastal Waterway are open to unrestricted navigation during periods of nonmilitary use. An unknown element of risk exists in this area due to the possible presence of unexploded projectiles.

(v) Warning of impending military use of the area will be contained in weekly Notice to Mariners.

(vi) Vessels having specific authority from the Commanding General, Marine Corps Base, Camp Lejeune, North Carolina, may enter the area.

(f) Enforcing agency. The regulations of this section shall be enforced by the Commanding General, Marine Corps Base, Camp Lejeune, North Carolina, or his authorized representatives.

§204.80 Archers Creek, Ribbon Creek and Broad River, S.C.; U.S. Marine Corps Recruit Depot Rifle and Pistol Ranges, Parris Island. (a) During the periods when the rifle and pistol ranges on Parris Island are in use, the following areas will be restricted to navigation:

(1) At the rifle range. Archers Creek between Broad River and Beaufort River and Ribbon Creek from Broad Creek entrance. The area is inclosed by the following points:

32°21′40″N.,	80°44′52″W;
32°21′51″N.,	80°44′38″W;
32°21′54″N.,	80°44′41″W;
32°22′01″N.,	80°44′21″W;
32°22′08″N.,	80°44′15″W;
32°22′15″N.,	80°44′07″W;
32°22′17″N.,	80°44′05″W;
32°22′20″N.,	80°43′52″W;
32°22′17″N.,	80°43′48″W;
32°22′17″N.,	80°43′47″W;
32°21′44″N.,	80°43′28″W;
32°21′30″N.,	80°43′13″W;
32°20′55″N.,	80°42′23″W;
32°20′21″N.,	80°42′24″W;
32°20′06″N.,	80°42′43″W;
32°20′12″N.,	80°43′01″W;
32°20′18″N.,	80°43′22″W;
32°20′28″N.,	80°43′33″W;
32°20′30″N.,	80°43′37″W;
32°20′35″N.,	80°43′41″W;

and thence to point of beginning:

32°21′40″N.,	80°44′52″W.

(2) At the pistol range. An area in Broad River inclosed by the following points:

32°20′09″N.,	80°42′57″W;
32°19′27″N.,	80°42′27″W;
32°18′57″N.,	80°43′24″W;
32°19′39″N.,	80°43′54″W;
32°20′00″N.,	80°43′36″W;
32°20′00″N.,	80°43′15″W.

The area will be adequately marked by red flags for the convenience and protection of the general public.

(b) Firing over these ranges will normally take place between the hours of 6:30 a.m. and 5 p.m., Monday through Friday, and from 6 a.m. to 12 noon on Saturday, National holidays excepted, and at other times as designated and properly published by the Commanding General, Parris Island Marine Base.

(c) Vessels and other watercraft shall not enter the restricted waters when firing is in progress. At all other times these waters are open to navigation. Safety regulations shall be enforced at all times with the following specific precautions being provided by the Parris Island Marine Base:

(1) At the rifle range-Warning signs indicating the periods when the rifle range is in use will be posted at the entrances to Archers Creek and Ribbon Creek. Also the warning signs will be placed at the corners of the rifle range impact area.

(2) At the pistol range-Warning flag shall be flown from top of a lookout tower with a sentry lookout during actual firing. Also a patrol boat shall be accessible for clearing the area and warning all approaching vessels of the danger zone area and the schedule of firing. During storms or similar emergencies this area shall be opened to vessels to reach safety without undue delay for the preservation of life and property.

(d) The regulations in this section shall be enforced by the Commanding General, Marine Corps Recruit Depot, Parris Island, South Carolina, and such agencies as he may designate.

§204.81 Atlantic Ocean off Georgia Coast; air-to-air and air-to-water gunnery and bombing ranges for fighter and bombardment aircraft, United States Air Force. (a) The danger zones-(1) For fighter aircraft. An area approximately 30 miles offshore between Wassaw Sound and Brunswick, Georgia, described as follows: Beginning at latitude 31°55′30″, longitude 80°24′00″; thence 90° true to longitude 80°16′00″; thence southwesterly to latitude 31°10′00″, longitude 80°43′00″; thence 270° to longitude 80°51′00″; and then northeasterly to the point of beginning.

(2) For bombardment aircraft. An area approximately 70 miles off shore between Savannah Beach and Brunswick, Georgia, described as follows: Beginning at latitude 32°00′00″, longitude 79°43′00″; thence 90° true to longitude 79°07′00″; thence southwesterly to latitude 31°10′00″, longitude 79°24′00″; thence 270° true to longitude 80°00′00″; and thence northeasterly to the point of beginning.

(b) The regulations. (1) The danger zones shall be open to navigation except when aerial gunnery or bombing practice is being conducted.

(2) Prior to conducting each practice the entire area will be patrolled by aircraft to warn any watercraft found in the vicinity that such practice is about to take place. The warnings will be by "buzzing", i.e., by flying low over the watercraft. Any watercraft shall, upon being so warned, immediately leave the area designated and shall remain outside the area until practice has ceased.

(3) The regulations in this section shall be enforced by the Commanding Officer, 2d Bombardment Wing, Hunter Air Force Base, Savannah, Georgia, and such agencies as he may designate.

§204.82 Lake George, Fla.; naval bombing area. (a) The danger zone. An area in the eastern part of Lake George described as follows: Beginning at latitude 29°13′16″, longitude 81°34′28″; thence along a line parallel to the navigation channel to latitude 29°20′05″, longitude 81°36′15″; thence along a line about three-fifths mile southerly from the Putnam-Volusia County line to latitude 29°20′19″, longitude 81°35′12″; thence to latitude 29°18′36″, longitude 81°33′53″; thence to latitude 29°13′22″, longitude 81°32′38″; and thence to the point of beginning. The area will be marked by appropriate warnings signs at the five corners and at the midpoint of the longer side.

(b) The regulations. (1) Bombing operations will be confined, as nearly as practicable, to the north-south center line of the danger zone, keeping well clear of the navigation channel.

(2) Prior to each bombing operation the danger zone will be patrolled by naval aircraft which will warn vessels to leave the area by "zooming" a safe distance to the side and at least 500 feet above the surface. Upon being so warned such vessels shall leave the danger zone immediately, and no vessel shall enter the danger zone until bombing operations have ceased.

(3) At intervals of not more than three months, public notices will be issued that bombing operations are continuing. Such notices will appear in the local newspaper and in "Notice to Mariners".

(4) The regulations in this section shall not deny passage through Lake George by regular cargo-carrying vessels proceeding along established lanes for such vessels. When any such vessel is within the danger zone the officer in charge of the bombing operations will cause the cessation or postponement of such operations until the vessel has cleared the area. The vessel shall proceed on its normal course and shall not delay its progress.

(5) The regulations in this section shall be enforced by the Commander, Naval Air Bases, Sixth Naval District, Naval Air Station, Jacksonville, Florida, and such agencies as he may designate.

§204.85 Atlantic Ocean off Cape Canaveral, Fla.; Air Force Missile Testing Area, Patrick Air Force Base, Fla. (a) The danger zone. An area in the Atlantic Ocean immediately offshore from Cape Canaveral defined by a line 3 nautical miles from shore, said area terminating in the north at a line on a bearing of 70° from a point on shore at approximate latitude 28°35′ north and in the south at a line on a bearing of 115° from a point on the shore at approximate latitude 28°25′ north.

(b) The regulations. (1) All unauthorized vessels are prohibited from operating within the danger zone during firing periods to be specified by the Commander, Air Force Missile Test Center, Patrick Air Force Base.

(2) Warning signals will be used to warn vessels that the danger zone is active. These signals will be in the form of a large red ball and a red flashing high intensity beacon. One signal will be located on a 90-foot pole near the shoreline at the north end of the danger zone, and one signal will be located on a 90-foot pole near the shoreline about one-half mile north of the south limit of the danger zone. An amber rotating beacon and warning sign will be erected on the north side of the Port Canaveral ship channel to indicate to vessels about to leave the harbor that the danger zone is in use.

(3) When the signals in subparagraph (2) of this paragraph are displayed, all vessels, except authorized patrol vessels, will immediately leave the danger zone by the most direct route and stay out until the signals are discontinued.

(4) The regulations in this paragraph shall be enforced by the Commander, Air Force Missile Test Center, Patrick Air Force Base, Fla., and such agencies as he may designate.

§204.95 Straits of Florida and Florida Bay in vicinity of Key West, Fla.; operational training area, aerial gunnery range, and bombing and strafing target areas, Naval Air Station, Key West, Fla. (a) The danger zones-(1) Operational training area. Waters of the Straits of Florida and Gulf of Mexico southwest, west and northwest of Key West bounded as follows: Beginning at latitude 25°45′00″, longitude 82°07′00″; thence southeast to latitude 24°49′00″, longitude 81°55′00″; thence southwest to latitude 24°37′30″, longitude 82°00′30″; thence westerly to latitude 24°37′30″, longitude 82°06′00″; thence southerly to latitude 24°28′30″, longitude 82°06′00″; thence southerly to latitude 24°25′00″, longitude 82°06′30″; thence easterly to latitude 24°25′00″, longitude 81°57′00″; thence southwesterly to latitude 23°30′00″, longitude 82°19′00″; thence westerly to latitude 23°30′00″, longitude 82°46′00″; thence northwesterly to latitude 23°52′30″, longitude 83°11′00″; thence northerly to latitude 24°25′00″, longitude 83°11′00″; thence easterly to latitude 24°25′00″, longitude 83°08′00″; thence clockwise along the arc of a circle with a radius of 92 miles centered at latitude 24°35′00″, longitude 81°41′15″ to latitude 25°45′05″, longitude 82°23′30″; thence east to point of beginning.

(2) Bombing and strafing target areas.

(i) A circular area immediately west of Marquesas Keys with a radius of two nautical miles having its center at latitude 24°33.4′ and longitude 82°10.9′, not to include land area and area within Marquesas Keys. The target located within this area, a grounded LSIL will be used for bombing and aircraft rocket exercises.

(ii) A circular area located directly west of Marquesas Keys with a radius of three statute miles having its center at latitude 24°35.6′ and longitude 82°11.6′, not to include land area within Marquesas Keys. The targets located within this area, pile-mounted platforms, will be used as high altitude horizontal bombing range utilizing live ordnance up to and including 1,800 pounds of high explosives. In general, these explosives will be of an air-burst type, above 1,500 feet.

(iii) A circular area located west of Marquesas Keys with a radius of two nautical miles having its center at latitude 24°34′30″ and longitude 82°14′00″.

(b) The regulations. (1) In advance of scheduled air or surface operations which, in the opinion of the enforcing agency, may be dangerous to watercraft, appropriate warnings will be issued to navigation interests through official government and civilian channels or in such other manner as the District Engineer, Corps of Engineers, Jacksonville, Florida, may direct. Such warnings will specify the location, type, time, and duration of operations, and give such other pertinent information as may be required in the interests of safety.

(2) Watercraft shall not be prohibited from passing through the operational training area except when the operations being conducted are of such nature that the exclusion of watercraft is required in the interest of safety or for accomplishment of the mission, or is considered important to the national security.

(3) When the warning to navigation interests states that bombing and strafing operations will take place over the designated target areas or that other operations hazardous to watercraft are proposed to be conducted in a specifically described portion of the overall area, all watercraft will be excluded from the target area or otherwise described zone of operations and no vessel shall enter or remain therein during the period operations are in progress.

(4) Aircraft and naval vessels conducting operations in any part of the operational training area will exercise caution in order not to endanger watercraft. Operations which may be dangerous to watercraft will not be conducted without first ascertaining that the zone of operations is clear. Any vessel in the zone of operations will be warned to leave and upon being so warned the vessel shall leave immediately.

(5) The regulations in this section shall be enforced by the Commandant, Sixth Naval District, Charleston, S.C., and such agencies as he may designate.

Part 205–Dumping Grounds Regulations:

§205.30 Ashley River and Charleston Harbor, S.C. (a) The dumping grounds. (1) Along the east shore of Cooper River opposite Charleston, not more than one-fourth mile from the shore line at

low water, north of an east and west line through a point 200 feet south of the southerly end of Hog Island, and south of a line parallel to and 500 feet south of the John P. Grace Memorial Bridge.

(2) Along the east shore of Cooper River, in water not over 20 feet deep at mean low water, between an east and west line through the stack at the port terminal, and another east and west line through the mouth of Filbin Creek.

(3) Along the James Island shore of the Ashley River in water not more than 12 feet deep at the time of dumping, to the southeast of a line through the most southerly point of the battery and the rear south channel range light.

(b) The regulations. (1) The areas described in paragraph (a) of this section may be used only for dumping of suitable nonfloatable materials, not easily transported by the currents, from dredging and other operations in Charleston Harbor and vicinity, such as submarine excavations, ballast and other suitable materials from vessels, and waste materials of suitable character from neighboring land excavations.

(2) All dumping shall be done during the daytime, unless otherwise specially permitted by the district engineer, and such dumping shall be subject to supervision by said district engineer, or his representatives, who may suspend the privilege at any time if, in his opinion, the interests of navigation so require.

(3) No dumping shall be commenced without at least 24 hours prior notice thereof to the District Engineer.

(4) Dumping of other than dredged material shall be done only under the supervision of said district engineer or his representatives, and the cost of inspection shall be borne by the party responsible for the dumping.

(5) Inspectors and others while engaged in this service will be afforded satisfactory transportation to and from the dumping grounds, and will be provided protection from the weather and, if necessary, with satisfactory board and sleeping accommodations by the responsible party.

(6) In all the above cases when, in the judgment of the district engineer, it becomes necessary, he shall provide buoys or other suitable markers showing the limits of these dumping grounds, and the expense of providing these shall be borne by the responsible parties.

(7) This section shall not be construed as authorizing, without the usual Department of the Army written permit, any dredging in or connecting with the navigable waters.

(8) Dredged material from a single job, in excess of 10,000 cubic yards, shall not be dumped in said areas without the usual Department of the Army written permit.

(9) Dumping of waste materials from neighboring lands areas will be limited to restricted quantities. Such dumping will be done only under the usual Department of the Army written permit.

(10) In case any deposits are left unnecessarily high, or when in the opinion of the district engineer such action is required in the interests of navigation, the responsible party shall, upon 10 days notice by the district engineer, lower and level at his own expense such deposits to the depth required and within the time specified by said district engineer and failure to do so shall be considered a violation of these regulations and of section 4 of the act of March 3, 1905 (33 Stat. 1147; 33 U.S.C. 419).

(11) The discharge into the Ashley River of phosphate washings is prohibited, and the washing water must be allowed to flow back to the river only after the contained sediment has had time to become reasonably well deposited.

(12) Map of the dumping grounds may be seen at the office of the district engineer, or obtained from him.

(13) No dumping shall be done in Charleston Harbor or adjacent waters, outside the dumping grounds prescribed in this section, unless specifically authorized by a Department of the Army permit.

§205.80 Entrance to seaports. (a) The regulations. (1) The areas prescribed in paragraph (b) of this section, except as provided in subparagraphs (9), (10), and (12), may be used only for the dumping of suitable nonfloatable materials, not easily transported by the currents. Dumping of objects and materials of any type or class within the areas described in paragraph (c) of this section is strictly prohibited.

(2) No dumping shall be done in areas established for this purpose until prior permission therefore has been obtained from the District Engineer, in charge of the locality. The district engineer may suspend the work or revoke the permission at any time. If inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the party responsible for the dumping.

(3) Maps showing the location of the dumping grounds may be seen at the office of the district engineer, in charge of the locality, or upon request, he will furnish a written description of the location of the grounds.

(4) The regulations in this section shall be enforced by the Commanders, Eastern Sea Frontier, Caribbean Sea Frontier and Western Sea Frontier, and such agencies as they may designate.

(b) Dumping grounds.

(1) to (4) do not include areas covered by this Coast Pilot.

(5) The waters of the Atlantic Ocean south of Charleston Harbor, South Carolina, within a circle having a radius of five miles with its center at latitude 32°20′00″, longitude 79°55′00″.

(6) The waters of the Straits of Florida south of Key West Harbor, Florida, within a circle having a radius of five miles with its center at latitude 23°54′00″, longitude 81°37′00″.

(7) to (13) do not include areas covered by this Coast Pilot.

(c) Prohibited dumping grounds. (1) The waters of the Atlantic Ocean off Charleston Harbor, South Carolina, within an area prescribed by a line bearing 159° true from latitude 32°41′42″, longitude 79°53′00″ (Charleston Light), and a line bearing 90° true from latitude 32°45′54″, longitude 79°49′54″ (Coast Guard Station), and extending seaward to the 40-fathom curve.

(2) The waters of the Straits of Florida south of Key West Harbor, Florida, within the 30-foot main ship channel and a triangular area including the approaches and entrance to the channel bounded as follows: Beginning at latitude 24°28′10.2″, longitude 81°48′06″, thence to latitude 24°26′00″, longitude 81°46′00″, thence to latitude 24°26′00″, longitude 81°50′00″, thence to the point of beginning.

Part 207-Navigation Regulations:

§207.153 Elizabeth River, Southern Branch, Va., naval restricted areas. (a) The areas-(1) St. Helena Annex Area. Beginning at a point at St. Helena Annex of the Norfolk Naval Shipyard, on the eastern shore of Southern Branch of Elizabeth River, at latitude 36°49′43″, longitude 76°17′26.5″; thence in a southwesterly direction to a point on the eastern boundary of Norfolk Harbor 40-foot channel at latitude 36°49′42″, longitude 76°17′33″; thence in a southerly direction along the eastern boundary of Norfolk Harbor 40-foot channel to latitude 36°49′28″, longitude 76°17′27″; thence easterly to the shore at latitude 36°49′28″, longitude 76°17′22″; and thence, northerly along the shore to the point of beginning.

(2) Norfolk Naval Shipyard Area. Beginning at a point on the shore at the northeast corner of the Norfolk Naval Shipyard, at latitude 36°49′43.5″, longitude 76°17′41.5″; thence due east approximately 100 feet to the western boundary of Elizabeth River channel; thence in a southerly direction along the western boundary of the channel to the point where it passes through the draw of the Norfolk and Portsmouth Belt Line Railroad bridge, thence in a southwesterly direction along the northerly side of the bridge to the western shore of Southern Branch of Elizabeth River; and thence along the shore in a northerly direction to the point of beginning.

(3) Southgate Terminal Area. Beginning at a point at the northeast corner of Southgate Terminal Annex of Norfolk Naval Shipyard, at latitude 36°48′23″, longitude 76°17′39″; thence east to latitude 36°48′23″, longitude 76°17′29″; thence southerly along the western boundary of Norfolk Harbor 35-foot channel to latitude 36°48′04″, longitude 76°17′33″; thence west to latitude 36°48′04″, longitude 76°17′41″; and thence along the shore in a northerly direction to the point of beginning.

(b) The regulations. (1) No vessels other than Naval vessels and other vessels authorized to move to and from piers at the Norfolk Naval Shipyard and its two annexes described in paragraph (a) (1) and (3) of this section, and no person other than persons embarked in such vessels, shall enter the restricted areas.

(2) This section shall be enforced by the Commander, Norfolk Naval Shipyard, Portsmouth, Va. and such agencies as he may designate.

§207.154 Southern Branch of Elizabeth River; speed. In that part of the Southern Branch of Elizabeth River between the junction of the Southern and Eastern Branches of the Elizabeth River and the Norfolk and Portsmouth Belt Line Railroad Bridge, no vessel shall move at a speed exceeding six knots.

§207.158 Chesapeake Bay entrance; naval restricted area. (a) The area. Beginning at a point on the south shore of Chesapeake Bay at longitude 76°03′06″; thence to latitude 37°01′18″, longitude 76°02′06″; thence to latitude 37°00′18″, longitude 75°55′54″; thence to latitude 36°58′00″, longitude 75°48′24″; thence to latitude 36°51′48″, longitude 75°51′00″; thence to the shore at longitude 75°58′48″, and thence northwesterly and southwesterly along the shore at Cape Henry to the point of beginning.

(b) The regulations. (1) Anchoring, trawling, crabbing, fishing, and dragging in the area are prohibited, and no object attached to a vessel or otherwise shall be placed on or near the bottom.

(2) This section shall be enforced by the Commandant, Fifth Naval District, Norfolk, Va.

§207.160 All waterways tributary to the Atlantic Ocean south of Chesapeake Bay and all waterways tributary to the Gulf of Mexico east and south of St. Marks, Fla.; use, administration, and navigation. (a) Description. This section applies to the following:

(1) Waterways. All navigable waters of the United States, natural or artificial, including bays, lakes, sounds, rivers, creeks, intracoastal waterways, as well as canals and channels of all types, which are tributary to or connected by other waterways with the Atlantic Ocean south of Chesapeake Bay or with the Gulf of Mexico east and south of St. Marks, Florida.

(2) Locks. All Government owned or operated locks and hurricane gate chambers and appurtenant structures in any of the waterways described in subparagraph (1) of this paragraph.

(3) United States property. All river and harbor lands owned by the United States in or along the waterways described in subparagraph (1) of this paragaph, including lock sites and all structures thereon, other sites for Government structures and for the accommodation and use of employees of the United States, and rights of way and spoil disposal areas to the extent of Federal interest therein.

(4) Vessels and rafts. The term "vessels" as used in this section includes all floating things moved over these waterways other than rafts.

(b) Authority of District Engineers. The use, administration, and navigation of these waterways, Federal locks and hurricane gate chambers shall be under the direction of the officers of the Corps of Engineers, United States Army, detailed in charge of the respective sections, and their authorized assistants. The cities in which the U.S. District Engineers are located are as follows:

U.S. District Engineer, Norfolk, Virginia.

U.S. District Engineer, Wilmington, North Carolina.

U.S. District Engineer, Charleston, South Carolina.

U.S. District Engineer, Savannah, Georgia.

U.S. District Engineer, Jacksonville, Florida.

(c) Commercial Statistics. (1) As required by section 11 of the River and Harbor Act of September 22, 1922 (42 Stat. 1043; 33 U.S.C. 555), owners, agents, masters and clerks of vessels plying upon the waterways described in paragraph (a)(1) of this section shall submit a report on such activities for statistical purposes which most contain the following information:

(i) Name of Vessel.

(ii) Name and address of owner or operator.

(iii) Type of vessel-steam, motor, sail, barge, or other type.

(iv) Net registered tonnage-if not registered, approximate net tonnage.

(v) Maximum draft at time of passage.

(vi) Number of passengers.

(vii) Cargo-by commodities, expressed in short tons, or other units by which such commodities are customarily measured, giving origin and destination.

(2) All persons rafting and towing logs shall submit a report of their activities containing such information as may be called for by the District Engineer concerned.

(3) The report should be presented to the lockmaster of the federally operated locks for each trip made. Where no federally operated lock is passed, they shall be mailed promptly to the District Engineer. On written request, persons or corporations making frequent use of these waterways may be granted permission to submit monthly statements in lieu of reports by trips. Reports may be submitted on forms furnished free of charge by the District Engineer.

(d) Bridges. (For regulations governing the operation of bridges, see §117.1, §117.240 and §117.245 of this title).

(e) Locks-(1) Authority of lockmasters. The lockmaster shall be charged with the immediate control and management of the lock, and of the area set aside as the lock area, including the lock approach channels. He shall see that all laws, rules and regulations for the use of the lock and lock area are duly complied with, to which end he is authorized to give all necessary orders and directions in accordance therewith, both to employees of the Government and to any and every person within the limits of the lock and lock area, whether navigating the lock or not. No one shall cause any movement of any vessel, boat, or other floating thing in the lock or approaches except by or under the direction of the lockmaster or his assistants.

(2) Signals. Vessels desiring lockage in either direction shall give notice to the lockmaster at not more than three-quarters of a mile nor less than one-quarter of a mile from the lock, by two long and two short blasts of a whistle. When the lock is available, a green light, semaphore or flag will be displayed; when not available, a red light, semaphore or flag will be displayed. No vessels or rafts shall approach within 300 feet of any lock entrance unless signalled to do so by the lockmaster.

(3) Precedence at locks. (i) The vessel arriving first at a lock shall be first to lock through; but precedence shall be given to vessels belonging to the United States and to commercial vessels in the order named. Arrival posts or markers may be established ashore above or below the locks. Vessels arriving at or opposite such posts or markers will be considered as having arrived at the locks within the meaning of this subparagraph.

(ii) The lockage of pleasure boats, house boats or like craft shall be expedited by locking them through with commercial craft (other than barges carrying petroleum products or highly hazardous materials) in order to utilize the capacity of the lock to its maximum. If, after the arrival of such craft, no separate or combined lockage can be accomplished within a reasonable time not to exceed the time required for three other lockages, then separate lockage shall be made.

(4) Entrance to and exit from locks. No vessel or raft shall enter or leave the locks before being signalled to do so. While waiting their turns, vessels or rafts must not obstruct traffic and must remain at a safe distance from the lock. They shall take position in rear of any vessels or rafts that may precede them, and there arrange the tow for locking in sections if necessary. Masters and pilots of vessels or in charge of rafts shall cause no undue delay in entering or leaving the lock, and will be held to a strict accountability that the approaches are not at any time unnecessarily obstructed by parts of a tow awaiting lockage or already passed through. They shall provide sufficient men to move through the lock promptly without damage to the structures. Vessels or tows that fail to enter the locks with reasonable promptness after being signalled to do so will lose their turn.

(5) Lockage of vessels. (i) Vessels must enter and leave the locks carefully at slow speed, must be provided with suitable lines and fenders, must always use fenders to protect the walls and gates, and when locking at night must be provided with suitable lights and use them as directed.

(ii) Vessels which do not draw at least six inches less than the depth on miter sills or breast

walls, or which have projections or sharp corners liable to damage gates or walls, shall not enter a lock or approaches.

(iii) No vessel having chains or lines either hanging over the sides or ends, or dragging on the bottom, for steering or other purposes, will be permitted to pass a lock or dam.

(iv) Power vessels must accompany tows through the locks when so directed by the lockmaster.

(v) No vessel whose cargo projects beyond its sides will be admitted to lockage.

(vi) Vessels in a sinking condition shall not enter a lock or approaches.

(vii) The passing of coal from flats or barges to steamers while in locks is prohibited.

(viii) Where special regulations for safeguarding human life and property are desirable for special situations, the same may be indicated by printed signs, and in such cases such signs will have the same force as other regulations in this section.

(ix) The lockmaster may refuse to lock vessels which, in his judgment, fail to comply with this paragraph.

(6) Lockage of rafts. Rafts shall be locked through in sections as directed by the lockmaster. No raft will be locked that is not constructed in accordance with the requirements stated in paragraph (g) of this section. The party in charge of a raft desiring lockage shall register with the lockmaster immediately upon arriving at the lock and receive instructions for locking.

(7) Number of lockages. Tows or rafts locking in sections will generally be allowed only two consecutive lockages if one or more single vessels are waiting for lockage, but may be allowed more in special cases. If tows or rafts are waiting above and below a lock for lockage, sections will be locked both ways alternately whenever practicable. When there are two or more tows or rafts awaiting lockage in the same direction, no part of one shall pass the lock until the whole of the one preceding it shall have passed.

(8) Mooring. (i) Vessels and rafts when in the lock shall be moored where directed by the lockmaster by bow, stern and spring lines to the snubbing posts or hooks provided for that purpose, and lines shall not be let go until signal is given for vessel or raft to leave. Tying boats to the lock ladders is prohibited.

(ii) The mooring of vessels or rafts near the approaches to locks except while waiting for lockage, or at other places in the pools where such mooring interferes with general navigation of the waterway is prohibited.

(9) Maneuvering locks. The lock gates, valves, and accessories will be moved only under the direction of the lockmaster; but if required, all vessels and rafts using the locks must furnish ample help on the lock walls for handling lines and maneuvering the various parts of the lock under the direction of the lockmaster.

(f) Waterways-(1) Fairway. A clear channel shall at all times be left open to permit free and unobstructed navigation by all types of vessels and rafts that normally use the various waterways or sections thereof. The District Engineer may specify the width of the fairway required in the various waterways under his charge.

(2) Stoppage in waterway, anchorage or mooring. (i) No vessels or rafts shall anchor or moor in any of the land cuts or other narrow parts of the waterway, except in case of an emergency. Whenever it becomes necessary for a vessel or raft to stop in any such portions of the waterway it shall be securely fastened to one bank and as close to the bank as possible. This shall be done only at such a place and under such conditions as will not obstruct or prevent the passage of other vessels or craft. Stoppages shall be only for such periods as may be necessary.

(ii) No vessel or raft wil be allowed to use any portion of the fairway as a mooring place except temporarily as authorized above without the written permission from the District Engineer.

(iii) When tied up, all vessels must be moored by bow and stern lines. Rafts and tows shall be secured at sufficiently close intervals to insure not being drawn away from the bank by winds, currents or the suction of passing vessels. Tow lines shall be shortened so that the different parts of the tow shall be as close together as possible. In narrow sections, no vessel or raft shall be tied abreast of another.

(iv) Lights shall be displayed in accordance with provisions of the Federal Pilot Rules.

(v) No vessel, even if fastened to the bank as prescribed in subdivision (i) of this subparagraph, shall be left without a sufficient crew to care for it properly.

(vi) Vessels will not be permitted to load or unload in any of the land cuts except at a regular established landing or wharf without written permission secured in advance from the District Engineer.

(vii) No vessel, regardless of size, shall anchor in a dredged channel or narrow portion of a waterway for the purpose of fishing, if navigation is obstructed thereby.

(viii) Except in cases of emergency the dropping of anchors, weights, or other ground tackle, within areas occupied by submarine cable or pipe crossings, is prohibited. Such crossings will ordinarily be marked by signboards on each bank of the shore or indicated on coast charts.

(3) Speed. (i) Vessels shall proceed at a speed which will not endanger other vessels or structures and will not interfere with any work in progress incident to maintaining, improving, surveying or marking the channel.

(ii) Official signs indicating limiting speeds through critical portions of the waterways shall be strictly obeyed.

(iii) Vessels approaching and passing through a bridge shall so govern their speed as to insure passage through the bridge without damage to the bridge or its fenders.

(iv) A vessel being overtaken by another shall slacken speed sufficiently to permit the passage to be effected with safety to both vessels.

(4) Assembly and handling of tows.

(i) All vessels drawing tows not equipped with rudders shall use two tow lines or a bridle and shorten them to the greatest possible extent so as to have full control at all times. The various parts of a tow shall be securely assembled with the individual units connected by lines as short as practicable. If necessary, as in the case of lengthy or cumbersome tows or tows in restricted channels, the District Engineer may require that tows be broken up and may require the installation of a rudder, drag or other approved steering device on the tow in order to avoid obstructing navigation or damaging the property of others, including aids to navigation maintained by the United States or under its authorization, by collision or otherwise.

(ii) No tow shall be drawn by a vessel that has insufficient power or crew to permit ready maneuverability and safe handling.

(iii) Tows desiring to pass a bridge shall approach the opening along the axis of the channel so as to pass through without danger of striking the bridge or its fenders. No vessel or tow shall navigate through a drawbridge until the movable span is fully opened.

(iv) In the event that it is evident to the master of a towing vessel that a tow cannot be safely handled through a bridge, it will be brought to anchor and the towed vessels will be taken through the bridge in small units, or singly if necessary, or the tow will wait until navigation conditions have improved to such an extent that the tow can pass through the bridge without damage.

(5) Projections from vessels. No vessel carrying a deck load which overhangs or projects over the side of said vessel, or whose rigging projects over the side of the vessel so as to endanger passing vessels, wharves or other property, will enter or pass through any of the narrow parts of the waterway.

(6) Meeting and passing. Vessels, on meeting or overtaking, shall give the proper signals and pass in accordance with Federal Pilot Rules. Rafts shall give to vessels the side demanded by proper signal. All vessels approaching dredges, or other plant engaged on improvements to a waterway, shall give the signal for passing and slow down sufficiently to stop if so ordered or if no answering signal is received. On receiving the answering signal, they shall then proceed to pass at a speed sufficiently slow to insure safe navigation.

(g) Rafts, logging. (1) Rafts will be permitted to navigate a waterway only if properly and securely assembled. The passage of "bag" or "sack" rafts, "dog" rafts, or of loose logs over any portion of a waterway, is prohibited. Each section of a raft will be secured within itself in such a manner as to prevent the sinking of any log, and so fastened or tied with chains or wire rope that it cannot be separated or bag out so as to materially change its shape. All dogs, chains and other means used in assembling rafts shall be in good condition and of ample size and strength to accomplish their purposes.

(2) No section of a raft will be permitted to be towed over any portion of a waterway unless the logs float sufficiently high in the water to make it evident that the section will not sink en route.

(3) Frequent inspections will be made by the person in charge of each raft to insure that all fastenings remain secure, and when any one is found to have loosened, it shall be repaired at once. Should any log or section be lost from a raft, the fact must be promptly reported to the District Engineer, giving as definitely as possible the exact point at which the loss occurred. In all cases the owner of the lost log or section will take steps immediately to remove the same from the waterway.

(4) The length and width of rafts shall not exceed such maximum dimensions as may be prescribed by the District Engineer.

(5) All rafts shall carry sufficient men to enable them to be managed properly, and to keep them from being an obstruction to other craft using the waterway. To permit safe passage in a narrow channel rafts will, if necessary, stop and tie up alongside the bank. Care must be exercised both in towing and mooring rafts to avoid the possibility of damage to aids to navigation maintained by the United States or under its authorization.

(6) When rafts are left for any reason with no one in attendance, they must be securely tied at each end and at as many intermediate points as may be necessary to keep the timbers from bagging into the stream, and must be moored so as to conform to the shape of the bank. Rafts moored to the bank shall have lights at 500-foot intervals along their entire length. Rafts must not be moored at prominent projections of the bank, or at critical sections.

(7) Logs may be stored in certain tributary streams provided a clear channel at least one-half the width of the channel be left clear for navigation along the tributary. Such storage spaces must be protected by booms and, if necessary to maintain an open channel, piling should also be used. Authority for placing these booms and piling must be obtained by written permit from the District Engineer.

(8) The building, assembling, or breaking up of a raft in a waterway will be permitted only upon special authority obtained from the District Engineer, and under such conditions as he may prescribe.

(h) Dumping of refuse or oil in waterway, obstructions. Attention is invited to the provisions of sections 13 and 20 of the River and Harbor Act of

March 3, 1899 (30 Stat. 1152, 1154; 33 U.S.C. 407, 415), and of sections 2, 3, and 4 of the Oil Pollution Act of June 7, 1924 (43 Stat. 604, 605; 33 U.S.C. 432-434), which prohibit the depositing of any refuse matter in these waterways or along their banks where liable to be washed into the waters; authorize the immediate removal or destruction of any sunken vessel, craft, raft, or other similar obstruction, which stops or endangers navigation; and prohibit the discharge of oil from vessels into the coastal navigable waters of the United States.

(i) Damage. Masters and owners of vessels using the waterways are responsible for any damage caused by their operations to canal revetments, lock piers and walls, bridges, hurricane gate chambers, spillways, or approaches thereto, or other Government structures, and for displacing or damaging of buoys, stakes, spars, range lights or other aids to navigation. Should any part of a revetment, lock, bridge, hurricane gate chamber, spillway or approach thereto, be damaged, they shall report the fact, and furnish a clear statement of how the damage occurred, to the nearest Government lockmaster or bridge tender, and by mail to the District Engineer, U.S. Engineer Office in local charge of the waterway in which the damage occurred. Should any aid to navigation be damaged, they shall report that fact immediately to the nearest Coast Guard Officer in Charge Marine Inspection.

(j) Trespass on property of the United States. Trespass on waterway property or injury to the banks, locks, bridges, piers, fences, trees, houses, shops or any other property of the United States pertaining to the waterway, is strictly prohibited. No business, trading or landing of freight or baggage will be allowed on or over Government piers, bridges, or lock walls.

(k) Copies of regulations. Copies of the regulations in this section will be furnished free of charge upon application to the nearest District Engineer.

§207.164 Neuse River and tributaries at Marine Corps Air Station, Cherry Point, N.C.; restricted area. (a) The area. That portion of Neuse River within 500 feet of the shore along the reservation of the Marine Corps Air Station, Cherry Point, North Carolina, extending from the mouth of Hancock Creek to a point approximately 6,800 feet west of the mouth of Slocum Creek, and all waters of Hancock and Slocum Creeks and their tributaries within the boundaries of the reservation.

(b) The regulations. (1) Except in cases of extreme emergency, all vessels other than those operated by the United States Navy or Coast Guard are prohibited from entering this area without prior permission of the enforcing agency.

(2) The regulations in this section shall be enforced by the Commanding General, United States Marine Corps Air Station, Cherry Point, North Carolina, and such agencies as he may designate.

§207.164a Cape Fear River and tributaries at Sunny Point Army Terminal, Brunswick County, North Carolina; restricted area. (a) The area. That portion of Cape Fear River due west of the main ship channel extending from U.S. Coast Guard buoy No. 31A at the north approach channel to Sunny Point Army Terminal to U.S. Coast Guard buoy No. 23A at the south approach channel to Sunny Point Army Terminal and all waters of its tributaries therein.

(b) Except in cases of extreme emergency, vessels of any size or rafts other than those authorized by the Commander, Sunny Point Army Terminal, are prohibited from entering this area without prior permission of the enforcing agency.

(c) The regulations in this section shall be enforced by the Commander, Sunny Point Army Terminal, Southport, North Carolina, and such agencies as he may designate.

§207.164b Cooper River and tributaries at Charleston, S.C.; restricted areas. (a) The area. (1) That portion of Cooper River beginning on the westerly shore at latitude 32°49′50″, longitude 79°56′10″; thence to latitude 32°49′54″, longitude 79°55′55″; thence to latitude 32°50′32″, longitude 79°55′55″; thence to latitude 32°51′01″, longitude 79°56′07″; thence to latitude 32°51′19″, longitude 79°57′05″; thence to latitude 32°51′33″, longitude 79°57′27″; thence to latitude 32°51′48.5″, longitude 79°57′41.5″; thence to latitude 32°52′06″, longitude 79°57′54″; thence to latitude 32°52′27″, longitude 79°58′01″; thence to latitude 32°52′37″, longitude 79°58′03″; and thence to the westerly shore at latitude 32°52′37″, longitude 79°58′06″.

(2) The reach of Shipyard Creek upstream from a line 300 feet from and parallel to the upstream limit of the improved Federal turning basin.

(3) That portion of Cooper River extending from the mouth of Goose Creek to Red Bank Landing, a distance of approximately 4.8 miles, and the tributaries to Cooper River within 2½ mile radii of the ammunition piers.

(b) The regulations. (1) Unauthorized vessels and other watercraft shall not enter at any time the restricted areas described in paragraph (a) (1) and (2) of this section.

(2) Vessels other than those authorized by the Commanding Officer, Naval Ammunition Depot, entering the restricted area described in paragraph (a) (3) of this section shall proceed at normal speed and under no circumstances anchor, fish, or loiter in any way until clear of the restricted area. The area will be marked with suitable warning signs.

(3) The regulation in subparagraph (1) of this paragraph shall be enforced by the Commanding Officer, Southeastern Division, Naval Facilities Engineering Command, U.S. Naval Base, Charleston, S.C., and such agencies as he may designate.

(4) The regulation in subparagraph (2) of this paragraph shall be enforced by the Commanding Officer, Naval Ammunition Depot, Charleston, S.C., and such agencies as he may designate.

§207.165 St. Johns River Fla., Ribault Bay; prohibited area. (a) The Area. All waters constituting the Turning Basin within the Naval Air Base Reservation, Mayport, Florida, and enclosed by a line bearing approximately 180° true from Ribault Channel Light 4 to the shore at a point connecting with the Naval Base boundary line fence.

(b) The regulations. (1) All vessels and craft except those operated by the United States Navy or Coast Guard are prohibited from entering this area except in cases of extreme emergency.

(2) This section shall be enforced by the Commander, United States Naval Air Station, Jacksonville, Florida, and such agencies as he may designate.

§207.169 Oklawaha River, navigation lock and dam at Moss Bluff, Fla.; use, administration and navigation. (a) The owner of or agency controlling the lock shall not be required to operate the navigation lock except from 7 a.m. to 7 p.m. during the period of February 15 through October 15 each year, and from 8 a.m. to 6 p.m. during the remaining months of the year. During the above hours and periods the lock shall be opened upon demand for the passage of vessels. The hours of operation are based on local time.

(b) The owner of or agency controlling the lock shall place signs of such size and description as may be designated by the District Engineer, U.S. Army Engineer District, Jacksonville, Fla., at each side of the lock indicating the nature of the regulations of this section.

§207.170 Federal Dam, Oklawaha River, Moss Bluff, Fla.; pool level. (a) The level of the pool shall normally be maintained at elevation 56.5 feet above sea level: Provided, That the level of the pool may be raised to not exceeding 58.5 feet above sea level at such times as may be authorized in writing by the District Engineer, Jacksonville, Fla., and subject to such conditions as he may specify.

(b) When in the opinion of the District Engineer, an emergency exists requiring the lowering of the pool level to an elevation less than 56.5 above sea level either to safeguard the dikes or to increase the discharge from Lake Griffin in times of high water, the discharge past the dam shall be regulated in such manner as he may direct until he shall declare the emergency passed.

§207.170a Eugene J. Burrell Navigation Lock in Haines Creek near Lisbon, Florida; use, administration and navigation. (a) The owner of or agency controlling the lock shall not be required to operate the navigation lock except from 7 a.m. to 12 noon, and from 1 p.m. to 7 p.m., during the period of February 15 through October 15 each year; and from 8 a.m. to 12 noon, and from 1 p.m. to 6 p.m., during the remaining months of each year. During the above hours and periods the lock shall be opened upon demand for the passage of vessels.

(b) The owner of the lock shall place signs, of such size and description as may be designated by the District Engineer, U.S. Army Engineer District, Jacksonville, Florida, at each side of this lock indicating the nature of the regulations of this section.

§207.170b Apopka-Beauclair Navigation Lock in Apopka-Beauclair Canal in Lake County, Florida; use, administration and navigation. (a) The owner of or agency controlling the lock shall not be required to operate the navigation lock except from 7:00 a.m. to 12:00 noon, and from 1:00 p.m. to 7:00 p.m., during the period of February 15 through October 15 each year; and from 8:00 a.m. to 12 noon, and from 1:00 p.m. to 6:00 p.m., during the remaining months of each year. During the above hours and periods the lock shall be opened upon demand for the passage of vessels.

(b) The owner of the lock shall place signs, of such size and descriptions as may be designated by the District Engineer, U.S. Army Engineer District, Jacksonville, Florida, at each side of this lock indicating the nature of the regulations.

§207.170c Kissimmee River, navigation locks between Lake Tohopekaliga and Lake Okeechobee, Fla.; use, administration and navigation. (a) The owner of or agency controlling the locks shall be required to open the navigation locks upon demand for passage of vessels during the following hours and periods:

Locks S-61, S-65, and S-65E:

Monday through Friday, all year; 7:00 a.m. to 6:00 p.m.

Saturday and Sunday, Mar. 1 through Oct. 31; 5:30 a.m. to 7:30 p.m.

Saturday and Sunday, Nov. 1 through Feb. 28; 5:30 a.m. to 6:30 p.m.

Lock S65-A:

Seven days a week, all year; 8:00 a.m. to 5:00 p.m.

Locks S-65B, S-65C, and S-65D:

Monday through Friday, all year; 8:00 a.m. to 5:00 p.m.

Saturday and Sunday, Mar. 1 through Oct. 31; 5:30 a.m. to 7:30 p.m.

Saturday and Sunday, Nov. 1 through Feb. 28; 5:30 a.m. to 6:30 p.m.

(b) The owner of or agency controlling the locks shall place signs, of such size and description as may be designated by the District Engineer, U.S. Army Engineer District, Jacksonville, Florida, at each side of the locks indicating the nature of the regulations of this section.

§207.170d Taylor Creek, navigation lock (S-193) across the entrance to Taylor Creek at Lake Okeechobee, Okeechobee, Fla.; use, administration and navigation. (a) The owner of or agency controlling the lock shall not be required to operate the navigation lock except from 5:30 a.m. to 8:00 p.m. daily. During the above hours the lock shall be opened upon demand for the passage of vessels.

(b) The owner of the lock shall place signs, of such size and description as may be designated by the District Engineer, U.S. Army Engineer Dis-

trict, Jacksonville, Florida at each side of this lock indicating the nature of the regulations of this section.

§207.171 Canaveral Harbor adjacent to the Navy pier at Port Canaveral, Fla.; restricted area. (a) The area. The waters of Canaveral Harbor within a line circumscribing the water approaches to the Navy pier along the northeasterly edge of the Canaveral Harbor turning basin at a distance of 200 feet from all portions of the pier including the dolphins 200 feet off the northwest end and 75 feet off the southeast end of the pier.

(b) The regulations. (1) All unauthorized vessels and personnel are prohibited from the area during specified periods.

(2) The area will be closed when a red ball is shown by day or red flashing lights are displayed by night from the southwest side of the Port Canaveral water tower. The red lights will be shielded to seaward.

(3) Lighted signs indicating the restricted area will be placed on the pier and adjacent thereto.

(4) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Ordnance Test Unit, AFMTC, Patrick Air Force Base, Florida.

§207.171a Banana River at Cape Canaveral Missile Test Annex, Fla.; prohibited area. (a) The area. The waters within a semicircle with a radius of 10,000 feet centered on the easterly shore of Banana River at Cape Canaveral at latitude 28°27′23″, longitude 80°35′48″.

(b) The regulations. (1) All unauthorized craft shall stay clear of the area at all times.

(2) The regulations in this section shall be enforced by the Commander, Air Force Missile Test Center, Patrick Air Force Base, Florida, and such agencies as he may designate.

§207.171b (Reserved)

§207.171c Banana River at Patrick Air area. (Revoked)

§207.171d Banana River at Patrick Air Force Base, Fla.; prohibited area. (a) The area. The water area within a semicircle with a radius of 600 feet having its center at latitude 28°14′14.1″, longitude 80°36′54.7″ near the easterly shore of Banana River. The offshore boundary will be marked with appropriate warning signs.

(b) The regulations. (1) All unauthorized watercraft shall stay clear of the area at all times.

(2) The regulations in this section shall be enforced by the Commander, Air Force Missile Test Center, Patrick Air Force Base, Florida, and such agencies as he may designate.

§207.171e Banana River near Orsino, Fla.; restricted area. (a) The area. That part of Banana River N of the NASA Banana River Causeway near Orsino and extending above the head of said river to the N and westerly to Kennedy Parkway North.

(b) The regulations. (1) All unauthorized craft and personnel shall stay clear of the area at all times.

(2) The regulations in this section shall be enforced by the Director, John F. Kennedy Space Center, NASA, Cocoa Beach, Fla.

§207.171f Atlantic Ocean near Port Everglades, Fla.; Naval restricted area. (a) The area. An area bounded on the east by longitude 80°03′30″, on the south by latitude 26°03′00″, on the west by the beach south of Port Everglades Entrance Channel and a line extended northeasterly on the alinement of the beach to a point on the southerly limit of the entrance channel, and on the north by the southerly limit of said entrance channel and its easterly prolongation to longitude 80°03′30″.

(b) The regulations. (1) Anchoring of ocean-going vessels or any vessel with draft in excess of 12 feet shall be prohibited in the area.

(2) The regulations of this section shall be enforced by the Officer-in-Charge, U.S. Naval Ordnance Laboratory Testing Facility, Ft. Lauderdale, Fla., and such agencies as he may designate.

§207.172 Biscayne Bay, Fla.; Seaplane Operating Area, Coast Guard, Miami, Fla. (a) (Reserved)

(b) The seaplane operating area-(1) The area. Beginning at Dinner Key Seaplane Channel Approach Light 2; thence 54° for approximately 9,900 feet to Biscayne Bay Range Three Front Light C; thence 178° for approximately 4,350 feet to Biscayne Bay Range Three Rear Light; thence 182° for approximately 12,750 feet to Southwest Point Daybeacon 26; thence 270° for approximately 13,500 feet to a position in Biscayne Bay at latitude 25°41′24″, longitude 80°13′30″; thence 30° for approximately 9,900 feet to Dinner Key Channel Light 1; and thence 21° for approximately 3,050 feet to the point of beginning.

Note: All bearings are referred to true meridian.

(2) The regulations. (i) Watercraft may navigate, anchor, or moor within the operating area. Fishing will be permitted.

(ii) Watercraft utilizing the area during hours from sunset to sunrise, or during periods of low visibility, shall comply strictly with existing regulations of the Rules of the Road applicable to Inland Waters and Motorboat regulations pertaining to required lighting while underway or at anchor.

(iii) Watercraft within the operating area must recognize the fact that the maneuverability of aircraft on the surface is relatively limited as compared to that of vessels or vehicles specifically designed for surface operations. Therefore, it is essential that occupants of all watercraft shall, when in the seaplane operating area, exercise due vigilance and be alert for the presence of aircraft either taxiing on the surface, or approaching for landings and takeoffs within the area.

(iv) Seaplane landings and takeoffs will be covered by the presence of a station crash boat whenever possible. Under unusual and infrequent circumstances seaplanes may be limited to a particular heading or portion of the operating area, and watercraft in that vicinity may be requested by

the crash boat to yield right-of-way to the aircraft for the particular maneuver involved. Under such unusual conditions watercraft shall comply with the request made by the crash boat for the mutual safety of boats and aircraft.

(c) Notices. Notices covering the regulations in this section will be posted at the nearby marina and wharves and at boat basins in Miami and adjoining towns.

(d) Enforcement. The regulations in this section shall be enforced by the Commanding Officer, U.S. Coast Guard Base, Miami Beach, Fla., and such agencies as he may designate.

§207.173 Key West Harbor at U.S. Naval Base, Key West, Fla.; dummy minefield and swimming and diving training area. (a) The area. An irregular area south of Key West Island the coordinates of which are as follows: A point on the shoreline of Key West Island at latitude 24°32′44″, longitude 81°48′01″; latitude 24°32′02″, longitude 81°47′43″; latitude 24°31′56″, longitude 81°47′58″; latitude 24°32′15″, longitude 81°48′14″; a point on the shoreline of Key West Island at latitude 24°32′42″, longitude 81°48′10″. Within this area are five spherical yellow buoys 34 inches in diameter each with a 2-foot by 2-foot plywood square painted with day glow and mounted on a 6-foot staff. Buoys numbered 1 through 4 are located on a bearing 164° T from a point on the shoreline of Key West Island due south of Key West Light at the following intervals from shore respectively: 500 yards; 750 yards; 1,000 yards; and 1,500 yards. Buoy number 5 is located 300 yards 245° T from buoy number 2. All dummy mines are laid on the bottom.

(b) The regulations. (1) All craft shall reduce speed and proceed with caution when underway in this restricted area.

(2) All craft shall stay well clear of naval craft displaying the Four flag (a red flag with a diagonal white cross) and be particularly alert to observe and obey signals from such craft.

(3) Laying lobster pots in this area is prohibited.

(4) The regulations in this section shall be enforced by the Commander, U.S. Naval Base, Key West, Florida, and such agencies as he may designate.

§207.173a Key West Harbor, at U.S. Naval Base, Key West, Fla; naval restricted area. (a) The areas. (1) All waters within 100 yards of the U.S. Naval Station beginning at a point 100 yards due south of the south end of Whitehead Street at latitude 24°32′42.3″N., longitude 81°47′51″W., and extending westerly and northerly around the U.S. Naval Station to latitude 24°33′33″ N.,longitude 81°48′32.7″W.; and thence to the shore at latitude 24°33′32″ N., longitude 81°48′29.5″ W., the north end of the U.S. Coast Guard Base.

(2) All waters within 100 yards of the U.S. Naval Station Annex and the U.S. Naval Air Station Annex beginning at the shore at latitude 24°33′47.6″ N., longitude 81°47′55.6″ W.; thence westerly to latitude 24°33′48″N., longitude 81°48′00.9″W.; thence southerly to latitude 24°33′45.8″N., longitude 81°48′01″W.; thence westerly to latitude 24°33′47″N., longitude 81°48′12″W.; thence northerly to latitude 24°34′06.3″N., longitude 81°48′10″W.; and thence to latitude 24°33′57.6″N., longitude 81°47′20″W., 100 yards offshore of beacon No. 18.

(3) All waters within 100 yards of Fleming Key and within 100 yards of the fence across Fleming Key Cove.

(b) The regulations. (1) Entering or crossing any of the restricted areas described in paragraph (a) of this section is prohibited except as follows: Privately owned vessels properly registered and bearing identification in accordance with Federal and/or State laws and regulations, and at night showing lights required by Federal laws and U.S. Coast Guard regulations or, if no constant lights are required, then a bright white light showing around the horizon, may transit the following portion of the restricted areas:

(i) The channel about 75 yards in width extending from the northwest corner of the U.S. Naval Station Annex eastward beneath the Fleming Key bridge along the north shore of the U.S. Naval Station Annex and the U.S. Naval Air Station Annex.

(ii) A channel 150 feet in width which will extend easterly from the main ship channel into Key West Bight, the northerly edge of which channel passes 25 feet south of the Navy Annex piers on the north side of the Bight. While legitimate access of privately owned vessels to facilities of Key West Bight is unimpeded, it is prohibited from mooring, anchoring, or fishing within 50 feet of any U.S. Navy owned pier or craft.

(2) Stopping or landing by other than government owned vessels and certain specifically authorized private craft in any of the restricted areas described in paragraph (a) of this section is prohibited.

(3) Vessels using the restricted channel areas described in subparagraph (1) (i) and (ii) of this paragraph shall proceed at speeds commensurate with minimum wake.

(4) The regulations in this section shall be enforced by the Commander, U.S. Naval Base, Key West, Fla., and such agencies as he may designate.

3. CAPE HENRY TO KEY WEST

The Atlantic Coast of the United States from Cape Henry to Cape Florida is low and sandy, backed by woods. From Cape Florida to Key West the coast is formed by a long chain of small islands known as the Florida Keys. The Florida Reefs extend seaward of the keys and are nearly parallel to them.

The coastline of Virginia from Cape Henry southward to the boundary of North Carolina is firm land for 13 miles; then it becomes a barrier beach, covered with sand dunes for 11 miles. The boundary between Virginia and North Carolina is the only marked boundary on this section of the coast. The easternmost boundary monument is a granite shaft 6 feet high about 0.5 mile west of the beach.

The coastline of North Carolina is a long barrier beach. The islands are known as the **Outer Banks.** The banks are constantly shifting sand dunes varying in height. Three capes, with their offshore shoals, project from the islands, namely: Hatteras, Lookout, and Fear. Behind the barrier beach a chain of sounds, including Currituck, Roanoke, Albemarle, Pamlico, Core, and Bogue, stretch along the entire 300 miles of coastline of the State.

Bordering the sounds on the mainland is a belt from 30 to 80 miles wide, where the land is level and sometimes swampy. On the north a portion of the Great Dismal Swamp spreads across the border of Virginia into North Carolina. Between Albemarle Sound and Pamlico River the swamplands are locally known as **dismals** and **pocosins.** They occur on the divides or watersheds between the rivers and sounds. In the southeast section of North Carolina are the **savannas,** treeless prairie land with a thick growth of grass and wild flowers; they have been formed by a lack of drainage and a close impervious soil.

The coastline of South Carolina from Little River Inlet to Winyah Bay is practically an unbroken beach. Cape Romain, just south of Winyah Bay, and the shoal extending seaward from it, form the southern point of indentations which has its northern point at Cape Fear. From Winyah Bay to Savannah River, the boundary between South Carolina and Georgia, the coastline is a border of sandy barrier islands. The large sounds so characteristic of the North Carolina coast are missing.

The coastline of Georgia between Savannah River on the north and St. Marys River on the south is partly submerged at flood tide, and is broken by tidal rivers and marshes covered with dense grasses. The most important sandy islands off the coast are Tybee, Wassaw, Ossabaw, St. Catherines, Sapelo, St. Simons, Jekyll, and Cumberland.

The coastline of Florida is a long, low, barrier beach from the border of Georgia south to Cape Florida. Many of the leading tourist resorts have been built on this beach, while the business districts are often on the mainland.

Under the sand and the lagoons is a limestone called **coquina,** which is soft while in its native state, but becomes a hard building stone when exposed to the air.

Below Cape Florida the Florida Keys and Florida Reefs extend for about 134 miles in a southwesterly curve to Sand Key Light, and about 58 miles in a westerly direction to Loggerhead Key. These keys and reefs are of sand, shell, and coral formation. The keys are generally low and covered with mangrove.

Aids to navigation.–Lights are on or near the dangerous capes, at the entrance to the harbors, and along the Florida Reefs. The critical dangers are buoyed. The coast is well covered by loran. Radiobeacons are at most of the principal light stations. Radar, though always a valuable navigational aid, is generally of less assistance in navigation along this coast due to the relatively low relief; the accuracy of radar ranges to the beach cannot be relied upon. Coastal buoys equipped with radar reflectors are of help in this regard. It is sometimes possible to obtain a usable radar return from the larger lighthouses, but positive target identification is usually difficult. There are numerous aerolights along the coast that are useful for navigation, but they should not be confused with the marine lights.

Boundary lines of inland waters.–At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not described, **Inland Rules** and **Pilot Rules** apply shoreward of the outermost buoy or other aid to navigation of any system of aids; **International Rules** apply outside the aids. Specific lines are described in **Part 82, chapter 2.**

Control over movement of vessels.–**(See Part 124, chapter 2, for regulations requiring advance notice of vessel's time of arrival to Captain of the Port.)**

Harbor entrances.–The entrance to every harbor on this stretch of the coast is more or less obstructed by a shifting sandbar over which the channel depth is changeable. The entrance channels of the larger and more important harbors have been improved by dredging; in some cases jetties have been built from both sides of the entrance.

The buoys on many of the bars are not charted because they are moved from time to time to indicate the changing channel. They are liable to be dragged out of position and cannot always be replaced immediately, so a stranger must use the

greatest caution. If possible, a stranger should enter a harbor or inlet on a rising tide.

The tidal currents have considerable velocity in all of the entrances, and their direction is affected by the force and direction of the wind; sailing vessels entering the harbors and sounds require a fair working breeze during the ebb.

Strangers should not attempt to enter the harbors without the assistance of a pilot during easterly gales when the sea breaks on most of the bars.

Depths.-Between Cape Henry and Jupiter Inlet frequent soundings will give the mariner timely warning of his approach to the land from seaward.

Northward of Cape Hatteras the 20-fathom curve is from 13 to 45 miles offshore, but inside of 15 fathoms the depths are irregular and many holes of limited extent lie inside the general limits of corresponding depths; 10 to 14 fathoms are found in places only 1.5 miles offshore. This irregularity of depth is apt to confuse the mariner and lead him into danger in thick weather; the greatest caution should therefore be used inside of a depth of 20 fathoms. By keeping over 6 miles from the beach all dangers will be avoided, but the strong currents which sometimes set along the shore must be considered, especially after a gale.

Southeastward of Cape Hatteras, and off the end of the shoals which extend seaward about 8 miles, the 20-fathom curve is from 12 to 15 miles offshore, and the 30-fathom curve is only a short distance farther. In thick weather, soundings of 20 fathoms or less should warn the mariner to keep offshore.

From Cape Hatteras to Jupiter Inlet, the 20-fathom curve is fairly regular and for a greater part of the distance is from 40 to 55 miles offshore. Northward of St. Johns River, the water shoals uniformly to the 10-fathom curve, which, excepting in the two great bights between Cape Hatteras and Cape Fear, is from 10 to 30 miles offshore. Vessels bound for any of the harbors between Cape Fear and St. Johns River should approach the land with caution when in 10 fathoms of waters; inside the 10-fathom curve depths are irregular and spots of 5 fathoms or less will be found from 6 to 12 miles offshore. In thick weather vessels standing along the coast should keep a general depth of 10 fathoms between Cape Fear and St. Johns River.

In a heavy sea, depths of less than 6 fathoms show discolored water; deep-draft vessels should be cautious about passing over such spots.

Southward of St. Johns River, the 20-fathom curve draws inshore gradually and at Jupiter Inlet is only 4 miles from the beach, and the 100-fathom curve a little over 8 miles. Southward of Jupiter Inlet, both curves draw closer inshore, and along the Florida Reefs the 20-fathom curve is close in to the reefs, while the 100-fathom curve is at an average distance of about 7 miles outside the reefs. The 10-fathom curve between St. Johns River and Jupiter Inlet is regular and of no use in determining distance from shore. Approaching Florida Reefs southward of Jupiter Inlet, soundings are of little use unless taken frequently as the water shoals rapidly from seaward.

In the approach to the Bahama Banks along the Straits of Florida, the discolored water is the best indication the mariner has to warn him of shoal water; the 100-fathom curve at some points is only 1 or 2 miles from the shoal water of the banks.

Tropical waters.-The most remarkable feature is the exceeding clearness of the sea water, enabling the bottom to be seen from aloft at considerable depths and at some distance. The navigation of the banks is consequently conducted almost entirely by the eye, but care must be taken not to run with the Sun ahead of the vessel as that prevents the banks from being seen.

The charts indicate clearly the positions of the many shoal heads, but considerable experience is required in identifying the patches by the color of the water. Small clouds, moving slowly and known to the pilots as **flyers**, are apt to deceive the inexperienced, their reflection on the surface of the sea over the clear white sandy bottom has every appearance of rocky shoals. It is prudent to avoid a dark spot.

Bank Blink is a phenomenon in tropical waters described as a bright reflected light hanging over the clear white sandbanks, serving to point them out from a considerable distance. From experience, it has been found to be untrustworthy, however, and should not be depended on in place of a lookout aloft. Soundings, dead reckoning, and fixes should be carefully checked and evaluated.

Anchorages.-Vessels may find refuge at a number of places along the coast according to draft. The more important places are Lookout Bight, Beaufort Inlet, Cape Fear River, Winyah Bay, Charleston Harbor, Port Royal Sound, Savannah River, Sapelo Sound, St. Simons Sound, Cumberland Sound, St. Johns River, Fort Pierce Inlet, Lake Worth Inlet, Port Everglades, Miami, and Key West. A number of anchorage areas have been established by Federal regulations within the area of this Coast Pilot; limits and regulations are given in **Part 110**, chapter 2.

Dangers.-Along the coast are a number of wrecks that are obstructions to navigation. Most of the dangerous wrecks are marked with lighted buoys. A careful check should be made of the chart to insure that dangerous wrecks are not along the routes selected.

Trawlers or other vessels should exercise caution while dragging the ocean floor within a 25-mile radius of Cape Canaveral, Fla., since it is known that missile debris exist in the area, some of which may contain unexploded ordnance.

Mariners are also cautioned against possible hazards of a weather rocket impact area that extends more than 50 miles offshore at Cape Canaveral, Fla. Falling rocket casings may be hazardous during the hours of 1930-2100 e.s.t., Monday through Friday.

Danger zones have been established within the area of this Coast Pilot. (See **Part 204**, chapter 2, for limits and regulations.) Submarine operating areas and transit lanes are off the North and South Carolina coasts, and off Key West, Fla.; the areas are shown on the charts.

Drawbridges.-Within the area of this Coast Pilot, the general Federal regulations and the opening signals for all drawbridges are given in 117.240, chapter 2. In addition, special regulations, which have been prescribed for a number of specific bridges, are found in **117.245 to 117.462**, chapter 2. These special regulations allow certain drawbridges to be unattended during specified times and dates. Such bridges may not be required to open at all or may open only during specified periods, and normally a specified minimum advance notice must be given to the authorized representative of the bridge owner to have the bridge opened; the exact procedure for contacting this representative must generally be posted on signs at the bridge. Additional information of a very general nature and which applies to all drawbridges is given in **117.1** and **117.1a**, chapter 2.

Routes-East coast of the United States to Key West.-Proceed as direct as safe navigation permits to 35°08'N., 75°15'W., off Diamond Shoal Light, thence on rhumb lines through the following positions:

Outer route to Jupiter Inlet Light
33°00'N., 75°35'W.
28°00'N., 79°00'W.
26°57'N., 80°00'W., off Jupiter Inlet Light
Inner route to Jupiter Inlet Light
33°27'N., 77°32'W., off Frying Pan Shoals
32°00'N., 80°00'W.
31°00'N., 80°30'W.
29°30'N., 80°30'W.
28°39'N., 80°17'W., off Hetzel Shoal lighted whistle buoy 8
27°24'N., 80°02'W., off wreck lighted buoy 12A
26°57'N., 80°00'W., off Jupiter Inlet Light

Thence follow the coast of Florida and the Florida Keys as close as safe navigation permits to Key West.

Key West to east coast of the United States via Gulf Stream. Follow the Gulf Stream in the Straits of Florida about 8 miles off the Florida Reefs, passing Fowey Rocks Light at a distance of 10 to 12 miles and Jupiter Inlet Light 15 miles, thence follow the main axis of the Gulf Stream in the Atlantic Ocean through the following positions:

30°25' N., 79°40' W.
31°11'N., 79°15'W.
34°00'N., 75°49'W.
35°08'N., 75°05'W., off Diamond Shoal Light;

Thence as direct as safe navigation permits to destination.

Southbound vessels from Diamond Shoal Light to Jupiter Inlet Light use either the outer route or the inner route to avoid the full northerly set of the Gulf Stream. Most of the regular lines bound for the Straits of Florida use the route outside the Gulf Stream. All vessels bound to any port as far south as the St. Johns River follow the coast inside the Gulf Stream. Currents up to 4.5 knots have been observed at 35°05.3'N., 75°19.7'W. (former position of Diamond Shoal Lightship). High current velocities usually occur during heavy or long continued gales. Currents produced by onshore winds are likely to set toward the shore. Details of the wind-driven currents are given in the Tidal Current Tables.

The course from Diamond Shoal Light to 33°00'N., 75°35'W., along the outer route crosses the Gulf Stream. Under ordinary conditions an average allowance should be made for a 1-knot current setting northeastward for the entire run; with northeasterly winds there may be practically no current, whereas southerly, and especially southwesterly winds, may increase it considerably. Frequent fixes should be obtained.

There is uncertainty as to the currents that may be expected on the course from 33°00'N., 75°35'W., to 28°00'N., 79°00'W., along the outer route. Frequent fixes should be obtained to guard against being set off course by the variable currents and also to insure clearing Matanilla Shoal.

When crossing the Gulf Stream for Jupiter Inlet Light, **Matanilla Shoal** should be given a wide berth. The northwestern end of the shoal is marked by a lighted whistle buoy, but it is often difficult to find owing to atmospheric conditions. The bank in the vicinty of the shoal is extremely dangerous, as the bottom is rocky and covered with dark seaweed, the water is not discolored, and the sea does not break. The current for some distance northward of the shoal is very uncertain and near the edge of the bank sets strongly toward it.

Caution.-The charted position, size, shape, and orientation of the islands, banks, and shoals in the Bahama Islands are unreliable. Extraordinary caution should be exercised in the navigation of this area.

When on the course northwestward of Matanilla Shoal an allowance should be made for a northerly current, averaging about 2.5 knots for the entire run of about 80 miles. It will, therefore, be necessary to shape the course sufficiently southward of Jupiter Inlet Light to allow for the northerly set. When fixing the position by bearings on the light, keep in mind that while outside the 100-fathom curve the vessel is probably in the full strength of the Gulf Stream, where the northerly current may average a velocity of 4 knots. If the light is on the starboard bow, the vessel will be much closer to it than indicated by the distance run between the successive bearings on it.

The courses southward of Diamond Shoal Light on the inner route to Hetzel Shoal lighted whistle buoy 8 have depths of 17 to 20 fathoms. In approaching and passing the shoals off Cape Canaveral, care must be exercised. The current of

the Gulf Stream may be expected under ordinary conditions to set against the vessel for the entire run with a velocity of about 0.5 to 1 knot, the direction of the current following the curve of the coast. It must be remembered, however, that the effect of winds is almost immediately felt on the currents and that with northerly and especially northeasterly winds, a current of possibly 1 knot will set southward along the coast. Southerly, and especially southwesterly winds, increase the velocity of the Gulf Stream.

On the inner route from Hetzel Shoal to Jupiter Inlet Light, the 15-fathom curve is a good guide. The current of the Gulf Stream may be expected under ordinary conditions to have a velocity of about 1 knot off Cape Canaveral increasing to 1.5 or 2 knots off Jupiter Inlet Light.

Southbound vessels from Jupiter Inlet Light to Fowey Rocks Light usually follow the coast at a distance offshore of 1 to 1.5 miles to Hillsboro Inlet Light, thence 1.5 to 2 miles offshore, passing 1 mile eastward of Miami lighted whistle buoy 2 and Fowey Rocks Light. A northward current can be expected near the coast from northward of Jupiter Inlet to Fowey Rocks. The velocity of the current gradually increases as the axis of the Gulf Stream is approached.

Southbound vessels from Fowey Rocks Light to Key West usually follow a course 1 to 2 miles off the Florida Reefs in the daytime and 2 to 4 miles off at night. The position should be checked on the aids as passed and on the lights and sectors at night. Care must be taken not to get inside of the line of reefs, daybeacons, buoys or lights, especially when passing parts of the reef that lie well back of the edge and do not break or show near the surface. The color of the water does not always mark the edge of the reefs.

Except in the vicinity of Fowey Rocks, where the 100-fathom curve is only about 2 miles outside the reef, the 50-fathom curve lies from 2 to 4 miles from Florida Reefs, and this is about the least depth that can be depended upon to insure safety in skirting them. To be useful, soundings must be taken very frequently when navigating this region; a recording echo-sounder should be of great value.

The reefs are fringed in places with broken ground, which, as a measure of safety, should be avoided by deep-draft vessels where the depths are less than 10 or 12 fathoms.

A number of vessels have been lost on the reefs between The Elbow and Molasses Reef, and extra caution should be observed in this locality. The extremely variable current against the vessel should be carefully considered in determining the position off Carysfort Reef Light from which to shape the course to lead well clear of The Elbow.

Vessels bound for Habana generally shape the course for that port when abreast of Alligator Reef Light.

Any crossing of the Gulf Stream should be regarded as difficult on account of the strong current of variable velocity, for which it may not be possible to make a proper allowance, and the abrupt shoaling inside the 100-fathom curve. The axis of the Gulf Stream is nearest the reefs from about 10 miles northward of Carysfort Reef Light to Molasses Reef Light.

Northbound vessels from Key West to Cape Hatteras follow the Gulf Stream. The velocity of the current varies greatly in different localities and is also subject to sudden changes, due to wind, differences in barometric pressure, and the like, so that no fixed hourly rate can be given. Often high velocities will be carried between certain points and will suddenly drop off between others. Frequent fixes should be obtained to determine accurately the speed of advance. The greatest velocity is between Carysfort Reef and Jupiter Inlet, ranging from 2 to 4.5 knots.

The course between Jupiter Inlet Light and 30°25′N., 79°40′W., should lead from 6 to 30 miles outside the 100-fathom curve. Northward currents of 1.5 to 3.5 knots may be expected. It is reported that between latitude 30°30′ and 32°30′N. heavy tide rips will be experienced, indicating a change in the direction of the stream and not an increase in the velocity, and creating in stormy weather a very uncomfortable sea.

When approaching Diamond Shoal great care must be taken to determine accurately the position of the vessel. The currents are subject to wide variations as indicated by observations taken from the former Diamond Shoal Lightship. At times during both summer and winter the Gulf Stream has great velocity; at other times none will be found, or a southerly set may be experienced with northerly winds. The general direction of the stream is northeast with a velocity of 1 to 2 knots, but on nearing 35°05.3′N., 75°19.7′W. (former position of Diamond Shoal Lightship), the current is reported to set well to the east-northeast and at other times nearly north. In northerly and northeasterly weather a dangerous heavy cross and confused sea usually is encountered in the stream between Jupiter Inlet and Cape Hatteras.

Inside Navigation.–Navigation on the waterways covered by this volume requires a knowledge of the channel conditions and other factors restricting navigation. General items of interest to the vessel operator are indicated in the paragraphs that follow; details are given in the text.

Speed–Regulations are given in **207.160**, chapter 2.

Bends or curves.–In the Intracoastal and adjoining waterways there are many sharp bends which are dangerous to vessels meeting or passing. On approaching a bend, a vessel should reduce speed sufficiently to be able to stop within half the distance to a ship coming from the opposite direction. Under no circumstances should a vessel attempt to overtake and pass another at a bend. Even with sufficient view of the channel ahead

and after proper exchange and understanding of signals, the overtaken vessel may suddenly sheer from current action. This is even more pronounced with larger vessels and tows.

Cross currents.-Where two streams cross, the current will have a greater velocity in the deeper channel. This is noticeable along the Intracoastal Waterway where it follows a dredged canal cutting across a winding stream. Cross currents will also be noticed where either an inlet from the ocean or a drainage canal enter the waterway.

Cross Currents are especially strong at New River Inlet and Bogue Inlet, N.C. Failure to allow for cross currents when passing these and other inlets is the cause of many rescue calls to the Coast Guard.

Spoil banks.-Nature quickly covers her scars. This is true of the spoil banks made by dredging. In the northern areas when awash these banks are often covered by grass, while in the southern areas they are covered by bushes and sometimes fairly large trees.

Water hyacinth is a floating freshwater plant which infests numerous streams tributary to the South Atlantic and Gulf coasts. It has bright green leaves and a purple flower. It propagates from seeds and suckers, spreads quickly in most localities, and may cause complete suspension of navigation if not removed. The hyacinths form in mats or jams and float around driven by the wind or current. In open water these mats often resemble small islands. At times some of the bays and tributaries may be changed in appearance due to hyacinth jams. Where the water is apt to be brackish, an attempt can be made to force a boat through the mat. In doing so, however, care should be taken that any logs that might be floating in the weeds are not struck with force enough to damage the hull. Snakes may also be found on the hyacinth mats. The work of removing this growth is undertaken by the various Corps of Engineers districts and the State of Florida by the processes of spraying, cutting, and the use of booms.

Mangrove.-Three distinct types of mangrove are found in the southern section of this area. Yellow mangrove grows to a height of about 4 feet and is found principally on the sand flats in front of the fast land. Red mangrove grows to a height of 10 to 15 feet and is rooted in water most of the time. Black mangrove grows on sand ridges and higher ground which cover only at very high water or storm tides. The black mangrove sometimes grows to a height of 50 to 60 feet.

Stumps and sunken logs.-Reports are frequently made that vessels have struck shoals or rocks in rivers which have later proved to be stumps or sunken logs. Mariners are warned against navigating too close to the banks of streams where submerged stumps are known or may be expected to exist.

Hurricane moorings.-On receiving advisory notice of a tropical disturbance small boats should seek shelter in a small winding stream whose banks are lined with trees, preferably cedar or mangrove. Moor with bow and stern lines fastened to the lower branches; if possible snug up with good chafing gear. The knees of the trees will act as fenders and the branches, having more give than the trunks, will ease the shocks of the heavy gusts. If the banks are lined only with small trees or large shrubs, use clumps of them within each hawser loop. Keep clear of any tall pines as they generally have shallow roots and are more apt to be blown down.

Tides.-On the outer coast the mean range of tide increases from 2.8 feet at Cape Henry to 5.9 feet at Edisto Beach. In the sounds and rivers south to Florida the range is generally greater, reaching 8.0 feet or more at some locations. Along the east coast of Florida the average tide range is about 2.5 feet, and in the Florida Keys the ranges vary from 0.2 feet to 2.4 feet. More detailed information is included in the Tide Tables.

Currents.-It appears that, except during northerly and northeasterly winds, a current of about 0.5 knot average velocity, setting northeastward with the trend of the coast, may be expected outside the 10-fathom curve between Cape Canaveral and Cape Hatteras. Farther offshore the velocity of the northeastward flow increases as the axis of the Gulf Stream is approached.

Strong currents are produced by the wind along the coast during northeasterly and southerly gales, reversing or greatly increasing the normal current. Their velocity and direction depend upon the direction, strength, and duration of the wind. Details of the velocities and directions of currents caused by winds for a number of locations along the Atlantic coast are given in the Tidal Current Tables.

The **Gulf Stream** is the most famous of the principal ocean currents. The name was first used by Benjamin Franklin in 1769. In general, as the swift current of the Gulf Stream issues into the sea through Straits of Florida, its waters are characterized by a deep blue color, high-salinity, high temperature in the upper stratum, and absence of phosphorescence. Except near shoals where waves may stir up bottom sediments, Gulf Stream water is very clear, enabling visual penetration to unusually great depths. At its junction with coastal seawater, the edges may frequently be recognized in moderate weather by ripples, as well as by the difference in color. Northward, in the cooler regions, the evaporation from its surface, when the temperature of the air is lower than that of the water, is apparent as "sea smoke". In addition, the stream may carry with it some **gulf weed** (Sargassum), which is olive brown, branched seaweed with berrylike air vessels. Surface debris, such as logs and other material, tends to drift toward the eastern edge of the stream, but not toward the western edge.

The upstream extent of the Gulf Stream can be traced to the Yucatan Strait where a well-established current enters the Gulf of Mexico. The position of the strong current between Yucatan Strait and the Straits of Florida is quite variable, ranging from close inshore off northwestern Cuba to a loop penetrating over 300 miles northward into the Gulf. The flow in this region is sometimes referred to as the **Loop Current,** and occasionally may take the form of one or more large eddies detached from the direct flow.

After entering the Straits of Florida between Cuba and the Florida Keys, the current becomes much more stable. The major variations of the current from off Key West to off Little Bahama Bank appears to be a meandering of the axis of the current within the narrow confines of the Straits. The current within the Straits and slightly to the north is frequently referred to as the **Florida Current.**

Shortly after emerging from the Straits of Florida, the stream is joined by the **Antilles Current,** which flows northwesterly along the open ocean side of the West Indies. The Antilles Current, like the Gulf Stream, carries warm, highly saline waters of clear indigo blue. The union of the two currents gives rise to a broad and deep current possessing about the same characteristics as the Florida Current except that the velocity is somewhat reduced and somewhat greater lateral meandering occurs. As it flows northward, then northeastward, paralleling the general trend of the 100 fathom contour as far as Cape Hatteras, the lateral meandering does not generally exceed one stream width, or about 50 miles.

Beyond Cape Hatteras the current is forced eastward into much deeper water under the combined effects of the deflecting force of the Earth's rotation and convergence of the bottom contours at Cape Hatteras. As it moves into progressively deeper water, the stream is subject to increased meandering, following a wavelike course, the limits of which have a north-south extent on the order of 300 miles between 60°W and 55°W. The wavelike features of the stream paths propagate to the east at speeds on the order of 5 miles per day, and occasionally throw off detached current rings or eddies which may give the impression of alternating bands of strong currents and ultimately leads to loss of identity of the Gulf Stream as a coherent flow. These current bands are frequently accompanied by bands of high and low temperature, but it is not generally possible to judge the direction of flow from the temperature of the surface water.

Eastward of the Grand Banks of Newfoundland, the whole surface is slowly driven eastward and northeastward by the prevailing westerly winds to the coastal waters of northwestern Europe. For distinction, this broad and variable wind-driven surface movement is sometimes referred to as the **North Atlantic Drift** or **Gulf Stream Drift.**

On its western or inner side, the Gulf Stream is separated from the coastal waters by a zone of rapidly falling temperature, to which the term "cold wall" has been applied. The abrupt change in the temperature of the waters separated by the cold wall is frequently very striking and is a definite indication of the edge of the stream. It is most clearly marked north of Cape Hatteras but extends, more or less well defined, from the Straits of Florida to the Grand Banks of Newfoundland. In the vicinity of the Grand Banks, the cold wall represents the dividing line between the warm current of the Gulf Stream and the cold waters of the **Labrador Current,** which according to observations, turns sharply, between parallels 42 and 43 and meridians 51 and 52, and flows easterly, parallel to the Gulf Stream.

Throughout the whole stretch from the Florida Keys to past Cape Hatteras the stream flows with considerable velocity. Characteristic average surface speed is on the order of 2.5 knots, increasing to about 4 knots off Cape Florida where the cross sectional area of the channel is least. These values are for the axis of the stream where the current is a maximum, the speed of the stream decreasing gradually from the axis as the edges of the stream are approached. The speed of the current varies with an annual cycle, tending to be greatest in July, and least in November throughout this region. Both the speed and position of the axis of the stream fluctuate also from day to day, hence description of both position and speed are averages.

Crossing the stream at Jupiter or Fowey Rocks, an average allowance of 2.5 knots in a northerly direction should be made for the current.

Crossing the stream from Habana, a fair allowance for the average current between 100-fathom curves is 1 knot in an east-northeasterly direction.

A vessel bound from Cape Hatteras to Habana, or the Gulf ports, crosses the stream off Cape Hatteras. A fair allowance to make in crossing the stream is 1 to 1.5 knots in a northeasterly direction for a distance of 40 miles from the 100-fathom curve.

Earlier systematic observations on the Gulf Stream dealt with the temperature of the water rather than its motion, and the axis was taken to be along the line of highest temperature obtained. Later the axis was taken to mark the line of greatest velocity. Ordinarily it is assumed that the two axes coincide, but this is by no means certain. The thermometer, although it indicates the limits of the stream in a general way, is therefore only an approximate guide to the velocity of the currents, nor is it to be assumed that the northerly set will be lost when the thermometer shows a region of cold seawater.

The lateral boundaries of the current within the Straits are fairly well fixed, but as the stream leaves the Straits its eastern boundary becomes

somewhat vague. On the western side the limits can be defined approximately since the waters of the stream differ in color, temperature, salinity, and flow from the inshore coastal waters. On the east, however, the Antilles Current combines with the Gulf Stream so that its waters here merge gradually with the waters of the open Atlantic. Observations of the National Ocean Survey indicate that, in general, the average position of the inner edge of the Gulf Stream as far as Cape Hatteras lies inside the 50-fathom curve.

At the western end of the Straits of Florida the limits of the Gulf Stream are not well defined. Between Fowey Rocks and Jupiter Inlet the inner edge lies very close to the shoreline.

Along the Florida Reefs between Alligator Reef and Dry Tortugas the distance of the northerly edge of the Gulf Stream from the edge of the reefs gradually increases toward the westward. Off Alligator Reef it is quite close inshore, while off Rebecca Shoal and Dry Tortugas it is possibly 15 to 20 miles south of the 100-fathom curve. Between the reefs and the northern edge of the Gulf Stream the currents are ordinarily tidal and are subject at all times to considerable modification by local winds and barometric conditions. This neutral zone varies in both length and breadth; it may extend along the reefs a greater or less distance than stated, and its width varies as the northern edge of the Gulf Stream approaches or recedes from the reefs.

The approximate position of the axis of the Gulf Stream for various regions is shown on the following NOS charts: 11013 (1002), Straits of Florida; 411 (1007), South Carolina to Cuba; 11460 (1112), Cape Canaveral to Key West; 11420 (1113), Alligator Reef to Habana. Chart 11009 (1001) shows the axis and the position of the inner edge of the Gulf Stream from Cape Hatteras to Straits of Florida.

Winds currents are very complicated. Their velocities and directions depend upon a number of factors such as the velocity, direction, and duration of the wind, the proximity of the coast and the direction of the coastline. Generally in the Northern Hemisphere the wind-driven current sets somewhat to the right of the wind, but in coastal waters there are many exceptions to this general rule, the current often setting to the left of the wind, due to the tendency of the current to follow the direction of the coastline or to other local conditions.

The velocity of the wind current relative to that of the wind also varies with the locality. Wind-current information is given in the Tidal Current Tables.

Weather.-Climatological tables for Atlantic coast localities, a table of fog signal operations, and meteorological tables for coastal ocean areas covered by this volume follow the appendix. The tables for ocean areas were compiled from observations made by ships in passage. Also listed in the appendix are National Weather Service offices and radio stations which transmit weather information.

General.-The coastal area from Cape Henry to Key West is low and flat. The entire shoreline is marked by inumerable indentations and irregularities, many of which cause important local climatic variations. In the area north of the Florida Peninsula there is an abrupt rise from the coastal plain which continues in an irregular terraced pattern westward, and culminates in the Blue Ridge Mountains, the Great Smokies, and other ranges of the Appalachian chain. The mountainous area, though at a considerable distance from the ocean, forms a partial barrier to the cold waves that move southeastward from the interior.

The climate of the region varies from temperate and semimarine in southern Virginia to humid and subtropical in southern Florida.

Pressure.-Over the ocean east of the southeastern seaboard there is a region of high pressure. This Azores or Atlantic High is the center of the surface circulation system in this area. During the year it migrates a limited distance to the north or south and to the east or west, but is persistent throughout the year. The circulation over the eastern seaboard is controlled largely by the proximity of the Azores High.

During the winter the mean position of the Azores High is far out to sea. Major frontal systems developing over the continent and the Gulf of Mexico sweep over the Middle Atlantic States until the mountain ranges to the westward partly obstruct their progress and cause considerable modification. Usually only the strongest polar outbreaks penetrate to the southernmost points in the area. The rapidly changing air masses in the northern part of the area may be observed in variable temperatures from day to day and in the alternation between brief stormy periods followed by crisp, clear days. The contact between polar air masses of continental and maritime origin and tropical maritime air is greatest at this time. Consequently winter storms are generally severe and are accompanied by strong, gusty winds. Northers, when they do occur, cause rough seas in the Straits of Florida.

During the spring the Azores High begins to move westward and northward. It affects the southern Atlantic coast where frequency of passing cyclonic storms decreases and the weather becomes more uniformly warm and humid. The northern part of the area, still at the outer edge of the High, is subject to frontal activity and changing air masses. Warm spring rains usually alternate with mild weather. It is not uncommon, however, for the Azores High to dominate the entire area in this season, bringing summer heat and enervating humidities.

In summer the center of the Azores High has moved to its northern limit and extends over the entire eastern seaboard. The intensity is moderate but persistent, blocking the eastward movement of

the continental pressure systems. For weeks at a time the weather on the coast may not change significantly. This season is characterized by frequent instability, showers and thunderstorms, high temperatures and humidities, and relatively low winds velocities. The summer also marks the beginning of the hurricane season, which reaches its peak in late summer and early fall. All of the coastal states have felt the effect of tropical cyclones.

During the fall the Azores High retreats southward and eastward, leaving the Atlantic coast under the influence of a weak continental high-pressure zone. The weakening of the pressure system indicates the gradual transition to the winter pattern accompanied by increased frontal activity, particularly in the northern part. The weather is usually cool and fine, interrupted by brief rainy periods associated with the passage of fronts.

The pressure pattern changes considerably over the area from winter to summer. At individual stations, however, the seasonal variation in mean pressure is only 0.12 inch to 0.17 inch throughout the year. Extremes vary considerably more than this. During the summer the mean pressure remains low and steady, but begins to rise again in September and continues to rise through the remainder of the year.

The extreme lowest pressure from a hurricane was 26.35 inches at Long Key during the "Labor Day hurricane" of 1935. The lowest pressure from an extratropical cyclone (28.32 inches) occurred at Cape Henry in March. The seasonal range from extreme highest to extreme lowest is greater during winter and smaller during summer, an indication of the numerous Lows and Highs that traverse the area during the winter.

Winds.-In winter over the northern part of the sea area (north of latitude 30°) predominant winds are from the north through west. Southwest winds are also frequent. Along the coast north of latitude 35° wind directions are variable, though predominantly from the westerly quadrant. Along the middle coast, directions are mostly northerly to westerly. Off and along the Florida coast, south of latitude 30°, easterly winds are prominent throughout the year.

Winter storms over the entire area are modified by the Appalachian Mountain ranges. However, even the extreme southern portion occasionally experiences northwesterly winds when the severest of the winter storms penetrate this far south.

In spring, over the northern part of the sea area (north of latitude 30°), winds from the southwest, south, and northeast are equal in frequency. Along the coast (north of latitude 35°) southwest winds predominate. North and south winds are also frequent. Along the middle coast south and southwest winds predominate.

In summer the persistence and dominance of the Azores High is shown in the increasing frequency of southwesterly winds over the northern part of the sea area. Along the coast (north of latitude 35°) southerly winds predominate. Along the middle coast southwest winds predominate.

In autumn the recession of the Azores High, accompanied by changing pressure systems along the coast, results in a sharp increase in the frequency of northerly winds, which are recorded about 50 percent of the time over the northern part of the sea area. Along the coast (north of latitude 35°) and the middle coast (between 30° and 35° latitude) northern winds prevail.

Along the coast a daily shift in wind direction is observed. During the warmest part of the day winds blow from the ocean toward shore (known as **sea breeze**), and during the coolest, from the land toward the sea **(land breeze)**. Offshore winds, unless they are exceptionally strong, are generally considered most favorable for coastal navigation. Onshore winds have a more pronounced effect upon the surface, particularly when they have been blowing from the same direction for a long period of time. A strong sea breeze can cause heavy or choppy seas and swell, and frequently makes navigation difficult for small vessels.

Wind velocities along the southeastern coast are generally moderately light, averaging 8 to 12 knots over the year. Monthly averages vary in summer from 6 to 10 knots, and 8 to 15 knots in winter. Wide departures from these averages should be expected in all seasons. In the immediate coastal area the windward side of the promontories may be lashed by gales and heavy seas, while the lee side is relatively protected. Averages do not show these variations. The area from Cape Hatteras to Cape Henry, exposed as it is to the ocean, is subject to severe northeasterly storms as well as moving continental pressure systems. Cape Hatteras is particularly exposed to the winds, with open sea from north through east to southwest. South of Cape Hatteras gale winds are much less frequent, occurring generally on less than 15 days a year. The frequency of calms is less than 1 percent in the north and from 15 to 20 percent during the year at most places in the middle and south.

Extreme wind velocities are a hazard in any month. Though winds greater than 34 knots are comparatively infrequent, they have been recorded at all stations in this stretch of coast at almost any time of the year. Gale winds usually accompany sharply defined frontal systems, severe cyclone storms, hurricanes, or occasionally severe local thunderstorms.

The seasonal variation in wind velocity is slightly greater in the north than in the south. An idea of the magnitude of the difference is given by the monthly averages as indicated in the tables in the appendix. Highest mean velocities occur during March in the north and in October and November in the extreme south; lowest velocities occur during July and August over the entire area. Over the ocean, winds are slightly stronger than at most land stations during the winter and about the same during the summer.

Temperature.-The temperature regime of the southern Atlantic coast varies from temperate in the northern part of the area to subtropical in the southern part. The gradation from north to south is regular, decreasing with increasing latitude. Another interesting variation is the general modification process of the ocean and coastal temperatures by each other. Along the coast the sheltered land stations have warmer summers and cooler winters than do exposed points.

Temperatures along the southeastern seaboard region are conducive to a long period of small-craft operation. The southern Atlantic coast annual mean air temperatures range from 59.7°F. at Norfolk, Va., to 76.8°F. at Key West, Fla. January is the coldest month at most stations; July the warmest. The range in mean monthly air temperature over the area is from 41.2°F. at Norfolk in January to 83.6°F. at Key West in August.

Over the water area the coldest month is February and the warmest is August. Exposed coastal stations experience mean air temperatures more like those over the water than those over land, and have annual extremes in February and August.

The daily range in temperature averages from 10° to 17°F. at coastal stations throughout the year and is likely to be less over the water. The greatest daily variation occurs at most stations during the winter and early spring and the lowest during late summer and fall.

Very little data on extreme temperatures for the ocean areas are available. At coastal stations temperatures above 100°F., while not common, have been recorded. The highest during the period of record considered was 105°F. at Jacksonville, Fla., in July. The lowest recorded temperature was 8°F. at Norfolk, Va., in February.

Humidity.-Mean relative humidity is highest from July through September and lowest in April and May. Data are not summarized for water areas, but the relative humidities are known to be uniformly high. The presence of minute particles of salt in the air over the ocean together with the high moisture content in the air results in a very corrosive effect upon equipment and supplies, both on the water and at nearby shore points.

Cloudiness.-Mean cloudiness over the area is moderate to moderately high throughout the year, averaging from 35 to 65 percent sky oover. In general, however, the cloudiest month is January in the northern sections and over most of the water areas, and may be any month from June through September in the southern section. At most of the individual stations in the northern part of the area the least average cloudiness occurs in October, and in the extreme southern part least cloudiness occurs in February or March.

Since the air is usually moist, only a small decrease in temperature may cause condensation and cloud formation. At the edge of the warm northward-moving Gulf Stream and the cool southward-moving countercurrent which skirts the shore from Cape Hatteras, N.C., to Jacksonville, Fla., sharp contrasts in temperature result in the formation of heavy stratus clouds which may appear very much as a cold front. These clouds may persist for days at a time if the wind is light and may be carried inland by northeasterly winds. Such cloudiness is common during the spring when the gradient between shore water and Gulf Stream temperatures is steepest.

The fact that maximum cloudiness for the year occurs during the winter at northern coastal stations may be explained by the maximum frequency of cyclonic storms passing northward or northeastward from the central or south-central section during that season. These rarely affect the extreme southern part of the area.

Much of the cloudiness over the entire area is of the cumulus type, resulting from either the unstable conditions that accompany cyclonic activity in all seasons, or the general air mass instability during the summer. Such clouds frequently form over land during the day and drift seaward at night.

Sunshine.-The area as a whole experiences monthly averages of from 52 to 80 percent of possible hours of sunshine during the year. In the north the largest percentage of possible sunshine occurs in spring and fall and the smallest percentage in winter. In the overall picture, the extreme south and narrow belt in the north-central part of the area shows a greater percentage of possible sunshine than the northern and south-central sections.

Precipitation.-Over the southeastern seaboard region precipitation is moderately heavy, averaging about 45 to 60 inches a year. Monthly departures may be large in any individual year, but over a long period of record, 50 to 75 years, a fairly uniform pattern prevails. Since the area lies within both temperate and subtropical regions, the precipitation pattern shows differences in both type and amount from north to south. Irregularities from station to station in the idealized pattern are due to differences of exposure at the observing stations. Year-to-year variation is caused by overall departures from the average general circulation.

In the northern part of the area, maximum rainfall occurs normally during July and August, and minimum in November. In the southern section, however, maximum rainfall falls in September or October, and the least in February. Average monthly totals at most stations range from 2 to 6 inches throughout the year. During the months of greatest hurricane frequency, excessive rains of 9 to 15 inches in a 24-hour period have been recorded. These may occur at any point along the coast, but are most common in the southern part of the area.

The monthly mean number of days with 0.01 or more of precipitation in the northern part of the area ranges from about 8 to 10 days a month in the

fall to 10 to 12 days a month in the summer and winter. In the central part of the area the most rainy days are in summer, 11 to 16 days a month, and the least in spring and fall, 6 to 9 days a month. The most rainy days along the Florida coast, 14 to 18 days a month, generally occur in late summer and early fall, and the minimum number, 5 to 8 days a month, from February through April.

Much of the precipitation, like cloudiness, is associated with cyclonic activity throughout the year. During the winter, precipitation is usually general, but may come with occasional thunderstorms along fronts. Frontal systems originating or developing in the Gulf region result from the interaction of a moist tropical air mass with colder continental masses. These move eastward or northeastward and bring extensive precipitation to the seaboard region. During the summer, when the area is dominated by the Azores High and cumulus clouds predominate, precipitation is localized and is showery in nature.

The intensity of ordinary cyclonic storms and showers is usually greater over land than over water. Heaviest precipitation occurs over land and near coastal waters in the afternoon; over open water during the night.

Thunderstorms along the coast occur on an average of from 40 days a year in the north to 80 days a year in the south. Maximum occurrence is from June through August, and an average of 7 to 18 thunderstorms a month occur during this season. In summer, cumulus clouds frequently develop into thunderstorms over the land and drift seaward late in the afternoon.

Snow falls from December through March in the northern part of the area on 1 or 2 days a month. So far as coastal operations are concerned, snow conditions are not significant since most of the area is entirely free from snow the year round.

Visibility.-Visibility is generally good throughout the year over the entire area. Fog is the principal restriction to visibility. Fog reducing visibility to 0.25 mile or less is very irregular, ranging from practically no days a year at some stations to 37 days a year at Savannah, Ga. Differences in exposure account for the considerable variation between locations. In general, however, fog decreases from north to south, and the worst fog conditions occur during the winter when air masses change frequently. Visibility is usually poorest during the night and early morning.

Along the coast radiation fog is frequent, forming shortly after sunset. These fogs generally do not extend any great distance seaward, but may seriously restrict harbor activities. Sea fogs sometimes drift onshore on hot summer days, persisting for many hours in a shallow layer along the coast. Over the land, dispersal usually begins at the surface giving the effect of lifting. Over the water, fog generally persists at the surface and restricts visibility until the last vestige of the formation disappears.

In addition to fog, precipitation occasionally reduces visibility over both land and water, and haze and smoke sometimes restrict visibility over land.

Tropical cyclones.-A tropical cyclone is a warm core, low-pressure system that develops over the warm waters of the tropical oceans and exhibits a rotary, counterclockwise circulation in the Northern Hemisphere (clockwise in the Southern Hemisphere). Although relatively small in area coverage, this storm can attain awesome strength, with winds near its center reaching 175 knots or more. Tropical cyclones occur almost entirely in six rather distinct regions of the world; one of these, the **North Atlantic Region** (West Indies, Caribbean Sea, Gulf of Mexico, and waters off the U.S. east coast), includes the area covered by this Coast Pilot. In this region, tropical cyclones with winds of 34 to 63 knots are called **tropical storms,** while tropical cyclones with winds greater than 63 knots are called **hurricanes.** Hurricanes are infrequent in comparison with middle-and high-latitude storms, but they have a record of destruction far exceeding that of any other type of storm. Because of their fury, and the fact that they are predominately oceanic, they merit the special attention of all mariners, whether professional or amateur.

Rarely does the mariner who has experienced a fully developed tropical cyclone (hurricane) at sea wish to encounter a second one. He has learned the wisdom of avoiding them if possible. The uninitiated may be misled by the deceptively small size of a tropical cyclone as it appears on a weather map, and by the fine weather experienced only a few hundred miles from the reported center of such a storm. The rapidity with which the weather can deteriorate with approach of the storm, and the violence of the hurricane, are difficult to visualize if they have not been experienced.

As a tropical cyclone moves out of the Tropics to higher latitudes, it normally loses energy slowly, expanding in area until it gradually dissipates or acquires the characteristics of extratropical cyclones. At any stage, a tropical cyclone normally loses energy at a much faster rate if it moves over land. As a general rule, tropical cylones of the North Atlantic Region move with the prevailing winds of the area. In small hurricanes the diameter of the area of destructive winds may not exceed 25 miles while in some of the greatest storms the diameter may be as much as 400 to 500 miles.

At the center is a comparative calm known as the "eye of the storm". The diameter of this "eye" varies with individual storms and may be as little as 7 miles, but is rarely more than 30 miles. The average is 15 to 20 miles. This center is the region of low atmospheric pressure around which winds blow in a more or less circular course, spiraling inward in a counterclockwise direction. Winds at the outer edge of the storm area are light

to moderate and gusty, and often increase toward the center to speeds too high for instrument recording. Although the air movement near the center of the hurricane is usually light and fitful, the seas in this area are in most cases very heavy and confused, rendered so by the violent shifting winds which surround it. Furthermore, after the center has passed a vessel, she may expect a sharp renewal of the gales, with winds from a more or less opposite direction. The hurricane may effect an area covering tens of thousands of square miles.

In the North Atlantic, tropical cyclones form over a wide range of ocean between the Cape Verde Islands and the Windward Island, over the western part of the Caribbean Sea, and the Gulf of Mexico. While some may initially move northward, especially those that form southeast of Bermuda, most take a westerly to northwesterly course. Of these, some curve gradually northward, either east of or above the larger islands of the West Indies, then turn northeastward or eastward for varying distances from the Atlantic Coast of the United States. Others pass over or to the south of the larger islands and enter the Gulf of Mexico, then curve northward or northeastward and strike some part of the east Gulf Coast. Others may continue westward and strike the west Gulf Coast.

The most common path is curved, the storms moving generally in a westward direction at first, turning later to the northwestward and finally to the northeastward. A considerable number, however, remain in low latitudes and do not turn appreciably to the northward. Freak movements are not uncommon, and there have been storms that described loops, hairpin-curved paths, and other irregular patterns. Movement toward the southeast is rare, and in any case of short duration. The entire Caribbean area, the Gulf of Mexico, the coastal regions bordering these bodies of water, and the Atlantic Coast are subject to these storms during the hurricane season.

Hurricanes develop over the southern portions of the North Atlantic, including the Gulf of Mexico and Caribbean Sea, **mostly from June through October, infrequently in May and November, and rarely in other months;** the hurricane season reaches its peak in September. An average of nine tropical cyclones form each year (reaching at least tropical storm intensity) and five of these reach hurricane strength. June and July storms tend to develop in the northwestern Caribbean or Gulf of Mexico while during August there is an increase in number and intensity, and the area of formation extends east of the Lesser Antilles. September storms develop between 50°W and the Lesser Antilles; in the southern Gulf of Mexico, the western Caribbean, near the Bahamas, and around the Cape Verde Islands. Formation in October shifts primarily to the western Carribean, and off-season storms are widespread with a slight concentration in the southwestern Caribbean.

The average speed of movement of tropical cyclones in the Tropics is about 10 to 15 knots. This speed, however, varies considerably according to the location of the storm, its development, and attendant meteorological conditions. The highest rates of progression usually occur when the storm is moving northward or northeastward in the middle or higher latitudes.

Locating and tracking tropical cyclones.–By means of radio, the National Weather Service collects weather observations daily from land stations, ships at sea, and aircraft. When a tropical cyclone is located, usually in its early formative stage, it is followed closely. In the North Atlantic, U.S. Navy, Air Force, and NOAA aircraft make frequent flights to the vicinity of such storms to provide information needed for tracking the tropical cyclone and determining its intensity. Long-range shore radar stations follow the movement of the storm's precipitation area when it is in range. Bulletins are broadcast to ships several times daily, giving information on each storm's location, intensity, and movement. As a further aid, the mariner may obtain weather reports by radio directly from other ships in the vicinity of a tropical cyclone.

Signs of approach.–Although radio reports normally prove adequate for locating and avoiding a tropical cyclone, knowledge of the appearance of the sea and sky in the vicinity of such a storm is useful to the mariner. The passage of a hurricane at sea is an experience not soon to be forgotten.

An early indication of the approach of such a storm is the presence of a long swell. In the absence of a tropical cyclone, the crests of swell in the deep waters of ths Atlantic pass at the rate of perhaps eight per minute. Swell generated by a tropical cyclone is about twice as long, the crests passing at the rate of perhaps four per minute. Swell may be observed several days before arrival of the storm.

When the storm center is 500 to 1,000 miles away, the barometer usually rises a little, and the skies are relatively clear. Cumulus clouds, if present at all, are few in number and their vertical development appears suppressed. The barometer usually appears restless, pumping up and down a few hundredths of an inch.

As the tropical cyclone comes nearer, a cloud sequence begins which resembles that associated with the approach of a warm front in middle latitudes. Snow-white, fibrous "mare's tails" (cirrus) appear when the storm is about 300 to 600 miles away. Usually these seem to converge, more or less, in the direction from which the storm is approaching. This convergence is particularly apparent at about the time of sunrise and sunset.

Shortly after the cirrus appears, but sometimes before, the barometer starts a long, slow fall. At first the fall is so gradual that it only appears to alter somewhat the normal daily cycle (two maxima and two minima in the Tropics). As the rate of

fall increases, the daily pattern is completely lost in the more or less steady fall.

The cirrus becomes more confused and tangled, and then gradually gives way to a continuous veil of cirrostratus. Below this veil, altostratus forms, and then stratocumulus. These clouds gradually become more dense, and as they do so, the weather becomes unsettled. A fine, mist-like rain begins to fall, interrupted from time to time by showers. The barometer has fallen perhaps a tenth of an inch.

As the fall becomes more rapid, the wind increases in gustiness, and its speed becomes greater, reaching a value of perhaps 22 to 40 knots (Beaufort 6-8). On the horizon appears a dark wall of heavy cumulonimbus, the **bar** of the storm. Portions of this heavy cloud become detached from time to time and drift across the sky, accompanied by rain squalls and wind of increasing speed. Between squalls, the cirrostratus can be seen through breaks in the stratocumulus.

As the bar approaches, the barometer falls more rapidly and wind speed increases. The seas, which have been gradually mounting, become tempestuous squall lines, one after the other, sweep past in ever-increasing number and intensity.

With the arrival of the bar, the day becomes very dark, squalls become virtually continuous, and the barometer falls precipitously, with a rapid increase in the wind speed. The center may still be 100 to 200 miles away in a hurricane. As the center of the storm comes closer, the ever-stronger wind shrieks through the rigging and about the superstructure of the vessel. As the center approaches, rain falls in torrents. The wind fury increases. The seas become mountainous. The tops of huge waves are blown off to mingle with the rain and fill the air with water. Objects at a short distance are not visible. Even the largest and most seaworthy vessels become virtually unmanageable and may sustain heavy damage. Less sturdy vessels do not survive. Navigation virtually stops as safety of the vessel becomes the prime consideration. The awesome fury of this condition can only be experienced. Words are inadequate to describe it.

If the eye of the storm passes over the vessel, the winds suddenly drop to a breeze as the wall of the eye passes. The rain stops, and skies clear sufficiently to permit the sun to shine through holes in the comparatively thin cloud cover. Visibility improves. Mountainous seas approach from all sides, apparently in complete confusion. The barometer reaches its lowest point, which may be 1½ or 2 inches below normal in hurricanes. As the wall on the opposite side of the eye arrives, the full fury of the wind strikes as suddenly as it ceased, but from the opposite direction. The sequence of conditions that occurred during approach of the storm is reversed, and pass more quickly, as the various parts of the storm are not as wide in the rear of a storm as on its forward side.

Locating the center of a tropical cyclone.–If intelligent action is to be taken to avoid the full fury of a tropical cyclone, early determination of its location and direction of travel relative to the vessel is essential. The bulletins and forecasts are an excellent general guide, but they are not infallible and may be sufficiently in error to induce a mariner in a critical position to alter course so as to unwittingly increase the danger of the vessel. Often it is possible, using only those observations made aboard ship, to obtain a sufficiently close approximation to enable the vessel to maneuver to the best advantage.

As previously stated, the presence of an exceptionally long swell is usually the first visible indication of the existence of a tropical cyclone. In deep water it approaches from the general direction of origin (the position of the storm center when the swell was generated). However, in shoaling water this is a less reliable indication because the direction is changed by refraction, the crests being more nearly parallel to the bottom contours.

When the cirrus clouds appear, their point of convergence provides an indication of the direction of the storm center. If the storm is to pass well to one side of the observer, the point of convergence shifts slowly in the direction of storm movement. If the storm center will pass near the observer, this point remains steady. When the bar becomes visible, it appears to rest upon the horizon for several hours. The darkest part of this cloud is in the direction of the storm center. If the storm is to pass to one side, the bar appears to drift slowly along the horizon. If the storm is heading directly toward the observer, the position of the bar remains fixed. Once within the area of the dense, low clouds, one should observe their direction of movement, which is almost exactly along the isobars, with the center of the storm being 90° from the direction of cloud movement (left of direction of movement in the northern hemisphere).

The winds are probably the best guide to the direction of the center of a tropical cyclone. The circulation is cyclonic, but because of the steep pressure gradient near the center, the winds there blow with greater violence and are more nearly circular than in extratropical cyclones.

According to Buys Ballot's law, an observer who faces into the wind has the center of the low pressure on his right (northern hemisphere) and somewhat behind him. If the wind followed circular isobars exactly, the center would be exactly eight points, or 90°, from dead ahead when facing into the wind. However, the track of the wind is usually inclined somewhat toward the center, so that the angle dead ahead varies between perhaps 8 and 12 points (90° to 135°). The inclination varies in different parts of the same storm. It is least in front of the storm, and greatest in the rear, since the actual wind is the vector sum of that due to the pressure gradient and the motion of the storm

along the track. A good average is perhaps 10 points in front, and 11 or 12 points in the rear. These values apply when the storm center is still several hundred miles away. Closer to the center, the wind blows more nearly along the isobars, the inclination being reduced by one or two points at the wall of the eye. Since wind direction usually shifts temporarily during a squall, its direction at this time should not be used for determining the position of the center.

When the center is within radar range, it might be located by this equipment. However, since the radar return is predominately from the rain, results can be deceptive, and other indications should not be neglected.

Distance from the storm center is more difficult to determine than direction. Radar is perhaps the best guide. The rate of fall of the barometer is of some help; this is only a rough indication, however, for the rate of fall may be quite erratic and will vary somewhat with the depth of the low at the center, the speed of the storm center along its track, and the stage in the life cycle of the storm.

Maneuvering to avoid the storm center.-The safest procedure with respect to tropical cyclones is to avoid them. If action is taken sufficiently early, this is simply a matter of setting a course that will take the vessel well to one side of the probable track of the storm, and then continuing to plot the position of the storm center, as given in the weather bulletins, revising the course as needed.

However, such action is not always possible. If one finds himself within the storm area, the proper action to take depends in part upon his position relative to the storm center and its direction of travel. It is customary to divide the circular area of the storm into two parts. In the Northern Hemisphere, that part to the **right** of the storm track (facing in the direction toward which the storm is moving) is called the **dangerous semicircle.** It is considered dangerous because (1) the actual wind **speed** is greater than that due to the pressure gradient alone, since it is augmented by the forward motion of the storm, and (2) the **direction** of the wind and sea is such as to carry a vessel into the path of the storm (in the forward part of the semicircle). The part to the **left** of the storm track is called the **navigable semicircle.** In this part, the wind is decreased by the forward motion of the storm, and the wind blows vessels away from the storm track (in the forward part). Because of the greater wind speed in the dangerous semicircle, the seas are higher here than in the navigable semicircle.

A plot of successive positions of the storm center should indicate the semicircle in which a vessel is located. However, if this is based upon weather bulletins, it is not a reliable guide because of the lag between the observations upon which the bulletin is based and the time of reception of the bulletin, with the ever present possibility of a change in the direction of motion of the storm. The use of radar eliminates this lag, but the return is not always a true indication of the center. Perhaps the most reliable guide is the wind. Within the cyclonic circulation, a **veering wind** (one changing direction to the right in the Northern Hemisphere and to the left in the Southern Hemisphere) indicates a position in the dangerous semicircle, and a **backing wind** (one changing in a direction opposite to a veering wind) indicates a position in the navigable semicircle. However, if a vessel is underway, its motion should be considered. If it is outrunning the storm or pulling rapidly toward one side (which is not difficult during the early stages of a storm, when its speed is low), the opposite effect occurs. This should usually be accompanied by a rise in atmospheric pressure, but if motion of the vessel is nearly along an isobar, this may not be a reliable indication. If in doubt, the safest action is usually to stop long enough to determine definitely the semicircle. The loss in valuable time may be more than offset by the minimizing of the possibility of taking the wrong action and increasing the danger to the vessel. If the wind direction remains steady (for a vessel which has stopped), with increasing speed and falling barometer, the vessel is in or near the path of the storm. If it remains steady with decreasing speed and rising barometer, the vessel is on the storm track, behind the center.

The first action to take if one finds himself within the cyclonic circulation, is to determine the position of his vessel with respect to the storm center. **While the vessel can still make considerable way through the water, a course should be selected to take it as far as possible from the center.** If the vessel can move faster than the storm, it is a relatively simple matter to outrun the storm if sea room permits. But when the storm is faster, the solution is not as simple. In this case, the vessel, if ahead of the storm, will approach nearer to the center. The problem is to select a course that will produce the greatest possible minimum distance. This is best determined by means of a relative movement plot.

As a very general rule, for a vessel in the Northern Hemisphere, safety lies in placing the wind on the starboard bow in the dangerous semicircle and on the starboard quarter in the navigable semicircle. If on the storm track ahead of the storm, the wind should be put about two points on the starboard quarter until the vessel is well within the navigable semicircle, and the rule for that semicircle then followed. With a faster than average vessel, the wind can be brought a little farther aft in each case. However, as the speed of the storm increases along its track, the wind should be brought farther forward. If land interferes with what would otherwise be the best maneuver, the solution should be altered to fit the circumstances. If the speed of the vessel is greater than that of the storm, it is possible for the vessel,

if behind the storm, to overtake it. In this case, the only action usually needed is to slow enough to let the storm pull ahead.

In all cases, one should be alert to changes in the direction of movement of the storm center, particularly in the area where the track normally curves toward the pole. If the storm maintains its direction and speed, the ship's course should be maintained as the wind shifts.

If it becomes necessary for a vessel to heave to, the characteristics of the vessel should be considered. A power vessel is concerned primarily with damage by direct action of the sea. A good general rule is to heave to with head to the sea in the dangerous semicircle or stern to the sea in the navigable semicircle. This will result in greatest amount of headway away from the storm center, and least amount of leeway toward it. If a vessel handles better with the sea astern or on the quarter, it may be placed in this position in the navigable semicircle or in the rear half of the dangerous semicircle, but never in the forward half of the dangerous semicircle. It has been reported that when the wind reaches hurricane speed and the seas become confused, some ships ride out the storm best if the engines are stopped, and the vessel is permitted to seek its own position. In this way, it is said, the ship rides with the storm instead of fighting against it.

In a sailing vessel, while attempting to avoid a storm center, one should steer courses as near as possible to those prescribed above for power vessels. However, if it becomes necessary for such a vessel to heave to, the wind is of greater concern than the sea. A good general rule always is to heave to on whichever tack permits the shifting wind to draw aft. In the Northern Hemisphere this is the starboard tack in the dangerous semicircle and the port tack in the navigable semicircle.

Practical rules.-When there are indications of a hurricane, vessels should remain in port or seek one if possible. Changes in barometer and wind should be carefully observed and recorded, and every precaution should be taken to avert damage by striking light spars, strengthening moorings, and, if a steamer, preparing steam to assist the moorings. In the ports of the southern States hurricanes are generally accompanied by very high tides, and vessels may be endangered by overriding the wharf where moored if the position is at all exposed.

Vessels in the Straits of Florida may not have sea room to maneuver so as to avoid the storm track, and should try to make a harbor, or to stand out of the straits to obtain sea room. Vessels unable to reach a port and having sea room to maneuver usually observe the previously discussed general rules for avoiding the storm center, which, for power-driven vessels, are summarized as follows:

Right or dangerous semicircle.-Bring the wind on the starboard bow (045° relative), hold course, and make as much way as possible. If obliged to heave to, do so with head to the sea.

Left or navigable semicircle.-Bring the wind on the starboard quarter (135° relative), hold course, and make as much way as possible. If obliged to heave to, do so with stern to the sea.

On storm track, ahead of center.-Bring the wind two points on the starboard quarter (157½ ° relative), hold course, and make as much way as possible. When well within the navigable semicircle, maneuver as indicated above.

On storm track, behind center.-Avoid the center by the best practicable course, keeping in mind the tendency of tropical cyclones to curve northward and eastward.

Coastal effects.-The high winds of a hurricane inflict widespread damage when such a storm leaves the ocean and crosses land. Aids to navigation may be blown out of position or destroyed. Craft in harbors, unless they are properly secured, drag anchor or are blown against obstructions. Ashore, trees are blown over, houses are damaged, powerlines are blown down, etc. The greatest damage usually occurs in the dangerous semicircle a short distance from the center, where the strongest winds occur. As the storm continues on across land, its fury subsides faster than it would if it had remained over water.

Along the coast, particularly, greater damage may be inflicted by water than by the wind. There are at least four sources of water damage. First, the unusually high seas generated by the storm winds pound against shore installations and craft in their way. Second, the continued blowing of the wind toward land causes the water level to increase perhaps 3 to 10 feet above its normal level. This **storm tide,** which may begin when the storm center is 500 miles or even farther from the shore, gradually increases until the storm passes. The highest storm tides are caused by a slow-moving hurricane of large diameter, because both of these effects result in greater duration of wind in the same direction. The effect is greatest in a partly enclosed body of water, such as the Gulf of Mexico, where the concave coastline does not readily permit the escape of water. It is least on small islands, which presents little obstruction to the flow of water. Third, the furious winds which blow around the wall of the eye often create a ridge of water called a **storm surge,** which strikes the coast and often inflicts heavy damage. The effect is similar to that of a **Tsunami (seismic sea wave)** caused by an earthquake in the ocean floor. Both of these waves are popularly called **tidal waves.** Storm surges of 20 feet or more have occurred. About three or four feet of this is due to the decrease of atmosphere pressure, and the rest to winds. Like the damage caused by wind, that due to high seas, the storm tide, and the storm surge is greatest in the dangerous semicircle, near the center. The fourth source of water damage is the heavy rain that accompanies a tropical cyclone.

This causes floods that add to the damage caused in other ways.

When proceeding along a shore recently visited by a hurricane, a navigator should remember that time is required to restore aids to navigation which have been blown out of position or destroyed. In some instances the aid may remain, but its light, sound apparatus, or radiobeacon may be inoperative. Landmarks may have been damaged or destroyed.

Principal ports.-The ports within the area of this Coast Pilot which have deep-draft commercial traffic are Morehead City, N.C.; Wilmington, N.C.; Georgetown, S.C.; Charleston, S.C.; Port Royal, S.C.; Savannah, Ga.; Brunswick, Ga.; Fernandina Beach, Fla.; Jacksonville, Fla.; Port Canaveral, Fla.; Fort Pierce, Fla.; Port of Palm Beach (near West Palm Beach), Fla.; Port Everglades (Fort Lauderdale), Fla; Miami, Fla.; and Key West, Fla. The larger ports of the group are Wilmington, Charleston, Savannah, Jacksonville, Port Everglades, and Miami. Jacksonville is the largest port on the east coast south of Hampton Roads and is a major ship repair center.

Pilotage.-Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade at the ports where state pilots are available. Pilotage is optional for coastwise vessels who have on board a pilot properly licensed by the Federal Government. Only at Wilmington, Charleston, and Jacksonville is there a pilot station which is manned 24 hours daily; at the other ports, arrangements for pilots must be made well in advance. Detailed information on pilotage procedures is given in the text for the ports concerned.

Local boatmen or fishermen competent to act as pilots for parts of the Intracoastal Waterway and interior waters can usually be found at the larger cities and towns along the route or near the entrances to the various tributaries.

Towage.-Tugs are available at the major ports; they can usually be obtained for the smaller ports on advance notice if none are available locally. Arrangements for tugs should be made in advance through the ships' agents or the pilots. See the text for the ports concerned as to the availability of tugs.

Harbormasters are appointed for most of the principal ports. They have charge of the anchorage and berthing of vessels.

Supplies.-Fuel oil, diesel oil, and all other supplies and services for large vessels are available at Morehead City, Wilmington, Charleston, Savannah, Jacksonville, Port Everglades, and Miami. Fuel oil and diesel oil are available locally, or can be barged or trucked in from another port, at Georgetown, Port Royal, Brunswick, Fernandina Beach, Fort Pierce, Port of Palm Beach, and Key West; other supplies and services for ships are limited at these ports.

Repairs.-Large oceangoing vessels can be drydocked and have major repair work done at Cainhoy (Near Charleston), Savannah, Jacksonville, and Port Everglades; the drydock capacities range from 4,200 tons (Port Everglades) to 33,000 tons (Jacksonville). Smaller vessels of from 800 to 1,700 tons may also be drydocked at Wilmington and Miami. (See text for details.)

Small-craft facilities.-Supplies, and repair facilities for small craft are at all the ports and at numerous places along the Intracoastal Waterway and on the tributaries branching from it. Many facilities are described in the text; a more complete listing is shown on the small-craft charts.

See pages T-20 and T-21 for tabulation of some of the principal small-craft facilities along the Intracoastal Waterway from Norfolk, Va. to Key West, Fla., and the controlling clearances of bridges, overhead cables, and locks.

Sailing vessels and power-driven vessels of less than 65 feet in length navigating narrow channels shall not hamper the safe passage of larger steam vessels which can navigate only inside that channel.

Standard time.-The area covered by this Coast Pilot uses eastern standard time (e.s.t.), which is 5 hours slow of Greenwich mean time (G.m.t.). Example: When it is 1000 at Greenwich it is 0500 along this coast.

Daylight saving time.-Throughout the area of this Coast Pilot, clocks are advanced 1 hour on the last Sunday in April and are set back to standard time on the last Sunday in October.

Legal public holidays.-New Year's Day, January 1; Washington's Birthday, third Monday in February; Memorial Day, last Monday in May; Independence Day, July 4; Labor Day, first Monday in September; Columbus Day, second Monday in October; Veterans Day, fourth Monday in October; Thanksgiving Day, fourth Thursday in November; and Christmas Day, December 25. The national holidays are observed by employees of the Federal Government and the District of Columbia, and may not be observed by all the states in every case.

In the areas covered by this Coast Pilot, other holidays are observed: Lee-Jackson Day, third Monday in January, in Virginia; Robert E. Lee's Birthday, January 19, in all states except Virginia; Arbor Day, third Friday in January, Florida; Good Friday, Florida; Easter Monday, North Carolina; April 2, Pascua Florida Day, Florida; April 12, Halifax Day, North Carolina; April 14, Pan American Day, Florida; April 26, Confederate Memorial Day, Georgia and Florida; May 10, Confederate Memorial Day, North Carolina and South Carolina; May 20, Mecklenburg Day, North Carolina; June 3, Jefferson Davis' Birthday, South Carolina, Georgia, and Florida; General Election Day, first Tuesday after the first Monday in November, all states.

4. CAPE HENRY TO CAPE LOOKOUT

Charts 12200 (1109), 11520 (1110).-This chapter describes a 190-mile section of the Virginia and North Carolina coastline between Cape Henry and Cape Lookout, known as The Outer Banks, and the series of sounds and tributary waters behind the banks through which the Intracoastal Waterway passes from Chesapeake Bay southward. The Outer Banks, a line of long, low, and narrow islands, include the Portsmouth Islands, the uninhabited Core Banks, and Bodie, Hatteras, and Ocracoke Islands, parts of which comprise the Cape Hatteras National Seashore Recreational Area. The Intracoastal Waterway is described in chapter 12.

There are no deepwater ports along this stretch of the coast. Oregon, Hatteras, and Ocracoke Inlets provide the main entrances to the shallow, sandy-bottom waters behind The Outer Banks. These inlets are used principally by fishing vessels.

Discussed in this chapter are the waters of Albemarle Sound and its tributaries Little, Perquimans, Chowan, and Roanoke Rivers, and the towns of Hertford, Edenton, and Plymouth; Croatan and Roanoke Sounds, Roanoke Island, and the towns of Kitty Hawk, Nags Head, Manteo, and Wanchese; Pamlico Sound and the towns of Rodanthe, Avon, Buxton, Hatteras, and Ocracoke which are on the western side of The Outer Banks; Pamlico River and the towns of Swanquarter, Bath, and Washington; Neuse River and the town of New Bern; and Core Sound, Cedar Island, and the towns of Atlantic, Sealevel, Davis, and Marshallberg. These ports and waters support considerable traffic in barges and pleasure craft, and a large fishing and boatbuilding industry.

There are many off-lying shoals and other hazards along this coast including Diamond Shoals and Cape Lookout Shoals. Deep-draft vessels should give these dangers a wide berth.

Many **restricted** and **danger areas** are located offshore and in the inland waters. (See chapter 2 for rules and regulations.)

The low sandy beaches of the coastline do not present any good radar targets.

The Traffic Separation Scheme at the entrance to Chesapeake Bay is described in United States Coast Pilot 3, Atlantic Coast-Sandy Hook to Cape Henry.

Charts 12207 (1227), 12205 (129-SC).-The summer resort of **Virginia Beach** is about 5 miles southward of Cape Henry Light. Many high-rise buildings and two water tanks are prominent. Some of these are lighted at night. The cupola of the Cavalier Hotel, 3.4 miles south of Cape Henry Light, is distinctive.

Rudee Inlet, at the southern end of Virginia Beach and about 6 miles south of Cape Henry Light, is protected by two jetties at the entrance. The inlet is privately maintained and is reported subject to seasonal shoaling; local knowledge is advised. Private lights mark the ends of the jetties; a fog signal is at the south jetty light.

The inlet leads northward to **Lake Rudee,** and southward to **Lake Wesley.** A fixed highway bridge with a clearance of 28 feet crosses the arm of the inlet leading to Lake Rudee. Several overhead power and telephone cables with a least known clearance of 54 feet cross eastward of the bridge. A municipal marina for charter fishing boats is on the north shore of Lake Rudee close westward of the bridge.

Local magnetic disturbance.-Differences of as much as 6° from the normal variation have been observed 3 to 17 miles offshore from Cape Henry to Currituck Beach Light.

A **naval restricted area** extends northward, eastward, and southeastward from Cape Henry. (See **207.158,** chapter 2, for limits and regulations.)

A **naval prohibited area** is off Camp Pendleton, 7.4 miles southward of Cape Henry; limits and regulations are given in **204.53,** chapter 2.

Danger zones of naval firing ranges are about 8 and 9 miles southward of Cape Henry; limits and regulations are given in **204.51a** and **204.52,** Chapter 2.

Radar domes and a red and white checkered water tank, 158 feet above the water, are prominent at the Dam Neck Naval Station about 9 miles southward of Cape Henry Light.

At **Sand Bridge,** about 11 miles south of Cape Henry Light, a tower is prominent and there are about 3 miles of beach residences south of Sand Bridge.

In 1969, the former Coast Guard Station at Little Island, 14.5 miles south of Cape Henry Light, was being developed into a park by the City of Virginia Beach.

Part of Back Bay National Wildlife Refuge extends from 15 to 18.5 miles south of Cape Henry Light along The Outer Banks.

False Cape, so called because of its resemblance to Cape Henry when approaching from southward is about 22 miles southward of Cape Henry Light. Several spots with depths of 10 to 17 feet are 0.8 to 1.5 miles offshore from False Cape.

Sand dunes in this area have a tendency to alternately erode and then build up again as the seasons change, generally working to the southward; they should not be depended upon as navigational marks.

Charts 12204 (1229), 12205 (129-SC).-Currituck Beach Light (36°22.6'N., 75°49.8'W.), 158 feet above the water, is shown from a red conical tower on the beach near the settlement of **Corolla.** The buildings of the former Caffey Inlet Coast Guard station is 9.8 miles southward of the light. **Caffey Inlet** is closed.

Local magnetic disturbance.-Differences of as much as 11° from the normal variation have been observed 5 to 7 nautical miles offshore from Currituck Beach Light to Wimble Shoals (36°22.6'N., to 35°35.0'N.). A conspicuous steel tower is just eastward of Kitty Hawk, 20 miles southward of Currituck Beach Light. **Wright Monument,** a high stone memorial on the highest of the **Kill Devil Hills,** 3.5 miles southward of Kitty Hawk, is very prominent and is a good landmark on this low sandy coast where there are very few conspicuous objects.

Bodie Island Light (35°49.2'N., 75°33.8'W.), 156 feet above the water, is shown from a conical tower, with alternate white and black horizontal bands above the granite base, about 2 miles northward of the southern end of Bodie Island, and 36 miles southward of Currituck Beach Light.

Oregon Inlet, about 2.5 miles southward of Bodie Island Light, is entered over a shifting bar. A lighted whistle buoy marks the approach; other buoys, not charted, are frequently shifted in position to mark the best water. The inlet, used by local fishing vessels, but not recommended to strangers, requires continuous dredging; it deepens with northwest winds and fills in with northeast winds. Tidal currents in the inlet are reported to be as much as 5 knots. **Storm warning signals are displayed.** (See chart.)

A highway bridge crosses the inlet; the fixed channel span has a clearance of 65 feet over the main channel. A Coast Guard station is on the south side of the inlet. **Oregon Inlet Light** (35°46.1'N., 75°31.4'W.), 54 feet above the water, is shown from the Coast Guard station lookout tower. A radiobeacon is near the light.

Three marked dredged channels with a Federal project depth of 12 feet lead from Oregon Inlet into Pamlico Sound. **Oregon Inlet Channel** leads westward from the inlet to a junction with **Old House Channel,** which then leads southwestward into Pamlico Sound. From the junction, the inlet channel continues northward to a junction with **Roanoke Sound Channel,** which continues northward to a turning basin at Manteo. A side channel of the same project depth leads westward to a turning basin at Wanchese at the south end of Roanoke Island. A connecting channel with a project depth of 6 feet continues northward into Albemarle Sound from the north end of the Roanoke Sound Channel. (See Notice to Mariners and latest editions of charts for controlling depths.)

On the southern end of Bodie Island, just west of the bridge, there is a small-boat basin operated by the National Park Service from April through September. In 1969, depths of 4 to 12 feet were reported in the basin. An unlighted buoyed channel leads from the west-southwestward through Walter Slough to the basin. The aids, not charted, are frequently shifted in position to mark the best water. Gasoline, diesel fuel, water, ice, and a boat-launching ramp are available. The service station and store are prominent. Charter boats depart from here for deep-sea fishing.

Pea Island, on the south side of the entrance to Oregon Inlet, and the waters to the westward of the island, have been designated as a **National Wildlife Refuge.** Pea Island is the northern extension of Hatteras Island.

Roanoke Island, close westward of Bodie Island, separates Roanoke Sound on the east from Croatan Sound on the west.

Wanchese is a small town near the south end of Roanoke Island west of the entrance to Mill Creek. Gasoline, diesel fuel, water, groceries, and small charter boats can be obtained at the fishhouses and small docks. The largest of three marine railways in **Mill Creek** can haul out craft up to 60 feet for hull and engine repairs; there is a machine shop at the larger railway. There is a small-boat launching ramp. A large fleet of trawlers up to 110 feet take shelter and unload here.

Just south of Mill Creek is a marine railway that can haul out craft up to 50 feet; there is a small-boat launching ramp.

A marine railway that can handle craft up to 60 feet is on the unnamed creek on the western side of Roanoke Island opposite Mill Creek, about 500 yards southward of Baum Creek. Berthage, electricity, gasoline, and water are available.

The causeway over Roanoke Sound connects Roanoke Island with Bodie Island and U.S. Route 64-264 highway to Norfolk. It has a swing span with a clearance of 11 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

Manteo, the principal town on Roanoke Island and the seat of Dare County, is at the head of Shallowbag Bay, which indents the island near its northeast end. A large elevated tank in the town is conspicuous. Gasoline, diesel fuel, water, some supplies, and berthing facilities are available. Oil is barged into an oil terminal at Manteo. **Storm warning signals are displayed.** (See chart.)

Historic**Fort Raleigh,** site of the **Lost Colony,** is at the northern end of Roanoke Island. A national park is at Fort Raleigh.

Nags Head is a summer resort on the east side of Roanoke Sound, 3.5 miles northeastward of Manteo. Other inland waters are described in another section.

Platt Shoals, consisting of several spots covered 27 to 34 feet, are east-southeastward of Oregon Inlet and 2.5 to 4 miles offshore. Between the shoals and the shoal water off the shore the depths are 39 to 85 feet. In easterly gales the shoaler spots are marked by breakers.

Wimble Shoals, 15 miles southward of Oregon Inlet, are a number of ridges extending offshore about 4 miles, with depths ranging from 21 to 36 feet. In easterly gales the shoaler parts are marked by breakers. A lighted whistle buoy is outside the shoals.

Local magnetic disturbance.-Differences of as much as 8° from the normal variation have been observed in 35°32.0'N., 75°21.2'W. (chart 11555 (1232)). Differences of as much as 3° from the normal variation have been observed 6 to 12 miles offshore from Wimble Shoals to Cape Hatteras.

A telephone tower at **Waves** about 12.8 miles southward of Oregon Inlet Light is a prominent object.

Chart 11555 (1232).-Cape Hatteras, where the coast makes a sharp turn westward, is low and sandy. **Cape Hatteras Light** (35°15.3'N., 75°31.2'W.), 191 feet above the water, is shown from a black and white spirally banded tower on red brick base. About 1 mile northwest of Cape Hatteras Light, a telephone tower, a green water tower, and a radar sphere, in close proximity to each other, are prominent. A loran tower is about 1 mile southward of Cape Hatteras Light.

Weather.-Tropical cyclones in the summer and extratropical storms in the winter plague the mariner in this region. Winter storms often form in the waters off the Cape and move northward before reaching full force. However, hurricanes are often at full intensity when they pass Cape Hatteras and the many hulls of shipwrecked vessels attest to the fury of their winds and waves.

Hatteras, with its maritime climate, experiences few days when summer temperatures go above 90° F, and during the winter freezing temperatures are only about one-half as common as at inland stations.

The wind at Cape Hatteras, averages 8 to 11 knots all year round. (See page T-1 for Cape Hatteras climatological table.)

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Diamond Shoals extend off Cape Hatteras in a southeasterly direction for about 9 miles. Depths of 3 feet have been found on the shoaler parts. Diamond Shoals include **Hatteras Shoals, Inner Diamond Shoal,** and **Outer Diamond Shoal.** Hatteras Shoals, with little water over them, are usually marked by breakers. Outer Diamond Shoal consists of irregular patches, with depths of 3 to 18 feet, which are usually marked by breakers.

Caution.-Hydrography is not charted on Diamond Shoals due to the changeable nature of the area. Navigation in the area is extremely hazardous for all types of craft. During strong winds the currents set across the shoals with great velocity.

The difficulty of making proper allowance for the Gulf Stream, and the strong currents near the shoals, may cause considerable error in the reckoning. When approaching in thick weather, and uncertain of the position, care should be taken to stay in at least 20 fathoms, or preferably 30 fathoms. Diamond Shoal Light is the guide for clearing the shoals.

Diamond Shoal Light (35°09.2'N., 75°17.8'W.), 125 feet above the water, is shown from an orange tower on white deckhouse constructed on a four-legged metal structure, in 54 feet of water about 12.5 miles southeast of Cape Hatteras Light. The name DIAMOND is displayed in white letters on all four sides of the structure, and the tower legs are floodlighted. A fog signal and radiobeacon are at the light. **Storm warning signals are displayed daytime only.**

The submerged wreckage of the Civil War Ironclad **MONITOR,** about 10.4 miles south-southwest of Diamond Shoal Light, has been designated a Marine Sanctuary by the Secretary of Commerce. The sanctuary, administered by the Administrator, NOAA, Department of Commerce, is about 1 mile in diameter centered in 35°00'23"N., 75°24'22"W. Interim regulations state that: except as may be permitted by the Administrator, no person subject to the jurisdiction of the United States shall conduct, nor cause to be conducted, any of the following activities in the sanctuary:

(a) bottom anchoring;

(b) any type of subsurface salvage or recovery operation;

(c) any type of diving, whether by an individual or by a submersible;

(d) lowering below the surface of the water any grappling, suction, conveyor, dredging or wrecking device;

(e) detonation below the surface of the water of any explosive or explosive mechanism;

(f) seabed drilling or coring;

(g) lowering, laying, positioning or raising any type of seabed cable or cable-laying device;

(h) trawling; or

(i) discharging waste material into the water.

Permits for any of the above-mentioned activities for research related to the MONITOR or in connection with an air or marine casualty or the avoidance of same may be had by making application in writing to Administrator, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C. 20230.

Complete interim regulations covering the MONITOR Marine Sanctuary can be found in the Code of Federal Regulations, Title 15, Chapter IX, Part 924. These regulations were published in the Federal Register on February 5, 1975.

From Cape Hatteras to Cape Lookout the coast trends generally southwestward for 64 miles and is broken by several inlets. For 6 miles from Cape Hatteras it is thickly wooded near the beach, and between the woods and the beach is a range of

sand dunes 10 to 40 feet high. For the remainder of the distance the coast is a narrow barrier beach with numerous sand dunes. The coast is fairly bold, and depths of 4 to 7 fathoms will be found within 0.5 mile offshore, except off Hatteras Inlet, where shoals extend out 1.2 miles, and off Ocracoke Inlet, where they make out 1.6 miles.

Hatteras Inlet, 11 miles westward of Cape Hatteras Light, is entered over a shifting bar which is subject to continual change; local knowledge is recommended. The approach is marked by a lighted bell buoy; buoys marking the channel over the bar are not charted because they are frequently shifted in position. An 80-foot lookout tower on the east side of the inlet is a conspicuous mark. A green water tower about 2.6 miles east-northeastward of the tower is prominent.

Hatteras, a town 3 miles northeast of Hatteras Inlet, has several stores, a hotel, several motels, and restaurants. A Coast Guard station is on **Austin Creek,** 0.8 mile southwest of the town. A radiobeacon is at the station. **Storm warning signals are displayed.** (See chart.) There is a **contract** physician's office of the U.S. Public Health Service in the town. (See appendix for address.) There are several small wharves in the basin at Hatteras where gasoline, diesel fuel, water, and limited small-craft repairs can be obtained. Extensive repairs can be made at Wanchese.

A dredged channel in **Long Slue** leads from Hatteras Inlet gorge to Rollinson Channel in the vicinity of the basin entrance at Hatteras. In June 1974, the controlling depth was 10 feet. The channel is marked by lights and buoys. A privately maintained side channel leading into Austin Creek, in 1972, had a reported depth of 3½ feet to the Coast Guard pier and the ferry landing. The creek channel is marked by two lights.

Rollinson Channel, the approach to Hatteras from Pamlico Sound, is discussed later in this chapter.

A small ferry carries vehicles and passengers across Hatteras Inlet from Austin Creek to Ocracoke Island.

Tides.-The mean range of tide is 2 feet on the bar. In the channels the height of the water depends upon the direction and force of the wind. Daily predictions are given in the Tide Tables.

Currents.-The tidal currents in the channel through the inlet are influenced by winds and attain velocities of 2 knots. (For predicted times and velocities see the Tidal Current Tables.)

Other channels in Pamlico Sound are described in another part of this chapter.

Chart 11550 (419).-Ocracoke Inlet, 27 miles west-southwest of Cape Hatteras Light (chart 11555 (1232)), is entered over a shifting bar between the southern end of Ocracoke Island and the northern end of Portsmouth Island; the bar is subject to frequent changes. A lighted bell buoy marks the approach. Other buoys marking the inlet are not charted, because they are frequently shifted in position; local knowledge is advised.

Ocracoke Light (35°06.5'N., 75°59.2'W.), 75 feet above the water, is shown from a white tower near a clump of woods on the western part of Ocracoke Island and about 3 miles northeastward of Ocracoke Inlet. A Coast Guard station is 0.4 mile north of the light. **Storm warning signals are displayed.** (See chart.)

Several channels or sloughs lead from Ocracoke Inlet through the shoals to deep water in Pamlico Sound. **Teaches Hole Channel** follows the western side of Ocracoke Island and connects with Silver Lake through a dredged channel at Ocracoke. It also joins **Big Foot Slough Channel** northwest of Ocracoke which leads to Pamlico Sound. In April 1973, the controlling depth in the entrance channel to Silver Lake was 11 feet. Teaches Hole Channel is subject to frequent changes; buoys are frequently shifted in position. In April 1974, the controlling depth in Big Foot Slough Channel was 12 feet. Strong currents have been experienced in these channels; the buoys, lights, and daybeacons must be followed closely.

A swash channel, marked by a light and daybeacons, connects Big Foot Slough Channel with **Nine Foot Shoal Channel,** which leads off in a northwesterly direction. The controlling depth is about 5 feet through the swash channel to Pamlico Sound. Some local vessels use this channel as a short cut, but Big Foot Slough Channel is the recommended channel.

There are other unmarked shallow channels leading from Ocracoke Inlet to Pamlico Sound, but they should not be used without local knowledge because of the shifting shoals.

The town of **Ocracoke,** 3.5 miles inside the inlet, is frequented by numerous fishing vessels. Supplies in limited quantities are available. Gasoline, diesel fuel, water, electricity, and ice may be obtained at the piers.

A toll ferry transports passengers and autos daily from Ocracoke to a ferry landing on the north side of Cedar Island, about 12 miles by road north of Atlantic on the mainland, and a mail boat runs to Portsmouth 3 days a week. There are several motels and restaurants in the village. There are numerous points of interest on the island, and the National Park Service has a museum at the village and also maintains camp sites for tourists. Facilities for repairing boats are limited.

Silver Lake, a circular basin at Ocracoke, affords good anchorage in depths of 12 feet, and has several wharves extending from the shore to depths of 10 or more feet. A small marine railway on the west shore of Silver Lake can handle boats up to 50 feet for hull repairs only.

Portsmouth is a small town on the west shore of Ocracoke Inlet. A spire and a cupola here are prominent landmarks. The inactive Coast Guard Station, the largest building, is near the inlet.

Tides.-The mean range of tide is 1.9 feet over the bar at Ocracoke Inlet and 1 foot in Silver Lake. In the channels, the height of the water depends upon the direction and force of the wind. Daily predictions are given in the Tide Tables.

Currents.-The currents in the inlet and connecting channels are influenced by the winds. The ebb current usually has a greater velocity than the flood. Velocities up to 4 knots have been observed. Current predictions for several locations in the channels may be obtained from the Tidal Current Tables.

Drum Inlet (see chart 11545 (420)), 17 miles southwestward of Ocracoke Inlet, is an opening in the barrier beach leading to deep water in Core Sound. The channel is constantly shifting and should be used only with local knowledge. In 1975, the channel had shoaled to 2 feet, navigational aids were removed, and maintenance dredging was suspended.

Chart 11544 (1233).-Cape Lookout is the extremity of a long and very narrow sand beach projecting into the sea where the coast angles sharply westward. **Cape Lookout Light** (34°37.3'N., 76°31.5'W.), 156 feet above the water, is shown from a black and white diagonally checkered tower on the north point of the cape. A radiobeacon is about 1.5 miles south-southwestward of the light, and a Coast Guard station is 0.2 mile north of the radiobeacon.

Cape Lookout Shoals extend about 9 miles south-southeastward from the cape where they are marked by a lighted whistle buoy. Their greatest width is about 2 miles, and depths over the shoals range from 2 to 18 feet. **Lookout Breakers** is the local name for the ridge, covered 2 feet, about 4 miles out on the shoals south of the cape. Between Lookout Breakers and the cape are several other spots which break heavily.

Outside the shoals proper are two irregular shoals with depths of 28 feet over them, and a spot cleared to 39 feet. These can be avoided by passing south of the lighted whistle buoy about 20 miles south-southeastward of the cape. In thick weather a vessel should stay in 14 fathoms or more if uncertain of its position. A number of wrecks with varying depths over them are in the vicinity of the shoals; some are marked.

Chart 11545 (420).-Lookout Bight, on the west side of Cape Lookout, affords good anchorage for large vessels, except with winds from south through west to northwest. This harbor of refuge is protected by a rubblestone breakwater awash at low water and hardly visible when a heavy sea is running; its outer end is marked by a lighted buoy about 200 yards northwestward of its seaward end. Mariners should give it a wide berth in bad weather.

Good anchorage, with ample swinging room, may be had northeast of the breakwater in 30 to 35 feet, soft mud bottom. This anchorage is not free from swell, however, and small vessels at anchor may be uneasy if the seas are high. Large oceangoing vessels usually anchor north or northwest of the breakwater in 39 to 45 feet, soft sand and mud bottom.

Good anchorage for small vessels can be had in the inner bight south of **Wreck Point** in 14 feet, good holding ground of soft mud. Prevailing swell from the southwest is effectively excluded, but the surrounding terrain is too low to greatly restrain the force of wind. A severe blow from the northerly direction may cause a vessel to drag, but most boats drop an extra anchor if the wind reaches gale force from any direction.

There is a marina on the southeast shore of the bight where gasoline, water, ice, and some provisions may be obtained. There are restrooms and a snack bar at the head of the pier, which has 2 feet of water alongside.

A Federal project provides for a channel 7 feet deep from deep water in Lookout Bight through **Barden Inlet** and **Lighthouse Bay** to deep water in Back Sound. The channel is very unstable and has a tendency to fill. In July-September 1974, the midchannel controlling depth was 4 feet. The channel is well marked; however, the uncharted buoys and daybeacons through Barden Inlet are frequently shifted in position to mark the best water. Local knowledge or radio check with the Coast Guard station at Cape Lookout is advised.

The channels in Back Sound and Core Sound are described in another section.

INLAND WATERS

Boundary lines of inland waters.-There are no specific lines established for the inland waters covered in the remainder of this chapter. The general rules for inland waters apply. (See **82.2**, chapter 2.

Charts 12207 (1227), 12204 (1229), 12205 (129-SC).-Currituck Sound is a narrow and shoal body of water which extends for 25 miles in a north-south direction behind the barrier beach near Currituck Beach Light. The southern part of the sound is navigable for craft drawing 4 or 5 feet to the junction with Albemarle Sound, but navigation among the extensive shoals depends on local knowledge of the channels and on the level of the water. The northern part of the sound is practically unnavigable due to dense grass. There are no periodic tides in Currituck Sound; the water level depends upon the force and direction of the winds.

Charts 12207 (1227), 12205 (129-SC).-Back Bay and its connections with Currituck Sound extends a little over 10 miles northward from the northeastern end of the sound. This shoal bay is navigable only for small boats. Northward of Back Bay are shallow **Shipps Bay** and **North Bay.** Facilities with

small-boat launching ramps, and some with gasoline, water, ice, and bait and tackle, are along the western shores of Back, Shipps, and North Bays.

North Landing River extends in a north-northwesterly direction from the north end of Currituck Sound. The river is a part of the Intracoastal Waterway and is described in chapter 12.

Naval aircraft bombardment **target areas** are in North Landing River off Troublesome Point, and in Currituck Sound east of Bell Point; limits and regulations are given in **204.54 (a)(1) and (2), and (d)(1) and (4),** chapter 2.

Chart 12204 (1229).-Several landings are on the east shore of **Whale Head Bay,** just southward of Currituck Beach Light (36°22.6'N., 75°49.8'W.).

The landing at **Poplar Branch,** on the western shore of Currituck Sound, about 6 miles south-southwestward of Currituck Beach Light, is frequented by local fishermen and duck hunters. In 1968, depths of 2 feet were reported in the approach to the pier and 1 foot alongside. In 1963, craft drawing 2 feet could pass through the channel to **Gaffy Landing.** about 2 miles south of Poplar Branch.

Piper Hill, on the outer beach, about 4 miles east of Poplar Branch, is approached through **Lone Oak Channel** and **Beasley Bay.** Lights mark the channel. In 1963, a draft of 2 feet could be carried through the channel, but local knowledge is required to make the crossing of Poyner Bar. Dense grass covers the whole area.

Wright Memorial (U.S. Route 158) Highway Bridge over the south end of Currituck Sound between **Sampson Point** and the outer beach, has a 40-foot fixed span over the navigation channel with a clearance of 35 feet. An overhead power cable, with a clearance of 55 feet at the center of the channel, is about 100 yards northward of and parallel to the bridge.

Charts 12205 (129-SC), 12206 (829-SC), 11553 (831-SC), 12204 (1229).-Albemarle Sound is about 45 miles long in an east-west direction, and in width ranges from 11 miles near its eastern end to 3 miles about 10 miles from the western end. The sound has good navigable depths for any vessel able to pass through the canals and, with its numerous tributaries, forms the approach to many towns and landings.

There are depths of 10 to 18 feet along the routes from North River and Pasquotank River to Croatan Sound and Alligator River, and less water farther eastward. Fish stakes and nets, extending long distances from shore are often found on the shoals, especially at the northern entrance to Croatan Sound. The shores of Albemarle Sound are low and generally wooded; there are no prominent natural features.

Naval aircraft bombardment **target areas** are on both sides of Albemarle Sound between Alligator River and the first bridge to the westward. (See **204.54 (b), (d) (2) and (4),** chapter 2, for limits and regulations.)

The eastern end of Albemarle Sound, which is separated from the Atlantic Ocean by the barrier beach about 15 miles north of Bodie Island Light, is connected northward with Currituck Sound and southward with Croatan and Roanoke Sounds, and by the latter sounds with Pamlico Sound.

Westward of Laurel Point, about 33 miles from the east end of Albemarle Sound, the water is usually fresh or slightly brackish. The rise and fall of the water level depends on the direction of the winds.

Charts 12204 (1229), 12205 (129-SC),-Kitty Hawk Bay, with depths of about 3 to 8 feet, is at the east end of Albemarle Sound. Daybeacons mark the best water into the bay. **Kitty Hawk** is a small town on the north side of the bay. There are several private landings along its shores. A public marina is at **Avalon Beach** at the southeastern end of the bay; berths, electricity, water, ice, and a launching ramp are available.

North River, on the north side of Albemarle Sound near the eastern end, is a part of the Intracoastal Waterway and is described in chapter 12.

Chart 12206 (829-SC).-Pasquotank River Entrance Light (36°09.4'N., 75°58.7'W.), 23 feet above the water and shown from a small white house on piles with a black and white checkered diamond daymark, marks the entrance to **Pasquotank River.** A light is about 2.2 miles westward of the entrance light. The river, entered between **Wade Point** on the west and Camden Point on the east, and Elizabeth City are described in connection with the Dismal Swamp Route of the Intracoastal Waterway, chapter 12.

Chart 12205 (129-SC).-Flatty Creek, about 7.5 miles westward of Pasquotank River Entrance Light (36°09.4'N., 75°58.7'W.), is shoal and little used; depths over the bar, in 1963, were 3 feet and 3 to 5 feet inside for a distance of 3.5 miles. A small-craft facility is on the east side of the entrance to the creek. Berths, electricity, gasoline, water, ice, and a launching ramp are available.

Little River is on the north side of Albemarle Sound and 4 miles westward of Flatty Creek. The channel at the entrance is about 0.3 mile wide between shoals, and is marked by a daybeacon. The river has a general northwesterly trend to the village of **Nixonton,** which is on the east bank 7 miles above the entrance. There are no facilities at the village. In 1963, 7 feet was the deepest draft that could be taken to the village. Spits, with little water over them and generally steep-to, make out some distance in places from the shores, especially off the points. The channel in the upper reaches of the river is well marked by the outer ends of the

fishweir stakes which make out from shore. Gasoline and limited supplies are available to sport fishermen in **Hall Creek,** about 1.5 miles above Nixonton.

Perquimans River, on the north side of Albemarle Sound, about 4 miles westward of Little River, has its entrance between **Harvey Point** on the west and **Reed Point** on the east. A light is about 1.2 miles southward of Reed Point, and a light is close eastward of Harvey Point. A depth of about 9 feet can be carried to Hertford, about 11.5 miles above the entrance, thence about 7 feet for about 1 mile to the Norfolk Southern railroad bridge.

Two other bridges cross Perquimans River. U.S. Route 17 bypass highway bridge, between **Ferry Point** and **Crow Point,** about 10.5 miles above the entrance, has a fixed span with a clearance of 33 feet, and U.S. Route 17 highway swing bridge, about 0.6 mile above and crossing the narrow part of the river at Hertford, has a clearance of 7 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

Obstructions have been reported near midriver about 0.5 mile and 1 mile below the highway fixed bridge.

Hertford, on the southwest bank of Perquimans River, has rail connections with the Norfolk Southern Railway and highway connections with U.S. Route 17 to Edenton and Elizabeth. Oil is barged into Hertford to an oil pier on the south side of the river just above the highway swing bridge. Several marinas are on the north side of the river between the two highway bridges. Berths, gasoline, diesel fuel, water, ice, limited marine supplies, and boat ramps are available. The river water is fresh at Hertford.

Above Hertford the river is narrow and crooked, but has fairly good depths for about 8 miles to a point near **Goodwin Creek.** Navigation is restricted to very small boats, about a mile above the highway swing bridge, by the Norfolk Southern railroad bridge, which has a 22-foot fixed span with a clearance of 3 feet.

Yeopim River, 6 miles west of Perquimans River, is shoal and unimportant. A shoal area, marked at its southeastern extremity by a daybeacon, extends from the entrance. Stumps and other obstructions, the remains of former **Batts Island,** are near the center of the shoal. This area should be avoided. In crossing the shoal, mariners should leave the daybeacon to the eastward and slightly favor **Drummond Point,** the southern entrance point of Yeopim River. Local knowledge is advised.

A marina at **Snug Harbor,** on the north side of the entrance, has berths, electricity, water, ice, limited marine supplies, and a launching ramp.

Six miles southwestward from Drummond Point, State Routes 32-37 highway bridge crosses Albemarle Sound from **Sandy Point** to the south shore. The swing span, near the middle of the bridge, has a clearance of 14 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.) The 23-foot fixed spans have a clearance of 14 feet. Four miles westward of the highway bridge, the Norfolk Southern railway trestle crosses the sound. About 1.5 miles from the northern end of the bridge is a bascule span with a clearance of 6 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.) Five 35-foot fixed girder spans, at intervals of about 0.5 mile, have clearances of 8 feet. The overhead power cable close eastward of the bridge has a clearance of 93 feet at the drawspan and minimum clearances of 43 feet elsewhere. A fog signal is sounded at the bridge.

Edenton Bay is on the north side of Albemarle Sound just westward of the railroad trestle which crosses the sound. **Edenton,** a town at the head of the small bay, has rail and highway communications with Norfolk and the south. Lumber is shipped by rail, truck, and by barge. The main industries are peanuts, lumber, veneer, inks, textiles, plywood, and boatbuilding. The river water is fresh. A **contract physician's office** of the U.S. Public Health Service is in the town. (See appendix for address.) warning signals are displayed. (See chart.)

A large water tank in the town is the most prominent object from the sound. Also prominent is a radio tower near the city wharf.

A dredged channel leads from deep water in Albemarle Sound to the head of the bay where it separates into dredged reaches leading in northwesterly and northeasterly directions along the town waterfront. The controlling depths, in June 1972, were 11 feet in the entrance channel, thence 11 feet in the eastern portion of the northwestern reach, and 4 feet in the remainder of the northwestern reach and in the northeasterly reach. The channel is well marked by lights and daybeacons.

The inner anchorage, close eastward of the channel entrance, has a depth of 9 feet, but is small. The larger anchorage is on the western side of the entrance. Numerous fish stakes, some of which are covered at low water, are reported inside the 12-foot contour on the west side of the entrance to Edenton Bay from Reedy Point eastward.

The city wharf, which has a light, is at the head of the entrance channel. In 1969, depths of 9 feet were reported alongside the west bulkhead. A fish wharf and an oil wharf are close westward of the city wharf; depths of 10 feet were reported alongside in 1969.

Pembroke Creek is a small nontidal stream flowing easterly into the head of Edenton Bay. U.S. Route 17 highway bridge, 0.6 mile above the mouth of the creek, has a 20-foot fixed span with a clearance of 5 feet. With local knowledge a draft of 5 feet can be carried to the bridge. At a marina on the northeast bank of the creek, just below the bridge, berthage, gasoline, water, diesel fuel, ice,

and some marine supplies can be obtained. Engine repairs are made at the marina, and there is a small-boat launching ramp. About 1 mile above the bridge is a U.S. Fish Hatchery.

Chowan River empties into the western end of Albemarle Sound from northward, and with its tributaries forms one of the largest rivers in North Carolina. In 1963, a controlling depth of 15 feet was available to Winton about 32 miles above the mouth. About 11 feet is available to the confluence of Blackwater and Nottoway Rivers, 45 miles above the mouth. For about 17 miles above its mouth, Chowan River has an average width of 1.5 miles. Snags, many of which are underwater, are generally found on the shoals in this part of the river; the worst place, known as **Stumpy Reach,** is between Colerain Landing and **Bennetts Creek,** a distance of about 6 miles. The channel must be followed closely passing through this reach.

Chowan River is marked by lights and daybeacons to a point about a mile below Winton.

Traffic on the river is mainly in pulpwood barges, and there is some commercial fishing. Gasoline, limited supplies, and launching ramps are available for small craft at various marinas along the river as far as Winton.

Salmon Creek is a small stream which flows easterly into the west side of Chowan River just above the mouth. The entrance to the creek is a good harbor for boats of drafts up to 6 feet. **Avoca** is a village on the south bank about a mile above the entrance. In 1963, the controlling depth was 7 feet to Avoca, thence 5 feet for another 0.5 mile.

The highway bridge between Emperor Landing and Edenhouse Point, about 3 miles above the mouth of Chowan River, has a swing span with a clearance of 4 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

Gasoline, limited supplies, and a launching ramp are available at a marina in **Rockyhock Creek** on the east bank of the river about 6 miles above the mouth. Depths in the approaches and alongside are reported to be 4 feet.

Colerain Landing, on the west bank of the Chowan River, 12 miles above the entrance, is the site of a large herring factory. Just above it is an oil dock. The village of **Colerain** is on a hill 0.5 mile inland.

A marina at **Cannon Ferry** on the east bank of the river about 17.5 miles above the mouth of the river has gasoline (in cans), limited supplies, and a launching ramp.

Gasoline and a launching ramp are available at a marina at **Harrellsville** on the south bank of the river about 20 miles above the mouth.

Tunis, a landing on the south bank of Chowan River and east of the Seaboard Coast Line Railroad bridge, is 30 miles above the mouth. The railroad bridge has a hand-operated swing span with a clearance of 5 feet. (See **117.240,** chapter 2, for drawbridge operations and opening signals.) An overhead power cable with a clearance of 74 feet crosses the river about 0.4 mile eastward of the bridge. Berthage, electricity, gasoline, limited supplies, and launching ramps are available at two marinas on the west side of Catherine Creek just below the railroad bridge.

Winton is a small town on the west bank of the river 32 miles above the mouth. A marina is east of the highway bridge on the west bank of the river. An overhead power cable with a clearance of 74 feet crosses the river about 0.4 mile eastward of the bridge. Berthage, electricity, gasoline, limited supplies, and a launching ramp are available. Hull and engine repairs can be made. U.S. Route 13 highway bridge at Winton has a fixed span with a clearance of 35 feet. A small wharf is above the bridge, and another is below the bridge on the south bank and eastward of a ramp used by barges for loading pulpwood.

Meherrin River joins the Chowan River from westward 2.5 miles above Winton. About 0.4 mile above the mouth of the river is a cable ferry. **Murfreesboro** is a small town 10.5 miles above the mouth. U.S. Route 258 highway bridge here has a fixed span with a clearance of 24 feet. In 1965, the controlling depth was 10 feet to Murfreesboro; the turning basin here had a controlling depth of about 12 feet.

About 13 miles above Winton, Chowan River is formed by the confluence of **Blackwater River** and **Nottoway River** near the Virginia State line. In 1958, the controlling depth in Blackwater River was reported to be 7 feet to **Franklin,** Va., where there is a wharf. Small craft are able to reach **Burdette,** Va., 10.5 miles above Franklin. A highway bridge across Blackwater River, 8 miles above its mouth at South Quay, has a swing span with a clearance of 17 feet. (See **117.245 (a) through (e), (g) (3-b),** and **117.240,** chapter 2, for drawbridge regulations and opening signals.) Five other bridges cross the river between Franklin and Burdette; the fixed bridges have a minimum channel width of 22 feet and a minimum clearance of 12 feet. Navigation of Nottoway River is restricted by seven fixed bridges; the minimum channel width of the bridges is 13 feet and the clearance 7 feet.

Roanoke River rises in the Blue Ridge Mountains, west of Roanoke, Va., and flows southeasterly into **Batchelor Bay,** a shoal bight at the southwestern end of Albemarle Sound; about halfway it is joined by the **Dan River,** its principal tributary. There are a number of flood control and power dams on the rivers. The largest of these, about 17 miles below Clarksville, Va., forms the John H. Kerr Reservoir. The reservoir extends upstream about 48 miles on the Roanoke and about 30 miles on the Dan River. Another dam is at **Roanoke Rapids** about 120 miles from the mouth of the river.

In September 1972, the controlling depth was 8 feet at midchannel from Albemarle Sound to Plymouth; thence in September 1973, 10 feet at midchannel to Hamilton, 52 miles above the

mouth; thence in 1970, 8 feet at midchannel to Palmyra Landing, 67 miles above the mouth. The river is marked by lights and daybeacons to a mile below Plymouth.

A fixed highway bridge, which spans the Roanoke, Middle, and Cashie Rivers, crosses the Roanoke 2.5 miles above the mouth with a clearance of 50 feet.

Plymouth is an important town 6 miles above the mouth of Roanoke River. The town has good highway and rail connections. Freshwater, gasoline, diesel fuel, and provisions are available. There are several small wharves at Plymouth, with 14 to 18 feet of water alongside. A veneer factory is on the river front below the town, and 1 mile above the town is the large wharf of a pulpmill, which has 15 to 18 feet of water alongside.

Williamston is 26 miles above the mouth of the river. U.S. Routes 13 and 17 highway bridge at Williamston has a swing span with a clearance of 17 feet at low water and 4 feet at high water. (See **117.240**, chapter 2, for drawbridge regulations and opening signals.) Just below the bridge are a fertilizer plant and an oil dock. Several oil piers are above the bridge. Logs and oil comprise most of the shipping.

About 9 miles above Hamilton, a fixed bridge with a clearance of 14 feet crosses the river.

Cashie River flows southeasterly for about 50 miles to its intersection with the **Thorofare**, connecting Cashie and Roanoke Rivers; thence it flows northeasterly for about 6 miles and empties into Batchelor Bay. In June 1972, the controlling depth was 9½ feet to Windsor. Mariners are advised, however, that shoaling and many obstructions have been reported in Cashie River. A fixed highway bridge, which spans the Cashie, Middle, and Roanoke Rivers, crosses the Cashie River about 1 mile above Batchelor Bay and has a clearance of 16 feet. A cable ferry crosses the river about 6 miles above the mouth.

The Thorofare has several sharp bends, and at its junction with the Cashie River there are two small islands. Pass eastward of the islands. The head of navigation in Cashie River is the fixed highway bridge at **Windsor**. Gasoline and some supplies are available. An overhead power cable crossing the river about 0.5 mile below the bridge has a clearance of 55 feet.

Kendrick Creek is on the south side of Albemarle Sound just westward of the railroad trestle which crosses the sound. Several fishhouses and a launching ramp are here. The controlling depth, in 1963, was 7 feet from the entrance channel and for a distance of 4 miles up the creek, which is the head of navigation; the creek is obstructed by trees and logs above this point. The entrance is marked by a light and daybeacon.

The channel into Kendrick Creek is marked on either side by rows of piles. There are stumps in places on the shoals at the mouth of the creek. The Norfolk Southern Railway bridge, just above the mouth, has a swing span with a channel width of 32 feet and a clearance of 3 feet. the bridge is kept in a closed position. (See **117.245 (a), (e), and (g) (2)**, chapter 2.) An overhead power cable just above the railroad bridge has a clearance of 47 feet. **Mackeys** is a small town 0.5 mile above the entrance. The highway bridge about 0.5 mile above Mackeys has a 34-foot fixed span with a clearance of 8 feet.

Bull Bay is on the south side of Albemarle Sound, about 13 miles eastward of Kendrick Creek. **Bull Creek** and **Deep Creek** empty into the western side of the bay. A channel with a depth of 7 feet, in 1963, leads through the flats to the entrance of Bull and Deep Creeks. A small-craft facility with reported depths of 3½ feet alongside is at Mill Point on the eastern side of Bull Bay. Berthage, water, bottled gas, a boat ramp, and gasoline in cans are available.

Scuppernong River empties into the eastern end of Bull Bay from southeastward. Lights and daybeacons mark the channel from the bay to Columbia. In 1973, the controlling depths were 3 feet (8 feet with local knowledge) from the mouth to Columbia; thence 8 feet to Spruills Bridge; and thence in 1963, 4 feet to a turning basin at **Cherry**, about 16 miles above the mouth.

Columbia, a small town 4 miles above the mouth of the river, has two inactive oil docks and several landings. The landings have depths of 14 to 16 feet alongside, but are in poor condition and not able to accommodate more than one boat at a time. There are two marinas on the east side of the river, one close below and one close above the first highway bridge. Berthage, electricity, gasoline, diesel fuel (by truck), some supplies, and a launching ramp are available. Engine and electrical repairs can be made.

The first of two highway bridges at Columbia has a swing span with a channel width of 43 feet through the west draw and 38 feet through the east draw; clearance is 2 feet. The second highway bridge has a 35-foot fixed span with a clearance of 12 feet; the navigation span of this bridge is removable. An overhead power cable above the second bridge at Columbia has a clearance of 76 feet.

Cross Landing Bridge, 12 miles above the mouth of Scuppernong River, has a fixed span with a channel width of 32 feet and a clearance of 5 feet. **Spruills Bridge**, 15 miles above the mouth near **Creswell**, has a 32-foot removable span with a clearance of 6 feet. An overhead power cable at the bridge has a clearance of 25 feet. (See **117.245 (a) through (e), (g) (3)**, and **117.240**, chapter 2, for drawbridge regulations and opening signals for drawbridges over the Scuppernong River.)

Charts 12205 (129-SC), 11553 (831-SC).-Alligator River is on the south side of Albemarle Sound directly opposite Pasquotank River. For about 18 miles above the mouth (see

also chart 11548 (1231)), Alligator River has a southerly direction, is 2 to 3 miles wide, and has general depths of 8 to 11 feet. Above this, the river has a further length of about 24 miles, is narrow and crooked, but, in 1963, had depths of 8 feet or more to **Cherry Ridge Landing;** the upper part, however, is too narrow to turn in. Logs are towed from the river in barges and rafts.

The entrance to Alligator River is full of shoals, but the channel of the Intracoastal Waterway, described in chapter 12, has been dredged through the shoals and along the entire length of the wider part of the river.

On the eastern side of Alligator River and just above the mouth is the entrance to **East Lake** and **South Lake** (see also chart 12204 (1229)), which in 1963, had general depths of 6 to 8 feet. The village of **East Lake** is on the east side of Alligator River, 4 miles above the mouth. U.S. Route 64 highway bridge crossing the river at East Lake has a swing span with a clearance of 14 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

Little Alligator River empties into Alligator River from westward just inside the entrance. The narrow, crooked channel of Little Alligator River, in 1963, had a controlling depth of 5 feet for about 6 miles to a landing at the head of the river where gasoline, diesel fuel, water, and provisions are obtainable.

Charts 12204 (1229), 12205 (129-SC).-Croatan Sound, between Roanoke Island and the mainland, connects Albemarle and Pamlico Sounds. The controlling depth through the dredged channel was 7 feet in October 1973. The channel is well marked, but strangers should not attempt passage at night. Fish stakes are numerous in season.

Height of water in Croatan Sound depends entirely on the wind, which under exceptional conditions may lower or raise the level as much as 1.5 feet from normal; easterly winds lower the water and westerly winds raise it. Strong northerly or southerly winds produce currents which are especially marked when the wind shifts suddenly to the opposite direction.

There is a good harbor in **Peter Mashoes Creek,** westward of Croatan Light, but entrance is possible only for small craft. The fixed highway bridge (U.S. Routes 64 and 264) between **Redstone Point** on the mainland and **Weir Point** on Roanoke Island has a clearance of 45 feet.

Roanoke Sound and the towns on the east side of Roanoke Island are described in another section.

Charts 12204 (1229), 11548 (1231), 11555 (1232).-Pamlico Sound, the largest body of water in North Carolina, extends from Roanoke Island to Cedar Island. On the east it is separated from the Atlantic Ocean by a narrow barrier beach extending from Oregon Inlet to the southern end of Portsmouth Island. To the west it is joined by the Pamlico and Neuse Rivers, and to the south by Core Sound. It is about 65 miles long and has a maximum width of about 25 miles. Oregon, Hatteras, and Ocracoke Inlets pierce the narrow beach, giving access to the ocean, but all are blocked by inside bars with little water over them; they are described in another section.

The northern and western shores of Pamlico Sound are broken by numerous small bays and two large rivers, Pamlico River and Neuse River. General depths in the middle of the sound are 14 to 24 feet, but shoals extend miles from shore in many places. **Bluff Shoal** , northward of Ocracoke Inlet, has 7 to 12 feet over it and extends completely across the sound. It is marked by a light. A dangerous wreck, reported covered 4 feet, is close northward of the light.

In the exposed parts of the sound, strong winds from any direction raise a short, choppy sea uncomfortable to small craft and even dangerous to open boats; but protected anchorage for small craft can be found in the many bays along the northern shore, and along the southern shore in several sloughs which lead to sheltered berths in the lee of shoals. Middletown Anchorage and the anchorage in the bight formed by the hook of Royal Shoal can be made either day or night, with caution.

Tides at the inlets have a mean range of 2 feet. (For daily predictions see the Tide Tables.) In other parts of the sound the periodic tide is less than 0.5 foot. Easterly and westerly winds produce the greatest change in water level. Currents are negligible except in the vicinity of the inlets.

Chart 12204 (1229).-Stumpy Point Bay, on the west side of Pamlico Sound 10 miles from the south end of Roanoke Island and about 11 miles southwestward of Oregon Inlet, affords good anchorage in depths of about 3 to 4 feet. A dredged channel leads from Pamlico Sound to a turning basin at **Lake Worth,** the small town at the head of the bay. In June 1974, the controlling depth was 8 feet to and in the basin. The channel is well marked by lights and daybeacons. A fishhouse and landing at the upper end of the basin have gasoline and diesel fuel.

Stumpy Point, a small town on the east side of Stumpy Point Bay, has a fishhouse where gasoline, diesel fuel, and water are available; a marine railway can haul out vessels up to 50 feet for hull and engine repairs.

Long Shoal River, which flows southerly into Pamlico Sound about 8 miles southwestward of Stumpy Point Bay, is 1.5 miles wide at the mouth and is a good anchorage for vessels with drafts of 8 feet or less. Shoals with 1 to 2 feet over them on both sides of the entrance break up the sea from southward. The channel, in 1963, had a depth of 9 feet to an anchorage off **Pains Bay,** thence 9 feet for another mile, thence 5 feet for 2 miles. **Long**

Shoal, to the east of the entrance, and **Pingleton Shoal**, on the west, are marked by lights, and daybeacons mark the points of shoals in the entrance. With the aid of the chart, strangers should have little difficulty entering Long Shoal River in daytime. The **danger zone** of a naval ordnance test area is centered at a target on Long Shoal. (See **204.54 (c), (d) (3) and (4)**, chapter 2, for limits and regulations.)

Rodanthe is a town on the narrow barrier beach on the east side of Pamlico Sound 12 miles southward of Oregon Inlet and nearly opposite Stumpy Point Bay. **Chicamacomico Channel** is a dredged channel leading from the sound to the basin at Rodanthe. Two landings are in the basin in addition to the bulkheaded area. In 1973, the channel had a midchannel controlling depth of 6 feet; with the same depth available in the basin. The channel approach and channel are marked by lights.

Chart 11555 (1232).-Avon is a town on the barrier beach on the southeast side of Pamlico Sound 5.7 miles northward of Cape Hatteras Light (35°15.3'N., 75°31.2'W.). Shoal water extends about 3 miles from shore. A dredged channel leads from Pamlico Sound to the basin at Avon. In October 1973, the midchannel controlling depth was 4 feet with 6 feet in the basin. The channel is marked by lights and daybeacons. Gasoline and diesel fuel are available at a fishhouse landing in the basin.

Cape Channel, a natural opening in the shoal about 5 miles southwestward of Avon, was formerly part of a channel leading to Avon. It is now used by local fishermen passing from Pamlico Sound to anchorage north of Buxton. Local knowledge is advised. The channel is partially marked by a light and daybeacons.

Buxton is a small town about a mile north-northwest of Cape Hatteras Light. The town of **Frisco** is about 4 miles westward, on the southeast side of Pamlico Sound. There are no wharves at either place, and anything but light-draft vessels must anchor well offshore. Local fishermen usually approach Buxton through Cape Channel.

Rollinson Channel, about 12 miles southwestward of Avon, is a dredged channel leading from deep water in Pamlico Sound to the basin at Hatteras; it also joins with the channel leading through Long Slue to the Hatteras Inlet gorge. In April 1973, the midchannel controlling depth was 9 feet in the channel with 7 feet in the basin. The channel is well marked by lights. A light, off the end of **Oliver Reef**, is about 1.5 miles southwestward of the Pamlico Sound entrance to Rollinson Channel.

Hatteras Inlet, the channel through Long Slue, and the facilities at Hatteras were described previously in another section.

Far Creek (35°30.5'N., 75°58.0'W.) is on the northwest side of Pamlico Sound between **Pingleton Shoal** and **Gibbs Shoal**. A dredged channel leads from deep water in the sound to the basin at the town of **Engelhard**. In June 1974, the midchannel controlling depth was 4½ feet to the basin with 4½ feet in the basin. The channel is marked by lights and daybeacons.

An oil dock and several piers, with depths of 7 to 12 feet alongside, are on the south side of the basin just below U.S. Route 264 fixed highway bridge at Engelhard. There is barge traffic in oil, grain, and sand and gravel. Fishing vessels unload here, and seafood is shipped from the town by truck. Gasoline, diesel fuel, ice, and some marine supplies are available.

Middletown Anchorage, a broad open bight in the northwestern shore of Pamlico Sound just southward of Far Creek, has depths of 9 to 13 feet and is sheltered from eastward by Gibbs Shoal, which has 1 to 4 feet over it. There is no shelter from southeasterly or southerly winds. The anchorage is large and easy of access, and is used by tows and other vessels. **Middletown**, a short distance inland from the anchorage, is reached by light-draft boats by way of **Middletown Creek** (see chart 11548 (1231)). In 1963, the controlling depth over the bar and to the fixed bridge over the creek at Middletown was 3 feet. Vessels must pass south of the light on the southeast end of Gibbs Shoal in entering. Gasoline is obtainable in the town.

Caution should be used in approaching Middletown Anchorage at night, as the low marshy shore extends long distances from the woods in places and does not show well. In rough weather vessels with drafts less than 4 feet prefer to pass inside Gull Shoal Light when bound southwestward from Middletown Anchorage. They enter Wysocking Bay, pass westward of Gull Rocks, and thence eastward of the light 0.4 mile eastward of **Hog Island**.

Wysocking Bay, about 7.5 miles southwestward of Far Creek, indents the north shore of Pamlico Sound northwestward of Gull Shoal Light. It is a convenient anchorage for small craft drawing less than 6 feet when following the north shore of the sound. In 1963, the bay had depths of 7 to 5 feet from the entrance to its head. The entrance is obstructed by shoals. Daybeacons and lights mark the channel which leads northward of **Gull Shoal** and into the bay. **Gull Rocks**, on the south side of the entrance to the bay, are covered at ordinary water levels.

Nebraska Canal, with a depth of about 1½ feet in 1963, leads from the head of Wysocking Bay to **Nebraska**, a small town 2 miles inland where gasoline and supplies can be obtained (see chart 11548 (1231)). The lower part of the canal has filled in so that boats going to Nebraska must enter the old cut at the entrance light; local knowledge is required. A fixed bridge crosses the canal at Nebraska.

Chart 11548 (1231).-Bluff Point Shoal Light (35°19.3'N., 76°07.2'W.), 15 feet above the water and shown from a black square daymark, marks

the end of the shoal making eastward about 1.8 miles from **Bluff Point.** The point, low and marshy, separates **East Bluff Bay** and **West Bluff Bay,** two unimportant bights southwestward of Wysocking Bay. A daybeacon marks the 4-foot shoal 2 miles south-southeastward of Bluff Point. Extending southward from Bluff Point is a large area of shoal water, a tongue of which, called **Bluff Shoal,** extends completely across Pamlico Sound. Depths of Bluff Shoal are 7 to 12 feet. A light is near the middle of the shoal. Close northward of this light is a wreck reported covered 4 feet. A 12-foot slough through the shoal is about 1 mile northward of the light.

Juniper Bay, on the north side of Pamlico Sound 4 miles westward of Bluff Point, is about 1.5 miles wide at the entrance, but narrows gradually toward its head, to a narrow, crooked stream 3 miles above the entrance. Shoals extend from both shores. A light marks the shoal extending from the east point at the entrance. The middle of the bay had depths of 7 to 10 feet, in 1963. The bay has considerable traffic in small craft with drafts less than 5 feet; these make the passage to and from Belhaven by way of Swanquarter Narrows, Swanquarter Bay, and the canal to Deep Bay.

Great Island, on the west side of the approach to Juniper Bay, is low and grassy. A light marks the shoal extending southeast from the island. **Swanquarter Narrows,** between Great Island and the mainland to the north, is navigable for vessels of 6-foot draft. In 1963, the controlling depth in the narrows was 7 feet. A light marks the western entrance to the narrows.

Swanquarter Bay, northwestward of Great Island, is about 2 miles wide at the mouth, but narrows gradually toward its head 4 miles above. Depths in the bay, in 1963, were 6 to 12 feet to abreast the town of Swanquarter on the east side of the bay. Oyster beds are numerous in the bay. A water tank, painted green, near the northwest end of town in about 35°24.5'N., 76°19.9'W., is reported prominent from the bay.

A dredged channel leads from near the northern end of Swanquarter Bay to a basin at Swanquarter. In October 1973, the midchannel controlling depth was 6½ feet with 6½ feet in the basin. The natural channel leading through the bay to the dredged channel is marked by lights and daybeacons.

Swanquarter, the seat of Hyde County, is the center of trade for much of this area. Gasoline, diesel fuel, and water are available. The town has highway connections with U.S. Route 264.

A dredged channel leads through a land cut from the west side of Swanquarter Bay, about 3.5 miles above the entrance, and connects with Deep Bay to the westward. In October 1973, the controlling depth through the cut was 6 feet. A light is at each end of the cut.

Rose Bay, westward of Swanquarter Bay on the north side of the entrance to Pamlico River, is 1.8 miles wide at the entrance, but shoals extending from both sides restrict the entrance channel to a width of 0.6 mile. The channel, in 1963, had depths of 7 feet or more for 4 miles from the entrance. A light is at the entrance, and daybeacons and lights mark the best water in the bay. The bay is used mostly by local fishing boats.

Deep Bay, leading eastward from just inside the entrance of Rose Bay, is the approach to the dredged land cut to Swanquarter Bay. In 1963, the controlling depth was 7 feet to the land cut, thence in 1973, 6 feet at midchannel through the land cut. Local vessels use this route. A narrow channel, locally known as **The Blowout,** has been cut by private interests through the narrow neck of **Judith Island** from Deep Bay to **Deep Cove** on the Pamlico Sound side. The channel is not maintained, but is used considerably by local fishermen; strangers should not attempt it. In 1974, the reported controlling depth through The Blowout was 5 feet.

Charts 11548 (1231), 11554 (537).-Pamlico River and **Tar River** are the two names applied to the same river; it is known as the Pamlico below Washington, N.C., and as the Tar above that point. The river rises in Person County, flows in a general southeasterly direction, and empties into the northwestern part of Pamlico Sound. Pamlico River, in 1963, had depths of 12 feet or more for a distance of 20 miles above the mouth to a point just above Core Point.

Above this point a dredged channel leads to Washington, and, in Tar River, a natural channel leads for about 15 miles to the entrance to Hardee Creek, thence for another 3 miles to Greenville. In February 1970, the midchannel controlling depth in the dredged channel was 10 feet to a point about 0.4 mile above the second bridge at Washington; thence in Tar River, in 1956-1964, 6 feet to Hardee Creek, with 3½ feet in the entrance to Hardee Creek, and thence 2½ feet from Hardee Creek to Greenville. The channel is marked by lights to Washington, and by daybeacons to Greenville.

Test wells, privately marked by lights, are on both sides of the channel in Pamlico River and extend from a point about 16 miles above the mouth to just below Washington.

Pamlico River is nontidal; variations in the water level at Washington, due to prevailing winds, seldom exceed 2 feet. The extreme range of the flood or freshet stage for Tar River is 34 feet at Tarboro, 75 miles above the mouth. For the lower section, the extreme range due to winds is 8.5 feet.

Charts 11548 (1231), 11553 (831-SC).-Pungo River, which empties into Pamlico River from northward about 5 miles above the mouth, has a channel well marked by daybeacons and lights, and can be readily followed by a stranger for 15 miles. The river then narrows. The least channel depth, in 1963, was 8 feet to **Leechville,** a town 18 miles above the mouth. The U.S. Route 264 highway bridge at Leechville has a 30-foot fixed

span with a clearance of 7 feet. An overhead power cable on the north side of the bridge has a clearance of 35 feet. Tributaries to the Pungo River include several navigable creeks. The most important in order of ascension are Wright, Slade, Pungo, Pantego, and Wilkerson, which empty into the northeast end of the river. The route of the Intracoastal Waterway, described in chapter 12, follows Pungo River from Wilkerson Creek to and across Pamlico River.

Wright Creek empties into the west side of Pungo River 2 miles above the mouth and about 8 miles south of Belhaven. A dredged channel leads into the north prong of the creek from deep water in Pungo River to a turning basin 1.1 miles up the creek. In October 1973, the controlling depths in the channel and basin were 2½ feet. The channel is marked by lights and daybeacons.

A boatyard at **School House Landing**, on the south bank of the north prong, has a marine railway that can haul out craft up to 35 feet for hull repairs and storage. Berthage, gasoline, diesel fuel, water, ice, provisions, marine supplies, and a launching ramp are available.

Slade Creek, which empties into Pungo River from eastward about 4 miles above the mouth, in 1963, had depths of 8 feet or more for 2 miles from the mouth, and 7 feet for 2 miles farther. The creek is unmarked.

Pungo Creek (see also chart 11554 (537)) empties into Pungo River from westward about 8 miles above the mouth of the river and 1.5 miles southwestward of Belhaven. A highway bridge, 2.5 miles above the mouth of the creek, has a 32-foot fixed span with a clearance of 8 feet. The overhead power cable just north of the bridge has a clearance of 35 feet. In 1963, the creek had depths of 9 feet or more to the bridge and thence 7 feet for about 2 miles. A light and a daybeacon mark the entrance to the creek.

Pantego Creek (see also chart 11554 (537)) just northward of Pungo Creek, empties into Pungo River northward about 9 miles above the mouth of the river. Timber breakwaters, in fair condition, extend from both shores of the entrance. The outer ends of the breakwaters are marked by lights.

A dredged channel leads from Pungo River through the breakwaters and to the basin at Belhaven just below State Route 90 highway bridge. In 1973, the controlling depth to the basin was 8½ feet. Above the dredged channel, in 1963, there were depths of about 7 feet for 1 mile above the bridge, thence 4 feet to the highway bridge at the town of **Pantego**; lights and daybeacons mark the dredged channel. State Route 90 highway bridge at Belhaven has a 32-foot removable span with a clearance of 8 feet. An overhead power cable just west of the bridge has a clearance of 35 feet.

Belhaven, on the northeastern side of the entrance to Pantego Creek, has an excellent harbor for small craft. The town is connected with the interior by highway and railroad. Seafood, grain, and lumber are shipped from here. Marine supplies can be obtained in the town, and hotel accommodations are available.

Gasoline, diesel fuel, water, ice, berths, and marine supplies can be obtained at the small-craft facilities on the north side of the creek at Belhaven, just inside of the breakwater. One of the facilities has a marine railway that can handle craft up to 60 tons for engine and hull repairs. A launching ramp is also available.

Goose Creek, opposite the entrance to Pungo River, empties into Pamlico River from southward about 7 miles above the mouth of the river. The dredged channel of the Intracoastal Waterway crosses the shoals, which obstruct the mouth of the creek, and passes southward to **Upper Spring Creek** and the land cut which connects with Bay River.

Chart 11554 (537).-South Creek, about 11 miles above the entrance to Pamlico River, empties into the river from the southward. The deeper entrance is southward of **Indian Island** and the shoal extending westward from that island to **Hickory Point** (35°21.8′N., 76°41.9′W.), the north point at the entrance to the creek. In 1963, a draft of about 6 feet could be taken through the channel across the shoal west of Indian Light; a light and a daybeacon mark the best water. The creek has depths of 7 feet or more for 4 miles above Hickory Point. Above this point, a dredged channel leads to Aurora, and thence to Idalia, about 9 miles above Hickory Point. In 1963, a depth of 6 feet could be taken to Aurora, and thence about 4 feet to Idalia. The channel is marked by daybeacons as far as Aurora.

Aurora is a town on the west side of South Creek, about 7 miles above Hickory Point. An oil dock here is in ruins. State Route 33 highway bridge, with a 37-foot fixed span and a clearance of 5 feet, crosses the creek at Aurora. Small boats use the creek as far as **Idalia**, about 2 miles above Aurora.

Bond Creek and **Muddy Creek** share a common entrance close eastward of South Creek, about 1 mile southward of Hickory Point. The town of **South Creek**, about 0.5 mile above the entrance, is bordered on the west by Bond Creek, and on the east by Muddy Creek. The entrance is marked by daybeacons. A fish wharf in ruins and a crabmeat-packing house, are on the west and east sides of the town, respectively. In 1963, a depth of 6 feet could be taken in Bond Creek to the wharf in ruins, and 6 feet for another 1.7 miles. Gasoline and diesel fuel are available at the crabmeat-packing house pier on Muddy Creek.

North Creek empties into Pamlico River directly opposite South Creek. The channel had depths of 5 feet or more for about 1.5 miles in 1963, and is marked by a light and daybeacons, but its navigation should not be attempted by strangers. In East

Fork, the channel had a depth of 7 feet for 1.5 miles above the entrance.

A ferry, operated by the State Roads Commission, crosses Pamlico River about 15 miles above the mouth. The privately marked channels leading to the northern terminal in **Gaylord Bay**, about 3.5 miles westward of North Creek, and to the southern terminal about 3 miles westward of Hickory Point, had reported depths of 9 feet in 1973.

A privately dredged channel leads to a basin of a phosphate plant on the south side of Pamlico River, about 15.5 miles above the mouth and 4 miles westward of Hickory Point. The channel is privately marked by a light and buoys. In 1965-1974, the reported controlling depth was 12 feet. The structures at the plant are the most conspicuous objects in the area.

Durham Creek empties into Pamlico River from southward 17.5 miles above the mouth and 6.5 miles westward of Hickory Point. The creek, in 1963, had a depth of 4 feet to Bonnerton, 4 miles above the entrance. A fixed highway bridge with a clearance of 2 feet crosses the creek at Bonnerton. A daybeacon marks the entrance.

Bayview is a pleasure resort on the north bank of Pamlico River 6.5 miles northwestward of Hickory Point and about 2 miles eastward of the entrance to Bath Creek. Small tourist cabins are available, and a good secondary road connects with State Route 92 highway northward. The nearest rail connections are at Washington, about 20 miles distant by highway. Gasoline and some supplies are available at Bayview, and there is a small-boat launching ramp. All of the docks at Bayview are in ruins.

Bath Creek, opposite Durham Creek, flows southward into Pamlico River 8 miles northwestward of Hickory Point. In 1963, depths of 7 feet or more could be carried for 1.8 miles to the bridge at the town of Bath, thence 4 feet for about another 1.7 miles. The most difficult part of the channel to Bath is the entrance, where a shoal with grass showing extends halfway across from the west side and drops off abruptly. The channel is marked by lights and daybeacons to a point about 0.35 mile southward of the highway bridge. The outer edge of the shoal is marked by a light. Numerous fish traps are off the creek entrance during the fishing season from January through May.

The State Route 92 highway bridge at Bath has a 37-foot fixed span with a clearance of 13 feet. An overhead cable close northward of the bridge has a clearance of 60 feet. The bulkhead below the bridge has a depth of 6 feet alongside, and a small dock north of the bridge has 4 feet alongside. Gasoline and some supplies are available at Bath, and there is a small-boat launching ramp.

Pamlico River above Bath Creek is usually fresh.

Blounts Creek flows northward into **Blounts Bay**, which is on the south side of Pamlico River, about 25 miles above the mouth. A highway bridge, 0.2 mile above the entrance of the creek, has a 36-foot fixed span with a clearance of 15 feet. Overhead power and telephone cables immediately southward of the bridge have a reported clearance of 10 feet. The creek, in 1963, had depths of 5½ feet or more for about 1 mile above the bridge and 3 feet for an additional 2 miles.

Broad Creek, on the north side of Pamlico River opposite Blounts Bay, in 1963 had a controlling depth of 5 feet from the entrance to the **Washington Yacht and Country Club**, a distance of 1 mile, thence 4 feet for another 1.3 miles. The channel is marked by lights, daybeacons, and "no wake" markers. Gasoline, water, and electricity are available at the piers of the private club, which has 4 feet of water alongside. Just south of the yacht club is a pier with 4 feet alongside where only covered storage is available. An overhead power cable with a reported clearance of 30 feet crosses the creek about 0.3 mile northward of the yacht club.

Runyon Creek is on the north side of Pamlico River at Washington. U.S. Route 264 highway bridge and the Norfolk Southern railroad bridge crossing the creek just above the mouth have 18-foot fixed spans and a clearance of 4 feet. There is a marina where gasoline, diesel fuel, water, electricity, provisions, and some supplies may be obtained. A small marine railway can haul boats up to 30 feet for hull and engine repairs, and there is a small-boat launching ramp. In 1963, there was a depth of 4 feet from the improved channel to and alongside the pier at the marina.

Washington, 32 miles above the mouth of Pamlico River, is the seat of Beaufort County and an important business center with communications extending to nearly all points on Pamlico River and Pamlico Sound. The town has restaurants, hotels, and motels. Marine supplies are available.

Barge traffic in gasoline, oil, pulpwood, lumber, and grain constitutes the principal commerce at Washington.

Two swing bridges cross the river at Washington. The Norfolk Southern railroad bridge has a clearance of 7 feet, and Route 17 highway bridge, about 0.7 mile above, has a clearance of 6 feet. Drawbridge regulations and opening signals for the railroad bridge are given in **117.240**, chapter 2, and for the highway bridge in **117.240**, and **117.245 (a) through (e), and (g) (4)**, chapter 2. The overhead power cable close westward of the highway bridge has a clearance of 75 feet.

Storm warning signals are displayed. (See chart.)

A county hospital is at Washington.

Coast Guard.-The Marine Inspection Office at Wilmington, N.C., maintains a **documentation office** at the Post Office Building in Washington.

Most of the wharves and piers at Washington handle barge traffic. These privately operated facilities extend along the southwest waterfront of the town between the railroad and highway

bridges. A marina and a marine railway are also here. Gasoline, diesel fuel, water, ice, and marine supplies are available. The marine railway can handle craft up to 75 feet for minor hull and engine repairs. The city-owned bulkhead, about 750 feet long, is on the southwest waterfront about 0.3 mile southeastward of the highway bridge; depths of 5 feet are reported alongside. The bulkhead is restricted to pleasure craft not exceeding 50 feet in length or 20 feet in width. Craft drawing more than 5 feet are subject to damage due to the stone riprap which extends from the bottom of the bulkhead.

Washington has rail connections with the Seaboard Coast Line Railroad and the Norfolk Southern Railway, and highway connections with U.S. Routes 17 and 264.

A highway swing bridge with a clearance of 5 feet at extreme high water and 10 feet at low-water stage crosses the Tar River at **Grimesland,** about 7 miles above Washington. (See **117.240,** and **117.245 (a) through (e), and (g) (4),** chapter 2, for drawbridge regulations and opening signals.) An overhead power cable about 5 miles above Grimesland has a clearance of 77 feet.

Chart 11548 (1231).-Mouse Harbor, Big Porpoise Bay, and **Middle Bay** are small unmarked shallow bays on the east side of **Goose Creek Island** on the western side of Pamlico Sound between **Pamlico Point Light** (35°18.8′N., 76°27.3′W.) and Jones Bay. The light marks the south side of the entrance to Pamlico River, and is shown 40 feet above the water from a black and white daymark on piles. A fog signal is at the light. **Mouse Harbor Ditch** and **Leary Canal** are two small-boat passages which connect Mouse Harbor with Clark Creek on Pamlico River, and Big Porpoise Bay with Middle Bay. In 1969, it was reported that these passages were not being maintained, and were being used only by shallow-draft skiffs; local knowledge is advised. The three bays are frequented only by local fishermen.

Jones Bay is on the western side of Pamlico Sound about 7 miles southward of Pamlico Point Light and just northward of the entrances of Bay and Neuse Rivers. In 1963, the bay had depths of 7 feet or more for 4 miles above its mouth. The entrance is somewhat obstructed by shoals through which a marked channel leads into the bay. On the north side, near the head of the bay, is the town of **Hobucken.** Small craft bound for the town can land in the cove 0.8 mile above **Drum Creek,** which indents the north shore of the bay about 3.5 miles above the entrance.

Ditch Creek, on the opposite side of Jones Bay from Drum Creek, leads to an old canal through which small boats can be taken at high water to Bay River. Hobucken is discussed further in chapter 12 in connection with the Intracoastal Waterway which crosses the head of Jones Bay and links it with Goose Creek on the north and Bay River on the south. A Coast Guard station fronts the Intracoastal Waterway at Hobucken.

The approach to Jones Bay from eastward is over or around **Brant Island Shoal,** which extends for 10 miles in a southeasterly direction from the north side of the entrance to the bay. For 6 miles southeastward to Brant Island Slue Light 1, the shoal has depths of 2 to 3 feet; between that light and Brant Island Shoal Light at the outer end are depths of 5 to 8 feet.

The **danger zone** of a bombing and rocket firing area is in Pamlico Sound near Brant Island; limits and regulations are given in **204.55 (a) and (c),** chapter 2.

Charts 11548 (1231), 11552 (538).-Bay River about 10 miles southward of Pamlico Point Light (35°18.8′N., 76°27.3′W.), empties into the western part of Pamlico Sound between Jones Bay and the mouth of Neuse River. The natural channel, from the entrance to off the mouth of Trent Creek about 12 miles above the entrance, is marked by lights and daybeacons and, in 1963, had depths of 9 feet or more. It can be followed readily. Above this point, a dredged channel leads to Bayboro, which is practically the head of navigation. In 1963, the controlling depth was 9 feet. The dredged channel is marked by daybeacons to Stonewall. An overhead power cable crossing the river about 0.3 mile below Bayboro has a clearance of 65 feet.

The route of the Intracoastal Waterway is along Bay River for 4 miles, thence northward through Gale Creek.

Vandemere is a town on the north side of Bay River 8 miles above the mouth. Gasoline, diesel fuel, and some supplies are available. There are two marine railways that can haul out vessels up to 60 feet in length for hull repairs and there is a machine shop with engine repair service. In 1963, the controlling depth was 9 feet to Vandemere, and there was 10 feet of water alongside the piers and 4 feet at end of railways.

Stonewall is a small town on the south side of the river 14 miles above the mouth; most of its docks are in ruins.

Bayboro, 15 miles above the mouth of the river, has docks in fair condition on the east side of the creek leading to Mill Pond. Depths at the oil and fish docks are 8 to 9 feet. Gasoline, ice, and some supplies are obtainable here. Lumber and pulpwood are shipped out by Norfolk Southern Railway. Navigation above Bayboro is restricted by fixed bridges at the town. A **contract physician's office** of the U.S. Public Health Service is at Bayboro. (See appendix for address.)

Neuse River rises in the northern part of North Carolina and flows for about 250 miles in a general east-southeasterly direction into the western end of Pamlico Sound. Its mouth is about 5 miles wide, but is reduced to a navigable width of about 2 miles by shoals which extend from either side. The river has natural depths of 13 feet or more for 25 miles above its mouth.

Above this point, Neuse River has been improved by dredging. In November 1974, the controlling depths were 8½ feet at midchannel to the junction with the channel leading along New Bern's south waterfront on Trent River, thence 8 feet for a midwidth of 100 feet along the east side of the city to the Norfolk Southern railroad bridge, thence, in December 1974, 10 feet at midchannel to about 1.3 miles above the railroad bridge, and thence, 4 feet for 23 miles above the city. The channel is marked to about 4 miles above the city. Strangers should not attempt to navigate the river above that point.

Tides.-Neuse River has practically no tide, the variation in water level being due principally to winds. Easterly winds cause high water and westerly winds low water, the maximum variations with heavy gales amounting to about 2 feet above or below the normal in the lower part of the river, and about 3 or 4 feet at New Bern. Freshets of 10 to 20 feet occur in the upper reaches of the river above New Bern, but have little effect at or below the town.

Broad Creek empties into the north side of Neuse River about 4 miles above the mouth. In 1963, the controlling depth was 7 feet for a distance of 2.5 miles, thence 5 feet to Whortonsville. A light marks the entrance to the creek. **Pamlico** is a village on the south side of the creek, 3 miles above the entrance. **Whortonsville** is on the east side of the entrance to **Brown Creek** about 0.5 mile northeast of Pamlico, and on the opposite side of Broad Creek. Gasoline is available at the pier which has a depth of 5 feet alongside. Minor logging operations are conducted in Broad Creek. Overhead power cables crossing the mouth of Brown Creek and Broad Creek at Pamlico have a clearance of 40 feet.

South River flows into the south side of Neuse River about 8 miles above the mouth. The entrance is marked by daybeacons and a light. The channel had depths of 8 feet for about 6 miles above the entrance, thence 7 feet for another 1.5 miles, in 1963.

The **danger zones** of several bombing, rocket firing, and strafing areas are in Turnagain Bay and Rattan Bay, in Neuse River, and in Long Bay and West Bay in Pamlico Sound. (See **204.55 (b) and (c)**, chapter 2, for limits and regulations.)

Chart 11552 (538).-Garbacon Shoal extends halfway across Neuse River from the southern shore 10 miles above the mouth, leaving a clear width of about 0.8 mile between the 12-foot contours. The outer end of the shoal is marked by a light.

Oriental is a small town at the entrance to **Smith Creek** on the north bank of the Neuse River about 11 miles above the mouth. Fishing is the principal industry and seafood is trucked to the interior. The harbor is protected by a rubble-mound breakwater marked by a light off the end.

A dredged channel, marked by lights and daybeacons, leads from Neuse River to a basin at Oriental. In February 1970, the midchannel controlling depth to the basin was 8 feet, thence 8 feet in the basin. The harbor provides excellent anchorage for small craft.

Marinas, at the head and on the east side of the basin, have reported depths of 8 and 10 feet alongside, respectively; berthage, electricity, gasoline, diesel fuel, water, ice, and a launching ramp are available. A marine railway between the marinas can handle craft up to 60 feet for hull repairs. Limited amounts of marine supplies are available at Oriental.

A highway bridge 0.2 mile above the entrance to Smith Creek has a 36-foot fixed span with a clearance of 17 feet. In 1973, a fixed highway bridge with a design clearance of 45 feet was under construction immediately northwestward of the existing bridge; upon completion, it will replace the existing bridge. Overhead power and telephone cables with clearances of 27 feet cross the creek at **Blackwell Point.** An abandoned railroad bridge, in ruins, across **Morris Creek** about 1 mile above the highway bridge has a 11-foot fixed span with a clearance of 6 feet. **Greens Creek** joins Smith Creek at **Dewey Point** just above the highway bridge.

Adams Creek empties into the south side of Neuse River about 13 miles above the mouth. The creek is part of the Intracoastal Waterway and is described in chapter 12.

Clubfoot Creek flows into Neuse River from southward about 15 miles above the mouth. The approach is marked by a daybeacon and the entrance by a light. The channel southward of the light is narrow with shoals rising abruptly on both sides. Depths in the channel, in 1963, were 5 feet or more for 3 miles above the light.

Dawson Creek, on the north side of Neuse River about 14 miles above the mouth, is entered through a dredged channel, marked by daybeacons, that leads from the river to the mouth of the creek. In November 1973, the controlling depth was 6 feet. A highway bridge with a fixed 32-foot span and a clearance of 11 feet crosses the mouth of the creek at **Janeiro.**

A ferry crosses Neuse River about 18 miles above the mouth between Cherry Point and **Minnesott Beach.**

Hancock Creek is on the south side of Neuse River about 20 miles above the mouth. In 1963, a draft of 10 feet could be carried through the narrow entrance to the **Cherry Point Wharf** just inside by following the **256°** lighted range. The depth at the wharf was 12 feet. The lighted range, a light, and daybeacons mark the channel.

A **restricted area** at the Cherry Point Marine Corps Air Station, which includes Hancock and Slocum Creeks and their tributaries, is described in **207.164,** chapter 2.

Two radio towers and a water tank at the station are conspicuous.

Slocum Creek, on the south side of Neuse River 22 miles above the mouth, in 1963, had a controlling depth of 4 feet for 4 miles to the forks, and up the East Prong 0.1 mile to a foot bridge across the creek which obstructs passage for further navigation. A light and daybeacons mark the critical parts of the channel at the entrance to the creek. A highway bridge with a 12-foot fixed span and a clearance of 11 feet crosses 3 miles above the entrance. An overhead cable with a clearance of 39 feet crosses the creek just below the bridge.

Beard Creek is on the north side of Neuse River opposite Slocum Creek. The mouth of the creek is marked by a daybeacon. The controlling depth from the entrance to the highway bridge, 2.3 miles upstream, was 4 feet in 1963. The bridge has a fixed span and a clearance of about 4 feet. Good anchorage may be found off the eastern side of the entrance.

Goose Creek, on the northeast side of Neuse River 27 miles above the mouth, in 1963, had depths of 5 feet or more to **Wood Landing,** 3 miles above the entrance. **Upper Broad Creek,** on the northeast side of Neuse River 28 miles above the mouth, had depths of 5 feet or more, in 1963, to **Lees Landing** 4 miles above the entrance. Overhead power cables about 1.4 miles above the mouth and at the landing have clearances of 35 feet and 40 feet, respectively. The entrance is marked by daybeacons.

New Bern, a city on the west bank of Neuse River 34 miles above the mouth, is the seat of Craven County and an important center for this area. The city has many points of historical interest including Tryon Palace, an 18th century restoration. A county hospital is here, and there are numerous restaurants, hotels, and motels. Gasoline, diesel fuel, water, ice, marine supplies, and provisions are available.

Barge traffic in petroleum products, crushed rock, pulpwood, and chemicals constitutes the principal commerce at New Bern. In addition to vessel repairs, the city supports a considerable boat and barge building industry.

The rectangular lighted clock tower atop City Hall is visible for 10 miles downriver and is an excellent landmark. Vessels proceeding up the river to New Bern are advised to stay in the channel because of the numerous fish traps scattered indiscriminately throughout the unmarked areas. The river is slightly brackish except during freshets.

Weather.-New Bern's climate is influenced by both the Atlantic Ocean and Pamlico Sound, particularly in the winter. Winds blowing from a southerly or easterly direction have a moderating effect on temperatures.

The long hot summers begin in May when afternoon temperatures occasionally reach 90°F, and reach a peak in July when they average 90°F; they begin to fall off by the end of September. The influence of nearby waters can be seen in the fact that temperatures over 100°F are a rarity.

Rainfall averages more than 55 inches annually with July through September contributing most An average of 2 inches of snow falls at New Bern each winter.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Most of the wharves and piers at New Bern handle barge traffic. These privately operated facilities are on the south side of the city on Trent River, and on the east side on Neuse River.

There are two shipyards on the Trent River; the larger, just westward of the Atlantic and East Carolina Railway bridge, has five marine railways that can handle vessels up to 205 feet or 1,200 tons. The other just westward of U.S. Route 70 highway bridge, has two marine railways that can haul out vessels up to 150 feet. Major hull, engine, electrical, and electronic repairs can be made. Most of the work done is on vessels engaged in the Intracoastal Waterway trade.

A marina on the south side of Trent River just southwestward of the railroad bridge has three 100-foot-long piers with depths of 9 feet alongside. A marine railway here can handle craft up to 50 feet for hull and engine repairs. Berthage, electricity, gasoline, diesel fuel, water, dry storage, ice, and launching ramps are available.

New Bern is served by three railroads; the Norfolk Southern, the Seaboard Coast Line, and the Atlantic and East Carolina, which is a branch of the Southern Railway system. Highways connect with U.S. Routes 70 and 17, and State Route 304. The city is also served by a commercial airline.

U.S. Route 17 Highway bridge over Neuse River at New Bern has a swing span with a clearance of 13 feet. (See **117.240, and 117.352,** chapter 2, for drawbridge regulations and opening signals.) The Norfolk Southern Railway bridge, 0.9 mile above the highway bridge, has a swing span with a clearance of 0 feet at extreme high water and 2 feet at low water. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.) The overhead power cable at the railroad bridge has a clearance of 50 feet over the main channel.

Trent River empties into Neuse River on the south side of New Bern. A dredged channel leads westward from Neuse River along the waterfront on the south side of New Bern. In January 1974, the controlling depth was 7 feet at midchannel in the dredged section, thence depths of 6 feet to Pollocksville, and thence, in 1957, 3½ feet to Trenton, 33 miles above the mouth. The channel above New Bern is marked by lights and daybeacons for a distance of about 6.5 miles.

U.S. Route 70 highway swing bridge over Trent River at the mouth has a clearance of 13 feet. (See **117.240 and 117.353,** chapter 2, for drawbridge regulations and opening signals.) The Atlantic and East Carolina Railway bridge, about 0.2 mile westward of the highway bridge has a swing span with

a channel width of 43 feet and a clearance of 3 feet. (See **117.240**, chapter 2, for drawbridge regulations and opening signals.) Overhead power cables cross Trent River about 1.8, 4.8, 8.8, and 14 miles above its mouth; clearances are 65 feet, 48 feet, 55 feet, and 63 feet, respectively.

At **Pollocksville,** 15 miles above the mouth, the Seaboard Coast Line railroad bridge has a 40-foot lift span with a clearance of 2 feet down and 27 feet up. The bridge is kept in the closed position. (See **117.245 (g) (6),** chapter 2, for drawbridge regulations.) Just above the railroad bridge, U.S. Route 17 highway bridge has a 48-foot fixed span with a clearance of 5 feet.

A fixed highway bridge with a 32-foot span and a clearance of 2 feet at high water and 12 feet at low water crosses Trent River, about 6.5 miles above Pollocksville.

Brice Creek enters Trent River from the east about 1.7 miles above the mouth. The natural depths in the creek were 8 to 40 feet for 2.6 miles in 1963. A highway bridge 1 mile above the mouth has a 25-foot fixed channel span with a clearance of 5 feet.

Chart 11548 (1231).-West Bay is a large irregularly shaped body of water on the southwest side of Pamlico Sound west of Cedar Island and just southeastward of Neuse River entrance. The shores of the bay and its numerous branches are marshy, and it is of little importance other than for its oyster beds. In 1963, a depth of 8 feet could be taken into the three principal arms of the bay through narrow and devious channels. Lights and daybeacons mark the entrance to West Bay and the channel in **West Thorofare Bay,** the middle arm.

Hooked-shaped **Royal Shoal** extends northwestward from the vicinity of Ocracoke Inlet. The shoal is marked by four lights and a daybeacon. Tows and other vessels sometimes anchor inside the hook when the seas are too rough to make headway in the sound. The shoal, which bares in one place and elsewhere is covered 1 to 4 feet, breaks the seas so as to leave comparatively smooth water in the anchorage. Depths in the anchorage are 9 to 14 feet over good holding ground.

Charts 11550 (419), 11545 (420).-Core Sound extends southwesterly along and just inside the barrier beach from the south side of Pamlico Sound to Cape Lookout, a distance of about 27 miles; the width varies between 2 and 3 miles. The sound is mostly shoal, but an improved channel, well marked by lights, extends along its entire length. Behind Cape Lookout, Core Sound is joined by Back Sound and The Straits, both of which connect with Beaufort Harbor.

Channels.-The main route from Pamlico Sound to Beaufort Harbor is via a marked channel through Wainwright Slue, Core Sound, The Straits, and Taylor Creek. The alternate route to Beaufort Harbor is via a marked channel which leads southward along the east side of Harkers Island from a point just eastward of The Straits, thence southward of the island through Back Sound, thence along the westerly side of the island where it rejoins the main route. In July-September 1974, the controlling midchannel depths in the dredged sections were 4 feet in the main route and 3½ feet in the alternate route.

From The Straits, the main route to Beaufort Harbor leads southwestward to the junction with the alternate route, westward of Harkers Island, thence westward along the north side of **Middle Marshes** to abeam **Lenoxville Point** where it turns sharply northward and then westward into **Taylor Creek.** The route is then westward through Taylor Creek to the wharves at Beaufort.

Tides.-The mean range of tide in Core Sound is less than ½ foot, except near the inlets. Tidal currents of 1 to 2 knots may be experienced in the southern part of Core Sound.

The channels from Core Sound to Beaufort Inlet via The Straits and Back Sound are described later in this chapter.

Chart 11550 (419).-Wainwright Slue is a small anchorage in the northeastern entrance to Core Sound. Shelter from the sea is provided by surrounding shoals which have depths of 1 to 3 feet over them. Depths in the anchorage, in 1963, were 8 to 10 feet. The channel into Core Sound is through Wainwright Slue and east of **Wainwright Island.**

Cedar Island Bay, off the northeast side of Cedar Island, makes into the northwest side of Core Sound. The bay is used mainly by fishing boats. An improved channel leads from the entrance, about 2.8 miles southwestward of Wainwright Island, to a small-craft basin on the west side of the bay. In July 1973, the controlling depth was 3 feet to the basin, thence 5 feet in the basin. The channel is marked by lights and daybeacons, and by a light at the entrance. Gasoline, diesel fuel, and water can be obtained at the pier at the head of the basin. A radar dish antenna and a telephone tower are conspicuous on the south entrance point to the bay.

The terminal of the Ocracoke-Cedar Island ferry, marked by lights at the entrance, is at the north end of Cedar Island about 5.2 miles westward of Wainwright Island. The passenger and vehicle ferry operates daily to Ocracoke on the outer beach.

Thorofare Bay, on the northwest side of Core Sound and 8 miles from the northeastern entrance, indents the eastern shore of Cedar Island about 3 miles southward of Cedar Island Bay. The bay is connected with West Thorofare Bay by a land cut known as the **Thorofare.**

A dredged channel leads through Thorofare Bay, and thence through the Thorofare to West

Thorofare Bay. This passage provides a convenient route to local fishermen from Core Sound to West Bay and to the mouth of Neuse River. In June 1974, the midchannel controlling depth was 4 feet from West Thorofare Bay to Core Sound. The critical part of the channel is marked by lights and daybeacons.

A highway bridge near the eastern end of the Thorofare has a swing span with a channel width of 30 feet and a clearance of 8 feet. (See **117.240**, chapter 2, for drawbridge regulations and opening signals.) An overhead power cable with a clearance of 62 feet crosses just eastward of the bridge.

Atlantic, a town on the northwest side of Core Sound about 2 miles southwestward of the eastern entrance to Thorofare Bay, has a restaurant and a motel. A cluster of four aluminum-colored fuel storage tanks on the beach is prominent from seaward.

A marked, dredged channel leads northeastward from the main channel in Core Sound to a basin at Atlantic, about 0.5 mile above the entrance, thence continues northeastward behind a breakwater extending from **White Point** for another 0.3 mile to a basin at **Little Port Brook.** In June 1974, the controlling depths were 5 feet for a midwidth of 50 feet to the basin at Atlantic and 5½ feet in the basin, and thence 3 feet for a midwidth of 60 feet to the basin at Little Port Brook and 7 feet in the basin. The basin at Atlantic is used mainly by fishing boats. Gasoline, diesel fuel, water, ice, provisions, and limited marine supplies are available. A spur channel, with a reported depth of 8 feet, leads to a marine railway just southward of the basin; craft up to 45 feet can be handled for hull repairs.

U.S. Route 70 highway connects with Beaufort and Morehead City.

Chart 11545 (420).-Sealevel is a small fishing community about 3 miles southwestward of Atlantic on the west shore of Core Sound. A restaurant and a motel are in town. A dredged channel leads from the sound to a basin at Sealevel. In July 1973, the midchannel controlling depth to the basin was 4½ feet, with 4½ feet in the basin. The channel is marked by lights.

The U.S. Public Health Service maintains a **contract physician's office** at Sealevel. (See appendix for address.) A private hospital is also here.

A pier, used mainly by fishing vessels, is in the basin; depths of 8 feet are reported alongside. Gasoline, diesel fuel, water, and ice are available. Limited amounts of marine supplies can be obtained in town.

Sealevel is connected with Beaufort and Morehead City by U.S. Route 70 highway.

Davis, another small fishing community, 5 miles southwestward of Sealevel, ships seafood to the interior by truck. A dredged channel leads from Core Sound to a basin at Davis. In July 1973, the midchannel controlling depth to the basin was 4 feet, with 4 feet in the basin. Gasoline, diesel fuel, water, and ice are available at a pier in the basin; depths of 4 feet are reported alongside. A machine shop nearby is available for engine repairs. There are cabins and a restaurant at Davis; limited amounts of marine supplies also can be obtained here.

Davis is connected with Beaufort and Morehead City by U.S. Route 70 highway.

A pier, with reported depth of 4 feet alongside, is on the north side of **Oyster Creek**, about 1 mile northward of Davis. The entrance channel into the creek is marked by a light and a daybeacon. A machine shop, near the pier, is available for engine repairs. U.S. Route 70 highway bridge, about 0.4 mile above the entrance, crosses Oyster Creek just above the pier. The bridge has a 20-foot fixed span with a clearance of 7 feet.

Marshallberg, about 6 miles southwestward of Davis, is on the west shore of Core Sound, and on the north side of the eastern entrance to The Straits. A dredged channel leads from the main channel in Core Sound to a basin at Marshallberg. In July 1973, the midchannel controlling depth to the basin was 4 feet, with 4 feet in the basin. The channel is marked by a light and daybeacons. A marina is on the southeast side of the basin; gasoline, berthage, electricity, diesel fuel, water, ice, provisions, and some marine supplies are available. A boatyard is immediately westward of the marina. A marine railway here can handle vessels up to 125 feet in length for complete hull and engine repairs. Depths of 6 feet are reported alongside the marina and boatyard.

Back Sound, southward of Harkers Island, and **The Straits** which parallel Back Sound on the opposite side of the island, provide two marked routes from Core Sound to a junction with the Morehead City Harbor Channel at Beaufort Inlet. The northern route leads westward through The Straits and along the northerly side of Middle Marshes; the southerly route leads westward through Back Sound and along the southerly side of Middle Marshes. Both routes have several shoals close to the channels. The chart is the best guide.

The improved channel from Back Sound to Lookout Bight has been discussed previously.

The Straits, with an average width of about 0.5 mile, but in places only 100 yards wide in the channel, also affords a through passage from Core Sound to Beaufort Harbor. The passage has been discussed previously in this chapter. A highway bridge over the western end of The Straits has a swing span with a channel width of 36 feet and a clearance of 14 feet. (See **117.240**, chapter 2, for drawbridge regulations and opening signals.) The overhead power cable close eastward of the fixed bridge has a clearance of 71 feet.

Westmouth Bay is a cove on The Straits side of Harkers Island. A marine railway at a boatbuilding yard at the head of the bay can haul out vessels up to 45 feet for hull repairs. The town of **Harkers**

Island in the central part of the island, has piers both on Back Sound and at the head of Westmouth Bay; depths to the piers were 3 feet in 1963. Gasoline, diesel fuel, water, ice, and some provisions may be obtained at the piers, and there is also a small machine shop.

The eastern end of Harkers Island has three small marinas. Gasoline, diesel fuel, water, ice, electricity, showers, motels, restaurants, cottages, and provisions are available. There are two small-boat launching ramps at each marina; dry and wet storage can be obtained, and there is ample berthing space at the piers, which have 3 feet of water alongside. Seafood is shipped by truck and boat from the island.

A marina on the southwest point of the island has gasoline, water, ice, and some provisions available. A restaurant and motel are at the head of the pier, which has 3 feet of water alongside.

5. CAPE LOOKOUT TO CAPE FEAR

This chapter describes the deepwater ports of Morehead City and Wilmington, and the smaller ports of Beaufort, Swansboro, Jacksonville, Wrightsville Beach, Wrightsville, Carolina Beach, and Southport. These smaller ports are principally engaged in barge, fishing, and small-craft traffic.

Also discussed are the waters of Cape Fear River and its tributaries; Bogue, Stump, and Topsail Sounds; and Beaufort, Bogue, and New River Inlets, including some of the lesser inlets.

The section of the Intracoastal Waterway from Morehead City to Cape Fear River is described in chapter 12.

Chart 11520 (1110).-From Cape Lookout the coast extends 8 miles in a northwesterly direction and then curves gradually westward and southward to Cape Fear. This section, nearly 100 miles long, is similar to that between Capes Hatteras and Lookout, but the strips of land which form it are separated from the mainland by much narrower bodies of water. As a consequence, the thick woods of the mainland can be seen from much farther seaward.

Depths along this stretch of coast are regular, and 4 to 6 fathoms can be taken to within 1.5 miles of the beach. The 10-fathom curve, about 10 miles offshore, is nearly parallel to the shore until eastward of Cape Fear where it bends southeastward around Frying Pan Shoals. The 20-fathom curve is from 20 to 45 miles offshore.

There are numerous charted wrecks along this section of the coast, some extending as much as 75 miles offshore; the more dangerous ones are marked.

A **danger zone**, near the northern end of Onslow Bay, extends offshore from Bear Inlet to about 8 miles southward of New River Inlet. (See **204.56**, chapter 2, for limits and regulations.)

Between Beaufort Inlet and Cape Fear River are several inlets through which 4 to 10 feet can be carried to sheltered anchorage, but all are obstructed by shifting bars on which the sea breaks when at all rough. A sea breeze, even if light, will cause a heavy break on the bars, while a land breeze may be heavy without making the bars dangerous. Strangers bound southward in small craft should not leave a sheltered anchorage with the wind anywhere between southeast and southwest, and should find anchorage as soon as possible after the wind begins to blow from those directions. The best guide for entering or leaving the inlets is the appearance of the water, as breakers always form on the shoal areas; strangers should not attempt to enter an inlet when breakers form entirely across it.

This section of the coast, due to its low relief, presents no good radar targets except for the structure of Frying Pan Shoals Light.

Charts 11545 (420), 11547 (423).-Beaufort Inlet is about 220 miles southwestward of the Chesapeake Bay entrance and the same distance northeastward of Charleston. It is the approach to **Morehead City Harbor**, the most important coastal harbor between Cape Henry and the Cape Fear River. The ports of Morehead City and Beaufort are on the west and east sides of the harbor, respectively.

Morehead City, about 4 miles above the Beaufort Inlet channel entrance, is a modern resort city, with marine, shopping, and service facilities, and hotels, motels, and restaurants. It is 249 miles south of Norfolk, Va., and 154 miles north of Wilmington, N.C., by coastwise routes.

The port of Morehead City, the first deep-draft port south of Norfolk, Va., serves as a cargo transshipment point for oceangoing vessels, barges plying the Intracoastal Waterway, rail, and trucks. Exports include general cargo, phosphates, tobacco, lumber, animal products, and dried milk. Imports are petroleum and steel products, fish meal, and general cargo, including canned goods, plywood and hardware.

Prominent features.-The chimney of a bathhouse, about 1.1 miles westward of Fort Macon, a standpipe at the eastern end of Morehead City, two water tanks at the State Terminal, and a water tank in Beaufort are the most conspicuous landmarks from seaward. It is reported that under ideal conditions Cape Lookout Light and the configuration of Cape Lookout prove of some value as radar targets in making the approach to Beaufort Inlet; these targets, however, should not be relied upon too strongly.

Fort Macon State Park is on the west side of Beaufort Inlet. The Fort Macon Coast Guard Base is close westward of the fort on **Fort Macon Creek.**

Boundary lines of inland waters.-There are no specific lines established for Beaufort Inlet. The general rules for inland waters apply. (See **82.2**, chapter 2.)

Channels.-A Federal project provides for a 35-foot main channel through the bar and Beaufort Inlet to a turning basin of the same depth off the North Carolina State Ports Authority Terminal at Morehead City; thence a 12-foot channel and turning basin westward along the Morehead City waterfront as far as Tenth Street; thence a 6-foot channel to the Intracoastal Waterway in Bogue Sound. The main channel is subject to continual shoaling, especially along the edges. Lighted ranges and lighted buoys mark the main channel;

lights, buoys, and daybeacons mark the minor channels. (See Notice to Mariners and latest editions of the charts for controlling depths.)

Anchorage.-Vessels required to anchor to await a pilot may select anchorage in the charted berths on either side of the sea buoy (Beaufort Lighted Whistle Buoy 2BI). Although these berths are for the convenience of naval vessels, there are no restrictions in their use by other vessels. Lesser depths than charted may exist in these berths, as they are discontinued disposal areas; caution is advised. Good anchorage for large vessels also may be found in the area from the sea buoy eastward to Cape Lookout in good sand-shell holding bottom. All of the anchorages are exposed from the southwest quadrant.

Dangers.-Cape Lookout Shoals, previously described in chapter 4, are the principal danger in the approach to Beaufort Inlet. Discontinued spoil areas are on both sides of the approach to the entrance channel, and a spoil area is immediately northward of the one on the west side. Lesser depths than charted may exist in these areas; caution is advised. A number of wrecks, some of which are marked, are in the approaches. A fish haven, marked by a buoy, is about 3.8 miles west-northwestward of the sea buoy.

Tides.-The mean range of tide at Morehead City is 2.8 feet. (See the Tide Tables for daily predictions.) **Currents.**-Tidal currents along Beaufort Inlet Channel attain velocities of 2 to 3 knots. They usually set along the channels, but, at the entrance to Morehead City Channel, they usually set across the channel near the end of the flood period and beginning of the next ebb.

Heavy swells build up in Beaufort Inlet Channel with northerly or southerly winds, making boating hazardous and entry or departure of ships difficult during unfavorable tidal conditions. Tidal conditions are hazardous near and under the causeway north of the Port Terminal. (For predictions see the Tidal Current Tables.)

Weather.-The marine influence at Morehead City is reflected by the average number of days the temperature reaches 90°F. or above (20 days) and falls to 32°F. or below (25 days). During the warmest part of the year (July and August) average daytime temperatures reach the mid-80's while nighttime lows fall into the low 70's. Winters are mild with maximum temperatures in the mid-50's and minimums in the upper 30's to low 40's. Rainfall averages about 52 inches annually; more than one-third of that falls during July, August, and September. The number of days with measurable precipitation averages 4 to 7 per month throughout the year.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. coastwise vessels which have on board a pilot licensed by the Federal Government. Pilots board vessels in the vicinity of the sea buoy (Beaufort Inlet Lighted Whistle Buoy 2B1) from the pilot boat, day or night. Deeper draft vessels may be required to anchor to wait on tides before entering. (See anchorage.) The pilot boat, the A.T. PINER, painted white, is equipped with radiotelephone and guards 2182 kHz, 2738 kHz, and VHF-FM channel 16 (156.80 MHz) when working ships. At other times, and only during the day, these frequencies are guarded at the pilot station on the east side of Radio Island just below and near the Beaufort-Morehead City Causeway. Pilots work tugs on separate frequencies. Arrangements for pilot services are usually made well in advance through ship's agents.

Towage.-Tugs up to 650 hp are available; tugs are required for docking oceangoing vessels. Arrangements for such services are usually made well in advance through ships' agents.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) U.S. Public Health Service maintains a **contract physicians' office** in Morehead City. (See appendix for addresses.) There is a county hospital in Morehead City.

Agriculture quarantine inspections are conducted at the berths. Officials maintain an office at the North Carolina State Ports Authority Terminal.

Customs.-Beaufort-Morehead City is a customs **port of entry**; customs office is in the Post Office Building at Morehead City.

Immigration officials come from Wilmington, N.C., when requested.

Coast Guard.-The Marine Inspection Office at Wilmington, N.C., maintains a **documentation office** at the Post Office Building in Morehead City.

Harbor regulations.-The port of Morehead City is administered by the North Carolina State Ports Authority, which is represented by the manager of the North Carolina State Ports Authority Terminal. The manager's office is at the terminal. Copies of the harbor regulations are available.

The Morehead City **harbormaster** maintains an office at the terminal.

Wharves.-The facilities described at the port of Morehead City include the North Carolina State Ports Authority Terminal and its barge facility at the northeast corner of the terminal, and a privately operated oil terminal on the east side of the basin on Radio Island.

The alongside depths for the facilities described are reported depths. (For information on the latest depths, contact the State Ports Authority or the private operator.) Unless otherwise indicated, the facilities mentioned are owned and/or operated by the State Ports Authority.

Most of the other facilities in the port are used by fishing vessels and small craft. (For complete

description of the port facilities, refer to the Port Series, a Corps of Engineers publication.)

North Carolina State Ports Authority Terminal: The terminal wharf provides over 3,600 feet of berthing space and has a 45-foot apron extending along its full length. Six general cargo vessels and one petroleum tanker can be accommodated at the terminal. Double marginal tracks, with crossovers, extend along the full length of the wharf apron. A single depressed track serves the rear of all transit sheds and warehouses. Three transit sheds provide a total of 147,000 square feet of storage space, and seven warehouses provide 362,000 square feet. There are 13 acres of paved open storage space. Cargo at the terminal is generally handled by ship's tackle, however, forklifts and heavy handling equipment are available. Each berth has water and electricity. Cyanide and acritet fumigation facilities are maintained at the terminal. All deck heights are 10 feet.

Berth 1, on east side of terminal and north side of turning basin: 350-foot south face with offshore mooring buoys to accommodate large tankers, 35 feet alongside; 80-foot east face, 35 feet alongside; north side 101 feet long with depths alongside of 35 feet at the offshore end decreasing to bare at the inshore end; pipelines extend from the berth to storage tanks in the rear; receipt of petroleum products by barge and ship; north side used by military landing craft; south side for bunkering vessels; operated jointly by State Ports Authority and Blue Ridge Fuel Co.

Berths 2 and 3, immediately southward of Berth 1: 1,000 feet long, 35 feet alongside; used to handle phosphate by a travelling shiploading tower; loading capacity 3,800 tons per hour; a belt conveyor system interconnects the berths; a 106,000-ton capacity bulk phosphate warehouse, and a phosphate barge handling facility at the northeast corner of the terminal.

Berths 4,5,6, and 7, on the south side of the terminal: 2,371 feet long, 35 to 45 feet alongside; pipelines for petroleum products extend from the berths to storage tanks in the rear; forklifts up to 10 tons can be equipped for handling barrels, bales, pallets, etc.; mobile cranes up to 7-ton capacity; two 115-ton gantry cranes at Berths 6 and 7 can be fitted with buckets, hooks, or magnets and can be used in tandem for 230-ton lifts; facilities for handling 20- and 40-foot containers; a railroad loading and unloading ramp available for "piggy-back" operations; berths used for receipt and shipment of cargo in the foreign trade, and receipt of petroleum products.

The **barge facility,** at the northeast corner of the State Ports Authority Terminal and just above U.S. Route 70 highway bridge, has four 300-foot barge berths with depths of 15 to 18 feet alongside; two berths are along the north side and two along the east side. Barges unload bulk phosphate here. The berths are connected by a belt conveyor system with Berths 2 and 3 and a bulk phosphate storage warehouse.

Aviation Fuel Terminals Wharf, on the west side of Radio Island; 85-foot T-head pier; about 700 feet of berthing space with dolphins; 35 feet alongside; deck height, 12 feet; hose-handling derrick; pipelines extend from wharf to tank farm in rear; receipt and shipment of petroleum products and liquid fertilizers; owned and operated by Aviation Fuel Terminals, Inc.

A Navy staging area and four LST loading ramps are at the southern end of Radio Island. Three rows of mooring dolphins separate the loading ramps. A submerged groin extends southward along the easterly side of the easterly row of dolphins.

Supplies.-Bunker C fuel oil is available at Berth 1, North Carolina State Ports Authority Terminal. Diesel fuel is obtained by truck. Marine supplies and provisions are available in Morehead City.

Repairs.-There are no drydocking or major repair facilities for deep-draft vessels in the port; the nearest facilities are at Newport News and Norfolk, Va. Several machine shops, off the waterfront, can make limited above-the-waterline repairs. The largest of these shops is equipped to perform general welding and fabricating, and produce shafts up to 14 feet in length.

A repair facility, mainly for barges, is at the end of the dredged channel in **Calico Creek,** which leads along the north side of the North Carolina State Ports Authority Terminal. The marine railway at the facility has a 1,500-ton capacity and can handle barges up to 300 feet; a 125-ton fixed lift is also available.

Small-craft facilities.-Most of the small-craft facilities are along the southern waterfront of Morehead City. A yacht basin is on the north side of the city, off the northwest side of the North Carolina State Ports Authority Terminal. Berthage, electricity, gasoline, diesel fuel, water, ice, provisions, and marine supplies are available. Restaurants and living accommodations are along the waterfront. A marina, with a marine railway, is on the south waterfront; craft up to 85 feet can be handled for hull, engine, and electrical repairs. Fixed lifts up to 100 tons are also available here. Other small-craft facilities are at nearby Beaufort and Radio Island, and westward of the city along the Intracoastal Waterway.

Communications.-The port is served by U.S. Route 70 and State Route 24. The city is linked to the Southern Railway System through the Atlantic and East Carolina Railway. The 3-mile Beaufort and Morehead Railroad connects the city with nearby Beaufort.

Beaufort (pronounced BO-furt), on the eastern side of Morehead City Harbor, has considerable fishing and boatbuilding activity. It is reached from Beaufort Inlet through Bulkhead Channel and from the Intracoastal Waterway through Gallant Channel. The Taylor Creek Channel is described in chapter 4.

A Federal project provides for channel depths of 15 feet in **Bulkhead Channel;** 12 feet in **Gallant Channel** from the Intracoastal Waterway to the first turn just north of Town Creek, thence 15 feet in the lower part of the channel to the junction with Bulkhead Channel, and thence 15 feet from the junction through a 12-foot basin in front of the town of Beaufort, and thence through Taylor Creek to a point 0.2 mile westward to Lenoxville Point. The channels are subject to shoaling between dredging, and lesser depths may be found. (See Notice to Mariners and latest editions of charts for controlling depths.) The channels are well marked by lights, buoys, and daybeacons.. A submerged groin extends southward between the westerly edges of Bulkhead Channel and the easterly row of dolphins at the southeastern end of Radio Island.

A dredged channel leads eastward from Gallant Channel to a basin at the head of **Town Creek,** north of Beaufort. In December 1966, the midchannel controlling depth to the basin was 10 feet, thence 10 feet in the basin.

Beaufort is connected by rail and highway bridges across Gallant Channel to **Radio Island** and thence to Morehead City by bridges over the Intracoastal Waterway. Minimum clearance is 4 feet for the bridges with bascule spans over Gallant Channel. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.) An overhead power cable close northward of the highway bridge has a clearance of 87 feet. The bridges over the Intracoastal Waterway are described in chapter 12.

Small-craft facilities.-Most of the facilities are along the southwest waterfront of Beaufort. There are also facilities near the northern end of Radio Island. A marina with a 10-ton fixed lift is in the cove on the west side of the island just below the Beaufort-Morehead City Causeway, and two 50-ton marine railways are available on the east side of the island just opposite the marina; engine, hull, and electrical repairs can be made. Berthage, electricity, gasoline, diesel fuel, water, ice, launching ramps, provisions, and marine supplies are available at most of the facilities. Machine shops nearby can also make engine repairs.

Charts 11543 (1234), 11541 (833-SC).-Bogue Sound extends about 22 miles westward along the coast from Beaufort Inlet to Bogue Inlet. It is shallow and separated from the ocean by **Bogue Banks,** a wooded beach 0.1 to 1 mile wide. The sound is about 2 miles wide midway of its length, but narrow at each end; the western end has numerous marshy islets. The Intracoastal Waterway route is through the north side of the sound. The mean range of tide in Bogue Sound is about 2.5 feet near the inlets, and about a foot where the tides meet near the middle. Strong south and southwest winds may raise the tide a foot or more, and north to northwest winds lower it the same amount.

Bogue Inlet, 22 miles west of Beaufort Inlet, is the seaward approach to the town of Swansboro, which can be seen from outside. The entrance is used almost exclusively by local fishermen. The inlet is between a high wooded ridge on the west and a long low spit on the east. On the inside of the spit, about a mile eastward of the inlet, is a Coast Guard station. The entrance is obstructed by a shifting bar extending about 0.5 mile seaward. In January 1974, the controlling depth was 3½ feet over the bar, thence 6 feet at midchannel in the dredged channel to the Intracoastal Waterway. A lighted buoy marks the entrance. A buoy is on the bar, and lighted buoys and lights mark the channel.

The channel into Bogue Inlet is continually changing, and the buoys are shifted frequently. Strangers should wait for a rising tide and never attempt to enter when the bar is breaking. If local fishermen happen to be coming in, it is advisable to follow them. The channels inside the inlet are also subject to considerable change, particularly during southeast and southwest storms.

The mean range of tide is 2.2 feet in the inlet; high water occurs 2 hours earlier than at the head of the marshes inside. (See the Tide Tables for daily predictions.)

Swansboro, a small town on the west bank of White Oak River 3 miles north of Bogue Inlet, is reached by the shifting channel from the inlet, and from Bogue Sound and Cape Fear River through the Intracoastal Waterway. Numerous fishermen base at Swansboro. State Route 24 highway bridge over White Oak River at the town has a 30-foot fixed span with a clearance of 12 feet. The highway bridge over the easterly channel, about 0.3 mile southeastward, has a 30-foot fixed span with a clearance of 6 feet. Swansboro is described in more detail in connection with the Intracoastal Waterway, chapter 12.

For 4 miles above Swansboro, **White Oak River** has a width of 1 mile or more through which there is a narrow tortuous channel between the flats and oyster rocks. Farther up, the river is narrow and deep and leads between marshes to the fixed bridge at the town of **Stella** , about 8 miles above Swansboro. The river above State Route 24 highway bridge is unmarked and has many logs and snags; navigation is limited to shallow-draft skiffs only.

Bear Inlet and **Browns Inlet,** 3 and 6 miles westward of Bogue Inlet, respectively, are unmarked and used by local boats only; neither is recommended to strangers.

The **danger zones** of firing ranges are in the ocean between Bear Inlet and New River Inlet and in New River; limits and regulations are given in **204.56,** chapter 2.

Chart 11542 (777).-New River Inlet, 35 miles westward of Beaufort Inlet, is considered dangerous by local pilots, and entrance should not be attempted except under the most favorable condi-

tions. A strong ebb current from the inlet causes a break on the bar when there is a sea outside. The break is especially bad when the ebb sets against a south or southeast wind. Current predictions may be obtained from the Tidal Current Tables. The mean range of tide at the inlet is 3 feet. At the head of the marshes, 2 miles above the entrance, the range is about 1 foot. (See Tide Tables for daily predictions.)

In 1963, the controlling depth over the bar was 4 feet; the bar channel is subject to continual changes and local knowledge is advised. A dredged channel leads from inside the bar to the Intracoastal Waterway. In August 1974, the midchannel controlling depth was 6 feet. The inlet is marked at the entrance by a lighted bell buoy; other buoys marking the bar channel are not charted because they are frequently shifted in position. An unmarked fish haven is about 1.9 miles southwestward of the southern entrance point to New River Inlet.

New River has a width of 1 to 2 miles from the head of the marshes above the inlet to within 2 miles of Jacksonville, above which it is a narrow stream. There is practically no periodic tide in the river. It has been reported, however, that the wind can vary the height of the water 3 to 4 feet at the State Route 172 highway swing bridge, 3 miles above the Intracoastal Waterway.

A dredged channel in New River leads from the Intracoastal Waterway to the Seaboard Coast Line Railroad bridge at Jacksonville. In August 1974, the midchannel controlling depth was 8½ feet. The channel is well marked by lights and daybeacons. Spoil areas, some discontinued, extend close along the easterly side of the channel for almost its entire length.

Fulcher Landing, used mainly by fishermen, is on the west side of New River about 1.5 miles above the Intracoastal Waterway. There are numerous piers at seafood-packing houses at the landing where gasoline, diesel fuel, water, electricity, and marine supplies may be obtained. Cabins and a restaurant are nearby. Two marine railways here can haul out boats up to 50 feet for engine and hull repairs.

State Route 172 highway bridge over New River, 3 miles above the Intracoastal Waterway, has a swing span with a clearance of 8 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

Jacksonville, on the east bank of New River about 17 miles above the Intracoastal Waterway, is a town with restaurants, hotels, motels, and a county hospital. Provisions and limited amounts of marine supplies are obtainable here. Fish is moved by rail and truck to the interior, and pulpwood is shipped by rail and also by barge down the Intracoastal Waterway.

There are several barge docks and a marina on the east side of the river at Jacksonville, just below the Seaboard Coast Line Railroad bridge. Berthage, electricity, gasoline, diesel fuel, water, ice, and a launching ramp are available at the marina; engine repairs can also be made.

Jacksonville has highway connections with U.S. Route 17 and State Routes 24 and 53, and railroad connections with the Seaboard Coast Line Railroad.

The Seaboard Coast Line Railroad bridge over New River at Jacksonville has a swing span with a channel width of 48 feet and a clearance of 3 feet. (See **117.240 and 117.245 (a) through (e), and (g) (8),** chapter 2, for drawbridge regulations and opening signals.) An overhead cable close southward of the bridge has a clearance of 50 feet. The highway bridge, 0.5 mile above the railroad bridge, has a 28-foot fixed span with a clearance of 13 feet. Overhead power cables just above this bridge have a clearance of 14 feet. About 200 yards above this bridge is another highway bridge which has a 33-foot fixed span with a clearance of 14 feet.

Charts 11539 (1235), 11541 (833-SC).-New Topsail Inlet, 19 miles southwestward of New River Inlet, is marked off the entrance by lighted buoy, and entered through a marked channel over a shifting bar. The bar channel leads to a junction with two dredged channels inside the entrance. In September 1974, the midchannel controlling depth over the bar was 8 feet. The buoys marking the bar channel are frequently shifted in position to mark the best water, and therefore not charted; caution is advised. The inlet should not be entered by strangers. The mean range of tide is 3 feet.

An unmarked fish haven is about 2.2 miles eastward of the northern entrance point to New Topsail Inlet.

The dredged channels inside the entrance are well marked. One channel leads northeastward through Topsail Sound for about 5.5 miles to a junction with the Intracoastal Waterway; in October 1973, the midchannel controlling depth was 7 feet. The other channel leads northwestward for about 1.1 miles to a junction with the Intracoastal Waterway; in August 1973, the midchannel controlling depth was 7 feet.

Topsail Sound extends northeastward from New Topsail Inlet along the northwesterly side of the barrier beach. There are several marinas on the southeasterly side of the sound where berthage, electricity, gasoline, diesel fuel, water, ice, and limited amounts of marine supplies can be obtained; launching ramps also are available. A marine railway that can handle craft up to 75 feet for engine and hull repairs is available at the facility about 2.5 miles above the inlet. A fixed hoist is at the northernmost facility.

Old Topsail Inlet, 1.5 miles southwestward of New Topsail Inlet is constantly changing. In 1969, it was reported that shoaling in the inlet was increasing and that it was being used by skiffs only. The inlet is not marked. Strangers should not enter

the inlet. The shore on both sides is a low sand beach without distinguishing marks.

Rich Inlet, about 4.5 miles southwestward of New Topsail Inlet, had a depth of 3 feet over the bar in 1963, but is constantly changing. Local fishermen sometimes use it. It is not marked. Strangers should not enter without local knowledge.

An unmarked fish haven is about 2.7 miles southward of the southern entrance point to Rich Inlet.

Mason Inlet is 8.5 miles southwestward of New Topsail Inlet. In 1969, it was reported that it was being used by skiffs only. The inlet is constantly changing; it is unmarked, and strangers should not attempt it.

Wrightsville Beach is a summer resort about 11.5 miles southwestward of New Topsail Inlet. Two tanks and an 8-story motel on the beach and the stacks and tanks of a saltwater conversion plant on Harbor Island are prominent from seaward. The facilities on the inside of the barrier beach are reached through Masonboro Inlet.

A Coast Guard station is at the southern end of Wrightsville Beach at Masonboro Inlet.

Masonboro Inlet, about 12.5 miles southwestward of New Topsail Inlet and 22.3 miles north-northeastward of Cape Fear, is protected on the northeast side by a 3,600-foot-long jetty. A lighted whistle buoy is off the entrance.

A channel leads across a shifting bar at Masonboro Inlet, thence northward through dredged **Banks (Wrightsville) Channel,** and **Motts Channel** to a junction with the Intracoastal Waterway at Wrightsville. In July 1974, the midchannel controlling depths were 14 feet over the bar, thence 8 feet to the Intracoastal Waterway. The buoys marking the bar channel are frequently shifted to mark the best water, and therefore not charted; caution and local knowledge are advised. Banks and Motts Channels are well marked by lights and daybeacons.

Strong tide rips form on the ebb current. The mean range of tide on the bar is 3.8 feet. (See Tide Tables for daily predictions.)

The municipal dock at Wrightsville Beach, just southward of U.S. Route 74 highway bridge, is 120 feet long with a reported depth of 4 feet alongside; water and electricity are available. Charter fishing boats use the wharf. There is bus service between Wrightsville Beach, Wrightsville, and Wilmington.

A marina on the northeast side of Banks Channel between Wrightsville Beach and **Wrightsville** has a 30-ton mobile hoist; hull, engine, and electrical repairs can be made. Berthage, electricity, gasoline, water, ice, and some marine supplies are available. Depths in the approach and alongside are reported to be 8 feet.

Other marinas along the Intracoastal Waterway at Wrightsville are discussed in chapter 12.

Charts 11539 (1235), 11534 (835-SC).-Carolina Beach Inlet is about 7 miles south of Masonboro Inlet. The inlet is not marked nor maintained and is subject to continual change. It is sometimes used by local charter boats as an access to the Intracoastal Waterway. Only those with local knowledge should use it.

Carolina Beach is a resort about 3 miles southward of Carolina Beach Inlet and 12 miles northward of Cape Fear. A dredged channel connects the landlocked basin at the town with Myrtle Grove Sound and the Intracoastal Waterway. In April 1971, the controlling depth was 6 feet. Daybeacons mark the channel.

A marina at the head of the basin can provide berthage, electricity, gasoline, diesel fuel, water, ice, and some marine supplies; a launching ramp is also available. Depths of 8 feet are reported alongside the marina.

Storm warning signals are displayed. (See chart.)

Some of the more prominent landmarks that can be seen from seaward along this section of the coast are: a group of four loran towers centered in 34°03.8'N., 77°54.8'W., about 2 miles north-northwestward of Carolina Beach; an aero radiobeacon on the west side of Cape Fear River, about 3.6 miles northwestward of the loran towers; and a tank and radar domes at **Kure Beach** 3.8 miles and 5 miles southward of the loran towers, respectively.

Chart 11536 (1236).-Cape Fear is a low, sharp, sandy point 85 miles southwestward of Cape Lookout at the southern extremity of **Smith Island.** This island, on the eastern side of the entrance of Cape Fear River, is mostly low and marshy, but on the western side has a thick growth of trees and a 99-foot-high octagonal tower of an abandoned light.

Frying Pan Shoals, extending south-southeastward from Cape Fear, are bare in spots near the shore and have general depths of 2 to 12 feet in an unbroken line to a point 10 miles from the cape; for 6 miles farther the shoals are broken with depths ranging from 10 to 20 feet. Broken ground with depths of 5 to 7 fathoms extends from the shoals proper almost to Frying Pan Shoals Light. A natural channel, known as **Frying Pan Shoals Slue,** cuts through the shoals about 11.5 miles southward of Cape Fear. The Slue is marked at the northeastern approach by a lighted buoy and about midway of its length by two buoys. A depth of about 20 feet can be carried through the channel with the aid of the chart. The channel is used by fishing boats and other small craft.

Frying Pan Shoals Light (33°29.1'N., 77°35.4'W.), 118 feet above the water, is shown from a dark green tower on the corner of a four-legged metal structure painted yellow with the words FRYING PAN on the north, east, and south sides in 46 feet of water about 28.5 miles southeastward of Cape Fear. A fog signal and radiobeacon are at the light.

Storm warning signals are displayed daytime only.

A wreck, covered 6 feet, lies on Frying Pan Shoals about 16 miles west-northwestward from the light. An obstruction, reported covered 19 feet, lies in 75 feet of water 3.8 miles westward from the light.

Chart 11537 (426).-Cape Fear River, 370 miles long and the approach to the city of Wilmington, empties into the sea immediately westward of Cape Fear. Barge traffic is active as far as **Fayetteville,** about 125 miles above the mouth.

Wilmington, 24 miles above the mouth, on the east bank of Cape Fear River, is the leading port of North Carolina. It is 363 miles south of Norfolk, Va., and 315 miles north of Jacksonville, Fla., by coastwise routes. Exports are iron and steel products, pulp and paper products, wood pulp, machinery, auto parts, bark, tobacco, fertilizer, bulk cement, sugar, scrap metal, boiler components, and numerous manufactured articles. Imported are sulfur, tobacco, tools and hardware, molasses, sugar, burlap and jute, fertilizer, coal tar, lumber, petroleum products, and bulk chemicals. There are many tourist attractions and points of historical interest in the city and vicinity, including the USS NORTH CAROLINA, a World War II memorial, which is berthed on the west bank of Cape Fear River opposite Wilmington.

Prominent features.-Oak Island Light (33°53.6'N., 78°02.1'W.), 169 feet above the water, is shown from a 155-foot cylindrical tower, upper part black, middle white, and lower part gray, on Oak Island on the western side of Cape Fear River entrance; a radiobeacon is at the light. It is the most conspicuous object in the approach. The abandoned lighthouse, known as "Old Baldy", on the west side of Smith Island, and the buildings of the Oak Island Coast Guard Station, westward of Fort Caswell, are also conspicuous.

Three buildings of a former Coast Guard station on Cape Fear are conspicuous. A water tank at Kure Beach and two silver radar domes about 1.3 miles southward of the tank are visible well to seaward.

Frying Pan Shoals Light structure is reported to be a good radar target in the approach to Cape Fear River. It is also reported that under ideal conditions the configuration of Cape Fear and Oak Island Light prove of some value as radar targets when closer in; these targets, however, should not be relied upon too strongly.

Boundary lines of inland waters.-There are no specific lines established for Cape Fear River. The general rules for inland waters apply. (See**82.2,** chapter 2.)

Channels.-A Federal project provides for a channel 40 feet deep over the ocean bar, thence 38 feet for 24 miles to Wilmington including the turning basin off the southerly part of the city; thence in Northeast (Northeast Cape Fear) River 32 feet to and including a turning basin 0.4 mile above the mouth, thence 32 feet to Hilton Bridge about 1.2 miles above the mouth, and thence 25 feet to and including a turning basin about a mile above the bridge. **Dredging to project depths has not been completed.** (See Notices to Mariners and latest editions of charts for controlling depths.) The channel is well marked with lighted ranges and other aids.

Western Bar Channel, close to **Fort Caswell** on the western side of the entrance to Cape Fear River, is used considerably by small craft bound westward along the coast. The channel is good for about 6 feet, but is not buoyed. The best water lies from 100 to 200 yards offshore south of Fort Caswell, and from there the channel through the shoals trends about 256°. Abreast the Coast Guard station, the shore should not be approached closer than 0.3 miles. A dredged channel from Cape Fear River to the Coast Guard wharf had a reported controlling depth of 7 feet in 1970. The channel is marked by daybeacons and lights.

A ferry, operated by the N.C. State Highway Commission, crosses the river from Price Creek about 4.5 miles above the mouth to Federal Point on the east side of the river about 3 miles south-southwest of **Kure Beach.** The channels leading to the ferry terminals are marked by pilings with reflectors and are maintained by the Highway Commission. Reported controlling depths were 9 feet in Price Creek ferry channel in 1973, and 12 feet in Federal Point ferry channel in 1972.

A highway lift bridge with a clearance of 65 feet down and 135 feet up crosses Cape Fear River at Wilmington, about 23.5 miles above the mouth. Bridges crossing Cape Fear River above Wilmington are discussed later in this chapter.

Anchorages.-Good anchorage is available in the Cape Fear River abreast the town of Southport. The holding ground is good, but because of strong tidal currents vessels should anchor with a good scope of chain. This anchorage is sometimes used as a harbor of refuge in the winter by coasting vessels.

Vessels awaiting entrance to the river may find good holding ground in about 7 fathoms within 0.6 mile southeastward of the sea buoy (Cape Fear River Entrance Lighted Whistle Buoy 2CF). The area to the northwestward of the sea buoy is reported to be rocky and foul, and some vessels have lost anchors or broken flukes in the area.

Dangers.-Frying Pan Shoals are the principal danger in the approaches to Cape Fear River. Isolated wrecks, some marked, and obstructions with varying depths over them are in the approaches.

Bald Head Shoal and **Middle Ground** are dangerous shoals on either side of the bar channel.

Caution should be exercised in Cape Fear River at times when tides are higher than normal and after heavy rains as logs and floating debris may be encountered.

A **restricted area** of the Sunny Point Army Terminal is 9 miles above the mouth of Cape Fear

River; limits and regulations are given in **207.164a**, chapter 2.

Routes.-On the approach to Cape Fear River from northward, the safer course, and the one generally used by deep-draft vessels, is outside of Frying Pan Shoals Light.

From southward, deep-draft vessels should set a course to pass outside the broken ground extending offshore between Cape Romain and Winyah Bay. When clear of this broken ground, the course can be shaped for Cape Fear River Entrance Lighted Whistle Buoy 2CF. When approaching from southward an overrun of as much as 0.5 knot may be expected except during northeasterly winds.

Tides and currents.-The mean range of tide at the entrance is 4.5 feet; at Southport 4.1 feet, and at Wilmington, 3.6 feet. Daily predictions for Wilmington are given in the Tide Tables; predictions for a number of places on the river and in the vicinity are also in the tables.

The tidal currents on the bar run with considerable velocity and as a rule set nearly in the direction of the channels, but on the last of the flood and first of the ebb they set to the eastward across the channel and on the beginning of the flood they set to the westward. In the river their set is generally in the direction of the channel. The relative velocities of flood and ebb depend upon the stage of the river. During freshets the flood at times is completely overcome by the river current and the ebb is greatly increased. At low-river stages, a strong flood is felt for a considerable distance above Wilmington, where it runs 5½ hours to nearly 7 hours of ebb; downriver from Wilmington, the periods of flood and ebb become more nearly equal. Current predictions for a number of locations in Cape Fear River may be obtained from the tidal current tables.

Weather.-The climate is usually mild and even in winter, after low temperatures at night, the days warm up. Sea fog is experienced from November to April, usually with the advent of southeast or southerly winds when it may hang on for several days. Westerly winds clear it off. After a very warm day with a large drop in temperature at night, fog may settle on the river, but it usually burns off in the forenoon. It may be thick on the bar and outside, and clear on the river from 2 or 3 miles above the entrance. The office of the National Weather Service is at the New Hanover County Airport about 5 miles outside of the city. **Barometers** may be compared there. (See page T-2 for **Wilmington climatological table.**)

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Freshets occur any time from November through April, but no appreciable rise in the water level has been reported at Wilmington. They do have a marked effect on the tidal currents and sometimes overcome the flood current entirely in the river almost to the entrance. The velocity of the ebb current is greatly increased during freshets.

Pilotage is compulsory from the bar to Southport for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. coastwise vessels which have on board a pilot licensed by the Federal Government. Pilotage is not compulsory between Southport and Wilmington, but if a vessel does take a pilot he must be a State Pilot. Most vessels and even tugs take a pilot in entering the river. The Wilmington Cape Fear Pilots Association maintains two 50-foot pilot boats, the CAPE FEAR PILOTS, and the CAPE FEAR PILOTS II, both painted white, and each with the name on the bow and stern. The pilot boats maintain radiotelephone communications on 2182 kHz, 2638 kHz, 2738 kHz and on VHF-FM channel 18A (156.90 MHz). The pilot station at Southport monitors these frequencies on a 24-hour basis. Communication on other frequencies is also maintained between the pilots, pilot station, tugs, and bridge to bridge. At night, the pilot boats display a white light over a red light; no day signals are displayed. Pilots board vessels day or night in the vicinity of the sea buoy (Cape Fear River Entrance Lighted Whistle Buoy 2CF). Pilots may be obtained by wire, by radiotelephone through the Charleston Marine Operator (telephone 919-763-4931 in Wilmington or 919-457-5831 in Southport) or by prior arrangements with the ships' agents. Vessels can call the pilots directly to discuss time of arrival, or existing weather conditions on 2738 kHz, or VHF-FM channel 18A (156.90 MHz).

Towage.-Vessels seldom find it necessary to employ tugs between the sea buoy and the turning basin off the southerly part of Wilmington, but tugs are generally used to assist in docking and movement within the port or to upriver facilities. Inbound vessels are usually met by the tugs just below the terminal they are bound for or off the State Ports Authority Terminal wharf. Tugs up to 1,800 hp are available.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) U.S. Public Health Service maintains **contract physicians' offices** at Southport and Wilmington. (See appendix for addresses.) Deratization inspection, and issuance or renewal of certificates are not possible at Wilmington or Southport. A county hospital is at Wilmington.

Agriculture quarantine inspections are conducted at the berths. Officials have their office in the Federal Building (34°14′08″N., 77°56′58″W.).

Customs.-Wilmington is a port of entry. Vessels are usually boarded at the berths. Officials have their offices at the North Carolina State Ports Authority Terminal (34°12′00″N., 77°57′23″W.).

Coast Guard.-The **Captain of the Port,** and a **Marine Inspection Office** and **documentation office** are in the Federal Building.

Immigration officials maintain an office in the Federal Building. Vessels are inspected at their berths.

Harbor Regulations.-A Board of Commissioners of Navigation and Pilotage adopts regulations which are enforced by a **harbormaster.** The harbormaster's office is at the Waters Shipping Co., 2907 Burnett Boulevard, near North Carolina State Ports Authority Terminal. There is a **speed limit** of 5 miles per hour in Cape Fear River between Point Peter (34°14′27″N., 77°57′20″W.). and the foot of Queen Street, about 0.9 mile south of Point Peter.

Wharves.-Only the major port facilities at Wilmington are described. These include North Carolina State Ports Authority Terminal wharf, the port's only general cargo facility, several oil terminals, and bulk-handling facilities for cement, asphalt products, molasses, liquid chemicals, sulfur, fertilizers, and liquid sugar. Most of the piers and wharves have railroad and highway connections, and water and electricity. Cargo is generally handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. The alongside depths given for each facility described are reported depths. (For information on the latest depths, contact the operator.) There are many smaller facilities at Wilmington which are used by barges and small vessels, as vessel repair berths, and for scrapping operations; these facilities are not described. (For a complete description of the port facilities, refer to the Port Series, a Corps of Engineers publication.)

East side of Cape Fear River:

Exxon Co. USA Wharf (34°10′35″N., 77°57′26″W.): 82-foot T-head pier, 1,000 feet with dolphins; 40 feet alongside; deck height, 13 feet; pipelines extend from pier to storage tanks in the rear; receipt and shipment of petroleum products by ship and barge; bunkering vessels; owned and operated by Exxon Co. USA.

Mobil Oil Corp. Wharf: about 0.35 mile north of Exxon Co. USA Wharf; 40-foot T-head pier, 700 feet with dolphins; 34 feet alongside; deck height, 11 feet; pipelines extend from the pier to two storage tank farms in the rear; receipt and shipment of petroleum products; owned and operated by Mobil Oil Co.

Shell Oil Co. Wharf: about 0.3 mile northward of Mobil Oil Corp. Wharf; 120-foot T-head pier, 750 feet with dolphins; 34 feet alongside; deck height, 10 feet; pipelines extend from pier to three storage tank farms in the rear; receipt and shipment of petroleum products; fueling tugs and other types of small vessels; owned and operated by Shell Oil Co.

Texaco Wharf; about 0.25 mile northward of Shell Oil Co. Wharf; 122-foot T-head pier, 550 feet with dolphins; 34 feet alongside; deck height, 16 feet (lower end) and 18½ feet (upper end); pipelines extend from pier to two storage tank farms in the rear; receipt of petroleum products, bunkering vessels; owned and operated by Texaco, Inc.

North Carolina State Ports Authority Wharf (North Carolina State Docks): at Dram Tree Point immediately northward of Texaco Wharf; 5,363 foot face; 34 feet alongside; deck height, 12 feet; four transit sheds, total 260,000 square feet storage area; warehouses, total 397,000 square feet storage area; one cargo storage shelter total 240,000 square feet storage area; about 28 acres paved open storage; cranes up to 115-ton capacities equipped for magnet, bucket or container cargo operations, maximum lift capacity 120 tons; two 5-ton gasoline mobile cranes, forklift trucks with capacities up to 10-tons with accessories, cotton and paper clamp, etc.; two railroad tracks on 50-foot apron; railroad car storage area in rear of terminal connect with Seaboard Coast Line Railroad; fumigation plant; bonded warehouse; receipt and shipment of general cargo in the foreign and domestic trade; owned and operated by the North Carolina State Ports Authority.

Wilmington Chemical Terminal: about 0.35 mile northward of the northern end of State Ports Authority Wharf; 70-foot T-head pier, 600 feet with dolphins; 32 feet alongside; deck height, 12 feet; pipelines extend from pier to storage tanks in the rear; receipt and shipment of liquid chemicals and molten sulfur; owned by North Carolina State Ports Authority and operated by Wilmington Chemical Terminal, Inc.

Chevron Asphalt Dock: about 0.45 mile northward of the northern end of State Ports Authority Wharf; 35-foot T-head pier, 560 feet with dolphins; 30 feet alongside; deck height, 10 feet; pipelines extend from pier to storage tanks in the rear; receipt of bulk asphalt products; owned and operated by Standard Oil of California.

Taylor-Piedmont Co. Wharf: about 0.7 mile northward of the northern end of State Ports Authority Wharf; 30-foot T-head pier, 360 feet with dolphins; 28 feet alongside; deck height, 10 feet; pipelines extend from pier to storage tanks in plant at rear; receipt of creosote; owned by the City of Wilmington and operated by Taylor-Piedmont Co.

Hess Oil Co. Wharf: about 0.85 mile northward of the northern end of State Ports Authority Wharf; 60-foot T-head pier, about 550 feet with dolphins; 34 feet alongside; deck height, 8 feet; pipelines extend from pier to storage tanks in the rear; receipt of petroleum products; owned and operated by Hess Oil and Chemical Co.

Cape Fear Terminal Wharf: about 1 mile northward of the northern end of State Ports Authority Wharf; three T-head piers, 30, 151, and 60 feet long, 620 feet with dolphins; 32 feet alongside; deck height, 10 feet; pipelines extend from pier to storage tank farm in the rear; receipt and shipment of bulk petroleum products and bunkering vessels; owned by Gulf-Union Oil Co. and operated by Union Oil Co.

American Molasses Co. Wharf: about 1.3 miles northward of the northern end of State Ports Authority Wharf; 147-foot face, 550 feet with dolphins; 34 feet alongside; deck height, 10 feet; south and north sides each 70 feet long; pipelines extend from wharf to storage tanks in the rear; receipt of molasses, mooring of fireboats, occasional berthage of vessels awaiting berths at North Carolina State Ports Authority Terminal; owned and operated by American Molasses Co. of North Carolina, Inc.

U.S. Coast Guard Wharf: about 2 miles northward of the northern end of State Ports Authority Wharf; 747-foot face; 25 feet alongside; deck height, 9½ feet; mooring of U.S. Government vessels; owned and operated by the U.S. Government.

Cape Fear Technical Institute Wharf: about 0.1 mile northward of U.S. Coast Guard Wharf; 233-foot face; 20 feet alongside; deck height, 10 feet; mooring of the institute's training vessels; owned and operated by the State of North Carolina.

East side of Northeast (Northeast Cape Fear) River:

Seaboard Coast Line Railroad Co. Diesel Fuel Wharf (34°14′30″N., 77°57′10″W.): at the mouth of the river; 198-foot face, 550 feet with dolphins; 29 feet alongside; deck height, 10 feet; pipelines extend from wharf to storage tanks in rear; receipt of diesel fuel; owned and operated by Seaboard Coast Line Railroad.

Almont Shipping Co. Piers: about 250 yards above Seaboard Coast Line Railroad Co. Wharf; Pier A, the more southerly pier, 110-foot face, 30 feet alongside; south side 400 feet long, 12 feet alongside; north side 450 feet long, 32 feet alongside; all deck heights, 10 feet; Piers B and C, immediately above Pier A, 320-foot face, 30 feet alongside, south side 410 feet long, 32 feet alongside; north side 410 feet long, 30 feet alongside; all deck heights, 10 feet; four warehouses total 144,000 square feet storage space; vessels unload bulk fertilizer materials by means of hopper-conveyor belt systems to warehouses or to loading chutes at rear of warehouses for shipment; related equipment includes bulk-pilers, two 30-ton cranes, and bulldozers; owned and operated by Almont Shipping Co.

Dixie Crystals Liquid Sugar Depot Dock: about 1.1 miles above Seaboard Coast Line Railroad Co. Wharf; 27-foot T-head pier, 200 feet with dolphins; 14 to 35 feet alongside; deck height, 9 feet; pipelines extend to and from storage tanks in the rear; receipt and shipment of bulk liquid sugar by barge; owned and operated by Savannah Sugar Refining Corp.

West side of Northeast (Northeast Cape Fear) River:

Ideal Cement Co. Pier: about 0.9 mile above Point Peter (34°14′27″N., 77°57′20″W.); 358-foot T-head pier, 580 feet with dolphins; 32 feet alongside; deck height, 8 feet; storage warehouse; receipt of bulk cement by barge, export of bulk cement by ship; handling of bulk cement is by air-pump system; owned and operated by Ideal Cement Co.

W. R. Grace Co. Wharf: about 1.3 miles above Ideal Cement Co. Pier; 45-foot T-head pier, 540 feet with dolphins; 26 feet alongside; pipelines extend from dock to storage tank at plant; receipt of liquid ammonia, owned and operated by W.R. Grace & Co.

West side of Cape Fear River below Wilmington:

Military Ocean Terminal (Wharf No. 1, No. 2, and No. 3): at Sunny Point, about 9 miles above the mouth; three identical 2,000-foot long wharves, about 0.4 miles apart; 12 to 37 feet alongside; deck heights, 16 feet; open and closed storage areas; forklifts up to 72 tons; truck unloading and railroad trackage at each wharf; highway connections; terminal railroad connects with Seaboard Coast Line Railroad; shipment of military supplies; operated by U.S. Army.

Supplies.–All manner of marine supplies and provisions are obtainable at Wilmington. Potable water is available at most of the berths. Bunker C oil is available to oceangoing vessels at Humble Oil Wharf and by barge. Diesel oil is available by truck.

Repairs.–There are two shipyards at Wilmington. All are on the west bank of Northeast (Northeast Cape Fear) River, one about 0.2 mile below the highway bridge, and the other about 0.5 mile above the railroad bridge.

The shipyard above the railroad bridge has a floating drydock with a lifting capacity of 1,000 tons and can handle vessels up to 200 feet. A 50-ton barge-mounted stiff-legged crane, and a 15-ton gantry crane are available. Hull, engine, and electrical repairs can be made.

The yard below the highway bridge has a 1,000-ton marine railway that can haul out craft up to 200 feet. A 100-ton boat lift, two 7½-ton crawler cranes, and a 5-ton mobile lift are available. Hull and engine repairs can be made, and there are machine, carpenter, and electrical repair shops; repairs to propellers up to 8 feet in diameter can also be made.

There are also several machine shops at Wilmington, on and off the waterfront, that can fabricate shafts, perform welding, and repair shafts and propellers. The largest propeller that can be repaired is 10 feet in diameter; the largest shaft that can be produced is 36 inches by 21 feet.

Small-craft facilities.–Berths and other facilities for small craft are limited at Wilmington due to the heavy commerical traffic. However, berths, gasoline, diesel fuel, water, ice, and a 1,000-ton marine railway are available at the shipyard on the west bank of Northeast River, about 0.2 mile below the highway bridge. The yard can also make hull, engine, and electrical repairs. More extensive small-craft facilities are at Southport, which is mentioned later in this chapter.

Communications.-Wilmington is served by U.S. Routes 17, 117, 74-76, 421, and State Routes 132 and 133, and has railroad connections with the Seaboard Coast Line Railroad. A commercial airline serves the local airport.

Southport, on the west bank of Cape Fear River 3 miles above the mouth, is a town where provisions and marine supplies can be obtained. Along its waterfront there are several fish wharves, service wharves, a yacht basin, and a small-boat harbor operated by the North Carolina State Ports Authority, as well as restaurants and motels. Berthage with electricity, gasoline, diesel fuel, water, and ice are available at these facilities. The U.S. Public Health Service maintains a **contract physician's office** in Southport. (See appendix for address.)

The Wilmington Cape Fear Pilots Association maintains an office and a lookout tower (33°55.0'N., 78°01.2'W.) adjacent to the town pier, which had 7 feet alongside in 1963. A marine railway is on the north side of the Intracoastal Waterway about 0.1 mile westward of the lookout tower; vessels up to 40 feet can be hauled out for hull repairs. About 6 feet can be taken to the railway. Immediately westward of the marine railway is a yacht basin which, in September 1973, had depths of 10 feet. The small-boat harbor, about 0.45 mile westward of the lookout tower, has a 36-ton mobile hoist and facilities for hull, engine, and electrical repairs. In September 1973, depths of 6 feet were available in the small-boat harbor. A storm barrier on the south bank of the Intracoastal Waterway protects the harbor.

From Southport the Intracoastal Waterway leads northward and follows the main ship channel in Cape Fear River to a point about 11.5 miles above the mouth of the river where it leaves the main ship channel and leads northeasterly to the west end of a landcut, known as **Snows Cut,** thence through the landcut to Myrtle Sound.

A dredged channel in Cape Fear River above Wilmington leads northwesterly for 3.5 miles to a turning basin at **Navassa,** thence to **Fayetteville,** the head of navigation, 100 miles above Wilmington. Three locks and dams are between Navassa and Fayetteville. In April 1973, the midchannel controlling depths were 11 feet to the turning basin at Navassa with 10 feet in the turning basin, thence in July-September 1974, the midchannel controlling depth was 5 feet to Fayetteville. The locks have a usable length of 200 feet, a width of 40 feet, and a depth over miter sills of 9 feet.

U.S. Route 17 highway bridge over Cape Fear River opposite Wilmington has a bascule span with a clearance of 26 feet. Just above the highway bridge is an overhead power cable with a clearance of 125 feet. The Seaboard Coast Line Railroad bridge at Navassa has a bascule span with a clearance of 6 feet. The least known high water clearance of the fixed bridges crossing Cape Fear River between Navassa and Fayetteville is 13 feet.

Black River flows into Cape Fear River about 12 miles above Wilmington. It has been reported that drafts of not more than 3 feet can be taken to **Still Bluff,** about 10.4 miles above the mouth.

Northeast (Northeast Cape Fear) River empties into Cape Fear River from northward at Point Peter 34°14'27"N., 77°57'20"W.), near the northern end of Wilmington. Above the turning basin, about 2 miles above the mouth, it is reported that natural depths of 6 feet can be taken for 42 miles, and thence 3 feet for 7 miles to **Crooms Bridge.**

U.S. Route 17 highway bridge over Northeast River 0.6 mile above its mouth has a bascule span with a clearance of 26 feet. The Hilton (Seaboard Coast Line) railroad bridge, about 1 mile above the mouth, has bascule span with a clearance of 4 feet. State Route 117 highway bridge at **Castle Hayne,** about 23.4 miles above the mouth, has a fixed span with a clearance of 23 feet at low water stage. The Seaboard Coast Line Railroad bridge just above it has a swing span with a clearance of 7 feet at low water stage. (See **117.240, and 117.245 (a) through (e), and (g) (10),** chapter 2, for drawbridge regulations and opening signals.)

Smith Creek empties into Northeast River from eastward about 1.5 miles above the river mouth. The controlling depth over the bar was 8 feet in July 1972, thence, in 1963, 4½ feet to the walkway crossing the creek at the airport. The creek was foul with stumps, logs, and submerged piling from the entrance to its head. State Route 117 highway bridge, 1.3 miles above the mouth, has a swing span with a channel width of 45 feet and a clearance of 3 feet. (See **117.240 and 117.245 (a) through (e) and (g) (9),** chapter 2, for drawbridge regulations and opening signals.) The Seaboard Coast Line Railroad bridge, about 2 miles above the mouth, has a fixed span with a clearance of 12 feet. An overhead power cable just above the bridge has a clearance of 30 feet.

Freshets.-Low-water stages prevail in the rivers above Wilmington from 2 to 4 months during the summer, and freshets usually occur as often as once a month during the remainder of the year, but with no regularity.

6. CAPE FEAR TO CHARLESTON HARBOR

This chapter describes the coast of North and South Carolina from Cape Fear to Charleston Harbor.

Also discussed are the deepwater ports of Charleston and Georgetown, S.C.; several smaller ports of which Wando and Mount Pleasant are the more important; Winyah Bay and its tributary rivers; the waters of Ashley, Wando, and Cooper Rivers and their tributaries; several of the minor rivers; and the shallow inlets which make into this section of the coast, including Shallotte, Little River, Dewees, North, Price, and Capers.

The section of the Intracoastal Waterway from Cape Fear River to Charleston Harbor is described in chapter 12.

There are numerous wrecks along this section of the coast; the most dangerous are marked.

Chart 11520 (1110)-From Cape Fear the coast curves gradually westward and southward for 80 miles to Winyah Bay Entrance. This section of the coast is a sand beach, with numerous sand dunes, separated from the heavily wooded mainland by small streams and marshes. From offshore, the woods appear to extend to the outer beach. The coast is clear, and a depth of 3 fathoms can be taken to within a mile of the beach, except at Murrells Inlet where, about 2 miles offshore, there is a 16-foot spot. The 10-fathom curve is from 11 to 25 miles offshore, and inside it the water shoals gradually as the shore is approached.

The character of the coast changes from Winyah Bay to Charleston Harbor. Here the coastline trends southwestward for about 45 miles and is a border of sandy barrier islands with off-lying shoal areas which include Romain Shoal, Bull Breakers, and Rattlesnake Shoal. These shoal areas should be given a wide berth. The 10-fathom curve along this section of the coast extends from 11 to 21 miles offshore.

Charts 11536 (1236), 11534 (835-SC).-Lockwoods Folly Inlet is entered over a shifting bar 11 miles westward of Cape Fear River. Strangers should not attempt it as the inlet is enclosed by breakers at virtually all stages of tide and wind. In July 1972, the midchannel controlling depth over the bar and to the Intracoastal Waterway was 1½ feet. The buoys marking the inlet are not charted, because they are frequently shifted in position to mark the best water. There are three charted wrecks, all showing at low water, near the entrance to the inlet; two are at the mouth, and the other is about 0.3 mile to the westward 200 yards offshore. A high sand dune is east of the inlet.

Lockwoods Folly River is navigable from the ocean to the Intracoastal Waterway, at the head of the marshes inside the inlet, and thence to a fixed highway bridge at **Supply,** which is at the practical head of navigation 16 miles above the waterway. The channel is narrow, bordered on both sides by oyster bars covered at high water, and not maintained. The mean range of tide is 4.2 feet at the inlet and about 2 feet at Supply. In December 1972, the controlling depth from the waterway to Supply was less than 1 foot. The river channel is marked by daybeacons to a pier about 1.6 miles northward of the Intracoastal Waterway where gasoline, water, and groceries can be obtained. In 1969, it was reported that the river was only being used by shallow-draft skiffs.

An **explosives anchorage** is centered about 3.5 miles southwestward of Lockwoods Folly Inlet. (See **110.170,** chapter 2, for limits and regulations.)

Shallotte Inlet, 19 miles westward of Cape Fear River, is entered over a shifting bar and has a winding entrance. A lighted buoy marks the entrance. The bar channel is subject to continual change, and the buoys marking it are shifted frequently to mark the best water, and therefore not charted. The inlet, used only by local fishermen and not recommended to strangers, provides an access from the sea to the Intracoastal Waterway and to **Shallotte River.** The river is navigable to the town of **Shallotte,** about 8 miles above the inlet. In 1963, the controlling depth over the bar and to the Intracoastal Waterway was 4 feet, and thence in November 1974, 4 feet to Shallotte. The mean range of tide is 4.6 feet near the inlet and about 3 feet at Shallotte.

Berthage, electricity, gasoline, diesel fuel, water, ice, launching ramps, and some marine supplies can be obtained at two small-craft facilities on the west bank of Shallotte River, about 0.5 mile and 1.3 miles above the Intracoastal Waterway. A marine railway at the southerly facility can handle craft up to 40 feet for hull and engine repairs. The facilities at Bowen Point are described with the Intracoastal Waterway in chapter 12.

Tubbs Inlet, 6 miles westward of Shallotte Inlet, is seldom used. It is unmarked and not recommended to strangers.

Charts 11535 (1237), 11534 (835-SC).-Little River Inlet, 28 miles westward of Cape Fear River, is entered between **Waities (Waiter) Island** on the west and **Bird Island** on the east, at high water. A lighted whistle buoy is off the entrance. The bar channel is subject to continual change, and the buoys marking it are shifted frequently to mark the best water, and therefore not charted; local

knowledge is advised. In 1963, breakers extended across the entire entrance and no channel was found. However, in 1969, local fishing boats were reported using the inlet. Once inside the bar, a channel leads for about 1.5 miles to the junction with the Intracoastal Waterway from a point northward of the eastern end of Waities Island. In 1967, the controlling depth in this channel was about 9 feet. The mean range of tide at the inlet is about 5 feet.

Between Little River Inlet and Murrells Inlet are many piers, most of which are marked by lights and extend out some 400 to 1,000 feet into the ocean. **Storm warning signals are displayed.** (See chart.)

Myrtle Beach, a summer resort, is on the outer beach nearly 20 miles southwestward of Little River Inlet and 32 miles north-northeastward from Georgetown Light. At **Ocean Forest,** 3.5 miles northeast of Myrtle Beach, there is a large red brick hotel whose tall central tower is the most prominent landmark between Beaufort and Winyah Bay. An aviation light is on the hotel tower at an elevation of 176 feet. Numerous tanks in the area are conspicuous. Hotels, motels, and a space needle tower along the beach, and a microwave tower, 230 feet high, at Myrtle Beach, are also prominent. At Myrtle Beach Air Force Base, the rotating aerobeacon on a tank, and several radio antennas close-to, marked by red lights, can be seen seaward.

Murrells Inlet, 12 miles southwest of Myrtle Beach and 20 miles north-northeastward of Georgetown Light, connects with **Main Creek** and **Oaks Creek,** which drain a considerable area of marsh between the mainland and the outer beach. The entrance bar is shifting, and the channel is subject to change. A lighted bell buoy is off the entrance. In 1975, the inlet had shoaled to less than 2 feet, and the transit of this entrance was hazardous to all traffic at both low and high water. Inside the inlet, where the channel turns sharply to northward into Main Creek, the tide rips are strong at full ebb or flood current. In 1963, the controlling depth was 4 feet up this channel for about 1.8 miles to a launch landing. The channel over the bar is marked by buoys, and the channel in Main Creek to the landing by daybeacons. The aids marking the bar channel are shifted frequently to mark the best water, and therefore not charted. Local fishermen use this inlet, but strangers should not enter without local knowledge.

There are two marinas on Main Creek; one is at the landing, and the other is eastward of the landing on the west side of the barrier beach. Berthage, electricity, gasoline, diesel fuel, water, ice, launching ramps, and some marine supplies are available at both facilities; hull repairs can be made at the westerly facility. Depths in the approaches and alongside the piers at the marinas are reported to be about 3 feet. Restaurants and motels are available.

Two fish havens, marked by buoys, are about 3.3 miles east-southeastward and about 5.5 miles south-southeastward, respectively, of Murrells Inlet.

Charts 11532 (787), 11535 (1237), 11531 (1238).-North Inlet, about 14 miles southward of Murrells Inlet and 6 miles northward of Georgetown Light, connects with Winyah Bay by way of both **Town Creek** and **Jones Creek.** Some local fishermen use the inlet, but strangers should not. In 1963, the controlling depth over the bar was 5 feet. The inlet and the creeks are unmarked. There is little water on the Winyah Bay side, and navigation is restricted to shallow-draft craft. In 1963, Jones Creek, the southerly of the two, was found to bare in places, and, in 1969, numerous oyster bars were reported.

Winyah Bay is the first harbor southward of Cape Fear River, a distance of 70 miles, that is navigable for vessels drawing up to 25 feet. It is entered between **North Island** and **South Island.** The entrance is protected by jetties. The entrance is not safe for small craft except in favorable weather. Heavy tide rips prevail near the ends of the jetties, and heavy seas run in moderate weather. The south jetty is visible only at low water. Craft drawing 4 feet or less can enter close to the outer end of the north jetty in good weather.

Georgetown, 14 miles above the entrance to Winyah Bay, is on the north bank about 1.5 miles above the entrance to Sampit River. It is 392 miles south of Norfolk and 247 miles north of Jacksonville by coastwise routes. It is a city of growing commercial importance and has a large pulpmill, a chemical plant, a steel fabrication plant and rolling mill, and several seafood processing plants. The principal exports are steel products, wood pulp, and kraft paper. Veneer logs, tapioca meal, petroleum products, and general cargo are imported. It is the terminus of a branch of the Seaboard Coast Line Railroad, and considerable ocean shipping calls at the port. It has schools, banks, motels, markets, restaurants, a hospital, and many landmarks of historical interest.

Prominent features.-Georgetown Light (33°13.4'N., 79°11.1'W.), 85 feet above the water, is shown from a white cylindrical tower near the south end of North Island. A radiobeacon is at the light. The light is difficult to pick up in daytime especially in hazy weather due to the sanddunes in the vicinity and the trees surrounding the lighthouse. There are no other prominent objects in the vicinity, and the land is low on both sides of the entrance.

Boundary lines of inland waters.-There are no specific lines established for inland waters in Winyah Bay. The general rule for inland waters apply. (See **82.2,** chapter 2.)

Channels.-Federal project depth is 27 feet from the sea to the turning basin off the two deepwater terminals on Sampit River. The channel is well

marked by lighted ranges, buoys, and other aids. The channel is maintained at or near project depth, but during freshets from February to April it is reported that silting occurs in the turning basin and on Sampit River Range; annual dredging is necessary to maintain this portion at project depths. (See Notice to Mariners and latest editions of charts for controlling depths.)

An unmarked dredged side channel leads from the main river channel along the easterly and northerly sides of the horseshoe-shaped bypassed portion of Sampit River fronting the city of Georgetown to the north end of another turning basin on the westerly side of the horseshoe. The turning basin, marked by lights and buoys, can also be entered from the main river channel. In 1968, the side channel had a controlling depth of 12 feet. In 1973, depths of 27 feet were available in the turning basin except for a depth of 20 feet at the northern end. The channel has a tendency to shoal between dredgings.

Anchorages.-There are no anchorages in Winyah Bay or Sampit River for deep-draft vessels. The recommended anchorage, as reported by the local pilots, is about 5 miles eastward of Georgetown Light in 5 to 6 fathoms, sandy bottom.

Dangers.-The principal dangers in the approach to Winyah Bay are: **East Bank,** covered 6 feet and marked by a buoy, about 2 miles south of the end of the south jetty; an unmarked shoal, with a least depth of 14 feet, about 4 miles southward of East Bank; **Hector Wreck,** cleared to a depth of 9 feet and marked by a lighted bell buoy, about 12 miles southward of the sea buoy (Winyah Bay Lighted Bell Buoy 2WB); a wreck, with 19 feet over it and marked by a lighted gong buoy, about 13 miles southeastward of the sea buoy; and an obstruction, reported covered 20 feet, 300 yards northward of the sea buoy. Vessels approaching the entrance at night should remain in the vicinity of the sea buoy until the pilot boards. Some vessels, mistaking Range B Lights for Entrance Channel Range A Lights, have approached the entrance too closely at night and only with difficulty have cleared the outer end of the south jetty. Mariners are advised to familiarize themselves with the characteristics of these ranges before making the approach.

The local pilots report that the southwest tip of North Island just inside the jetties is building up and is encroaching southward to near the easterly edge of the channel; caution is advised.

Tides and currents.-The mean range of tide on the bar off the end of the south jetty is 4.6 feet; in the channel off Georgetown Light is 4 feet; and at Georgetown, 3.3 feet. The force and direction of the wind has marked influence on the range of the tide. Continuing easterly winds bringing abnormal high tides and westerly winds much lower tides.

The tidal currents are affected by variations in the flow of the tributary rivers. The velocity is greatest between the jetties where the average is between 2 and 3 knots. The set is diagonally across the south jetty. During freshets in the rivers, also with westerly winds, the velocity of the ebb current between the jetties is reported to be very strong at times and the channel buoys between the jetties are nearly towed under. In the channel in Winyah Bay, from the entrance to Georgetown, the tidal current averages about 2 knots, but during freshets the ebb current is considerably stronger and the flood weaker. Near the mouth of Sampit River, the tidal current averages about 1 knot with somewhat stronger ebb current velocities during freshets. Outside the jetties, with fresh to strong northeast winds, a strong southerly current is reported to set across the entrance channel and with southerly and southwesterly winds a northerly set is experienced. Current predictions for a number of places in Winyah Bay and vicinity are given in the Tidal Current Tables.

Weather.-The climate is usually mild, and, except in severe winters, little ice is seen and then only along the banks. The channels are never obstructed. Fog is prevalent during the fall and spring and usually sets in during southwesterly weather, when it may persist for several days. Fog due to a large drop in temperature usually burns off in the forenoon. Fog sometimes hangs offshore or in the entrance when it is clear inside.

Winter temperatures average near 60°F during the day and in the upper 30's at night. Temperatures drop to freezing or below only on about 28 days per year; a 4°F temperature was recorded one February. Precipitation averages about 3 to 4 inches per month during the winter and falls on 4 to 6 days per month; snow is rare and averages about one-half inch.

Summer maximum temperatures average in the upper 80's, while minimums average in the low 70's. Temperatures reach 90° F or higher on about 55 days annually; a reading of 104° F was recorded in both June and August. June through August is generally considered the rainy season; about half of the 50-inch annual average occurs during these months.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Routes.-Vessels from the northward usually make for the sea buoy from Frying Pan Shoals Light. When coming from the southward, they should stay outside Cape Romain Lighted Whistle Buoy 2CR, shaping for the entrance, taking care to avoid the wreck, marked by lighted gong buoy, about 4 miles north-northwestward of Cape Romain Lighted Whistle Buoy 2CR. Some vessels in closing the entrance have mistaken the ranges and come too close to the south jetty; they should remain in the vicinity of the sea buoy until the pilot boards.

Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. vessels in the coast-

wise trade which have on board a pilot licensed by the Federal Government. Pilots will board day or night from the pilot boat just south of the sea buoy (Winyah Bay Lighted Bell Buoy 2WB, (33°11.6'N., 79°05.4'W.). The pilot boat is painted white with a white P on a black funnel. The alternate pilot boat, the KERMATH, is painted white and has a flying bridge. The pilot boats fly the code flag H, and are equipped with radiotelephone and monitor 2182 kHz, 2368 kHz, 2738 kHz, and VHF-FM channels 16 (156.80 MHz) and 19A (156.95 MHz) when working ships. Pilots are arranged for in advance by wire, by radiotelephone through the Charleston or Savannah Marine Operators (telephone at Georgetown, 803-546-5977) or through ships' agents.

Towage.-Two tugs, 1,000 hp and 600 hp, are available at Georgetown. Tugs are required for docking and undocking large oceangoing vessels; tugs meet vessels just below Georgetown. Arrangements for such services are usually made well in advance through ships' agents.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) The U.S. Public Health Service maintains a **contract physician's office** in Georgetown. (See appendix for address.) There is a county hospital at Georgetown.

Agriculture quarantine inspections are made at the berths by officials from Charleston.

Customs.-Georgetown is a customs **port of entry.** A port director of customs boards vessels at the berths. The office is at the State Ports Authority Terminal.

Documentation may be obtained at the Coast Guard's Marine Inspection Office, Federal Building, Charleston, S.C.

Immigration officials from Charleston board vessels at the berths. The customs officer sometimes acts for the Immigration Service.

Harbor regulations.-The South Carolina State Ports Authority exercises jurisdiction over the port through the manager of the State Ports Authority Terminal at Georgetown. The manager's office is at the terminal. There are no formal harbor regulations.

Wharves.-Only the major port facilities at Georgetown are described. These include the South Carolina State Ports Authority Terminal Pier and the International Paper Co. Wharf, both on the north side of the turning basin in Sampit River, and two barge facilities above the turning basin. The wharves have railroad and highway connections, and most have water and electrical shore power available. General cargo is handled at the port by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. The alongside depths given for each facility described are reported depths. (For information on the latest depths, contact the operator.) There are several seafood-handling and small-craft service wharves along the city waterfront. (For a complete description of the port facilities, refer to the Port Series, a Corps of Engineers publication.)

Pier 32 (33°22'00"N., 79°17'30"W.): at northwest side of the horseshoe-shaped bypassed portion of Sampit River at Georgetown; marginal wharf with 600-foot face; 712 feet usable with dolphins; 27 feet alongside; deck height, 15 feet; 90-ton crane equipped with buckets and electromagnets; shipment of steel products; owned by South Carolina State Ports Authority and operated by Georgetown Steel Corp.

South Carolina State Ports Authority Terminal Pier 31 (33°21'35"N., 79°17'15"W.): north side of turning basin; marginal type wharf with 500-foot face; 27 feet alongside; deck height, 10 feet; transit shed with about 55,000 square feet of storage space; open storage area; forklift trucks; railroad tracks on 40-foot wharf apron and at rear of transit shed; vessels bunkering facility at the west end of the wharf; pipelines extend from pier to fuel storage tanks at terminal; receipt and shipment of general cargo in the foreign and domestic trade; receipt of fuel oil bunkering vessels; owned and operated by the South Carolina State Ports Authority.

International Paper Co. Wharf: north side of turning basin, about 350 yards westward of State Ports Authority Terminal: marginal type wharf with 480-foot face; 27 feet alongside; deck height, 10 feet; transit shed with 32,000 square feet of storage space; forklift trucks; railroad trackage on 34-foot apron and at rear of transit shed; shipment of paper, receipt of tapioca flour, and occasional receipt of general cargo in the foreign and domestic trade; owned by International Paper Co. and operated by Bay Harbor Warehouse Corp.

International Paper Co., Lower Wharf: north side of Sampit River about 0.75 mile westward of South Carolina State Port Authority Terminal: 175- and 90-foot faces, 510 feet usable berthing space with dolphins; 10 feet alongside ; deck height, 10 feet; mooring of company barges; owned and operated by International Paper Co., Southern Kraft Division.

International Paper Co., Upper Wharf: north side of Sampit River about 0.9 mile westward of South Carolina State Ports Authority Terminal; 350- and 153-foot faces, 1,653 feet usable berthing space with dolphins; 10 feet alongside; deck height, 10 feet; receipt of pulpwood, shipment of paper by barge; owned and operated by International Paper Co., Southern Kraft Division.

Supplies.-Marine supplies and provisions can be obtained at Georgetown. Bunker C is available to oceangoing vessels at the South Carolina State Ports Authority Terminal. Diesel fuel is trucked in to the two deepwater piers or barged in from Charleston.

Repairs.-There are no facilities available at the port of Georgetown for making major repairs or drydocking large, deep-draft vessels; the nearest such facilities are at Charleston, S.C. The Interna-

tional Paper Co. has two marine railways at its marine repair piers on the north side of Sampit River, about 0.3 mile westward of the State Ports Authority Terminal. These facilities are for maintaining and repairing company-owned floating equipment, but are available to the public in an emergency or by prior arrangement. Each railway can handle vessels up to 95 tons.

There are machine repair shops in Georgetown; minor above-the-waterline hull and engine repairs can be made.

Small-craft facilities.-There are several facilities on the east side of the bypassed portion of the river along the city waterfront. Gasoline, diesel fuel, berthage with electricity, water, ice, provisions, marine supplies, and launching ramps are available. A boatyard is on the east side of the bypassed channel about 0.4 mile northward of the junction with the main ship channel. The yard has two marine railways, the largest of which can handle craft up to 60 feet or 50 tons for hull and engine repairs; open, covered, wet, and dry storage is also available here. A 1-ton fixed lift is available at a marina about 250 yards above the boatyard; hull, engine, and electrical repairs can be made here.

Communications.-Georgetown is served by several good highways, and by the Seaboard Coast Line Railroad.

Above Georgetown the principal landing on **Sampit River** is at **Sampit** about 10 miles above the river mouth. U.S. Routes 17 and 701 highway bridge crossing the river at Georgetown has a fixed span with a clearance of 34 feet. The overhead power cable about 0.9 mile above the bridge has a clearance of 61 feet. A boatyard on **Penn Royal Creek,** off the river about 5 miles above Georgetown, has a marine railway that can haul craft up to 60 feet. Wet and dry storage are available, and hull and engine repairs can be made. In 1963, the controlling midchannel depth from the bridge to **Sampit Landing** was 7½ feet. Controlling depth in Penn Royal Creek was 9 feet to the boatyard. Sampit River above Georgetown is not marked.

Waccamaw River rises at Lake Waccamaw, N.C., and flows southwestward into Winyah Bay just above Georgetown. The river is little used, except for that section which is a part of the route of the Intracoastal Waterway described in chapter 12. The route of the waterway leaves Waccamaw River near Enterprise Landing, about 24 miles above the mouth.

The controlling depth in Waccamaw River from Enterprise Landing to **Conway,** 36 miles above the mouth, was 8 feet in 1972. This section of the river is marked by daybeacons to near Conway. Above Conway the river is obstructed by logs, snags, and sandbars. The mean range of tide at the river entrance is 3.2 feet and 1.2 feet at Conway. The head of the tidal reach is at **Bellamys Landing,** 80 miles above the mouth. (For predictions see the Tide Tables.) The freshet range at Conway is about 13.5 feet. An overhead power cable with a clearance of 76 feet crosses the river about 3 miles above Enterprise Landing. About a mile below Conway U.S. Route 501 fixed highway bridge over Waccamaw River has a clearance of 35 feet. An overhead power cable just northward of the bridge has a clearance of 59 feet. At Conway the river is crossed by three bridges. The first, a highway bridge, has a fixed span with a clearance of 50 feet. The second is a railroad swing bridge with a clearance of 3 feet. The third, also a railroad swing bridge, has a clearance of 1 foot; an overhead power cable near this bridge has a clearance of 50 feet. Regulations and opening signals for the drawbridges are given in **117.240,** chapter 2.

Pee Dee River rises in the North Carolina mountains and flows generally southeastward into Winyah Bay just westward of Waccamaw River. U.S. Route 17 fixed highway bridge over Pee Dee River just above the mouth at Georgetown has a clearance of 20 feet. About 300 yards northward of this bridge the 80-foot swing span of the former Route 17 highway swing bridge has been removed; the fixed portions of the bridge on either side of the channel remain as fishing piers. The velocity of the current at the former bridge is about 1 knot. (For predictions see Tidal Current Tables.) At **Yauhannah,** 28 miles above the mouth, the river is crossed by U.S. Route 701 fixed highway bridge with a clearance of 25 feet.

The Seaboard Coast Line Railroad bridge near **Poston,** about 62 miles above the mouth, is the head of commercial navigation. The river is unmarked.

Black River empties into Pee Dee River from northward about 3 miles above the mouth of the latter, and is navigable for a distance of 44 miles. The river is unmarked. The bridges over Black River have minimum channel widths of 16 feet and minimum clearances of 1 foot; regulations and opening signals for drawbridges are given in **117.240 and 117.245 (a) through (e) and (g) (14),** chapter 2. The mean range of tide in Pee Dee River is 3.3 feet at the mouth and 0.2 feet at the mouth of Little Pee Dee River, 33 miles above. **Mingo Creek** flows into Black River about 22 miles above the mouth of the latter. When last ascertained, the controlling depth in this creek was 8 feet. The mean range of tide is 2 feet, and the freshet range is 4.5 feet.

Chart 11531 (1238).-Between Winyah Bay and Charleston Harbor are several rivers and inlets which are changeable in character, and local knowledge is essential to enter even under favorable conditions. Some dry at low water, and in the others the depths range between 1 and 6 feet. Suitable anchorages for small craft can be found inside these inlets or in their tributary waters. At most entrances, the channels trend in northerly directions, and shoals and breakers generally mark the channel edges inside the bars. Entrances to

North Santee River and Bull Bay are less difficult of navigation than the other entrances in this locality, but these should be entered only at high water under favorable weather conditions.

Between Winyah Bay entrance and Cape Romain, broken ground, with depths of less than 5 fathoms, extends 11 miles offshore. In addition, East Bank, Hector Wreck, and a 14-foot spot about 6 miles offshore, all previously mentioned as dangers in the approach to Winyah Bay, should be avoided.

Santee River, formed by the confluence of **Congaree River** and **Wateree River,** flows generally southeast and enters the ocean between Winyah Bay and Cape Romain. Its two mouths, known as **North Santee River** and **South Santee River,** are both obstructed by shifting bars with little depth. In the tidal reach are several privately owned landings which are used infrequently. The river is closed to navigation at Wilson Landing, 75 miles above the mouth, by the Santee Dam.

Vessels bound for Santee River are advised to enter by way of Winyah Bay and the Intracoastal Waterway. Navigation between the coast and points on Santee River above the dam is possible by way of Cooper River and the Santee-Cooper project. The U.S. Route 17 fixed highway bridges over North and South Santee Rivers, about 12 miles above the mouths, have clearances of 29 feet over North Santee River and 15 feet over South Santee River.

Cape Romain, the southeasterly extremity of Cape Island, is about 14.5 miles southwestward of the entrance to Winyah Bay.

Cape Romain Shoal, with depths of 4 to 18 feet over it, extends 4 miles southeastward from Cape Romain. The outer end of the shoal is marked by a buoy. The twin towers of an abandoned lighthouse, the taller 165 feet high, stand on the east end of **Lighthouse Island,** northwestward of Cape Romain. A 335-foot microwave tower and a 108-foot lookout tower at McClellanville, about 6 miles inland, are also conspicuous from seaward.

Cape Romain Harbor, with depths of 1 to 2 feet, is an unimportant cove indenting the western shore of **Cape Island.** The harbor, used only by small local fishing craft, is approached from northward through a narrow, crooked, unmarked channel leading from sea around the north end of Cape Island. In 1963, the controlling depth was 4 feet. In 1969, the approach leading from the south between Cape Romain and Lighthouse Island to Cape Romain Harbor was reported closed. **Casino Creek** is one of several creeks and connecting passages that lead from inside of Cape Island to the Intracoastal Waterway; in 1963, the controlling depth was 3 feet in Casino Creek. The use of the creeks requires local knowledge; the chart is the best guide.

Five Fathom Creek, about 4.2 miles westward of the southwestern extremity of Cape Island, is entered westward of **Sandy Point** at the western end of **Raccoon Key.** In 1963, the controlling depth was 3 feet from the sea to the Intracoastal Waterway. Narrow and crooked at its upper end, the creek has deeper water throughout from the entrance to within a mile of the waterway. A bell buoy marks the approach, and buoys mark the channel through Bull Bay. The outer bar is subject to change, and strangers should not attempt it.

Bull Bay, southwest of Raccoon Key, is entered between Sandy Point on the north, and **Northeast Point** on the south. The bay is broad and shallow, and has numerous shoals, many of which are bare at low water. A 56-foot steel skeleton fire lookout tower west of the bay is conspicuous from seaward. The narrow channel into **Bull Creek,** at the southwest side of the bay had, in 1963, a controlling depth of about 9 feet over the bar. In 1963, shoaling to ½ foot extended 1.1 miles eastward to **Northeast Point.** The controlling depth in Bull Creek from Northeast Point to Bull Narrows was 2 feet in 1963; the creek is used occasionally as an anchorage. **Bull Breakers** extend 4 miles southward from **Bull Island,** on the southwest side of the entrance to Bull Bay, and are marked at their outer end by a buoy. The 131-foot steel skeleton lookout tower of the former Bull Island Lifeboat Station is prominent.

Chart 11521 (1239).-Price Inlet (31°52.5'N., 79°39.1'W.), between Bull Island and **Capers Island,** had a depth of about 4 feet over the bar in 1963. The channel is unmarked. In 1963, breakers extended across the entire area, and the controlling depth in **Price Creek** from the inner edge of the bar to the Intracoastal Waterway was 5 feet. The inlet, the best between Bull Bay and Charleston, is used by local fishermen. With average weather conditions, there are heavy breakers on the shoal on the eastern side of the channel and small breakers on the west side. Good anchorage is available in Price Creek. An overhead power cable with a clearance of 85 feet crosses Price Creek about 0.5 mile above the mouth.

Capers Inlet, between Capers Island and **Dewees Island,** has a depth of about 3 feet over the bar. In 1963, breakers extended across the entire entrance, and the controlling depth was 5½ feet in **Capers Creek** from the inner edge of the bar to the Intracoastal Waterway. The channel is narrow, unmarked, and seldom used. Because of the shoal that extends eastward on the south side of the inlet and breaks the southwesterly seas, the channel can be entered when the wind is southwest. A shoal bare at about half tide extends southward along the eastern side of the inlet. There are numerous stumps and snags outside the high waterline in Capers Creek. An overhead power cable over Capers Inlet has a clearance of 86 feet.

Dewees Inlet, between Dewees Island and **Isle of Palms,** had a depth of about 6 feet over the bar in 1963; thence, deeper water inside to the Intracoastal Waterway via **Dewees Creek.** The chan-

nel is narrow, unmarked, and seldom used. Breakers extend across the entrance to the inlet. An overhead power cable over Dewees Inlet has a clearance of 87 feet.

A water tower at the pleasure resort near the southwest end of the Isle of Palms and a lookout tower on Dewees Island are prominent. A fishing pier, marked at the outer end by private lights, projects seaward from the resort. Two wrecks, about 0.35 mile apart, are off the eastern shore of the Isle of Palms about 1.5 miles 107°½ and 1.6 miles 120°½ respectively, of the water tower. The wrecks are believed to be the remains of Confederate ships which were apparently sunk by Union forces as they sought to slip into blockaded Charleston Harbor; they are unmarked and are covered 6½ feet and 4½ feet, respectively. An obstruction, covered 9 feet and unmarked, is about 2.55 miles 125° from the water tower. Caution is advised in this area.

Breach Inlet is between Isle of Palms and Sullivans Island. There is very little water over the bar, and breakers extend entirely across the entrance under almost all weather conditions. Currents are extremely strong in this inlet. A highway bridge over the inlet has a fixed span with a clearance of 5 feet.

Charts 11523 (491), 11524 (470), 11521 (1239).-Charleston Harbor, 264 miles southwestward of Cape Hatteras and 65 miles northeastward of Savannah River, is the approach to the city of Charleston and to Cooper and Ashley Rivers. The harbor is easy of access day or night in clear weather, and is one of the best harbors of refuge on the South Atlantic coast.

Caution.-The areas generally to the east and southeast of Charleston Harbor are used extensively by the U.S. Navy and other military services to conduct various types of surface, subsurface, and aircraft training exercises. The Commander, U.S. Naval Base, Charleston, S.C., has cognizance of the operating areas through the Charleston Operating Area Coordinator (COAC).

Charleston, the largest city and port in South Carolina, is at the confluence of Cooper and Ashley Rivers. The distance from the end of the jetties to the southernmost wharves at Charleston is about 7 miles. The city is a center of a rich agricultural district for which it is the distributing point. Numerous manufacturing plants are in and near the city. The principal wharves are along the west bank of Cooper River. Imports are coffee, cotton, wool, bananas, frozen meats, plywood, automobiles, steel products, naval stores, petroleum products, and general cargo. Exports are dried milk, cotton textiles, wood pulp, lumber, heavy machinery, chemicals fertilizer, scrap iron, and general cargo.

A **prohibited dumping ground** is in the Atlantic Ocean off Charleston Harbor. (See **205.80 (a) and (c) (1),** chapter 2, for limits and regulations.)

Dumping grounds are in the Atlantic Ocean south of Charleston Harbor and in Ashley River. (See **205.30, 205.80 (a), and (b) (5),** chapter 2, for limits and regulations.)

Prominent features.-The entrance to Charleston Harbor is between converging jetties which extend nearly 3 miles seaward. Prominent to the northward of the entrance are several tanks on Sullivans Island and one on Isle of Palms. **Fort Moultrie** and the town of **Sullivans Island** are on the north side of the entrance; the 155-foot conical tower of the abandoned old Charleston Lighthouse is south of the entrance; **Fort Sumter** is on the southwest side of the channel just inside the entrance.

The prominent fixed red lights marking the top of the central span of the more northerly of the Cooper River twin bridges can be seen from the channel between the jetties, and are useful in connection with Mount Pleasant range. When Mount Pleasant range line is extended northwestward to the bridge, it intersects the bridge just west of the midpoint between the two bridge lights. Prominent fixed red lights also mark the top of the central span of the northerly bridge where it and the southerly bridge cross Town Creek, west of Drum Island.

Charleston Light (32°45.5'N., 79°50.6'W.), 163 feet above water, is shown from a triangular tower, upper half red, shown from a triangular tower, upper half black, lower half white, on Sullivans Island. A radiobeacon is at the light.

Storm warning signals are displayed. (See chart.)

Boundary lines of inland waters.-The line established for Charleston Harbor is described in **82.35,** chapter 2.

Channels.-The entrance to Charleston Harbor is between converging jetties, the inner portions of which are submerged. An opening in the south jetty is marked by buoys.

A Federal project provides for a channel 35 feet deep over the bar and through the entrance into the major reaches of Cooper River and Town Creek to Goose Creek, 13.6 miles above the mouth; and a connecting channel into Shipyard Creek 30 feet deep. A 35-foot Navy-maintained channel extends from the head of the Federal project in Cooper River to a turning basin at a naval facility, about 2.6 miles above Goose Creek; thence 30 feet for another 0.8 mile. The channels require constant dredging to maintain them at or near project depths, due to the silting of Cooper River. (See Notice to Mariners and latest editions of charts for controlling depths.) **South Channel,** from the main channel to off the Battery, is no longer maintained. In June 1970, the midchannel controlling depth was 23 feet from a junction with Rebellion Reach to a junction with Ashley River channel, thence 20 feet in 1963, to off the Battery. The channels are well marked by lighted ranges and other aids to navigation.

Anchorages.-The principal anchorage for deep-draft vessels is in the triangle westward of the junction of Rebellion Reach of the main channel with South Channel. (See **110.173**, chapter 2, for the limits of other anchorage areas covered by Federal regulations.)

Dangers.-Vessels approaching must guard against an inshore set which may amount to a knot or more due to indraft of current into the various inlets. In this area, preceding a northeasterly or following a southerly gale, a hazy atmospheric condition may be encountered, which results in low visibility of lights even in fine weather when it is clear overhead. During the periods when this condition prevails, it is reported that excessive inshore sets have been experienced.

Rattlesnake Shoal, 3 miles offshore and the same distance east-northeastward of the north jetty at the entrance to Charleston Harbor, is about 2 miles long east and west; its least depth is about 9 feet. A buoy is east of the outer end of the shoal.

Two unmarked rectangular-shaped drill mine fields, with reported depths of 30 feet in 1967, are about 6.5 miles northeastward and 7.5 miles east-northeastward, respectively, of the sea buoy (Charleston Lighted Whistle Buoy 2C). A lighted buoy is between these unmarked drill mine fields. Another drill mine field, marked by buoys, is about 10 miles southward of Charleston Light. An unmarked dangerous wreck is in 32°47.2'N., 79°30.9'W., about 4 miles northeastward of the buoy. There are several other unmarked charted dangers inside the buoy; caution is advised in this area.

Routes.-From northward, the safer approach to Charleston Harbor, and the one generally used by deep-draft vessels, is outside Frying Pan Shoals Light. The course should be shaped west-southwesterly to pick up Cape Romain Lighted Whistle Buoy 6, and then the Charleston sea buoy. From southward, a northeast course, from a point about 3 miles southeastward of Savannah Light, will lead to the Charleston sea buoy.

Caution.-Charleston pilots have reported that vessels approaching Charleston Harbor have mistaken the lighted buoy about 8 miles east-northeastward of the sea buoy for the sea buoy. Mariners are advised to check the light characteristics of the buoys.

Tides.-The mean range of tide at Charleston and Fort Sumter is about 5 feet. At Fort Sumter the tides occur about 10 minutes earlier than at Charleston. Daily predictions for Charleston are given in the Tide Tables.

Currents.-Off the entrance to Charleston Harbor the tidal currents are rotary with velocities of about 1 knot. Near the entrance to the jetties the current sets fair with the channel at strengths of flood and ebb and can be expected to set across the channel with a velocity of about 0.2 knot about 3 hours after strength of flood and ebb, setting northeastward and southwestward, respectively.

In the channel between the west end of the south jetty and the submerged jetty, the average velocities of the current at strengths of flood and ebb are about 1.5 knots and 2 knots, respectively.

Daily predictions for Charleston Harbor, off Fort Sumter, are contained in the Tidal Current Tables, and predictions for a number of other locations in the harbor and tributaries can be obtained through the use of Table 2 of the Tidal Current Tables. Tidal Current Charts are available for Charleston Harbor, including the entrance thereto, and Wando, Cooper, and Ashley Rivers.

Weather.-The climate is equable, and the port is comparatively free of fog and high winds. Mild winters and warm humid summers are caused by Charleston's closeness to the coast. Prevailing winds are northerly in the fall and winter and southerly in the spring and summer.

While temperatures often reach the 90's during the summer, readings of 100°F or higher are infrequent. Maximum temperatures are generally several degrees lower along the coast due to the cooling effect of the sea breeze. Summer is the rainiest season; showers and thunderstorms during this season account for 41 percent of the annual fall.

During the late summer and fall, weather is mostly sunny, but it is during this season that hurricanes are a maximum threat to South Carolina. Winters are mild, and 18 percent of the annual precipitation occurs during this season. Temperatures of 20°F or less are rare.

Spring is the most spectacular time of the year as a windy, cold March turns into a warm, pleasant April. Spring rainfall represents about 20 percent of the total annual precipitation.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

The National Weather Service Office is at the Municipal Airport about 12 miles outside of the city. **Barometers** may be compared there. (See page T-2 for the **Charleston climatological table.**)

Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. vessels in the coastwise trade which have on board a pilot licensed by the Federal Government. The Charleston pilots maintain two pilot boats, the PILOT and PILOT II; they are 65 feet and 60 feet long, respectively, have black hulls and white superstructures with gray trim, and the names are shown in white on their sides. Pilots board vessels day or night from the pilot boats in the vicinity of the sea buoy (Charleston Lighted Whistle Buoy 2C, (32°40.7'N., 79°42.9'W.). The boats fly the code flag "P", are equipped with radar, and maintain radiotelephone communications on 2738 kHz, 2182 kHz, and on VHF-FM channels, 13 (156.65 MHz), 16 (156.80 MHz), and 18A (156.90 MHz). The pilot station at Charleston monitors these frequencies on a 24-

hour basis. Communication on other frequencies is also maintained between the pilots, pilot station, and tugs. Pilots may be obtained by wire, by radiotelephone through the Charleston Marine Operator (telephone 803-722-6695), or by prior arrangement through ships' agents.

Towage.-Tugs are required for docking and undocking. Tugs up to 1,800 hp are available at all hours by arrangements through ships' agents. They usually meet vessels bound for Charleston proper at or near the Customhouse Reach, and vessels bound for North Charleston at or near North Charleston Reach. Tugs can also be engaged for salvage or deep-sea towing.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) An **outpatient** clinic is maintained by the Public Health Service. The quarantine office and the clinic are in the Federal Building. There are several large public and private hospitals in Charleston.

Agriculture quarantine inspections are conducted at the berths. Officials maintain an office in the Charleston Customhouse.

Customs.-Charleston is a customs **port of entry.** The customhouse is on the waterfront about a half mile northward of the Battery. Vessels are boarded at the berths.

Coast Guard.-The **Captain of the Port** is at the Coast Guard Base (32°46.4'N., 79°56.6'W.) on the east side of the Ashley River. **Documentation** may be obtained at the Marine Inspection Office in the Federal Building.

Immigration officials are stationed at Charleston. They board at the berths. The office is in the Federal Building.

Harbor regulations.-The South Carolina State Ports Authority exercises jurisdiction over the port of Charleston through its General Manager. The manager is at the Authority's main office at Customhouse Wharf. The **harbormaster** enforces the port regulations. The harbormaster's office is at the Carolina Shipping Co. on 9 Mid Atlantic Wharf Street.

Wharves.-Only the major facilities at Charleston and North Charleston are described. These facilities are all northward of the Battery along the west side of Cooper River and Town Creek, and in Shipyard Creek. Most of the berths have highway connections and either direct or beltline rail connections with the Seaboard Coast Line Railroad or the Southern Railway System. Water is also available at most berths. General cargo at the port is usually handled by ship's tackle; special equipment, if available, is mentioned in the description of the particular facility.

The largest shore-based hoist, a 400-ton shear-leg derrick, is at State Pier 8 (Columbus Street Terminal). A 100-ton capacity floating crane is available by special arrangement with the U.S. Army Transportation Depot in Charleston. Commercial floating cranes with 15- and 25-ton capacities are available and are based in Shipyard Creek. The alongside depths given for each facility are reported depths. (For information on latest depths, contact the operator.) There are many smaller facilities in Charleston which are used by barges and small vessels, and as vessel-repair berths; these are not described. (For a complete description of the port facilities, see the Port Series, a Corps of Engineers Publication.)

Facilities at Charleston proper, along the west side of Cooper River and Town Creek, northward of the Battery (32°46'08"N., 79°55'44"W.):

State Pier 2 (Union Pier): about 0.8 mile northward of the Battery; marginal type wharf with 2,550-foot face; 35 feet alongside; deck height, 12 feet; two transit sheds, total floor area 112,000 square feet; use of portable handling equipment from State Pier 8; railroad trackage at platform level inside transit sheds; electrical shore power connections; receipt and shipment of general cargo in the foreign and domestic trade, southern portion has passenger terminal and is used by cruise ships; owned and operated by the South Carolina State Ports Authority.

State Pier 8 (Columbus Street Terminal): about 1.8 miles northward of the Battery; marginal type wharf with 3,442-foot face and 46-foot apron; 35 feet alongside; deck height, 12 feet; three transit sheds, total floor area 446,000 square feet; more than 26 acres open storage space; one 90-ton truck crane; one diesel-electric 75-ton grantry crane; one 400-ton shear-leg crane; two 50-ton gantry cranes; forklifts with capacities from 1 to 8 tons; related tractor and trailer equipment; railroad trackage on apron and at rear of transit sheds; electrical shore power connections; receipt and shipment of general cargo in the foreign and domestic trade; owned and operated by the South Carolina State Ports Authority.

State Pier 9 (Banana Pier): joining State Pier 8 to the northward; marginal type wharf with 437-foot face and 30-foot apron; 35 feet alongside; deck height, 12 feet; three electric traveling banana unloaders, each with a capacity of 3,200 boxes per hour; covered electric belt conveyor system extends along rear of wharf to car and truck-loading platforms; railroad trackage serves covered loading platforms; electrical shore power connections; used for receipt of bananas and tropical fruit; owned by the South Carolina State Ports Authority and operated by United Brands.

Esso Tanker Wharf and Barge Dock: 3.4 miles northward of the Battery, just below the entrance to Shipyard Creek; offshore wharf with 72-foot face, 700 feet with dolphins reported; 38 feet alongside; deck height, 10 feet; pipelines extend from dock to storage tanks in the rear; hose-handling derricks; electrical shore power connections; railroad trackage serves oil refinery in rear; receipt and shipment of petroleum products; receipt of crude oil; bunkering vessels; owned and operated by Exxon Co. USA.

Facilities in Shipyard Creek, on the west side of Cooper River about 3.8 miles northward of the Battery:

Shipyard River Terminal Co. Wharf: south side of Shipyard Creek, just inside the entrance; marginal wharf with 390- and 400-foot faces, open aprons; 34 feet alongside; deck height, 14 feet; three warehouses, total floor area 162,000 square feet; 14-ton electric crane with 6½ cubic yard bucket and a capacity of 700 tons per hour unloads dry bulk material from vessels to open rail cars in rear or to storage warehouses via belt conveyor system; bagging plant has capacity of 2,000 tons per day; rail trackage in rear of wharf; electrical shore power connections; lower wharf used for receipt of dry bulk fertilizer materials; upper wharf for mooring vessels; owned by Etiwan Fertilizer Co. and operated by Shipyard Terminal Co.

Gulf Oil Co. Wharf: west side of Shipyard Creek about 400 yards westward of Shipyard River Terminal Co. Wharf; marginal type wharf with 490- and 510-foot faces, open aprons; 24 to 29 feet alongside; deck height, 13 feet; pipelines extend from wharf to storage tanks in the rear; hose-handling derricks; railroad trackage in rear; receipt of petroleum products and bunkering vessels; owned and operated by Gulf Oil Corp.

Airco Alloys and Carbide Co. Wharf: west side of Shipyard Creek about 0.5 mile northward of Gulf Oil Co. Wharf; offshore wharf with 500-foot face and open apron, 545 feet with dolphins; 32 feet alongside; deck height, 11 feet; three 40-ton locomotive cranes; rubber-wheeled automotive cranes, up to 80-ton capacities; railroad trackage on apron and in rear; used for receipt of ore and coke, shipment of ferro-alloys; owned and operated by Airco Alloys and Carbide Division of Air Reduction Co., Inc.

Facilities at North Charleston, along the west side of Cooper River, northward of the Battery:

Hess Oil and Chemical Corp., South Wharf (32°52′42″N., 79°58′04″W.): about 7.9 miles northward of the Battery; offshore wharf with 45-foot face; reciprocal agreement with British Petroleum Co., immediately to the northward, permits berthing of ships over 600 feet long; 37 feet alongside; deck height, 11 feet; pipelines extend from wharf to storage tanks in the rear; hose-handling derricks; used for receipt and shipment of petroleum products and mineral spirits; owned and operated by Hess Oil Co.

British Petroleum Co. (Sinclair Refining Co.) Wharf: about 160 yards northward of Hess Oil Co. Wharf; L-shaped offshore wharf with 250-foot face and open apron; reciprocal agreement with Hess Oil Co., immediately to the southward, permits berthing of ships over 600 feet long; 35 feet alongside; deck height, 11 feet; pipelines extend from wharf to storage tanks in the rear; hose-handling crane; railroad trackage in rear; used for receipt of bulk and packaged petroleum products; fueling tugs; owned and operated by British Petroleum Co.

Shell Oil Co. Wharf: about 450 yards northward of British Petroleum Co. Wharf; offshore wharf with 36-foot face; reciprocal agreement with Texaco, Inc., immediately to the northward, permits berthing of oceangoing tankers over 600 feet long; 32 feet alongside; deck height, 13 feet; pipelines extend from wharf to storage tanks in the rear; railroad trackage in the rear; used for receipt of petroleum products and bunkering vessels; owned and operated by Shell Oil Co.

Texaco Wharf: about 150 yards northward of Shell Oil Co. Wharf; offshore wharf with 140-foot face; reciprocal agreement with Shell Oil Co., immediately to the southward, permits berthing of oceangoing tankers over 600 feet long; 33 feet alongside; deck height, 13 feet; pipelines extend from pier to storage tanks in the rear; hose-handling derrick; railroad trackage in the rear; receipt of petroleum products, bunkering vessels; owned and operated by Texaco, Inc.

Phillips Petroleum Co. Marine Dock: about 300 yards northward of Texaco Wharf; offshore wharf with 50-foot face, 600 feet with dolphins reported; 35 feet alongside; deck height, 14 feet; pipelines extend from pier to storage tanks in the rear; used for receipt of petroleum products; owned by Phillips Pipeline Co. and operated by Phillips Petroleum Co.

Hess Oil and Chemical Co. North Wharf: about 200 yards northward of Phillips Petroleum Co. Marine Dock; offshore wharf with 150-foot face; 600 feet with dolpins reported; 38 feet alongside; deck height, 10 feet; pipelines extend from wharf to storage tanks in the rear; hose-handling derrick; railroad trackage in the rear; used for the receipt of petroleum products; owned and operated by Hess Oil and Chemical Co.

West Virginia Pulp and Paper Co. Wharf: about 0.65 mile northward of Hess Oil and Chemical Co. North Wharf; marginal type wharf with 480-foot face; 650 feet usable with dolphins; 28 feet alongside; deck height, 12 feet; two warehouses, total floor area 379,800 square feet; a tall oil pipeline extends from plant to wharf; railroad trackage on apron and in rear; used for receipt of sodium phosphate, shipment of kraft paper and tall oil; owned and operated by West Virginia Pulp and Paper Co.

State Pier 15, North Charleston Terminal: joining West Virginia Pulp and Paper Co. Wharf to the northward; marginal type wharf with a 1,050-foot face and 40-foot apron; 35 feet alongside; two transit sheds, total floor area 53,000 square feet; four warehouses, total floor area 710,400 square feet and 348,000 cubic feet cold storage; 61 acres open storage; portable cargo handling equipment listed under State Pier 8 available; railroad trackage on apron and in rear; three vacuum fumigation tanks available; owned and operated by South Carolina State Ports Authority.

State Pier 16, North Charleston Bulk Handling Wharf: joining State Pier 15 to the northward; mar-

ginal type wharf with 1,400-foot face and open apron; 35 feet alongside; deck height, 12 feet; two 40-ton electric traveling gantry cranes with bulk handling rate of 250 tons per hour, can be equipped with hooks or magnets; pipelines extend from wharf to storage tanks in the rear; portable cargo handling equipment listed under State Pier 8 available; 9½ acres open storage; railroad trackage on apron and in the rear; used for the receipt and shipment of general and bulk and container cargoes in the foreign and domestic trade, receipt of liquid caustic soda and chemical fumigants, and liquid sulfur; owned and operated by South Carolina State Ports Authority.

South Carolina State Ports Authority Grain Wharf: about 0.2 mile northward of State Pier 16; marginal type wharf with 380-foot face, open apron; 35 feet alongside; deck height, 12 feet; grain gallery with five loading spouts extends full length of wharf; conveyor belt connects grain gallery with a 1.8-million-bushel capacity grain elevator; each spout has a delivery rate of 15,000 bushels per hour; rail trackage serves grain elevator; used for shipment of grain; owned and operated by the South Carolina State Ports Authority.

Charleston Army Depot about 0.2 mile northward of the South Carolina State Ports Authority Grain Wharf; marginal type wharf with a 1,500-foot face; 35 feet alongside. (For further information contact the operator.)

Supplies.-All types of marine supplies and provisions can be obtained in Charleston. Water is available at most of the berths; Bunker C oil can be obtained at the Esso, Gulf, Shell, and Texaco wharves, or by barge. Diesel fuel is available by barge or truck.

Repairs.-There are no drydocking facilities for deep-draft vessels at Charleston proper, but floating drydocks up to 12,000-ton capacity are at nearby Cainhoy on the Wando River, which is described later in this chapter.

Several shops, on and off the waterfront, can make above-the-waterline hull repairs, and repairs to gasoline and diesel engines and electronic equipment anywhere in the harbor; the largest shafts that can be produced are 12 feet by 6 inches and 20 feet by 4 inches.

Wrecking and salvage gear is available at Charleston for normal operations and special equipment can be brought in.

Repair facilities for small craft are in Shem Creek and at the municipal marina on Ashley River; these are described later in this chapter.

Communication.-The port of Charleston is served by the Seaboard Coast Line Railroad and the Southern Railway System, which connect with most of the wharves either directly or through three beltline railroads. A number of steamship lines connect the port with principal foreign ports; frequent sailings are maintained by most of the lines. The Municipal Airport 12 miles northwestward of the Battery is served by four commercial airlines. Truck and bus lines serve the port. There are excellent highway connections with Interstate Route 26 and U.S. Routes 17, 701, 52, 52A, and 78.

Chart 11524 (470).-Ashley River empties into Charleston Harbor from the northwestward on the southwest side of Charleston. There are no towns or villages of importance above Charleston.

Channels.-A dredged channel in Ashley River leads from a point about 1 mile southeastward of the Battery (32°46′08″N., 79°55′44″W.) to a turning basin about 5.8 miles above the Battery. In 1970-1972, the centerline controlling depths were 15 feet from the channel entrance to the first bascule bridges, thence 13 feet to and in the turning basin, except for shoaling to 1½ feet in the northwest corner of the basin. Above the turning basin, in 1963, a midchannel depth of 4 feet could be carried to 2 miles above **Greggs Landing,** about 20 miles above the Battery. The river is marked by a lighted approach range, and by buoys and daybeacons to the turning basin.

The **Charleston Coast Guard Base** is on the east side of Ashley River, about 0.9 mile above the Battery. **Storm warning signals are displayed.** (See chart.)

A municipal marina is on the northeast side of the Ashley River 1.3 miles above the Battery and 0.3 mile north of the entrance to **Wappoo Creek,** which is a part of the Intracoastal Waterway. Berthage, electricity, gasoline, diesel fuel, water, ice, a launching ramp, and some marine supplies are available. Engine and electrical repairs can be made. In 1969, depths alongside the berths were reported to be 8 feet. A motel and restaurant are adjacent to the marina. In 1974, good anchorage for small craft was reported on the east side of the river just northward of the municipal marina. **Storm warning signals are displayed.** (See chart.)

Bridges.-Several bridges cross the Ashley River above the Battery. The two U.S. Route 17 highway bascule bridges, 100 yards apart, cross about 2 miles above the Battery. The first has a clearance of 18 feet for the central 50 feet; the second has a clearance of 14 feet. State Route 7 highway fixed bridge, 6.2 miles above the Battery, has a clearance of 50 feet at the center span. The overhead power cable 0.4 mile above the bridge has a clearance of 70 feet at the two main spans. The Seaboard Coast Line Railroad bridge, 10 miles above the Battery, has a bascule span with a clearance of 3 feet. The overhead power cable just below this bridge has a clearance of 74 feet. Drawbridge regulations and opening signals for the U.S. Route 17 bridges are given in **117.240, and 117.245 (a) through (e), and (g) (18),** chapter 2, and for the Seaboard Coast Line Railroad bridge in **117.240,** chapter 2.

An overhead power cable with a clearance of 70 feet crosses the Ashley River about 0.6 mile below Greggs Landing.

Hog Island Channel and **Shem Creek** lead to **Mount Pleasant** on the lower east side of Charleston Harbor. A marked channel leads from the Intracoastal Waterway to Hog Island Channel thence in Shem Creek to a terminal basin 0.4 mile above the mouth of the creek and just below the Route 17 highway bridge at Mount Pleasant. In 1963, the controlling depth from the Intracoastal Waterway to Hog Island Channel was 6 feet, thence in May 1971, 10 feet in Hog Island Channel and Shem Creek to the terminal basin, thence in 1963, 3 feet for another 0.2 mile. A boatbuilding yard on the southeast side of Shem Creek about 0.4 mile above the mouth has three marine railways, the largest of which can haul out craft up to 90 feet; hull, engine, and electrical repairs can be made. Berthage, electricity, gasoline, diesel fuel, water, ice, and some marine supplies are available. In 1969, depths alongside and in the approaches were reported to be 9 feet. Meals and lodging can be obtained nearby. Other wharves on the creek are used by fishing vessels. U.S. Route 17 highway bridge, 0.4 mile above the mouth of Shem Creek, has a 36-foot fixed span with a clearance of 12 feet. An overhead power cable with a clearance of 40 feet crosses the creek about 0.2 mile above the bridge.

Cooper River enters Charleston Harbor from northward on the eastern side of Charleston; the main channel of the harbor extends several miles up this river. **Drum Island** is 2 miles above the mouth of the river. The channel on the westerly side of this island is known as **Town Creek.**

A Navy degaussing range, marked by lighted and unlighted dolphins, crosses the channel between **Shutes Folly Island** and Charleston, about 0.3 mile northward of the Battery.

Bridges.-Two fixed bridges, about 5.7 miles above the mouth and parallel to each other, span Town Creek, Drum Island, and Cooper River on the east side of Charleston. Clearances for both bridges are: over Town Creek, 135 feet; Cooper River, 150 feet for a width of 300 feet and 135 feet for a width of 1,000 feet.

Shipyard Creek (Shipyard River) joins Cooper River from the west 3.8 miles above the Battery. There is considerable traffic in oil, bulk fertilizer materials, and ore on this waterway.

The Charleston U.S. Naval Base, Station and Shipyard extends along the west side of the Cooper River from 4 to 8 miles above the Battery. The large water tank, red and white, is conspicuous at the Naval Base.

Restricted areas are in the northern portion of Shipyard Creek, and on the west side of Cooper River along the U.S. Naval Base, Station and Shipyard. (See **207.164b (a) (1), (a) (2), and (b)**, chapter 2, for limits and regulations.)

North Charleston, just north of the naval facilities, is the site of several oil wharves, a cotton compress, a general cargo terminal, several bulk commodity wharves, and the U.S. Army Depot; these facilities have been described earlier under Wharves.

Chart 11527 (680).-In 1963, depths of 20 feet or more were available in Cooper River from the upper limit of the Navy-maintained channel about 3.4 miles above Goose Creek to **The Tee,** 26 miles above the Battery. The channel is not marked above the Navy-maintained channel. At The Tee the river divides into East and West Branches. This section of the river is bordered by marshland, with occasional bluffs 15 to 20 feet high. A **restricted area** is off the U.S. Naval Ammunition Depot, on the west side of Cooper River about 10 miles northward of the Battery. (See **207.164b (a) (3) and (b)**, chapter 2, for limits and regulations.)

An overhead power cable with a clearance of 75 feet crosses Cooper River about 21.1 miles above the Battery.

In **East Branch** the controlling depth in 1963 was 10 feet to **Pompion Hill Chapel,** 6 miles above The Tee. The channel is narrow and follows the ebb-tide bends. In **West Branch** the controlling depth in 1963 was 16 feet to the Seaboard Coast Line Railroad bridge 4 miles above The Tee. The first bend west of The Tee is a bad spot; deep water is on the inner side of the bend. The railroad bridge has a swing span with a channel width of 30 feet and a clearance of 8 feet. (See **117.240, and 117.245 (a) through (e), and (g) (17)**, chapter 2, for drawbridge regulations and opening signals.) Extreme caution is necessary at the bridge; the current is strong, and about 40 minutes is needed to open the draw. The mean range of tide at the bridge is 4.2 feet.

About 12 miles above The Tee, a tailrace canal enters West Branch from **Lake Moultrie.** The distance along the canal from West Branch to the lake is about 4 miles. Two bridges cross the canal with minimum clearance of 50 feet. A marginal wharf 200 feet long is on the west side of the canal about a mile above the junction with West Branch. In 1969, very strong currents were reported to exist in the canal.

A depth of about 11 feet is available from the Seaboard Coast Line Railroad bridge over West Branch to the tailrace canal and thence to the dam. The lock in the dam has a length of 180 feet, a width of 60 feet, and a depth over the miter sills of 12 feet; the vertical lift is 75 feet. A draft of 14 feet has been taken to the lake with favoring tides. Light-draft vessels can navigate to Columbia, S.C., by way of Lake Moultrie, Lake Marion, and the Congaree River. The last 18 miles are treacherous because of the twisting channel and varying water levels caused by a dam above Columbia. The lakes are fouled by submerged trees. Navigation should not be attempted by strangers.

Charts 11524 (470), 11526 (681).-Wando River empties from the northeast into Cooper River eastward of Drum Island.

Nowell Creek empties into the west side of Wando River, about 4.5 miles above Drum Island. The creek, about 5.5 miles above its mouth, joins **Beresford Creek.** Together they form a connection between Wando River and Cooper River. In 1973, shoaling to 2 feet was reported on the east side of the entrance to Nowell Creek.

An overhead power cable with a clearance of 145 feet crosses Wando River about 8.9 miles above Drum Island.

Cainhoy is a town on Wando River about 9 miles above Drum Island. Depths of about 15 feet can be taken to Cainhoy and thence, with local knowledge, 13 feet to the mouth of Guerin Creek 1.5 miles above State Route 41 highway bridge at Cainhoy, thence 8 feet for another 3.4 miles, thence 2 feet to Wards Bridge. The channel is marked as far as Cainhoy by buoys and unlighted ranges.

There are two repair facilities at Cainhoy; a shipyard on the south side of the river, and a boatyard on the north side.

The shipyard has three floating drydocks, a large sandblasting facility, and welding, shipfitting, machine, rigging, electrical, and pipe shops. Also, the yard is equipped to handle industrial type work, and can provide repair services to vessels outside the yard. Water, and electrical shore power and telephone connections are available, as well as a 25-ton floating crane, a 25-ton mobile crane, and a 30-ton gantry crane that is alongside the largest drydock. The three floating drydocks have the following dimensions: (1) 12,000-ton lifting capacity, 504-foot overall length, 434-foot length on blocks, 116-foot overall width, 85-foot maximum clear width for vessels, and a maximum depth of 23 feet at mean high water over the blocks; (2) 1,200-ton lifting capacity, 231-foot overall length, 161-foot length on the blocks, 82-foot overall width, 61-foot maximum clear width for vessels, and a maximum depth of 17 feet at mean high water over the blocks; and (3) the smallest drydock, has a lifting capacity of 1,000 tons. In 1972, depths of 25 feet were reported alongside the shipyard repair piers.

Two marine railways, 1,000 tons and 750 tons, are available at the boatyard. The yard has water and electrical shore power connections; hull, engine, and electrical repairs can be made. In 1969, depths of 18 feet were reported at the mooring dolphins at the yard.

State Route 41 bridge and an overhead power cable cross the river about 0.4 mile above Cainhoy; the highway bridge has a swing span with a clearance of 6 feet and the overhead power cable has a clearance of 45 feet. (See **117.240, and 117.245 (a) through (e), and (g) (16),** chapter 2, for drawbridge regulations and opening signals.)

Wando River continues for about 7 miles to **Wards Bridge** at the head of navigation. An overhead power cable crossing the river about a mile south of the bridge has a clearance of 30 feet. **Guerin Creek** flows into Wando River from the northeast about 2 miles above Cainhoy. **Guerin Bridge,** a fixed structure at the head of navigation, is some 3 miles above the mouth of the creek.

7. CHARLESTON HARBOR TO SAVANNAH RIVER

Charts 11480 (1111), 11521 (1239), 11513 (1240).-This chapter describes the coastline from Charleston Harbor to Savannah River. The coast, low and timbered, trends in a southwesterly direction for 65 miles and is broken by St. Helena, Port Royal, and Calibogue Sounds, and by numerous inlets from which there is access to the interior by way of the rivers emptying into them. Shoal water extends 3 to 8 miles offshore.

This section of the coast, due to its low relief, presents no good radar targets except for the structure of Savannah Light.

Included in this chapter are the deepwater ports of Savannah and Port Royal; the fishing and small-craft port of Beaufort, S.C.; Stono, and North Edisto Rivers; the tributary waters of the various sounds of which South Edisto, Coosaw, Beaufort, Broad, and Savannah Rivers are the more important; and several small towns along these waterways.

The section of the Intracoastal Waterway from Charleston to Savannah is described in chapter 12.

Caution.-The areas generally to the east and southeast of Charleston Harbor are used extensively by the U.S. Navy and other military services to conduct various types of surface, subsurface, and aircraft training exercises. The Commander, U.S. Naval Base, Charleston, S.C., has cognizance of the operating areas through the Charleston Operating Area Coordinator (COAC).

Charts 11522 (792), 11521 (1239).-Lighthouse Inlet (32°41.2'N., 79°53.0'W.), between **Morris Island** and **Folly Island** has no channel across the bar; entrance should be attempted only with local knowledge on a rising tide with a smooth sea. In 1963, the controlling depth over the bar and upsteam to **Secessionville** was 3 feet; the inlet is unmarked and used only by local fishermen. Small craft pass into Charleston Harbor by way of **Lighthouse Creek** and also into numerous sloughs north of Folly Island. **Folly Beach,** an amusement park on Folly Island, is connected by highway with Charleston. The buildings and lights are prominent from seaward.

Stono Inlet, 10 miles southwestward of Charleston Harbor entrance, is entered over a shifting bar between Folly Island and **Kiawah Island.** A lighted whistle buoy is southward of the entrance. The inlet is subject to continual change and should not be attempted without local knowledge. The entrance buoys are not charted, because they are frequently shifted in position to mark the best water. Local fishermen use the inlet.

An offshore **drill minefield,** about 4.5 miles square and marked by buoys, is about 7 miles southeastward of Stono Inlet and about 10 miles southwestward of the Charleston Harbor entrance buoy. An unmarked fish haven, covered 15 feet, is in about 32°28.8'N., 80°00.3'W., about 5.9 miles southwestward of the drill minefield.

Stono River, which joins Stono Inlet from northward, is of little commercial importance except in its upper reach above **Elliott Cut,** where it forms part of the Intracoastal Waterway. In 1963, the controlling depth from inside the inlet bar for about 12 miles to the highway bridge was 11 feet, thence 7 feet to a junction with the Intracoastal Waterway at Elliott Cut. Vessels usually enter the river by way of the waterway from Charleston. In the summer, numerous pleasure craft use Stono River and Folly River to reach Folly Beach. The highway bridge about a mile below Elliott Cut has a swing span with a clearance of 8 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

Folly River flows into Stono Inlet from the northeast and **Kiawah River** from the west. Both are relatively unimportant. Folly River is used by pleasure craft and local fishermen desiring to reach Folly Beach. In 1965, the controlling depth was 8 feet from its junction with Stono River at **Bird Key Island** for a distance of 4.5 miles upriver. The river is marked by lights and daybeacons for about 1.5 miles above the entrance. There are two marine railways that can handle vessels up to 55 feet for general repairs on the southeasterly side of the river, about 1.8 miles above the entrance. Gasoline, diesel fuel, ice, and provisions are available nearby. State Route 171 highway bridge about 3.1 miles above the entrance has a fixed span with a clearance of 10 feet. An overhead power cable close eastward of the bridge has a clearance of 39 feet. **Folly Creek** enters Folly River from the north about 2.7 miles above the mouth. State Route 171 highway bridge about 2.9 miles above the creek mouth has a fixed span with a clearance of 10 feet. An overhead power cable at the bridge has a clearance of 40 feet and another overhead power cable 0.4 mile above the bridge has a clearance of 48 feet.

North Edisto River, about 10 miles southwestward of Stono Inlet and 20 miles southwestward of Charleston Harbor entrance, is of little commercial importance and rarely used. Shoals extend offshore from the entrance as much as 3 miles and form a shifting bar. Flats, which bare at low water and are continually changing in character, are on both sides of the entrance; caution is advised. In 1963, the controlling depth over the bar was 8 feet. The entrance is marked by a lighted whistle buoy, and the channel by a 314° lighted range and by

buoys which are moved, when practicable, to indicate the best water. The entrance is well defined by breakers. A charted wreck is on the southwest side of the entrance channel, about 3.5 miles northwestward of the lighted whistle entrance buoy.

Two tributaries of North Edisto River, **Wadmalaw River** from eastward and **Dawho River** from westward, are part of the Intracoastal Waterway. **Bohicket Creek** entrance is about 2.5 miles above the entrance to North Edisto River. **Rockville,** a town about 1.1 miles above the mouth of Bohicket Creek, has several piers and wharves with 5 to 11 feet of water alongside at which fresh water can be obtained. In 1963, the controlling depth was 15 feet up the creek to Rockville. **Adams Creek,** west of Rockville, has several shrimp boat piers and wharves with depths of 6 to 9 feet alongside. A marina, close to these piers, has several piers with depths of 4 to 12 feet alongside; berths, fuel, and water are available. A boatyard, just northward of the marina, has a marine railway that can handle craft up to 60 feet or 40 tons for hull repairs. **Steamboat Creek** entrance, 6 miles above North Edisto River entrance, is marked by a daybeacon.

The mean range of tide in North Edisto River entrance is 5.8 feet. On the bar the direction of the current is generally across the channel. The flood current sets about westward, and the ebb eastward; both have considerable velocity. Inside the bar, in the channel between the breakers, the ebb current is to be guarded against, especially when it sets across the north breakers. Predicted currents for the North Edisto River entrance may be obtained from the Tidal Current Tables.

Charts 11517 (793), 11521 (1239), 11513 (1240).-The entrance to **St. Helena Sound** is 7 miles wide between **Bay Point,** the southern extremity of **Edisto Island,** on the northeast and **Hunting Island** on the southwest. An abandoned lighthouse, 128 feet high, on the northern part of Hunting Island, makes a good landmark. There are several channels through the shoals which extend about 6 miles seaward from the sound entrance. The buoyed channel, in 1973, had a depth of 5 feet; caution is advised. The mean range of tide on the bar and in the entrance to the sound is about 6 feet. In 1973, a survey revealed depths of 1 foot to 14 feet less than those charted across the entrance to St. Helena Sound. Caution is advised in navigating this area.

Most important of the several navigable rivers emptying into the sound are South Edisto, Ashepoo, Coosaw, Morgan, and Harbor Rivers; the first three are links in the route of the Intracoastal Waterway.

South Edisto River, which empties into St. Helena Sound immediately westward of Bay Point, is of little commercial importance. The approach to the river is marked by buoys. The river above its junction with **Dawho River,** about 18 miles above Bay Point, is known as **Edisto River.** Gasoline, diesel fuel, water, and some marine supplies can be obtained at a marina on the south side and just inside the entrance of **Big Bay Creek,** which empties into the east side of South Edisto River just above Bay Point. A small pier at the marina had a reported depth of 12 feet alongside in 1969. It has been reported that small craft have run aground at night when making Big Bay Creek from the northward by using the lights at the marina as guides; extreme caution is advised.

Edisto Beach State Park is about 2 miles northeastward of Bay Point. A marked channel into South Edisto River, about 3 miles southeastward of Bay Point, has depths of 12 to 16 feet over the ocean bar.

The Intracoastal Waterway leads through South Edisto River from landcuts at **Fenwick Cut** and **Watts Cut,** about 5.3 miles and 11.3 miles above Bay Point, respectively. This section of the river, between Fenwick Cut and Watts Cut, is marked in accordance with Intracoastal Waterway markings. In 1963, the controlling depth from Bay Point to the junction with the Intracoastal Waterway at Fenwick Cut was 10 feet, and from Watts Cut to **Fenwick,** about 20 miles above Bay Point, the controlling depth was 7 feet.

The river is usually entered from the Intracoastal Waterway; the entrance from the ocean is rarely used. The mean range of tide is 6 feet in the lower part of the river. Currents at the entrance have a velocity of about 1.8 knots; predictions may be obtained from the Tidal Current Tables. **Storm warning signals are displayed.** (See chart.)

A draft of about 3 feet can be taken for about 8 miles above Fenwick to **Jacksonboro.**

Ashepoo River, about 4.5 miles westward of Bay Point, flows into St. Helena Sound from northward on the west side of **Otter Islands.** A highway bridge over the river, 13 miles above the mouth, has a swing span with a clearance of 9 feet. (See **117.240 and 117.245 (a) through (e) and (h) (3),** chapter 2, for drawbridge regulations and opening signals.) An overhead power cable just westward of the bridge has a clearance of 63 feet, and another overhead power cable 4 miles above the bridge has a clearance of 84 feet. In 1963, the river had a controlling depth of 9 feet to the overhead power cable 4 miles above the highway bridge.

Coosaw River, which enters the head of St. Helena Sound from westward, is important only as a link in the Intracoastal Waterway. The river channel is irregular in depth, partly because of the phosphate dredges which once operated here.

Chart 11519 (794).-Combahee River, 3 miles above the mouth of Coosaw River, had a controlling depth of 10 feet, in 1963, for a distance of 9 miles above the entrance. The river is navigable for craft drawing up to 5 feet to U.S. Route 17 highway bridge 20 miles above the entrance. The

highway bridge has a fixed span with a clearance of 14 feet. The mean range of tide is 6.2 feet at the mouth of the river and 4.4 feet at the highway bridge.

New Chehaw River, on the north side of the entrance to Combahee River, is unimportant and has no traffic. **Old Chehaw River** enters the Combahee River from northward about 2 miles above New Chehaw River. The town of **Wiggins** is about a mile above the junction of Old and New Chehaw Rivers.

Bull River enters Coosaw River from the northward about 5 miles above the latter's mouth. Two miles above its mouth, Bull River divides into **Williman Creek** and **Wimbee Creek,** which pass north and south, respectively, of **Williman Islands** and rejoin 4.5 miles above the lower junction. The upper section of Williman Creek where it rejoins Wimbee Creek is known as **Schooner Channel.**

Chisolm is a small town on the south bank of Wimbee Creek about 1.5 miles above the lower junction with Williman Creek; the controlling depth to Chisolm, in 1963, was 8 feet. A section of a former railroad bridge, now used as a fishing pier, is on the west side of Wimbee Creek, 1 mile above the upper junction with Schooner Channel. An overhead power cable with a clearance of 80 feet crosses the creek at this point. The controlling depth, in 1963, was 8 feet to the fishing pier by way of Bull River, Williman Creek, and Schooner Channel; between Chisolm and the upper junction with Schooner Channel, Wimbee Creek is nearly dry in places at low water.

Parrot Creek, which enters Coosaw River on the south side directly opposite Bull River, is a 2-mile link between Coosaw and Morgan Rivers. The controlling depth through the creek, in 1963, was 11 feet. Daybeacons mark the north entrance.

Lucy Point Creek, about 2 miles westward of Parrot Creek, also connects Coosaw and Morgan Rivers; the controlling depth through the creek, in 1963, was 6 feet. A wharf and a shrimp-packing plant are just inside the Coosaw River entrance to the creek. A highway bridge crossing the creek 0.3 mile from the entrance has a fixed span with a clearance of 14 feet. The adjacent power cable has a clearance of 75 feet. A daybeacon marks the entrance.

Charts 11516 (571), 11517 (793), 11519 (794), 11513 (1240), 11518 (837-SC).-Morgan River flows into St. Helena Sound from westward. The river is about 8 miles long and at its head connects with Chowan Creek, a tributary of Beaufort River; at the divide, this passage is nearly dry at low water where U.S. Route 21 highway bridge has a 28-foot fixed span with a clearance of 4 feet. The mean range of tide near the head of Morgan River is about 7 feet. **Coffin Creek,** on the south side of Morgan River near the mouth, has a shrimp-packing plant 1.7 miles above the creek mouth where gasoline, diesel fuel, and emergency supplies can be obtained. In 1963, the controlling depth was 0.5 foot. On **Village Creek,** about 0.8 mile above Coffin Creek, there are two shrimp-packing plants where some fuel and supplies may be obtained, in an emergency only. In 1972, the controlling depth was 7 feet from the entrance to the shrimp-packing plants 1.5 miles upstream. **Edding Creek,** is about 1.5 miles west of Village Creek. In 1963, the controlling depth in the creek was 7 feet for a distance of 2.5 miles.

Chart 11517 (793).-Johnson Creek, at the northern end of Hunting Island, was reported closed at low water in 1973. Extensive shoals, bare at low water, are eastward and northeastward of the mouth of the creek. The area should be used only at high water by shallow-draft vessels with local knowledge.

Fripp Inlet, privately marked, is south of St. Helena Sound between Hunting Island and **Fripp Island.** A spherical water tank on a cylindrical support, on Fripp Island southwestward of the inlet, is prominent. The entrance is well defined by breakers, and flats which show at low water. The entrance is subject to continual change; entrance should not be attempted without local knowledge. A highway bridge across the inlet has a fixed span with a clearance of 15 feet. **Harbor River,** at the head of the inlet, connects with St. Helena Sound to the eastward, and **Story River** connects the inlet with Trenchards Inlet and Station Creek to the westward. In 1963, the controlling depth was 3 feet in Harbor River and 5 feet in Story River. U.S. Route 21 highway bridge over Harbor River, 0.5 mile above the mouth, has a swing span with a clearance of 15 feet. (See **117.240 and 117.245 (a) through (e), and (h) (5),** chapter 2, for drawbridge regulations and opening signals.) An overhead power cable crossing along the southwest side of the bridge has a clearance of 94 feet. **Wards Creek,** on the north side of Harbor River 0.25 mile above the highway bridge, has a shrimp-packing plant about 1.2 miles above the mouth where gasoline, diesel fuel, and emergency supplies may be obtained. In 1963, the controlling depth was 4 feet.

Skull Inlet, 3 miles southwest of Fripp Inlet, is a narrow passage with little water over the bar.

Chart 11516 (571).-Pritchards Inlet (32°17.0′ N., 80°33.0′ W.), 5 miles northeast of Port Royal Sound, is a narrow passage from the ocean to **Moon Creek** which connects with the upper part of Trenchards Inlet; there is very little water over the bar.

Trenchards Inlet, just northeast of Port Royal Sound, has a bar which extends about 2 miles from shore; the narrow unmarked channel over the bar has a controlling depth of about 4 feet. This inlet is connected at its head by Station Creek, which joins Port Royal Sound to the westward.

Port Royal Sound, one of the largest deepwater harbors on the Atlantic Coast between Cape Henry

and Key West, has an entrance about 2 miles wide between **Bay Point** on the northeast and **Hilton Head** on the southwest. It is 80 miles south of Charleston and is the ocean entrance to Port Royal and Beaufort.

Boundary lines of inland waters.-There are no specific lines established for Port Royal Sound. The general rules for inland waters apply. (See **82.2**, chapter 2.)

Prominent features.-The entrance is between shoals that extend up to 10 miles offshore. The land on both sides of the entrance is low and marshy, and fringed by sand beaches and timbered land. The breaking shoals are prominent. **Port Royal Sound Lighted Whistle Buoy 2PR** (32°05.0'N., 80°35.0'W.) marks the entrance.

Channels.-A Federal project provides for a dredged channel 27 feet deep across the bar and through the sound to Bay Point, thence 24 feet in Beaufort River to a 27-foot turning basin in Battery Creek at Port Royal. (See Notice to Mariners and latest editions of the charts for controlling depths.) There are several unmarked channels leading through the breakers; **South Channel,** lying westward of the dredged channel, with 12 feet, and **Southeast Channel,** between Martins Industry and St. Michaels Breaker just north of it, are the more important. The dredged channel is well marked by lights, lighted ranges, and buoys. The channel in Beaufort River, from the dredged channel northward to Beaufort, had a controlling depth of 12 feet in 1963.

Anchorages.-Port Royal Sound has natural depths of from 26 to 50 feet and is sometimes used as a harbor of refuge in winter. The best anchorage is off the mouth of Beaufort River westward of Bay Point. The holding ground on the rocky bottom south of Bay Point is poor. There is also good anchorage in 22 to 26 feet to the eastward of the dredged channel off the mouth of Chowan Creek.

Dangers.-The breaking shoals extending almost 10 miles off Bay Point, eastward of the entrance channel, and for about 8 miles off Hilton Head Island, are the principal dangers. In thick weather, vessels should not approach the entrance too closely before picking up the pilot, especially on the flood, when the current sets directly onto the shoals: **Martins Industry,** the outermost shoal, **St. Michaels Breakers,** just north of it, and the **Great North Breakers,** between it and Bay Point. **Gaskin Banks, Fishing Bank,** and **Joiner Bank** are to the westward of the entrance channel.

Danger zones of rifle and pistol ranges are in Broad River, Archers Creek, and Ribbon Creek. (See **204.80**, chapter 2, for limits and regulations.)

Tides and currents.-The mean range of tide is 6.4 feet on the bar, 7.2 feet at Port Royal, and 7.4 feet at Beaufort. The tidal currents on the bar have a velocity of 1.5 knots, off Hilton Head 1.8 knots, and at Beaufort River entrance from 1.5 to 2 knots. Winds greatly influence the velocity of the tidal current, especially on the runout after prolonged easterlies, which on the ebb often reaches 5 knots. The current generally sets fair with the channel, except at the turn from the entrance channel into Bay Point Reach, where a strong current sets diagonally across the channel. Here, on the ebb, vessels should exercise caution lest they be set onto St. Michaels Breakers, eastward of the bar channel. The tidal currents in the sound have a velocity of 2 knots or more at times. The tide rips on Fishing Rip and Middle Shoal sometimes have the appearance of breakers. Predictions for a number of places in Port Royal Sound and vicinity are given in the Tidal Current Tables.

Weather.-Beaufort and Port Royal Sound have a pleasant climate where summers are warm and humid while winters are mild. Winds are generally from the northeast in fall and winter and southerly in spring and summer; the average wind speed is around 10 mph.

Summer is the rainy season during which 38 percent of the annual rainfall is accumulated on about 7-9 days per month, mostly in the form of showers and thunderstorms. Tropical cyclones are most likely in late summer and early fall. Some seven tropical cyclones have battered the Beaufort area in the past 30 years. Summer afternoon temperatures average around 90° F with about 64 days a season recording 90°F or above; nighttime temperatures are usually in the low 70's.

Winter temperatures are generally in the low 60's during the afternoon and in the low 40's at night. Temperatures drop below freezing on about 22 days a season, while temperatures of 20° or less occur only about once a year. Winter precipitation accounts for about 20 percent of the annual total, falling mostly as steady rain. Each winter month averages about 5 days with measurable precipitation.

Fog occurs mostly in the winter and may be experienced from October to April, or after a very warm day when there is a sharp drop in temperature at night. It usually burns off in the forenoon. Easterly winds bring in the fog and westerly winds clear it away.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. vessels which have on board a pilot licensed by the Federal Government. The pilots board vessels from a 25-foot outboard motorboat equipped with VHF-FM channel 16 (156.80 MHz) at Port Royal Sound Lighted Whistle Buoy 2PR (32°05.0' N., 80°35.0' W.). Arrangements for the pilot are made in advance by wire or radiotelephone through the Charleston Marine Operator (telephone 803-524-7245), or through ships' agents. Pilots will take vessels in day or night.

Towage.-There are no tugs at Port Royal or Beaufort. If required, they may be obtained by prior arrangements through ships' agents from Charleston or Savannah.

Quarantine, customs, agriculture, and **immigration** requirements are attended to by officials from Charleston. Vessels are boarded at their berths. Prior arrangements should be made through ships' agents.

Harbor regulations.-There are no harbor regulations at Port Royal and Beaufort. The State Ports Authority Terminal at Port Royal is under the jurisdiction of the Director of the South Carolina State Ports Authority.

Wharves.-The South Carolina State Ports Authority Terminal (Pier 21), on the northeast side of the turning basin in Battery Creek at Port Royal, is the only deepwater facility in the area. It is owned by the Authority and operated by the Port Royal Clay Co. The 500-foot marginal wharf at the terminal had reported depths of 23 to 27 feet alongside in April 1968. A transit shed and a warehouse with 60,000 square feet and 8,500 square feet of storage area, respectively, are available at the terminal. Cargo is handled by ship's tackle; forklift trucks are available. The terminal has highway connections, and rail trackage connections with the Seaboard Coast Line Railroad at the rear of the transit shed. Bagged and bulk kaolin clay are shipped from the terminal. The other facilities at Port Royal include several small wharves and piers used by fishing vessels. There are only small-craft facilities at Beaufort; these are described later in this chapter.

Supplies.-Some marine supplies and provisions are available at Port Royal and nearby Beaufort. Bunker C fuel oil and diesel oil are brought in by barge from Savannah. Freshwater is piped to the South Carolina State Ports Authority Terminal.

Repairs.-There are no drydocking or major repair facilities for oceangoing vessels at Port Royal and Beaufort; the nearest such facilities are at Charleston and Savannah. Machine shops at Port Royal and Beaufort can make minor abovewater repairs.

Communications.-Rail freight and bus connections are available. There are good highways to the outer islands and to Savannah, Charleston, and inland places.

Beaufort River, which flows into Port Royal Sound from northward just inside Bay Point, is the approach to the U.S. Marine Corps Recruit Training Depot on Parris Island, Port Royal, and Beaufort. The river is a link in the Intracoastal Waterway; above the improved portion depths of 12 feet or more can be taken to the city of Beaufort.

Station Creek joins Beaufort River from eastward 1 mile above Bay Point. An inside route used only by local fishermen leads from Port Royal Sound to St. Helena Sound through Station Creek, Story River, and Harbor River. In 1963, the controlling depths were: Station Creek, 2 feet; Story River, 5 feet; and Harbor River, 3 feet. The entrance to Station Creek is marked by a daybeacon.

Chowan Creek, which empties into Beaufort River from northeastward about 5 miles above Bay Point, connects at its head with Morgan River. Passage to Morgan River is restricted about 5 miles above the mouth of Chowan Creek by U.S. Route 21 highway bridge and by the shoals in that vicinity.

Parris Island, on the west side of the entrance to Beaufort River, is the site of a U.S. Marine Corps Recruit Training Depot. The dock on Parris Island opposite the mouth of Chowan Creek had a depth of 19 feet alongside in 1963. The remains of an old U.S. Naval graving dock are adjacent to the pier. Several tanks and the many large buildings on the island are prominent.

Battery Creek empties into Beaufort River from northwestward 7 miles above Bay Point. Above the turning basin at Port Royal the creek, in 1963, had a controlling depth of 15 feet to State Route 281 highway bridge, and thence 7 feet in a narrow winding channel to about a half mile below the railroad bridge. At this point, 4.4 miles above the mouth, overhead power cables crossing the creek have a clearance of 12 feet. The highway bridge has a swing span with a clearance of 12 feet. (See **117.240 and 117.245 (a) through (e), and (h) (9),** chapter 2, for drawbridge regulations and opening signals.)

Archers Creek, a narrow passage leading westward from the mouth of Battery Creek to Broad River, is shoal at its eastern end. There is exposed piling at its western end. About midway of its length, a highway bridge has a 34-foot fixed span with a clearance of 16 feet. An overhead power cable is close eastward of the bridge; clearance is not known. The creek, along with Ribbon Creek, is included in the danger zone of a rifle range; limits and regulations are given in **204.80,** chapter 2.

Port Royal, a town on the north bank of the entrance to Battery Creek, is one of the oldest settlements on the Atlantic and of marked historical interest. The large modern State Ports Authority Terminal, described earlier, is here. Several plants above and below the terminal process shrimp, crab, oysters, and fish for shipment inland. Port Royal is the terminus of a branch of the Seaboard Coast Line Railroad.

Beaufort (pronounced Bew-fert), on the point of land jutting eastward into Beaufort River 11 miles above Bay Point, is a city of great historical interest. The city can also be reached from the northward via the Intracoastal Waterway. There are motels, banks, a hospital, and numerous small businesses. A good portion of the commercial life of the city is dependent on the proximity of a U.S. Naval hospital, the Marine Corps Recruit Training Depot, and the Marine Corps Air Station. It has good highway connections with the mainland and the other islands and beaches. It is served by a branch of the Seaboard Coast Line Railroad. Prin-

cipal commodities handled are fish, crabs, and oysters, which are trucked inland after processing, and truck farming. A boatbuilding firm is on nearby Factory Creek. There is fair anchorage in the stream off the wharf westward of U.S. Route 21 highway bridge. An inactive seafood-processing plant and the municipal (city) wharf, which was reported not being used in 1969, are on the south side of Beaufort westward of the bridge.

Small-craft facilities.-There are two marinas at Beaufort where gasoline, diesel fuel, berthage with electricity, water, ice, and some marine supplies can be obtained. The facility on the south side of the city westward of the bridge can make engine and electrical repairs, and has a launching ramp. The other, eastward of the bridge and on the south side of nearby **Factory Creek,** has a marine railway that can handle craft up to 65 feet or 50 tons for hull repairs; a launching ramp is available close westward.

Charts 11516 (571), 11519 (794), 11513 (1240).-Broad River, which enters Port Royal Sound on the west side of Parris Island, extends northwestward about 16 miles. The river is not difficult to navigate as far as Whale Branch, about 13 miles above the entrance. A **danger zone** of a pistol range is on the west side of Parris Island; limits and regulations are given in **204.80,** chapter 2. State Route 170 highway swing bridge with a clearance of 12 feet crosses Broad River about 7 miles above the entrance. (See **117.240 and 117.245 (a) through (e), and (h) (10),** chapter 2, for drawbridge regulations and opening signals.) Archers Creek, about 4 miles above the entrance of Broad River, connects Broad River with Beaufort River to the eastward; the creek was described earlier in this chapter.

Charts 11519 (794), 11513 (1240).-The Seaboard Coast Line Railroad bridge, which crosses Broad River about 15 miles above the entrance and 2 miles above Whale Branch, has a swing span with a clearance of 7 feet. (See **117.240 and 117.245 (a) through (e), and (h) (11),** chapter 2, for drawbridge regulations and opening signals.) **Pocotaligo River, Tulifiny River,** and **Coosawhatchie River** are shallow streams which empty into the head of Broad River.

Whale Branch, which connects Broad River with Coosaw River to the eastward, had a controlling depth of 7 feet in 1963. Overhead power cables crossing the branch have a minimum clearance of 40 feet; the cable with this least clearance crosses the branch immediately eastward of U.S. Route 21 highway bridge about 5.5 miles above the mouth. The Seaboard Coast Line Railroad bridge over the branch, 4 miles from Broad River, has a swing span with a clearance of 5 feet. The U.S. Route 21 highway bridge, 1.5 miles above the railroad bridge, has a fixed span with a clearance of 20 feet. A swing bridge serving the same highway close eastward has a swing span with a channel width of 34 feet and a clearance of 5 feet. (See **117.240 and 117.245 (a) through (e), and (h) (8),** chapter 2, for drawbridge regulations and opening signals for the swing bridges crossing Whale Branch.)

Brickyard Creek, 5 miles eastward of the highway bridges over Whale Branch, connects Coosaw River with Beaufort River to the southward and is a link in the Intracoastal Waterway. The mean range of tide is 7.3 feet at the mouth of the creek.

Chart 11516 (571).-Chechessee River empties into Port Royal Sound from westward. The State Route 170 highway bridge crossing the river 10 miles above the mouth has a fixed span with a clearance of 20 feet. In 1963, a least depth of 18 feet was available from the mouth of the Chechessee River to just above **Copps Landing** on the **Colleton River,** 5 miles above the mouth. These rivers are of no commercial importance.

Mackay Creek joins Chechessee River from westward about 1 mile above its mouth. An unmarked route from Port Royal Sound to Calibogue Sound is through Mackay Creek past the north side of Pinckney Island. This passage is more difficult than the route through Skull Creek, but equally deep water can be found by those having local knowledge. In 1963, the controlling depth in Mackay Creek was 9 feet. State Route 46 highway bridge over Mackay Creek from **Buckingham Landing** to **Last End Point** has a fixed span with a clearance of 25 feet. An overhead power cable crossing the river just north of the bridge has a clearance of 43 feet.

Skull Creek, a link in the Intracoastal Waterway, enters Port Royal Sound from southwestward about 4 miles above Hilton Head and is described in chapter 12.

Chart 11512 (440).-Calibogue Sound is entered between Hilton Head Island and **Daufuskie Island,** about 5 miles northward of Tybee Light (32°01.3′N., 80°50.8′W.). The entrance is obstructed by shifting shoals through which are several crooked channels. The best channel extends from Tybee Roads northward just eastward of the lighted range. In 1963, the controlling depth was 7½ feet on the bar. Inside the bar, depths are ample.

Cooper River, of importance only as a section of the Intracoastal Waterway, empties into Calibogue Sound from westward about 3 miles above the entrance to the sound.

Chart 11516 (571).-May River, which empties into Calibogue Sound from westward about 6 miles above the entrance, is the approach to the town of **Bluffton,** 7 miles above the mouth. The controlling depth in the river to Bluffton was 10 feet in 1963. The river is marked by daybeacons as far as Bluff-

ton. **Brighton Beach,** a small town about 3 miles downriver from Bluffton, has two small-boat launching ramps. The overhead power cable near **Buck Point** has a clearance of 35 feet over the narrow northern channel and 68 feet over the southern channel. The clearances for the power cable west of Bluffton (chart 11513 (1240)) are 53 feet over the northern channel and 48 feet over the southern. Passage is sometimes made from May River to Cooper River by way of unmarked **Bull Creek.** An overhead cable with a clearance of 46 feet crosses Bull Creek between Bull and Savage Islands. The tides meet in Bull Creek, forming flats. In 1963, the creek was found to be bare at low water at the junction of **Savage Creek,** thence 1 foot to a junction with May River.

Broad Creek flows into Calibogue Sound from eastward, about 1.2 miles above the entrance to the sound, and extends 6 miles into Hilton Head Island. In 1963, the controlling depth was 9 feet for a distance of 5 miles. The creek is privately marked by daybeacons for about 1.6 miles above the mouth.

The small-boat basin at **Harbour Town,** just southward of the entrance to Broad Creek, has a marina at which berths, electricity, gasoline, diesel fuel, water, ice, marine supplies, and engine repairs can be obtained. In October 1970, the privately marked and maintained channel to the boat basin had a reported controlling depth of 6 feet.

A marina is on the south side of **Palmetto Bay,** about 3.5 miles upstream from the entrance of Broad Creek. Berthage with electricity, gasoline, diesel fuel, water, ice, marine supplies, and a portable 16-ton lift are available. Hull, engine, and electrical repairs can be made, and meals and lodging are available.

Chart 11512 (440).-Savannah River, the boundary between the States of South Carolina and Georgia, is 65 miles southwestward of Charleston Harbor and 105 miles northward of the entrance to St. Johns River. It is navigable for deep-draft vessels to the upper end of Savannah Harbor, 19 miles above the outer ends of the entrance jetties, and for barges to the city of Augusta, 172 miles above the entrance. Deep-draft vessels approach the entrance from outside Savannah Light.

Savannah, on the south bank of Savannah River about 15 miles above the outer end of the jetties, is the second largest city and chief port of the State of Georgia. It is a leading southern port and is the main distributing point for the surrounding country. The city has considerable coastwise and foreign trade, and is connected with coastal cities to the north and south by the Intracoastal Waterway which crosses Savannah River several miles below the waterfront terminals. The climate is equable, and high-velocity winds are infrequent. The water-borne commerce is of a widely varied nature. Imports include petroleum products, sugar, lumber, cement, gypsum, fertilizer materials, newsprint, tea, coffee, burlap, molten sulfur, chemicals, iron and steel products, fish meal, and agricultural machinery; exports include petroleum products, kaolin clay, lumber, textiles, naval stores, kraft paper, tall oil, scrap iron, and agricultural machinery.

Prominent features.-Savannah Light (31°57.0'N., 80°41.0'W.), 85 feet above the water, is shown from a tower on white house on piles in 50 feet of water, about 10 miles east-southeastward of Tybee Light. On each of the sides is the word "SAVANNAH" in black letters and a red daymark. A fog signal and radiobeacon are at the light.

Tybee Light (32°01.3'N., 80°50.8'W.), 144 feet above water, is shown from an octagonal brick tower, lower one third white and upper two thirds black, on the northeast end of Tybee Island. A radiobeacon is at the light.

The flashing red lights atop the three WSAV radio towers on **Oatland Island** are prominent from seaward in clear weather, as is the large chemical plant southwestward of Mackey Point.

Boundary lines of inland waters.-The line established for Savannah River is described in **82.40,** chapter 2.

Channels.-A Federal project provides for a 40-foot channel across the bar through Tybee Roads to the jetties, thence 38 feet for about 16 miles in the main channel to the turning basin at Kings Island, thence 36 feet for about 1 mile, and thence 30 feet for another 1.4 miles to the head of the project about 500 yards below U.S. Route 17 highway bridge; the project also provides for suitable turning basins at city waterfront terminals. (See Notice to Mariners and latest editions of the charts for controlling depths.) The channels are well marked by lighted ranges, lights, and lighted and unlighted buoys.

Anchorages.-Most vessels anchor northward or northwestward of the sea buoy (Tybee Lighted Whistle Buoy T, 31°58.3'N., 80°44.0'W.), where depths range from 19 to 45 feet with good holding ground. There is no anchorage in Savannah River except in an emergency.

Dangers.-The set of the tidal current in and out of the various sounds and inlets should be carefully considered by vessels approaching Savannah by the inshore route. There are several unmarked obstructions in the approaches. The **danger area** of an Air Force air-to-air and air-to-water gunnery and bombing range is about 15 miles seaward of the light; limits and regulations are given in **204.81,** chapter 2.

Bridges.-An overhead power cable with a clearance of 180 feet crosses the main channel of the Savannah River at Fig Island about 10.3 miles above the mouth. The Eugene Talmadge Memorial Highway toll bridge near the western edge of the city waterfront, 13 miles above the mouth, has a fixed span with a clearance of 136 feet over the

center span width of 400 feet. U.S. Route 17A highway served by this bridge also crosses Back River to the northeastward over a trestle with a 34-foot fixed span which has a clearance of 10 feet. The vertical lift portion of the former Seaboard Coast Line Railroad bridge, crossing the improved deepwater channel about 1.3 miles above the Eugene Talmadge Memorial Highway bridge, has been destroyed; the fenders and pier remain. The railroad then crosses Back River on a trestle with a 30-foot fixed span which has a clearance of 11 feet; an overhead power cable on the south side of this bridge has a clearance of 15 feet. An overhead power cable with a clearance of 155 feet crosses the main channel of the Savannah River at Port Wentworth about 4.3 miles above the Eugene Talmadge Memorial Highway bridge, and another cable with a clearance of 55 feet crosses the mouth of Middle River just to the east of the main channel. The U.S. Route 17 (Houlihan) highway bridge about a mile above Port Wentworth at the head of the Federal project, has a swing span with a clearance of 8 feet. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.) The highway continues on across Middle River and Little Back River. A bridge across Middle River has a 17-foot fixed span with a clearance of 5 feet, and a bridge across Little Back River has a 40-foot fixed span with a clearance of 8 feet.

Tides and currents.-Daily predictions for both Savannah River entrance and Savannah are given in the Tide Tables. At the bar, high and low waters occur about 30 minutes earlier than at the river entrance. The mean range of tide is 6.8 feet at Tybee Light and 7.4 feet at Savannah.

The velocity of the ebb current from the entrance jetties to Savannah is from 2.6 to 3 knots. The flood current has a velocity of from 1.5 to 2.4 knots. The current is considerably influenced by winds and freshets. The predicted times of slack water and the times and velocities of strength of flood and ebb at the entrance to Savannah River are given in the Tidal Current Tables. Predictions for a number of other places in Savannah River may be obtained from data in the tables.

Currents set in the direction of the channel except at the entrance near Tybee Light, where the flood sets northwestward across the channel. Between the jetties the flood sets 260°. Freshets occasionally occur in the spring, but do not endanger shipping at the wharves.

In 1974, a dam with floodgates was under construction across Back River about 2.3 miles above the river's junction with Savannah River. When completed, the floodgates will allow water to enter Back River above the dam on the tidal flood, thence at high water slack the gates will be closed and the accumulated water will be allowed to flow back into the Savannah River northwestward of Hutchinson Island.

Weather.-Savannah has a temperate climate with an average annual rainfall of nearly 50 inches, half of which falls in the thunderstorm season, between mid-June and mid-September. Hurricanes affect Savannah about once every 10 years. Fog occurs about 3 to 4 days per month from September through May, and, where these conditions usually clear in the forenoon, the increasing industrial pollutants are often responsible for holding fog and smoke until midafternoon. It is often clear on the river when it is thick outside. (See page T-3 for **Savannah climatological table.**)

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

The National Weather Service Office is at the Municipal Airport, 9 miles outside the city, where **barometers** are compared.

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. vessels in the domestic trade which have on board a pilot licensed by the Federal Government. The Savannah pilots maintain two pilot boats; the SAVANNAH, black hull and white superstructure, and the alternate boat, PILOT, painted black. Both are 65 feet long, fly the code flag **H** and are equipped with radiotelephones, 2738 kHz and VHF-FM channel 16 (156.80 MHz). The boats are in direct communication with the pilot station in Savannah. Communications are monitored by the pilot station only during daylight, and by the pilot boats at all hours when working ships. Pilots board from the pilot boat in the vicinity of the sea buoy (Tybee Lighted Whistle Buoy T, 31°58.3′ N., 80°44.0′ W.). Ships are taken in day or night; deeper draft vessels are taken in on a rising tide. Pilots are arranged for in advance by radio and by radiotelephone through the Charleston or Jacksonville Marine Operator (telephone 912-236-0226 or 912-236-8105) or through ships' agents.

Towage.-Tugs up to 2,400 hp are available at Savannah on a 24-hour basis; services should be arranged for in advance. Vessels usually proceed from the bar to Savannah without assistance. Tugs, however, are required for docking, undocking, and when shifting berths. Vessels are met by tugs just below their assigned berths, or elsewhere in the harbor by special arrangement.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A U.S. Public Health Service **outpatient clinic** is at Savannah. (See appendix for address.) There are also public and private hospitals in the city.

Agriculture quarantine officials board vessels at their berths; the office is in the Customhouse.

Coast Guard.-The office of the **Captain of the Port** is at the Drayton Street Dock (32°04′53″N., 81°05′22″ W.). A Marine Inspection Office and a **documentation office** are in the Post Office Building.

Customs.-Savannah is a **customs port of entry.** Officials board vessels at their berths; the office is in the Customhouse.

Immigration officials board vessels at their berths; the office is in the Customhouse.

Harbor regulations.-The Savannah Port Authority has jurisdiction over Savannah Harbor and the port. Regulations are enforced by the **harbormaster** who can be reached through the Savannah Port Authority office at 42 E. Bay Street. Copies of the harbor regulations are available at the same office. A **speed limit** of 4 knots against the current and 6 knots with the current is in force within the harbor limits. The Georgia Ports Authority owns and operates the State docks and warehouses.

Wharves.-There are numerous wharves of all types at Savannah; only the major ones are described. Most of the facilities have highway and railroad connections as well as water and electrical shore power. The smaller facilities at Savannah are used by barges and small vessels, and as vessel repair berths; these are not described. Cargo is generally handled by ship's tackle; special cargo handling equipment, if available, is mentioned in the description of the particular facility. The alongside depths given for each facility described are reported depths. (For information on the latest depths, contact the operator.) A complete description of the wharves and piers at Savannah may be obtained from the Port Series, a Corps of Engineers publication.

Facility on the north side of Savannah River south of Oyster Bed Island:

Savannah State Docks, Barge-Carrying Vessel Terminal Wharf (32°02′15″N., 80°54′00″W.); about 2.5 miles above the outer ends of the entrance jetties; offshore row of platforms, 339 feet with dolphins; 38 feet alongside; deck height, 15 feet; mooring area for about 68 cargo barges; used for mooring of oceangoing barge-carrying vessels for loading and unloading cargo barges; owned and operated by Georgia Ports Authority.

Facilities on the south side of Savannah River below the Eugene Talmadge Memorial Bridge:

Standard Oil Co. Wharf (32°04′46″N., 81°02′35″ W.): about 3.1 miles below Eugene Talmadge Memorial Bridge; 215-foot offshore wharf, 315 feet with dolphins; 33 to 35 feet alongside; deck height, 17 feet; pipelines extend from wharf to storage tanks in rear; hose-handling derricks; fresh water available; railroad tracks connect with Seaboard Coast Line Railroad; used for receipt of petroleum products and fueling small vessels; owned and operated by Standard Oil Co.

Union Oil Co. Wharves A and B: about 0.1 mile westward of Standard Oil Wharf; offshore wharves, 67- and 80-foot faces, 460 feet with dolphins; 30 to 33 feet alongside; deck height, 15 feet; pipelines extend from Wharf B to storage tanks in the rear; hose-handling derricks; one 2-ton forklift; railroad tracks in rear connect with Seaboard Coast Line Railroad; used for shipment and receipt of petroleum products and receipt of packaged petroleum products; owned and operated by Pure Oil Co., Division of Union Oil Co. of California.

Flintkote Co. Wharf: about 0.4 mile westward of Union Oil Co. Wharves; 514-foot marginal wharf; 32 to 34 feet alongside; deck height, 15 feet; traveling 8½-ton bucket-equipped crane; used for receipt of gypsum rock; railroad tracks connect with Seaboard Coast Line Railroad; owned by Savannah Port Authority and operated by the Flintkote Co.

Seaboard Coast Line Railroad Co. Wharf: about 0.85 mile westward of Flintkote Co. Wharf; 1,907-foot marginal wharf, 1,990 feet with dolphins; 32 to 30 feet alongside; deck height, 20 feet; three transit sheds, total 97,000 square feet storage area; stevedore equipment available as required; railroad tracks on apron and in rear of transit sheds connect with Seaboard Coast Line Railroad; pipelines extend from wharf to storage tanks in rear; used for receipt and shipment of general and containerized cargo in the foreign and domestic trade; shipment of naval stores; receipt of molten sulfur; owned by Seaboard Coast Line Railroad and operated by East Coast Terminal.

Savannah State Dock-Ocean Terminal, Berths 1 and 2: about 200 feet below Eugene Talmadge Memorial Bridge; 1,110-foot marginal wharf with 22-foot apron; 30 feet alongside; deck height, 14 feet; one transit shed, total 86,000 square feet of storage area; stevedore equipment available as required; railroad tracks in rear of transit shed connect with Central of Georgia Railway; occasionally used for cruise vessels; owned and operated by the Georgia Ports Authority.

Facilities on the north side of Savannah River at Hutchinson Island below the Eugene Talmadge Memorial Bridge:

GITC Slip (32°05′10″N., 81°05′22″W.): about 0.2 mile below Eugene Talmadge Memorial Bridge; all deck heights 13.5 feet.

Berths 32-33: fronting Savannah River eastward of slip entrance; 805-foot marginal wharf; 34 feet alongside.

Berths 34-37; east side of slip; 1,470 feet long; 29 to 30 feet alongside.

Berths 41-42; west side of slip; 1,210 feet long; 32 to 28 feet alongside.

Berth 43: fronting Savannah River westward of slip entrance; 202-foot marginal wharf; 32 to 18 feet alongside.

Available at the terminal: 234,000 square feet covered storage area; two vessel-loading spouts at Berth 35 and one at Berth 37, each with rate of 150 tons per hour connects by conveyor-belt system from car pit under railroad tracks in rear; eight portable electric belt conveyors; two 5-ton capacity portable hoppers; forklifts with capacities up to 9 tons; railroad tracks at rear connect with Hutchinson Island Storage Yard and the Seaboard Coast Line Railroad; all berths used for receipt and shipment of general cargo in the foreign and

domestic trade and for receipt of dry bulk commodities including fertilizers, chemicals, and clay; owned by Mountain Properties, Inc., and operated by GITC, Inc.

Charter International Oil Co. Slip: about 0.3 mile below Eugene Talmadge Memorial Bridge; deck height, 12 feet; eastern side of slip 620-foot face, 560 feet usable; 23 to 15 feet alongside; western side of slip 400-foot face, 23 to 15 feet alongside; head of slip 245-foot face, 15 feet alongside; hose-handling derrick; pipelines extend from eastern and western side of the slip to storage tanks in the rear; railroad tracks connecting with Seaboard Coast Line Railroad serve railroad tank car loading rack; used for the receipt of petroleum products and bunkering vessels; owned by Seaboard Coast Line Railroad and operated by Charter International Oil Co.

Facilities on the southwest side of Savannah River between the Eugene Talmadge Memorial Bridge and Seaboard Coast Line Bridge:

Savannah State Docks-Ocean Terminal: just above Eugene Talmadge Memorial Bridge; Slip No. 1 (32°05′23″N., 81°06′11″W.), and Slip No. 2 immediately northward of Slip No. 1. A 45-ton mobile crane and forklifts with various attachments are shared by all berths at the terminal.

Berths 10a-10b: southeastern side of Slip No. 1; 1,035 feet long with 23-foot apron; 32 to 30 feet alongside; deck height, 12.5 feet; one transit shed, total 80,000 square feet storage area; liquid latex unloaded from vessels to rail tank car by hose and portable pumps; railroad tracks in rear of transit shed connect with Central of Georgia Railway; used for receipt and shipment of general cargo in the foreign and domestic trade; receipt of liquid latex.

Berths 12a-12b: southwestern side of Slip No. 1; 1,035 feet long with 23-foot apron; 32 to 30 feet alongside; deck height, 12.5 feet; adjustable transfer bridge at head of Slip No. 1 southwestward of berth 12a for handling cargo to and from LST-type vessels; depth at bridge 30 feet.

Berth 13: between Slips No. 1 and 2; 510-foot marginal wharf with 30-foot apron; 32 feet alongside; deck heights, 12 and 15 feet.

Berths 14-15: southeastern side of Slip No 2; 1,143 feet along with 57-foot apron; 32 feet alongside; deck height, 15 feet, two transit sheds with a total of 245,000 square feet of storage area; two 50-ton gantry cranes which also serve Berths 16 through 20; railroad tracks in rear of transit sheds and on apron of Berths 14 and 15 connect with Central of Georgia Railway; used for receipt and shipment of general and containerized cargo in the foreign and domestic trade, and receipt of dry bulk commodities including fertilizer and fertilizer materials.

Berths 16-17: southwestern side of Slip No. 2; 1,046 feet long; 32 feet alongside; deck height, 15 feet; transit sheds, 78,000 square feet total storage area; two 45-ton gantry cranes shared with Berths 14-20; railroad tracks on apron and in rear of transit sheds connect with Central of Georgia Railway; used for receipt and shipment of general cargo in the foreign and domestic trade.

Berths 18-20: immediately northward of Slip No. 2, about 0.4 mile above Eugene Talmadge Memorial Bridge; marginal-type wharf about 1,700 feet long; 34 feet alongside; deck height, 15 feet; one transit shed, total 57,000 square feet storage area; one commercial warehouse, total 44,000 square feet storage area; two fertilizer warehouses, total 117,000 square feet storage area; about 10 acres open storage area; two 45-ton gantry cranes shared with Berths 14-20; six 5-ton portable hoppers serve a fixed conveyor-belt system from wharf to fertilizer warehouses; railroad tracks in rear of transit shed and warehouses connect with Central of Georgia Railway; used for receipt and shipment of general cargo in the foreign and domestic trade, receipt of dry bulk fertilizer and fertilizer materials; Ocean Terminal is owned and operated by Georgia Ports Authority.

Colonial Oil Industries Oil Pier: about 0.7 mile above Eugene Talmadge Memorial Bridge; 125-foot offshore wharf, 290 feet with dolphins; 33 feet alongside; deck height, 12.5 feet; hose-handling tower; pipelines extend from wharf to storage tanks in the rear; railroad tank car loading rack in rear connects with Central of Georgia Railway; used for receipt and shipment of petroleum products and caustic soda, and replenishing harbor fuel barges; owned and operated by Colonial Oil Industries, Inc.

Facilities on southwest side of Savannah River above Seaboard Coast Line Railroad bridge (Garden City):

American Oil Co. Wharf (32°06′35″N., 81°07′28″W.): about 0.5 mile above Seaboard Coast Line Railroad bridge; 200-foot face; upper and lower sides 100 feet; 30 feet alongside; deck height, 12 feet; hose-handling derrick; pipelines extend from wharf to storage tanks in the rear; railroad tank car loading rack in rear connects with Central of Georgia Railroad; used for receipt of crude oil and receipt and shipment of petroleum products, bunkering vessels using the wharf; owned and operated by American Oil Company.

National Gypsum Co. Wharf: about 0.9 mile above Seaboard Coast Line Railroad bridge; 400-foot face with open apron; 28 feet alongside; deck height, 12 feet; open storage area with a capacity for 100,000 tons gypsum rock; one 7½-ton electric unloading tower with 2¾ cubic-yard bucket and with 50-foot outboard working reach, unloading rate 400 tons per hour, belt-conveyor system from wharf to open storage in the rear, one hopper for use of self-unloading vessels connects with belt-conveyor system; pipelines from wharf to storage tanks in rear; railroad tracks along rear of wharf and at rear of plant connect with Savannah and Atlanta Railway; used for receipt of gypsum rock, bauxite, and asphalt oil; owned and operated by National Gypsum Co.

Savannah State Docks-Garden City Terminal: extends along the southwest side of Savannah River from 1.1 to 2.4 miles above the Seaboard Coast Line Railroad bridge. Forklifts with various attachments are shared by all berths at the terminal. The terminal is connected by the Savannah State Docks Railroad with the major railroads that serve the port.

Berth 50a: southeast end of terminal; 90-foot offshore wharf, 700 feet usable space when used with dolphins and with Berth 50b to the northwestward; 34 feet alongside; deck height, 12.5 feet; hose-handling derricks; pipelines extend from wharf to storage tank farms in rear; railroad tracks at railroad tank car loading racks in rear; used for receipt of petroleum products, asphalt, and petrochemicals, shipment of tallow; receipt and shipment of other liquid bulk products, including vegetable oils, fertilizers, and naval stores.

Berth 50b: immediately northwestward of Berth 50a; 75-foot offshore wharf; 675 feet usable space when used with Berths 50a and 51 immediately to the southward and northward, respectively; 34 feet alongside; deck height, 12.5 feet; steam-heated pipelines extend from wharf to heated storage tanks in rear; used for receipt of molten sulfur.

Berths 51-57: immediately northwestward of Berth 50b; 3,865-foot marginal wharf; 40 to 37 feet alongside; deck height, 15 feet; five transit sheds, 359,000 square feet total storage area; more than 1-million square feet public warehouses in addition to private warehouses on lease; 140,000 square feet covered storage; about 69 acres open storage area; 640,000 cubic feet cold storage; fumigation plant; cranes up to 45 tons; use of mobile equipment at Savannah State Docks Ocean Terminal; two diesel electric switching engines; railroad tracks are on the aprons, at transit sheds, warehouses, open storage areas, railroad tank car loading racks, and at railroad car storage yards; all berths are used for receipt and shipment of general cargo, automobiles, and chemicals in the foreign and domestic trade, receipt of ores, pig iron, and salt cake, and shipment of scrap metal; Berth 51 receives bulk liquid latex, and has pipelines extending from it to storage tanks in the rear.

Multi-Purpose Container Wharf, Berths 58-59; immediately northwestward of Berth 57; 1,667-foot marginal wharf; 38 feet alongside; deck heights, 15 feet berth 58, 8 feet berth 59; 17-acre container storage area; one 45-ton container crane with 113-foot outboard and back reaches, one 45-ton mobile container crane, use of two 30-ton gantry cranes from Berth 57; receipt and shipment of containerized cargo.

Multi-Products Bulk Terminal Unloading Wharf, Berth 60: about 0.3 mile northwestward of Berth 58; 300-foot offshore wharf, 572 feet with dolphins; 32 to 30 feet alongside; deck height, 15 feet; 234,000 square feet covered bulk storage; belt-conveyor unloading system, capacity 1,400 tons per hour; receipt of dry bulk commodities.

Multi-Products Bulk Terminal Loading Wharf, Berth 61: about 0.1 mile northwestward of Berth 60; 340-foot offshore wharf; 34 to 32 feet alongside; deck height, 15 feet; belt-conveyor loading system; shipment of dry bulk commodities.

Savannah State Docks Garden City Terminal is owned and operated by Georgia Ports Authority.

Facilities on the west side of Savannah River (Port Wentworth):

Chevron Asphalt Co. Wharf: (32°08.3′N., 81°08.7′W.); 30-foot offshore wharf, 220 feet with dolphins; 32 to 28 feet alongside; deck height, 12 feet; hose-handling derrick; pipelines extend from wharf to storage tanks in the rear; used for receipt of asphalt; owned and operated by Chevron Asphalt Co.

Savannah Sugar Refining Corp. Wharf: about 0.3 mile northward of Chevron Asphalt Co. Dock; 300-foot offshore wharf; 32 feet alongside; deck height, 18 feet; bulk raw sugar is unloaded by mobile cranes into four 15-ton portable hoppers served by conveyor belts extending from wharf to refinery in rear; pipelines extend from wharf to storage tanks in the rear; railroad tracks in rear connect with Savannah and Atlanta Railway; used for receipt of raw sugar, molasses, and fuel oil; owned and operated by Savannah Sugar Refining Corp.

Atlantic Creosoting Co. Wharf: about 0.4 mile northward of Chevron Asphalt Co. Wharf; 217-foot wharf, 320 feet with dolphins; 26 feet alongside; deck height, 12 feet; three 25-ton diesel electric cranes; one diesel switch engine; pipeline extends from wharf to storage tank in the rear; railroad tracks on wharf and at plant connect with Central of Georgia Railroad; used for receipt of timber and creosote, shipment of treated piling, poles and ties; owned and operated by Atlantic Creosoting Co.

Georgia Pacific Corp., Georgia Steamship Division Wharf (32°09′06″N., 81°09′09″W.): 200-foot offshore wharf, 375 feet with dolphins; 19 feet alongside; deck height about 16 feet; 20,000 square feet covered storage; forklifts up to 3½ tons, mobile cranes rented as needed; receipt of lumber and plywood in containers; shipment of supplies and equipment; owned and operated by Georgia Pacific Corp.

Continental Can Co. Wharf: about 0.3 mile northwestward of Georgia Pacific Corp. Wharf; 240-foot marginal wharf, 405 feet with dolphins; 30 feet alongside; deck height, 16 feet; forklifts, shipment of linerboard, receipt of fuel oil for plant consumption; owned and operated by Continental Can Co., Inc.

Supplies.-All kinds of marine supplies and provisions are available at Savannah. Bunker C fuel oil and diesel oil are available at the Charter International Oil Co. Slip; fuel can also be obtained by barge. Freshwater is available at most of the berths.

Repairs.-There are two major marine repair facilities at Savannah that can make all types of hull, engine, electrical, and electronic repairs to oceangoing vessels. Both facilities are on the southwest side of the river, about 200 feet and 0.85 mile above the Eugene Talmadge Memorial Bridge, respectively. A graving dock 540 feet long, 73 feet wide, and 20 feet over the keel blocks at high water, is at the more northerly facility; cranes up to 50 tons are available here. The other facility makes major above-the-waterline repairs; cranes up to 60 tons are available here. Machine, electronic, electrical, sheet metal, and welding repair shops are off the waterfront at Savannah: Floating cranes up to 75 tons are available.

Communications.-Savannah has excellent rail, water, highway, and air transportation facilities. Two railroads, the Seaboard Coast Line Railroad and the Central of Georgia Railroad, a subsidiary of the Southern Railway operate out of the city. There is regular scheduled steamship service to all parts of the world, and considerable shipping coastwise and along the Intracoastal Waterway. Two major airlines, several bus lines, and numerous truck lines serve Savannah. The city has highway connections with Interstate Routes 16 and 19, and with U.S. Routes 17, 17A, and 80.

Small-craft facilities.-There are no small-craft facilities at Savannah. However, large yachts and transient tugs can be berthed on a space available basis at the Savannah Port Authority wharves on the south bank of the river about 0.65 mile below the Eugene Talmadge Memorial Bridge. Arrangements for this space must be made in advance through the harbormaster; a charge is made. The nearest place where gasoline, diesel fuel, and other services can be obtained is on the Intracoastal Waterway south of Savannah at Thunderbolt, or at Isle of Hope. (See chapter 12 for details.)

Charts 11514 (634-SC), 11515 (635-SC).-The Savannah River above Savannah is navigable to the city of **Augusta,** 172 miles (198 statute miles) above the mouth. A Federal project provides for a 9-foot channel over a width of 90 feet from near U.S. Route 17 highway bridge, 18.8 miles (21.6 statute miles) above the mouth, to Augusta. The controlling depth is about 7½ feet in this section of the river. Daybeacons mark some of the shoal and critical spots in the river, but the best guide for the mariner is the use of the chart to carry the best water. The river is swift and tortuous; daybeacons are sometimes carried away. Numerous foul areas exist near the shore, and floating debris is a constant danger to navigation. Local knowledge is advised.

The freshet variation above the normal pool level of the **New Savannah Bluff** lock and dam, 162.7 miles (187.2 statute miles) above the mouth, is about 13 feet ordinarily, with an extreme of 34 feet. The lock is 360 feet long, 56 feet wide, and has a depth over the lower miter sill of 10 feet. The depth over the upper miter sill at normal pool level is 13½ feet; the vertical lift is 15 feet. There is no navigation lock in the dam about 4 miles above Augusta.

Bridges.-Between U.S. Route 17 highway bridge and the lock and dam, the limiting clearances of the drawbridges are 7 feet and of the fixed bridges 27 feet. In 1975, a fixed highway bridge with a design clearance of 55 feet was under construction across the river about 24.2 miles (27.9 statute miles) above the mouth. Between the lock and dam and the head of navigation the limiting drawbridge clearances are 12 feet and the fixed bridges 26 feet at normal pool level. (See **117.240 and 117.245 (a) through (e), and (h) (12),** chapter 2, for drawbridge regulations and opening signals for the Charleston and Western Carolina Railway Co. bridge which crosses the river near Augusta, about 170 miles (195.6 statute miles) above the mouth.) An overhead power cable just below this bridge has a clearance of 76 feet. (See **117.240,** chapter 2, for regulations and opening signals for the other drawbridges crossing this section of the river.)

There are numerous landings between Savannah and Augusta without wharves or rail connections.

A city wharf, a Georgia State barge terminal, an oil terminal, and a brick-loading wharf are at Augusta.

The barge terminal has a depth of 9 feet alongside and a transit shed with 20,000 square feet of storage space. Modern freight handling equipment up to 10-ton lifting capacity is available, and the terminal is served by rail and truck connections.

Barge traffic between Savannah and Augusta is mainly in petroleum products upriver and brick downriver.

A small-craft marina at Augusta has a portable lift and can make hull, engine, and electrical repairs. Berthage with electricity, gasoline, diesel fuel (by truck), water, ice, and some marine supplies are available.

8. SAVANNAH RIVER TO ST. JOHNS RIVER

This chapter describes the coasts of South Carolina, Georgia, and Florida from Savannah River to St. Johns River, and includes the deep-water ports of Brunswick, Ga., and Fernandina Beach, Fla. Also discussed are Wassaw, Ossabaw, St. Catherines, Sapelo, Doboy, Altamaha, St. Simons, St. Andrew, Jekyll, Cumberland, and Nassau Sounds, and their tributaries, and several of the small towns along these waterways.

The Intracoastal Waterway for this section of the coast is described in chapter 12.

Charts 11509 (1241), 11502 (1242), 11488 (1243).-The coast from Savannah River to St. Johns River extends in a south-southwesterly direction for about 100 miles. Islands separated by numerous sounds and rivers constitute the entire coast. In general these islands are heavily wooded with marshy areas bordering them on their western sides. The 5-fathom curve extends about 7 miles offshore except in the vicinity of St. Simons Sound where 5 fathoms can be found as much as 12 miles offshore.

Caution must be observed along this section of the coast due to the inshore sets caused by the numerous rivers and sounds.

Private unlighted buoys mark several fish havens that have been established as much as 27 miles offshore along this section of the coast.

This section of the coast, due to its low relief, presents no good radar targets.

Boundary lines of inland waters.-The lines established for St. Simons Sound, St. Andrew Sound, and Cumberland Sound are described in **82.45,** chapter 2.

Danger areas for air-to-air and air-to-water gunnery and bombing ranges are off the Georgia coast; limits and regulations are given in **204.81,** chapter 2. (See chart 11480 (1111).)

Chart 11512 (440).-From Savannah River to Wassaw Sound, a distance of about 7 miles, the coast is formed by the shores of **Tybee Island** and **Little Tybee Island** which lie in a southwesterly direction. Dangerous shoals extend from the shores of the islands for a distance of 4.5 miles.

On the north side of Tybee Island, the **South Channel** of the Savannah River extends from the main channel at the east end of **Cockspur Island** to the southwest end of Elba Island where it again joins the main channel. In 1963, the controlling depth was 6 feet from the east entrance to near the junction with the Intracoastal Waterway where it was 2½ feet. **McQueens Island** is west of Tybee Island along the south side of South Channel. **Fort Pulaski National Monument** includes Cockspur and McQueens Islands. **Fort Pulaski** on Cockspur Island was built during the period 1829-1847. The Intracoastal Waterway crosses the South Channel through Elba Island Cut. The highway bridge crossing the channel between Cockspur and McQueens Islands has a 36-foot fixed span with a clearance of 10 feet. In 1974, a fixed highway bridge with a design clearance of 35 feet was under construction across South Channel between Elba Island and Savannah, 1.5 miles northwestward of Elba Island Cut.

Savannah Beach , a summer resort at the eastern end of Tybee Island, is conspicuous from seaward. An inside approach to the beach is made from South Channel through **Lazaretto Creek** and **Tybee Creek.** U.S. Route 80 highway fixed bridge crosses Lazaretto Creek just inside its entrance from South Channel; clearance is 35 feet. An overhead power cable with a clearance of 55 feet crosses the creek about 300 yards southward of the bridge. There are small-boat facilities near the bridge. Gasoline is available. In 1963, the controlling depth was 4 feet from South Channel Creek to a junction with Tybee Creek, thence 6 feet to Savannah Beach. A small marina at the beach has two 1-ton lifts. Gasoline, water, electricity, and limited berthing are available.

The remaining portions of Tybee and Little Tybee Islands are generally low and marshy, although they have many wooded hummocks with numerous creeks winding among them. Several creeks flow into the sea, but they are of little importance as their mouths are obstructed by shoals with crooked channels of 2 to 3 feet in depth.

The southwest part of Little Tybee Island, separated from the main body by a stretch of marsh, is **Beach Hammock (Petit Chou Island).** It is distinguishable by a large and heavily wooded hummock which marks the northern point of the entrance to Wassaw Sound.

The entrance to **Wassaw Sound** is about 9.5 miles southward of Tybee Light (32°01.3′ N., 80°50.8′ W.). Shoals extend offshore a distance of 4 to 4.5 miles from the entrance, forming a shifting bar. In 1963, the controlling depth was 9 feet through the marked-bar channel. The entrance, used only by small boats, is marked by a lighted buoy and the bar channel by lighted and unlighted buoys. A private unlighted buoy marks a fish haven about 5 miles eastward of the entrance buoy.

After crossing the bar at the entrance to Wassaw Sound, a channel with depths of 18 to 43 feet leads through the southern part of the sound and for 6 miles up Wilmington River to the Intracoastal Waterway. The channel is marked by lights in its southern part.

Tides and currents.-The mean range of tide varies from about 6.9 feet in the sound to about 7.8 feet up the rivers. The tidal currents in Wassaw Sound reach velocities up to 2 knots. Predictions for a number of places in the sound and vicinity may be obtained from the Tidal Current Tables.

Tybee River, also known as **Bull River,** flows into Wassaw Sound from northward. It is connected with the South Channel of the Savannah River 5 miles below the city of Savannah by St. Augustine Creek, the upper part of Wilmington River, and Elba Island Cut. The mouth of the river is obstructed by shoals. In 1963, the controlling depth was 10 feet from the mouth through St. Augustine Creek to a junction with the Intracoastal Waterway. The entrance is marked by a daybeacon. U.S. Route 80 highway bridge, 5.7 miles above the mouth, has a fixed span with a clearance of 20 feet. An overhead power cable with a clearance of 55 feet crosses the river close northwestward of the bridge.

Wilmington River flows into Wassaw Sound from northwestward. The upper end of the river from the junction with Skidaway River is part of the Intracoastal Waterway. **Turners Creek,** which connects the Wilmington and Tybee Rivers, in 1963 had a controlling depth of 3 feet until near its junction with **Richardson Creek** where it dries. U.S. Route 80 highway bridge over Turners Creek, 1.6 miles above the mouth, has a fixed span with a clearance of 35 feet. An overhead power cable on the northeastern side of the bridge has a clearance of 55 feet. The highway bridge 3 miles above the mouth has a clearance of 35 feet. An overhead power cable on the southwest side of the bridge has a clearance of 55 feet.

From Turners Creek, Richardson Creek winds generally in a westward direction for about 4 miles to Wilmington River. Two highway bridges crossing Turners Creek about 2.3 miles from its eastern entrance have fixed spans with minimum widths of 13 feet and minimum clearances of 5 feet. Overhead power cables at the bridges and 0.3 mile westward have minimum clearances of 35 feet. Boatyards and marinas on the creek can haul out craft up to 40 feet for hull and engine repairs. Gasoline, diesel fuel, water, and ice are available at several of the marinas and piers along the creek. Berthing with electricity and wet and dry storage is available. The velocity of the tidal current at the entrance to Wilmington River varies from 1 to 2 knots. Predictions may be obtained from the Tidal Current Tables.

The coast between Wassaw and Ossabaw Sounds is formed by **Wassaw Island,** which is triangular in shape and has a length of about 4.5 miles and a width of about 3.5 miles in its widest part. In general, the island is low and marshy; the strip of firm land forming the coastline is only 0.3 to 0.8 mile wide. The firm land is heavily wooded and has a broad sand beach backed by sand dunes. From this shore dangerous shoals extend to a distance of 3 to 4 miles. The marshy portion of the island is cut by numerous creeks winding among the heavily wooded hummocks. **Romerly Marsh Creek,** and **Odingsell River** separate the island from the islands to the westward.

Chart 11511 (573).-Ossabaw Sound, entered between the southern end of Wassaw Island on the north and **Bradley Point** (31°49.4'N., 81°02.9'W.) on the south, is a broad opening in the coast about 15 miles southwestward of Tybee Light. Most of the sound is shallow, and shifting shoals extend seaward about 4 miles. **North** and **South Channels** lead through the shoals into the sound. North Channel is marked by buoys. Small local fishing craft are the principal traffic seaward from the sound. Strangers are advised not to enter as breakers sometimes extend clear across the entrance. Vernon River, Ogeechee River, and numerous smaller rivers and creeks enter the sound.

Chart 11512 (440).-Vernon River enters Ossabaw Sound from the northwestward. The Intracoastal Waterway traverses a portion of this river. **Burnside River, Little Ogeechee River,** and several creeks enter the Vernon River. **Montgomery,** a town on Vernon River 5 miles above the mouth, has highway connections with Savannah.

Charts 11511 (573), 11509 (1241).-Ogeechee River flows into the western part of Ossabaw Sound. The river drains an extensive area and is subject to flood conditions which continually change the channel. Navigation to the Seaboard Coast Line Railroad bridges, about 27 miles above the sound, is possible with local knowledge. In 1963, the controlling depth was 6 feet to the first railroad bridge. This bridge has a 40-foot fixed span with a clearance of 14 feet. The second railroad bridge, parallel to and immediately northward of the first, has a lift span with a clearance of 4 feet down and 41 feet up. (See **117.240,** and **117.245 (a) through (e) and (h) (13),** chapter 2, for drawbridge regulations and opening signals.) The overhead power cable close northward of the more northerly bridge has a clearance of 50 feet. There is a large pulpwood loading dock with 13 feet alongside 5 miles downriver from the railroad bridges.

The currents in the Ogeechee River and Ossabaw Sound have considerable velocity, particularly the ebb setting out of the river. Current predictions for several locations in Ossabaw Sound and vicinity can be obtained from the Tidal Current Tables. The mean range of tide is about 7 feet, decreasing to about 1 foot at the highway bridge, 28.5 miles above the sound.

Chart 11511 (573).-The coastline between Ossabaw Sound and St. Catherines Sound is formed by the eastern shore of **Ossabaw Island,** which lies in a southwesterly direction and has a length of 8 miles and a width of 6 miles. The eastern half of

the island is heavily wooded. The north end forms the south shore of Ossabaw Sound.

The seaward side of the island appears unbroken by streams, and shows as a white sand beach backed by heavy woods. Dangerous shoals extend offshore nearly 5 miles.

The southwestern point of the island borders on St. Catherines Sound and is thickly wooded. The western half is almost entirely marshy and is cut up by numerous creeks which provide access to the higher ground to the eastward. On the west the island is separated from the marshes of the mainland by Bear River and **Florida Passage.**

St. Catherines Sound is about 22 miles southwestward of Tybee Light. The entrance is over a shifting bar which extends 5 miles offshore. The entrance buoy is 6.5 miles offshore. In 1963, the controlling depth in the marked bar channel was 8 feet. The points on its northern and southern sides are wooded.

There are no towns on the sound, and strangers seldom enter. Except for light-draft fishing craft, little traffic crosses St. Catherines Bar. Channels with depths of 13 to 38 feet lead from inside the bar into the entrances of its tributaries. The main body of the sound is exposed and becomes quite rough in moderately bad weather. Protected anchorage for small vessels is in **Walburg Creek** on the south side of the entrance to the sound.

The mean range of tide in the sound is 7.1 feet, increasing to 7.8 feet at Belfast and 7.9 feet at **Kilkenny Club.** (See the Tide Tables.) Tidal currents have considerable velocity at the entrance and in the tributary rivers. The Tidal Current Tables should be consulted for current predictions.

The Intracoastal Waterway crosses St. Catherines Sound just inside the entrance, and affords passage northward through Bear River and Florida Passage to Ossabaw Sound, and southward through North Newport River and Johnson Creek to Sapelo Sound.

Three main rivers enter the sound. **Bear River** and **North Newport River,** which form a portion of the Intracoastal Waterway, flow into the sound from the northwestward and southwestward, respectively. **Medway River** enters the sound from the westward. In 1963, there was a controlling depth of 10 feet to **Sunbury,** a small settlement on the western shore 7 miles above the mouth of Medway River. Water can be obtained at the wharf which serves an oyster plant and has a depth of 6½ feet alongside.

Belfast, a town on **Belfast River,** is reached by way of the Medway River and Belfast River. In 1963, the controlling depth in Belfast River was 4½ feet to Belfast. A pile of rocks, bare about 3 feet at low water, stands in the midchannel with surrounding depths of 8½ feet off the bluff at Belfast.

Charts 11511 (573), 11510 (574).-St. Catherines Island, which forms the coast from St. Catherines Sound to Sapelo Sound, lies in a nearly north and south line, and has a length of 9 miles and a width at its widest part of about 3 miles. The island is flat and much of it is marshy with the higher part heavily wooded.

When viewed from a distance seaward, only dense woods in level silhouette are to be seen on St. Catherines Island. Closer inspection reveals a white sand beach, with sand dunes 20 feet high near the center of the island which show up from some directions. A prominent sand dune, 3 miles south of the north end of the island and about 1 mile north of McQueen Inlet, is reported to show well from seaward. **McQueen Inlet,** the only break in the shoreline visible from seaward, is unimportant, as it is blocked by shoals at low water. Dangerous shoals extend offshore for 5 miles.

The island is separated from the marshes lying between it and the mainland by Walburg Creek, Johnson Creek, and South Newport River. The entrance to Sapelo Sound is between the south point of this island and the north point of Blackbeard Island.

Chart 11510 (574).-Sapelo Sound is about 33 miles southwestward of Tybee Light.

A lighted whistle buoy is 15 miles off the entrance. (See chart 11509 (1241).) About 8 miles from the entrance the break in the shore can be seen on a clear day. The tower of the abandoned lighthouse 10 miles southwestward of the sound can also be seen from off the bar and is a good landmark. Vessels should stay in a depth of over 5 fathoms until the bar channel buoys are seen because shoals extend about 5 miles offshore.

With the aid of the chart, and on a rising tide and a smooth sea, vessels should have no difficulty in entering during daylight by following the buoys. In 1963, the controlling depth on the bar was 15 feet. A comparison of the surveys made since 1859 shows virtually no change in the bar except in the vicinity of the shoalest part of **Experiment Shoal,** which has moved more than 0.25 mile southward. The slough between the shoal and St. Catherines Island also has deepened and extended, and now shows up as a swash channel with a least depth of 9 feet. Another unmarked channel south of the main channel has a reported depth of 8 feet and is used by fishing boats.

No towns of any importance are on the sound or tributaries. In northeasterly weather, anchorage can be made in the lower part of South Newport River with fair protection.

The mean range of tide is 6.9 feet. (See the Tide Tables for tidal differences on Sapelo River and its tributaries.) In the entrance to the sound the velocities of flood and ebb are 2.1 and 2.5 knots, respectively. The Tidal Current Tables should be consulted for current predictions.

The Intracoastal Waterway enters Sapelo Sound from the northward through South Newport River and continues southward to Doboy Sound through Sapelo River, Front River, Creighton Narrows, and Old Teakettle Creek.

South Newport River flows into the sound from northward just inside the entrance. In 1963, the controlling depth in the river was 5½ feet through **Cross Tide Creek** to its junction with North Newport River, thence 5 feet down that river to the Intracoastal Waterway. **Sapelo River,** entering the sound from westward, is used only by small fishing boats, except for the lower part below **Front River** which forms a part of the Intracoastal Waterway.

In 1963, a draft of 13 feet could be carried from the deeper waters of Sapelo River into the mouth of Front River, at the head of which a dredged channel through **Creighton Narrows** offers passage to Old Teakettle Creek and thence to Doboy Sound. The Intracoastal Waterway follows this route.

Mud River, flowing into the head of Sapelo Sound from southward, is a broad shallow body of water.

Julienton River enters Sapelo River from the northwest about 3 miles above the mouth. Shrimp boats base at **Shellman Bluff** on **Broro River,** locally known as **Shellman Creek,** which enters Julienton River about 4.5 miles above its mouth. Gasoline, water, ice, provisions, and a 2-ton hoist are available. In 1963, it was reported that with local knowledge 6 feet could be carried up Julienton River and Broro River to the shrimp dock. Other facilities are at **Continment Bluff** and **Dallas Bluff** on Julienton River, a short distance above Broro River. These include gasoline, diesel fuel, water, ice, provisions, and lodging.

Pine Harbor is on Sapelo River about 10.5 miles above the mouth. In 1963, the controlling depth was 1½ feet from the junction of Sapelo River and the Intracoastal Waterway to the landing at Pine Harbor.

The coastline from Sapelo Sound to Doboy Sound is formed by the shores of **Blackbeard Island** and **Sapelo Island.** These are separated by **Blackbeard Creek,** which empties into **Cabretta Inlet.** From all points of view, they appear as a single island and are described as such. Taken together they are 10 miles long in a south-southwesterly direction and 4 miles wide. Large portions of both islands are heavily wooded. These islands present no well-marked distinguishing features, except the usual sand beach backed by dense woods in level outline and the abandoned lighthouse tower near the south point of Sapelo Island. The western part of Sapelo Island consists almost entirely of broad marshes with numerous creeks. Most important of these is Duplin River, which has deep water for several miles and affords means of communication to the island. Sapelo Island is separated from the marshes lying between it and the mainland by Mud River and New Teakettle Creek.

Blackbeard Island is a game refuge under the control of the U.S. Fish and Wildlife Service.

Doboy Sound is 45 miles southwestward of Tybee Light and 16 miles northeastward of St. Simons Light. The entrance, between Sapelo Island and Wolf Island, is about 1 mile wide and obstructed by shifting shoals extending about 4.5 miles offshore. When approaching the sound, vessels should stay in a depth of 5 fathoms or more until the entrance buoys are sighted. If there is too much sea to cross the bar, vessels are advised to enter via St. Simons Sound and the Intracoastal Waterway.

A cluster of fish havens is eastward of Doboy Sound; the outermost is marked by a private unlighted buoy about 20 miles eastward of the entrance to the sound. (See chart 11509 (1241).)

The marked channel over the bar at the entrance to Doboy Sound is not considered safe for strangers except on a rising tide and a smooth sea. The bar has been changing over the past years. In 1963, the controlling depth was 5½ feet. An unmarked swash channel with a least depth of 5 feet makes into the sound close under the south point of Sapelo Island. The channels are used by local shrimp boats.

Doboy Sound extends northwestward about 5 miles from the bar with a width of about 0.8 mile. The mean range of tide is about 6.8 feet in the sound and about 7.3 feet at Darien. Tidal currents in the sound have a velocity of 2 knots at the entrance. Predicted currents may be obtained from the Tidal Current Tables. Good anchorage is found anywhere in the channel of the sound upstream from **Commodore Island** except in the cable area.

The Intracoastal Waterway enters Doboy Sound through Old Teakettle Creek and passes southward through North River, Darien River, Rockdedundy River, and Little Mud River to Altamaha Sound.

Duplin River, entering Doboy Sound from northward, is a small stream about 5 miles long. In 1963, the controlling midchannel depth was 11 feet from the entrance to **Pumpkin Hammock,** thence 6 feet for another 2 miles. A large private dock is on the eastern bank of the river, 0.3 mile upstream from the entrance, with a depth of 15 feet alongside. An overhead power cable with a clearance of 38 feet crosses the river about 1.7 miles above the mouth.

Sapelo Island, locally known as **Sapelo,** is a town on the southerly end of Sapelo Island at the head of **South End Creek.** The town is reached on high tide only. In an emergency some services and supplies can be obtained here. In 1963, the controlling depth was 2½ feet at the creek entrance and bare halfway to the town.

Old Teakettle Creek enters the sound from northward about 1 mile northwestward of Duplin River and forms a part of the Intracoastal Waterway. **Shellbluff Creek,** which enters Old Teakettle Creek from the westward about 0.7 mile from its northern entrance, in 1963, had a controlling depth of 1½ feet to the small packing plant at **Valona.** The docks are privately owned by a shrimp-boat-

building yard with a small marine railway for hauling them out. Diesel fuel, water, and ice are available.

Atwood Creek and **Hudson Creek** are small streams emptying into the head of Doboy Sound from the northwestward. In 1963, the controlling depth at Atwood Creek was 4 feet for a distance of 2 miles, and 9 feet in Hudson Creek to the mouth of the small creek leading to a small shrimp-packing plant at **Meridian Landing,** which is about 1.5 miles by road from **Meridian.**

Carnigan River enters the head of the sound from southwestward and is connected with North River by a branch known as **Buzzard Roost Creek.North River** enters Doboy Sound west of Doboy Island. It extends westward 6 miles to the town of **Ridgeville,** where it joins **May Hall Creek,** which, running southward, connects with Darien River 5 miles above its mouth. An overhead power cable with a clearance of 51 feet crosses May Hall Creek at Ridgeville. **Doboy Island** is wooded and has several buildings on its southwest end. A small private landing is on the west side of the island.

Back River, on the southern side of Doboy and Commodore Islands, forms another and little used entrance from the sound to North and Darien Rivers.

South River, also little used, empties into Doboy Sound from southwestward about 0.8 mile inside the entrance. It extends in a general westerly direction for 3 miles, where it joins **Little Mud River,** a part of the Intracoastal Waterway.

Darien River extends southwestward for a distance of 11.5 miles, where it joins the Altamaha River. The controlling depth, in 1968, was 10 feet from Doboy Sound through the Intracoastal Waterway and Darien River to the highway bridge at Darien. Several daybeacons mark the river channel. Care is necessary when navigating this river due to the shoals and numerous floating snags. Water is fresh in the river at Darien after the ebb has been running for about 3 hours. The best route from Doboy Sound to the Darien River is via the Intracoastal Waterway.

Darien is 9 miles above Doboy Island on the north bank of Darien River. Fishing and pulpwood are the main industries. Some shrimp and shad fishermen base here. A good highway passes through the town from Savannah to Brunswick, 18 miles away. Gasoline, diesel fuel, ice, fresh water, and supplies are available. Two marine railways, owned by a packing company, can haul out fishing boats up to 75 feet. The depth of water alongside the wharves was 8 to 17 feet, in 1963. U.S. Route 17 highway bridge crossing the river at the town has a fixed span with a clearance of 31 feet. The overhead cable about 100 yards west of the bridge has a clearance of 51 feet.

Chart 11508 (575).-Between Doboy Sound and Altamaha Sound is **Wolf Island,** which is about 2.5 miles long in a north-south direction. The island is almost entirely marsh, cut by numerous creeks.

Altamaha Sound is 48 miles southwestward of Tybee Light and 12 miles northeastward of St. Simons Light. The entrance and the sound are obstructed by shoals which are dangerous to navigation. An unmarked shifting channel through the shoals extends 4 miles from the entrance. It is advisable to enter Altamaha Sound via the Intracoastal Waterway. The mean range of tide in the entrance is 6.6 feet. (For current predictions, see the Tidal Current Tables.)

Altamaha River is formed by the confluence of the **Oconee River** and **Ocmulgee River,** 110 miles above the town of Darien and 119 miles above its mouth, and flows in a general southeasterly direction, entering the western end of Altamaha Sound. The river is subject to freshets, and depths change radically.

In 1967, the controlling depth was 2½ feet during 8 months of the year to **Milledgeville** , a city on the Oconee River 126 miles above the junction with the Altamaha River, and 3 feet to Macon, a city on the Ocmulgee River 178 miles above the junction. The depths are 2 to 12 feet less during the summer low-water period.

U.S. Route 17 highway bridge over **South Altamaha River,** 2.5 miles south of Darien, has a fixed span with a clearance of 44 feet. An overhead power cable on the west side of the bridge has a clearance of 64 feet. Interstate Route 95 highway bridge crossing South Altamaha River, about 1.2 miles westward of U.S. Route 17 highway bridge, has a clearance of 35 feet. Regulations and opening signals for the drawbridges crossing Altamaha, Oconee, and Ocmulgee Rivers are given in **117.240 and 117.245 (a) through (e), and (h) (15) through (h) (18),** chapter 2.

Little Mud River enters Altamaha Sound from northward about 2.5 miles inside the entrance. The Intracoastal Waterway passes through it. **Buttermilk Sound,** which enters Altamaha Sound from the southwestward, has an average width of 0.5 mile. At its head the sound connects with Frederica River and Mackay River; the latter connects with Back River. These three rivers enter the western end of St. Simons Sounds from northward, and Mackay River with Buttermilk Sound forms part of the Intracoastal Waterway.

Chart 11502 (1242).-The coast between Altamaha and St. Simons Sounds is formed by the shores of **Little St. Simons Island, Sea Island,** and St. Simons Island. These islands are separated only by stretches of marsh traversed by small streams, and from seaward appear as one body of land although from certain points the marshes, alternating with patches of trees, give the land an unusually broken appearance.

St. Simons Island is the main body of land between the two sounds, and in general description the other two islands may be considered as parts of it. The three taken together are 11 miles long and 6 miles wide at the northern end, diminishing

gradually to 2.5 miles near the southern end. Immediately along the coast and in the central parts it is heavily wooded. Between the two wooded portions is a stretch of marsh from 1 to 1.5 miles wide extending nearly the whole length of the island, and to the westward it is separated from the mainland by extensive marshes, through which flow the Frederica and Mackay Rivers, joining Altamaha and St. Simons Sounds.

Charts 11508 (575), 11506 (447).-The northern portion of St. Simons Island is marshy and traversed by **Hampton River,** a sizable stream flowing in an easterly and southeasterly direction, which separates St. Simons and Little St. Simons Islands and enters the sea 5 miles below Altamaha Sound. The dangerous shoals on both sides of the channel are unmarked; strangers should not attempt entrance from seaward without local knowledge. In 1963, the controlling depth was 4½ feet from Buttermilk Sound to Village Creek.

Village Creek flows into Hampton River from the southward, about 1.5 miles above its mouth. It goes through a stretch of marsh separating Sea Island and St. Simons Island. After a crooked course of several miles, it joins the **Blackbank River,** a narrow and twisting stream flowing to the southward between the two islands and entering the sea 4 miles south of Hampton River. The controlling depth, in 1972, was 5 feet for about 4.6 miles above the mouth, thence, in 1963, 1 foot to and through the cut to Blackbank River and the Sea Island Bridge. Village Creek is dry above the cut at low water. The highway bridge crossing Blackbank River to Sea Island has a 15-foot fixed span with a clearance of 7 feet; overhead cables about 200 feet south of the bridge have a clearance of 16 feet.

Charts 11506 (447), 11502 (1242).-St. Simons Sound 0.8 miles wide at the entrance, lies 61 miles southwestward of Tybee Light and 27 miles northward of Amelia Island Light. The sound forms a good harbor and is the approach to the city of Brunswick. The entrance is obstructed by dangerous shifting shoals, forming a bar which extends for a distance of 5.5 miles offshore.

Brunswick is on the eastern bank of Oglethorpe Bay and Academy Creek opposite Andrews Island, 7.5 miles above St. Simons Light. It is 4.5 miles west of the Intracoastal Waterway route which connects it with ports to the north and south. The city is the second largest port of commercial importance in Georgia. It is 104 miles south of Savannah and 82 miles north of Jacksonville by coastwise routes. The principal shipments from the port are naval stores, wood pulp, steel products, and chemicals. The principal receipts are salt, gypsum, and petroleum products. The principal industries are wood creosoting, seafood processing and manufacture of naval stores, paints, marine and stationary boilers, steel fabrication, wood pulp, and chemicals.

Brunswick Harbor comprises the improved channel across the bar, St. Simons Sound, Brunswick River, and Turtle River.

Brunswick River enters the sound from southwestward just inside the entrance and provides access for oceangoing vessels to the city of Brunswick. For a distance of 2.8 miles above its mouth, the river has an average width of 1.3 miles, but the deepwater channel averages only 0.3 mile in width. Above **Brunswick Point** the river has an average width of 0.7 mile to **Andrews Island,** which divides it into two branches. The southern branch is known as **Turtle River** and the northern branch, on which the city of Brunswick is situated, is known as **Oglethorpe Bay** to the mouth of **Academy Creek.**

Bridges.-The only bridge crossing the main channel is the Sidney Lanier (U.S. Route 17) highway bridge at Brunswick, 5.4 miles above the mouth, which has a lift span with a clearance of 24 feet down and 139 feet up. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.) State Route 303 highway bridge, crossing Turtle River just above the head of the improvement, has a fixed span with a clearance of 35 feet at the center; the nearby overhead power cable clearance is 55 feet over the main channel. There is little river traffic above these bridges.

Prominent features.-St. Simons Light (31°08.0'N., 81°23.6'W.), 104 feet above the water, is shown from a white conical tower attached to a brick dwelling on the north side of the entrance to the sound. A Coast Guard station is 1.2 miles northeastward of the light. The abandoned lighthouse on the north end of Little Cumberland Island, at the entrance to St. Andrew Sound and the three tanks on Jekyll Island, can be seen to the southward. Near the beach eastward and northeastward of St. Simons Light are many homes and summer residences extending to the vicinity of Hampton River. The two water tanks on St. Simons Island about 0.4 mile and 3.5 miles north of the light, the towers of the lift bridge crossing Brunswick River, and the tall stacks of the Hercules Powder Company in Brunswick are prominent.

Boundary lines of inland waters.-The lines established for St. Simons Sound are described in **82.45,** chapter 2.

Channels.-A Federal project provides for a channel 32 feet deep through the bar, thence 30 feet deep in Brunswick River and Oglethorpe Bay to the foot of Second Avenue, and thence 27 feet to Academy Creek; and 30 feet deep in Turtle River to the Allied Chemical Company wharf. (See Notice to Mariners and latest editions of the charts for controlling depths.) In October 1969, the centerline controlling depth in Academy Creek was 5 feet for a distance of about 0.6 mile above the mouth.

Lighted whistle buoys are 15 miles and 8 miles, respectively, off the entrance to St. Simons Sound.

The channel through the bar is marked with lights and lighted and unlighted buoys, and the channels inside the sound are marked with lighted ranges, and lighted and unlighted buoys.

Dangers.-An unmarked wreck, reported covered 14 feet, is in 31°03'08"N., 81°13'45" W., about 1.4 miles eastward of the entrance to the bar channel. Fish havens, marked by private unlighted buoys, are 3 miles northeastward and 16 miles east-southeastward , respectively, of the entrance to the bar channel. Shoal areas and spoil areas are in the approaches from the outer lighted whistle buoy to the midchannel lighted whistle buoy at the entrance to the bar channel. These should be avoided in heavy weather.

Anchorages.-There is good anchorage anywhere along the sides of the channel off the range lines in St. Simons Sound or Brunswick River. Depths of 22 to 79 feet may be found in the sound between Jekyll Island and St. Simons Islands, and depths of 17 to 30 feet in the Brunswick River directly westward of Jekyll Island. In the area westward of the Brunswick Harbor Range, across the channel from Brunswick, anchorage is only for small craft.

Tides and currents.-The mean range of tide is about 6.5 feet on the bar and 7.3 feet at Brunswick. Tidal currents normally follow the general direction of the dredged channel across the bar with a velocity of 2 knots. During northeasterly weather there is a strong southerly set across the bar channel and in southeasterly weather a strong northerly set. Current predictions for a number of locations in the vicinity of St. Simons Sound may be obtained from the Tidal Current Tables.

Weather.-The effect of the Atlantic coastal waters on Brunswick is reflected by warmer winter minimums in temperature and cooler summer maximums than cities farther inland. Maximum summer temperatures reach 90° F or greater on 74 days annually while minimum winter temperatures fall to freezing and below on only 7 days a year. Rainfall averages about 53 inches annually with more than 22 inches occurring from June through September; measurable rainfall occurs on 8 to 10 days per month during this season. Fog is prevalent from December through March and sometimes into April, but usually clears in the forenoon. Any large drop in temperature may bring in fog.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Vessels with less than 10-foot draft are exempt. Pilotage is optional for U.S. vessels in the coastwise trade which have on board a pilot licensed by the Federal Government. Pilots board incoming vessels from the pilot boat, day or night, just outside St. Simons Lighted Whistle Buoy "STS" (31°04.1 'N., 81°16.7' W.). The pilot boat, CAPTAIN SAM, a 30-foot skiff-type launch, flies the code flag "P" by day, and displays white over red lights at night. The pilot boat has no communications equipment. Pilots are arranged for in advance by wire or radiotelephone through the Jacksonville Marine Operator to Brunswick Bar Pilots Association, St. Simons Island (telephone 912-638-2242, 912-638-3154, or 912-638-3753) or through ships' agents.

Towage.-Tugs of 400 hp are available on a 24-hour basis; tugs are required for docking and undocking oceangoing vessels. Arrangements for tugs are made in advance through ships' agents. More powerful tugs can be obtained from Savannah or Jacksonville.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) Brunswick has a city hospital.

Agriculture quarantine inspections are conducted at the berths. Officials are sent from Savannah when such services are required.

Customs.-Brunswick is a port of entry. Officials have their office in the Federal Building. Vessels are boarded at the berths.

Coast Guard.-A documentation office is in the Federal Building.

Immigration.-There is no immigration office at Brunswick. Inspectors are sent from Savannah when such services are required.

Harbor regulations are under the control of the Brunswick Port Authority and are enforced by the **harbormaster**, who maintains an office in the administration building at the Brunswick Port Authority Lanier Dock. The harbormaster boards all vessels on arrival at their berths.

Wharves.-Only the major deepwater port facilities at Brunswick are described. These include the facilities along the southwest side of the city which are owned and operated by the Brunswick Port Authority and the Georgia Ports Authority, and one privately operated facility on the east side of Turtle River above Brunswick. These facilities have rail and highway connections, and water and electrical shore power connections. Cargo is generally handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. The alongside depths given for each facility described are reported depths. (For information on the latest depths, contact the operator.) The remainder of the facilities along the Brunswick waterfront and on the east side of Turtle River are used for servicing commercial fishing vessels and small craft, and for handling seafood and barge traffic; these are not described. (For a complete description of the port facilities at Brunswick, refer to the Port Series, a Corps of Engineers publication.)

East side of Oglethorpe Bay:

Brunswick Port Authority Lanier Dock (31°07'44"N., 81°29'32"W.): the southerly 500-foot section of a 2,140-foot marginal wharf; 50-foot

apron; 30 feet alongside; deck height, 13 feet; unloading tower, equipped with 6-cubic-yard grab bucket and with an unloading rate of 600 tons per hour, straddles railroad tracks on wharf; tower can load railroad hopper cars or trucks directly, or can be used with 40-ton capacity hopper which connects with conveyor belt system extending to open and covered storage areas in the rear; oil pipeline extends from wharf to storage tank in rear; rail connections with Seaboard Coast Line Railroad and the Southern Railway; receipt of Bunker C oil, and various dry bulk commodities including gypsum rock and salt, bunkering vessels; owned by the City of Brunswick and the County of Glynn and operated by Brunswick Port Authority.

Brunswick State Docks (Berths 1, 2, and 3): joining Brunswick Port Authority Lanier Dock to the northward; 1,640 feet of berthing space with 52-foot apron; 30 feet alongside; deck height, 13 feet; two transit sheds, total 91,000 square feet storage area; 40 acres open storage; one 25-ton mobile crane with 80-foot boom; two 2½-ton forklift trucks; use of unloading tower described under Brunswick Port Authority Lanier Dock; railroad tracks on wharf connect with Seaboard Coast Line Railroad and Southern Railway; receipt and shipment of general cargo in the foreign and domestic trade, receipt of bulk phosphate, shipment of naval stores; owned and operated by Georgia Ports Authority.

U.S. Coast Guard Wharf: about 1.25 miles northward of Brunswick Port Authority Lanier Dock; 65-foot offshore wharf; 10 feet alongside; deck height, 12 feet; used for mooring U.S. Coast Guard vessels; owned by the U.S. Government and operated by the U.S. Coast Guard.

East side of Turtle River:

Allied Chemical Corp. Wharf (31°10′42″N., 81°31′24″W.): offshore wharf with 347-foot face and 30-foot apron, 647 feet usable space with dolphins; 30 feet alongside; deck height, 12 feet; two traveling hoppers on wharf serve belt conveyor system extending to open salt storage area in rear; pipeline extends from wharf to storage tanks in rear; rail connections with Southern Railway; receipt of fuel oil for plant consumption and salt, and shipment of general cargo; owned and operated by Allied Chemical and Dye Corp., Solvay Process Division.

Supplies.-Provisions and some marine supplies are available at Brunswick. Oceangoing vessels can obtain Bunker C oil by barge, and diesel oil by truck. Gasoline and diesel fuel are available to commercial fishing vessels and recreational craft.

Repairs.-There are no drydocking or major repair facilities for oceangoing vessels in the port; the nearest such facilities are at Jacksonville, Fla., or Savannah, Ga. Machine, welding, and electrical shops off the waterfront can make limited above-the-waterline repairs. Two marine railways, about 0.55 mile northward of the Brunswick Port Authority Lanier Dock, can handle vessels up to 25 tons or 65 feet for repairs to wooden hulls, and other minor repairs.

There are no special facilities at the port for use in wrecking or salvage operations. Such equipment can be obtained from Savannah or Jacksonville.

Communications.-The port is served by the Seaboard Coast Line Railroad, the Southern Railway, several bus and truck lines, and by U.S. Highway Routes 17, 25, and 84. A commercial airline serves the airport on St. Simons Island, about 6 miles east of Brunswick.

Small-craft facilities.-Berthage with electricity, gasoline, diesel fuel, water, ice, and some marine supplies are available at Brunswick. Facilities along the Intracoastal Waterway, eastward of the city, are described in chapter 12.

St. Simons Island and **St. Simons** are summer resort towns on the southeast and south sides of St. Simons Island, respectively. The concrete T-head fishing pier at St. Simons had depths of 14 to 21 feet alongside in 1963.

Frederica River joins St. Simons Sound from the northward about 1 mile inside the entrance and for several miles, to the junction with Mackay River, is the main route of the Intracoastal Waterway. In 1963, the controlling depth was 9 feet from the north end of Lanier Island to a junction with the Intracoastal Waterway at Mackay River.

Mackay River enters the sound from northward, but is obstructed by a highway bridge, about 1.5 miles above the mouth, which has a 33-foot fixed span with a clearance of 8 feet. To the northward of **Lanier Island,** the river is joined by Frederica River and becomes the route of the Intracoastal Waterway.

Little River is west of Mackay River and flows into Back River. A highway bridge, about 0.7 mile above the mouth, has a 32-foot fixed span with a clearance of 8 feet.

Back River, an alternate route of the Intracoastal Waterway, enters St. Simons Sound from northward. In 1963, the controlling depth was 12 feet from St. Simons Sound to **Belle Point Creek,** thence in March 1974, 1 foot at midchannel to a junction with Mackay River. The toll highway bridge, 1.5 miles above the mouth, has a lift span with a clearance of 9 feet down and 85 feet up. (See **117.240** and **117.408,** chapter 2, for drawbridge regulations and opening signals.) Above the bridge the channel to the head of the improvement is marked by daybeacons and an unlighted range.

Terry Creek flows into Back River 0.5 mile above the highway bridge and leads westward 1.5 miles to the city of Brunswick and to a yacht club basin on the east side of the city. The channel through Terry Creek has been dredged for a distance of about 1.1 miles from Back River, at which point it junctions with a dredged section that leads northwestward into **Dupree Creek** for about 0.35 mile. In December 1974, the midchannel controlling depth was 4 feet in Terry Creek to the junction with Dupree Creek; thence, in 1972, the

controlling depth was 10 feet in Dupree Creek. About 1.3 miles above the mouth, Terry Creek is crossed by a highway bridge with a 34-foot fixed span with a clearance of 8 feet. The overhead power cable close southward of the bridge has a clearance of 26 feet. The yacht club basin is within the city limits of Brunswick and offers good protection from storms; it has 450 feet of dock space and a float with 10 feet alongside. Gasoline, ice, and water are available; provisions and diesel fuel may be delivered from the city.

The basin has a small-boat launching ramp and a 2-ton lift.

Plantation Creek and **Clubbs Creek** offer a protected short cut between Back River and Brunswick River, and can be used safely by small craft on a rising tide. In March 1974, the controlling midchannel depth in Plantation Creek was 4 feet and in 1963, 8 feet in Clubbs Creek.

South Brunswick River enters Turtle River from westward opposite Andrews Island. State Route 303 highway bridge, 3 miles above the mouth, has a 36-foot fixed span with a clearance of 15 feet. Overhead power cables on the east and west sides of the bridge have a least clearance of 30 feet.

Fancy Bluff Creek, a tug and barge route from Little Satilla River, enters South Brunswick River from the southwest 1.3 miles above the mouth. U.S. Routes 17 and 84 highway bridge, about 2.3 miles from the north entrance, has a fixed span with a clearance of 18 feet. The overhead power cable close southwest of the bridge has a clearance of 44 feet. A railroad bridge with a 20-foot fixed span and a 10-foot clearance is about 0.2 mile northward of the highway bridge. The controlling depth through the creek to Little Satilla River, in 1963, was 5 feet.

Cedar Creek enters Brunswick River from the south, about 1.2 miles from Brunswick Point. State Route 50 highway bridge, 1 mile above the entrance, has a 30-foot fixed span with a clearance of 10 feet. The controlling depth, in 1963, was 3 feet.

Jekyll Creek enters Brunswick River from southward about 2.5 miles above its mouth. With Jekyll and St. Andrews Sounds, it forms part of the Intracoastal Waterway to Fernandina Beach. (See chapter 12.)

Chart 11504 (448).-From St. Simons Island to St. Andrew Sound the coast is formed by the shores of Jekyll Island which extends nearly north and south for a distance of 6.5 miles and has a width of 2 miles. **Jekyll Island** is a State Park; several large park buildings, formerly private homes, are on the west side of the island, and on the east side are large motels and recreational buildings, bath houses, and the large prominent Aquarama (a large indoor swimming pool and auditorium). The island is wooded all along its eastern shore, and dark woods which are quite level in silhouette stand out in the background. Shoals extend 3 to 5 miles offshore. Three conspicuous gold spherical water tanks on top of slender green standpipes are about 2.2, 3.1, and 4.6 miles from the north end of the island. The towers of the lift bridge over the Intracoastal Waterway on the west side of the island can be seen offshore.

The western portion of Jekyll Island at the north and south ends is marshy, bordered by Brunswick River, Jekyll Creek, and Jekyll Sound. A marina on the Intracoastal Waterway on the west side of the island is described in chapter 12.

St. Andrew Sound, between Jekyll Island and Little Cumberland Island, is about 7 miles southward of St. Simons Sound and 17 miles northward of St. Marys Entrance.

Boundary lines of inland waters.-The lines established for St. Andrew Sound are described in **82.45,** chapter 2.

The entrance to the sound is over a shifting bar which extends about 5 miles offshore. Vessels should stay in 5 fathoms or more until the outer buoy is sighted. The channel into the sound is marked by buoys. An abandoned lighthouse is on the north end of Little Cumberland Island. Vessels with a draft of about 10 feet should have little difficulty entering the sound. In 1963, the controlling depth was 14 feet in the buoyed entrance channel. There are licensed pilots at Brunswick. The entrance is used only by local shrimp boats.

In the sound are extensive shoals, between which channels lead to the principal tributaries: Jekyll Sound on the north, Satilla River on the west, and Cumberland River on the south.

Tides and currents-The mean range of tide is 6.8 feet. The current velocity is about 2 knots in the entrance; predictions are given in the Tidal Current Tables.

The best anchorage in the sound is in the channel on the western side of Little Cumberland Island in 17 to 27 feet, good holding ground. Good anchorage is also found in the entrance of Jekyll Point.

The Intracoastal Waterway, which crosses the sound, enters from the northward through Jekyll Creek and Jekyll Sound and passes southward through Cumberland River to Cumberland Sound and St. Mary's Entrance.

Jekyll Sound, which enters St. Andrew Sound from northward just inside the entrance, has many shoals. Three channels lead to its three principal tributaries.

Good anchorage is found in the entrance to Jekyll Sound westward of Jekyll Point. **Jekyll Creek** enters the sound from northward, forming a part of the Intracoastal Waterway. Its northern part connects with Brunswick River. **Jointer Creek** (see also chart 11502 (1242)) enters Jekyll Sound from northwestward. It is crooked and has several narrow branches, all of which except Cedar Creek are blocked by the Jekyll Island Highway. A small boat can navigate from Brunswick River to Jekyll Sound by way of Cedar and Jointers Creeks, or through Turtle River, South Brunswick River, Fancy Bluff Creek, and Little Satilla River.

Little Satilla River (see also chart 11502 (1242)) enters Jekyll Sound from westward. In 1963, the controlling depth was about 10 feet from the entrance to Fancy Bluff Creek. Small craft going to landings on the river enter from South Brunswick River through Fancy Bluff Creek.

Satilla River enters St. Andrew Sound from the westward through a narrow channel in the shoals. In 1963, shoaling to 1 foot was found just below the bend 9 miles above the entrance. Shrimp boats going to **Woodbine,** 22 miles above the mouth, use Bailey Cut, which was reported to have a controlling depth of about 4 feet at its eastern entrance. U.S. Route 17 highway bridge at Woodbine has a fixed span with a clearance of 43 feet. The Seaboard Coast Line Railroad bridge adjacent to the westward has a swing span with a clearance of 5 feet. (See **117.240 and 117.245 (a) through (e) and (h) (19),** chapter 2, for drawbridge regulations and opening signals.) An overhead power cable 0.8 mile east of the bridges has a clearance of 57 feet; the overhead power cable between the bridges has a clearance of 61 feet. Traffic in the area consists mainly of sand tows and shrimp fishermen. A boatyard and shrimp dock on the south bank about 0.4 mile east of the highway bridge has a marine railway that can haul out craft up to 70 feet. There is 8 to 10 feet of water at the 90-foot T-head pier. Diesel fuel and freshwater are on the dock, and gasoline can be obtained by truck. Hull and engine repairs can be made in an emergency. Food, lodging, and marine supplies can be obtained in the town. The water is brackish at Woodbine with no worms and fresh above Burnt Fort. In 1963, the controlling depth was about 6 feet from Woodbine to **Burnt Fort,** 45 miles above the mouth of the river. State Route 252 highway bridge at Burnt Fort has a fixed span with a clearance of 16 feet.

The mean range of tide is 6.6 feet at the mouth and 3.2 feet at Burnt Fort. The freshet variation at **Waycross,** 142 miles above the mouth, is about 12 feet. There is reported to be no appreciable rise at Woodbine during freshets.

Cumberland River enters St. Andrew Sound from southward just inside Little Cumberland Island. Its general direction is southerly for a distance of 11 miles, where it joins Cumberland Sound. The Intracoastal Waterway follows this route, which is well marked by ranges in the more difficult sections.

Brickhill River branches from Cumberland River about 5 miles above the mouth and rejoins it at **Cumberland Dividings.** An overhead power cable with a clearance of 52 feet crosses Brickhill River about 4.5 miles above the Cumberland River entrance. **Floyd Creek** enters Cumberland River from westward about 4.5 miles above the north end of Little Cumberland Island, and joins with Satilla River through a cut to form an alternate passage to the Intracoastal Waterway.

Chart 11502 (1242).-Between St. Andrew Sound and St. Marys Entrance, the coastline, extending in a southerly direction for about 16 miles, is formed by the shores of Little Cumberland and Cumberland Islands. These two islands are separated only by a stretch of marsh and **Christmas Creek,** and appear as one island from seaward. The coastline shows a broad white sand beach backed by an almost continuous range of sand dunes with dense woods backing them.

The north end of **Little Cumberland Island,** heavily wooded, has a prominent buff colored bluff and is marked by an abandoned lighthouse.

Cumberland Island is almost entirely covered by woods, though somewhat marshy to the westward. The island is separated from the mainland by extensive marshes through which flow the Cumberland and Brickhill Rivers. The extreme southern point of the island, which forms the north side of the entrance to Cumberland Sound, has several conspicuous sand dunes.

From the north end for about 9 miles from the entrance to St. Andrew Sound, the coast is bordered by dangerous shoals extending 3 to 5 miles offshore. For the remaining distance to St. Marys Entrance there is a depth of 3 fathoms to within 1 mile of the beach.

Chart 11503 (453).-St. Marys Entrance and **Cumberland Sound** are 16 miles southward of St. Andrews Sound and 19 miles northward of St. Johns River. The sound is the approach to the city of Fernandina Beach, the town of St. Marys, the wharf at Kings Bay, and an inland passage to St. Andrew Sound through its connection with the Cumberland River.

Fernandina Beach, the principal city on Cumberland Sound, is on the east bank of Amelia River, 2 miles south of the entrance. It is the shipping port for woodpulp and paper products; bulk sulfur, salt cake, caustic soda, and fish meal are received. Some coastwise and foreign shipping serve the port, which also includes the wharf at Kings Bay.

Prominent features.-Amelia Island Light 30°40.4'N.,81°26.6'W.), 107 feet above the water, is shown from a 64-foot white conical tower 2 miles southward of the entrance to Cumberland Sound. Also prominent from seaward are the homes along the beach 2 to 3 miles south of the entrance, and a 295-foot-high processing tower southward of the entrance, about 0.9 mile 309° from Amelia Island Light. The tower is marked at night by flashing red lights.

Fort Clinch, on the south side of the entrance at the north end of Amelia Island, is a State Park, museum, and recreation area. The old fort and a large red brick building near the inshore end of the south jetty are conspicuous. Camping facilities and a small-craft launching ramp are at the northwest end of the island on the east side of the channel to Fernandina Harbor.

Channels.-A Federal project provides for a 34-foot channel over the bar at St. Marys Entrance thence northward through Cumberland Sound to two turning basins of the same depth in Kings Bay about 9.0 miles and 10.0 miles, respectively, above the outer ends of the jetties, and for a 28-foot channel leading from inside the bar southward in Amelia River to a turning basin of the same depth off Rayonier Wharf, about 5.8 miles above the outer ends of the jetties. (See Notice to Mariners and the latest editions of the charts for controlling depths.)

The entrance to Cumberland Sound is marked by two stone jetties. In 1969, the jetties were in very poor condition with the north jetty almost entirely submerged and the south jetty barely visible at mean high water. The jetties are marked off the ends and on both sides by unlighted buoys; each buoy is a white can, with an orange band near the top and waterline and the word "Jetty" in an orange diamond. Mariners are advised to exercise caution in this area, as the jetties are a menace to navigation when visibility is limited. Currents are strong off the ends of the jetties. The natural channel between the jetties is subject to frequent change. The currents scour out the channel during spring tides, but the shoals build up again during neap tides.

A lighted whistle buoy is 5 miles off St. Mary's entrance. The channel through the bar and the channels inside the sound are marked with lighted ranges, lights, and lighted and unlighted buoys.

Fishing vessels going northward out of the sound use the natural channel off the end of the north jetty marked by a buoy. Strangers are warned against using it as there is danger of being set into the end of the jetty. A shoal with a least depth of 6 feet extends more than a mile southeastward from the outer end of the south jetty.

Anchorages.-Vessels anchor outside St. Marys Entrance according to draft. Anchorage for vessels drawing 25 feet and more is reported 0.5 mile to 1 mile northward of St. Marys Entrance Lighted Whistle Buoy STM (30°42.5'N., 81°19.2' W.) in about 7 fathoms, sand and mud bottom with good holding ground. Anchorage for vessels drawing less than 25 feet is reported 1 mile eastward of Lighted Whistle Buoy 2 (30°42.6' N., 81°22.1'W.) in about 7 to 8 fathoms, sand and mud bottom with good holding ground. Inside the entrance is good anchorage along the sides of the channels in Cumberland Sound and in the Amelia River according to draft.

Tides and currents.-The mean range of tide is 5.7 feet at the entrance and 6.1 feet at Fernandina Beach. The tidal currents at the entrance have considerable velocity and are dangerous at times, especially on the flood which generally sets northwestward and on the ebb which sets southeastward except during northeast winds when there is a strong southerly set off the end of the jetties on both tides. It has been reported that this set sometimes attains a velocity exceeding 5 knots. Large vessels are cautioned not to enter the entrance channel before the pilot boards. Freshets in the St. Marys River may cause the ebb to run 7 or 8 hours. Current predictions for Cumberland Sound vicinity may be obtained from the Tidal Current Tables.

Weather.-Winters are usually mild. Fog is prevalent in March and at any time when there is a sharp drop in temperature. **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage for Fernandina Beach, Kings Bay, and St. Marys is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. vessels in the coastwise trade which have on board a pilot licensed by the Federal Government. The pilot station is on Amelia Island, and, weather permitting, the pilot boards from the pilot boat any hour of the day or night. Vessels drawing 25 feet and over are met in the vicinity of St. Marys Entrance Lighted Whistle Buoy STM, and vessels drawing less than 25 feet are met 1 mile eastward of Lighted Whistle Buoy 2. The pilot boat, a 30-foot launch with gray hull and white superstructure, flies the code letter "P", and is equipped with radiotelephone and monitors 2182 kHz when working ships. Pilot may be obtained by wire, by radiotelephone through the Jacksonville Marine operator (telephone 904-261-3824 or 904-261-3495) or by previous arrangement through ships' agents.

The St. Johns Bar Pilots, on request, will relay messages by telephone to the pilot at Fernandina Beach. (See chapter 9 for radiotelephone frequencies used by the St. Johns Bar Pilots.)

Towage.-Tugs are required for docking and undocking. Tugs of 400 hp are available on 4 hours' notice from a towing company at Brunswick, Ga. Arrangements for tugs are made through ships' agents or through the local pilot.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A county hospital is at Fernandina Beach.

Agriculture quarantine inspections are made at the berth by officials from Jacksonville, Fla.

Customs.-Fernandina Beach is a port of entry. Vessels are boarded at their berths. The customhouse is in the Post Office-Federal Building.

Coast Guard.-A documentation office at Jacksonville serves Fernandina Beach.

Immigration.-Arrangement for immigration inspection is made through ships' agents with the Immigration Office in Jacksonville, Fla. Vessels are boarded at the berths.

Harbor regulations.-All vessels are docked and undocked under the direction of the harbormaster, who is also the pilot. All vessels should proceed through the harbor at slow speed, and not over 5 knots, as there are many craft moored along the waterfront.

Wharves.-There are two privately owned facilities for deep-draft vessels at Fernandina Beach. Both have highway connections, and rail connections with the Seaboard Coast Line Railroad. Depths alongside are reported depths. (For latest information on depths contact the operator.) There are numerous smaller facilities along the waterfront which are used for the receipt of seafood and servicing of commercial fishing vessels and small craft; these facilities are not described. (For a complete description of the wharves and piers at Fernandina Beach, refer to the Port Series, a Corps of Engineers publication.) A deep-draft wharf at Kings Bay is described later, in this chapter.

Container Corporation of America Wharf (30°40′58″N., 81°27′37″W.) east side of Amelia River about 1.5 miles above the channel entrance; offshore wharf with 250-foot face, 365 feet with dolphins; 29 feet alongside; deck height, 14 feet; hose-handling equipment; pipelines lead from wharf to fuel oil storage tank in rear; untreated water available; receipt of fuel oil for plant consumption; owned and operated by Container Corporation of America.

Rayonier Wharf: east side of Amelia River, about 1.3 miles southward of the Container Corporation of America Wharf; marginal wharf with 400-foot face, 495 feet with dolphins; 27 to 30 feet alongside; deck height, 14 feet; transit shed with 30,000 square feet of storage space; warehouse with over 10,000 square feet of storage space; hopper and belt conveyor system for receipt of sulfur; two 4-ton crawler cranes with ¾-ton buckets; electric forklifts and platform trucks; pipelines extend from wharf to fuel oil and caustic storage tanks in the rear; electrical shore power connections; treated and untreated water available; receipt of sulfur, caustic soda, and fuel oil for plant consumption and shipment of woodpulp; owned and operated by Rayonier, Inc.

Supplies.-Provisions and some marine supplies are available at Fernandina Beach. The fresh water piped to the wharves is from artesian wells and, having some mineral content, should be treated for use in boilers. Bunker C oil and diesel oil for oceangoing vessels can be obtained by barge or truck from Jacksonville.

Repairs.-There are no drydocking or major repair facilities for oceangoing vessels at Fernandina Beach; the nearest such facilities are at Jacksonville, Fla. Machine, welding, and electrical shops off the waterfront can make limited above the waterline repairs. The larger of two marine railways is on the east side of Amelia River, about 0.6 mile northward of Rayonier Wharf; vessels up to 130 feet in length and 12-foot draft can be handled for hull, engine, and electrical repairs.

No special facilities are available for wrecking or salvage operations. Such equipment can be obtained from Jacksonville.

Communications.-Fernandina Beach is served by State Route A1A and by the Seaboard Coast Line Railroad (freight service only). There are bus connections to Jacksonville, and to Yulee, 5 miles inland, where there are passenger connections with the Seaboard Coast Line Railroad.

Small-craft facilities.-The municipal marina is on the east side of Amelia River, about 2.3 miles southward of the channel entrance and 0.5 mile northward of Rayonier Wharf. In 1969, depths of 8 feet were reported alongside the slips. A Florida State Welcome Station is on the municipal wharf on the north side of the marina. Berthage with electricity, gasoline, diesel fuel, water, ice, marine supplies, and a launching ramp are available; lodging and restaurants are nearby. A 4-ton fixed lift and a marine railway that can handle craft up to 75 feet are available; hull, engine, and electrical repairs can be made. Gasoline, diesel fuel, and water can also be obtained at the two fuel piers, northward and southward of the marina.

The Intracoastal Waterway enters Cumberland Sound from the Cumberland River and continues through the Amelia River on the south.

Beach Creek extends northward into Cumberland Island from a point just inside the entrance to Cumberland Sound. In 1963, there was 2 feet at the entrance, and the creek dried about 0.2 mile below Dungeness.

Kings Bay is in the northwesterly part of Cumberland Sound, about 5 miles above its southerly entrance. An explosives loading terminal here has a 2,000-foot concrete pile wharf with depths of 32 feet reported alongside, in 1969; deck height is about 14 feet. A rail spur line connects the terminal with the Seaboard Coast Line Railroad; two transit sheds and two 10-ton mobile hoists are available. The facility is owned by the U.S. Government and operated by the Blue Star Shipping Co. **Pilotage, towage, quarantine, customs,** and **immigration** are the same as for Fernandina Beach.

St. Marys River, the principal tributary of Cumberland Sound, enters from westward, and is a portion of the boundary between Georgia and Florida. It is used primarily by shrimp fishermen and tugs towing fuel oil as far as St. Marys. The controlling depth in the channel to St. Marys is about 14 feet. Above St. Marys a vessel with a draft of 10 feet or less should have little difficulty going as far as Kings Ferry, 32 miles above the mouth, on a rising tide. The river is very crooked, and some of the turns are sharp. The mean range of tide is 5.8 feet at the entrance, 6 feet at St. Marys, 5.1 feet at Crandall 5 miles above the mouth, 3 feet at Kings Ferry, and 1.5 feet at the Seaboard Coast Line Railroad bridge, 48 miles above the mouth. The water is fresh above the Seaboard Coast Line bridge, 20 miles above the mouth. A pilot for the river is available at Fernandina Beach.

The twin fixed spans of U.S. Route I-95 highway bridge with a clearance of 35 feet crosses St. Marys River about 15.2 miles above the mouth. U.S. Route 17 highway bridge at Wilds Landing, 20 miles above the mouth of the river, has a swing span with a clearance of 5 feet. The Seaboard Coast Line Railroad bridge just upstream has a swing span with a clearance of 5 feet. Drawbridge regulations and opening signals for these bridges are given in **117.240 and 117.245 (a) through (e) and (h) (21)**, chapter 2. Overhead power cables close upstream of the bridge have a least clearance of 55 feet.

The town of **St. Marys** is on the north bank of St. Marys River, 4 miles above the mouth. The larger wharves here have about 13 feet of water alongside. The larger of the two marine railways can haul out boats up to 65 feet for hull, engine, and electrical repairs. Gasoline, diesel fuel, and water are available on the wharves. Rail, telegraph, telephone, and provisions are available.

A good haven for small vessels, particularly in northeasterly weather, can be found at St. Marys. Small craft also can obtain refuge in bad weather by anchoring near the pulp mill 1 mile up North River or near the bridges 16 miles above St. Marys on the St. Marys River.

North River branches from St. Marys River about 2 miles above its mouth. A draft of 7 feet can be carried to the pulpmill dock up the river.

Bells River branches from St. Marys River about 1.5 miles above the town of St. Marys. It flows in an easterly direction to its junction with the Amelia River at Fernandina Beach. In 1963, the controlling depth was about 5 feet. **Chester**, a town on the river, has a number of small docks which were in poor condition in 1963.

Jolly River branches eastward from Bells River about 6 miles above its mouth, and empties into Cumberland Sound at the mouth of St. Marys River. The controlling depth, in 1963, was about 9 feet.

Lanceford Creek branches from Amelia River west of Fernandina Beach. The southern entrance where it joins Amelia River dries clear across; the eastern entrance into Bells River had a midchannel depth of 12 feet in 1963, and a midchannel depth of 8 feet was then carried to the docks at **Black Rock.** The creek widens off the docks into tidal flats which bare at low water. Small boats cross from the creek to Amelia River at high tide through **Soap Creek,** which passes through numerous mud flats and oyster beds that bare at low tide.

Chart 11488 (1243).-From St. Marys Entrance to St. Johns River the coast is formed by the shores of Amelia, Talbot, Little Talbot, and Fort George Islands. **Amelia Island** is nearly north and south, with a length of about 12 miles and a width varying from 1 to 2.5 miles. The island is low and gently undulating with heavy woods along the shore.

From seaward no prominent natural features distinguish Amelia Island from other land in the vicinity. It shows a long line of dark woods, irregular in outline, with numerous tall trees rising conspicuously above the general level. In front of these woods a range of sand dunes, partly covered with coarse grass and scrub, backs the broad stretch of white sand beach. Several landmarks are prominent along this stretch of the coast; these were mentioned with the discussion of Fernandina Beach earlier in this chapter. About 3 miles south-southeast of Amelia Island Light is a pier extending 800 feet into the ocean.

The western portion of Amelia Island is marshy. Separating the island from the mainland is a broad stretch of marsh through which flow the Amelia and South Amelia Rivers connecting Cumberland Sound and Nassau Sound.

Charts 11488 (1243), 11489 (841-SC).-Nassau Sound is 10 miles southward of Amelia Island Light and 6 miles northward of St. Johns River. The entrance is obstructed by shifting shoals which extend about 1.5 miles seaward and form a shallow bar. Breakers form across the entire entrance. Small craft are advised not to attempt passage through the shoals without local information. The mean range of tide in Nassau Sound is 5.4 feet. Route A1A highway toll bridge, 1 mile above the entrance, has a swing span with a clearance of 15 feet. (See **117.240 and 117.245 (a) through (e) and (h) (22)**, chapter 2, for drawbridge regulations and opening signals.) In 1972, local boaters reported shoaling to depths of about 2 feet in the northeasterly opening of the swing bridge creating hazardous conditions for small craft. It was further reported that small craft can make passage in deeper water through the bridge bents northeastward of the northeasterly opening. Vertical clearance of the bridge through the bents is about 9 feet. A small-craft launching ramp is on the south side of the bridge.

South Amelia River and Nassau River are the principal tributaries of Nassau Sound. **South Amelia River** enters from the northward and is a portion of the Intracoastal Waterway.

Nassau River enters Nassau Sound from the northwestward. Occasional sunken logs and numerous shoals are a menace to navigation. **Nassauville** is a small settlement on the north bank of the river, 7 miles above the entrance to the sound, with private piers adjoining private homes and a fishing camp. Local knowledge is necessary to carry the best water to Nassauville and **Christopher Creek,** where there is a private marine railway which can haul out craft up to 50 feet in an emergency.

Alligator Creek connects South Amelia River and Nassau River. Its twisting channel leads through tidal flats and between oyster bars.

Sawpit Creek enters the sound from the westward. Route A1A highway bridge, crossing the

creek about 0.3 mile above the mouth, has a 38-foot fixed span with a clearance of 15 feet. A portion of this creek forms a part of the Intracoastal Waterway.

Talbot Island, about 5 miles in length and 1.5 miles in width, is partly wooded and partly marshy. Along the marshy eastern shore flow several creeks which separate Talbot and Little Talbot Islands. Talbot Island, Little Talbot Island, and Fort George Island form a State park and recreation area and are connected to Amelia Island and the mainland by a paved highway and bridges. The road also leads to Jacksonville along the north bank of the St. Johns River with a ferry connection at Fort George Island to the south bank of Mayport.

Little Talbot Island, a strip of low flat land about 4 miles long and averaging about 0.8 mile wide, lies in a north-south direction. The island is wooded along its outer coast. From seaward it shows a strip of dark woods with many conspicuous sand dunes near the beach. Its south end runs off in a low point of bare sand bordering on Fort George Inlet.

Fort George Inlet is a narrow body of water separating Little Talbot and Fort George Islands. The inlet changes rapidly due to shifting sands at its entrance, and should never be used without local knowledge. The Heckscher Drive (State Routes 105-A1A) highway toll bridge near the entrance to the inlet has a 38-foot fixed span with a clearance of 15 feet at the center. An overhead power cable at the bridge has a clearance of 32 feet.

Fort George Island is westward and southward of Fort George Inlet. Its eastern shore, forming the coastline, shows a broad strip of white sand beach backed by a range of high hills. The island is separated from the mainland by Sisters Creek. Fort George Island formerly called Pilot Town, is a town on the St. Johns River near the south end of the island opposite Mayport.

9. ST. JOHNS RIVER

Charts 11490 (569), 11491 (636-SC), 11492 (685-686), 11495 (687-688).-St. Johns River, the largest in eastern Florida, is about 248 miles long and is an unusual major river in that it flows from south to north over most of its length. It rises in the St. Johns Marshes near the Atlantic coast below latitude 28°00'N., flows in a northerly direction, and empties into the sea north of St. Johns River Light in latitude 30°24'N. The river is the approach to the city of Jacksonville and a number of towns near its shores. Some of these places are winter resorts while others are centers of farming districts and citrus groves. Deep-draft vessels go as far as the large shipyard at Jacksonville, just below the Main Street highway lift bridge. Southward of the Jacksonville bridges, commercial traffic is light and consists almost entirely of oil barges. Many pleasure craft navigate this part of the river, usually going only as far as Sanford, though small boats have navigated the river as far as Lake Washington, 188 miles south of Jacksonville.

Jacksonville has expanded by consolidation to include most of Duval County and is now the largest city in the United States in terms of area; its extent along the St. Johns River is from the ocean to the town of Orange Park on the west side of the river and to Julington Creek on the east side. Most of the marine terminals are on the west side of the river about 21 miles above the entrance, just above the point where the river first turns southward. The deepwater port is the largest on the east coast of Florida. It is a major southeastern bulk-handling, distribution, and railroad center. Both general and bulk cargoes are handled, and Jacksonville is a leading southeastern container port. The principal exports are paper products, insecticides, naval stores, tallow, clay, scrap metal, logs and lumber, feed, and machinery. The principal imports are petroleum products, coffee, iron and steel products, automobiles, bananas, canned goods, lumber, alcoholic beverages, peat moss, and frozen foods.

Caution.-Broken ground with least depths of 4 to 5 fathoms lies from 4 to 6 miles from the coast for a considerable distance northward and southward of the St. Johns River entrance. Navigators should also bear in mind the prevailing northerly current in this area, which is felt until well inside the 10-fathom curve, except with northeasterly or northerly winds.

Several fish havens are eastward of the entrance to St. Johns River; the outermost, marked by a private unlighted buoy, is about 27 miles eastward of St. Johns Light.

Prominent features.-St. Johns Light (30°23.1'N., 81°23.9'W.), 83 feet above the water, is shown from a white square tower on the beach a mile south of St. Johns River north jetty; the radiobeacon antenna is 60 yards east of the light tower. Water tanks are prominent along the beaches to the southward.

Boundary lines of inland waters.-The line established for the entrance to St. Johns River is described in **82.50,** chapter 2.

Channels.-A Federal project provides for a channel 42-40 feet deep from the ocean to St. Johns Point, thence 40-38 feet deep to a point 1.5 miles westward of St. Johns Point, thence 38 feet deep to Little Marsh Island, thence 38-34 feet deep to Dame Point, thence 34 feet deep to Commodore Point via Terminal Channel, thence 30 feet deep to the Florida East Coast Railway bridge at Jacksonville. The main channel is maintained at or near project depths. (See Notice to Mariners and latest edition of chart for controlling depths.)

A lighted whistle buoy is 3 miles off the entrance to the river. The entrance channel, between two converging rubblestone jetties, and the channel in the river are marked by lighted and unlighted buoys, lights, and lighted ranges.

Anchorages.-Vessels waiting outside the entrance to St. Johns River can anchor in depths of 36 to 50 feet north-northeastward of the jetties if wind and sea permit. (See **110.182,** chapter 2, for limits and regulations of the anchorage areas.) Pilots sometimes anchor vessels in the channel opposite Mayport Basin while waiting for the weather to clear upstream, but this anchorage is not recommended due to the strong currents.

Anchorage areas have been established in the St. Johns River in the vicinity of Jacksonville; limits and regulations are given in **110.183,** chapter 2. Special small-craft anchorages are 4.5 miles south of Jacksonville. (See **110.1** and **110.73,** chapter 2, for limits and regulations.)

Merchant ships are normally anchored either in the area off Talleyrand Docks and Terminals, locally termed the lower anchorage, or in the area off Commodore Point, known as the upper anchorage. Though these are the only practical anchorages available, the holding ground is only fair and both anchorages are somewhat constricted.

Bridges.-Six bridges cross the St. Johns River at downtown Jacksonville. The fixed Matthews highway toll bridge, 0.5 mile north of Commodore Point, has a clearance of 152 feet across the main (Terminal) channel and 86 feet at the center of the span across Arlington Channel. At Commodore Point, a suspension bridge has a clearance of 135

feet, with 141 feet at the center. Main Street (Alsop) highway bridge, the first of four bridges at Hendricks Point, has a vertical-lift span with clearances of 40 feet down and 135 feet up; the second, Acosta highway bridge, 0.3 mile upstream from the Main Street bridge, has a vertical-lift span with clearances of 56 feet down and 164 feet up; the third, the Florida East Coast Railroad bridge adjacent to the Acosta bridge, has a bascule span with a clearance of 5 feet; the fourth, the Fuller Warren highway toll bridge, has a bascule span with a clearance of 44 feet at the center. Drawbridge regulations and opening signals are given in **117.240** and **117.430**, chapter 2.

Overhead power cables with a clearance of 175 feet cross the river about 9 miles above the entrance at Blount Island.

Routes.-Along the coast from Charleston to Jacksonville, the course between the outer lighted whistle buoys is from 10 to 15 miles offshore. Vessels making for St. Johns River entrance should guard against an inshore set which may amount to a knot or more due to the currents into the inlets. In thick weather, vessels approaching from the northeastward should be mindful of the fact that deep holes may be encountered which may lead them to believe that they are farther offshore than they actually are. Approaching from the southward, vessels clear Hetzel Shoal before heading for the lighted wreck buoy about 10 miles southeastward of the entrance, then steer for the lighted whistle buoy off the entrance. A set of 0.5 to 0.8 knot in a northerly direction parallel with the coast may be expected in this area due to the prevailing current, except with northerly or northeasterly winds. Southbound light-draft vessels can avoid the northerly set due to the prevailing current by following the coast at a distance of from 3 to 5 miles to abeam Ponce de Leon Inlet Light, and then shaping the course to pass outside of Hetzel Shoal Lighted Whistle Buoy 8.

Tides and currents.-The mean range of tide is 4.9 feet at St. Johns River entrance and about 1.2 feet at the railroad bridge at Jacksonville. From Jacksonville to Palatka the mean range of tide is about 1 foot. At low-water stages, tidal action is felt to Lake George. (See the Tide Tables for daily predictions at Mayport and several places on St. Johns River.)

The tidal currents are strong in St. Johns River as far as Jacksonville. The currents at the entrance between the jetties require special attention. The Bar Pilots report that 1 hour after the beginning of a blow from any direction from north through east to south, a very strong current sets with the wind across the end of the jetties, and the condition is usually dangerous; when such winds reach gale force, the positions of the buoys should not be relied upon as they may drag from station.

The velocity of the current between the jetties is 1.9 knots on the flood and 2.3 knots on the ebb; at Mayport, 2.2 knots on the flood and 3.1 knots on the ebb; at Mile Point, 2.5 miles above the entrance, about 2.8 knots. At downtown Jacksonville (Commodore Point), the velocity of current is about 1.0 knot; however, in 1967 a naval vessel reported being forced against the Acosta highway bridge by flood currents estimated to exceed 5 knots. Caution should be exercised in this area. The flood is increased by northeasterly and easterly winds and the ebb by southwesterly and westerly winds. (See the Tidal Current Tables for daily predictions of the tidal current in St. Johns River entrance and for a number of places on St. Johns River.)

The tidal currents above Jacksonville average less than a knot. The winds have considerable effect on the water level and velocity of the currents. Strong northerly and northeasterly winds raise the water level about 2 feet at Jacksonville, about 1 foot at Palatka, and about 1.5 feet at the mouth of Dunns Creek. Strong southerly and southwesterly winds lower the water level about 1 to 1.5 feet, increase the ebb, and decrease or may interrupt the flood. The currents in Deep Creek are weak, being due primarily to the winds and tide. There is a moderate drainage current in the Oklawaha River. The wind has no appreciable effect on the water level at the head of Dunns Creek and in Lake Crescent.

The river water may be fresh at Jacksonville at low water with westerly winds, while with northeasterly winds the water may be brackish to Palatka.

Freshets.-The flood stages in the river usually occur during the fall and are about 1 foot above ordinary low-water level at Jacksonville, 2 feet at Palatka, 3 feet at Lake George, 5 feet at Sanford, and 6.5 feet at Lake Harney.

Weather.-Jacksonville is near the northern boundary of the trade winds. The surrounding terrain is level, and easterly winds, blowing about 40 percent of the time, produce a maritime influence that moderates to some extent the heat of summer and the cold of winter. Also, being situated south of the usual path of winter storms, the city seldom experiences strong winds or severe cold waves. Exceptional weather is occasioned by infrequent "nor-easters" along the northeast Florida coast, marked by winds 17 to 26 knots, low stratus clouds, and drizzle. These occur mainly in late summer and fall, and sometimes persist for several days.

Prevailing winds are northeasterly in the fall and winter and southwesterly in spring and summer. Wind speed, which averages a little less than 8 knots, is slightly higher in the early afternoon than in the early morning, and in the spring than in other seasons of the year. Although this area is in the hurricane belt, it has been hit very seldom by hurricane-force winds. Most tropical cyclones reaching this latitude tend to move parallel to the coastline, keeping well out to sea, or else lose much of their force over land before reaching Jacksonville.

Fog is frequent in winter, rolling in with any easterly wind and often remaining across the entrance when it has cleared elsewhere. In calm weather, smog from the fertilizer and paper plants in the area often obscures the channel above Dame Point.

June, July, and August are the hottest months, with temperatures averaging above 80°F.; December, January, and February are the coolest months, with mean temperatures near the middle fifties. On clear, hot days either an afternoon thundershower or a southeasterly sea breeze usually reaches this area shortly after midday.

The atmosphere is moist, with an average relative humidity of about 75 percent, ranging from about 90 percent in early morning to about 55 percent during the afternoon. The greatest rainfall, mostly in the form of local thundershowers, occurs during the late summer.

The National Weather Service station is at Jacksonville International Airport, about 6.5 miles north-northwestward of the entrance to Trout River, and **barometers** can be compared there or checked by telephone (904-757-1110). (See Page T-3 for **Jacksonville climatological table.**) **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage.-Pilotage is compulsory for all foreign vessels and for U.S. vessels under register. Pilotage is optional for U.S. coastwise vessels which have on board a pilot licensed by the Federal Government. St. Johns Bar Pilots and a dispatcher are on duty 24 hours daily at the pilot station, which is on the south side of the entrance to Mayport Basin at 30°23'39" N., 81°24'16"W.; the pilot boat is moored at the T-pier here. The boat has a black hull with PILOT in white letters on the side, has a white superstructure, and flies a blue flag with a white P on it. The pilot boat is equipped with radar and radio. The dispatcher at the pilot station keeps a continuous watch and can transmit on VHF-FM channels 16 (156.80 MHz) and 18A (156.90 MHz), and on 2182 and 2738 kHz. Vessels should report their estimated time of arrival and their draft to the pilot station by radio at least 2 hours before arriving at the sea buoy. The pilot boarding area is between the sea buoy and the outermost entrance-channel buoys; a boarding ladder should be rigged 5 feet above the water. The bar pilots also maintain a business office, equipped with VHF-FM radio, at Jacksonville on the north side of Commodore Point.

Towage.-Tugs up to 1,800 hp, and docking pilots are available 24 hours a day at Jacksonville.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) Vessels are usually boarded at the docks between 0700 and 1900 weekdays. Special arrangements through the vessel's agents are necessary to board in the stream, after hours, or on Saturday, Sunday, and holidays. An **outpatient clinic** is maintained by the U.S. Public Health Service at the Federal Building. There are public and private hospitals in and about Jacksonville. Deratization and fumigation services are available.

Customs.-Jacksonville is a **customs port of entry.** The limits of the port are the same as Duval County. Vessels are usually boarded at their berths. The customhouse is in the Port Central Office Building near Talleyrand Docks and Terminals.

Immigration.-Jacksonville is an Immigration port of entry; the office is in the Federal Building. Vessels are usually boarded at the dock.

Coast Guard.-The **Captain of the Port** has an office on Talleyrand Avenue. The **Marine Inspection Office** is in the Port Central Office Building; a **documentation officer** is stationed at Jacksonville.

Agricultural quarantine.-All vessels arriving from a foreign port are inspected; the Agriculture personnel in Jacksonville are in the Post Office/Federal Building at 311 West Monroe Street and in the newer Federal Building at 400 West Bay Street. Fumigation of vessels to destroy parasites harmful to plants and animals is supervised by agriculture personnel.

Harbor regulations.-There is no harbormaster for the city of Jacksonville. The Jacksonville Port Authority, a State agency and corporation, operates the Talleyrand Docks and Terminals and the Blount Island Terminal; the berthing of vessels and other aspects of the direct operation of these terminals is controlled by the Director of the Operations Department. The operating staff of the port authority is directed by a managing director; the offices are at the Port Central Office Building, 2701 Talleyrand Avenue, near Talleyrand Docks and Terminals.

Wharves.-Of the 30 principal piers and wharves described for the port, 5 are operated by the Jacksonville Port Authority and the others are privately owned and operated. Most of the terminals have excellent highway connections. Three switching railroads connect the terminals and the three major railroads serving Jacksonville. General cargo at the port is usually handled by ships' tackle, but adequate equipment is available for medium lifts. Crawler and truck cranes with lifting capacities to 125 tons are available.

With one exception, only the deep-draft piers and wharves are described. (For a complete description of port facilities, see the Port Series, a Corps of Engineers publication.) **The alongside depths given for each facility are reported depths.** (For the latest such depth information, contact the Jacksonville Port Authority or the private operator.)

Blount Island Terminal Wharf: on main St. Johns River channel near the southwest tip of Blount Island, 10 miles above St. Johns entrance; 2,600-foot bulkhead wharf; 38 feet alongside; deck height, 9 feet; two transit sheds, 360,000 square feet; 45-ton container crane; 37-ton container

stacker; water connections, electricity for vessels; shipment of paper and linerboard, receipt and shipment of general cargo; owned/operated by Jacksonville Port Authority.

Kaiser Gypsum Co. Wharf: west side of Blount Island Channel (old river channel), 0.35 mile northward of the southwest tip of Blount Island; offshore wharf with 20-foot face, 620-foot berth with dolphins; 32 feet alongside; deck height, 10 feet; adjustable receiving hopper on wharf connected by conveyor to open storage area, delivery rate about 875 tons per hour; freshwater connections, electricity for vessels; receipt of gypsum rock by self-unloading vessels; owned/operated by Kaiser Gypsum Co., Inc.

North Side Generating Station Wharf: northwestern side of Blount Island Channel, 1.15 miles northeastward of Kaiser Gypsum Co. Wharf and 0.2 mile southwestward of the Blount Island highway bridge; offshore wharf with 60-foot face, 250-foot berth with dolphins; 32 feet alongside; deck height, 13½ feet; pipelines with tanker connections extend from wharf to storage tanks at powerplant; receipt of fuel oil for plant consumption; owned by City of Jacksonville, operated by Department of Electric & Water Utilities.

Hess Oil and Chemical Co. Wharf: north side of St. Johns River at mouth of Broward River, 0.3 mile east-northeastward of Drummond Point; offshore wharf with 60-foot face, 260-foot berth, with breasting dolphins; 30 feet alongside; deck height, 12 feet; pipelines with hose connections extend to storage tank ashore; receipt of Bunker C and occasional loading of harbor bunkering barges; owned/operated by Hess Oil and Chemical Co.

Gulf Oil Corp. Wharf: extending from Drummond Point; offshore wharf with 143-foot face, 200-foot berth with dolphins; 34 feet alongside; deck height, 12 feet; hose-handling derrick; pipelines extend to storage tanks ashore; freshwater connection and electricity for vessels; receipt of petroleum products and loading harbor bunkering-barges; owned/operated by Gulf Oil Corp.

U.S. Gypsum Co. Pier: just south of Trout River entrance on west side of St. Johns River at 30°23′01.5″N., 81°37′55.0″W.: pier 616 feet long and 42 feet wide, berthing only along south side, usable space 425 feet with dolphins; 26 feet alongside; deck height, 6 feet; steam-operated unloading tower with 70-foot boom unloads at 500 tons per hour into a hopper served by a conveyor system, which extends full length of pier to an open storage area ashore; electricity available for vessels; receipt of gypsum rock; owned/operated by U.S. Gypsum Co.

Phillips Petroleum Co. Wharf: 0.34 mile southward of U.S. Gypsum Co. Pier, west side of river; offshore wharf with 51-foot face, 200-foot berth with dolphins; 31 feet alongside; deck height, 10 feet; pipelines extend to storage tanks; freshwater connections for vessels; receipt of petroleum products; owned/operated by Phillips Petroleum Co.

Shell Oil Co. Wharf: west side of St. Johns River, 0.32 mile south of Phillips Petroleum Co. Wharf; offshore wharf with 87-foot face, 230-foot berth with dolphins; 33 feet alongside; deck height, 8 feet; hose-handling booms; pipelines extend to storage; freshwater connections for vessels; receipt of petroleum products, occasionally fueling towboats and harbor bunkering barges; owned/operated by Shell Oil Co.

Jacksonville phosphate Wharf: on south side of entrance to Long Branch Creek, 0.2 mile southwest of Shell Oil Co. Wharf; offshore wharf consisting of a line of dolphins connected by catwalks, 800-foot berth; 36-38 feet alongside; deck height, 10 feet; 2 loading towers, each with a loading rate of 2,850 long tons per hour; towers are served by conveyor from phosphate storage silos, total capacity 27,000 tons; freshwater hose connections for vessels; shipment of phosphate; owned by Southern Railway Co. and Occidental Corp. of Florida, operated by Occidental Corp. of Florida.

Alton Box Board Co. Fuel Wharf; 30°22′03″ N., 81°37′31″ W.; offshore wharf with mooring dolphins in line with face, 51-foot face, 250-foot berth with dolphins; 26 feet alongside; deck height, 10 feet; hose-handling derrick; pipeline connects wharf and storage tanks; freshwater connections for vessels; receipt of fuel oil for plant consumption; owned/operated by Alton Box Board Co., Paperboard Division.

Dillon Kennedy Generating Station Wharf: 30°21′50″N., 81°37′20″W.; offshore wharf with 101-foot face, 185-foot berth with two dolphins; 31-32 feet alongside; deck height, 10 feet; pipeline extends to storage; freshwater connections for vessels; receipt of fuel oil for plant consumption; owned by City of Jacksonville, operated by Department of Electric & Water Utilities.

Southern States Oil Co. Wharf: east side of river at 30°21′48″N., offshore wharf, 244-foot berth with dolphins; 28 feet alongside; deck height, 7 feet; one hose-handling crane; pipeline extends to storage; owned by MESCO, Inc., operated by Southern States Oil Co.

Texaco Wharf: west side of river, 0.29 mile southeastward of Dillon Kennedy Generating Station Wharf; offshore wharf with 140-foot face, 550-foot berth with dolphins; 30-32 feet alongside; deck height, 13 feet; hose-handling derrick; pipelines extend to storage; freshwater connections for vessels; receipt and shipment of petroleum products, fueling towboats; owned/operated by Texaco, Inc.

Standard Oil Co. Tanker Wharf: west side of river, 0.12 mile north of the north corner of the Jacksonville Port Authority's Pier No.1; 100-foot face, 200-foot berth with dolphins; 35 feet alongside; deck height, 12½ feet; hose-handling derricks; numerous pipelines extend from wharf to storage tanks; fresh-water, electricity available for

vessels; receipt of petroleum products and bunkering vessels; owned by Standard Oil Co. of Kentucky, operated by Standard Oil Co. of Kentucky and Sun Oil Co.

Jacksonville Port Authority, 8th Street Terminal: west side of river at 30°20'42"N., 81°37'20"W.; 707-foot bulkhead wharf; 34 feet alongside; deck height, 9 feet; transit shed, 60,000 square feet; about 25 acres of paved open storage; freshwater connections, electricity for vessels; receipt and shipment of general cargo, receipt of bananas and automobiles; owned/operated by Jacksonville Port Authority.

Sea-Land Service Terminal: immediately northward of 8th Street Terminal wharf; 1,200-foot bulkhead wharf; 34 feet alongside; deck height, 9 feet; one 27½-ton traveling container crane; 7-acre open storage area; freshwater connections, electricity for vessels; receipt and shipment of containerized cargo; owned by Jacksonville Port Authority, operated by Sea-Land Service, Inc.

Jacksonville Port Authority, Talleyrand Docks and Terminals, Berths 1 and 2: immediately northward of Sea-Land Terminal wharf; 1,100-foot bulkhead wharf; 34 feet alongside; deck height, 9 feet; transit shed, 160,000 square feet; molasses pipeline connects wharf and storage tanks; freshwater, sewer, telephone connections, and electricity for vessels; receipt and shipment of general cargo, receipt of molasses; owned/operated by Jacksonville Port Authority.

Jacksonville Port Authority, Talleyrand Docks and Terminals, Berth 3: Under construction immediately northward of Berth 2; berth will be a 548-foot bulkhead wharf with 34 feet alongside and a deck height of 9 feet. There will be a transit shed (160,000 square feet); fresh-water, sewer, and telephone connections; and electricity. Receipt and shipment of general cargo; owned/operated by Jacksonville Port Authority.

Jacksonville Port Authority, Talleyrand Docks and Terminals, Berths 4 and 5: Under construction immediately northward of Berth 3; berths will be along a bulkhead wharf extending about 1,300 feet northward from Berth 3 wharf, and will have 34 feet alongside and a deck height of 9 feet. There will be two transit sheds (160,000 square feet each); freshwater sewer, and telephone connections; and electricity. Receipt and shipment of general cargo, receipt of automobiles and bagged coffee beans; owned and operated by Jacksonville Port Authority.

Wilson & Toomer Fertilizer Co. Wharf: West side of river 0.95 mile north of the first bridge across the river and immediately southward of the Jacksonville Port Authority 8th Street Terminal wharf; offshore wharf with 360-foot face, 620-foot berth with dolphins; 30 feet alongside; deck height, 8 feet; unloading tower with 35-cubic-foot bucket, unloading rate 200 tons per hour to conveyor which extends to plant in rear; receipt and shipment of fertilizer materials; owned/operated by Wilson & Toomer Fertilizer Co.

McGiffin & Co. Wharf: west side of river 0.7 mile north of the first bridge; 440-foot wharf; 28-30 feet alongside; deck height, 10 feet; transit shed, 33,400 square feet; freshwater connections for vessels; receipt of general cargo; owned by Seaboard Coast Line Railroad Co., operated by McGiffin & Co., Inc.

Seaboard Coast Line Railroad Co. Wharf: west side of river immediately southward of McGiffin & Co. Wharf; 1,120-foot marginal wharf; 28-30 feet alongside; deck height, 9 feet; transit shed, 39,000 square feet; hose-handling derrick; numerous pipelines extend from wharf to storage tanks; receipt and shipment of general cargo, receipt and shipment of creosote; receipt of automobiles, petroleum products and asphalt; owned by Seaboard Coast Line Railroad Co.; operated by McGiffin & Co., Inc., Koppers Co., Pure Oil Co., and Trumbull Asphalt Co. of Delaware.

Eagle Terminal Wharf: west side of river immediately south of Seaboard Coast Line Railroad Co. Wharf and 1,000 yards northward of the first bridge across the river; 400-foot bulkhead wharf; 27 feet alongside; deck height, 9 feet; transit shed, 10,000 square feet; roll-on/roll-off ramp; open storage area for trailers, freshwater connections, electricity for vessels; receipt and shipment of general cargo and containerized cargo (truck trailers); owned by Seaboard Coast Line Railroad Co., operated by Eagle, Inc.

Strachan Shipping Co., Tangent A Wharf: at Commodore Point, 0.25 mile southward of the first river bridge; 1,500-foot bulkhead wharf; 30 feet alongside; deck height, 5½ feet; three transit sheds, 124,500 square feet total; 4 mobile cranes, 20 to 30 tons capacity; 3.4 acres of open storage; cement and petroleum pipelines connect wharf and storage tanks; freshwater connections, electricity for vessels; receipt and shipment of general cargo; receipt of petroleum products, automobiles, and bulk cement; bunkering vessels; owned by Commodores Point Terminal Corp., operated by Strachan Shipping Co.

Strachan Shipping Co. Wharf: immediately southward of Tangent A Wharf; bulkhead wharf, angled with one section of 500 feet and one of 180 feet; 30 feet alongside; deck height, 5½ feet; transit shed, 60,300 square feet; freshwater connections, electricity for vessels; receipt and shipment of general cargo, receipt of automobiles; owned by Commodores Point Terminal Corp., operated by Strachan Shipping Co.

Buccaneer Line Wharf: north side of river, immediately west of second bridge; angled bulkhead wharf, each of two sections 250 feet long; 22-24 feet alongside; deck height, 5 feet; freshwater connections, electricity for vessels; receipt and shipment of general cargo in Bahama Island trade; owned by Commodores Point Terminal Corp., operated by Buccaneer Line, Inc.

Sinclair Refining Co. Wharf: north side of river at 30°19'10" N., 81°38'30" W.; offshore wharf with

262-foot berth; 35 feet alongside; deck height, 7 feet; two hose-handling derricks; pipelines extend to storage; freshwater connections; receipt of bulk and packaged petroleum products, fueling towboats; owned/operated by Sinclair Refining Co.

TMT Trailer Ferry Wharf: north side of river, immediately westward of Sinclair Refining Co. Wharf; 355-foot bulkhead wharf; 20 feet alongside; deck height, 6 feet; roll-on/roll-off ramp with transfer bridge for loading truck trailers aboard barges; receipt and shipment of containerized cargo (truck trailers) aboard large towed barges with bow doors; owned by MESCO, Inc., operated by TMT trailer Ferry, Inc.

South Side Generating Station Wharf: south side of river at 30°19′01″N., 81°38′50″W.; offshore wharf with 100-foot face, 428-foot berth with dolphins; 30 feet alongside; deck height, 12 feet; two hose-handling derricks; pipeline extends to storage tanks; receipt of fuel oil for plant consumption; owned by City of Jacksonville, operated by Department of Electric and Water Utilities.

Jacksonville Shipyards berths: A number of piers and wharves are owned and operated for lay berths by the three divisions of Jacksonville Shipyards. The main yard is on the north side of the river about 0.45 mile eastward of the Main Street vertical-lift bridge (first bridge at Hendricks Point), the St. Johns Yard is on the north side of the river about 0.75 mile eastward of Main Street bridge, and the South Side Yard is on the south bank about 0.3 mile eastward of the bridge. There are about 8 principal piers and wharves with some 12 berths (about 4,800 feet) with depths ranging from 14 to 40 feet. (See "Repairs" for additional information on the shipyard.)

Supplies of all kinds in any quantity can be obtained, and all types of marine services are available in Jacksonville. Freshwater piped to the terminals. Fuel oil and diesel oil are available at the oil terminal wharves and by tank barge; most vessels bunker by barge while alongside.

Repairs.-The large shipyard at Jacksonville is on both sides of the river about midway between Commodore Point and the Main Street bridge (easterly bridge at Hendricks Point). The yard can perform all types of repair work on the largest ships able to come up the river. The largest floating drydock with a 33,000-ton lifting capacity is 826 feet long and has a clear width of 144 feet and a depth of 31 feet over the keel blocks. There are two floating drydocks of 18,000-ton lifting capacity, 667-foot overall length, and 93-foot width between the wingwalls; there are also five smaller floating drydocks, numerous mobile cranes of up to 65-ton capacity, berths for a large number of ships, shafts machined up to 30 inches by 40 feet, and all the other facilities normally available at a large shipyard. A smaller shipyard on the river at the junction with Sisters Creek (Intracoastal Waterway) has a 500-ton marine railway. Two other yards on Pablo Creek (Intracoastal Waterway south of St. Johns River) have a 1,000-ton floating drydock and marine ways which can handle vessels up to 100 feet.

In addition to the shipyards, Jacksonville has all types of specialized marine manufacturing, sales, and repair firms which handle such items as electronic equipment, electric motors and other components, ventilation and air conditioning systems, shafts and propellers, etc.

Small-craft facilities.-Excellent facilities are available in Jacksonville. The municipal marina, on the south side of the river between the Main Street and Acosta bridges, has berths for over 32 boats up to 108 feet; each berth has water and electricity, and depths are reported to be 15 feet. Gasoline and diesel fuel are pumped at the fuel pier, and ice is available. A restaurant and motel are adjacent to the marina, and groceries, laundries, and other businesses are within a mile. A watchman is on duty 24 hours daily. A dockmaster assigns slips and enforces regulations for the marina; copies of the regulations may be obtained from his office. Heads must be secured while in the marina; public toilets are in the dockmaster's house. Adequate mooring lines and fenders should be used, as currents become quite strong in the slips. A large illuminated fountain, said to be the world's largest, is in the city park back of the marina. There are a number of other modern well-equipped marinas and boatyards in Jacksonville; the major facilities are on the Ortega River, though others are on Trout River, Goodbys Creek, Doctors Inlet, and Julington Creek. Supplies, services, and repairs are available for all types of yachts.

Communications.-The port is served by three railroads, Seaboard Coast Line Railroad Co., Florida East Coast Railway, and Southern Railway. The Jacksonville Port Authority operates its own switching railroad, which serves the Talleyrand Docks and Terminals. Excellent highways reach the city, and there is a toll expressway system providing rapid transportation within the city; the primary highways leading from Jacksonville are Interstate Highways 10 and 95, and U.S. Routes, 1, 17, and 90. Jacksonville International Airport, operated by the Jacksonville Port Authority about 10 miles northward of the heart of the city, is served by six airlines. Both passenger and air freight service is available. There are also three general-aviation airports in the city. Numerous steamship lines connect with most of the principal foreign and domestic ports. Barge service is available for the Intracoastal Waterway, coastwise, and up the St. Johns River as far as Sanford.

Chart 11490 (569).-Mayport Basin is on the south side of the St. Johns River just inside the entrance jetties and westward of **St. Johns Point.** A deep channel leads along the inshore end of the south jetty to the basin. It is marked by a directional light, lights, and lighted and unlighted buoys. The waters of the turning basin are within a **prohibited**

area of the U.S. Naval Station Reservation; commercial and pleasure vessels are prohibited from entering except in cases of extreme emergency; limits and regulations are given in **207.165**, chapter 2.

Mayport is a town on the south bank of St. Johns River, 3 miles inside the entrance jetties. It has a ferry connection with the town of **Fort George Island** across the river. The wharves at Mayport are private and are used by fishing vessels. A Coast Guard base is at the southerly end of the waterfront. There is a marina and a yacht basin with depths of about 7 feet. Gasoline, diesel fuel, freshwater, ice, restrooms, charter boat hire, showers, electricity, and bottled gas are available. Shops and restaurants are nearby.

Chart 11491 (636-SC).-The Intracoastal Waterway crosses the St. Johns River 5.3 miles from the entrance through Sisters Creek on the north and Pablo Creek on the south.

A shipbuilding and drydock company is on the north side of the river and on the east side of Sisters Creek. The firm builds steel-hulled tugs and fishing vessels and does all kinds of repair work on commercial and Government vessels; work on pleasure craft, except very large yachts, is not done here. There is a 1,000-ton marine railway, several mobile cranes, complete shop facilities, and four berths for vessels of up to about 100 feet. The marine railway is on the St. Johns side of the yard, while the construction work is done on the Sisters Creek side. This firm has built a vessel 220 feet long.

Blount Island, low and sandy with fringing marshes, is on the north side of the St. Johns River about 9 miles above the entrance. The Jacksonville Port Authority terminal near the southwestern tip of the island has been described under "Wharves" for the Port of Jacksonville.

Blount Island Channel, a cutoff bend of the St. Johns River, extends from the main river channel around the northern side of Blount Island and rejoins the main channel at the southwestern tip of the island. The channel is practically divided near its midpoint by three low fixed bridges. From east to west these bridges are: a highway bridge with a clearance of 10 feet; a railroad bridge immediately southwestward of the first highway bridge with a 19-foot horizontal clearance and an 8-foot vertical clearance; and a highway bridge about 0.1 mile southwestward of the first two bridges with a 19-foot horizontal clearance and an 8-foot vertical clearance. Overhead power cables, with clearances of 175 feet, are on both sides of the southwesternmost highway bridge. The Federal project depth for the channel is 30 feet, but the controlling depth is usually considerably less than project depth. (See Notice to Mariners and chart tabulation for the latest controlling depths.) Two deep-draft private wharves on the marked western leg of Blount Island Channel are described under Jacksonville "Wharves".

Broward River, on the north side and 13 miles from the entrance to St. Johns River, has depths of 1 to 3 feet to Cedar Heights. The Heckscher Drive (State Route 105) highway bridge at the mouth has a 40-foot bascule span with a clearance of 13 feet. An overhead power cable at the bridge has a clearance of 40 feet. The Seaboard Coast Line Railroad bridge 0.4 mile upstream has a swing span with a channel width of 40 feet and a clearance of 8 feet. (See **117.240 and 117.245 (h) (23a)**, chapter 2, for drawbridge regulations and opening signals covering these bridges.)

The piers and shore facilities of a U.S. Navy Fuel Depot are 1.2 miles southwestward of **Drummond Point** on the northwest side of the St. Johns River, just below the mouth of the Trout River.

Trout River, north of downtown Jacksonville, has depths of 7 feet to the mouth of Ribault River and 3 feet to the highway bridge 4.5 miles above the mouth. The entrance is marked by daybeacons. The Seaboard Coast Line Railroad bridge, 0.5 mile above the entrance, has a swing span with a clearance of 1 foot. The span is normally kept open except for the passage of trains. On the east side at the south end of the bridge, there is a small marina with about 75 berths. Water, electricity, ice, and gasoline are available. There is a 2-ton hoist, and repairs can be made to hulls and gasoline engines. There is about 4 feet of water to the marina. The Main Street (U.S. Route 17) highway bridge 0.6 mile upstream has a fixed span with a clearance of 29 feet. The highway bridge, adjacent to the westward, except for the channel span, remains as a fishing pier. The overhead power cable at the bridge has a clearance of 35 feet. The Seaboard Coast Line Railroad bridge just upstream has a swing span with a channel width of 46 feet and a clearance of 2 feet. (See **117.245 (h) (24)**, chapter 2, for drawbridge regulations.) The overhead power cable, 0.5 mile above the bridge, has a clearance of 45 feet. The U.S. Route 95 Expressway toll highway bridge, 2 miles above the mouth, has a fixed span with a clearance of 29 feet at the center.

State Route 115 highway bridge, 4.5 miles above the mouth, has a 40-foot fixed span with a clearance of 18 feet.

Groups of piles, sunken wrecks, and barges are near the shores of Trout River. There are numerous private piers and landings on the river. The Jacksonville City Zoo is on the north side of the river between the first two bridges.

Charts 11492 (685-686), 11495 (687-688).-St. Johns River south of Jacksonville bridges. Many pleasure craft ply the river south of Jacksonville, going as far as Sanford. Commercial traffic is light, and consists of barges hauling petroleum products for oil company distributors and fuel oil for power plants; the oil barges are loaded at Jacksonville and towed to Palatka and Sanford. Heavy barge traffic is expected on the river when the Cross Florida Barge Canal is completed.

The route from Jacksonville to Sanford, a distance of 123 miles, is well marked by lights and daybeacons, and is comparatively easy to navigate with the aid of the charts. However, if a local pilot is desired, fishermen from Jacksonville, Palatka, Welaka, or Sanford will serve. The upper reaches of the river are partly obstructed by hyacinths at certain times of the year, and floating obstructions are a continual menace to navigation. A program for eradication of obnoxious aquatic plant growth, consisting mostly of spraying, is carried on jointly by the Corps of Engineers and the Florida Game and Fresh Water Fish Commission. The unimproved creeks tributary to the St. Johns River may be obstructed by logs and hyacinths.

Fish traps, pilings, and remains of old wharves are generally found close inshore or on the bars in midstream. Fish traps are usually constructed of small poles and are frequently destroyed and rebuilt. In some cases, they extend several feet above high water, and can be avoided in daylight hours, but in some places they have been broken off below the water and are a serious menace to small craft.

Channels.-A Federal project provides for a channel 13 feet deep from Jacksonville to Palatka, a distance of 48 miles, thence 12 feet to Sanford, an additional 75 miles. This project, however, has not been maintained or surveyed in recent years because of the light commercial traffic. In 1963, the controlling depth was 12 feet to Federal Point, thence 9 feet to Palatka, thence 10 feet to Welaka, thence 12 feet to Sanford.

Bridges.-General drawbridge regulations and opening signals for bridges over the St. Johns River and tributaries are given in **117.240**, chapter 2. Special drawbridge regulations for certain bridges that supplement the general regulations are referenced with the area description of the waterway.

Chart 11492 (685).-A 038°56′ - 218°56′ measured nautical mile is near the northwest shore of the St. Johns River between **Winter Point** and the Ortega River. The target at each end of the course has two pile structures 8 feet apart and perpendicular to the course with a steel rod at the top of each pile. The piles are connected by an observer's platform.

Ortega River is about 2 miles south of Fuller Warren Bridge 30°18.9′N., 81°40.3′W.) on the west side of the St. Johns River. It is the major yachting center in the Jacksonville area. The mouth of the river is marked by a light. In 1963, the controlling depth was 6½ feet across the bar at the entrance, thence 8 feet to the railroad bridge, thence 5½ feet for a distance of 1.4 miles above the second highway bridge.

The Grand Avenue (State Route 211) highway bridge, at the entrance to Ortega River connecting **Ortega and St. Johns Park** has a bascule span with a clearance of 9 feet. The Roosevelt Boulevard (U.S. Route 17) highway bridge, 0.7 mile upstream, has dual fixed spans each with a clearance of 45 feet. The northern 180-foot section of the former highway bascule bridge immediately westward remains as a fishing pier. An overhead power cable with a clearance of 65 feet is at the fishing pier. The Seaboard Coast Line Railroad bridge immediately westward of the fishing pier has a 40-foot bascule span with a clearance of 2 feet. The Timquana Road highway bridge crossing the river 1.9 miles above the railroad bridge has a fixed span with a clearance of 20 feet.

A modern well-equipped marina and boatyard are on the northwest side of the Ortega River about 0.4 mile above the first bridge. The marina has 150 covered and open slips for boats to 80 feet in length, with reported depths of 8 feet. Gasoline and oil, diesel fuel, ice, water, electricity, and showers are available, and a shopping center, restaurants, and a motel are nearby. The boatyard makes complete repairs on hulls, engines (gasoline and diesel), electronic equipment, and propellers; there are a 30-ton mobile hoist, a 30-ton marine railway, a 5-ton monorail, and a mast-stepping boom.

Another marina on the northwest bank of the Ortega River just northeastward of the twin highway bridges has berths for 75 boats of up to 42 feet in length, with reported depths of 10 feet. Gasoline and oil, diesel fuel, water, ice, electricity, and other supplies and services are available. On the southwest side of this bridge is the yard of a yacht-building corporation. About 0.2 mile above the twin bridges, on the northwest side, there is another excellent marina for yachts. There are 125 covered and open berths with reported depths of 6 feet. Gasoline and oil, diesel fuel, water, ice, electricity, and marine supplies are available. Complete repairs can be made; there are two 30-ton hoists. A shopping center and a cafeteria are within three blocks of the marina.

Cedar River, a tributary of the Ortega, enters from the northward about 1.5 miles above the mouth. In 1963, the controlling depth was 6 feet from the entrance to the highway bridge 1.4 miles above the entrance. The Blanding Boulevard highway bridge, 0.6 mile above the mouth, has twin fixed spans with a horizontal clearance of 30 feet and a vertical clearance of 16 feet. The San Juan Avenue highway bridge, 1.4 miles above the mouth, has a 39-foot fixed span with a clearance of 11 feet at the center.

On the west side of St. Johns River, 4 miles southward of Fuller Warren Bridge at the entrance to **Pirates Cove,** is the Florida Yacht Club. There is berthage for 10 boats at the finger piers inside the bulkhead. In 1963, a depth of 6 feet could be taken to the piers and there were depths of 5 to 8 feet alongside. Water and electricity are available on the piers.

Goodbys Creek, on the east side of the St. Johns River about 7 miles southward of Fuller Warren Bridge, has depths of about 3 feet to just above the

twin bridges of State Route 13, about 0.3 mile above the entrance; the twin 32-foot spans have a clearance of 12 feet. Two small marinas are on the north side of the creek, on either side of the bridges; gasoline and oil, berths, water, ice, and some marine supplies are available. The lower marina has a mobile hoist which can haul out most boats able to negotiate the creek.

Jacksonville Naval Air Station extends along the west side of the St. Johns River about 0.7 mile northwestward of and 2.5 miles south-southwestward of **Piney Point.** A dredged channel leading to a large pier at the station had a controlling depth of 9 feet in 1963. Another dredged channel leading to the station, about 2.4 miles southward of Piney Point, had a controlling depth of 11 feet in 1963.

The twin fixed spans of Highway 295 bridge, with clearances of 65 feet cross the St. Johns River just below the Naval Air Station, 2.5 miles southward of Piney Point.

Orange Park, 10 miles south of Fuller Warren Bridge on the west bank of the St. Johns River, is a winter resort. In 1968, an iron pipe obstruction was reported about 0.3 mile offshore eastward of Orange Park landing.

Doctors Inlet, 10.5 miles southward of Fuller Warren Bridge, is the entrance to **Doctors Lake** from the St. Johns River. In 1963, the inlet had a controlling depth of 12 feet, thence general depths of 7 to 12 feet to the head of the lake. It is an excellent fishing ground for sportsmen and a haven for small boats in stormy weather. U.S. Route 17 fixed highway bridge with a clearance of 37 feet crosses the mouth of Doctors Inlet.

A sunken barge is near the south end of the bridge.

There is a well-equipped marina on the south side of Doctors Inlet immediately west of the highway bridge. There are 35 covered slips for boats of up to about 40 feet and 7 open 24-foot slips; depths to the berths are reported to be about 5 feet. Gasoline pumps are on a bulkhead about 300 feet long; sailboats too large for the open slips may moor here. Diesel fuel may be obtained by tank truck. Ice, water, electricity, and some hardware and accessories are available. A snack bar is at the marina, and a restaurant is adjacent.

In 1968, many pilings, visible at low tide, but submerged at high tide, were reported in Doctors Lake: several along the northern lakeshore between Orange Point and Macks Point, others off Cane Point, Dixton Siding, Catfish Point, Hog Point, and between Geigers Point and Romeo Point. An old target area is reported in Mill Cove.

Julington Creek, 13 miles south of Fuller Warren Bridge on the east bank, had a controlling depth of 5 feet in 1963 to State Route 13 highway bridge about a mile inside the entrance, thence 4½ feet for another 1.3 miles. The highway bridge has a 44-foot fixed span with a clearance of 15 feet. An overhead power cable with a clearance of 40 feet crosses the creek at the bridge on the east side.

A modern well-equipped marina is on the north side of the creek just eastward of the bridge. There are 50 covered and open berths with fresh water and electricity. Gasoline and oil, ice, showers, and a restaurant are available. A 12-ton mobile lift is available, and all types of repairs can be made. The southern city limit of Jacksonville follows the north side of Julington Creek.

Black Creek, 18 miles southward of Fuller Warren Bridge at Jacksonville, is navigable for vessels of about 8-foot draft for about 15 miles to the town of **Middleburg.** In 1963, the controlling depth was 8½ feet to the Seaboard Coast Line Railroad bridge. The creek is used by small craft as a refuge during hurricanes. The trees along the bank form an excellent windbreak. Just inside the entrance are U.S. Route 17 twin fixed highway bridges with clearances of 30 feet. About 2.2 miles above the highway bridge an overhead power cable has a clearance of 47 feet. The Seaboard Coast Line Railroad bridge, 5 miles above the mouth, has a 44-foot fixed span with a clearance of 20 feet. An overhead power cable with a clearance of 49 feet crosses the creek just above State Route 218 highway bridge near Rideout, about 7.2 miles above the mouth. The bridge has a 40-foot fixed span with a clearance of 20 feet. State Route 218 highway bridge across the south fork at Middleburg has a 40-foot fixed span with a clearance of 13 feet. An overhead telephone cable with a clearance of 24 feet also crosses the south fork at Middleburg. A highway bridge across the north fork at Middleburg has a 30-foot fixed span with a clearance of 16 feet. An overhead power cable, close eastward of the bridge, has a clearance of 23 feet.

Green Cove Springs, a town on the west bank of the St. Johns River about 20 miles south of Jacksonville's Fuller Warren Bridge, has a number of private piers and a public concrete T-pier owned by the city. A hotel and restaurant are three blocks up the street leading from the foot of the municipal pier.

The many long piers and the extensive group of buildings and other facilities just southeastward of Green Cove Springs were formerly part of a U.S. Naval Station, but are now included in a privately owned industrial park; the northwesternmost pier is used by a small shipyard which builds steel barges, and the other piers are used for the dismantling of vessels by a scrap-metal company. A large orange and white checkered tank in the industrial park is prominent from the river.

Sections of a former bridge 2 miles southeastward of Green Cove Springs extend out into the river 333 yards from the south shore and 500 yards from the north shore; the rest of the bridge was removed. State Route 16 highway bridge, 0.5 mile upstream, crosses the river from **Red Bay Point** to **Smith Point;** it has a fixed span with a clearance of 45 feet. There are submerged obstructions in the river from **Magnolia Point,** 4 miles below the

bridge, to Smith Point. The areas are outlined on the chart and should be avoided.

Trout Creek and **Sixmile Creek** have a common entrance 24 miles south of Fuller Warren Bridge. These creeks are navigable for about 3 or 4 miles upstream. In 1963, the controlling depth was 6½ feet. State Route 13 highway bridge, 0.5 mile above the entrance of Trout Creek, has a 38-foot fixed span with a clearance of 14 feet. Gasoline and a surfaced launching ramp are available at the fishing camp just above the bridge. State Route 13 highway bridge, 1 mile above the entrance to Sixmile Creek, has a 40-foot fixed span with a clearance of 11 feet.

Chart 11492 (686).-Ninemile Point, south of Jacksonville, is a sharp point at a wide bend of the river. An overhead power cable across the outside bend about 1.5 miles east of the point has a clearance of 38 feet.

Rice Creek, 44 miles south of Jacksonville, is used occasionally by fuel barges going to the paper plant, about 2.3 miles above the mouth, near the head of its southerly branch. Paper from the plant is shipped by rail. The creek is entered through a dredged channel which leads westward from St. Johns River to near the head of the southerly branch. In January 1970, the controlling depths were 10 feet in the approach channel from St. Johns River to the mouth of Rice Creek, thence 8½ feet on the centerline in the creek to near the head of the southerly branch. The channel is marked by a **273°30′** lighted approach range, lights, and daybeacons. The Seaboard Coast Line Railroad bridge, 0.6 mile above the mouth, has a swing span with a channel width of 30 feet and a clearance of 3 feet. U.S. Route 17 highway bridge, 0.8 mile above the mouth, has a swing span with a channel width of 41 feet and a clearance of 9 feet; the overhead power cable at the bridge has a clearance of 60 feet.

An overhead power cable, with a clearance of 91 feet over the main channel and 60 feet elsewhere, crosses St. Johns River about 1.6 miles southward of the channel into Rice Creek.

Palatka is an important upriver town on the St. Johns River 48 miles south of Jacksonville. There are several sawmills; wood chips are shipped from them by rail to the papermill on Rice Creek. The marina here has good facilities for yachts. There are over 30 berths with water and electricity at finger piers in front of a large dry-storage building. Gasoline and diesel fuel are pumped; ice, marine hardware, accessories, and other supplies are available at the marina; and groceries, laundry facilities, and overnight accommodations are available nearby. A marine railway and a hoist are available for haul outs up to 55 feet; hull, gasoline engine, electronic, and propeller repairs can be made. The city pier, just northeastward of the marina, was in poor condition in 1969, with the southeast side in ruins. U.S. Route 17 highway bridge across the St. Johns River at Palatka has a bascule span with a clearance of 21 feet. In 1974, a fixed highway bridge with a design clearance of 65 feet was under construction adjacent to the bascule span.

Wilson Cove, 0.7 mile south of Palatka, is very shallow and fouled by hulks, piling, and concrete-ballast blocks.

An overhead power cable with a clearance of 159 feet crosses the St. Johns River 2.5 miles above the highway bridge.

Along the southern shore of the St. Johns River, about 4.5 miles above Palatka between **San Mateo** and **Edgewater,** submerged piling of old piers are a menace to inshore navigation. Keep at least 150 yards off this shore.

Dunns Creek, 6.5 miles above Palatka, is the approach to Crescent Lake, and is used by pleasure and fishing boats. The controlling depth to the lake, a distance of 7.5 miles, was 4 feet in 1963. Northeast storms raise the height of water in the creek. Some of the bends in the creek are sharp.

From St. Johns River the creek should be entered from a point northeast of its mouth, passing about 50 yards off the fish traps on the east side of the entrance. The eastern entrance of **Polly Creek** lies just to the west of the mouth of Dunns Creek, and care should be taken not to confuse the two.

Murphy Creek (Cross Creek) crosses Dunns Creek 0.5 mile inside the entrance. The easterly section of the creek is obstructed by a row of piling in Dunns Creek.

U.S. Route 17 highway bridge crossing Dunns Creek, 0.8 mile above the mouth, has a swing span with a clearance of 11 feet. (See **117.245 (h) (25),** chapter 2, for drawbridge regulations.) The span is hand operated and moves slowly. Pass through either opening, though the southwest side has a deeper channel. An overhead cable at the bridge has a clearance of 70 feet. Boats may land on either bank at the bridge. An overhead telephone cable with a clearance of 55 feet crosses at **Monroe Landing,** 3.8 miles above the mouth.

Crescent Lake is about 11 miles long and has a maximum width of about 2 miles. The general depths in 1963 were between 8 and 13 feet, gradually shoaling toward shore. There are no periodic tides in the lake; the range of tide in Dunns Creek becomes zero near its end. Sudden squalls in the lake cause a chop dangerous to small boats. In the center of the lake, the bottom is soft mud. Near the shore, the bottom changes to hard sand. Large patches of hyacinth drift about the lake with the changing wind. The lake appears to be free of sunken logs, but when navigating near the shore a close watch should be maintained for broken-off piling and sunken logs. On the west side of the lake, between Dunns Creek and Crescent City, are several fishing camps where gasoline can be obtained.

Crescent City is on the west side of the lake about 6.5 miles from the north end. There are a

municipal pier and a number of private piers, some of which are in ruins. The municipal pier had 10 feet alongside in 1963.

In 1963, a draft of 5 feet could be taken into and for a distance of 5 miles up **Haw Creek** at the head of Crescent Lake. Above this point navigation is obstructed by trees and logs. About 3 miles above the mouth is the hulk of a gunboat sunk during the Civil War.

Dead Lake is about one mile long and 0.5 mile wide at the head of Crescent Lake and, in 1963, had a general depth of 8 feet in the center. A daybeacon marks the entrance to the lake. St. Johns Park and the ruins of a dock are on the northeast shore. Considerable hyacinths are found at times in the lake.

Chart 11495 (687).-There are many fishing camps, resorts, and small marinas along the St. Johns River as far as Lake George; most have gasoline pumps, and some have moorage and other facilities. A recreation map, showing the various facilities, may be obtained from the Putnam County Chamber of Commerce, Box 550, Palatka, Fla. 32077.

At **Buffalo Bluff,** 9.8 miles above Palatka, the St. Johns River is crossed by the Seaboard Coast Line Railroad bridge which has a bascule span with a clearance of 7 feet.

The entrance to the **Cross Florida Barge Canal** is on the west side of the St.Johns River 2.4 miles southward of the railroad bridge at Buffalo Bluff. The canal, with an indefinite completion date, will be primarily for commercial barge traffic, but will also be open to pleasure and fishing boats. It will extend from the St. Johns River for 93 miles to the Gulf of Mexico at a point about 77 miles northward of Tampa Bay, in the vicinity of Yankeetown. The canal has a Federal project depth of 12 feet and width of 150 feet, and will have five navigation locks.

In December 1968, the **Henry Holland Buckman Lock (St. Johns Lock)** and **Rodman Dam** were completed, and the lock was open for use; it is the easternmost lock and is about 1.5 miles westward of the canal entrance from the St. Johns River. The lock is 84 feet wide and 600 feet long, has a depth of 14 feet over the gate sills, and a lockage time of 15 to 20 minutes; it is operated from 0800 to 1700 daily until the entire barge canal is completed. Traffic lights are in operation at both ends of the lock. (See **207.160,** chapter 2, for regulations.) Rodman Dam, across the Oklawaha River about 8 miles above its junction with the St. Johns River, blocks navigation of the Oklawaha River above the dam, as there is no lock; the upper Oklawaha River is reached through the eastern entrance of the barge canal from the St. Johns River, through Henry Holland Buckman Lock thence through the pool formed by Rodman Dam.

In 1969, the canal had been completed from the St. Johns River to the lock and for about 4.7 miles westward of the lock, where it enters Rodman Pool. This completed section of the canal is marked with aids to navigation; it is crossed about 1.6 miles westward of Henry Holland Buckman Lock by State Route 19 fixed highway bridge with a clearance of 69 feet; an overhead cable west of the bridge has a clearance of 89 feet. In traversing Rodman Pool to the upper Oklawaha River, prior to completion of the dredged barge canal, it is advisable to follow the course of the Oklawaha River bed through the pool, which is marked by aids to navigation installed by the Corps of Engineers; the markers, on iron pipes, are red on the right side of the river and green on the left side when going down the lake (away from Henry Holland Buckman Lock). Caution should be exercised, since numerous floating obstructions will be in the pool for many months before they can be removed by the Corps of Engineers. The Rodman Pool extends about 13 miles to the site of the **Eureka Lock and Dam,** which is under construction, but which has a navigation bypass; boats of less than 4-foot draft can continue up the Oklawaha River from Eureka Lock and Dam to the junction with **Silver Springs Run,** a distance of about 17 miles; navigation of the river from Silver Springs Run to **Moss Bluff Lock and Dam,** about 12 miles, and from Moss Bluff Lock to **Lake Griffin,** about 8 miles, may not be feasible at times due to low water. Navigation regulations for the Moss Bluff Lock and Dam are given in **207.169,** chapter 2.

Information on the pool level above Moss Bluff Dam is given in **207.170,** chapter 2. State Route 316 fixed highway bridge was under construction across the barge canal and Oklawaha River in 1969, about a mile above Eureka Dam; the design clearance at the canal is 65 feet. The minimum clearances of the several highway swing bridges across the Oklawaha River above Eureka Dam are 1 foot vertical and 34 feet horizontal. (See **117.434,** chapter 2, for drawbridge regulations.) For current and complete information on navigation of the Cross Florida Barge Canal and the Oklawaha River, contact the Corps of Engineers, 400 West Bay Street, Jacksonville (telephone 791-2236).

At the settlement of **Saratoga,** on the east side of the St. Johns River 2.3 miles southward of the Cross Florida Barge Canal entrance, there is a small wharf with clock faces on the cupola of the shelter roof. There is a depth of about 12 feet at the end of the wharf.

A marine resort is on the east side of the river 0.9 mile southeastward of the charted cupola at Saratoga. There is a long landing and float here for moorage of about 100 boats, with reported depths of 8 feet. Gasoline and oil, diesel fuel, fresh water, electricity, ice, a motel, and a restaurant are available.

Welaka is a town on the east side of the St. Johns River, 18 miles above Palatka and 66 miles south of Jacksonville. There are several fishing camp landings, with depths of 12 to 17 feet along-

side, where gasoline, water, ice, and some marine supplies can be obtained. A marine railway can haul out boats up to 35 feet for general repairs. Provisions are available.

Oklawaha River has its source in the system of large lakes in the central part of the peninsula of Florida and flows in a general northerly direction, then eastward, emptying into the St. Johns River 19 miles south of Palatka. Do not confuse the entrance of **Bear Creek** to the southward with the mouth of the river. The river is navigable for about 8 miles above the mouth to Rodman Dam; this is the head of navigation, as the dam has no lock. The upper Oklawaha River and Rodman pool are reached from the St. Johns River through the Cross Florida Barge Canal. (See the preceding description of that waterway.)

The depths and the speed of the downstream current in Oklawaha River below Rodman Dam are uncertain and will vary with the amount of water discharged from the dam's spillway. A depth of 4 feet can probably be taken to the dam. The river is extremely winding and is obstructed by shoals; snags and hyacinths may be encountered. State Route 19 fixed bridge crosses the river about 2.5 miles above the mouth with a clearance of 34 feet at low water stage.

A ferry consisting of a tug and barge crosses St. Johns River 4.2 miles south of Welaka just below Mt. Royal. An overhead power cable with a clearance of 65 feet crosses the river at this point. A hotel and a good wharf are at **Fort Gates,** 5.3 miles south of Welaka. There is a depth of about 10 feet alongside. Gasoline can be obtained at several fishing camps along the river.

Georgetown is a small town on the east bank of St. Johns River at the north end of Lake George, 8 miles south of Welaka. A ferry consisting of a tug and barge crosses the river between the town and **Drayton Island.**

Lake George, the first of the larger lakes on St. Johns River 75 miles south of Jacksonville, is about 10 miles long and 5.5 miles wide. The bottom is fairly uniform with depths of 8 to 12 feet in the center, shoaling rather abruptly near the shores. The improved channel, marked by a **347°** lighted range at the north end and a **167°** lighted range at the south end, lights, and daybeacons, cuts through the middle of the lake. In strong northerly and southerly winds the water becomes very rough. Small patches of hyacinth drift about the lake with the changing winds. Numerous old piling are found near the lake shore in 2 to 8 feet of water. The creeks emptying into the lake are shoal. A **naval bombing area** is in the eastern part of the lake; limits and regulations are given in **204.82,** chapter 2.

Astor is a small village 4.5 miles south of **Zinder Point** at the south end of Lake George. State Route 40 highway bridge, across the St. Johns River here, has a swing span with a clearance of 4 feet. The nearby overhead power cable has a clearance of 50 feet.

There are good overnight accommodations here, on both sides of the river just south of the bridge. There are restaurants and motels with landings, and gasoline is pumped from several fuel piers. There are reported depths of 7 to 13 feet at the piers.

Chart 11495 (688).-The main channel of St. Johns River flows through the northwest portion of **Lake Dexter,** 92 miles south of Jacksonville. This very shallow lake is 3.7 miles long and about 0.9 mile in its widest part. In 1963, a draft of 4 feet could be carried eastward through Lake Dexter, **Tick Island Creek, Lake Woodruff, Spring Garden Creek,** and the northern portion of **Spring Garden Lake** to **De Leon Springs.** The channel and aids to navigation are privately maintained. De Leon Springs is a privately owned tourist attraction and is one of the larger freshwater springs in Florida.

On the St. Johns River 14.6 miles south of **Dexter Point,** at **Crows Bluff,** the river is crossed by State Route 44 highway bridge which has a bascule span with a clearance of 10 feet at the center. An overhead power cable with a clearance of 83 feet crosses the river 0.3 mile north of the bridge. Just north of the bridge is a small park with a boat basin, small piers, and a launching ramp. In 1963, there was a general depth of 7 feet in the basin. Water can be obtained at the park. Gasoline may be obtained at a landing just south of the bridge, which had a depth of 10 feet alongside in 1963.

A marina, 1.4 miles south of Crows Bluff, has gasoline, water, ice, electricity, restrooms, showers, a motel, limited marine hardware, provisions, and a launching ramp. There is a 1-ton lift; hull and engine repairs can be made. There are reported depths of 6 to 12 feet alongside the bulkhead.

Lake Beresford is a small lake, 2.2 miles long north and south and 0.5 mile wide, on the east side of the St. Johns River, 107 miles south of Jacksonville. On the west side of the lake are a yacht club and several boat landings. Gasoline is available at these landings. There is a boat works where a marine railway can haul out boats up to 35 feet for hull and engine repairs. Marine supplies are available at the boat works, which has a 4-ton marine lift. There is berthage for 32 boats with reported depths of 5 to 7 feet alongside; wet and covered storage, electricity, and water are available. **Beresford** is a small town and landing near the north end of the lake. In 1963, the controlling depth was 6 feet from the lake entrance to the dock, which had 4 to 6 feet alongside.

Wekiva River, 115 miles south of Jacksonville, had a controlling depth of 5 feet in 1963 for a distance of about 3 miles above the mouth; above this point the river is little used and is obstructed by trees, logs, and hyacinth. The entrance is difficult to distinguish.

The improved channel of St. Johns River enters **Lake Monroe** 120 miles south of Jacksonville. Near the west end of the lake the river is crossed by three bridges. The Seaboard Coast Line Railroad bascule span and the U.S. Route 17 highway swing span have a minimum clearance of 7 feet. The overhead power cables below and above these bridges have a minimum clearance of 49 feet. On the north side of the river just east of the highway bridge is the small dredged basin of a State Park with depths of about 11 feet. Temporary moorage is available along the bulkheaded north side of the basin, but there are no facilities. The Interstate Route 4 fixed bridge, nearest the lake, has a clearance of 45 feet.

Enterprise is a town on the north shore of Lake Monroe. A channel, marked by lights and daybeacons, leads to the wharf of a powerplant west of the town; the centerline controlling depth was 7½ feet in September 1972.

Sanford, 123 miles south of Jacksonville, is an important city and railroad center on the south side of Lake Monroe in the heart of the celery district. Commercial barge traffic consists of petroleum products from Jacksonville; there are three oil company receiving piers westward of the yacht harbor. The modern well-equipped yacht harbor has two fueling stations which pump gasoline and diesel fuel, and ice, water, electricity, and other supplies and services are available. A large motel is adjacent to the harbor. A mobile hoist can haul out boats up to 50 feet or 20 tons for complete repairs. Depths are reported to be 6 feet. Another small-craft facility available in the Sanford area is at a boatworks just off the St. Johns River about 3 miles eastward of the city; the facility is on the south bank of **Indian Mound Slough,** just northwestward of the highway bridge at 28°48′06″N., 81°12′49″W. Freshwater, gasoline, diesel fuel, ice, and electricity are available here. Boats 75 feet long can use the docks and moorings. The marine railway is capable of hauling out boats 55 feet long. Hull and engine repairs can be made. A wharf 200 feet long provides covered storage for over 50 boats up to 60 feet in length. A depth of about 8 feet can be taken to the railway.

St. Johns River above Sanford.–The route from Lake Monroe to Lake Harney, a distance of 15 miles, is marked by numerous markers which have not been maintained since 1940. Navigation is not difficult except during periods of high water when the banks are flooded, at which time a local pilot should be taken. A Federal project provides for a channel 5 feet deep between the two lakes. In May 1973, the controlling depth was 1 foot.

State Route 415 highway bridge crossing the St. Johns River, 3 miles east of Sanford, has a hand-operated swing span with a clearance of 4 feet. (See **117.430 (a),** chapter 2, for drawbridge regulations.) An overhead power cable at the bridge has a clearance of 69 feet.

At the entrance to **Lake Jessup,** 6 miles east of Sanford, State Route 46 highway bridge crosses the channel entering the lake. It has a 47-foot fixed span with a clearance of 14 feet. A section of the old bridge just downstream extends 45 feet from the west shore and is used as a fishing pier. Lake Jessup is about 8.5 miles long with a greatest width of 2.2 miles. It is very shallow at the entrance and little used. General depths in the lake are 6 to 8 feet.

St. Johns River flows from **Lake Harney,** 140 miles south of Jacksonville. The lake is about 3.6 miles long with a greatest width of 2.2 miles. It is uniformly 6 to 7 feet deep except along the shores where it shoals. Boats do not generally go above the lake.

Above Lake Harney the St. Johns River continues generally southward through Lake Poinsett, Winder, Washington, Sawgrass, and Hellen Blazes, then into St. Johns Marshes.

10. ST. JOHNS RIVER TO MIAMI

This chapter describes the Florida coast southward from the St. Johns River (30°24'N., 81°24'W.) to Miami (25°46'N., 80°08'W.), and includes the deepwater ports at Port Canaveral, Fort Pierce, Port of Palm Beach, Port Everglades, and Miami. Information for offshore navigation is given first, followed by a detailed description of the coast, inlets, and seaports. The Intracoastal Waterway for this section of the coast is described in chapter 12.

Chart 11480 (1111).-The coast from St. Johns River to Cape Canaveral trends south-southeastward for 125 miles. Three inlets, St. Augustine, Matanzas, and Ponce de Leon indent the coast. From St. Johns River to Ponce de Leon Inlet the coast is bold in appearance, with an almost continuous range of sand dunes backed by woods. The section southward of Ponce de Leon Inlet for 25 miles is formed by a very narrow strip of lowland lying between the sea, and Indian River North, and Mosquito Lagoon. From seaward this coast shows a lowline of sand dunes partially covered by grass and scrub trees with distant woods showing over them. The only natural object distinctive in appearance is Turtle Mound, a green hillock about 10 miles south of Ponce de Leon Inlet. When seen from northward and eastward, it is quite conspicuous but is less marked when viewed from other directions. The woods in the vicinity of Cape Canaveral are farther back from the beach and are less distinct when seen from seaward. Many landmarks are available along this stretch of the coast that may be used by southbound vessels proceeding close inshore to avoid the Gulf Stream.

The depths from St. Johns River to Cape Canaveral are irregular. Depths of 5 to 7 fathoms are 1 mile offshore, while a depth of 3 fathoms is within 0.4 mile of the shore except off the entrances to St. Johns River, St. Augustine Inlet, Ponce de Leon Inlet, and from about 7 miles north of False Cape to Cape Canaveral.

A **179°-359° measured nautical mile** is just southward of the entrance to St. Johns River; the markers are located northward and southward of St. Johns Light. Shoal spots with depths of 33 to 38 feet over them are from 4 to 6 miles offshore and from 12 to 16 miles north-northeastward of St. Augustine Light. These shoals are about 8 miles long in a southeasterly direction and about 2.5 miles wide. A swash channel with depths of 40 to 50 feet is inside these shoals and about 2 miles from the beach.

Off Ponce de Leon Inlet 10 fathoms will be found within 2 miles of the beach. A wreck with 35 feet over it, a fish haven marked by buoys, and two shoal spots with depths of 37 to 39 feet are 5 to 7 miles north-northeastward of Ponce de Leon Inlet and from 3.5 to 5.5 miles off the beach. Going southward the 10-fathom curve gradually works offshore to a distance of 10 miles off False Cape. From about 7 miles north of False Cape to Cape Canaveral there are dangerous shoals.

Chart 11460 (1112).-From Cape Canaveral to Fort Pierce Inlet the coast trends generally south-southeastward for 62 miles and is broken only by Sebastian Inlet. The inlet is a narrow dredged channel, not distinguishable from any distance offshore except by the sand spoil bank on the north side which is bare and a little higher than other sand dunes in the vicinity. This section of the coast is formed almost entirely by a low, narrow strip of sand, covered with vegetation, which lies at a distance of 1 to 2 miles from the mainland, from which it is separated by the shallow waters of Banana and Indian Rivers, a part of the Intracoastal Waterway. From seaward the coast shows a line of sand dunes partly covered with grass and scrub palmetto. At several places buildings show prominently from seaward. In the background the heavy woods on the mainland may be seen. Shoals extend 10 miles offshore with a least depth of 29 feet at Bethel Shoal, 28.5 miles southward of Cape Canaveral Light.

From Fort Pierce Inlet to Lake Worth Inlet, the coast trends generally south-southeastward for 43 miles and is broken by St. Lucie and Jupiter Inlets. This section of the coast is formed by a low, narrow strip of sand, covered with vegetation, and separated from the mainland by the shallow waters of Indian River and by the Intracoastal Waterway connection between the Indian River and Lake Worth. From seaward the coast shows a line of sand dunes partly covered with grass and scrub palmetto. In the background the heavy woods on the mainland may be seen. Buildings show prominently from seaward.

From Lake Worth Inlet the general trend of the coast is south for 60 miles to the Miami Harbor entrance. The coastline is broken by Port Everglades, several unimportant inlets, Bakers Haulover Inlet, and the entrance to Miami Harbor. It is formed almost entirely by a low sand beach covered with grass and scrub palmetto, back of which it is wooded. Conspicuous from seaward are the buildings and piers at Palm Beach, Hillsboro Inlet Light, and the large buildings and tanks along the beach from Palm Beach southward, especially at Fort Lauderdale, Hollywood, Miami Beach, and Miami.

This section of the coast is also fairly bold, and the 20-fathom curve runs parallel to the beach at a distance of about 2 miles until in the vicinity of the Miami Harbor entrance where the curve of the shore becomes south-southwestward and the 20-fathom curve is about 4 miles offshore. Between Port Everglades and the Miami Harbor entrance shoaling is rapid, depths of 6 to 8 fathoms being found in places 1.5 miles from the beach.

Chart 11488 (1243).-The coast between St. Johns River and St. Augustine Inlet is straight with the 5-fathom curve about 0.5 mile offshore except at the entrances. Offshore shoals along this route have been described previously.

The first 10 miles south of St. Johns River are marked by the water tanks at most of the beach resorts. Buildings and an amusement park at **Jacksonville Beach,** about 6 miles south of the river entrance, are very prominent. Otherwise the coast is unmarked except for St. Johns Light and St. Augustine Light.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Charts 11488 (1243), 11485 (843-SC).-St. Augustine Inlet is 30 miles south of the St. Johns River entrance. **St. Augustine,** the oldest city in the United States and a popular winter resort with several fine hotels, is 2 miles inside the entrance.

Prominent features.-St. Augustine Light (29°53.1'N., 81°17.3'W.), 161 feet above the water, is shown from a conical tower with a black and white spirally banded shaft on the north end of **Anastasia Island,** 1.5 miles south of the entrance to St. Augustine Inlet.

Other prominent features are an elevated water tank about 250 yards southeast of the light, a cupola on the south end of a large building, a church dome, a stack, and several tanks in the city, and a radio tower in the northern part of the city. **Castillo de San Marcos** may be seen after entering the inlet.

Channels.-Shoals with depths of 4 feet or less form across the entrance to St. Augustine Inlet, but a controlling depth of about 10 feet is available with local knowledge to the facilities at St. Augustine. A lighted whistle buoy marks the approach, and buoys mark the channel. The entrance channel is subject to frequent change in depth and direction due to current and storm action. Dangerous and shifting shoals extend 1 mile seaward. The entrance buoys are moved with changing conditions.

Anchorages.-There is good anchorage in the Matanzas River at St. Augustine both below and above the bridge. This anchorage, however, is not used as a harbor refuge because during strong northeasterly and northwesterly winds the sea makes the bar impassable even for small vessels.

Routes.-The shore should be given a berth of at least 2 miles when approaching St. Augustine Inlet in order to stay outside of the outer sea buoy. No strangers should attempt to enter without a pilot as the channel shifts frequently.

Tides.-The mean range of tide is 4.5 feet, and high water occurs about 20 minutes later than at Mayport.

Weather.-The moderating influence of the Atlantic Ocean on maximum summer temperatures and minimum winter temperatures is pronounced along the coast, but diminishes a few miles inland. The mean daily maximum temperature on the beach is about 1°F lower in winter and about 2.5°F lower in summer than in the city. Temperatures reach 90°F or higher at the beach only a little more than half as many days as in the city.

The rainy season runs from the middle of June through the middle of October when about one half of the 52-inch annual total is recorded. During the summer, precipitation is usually in form of frequent afternoon and early evening thundershowers, which also help cool the air.

Tropical cyclones that have affected this area have been noted more for their 8 to 10 inches of rain than for destructive winds which are uncommon.

Prevailing wind directions are northerly in winter and southerly in summer, with a high frequency of easterly components that reflect a sea breeze on most warm days. Wind velocities generally range from 10 to 17 knots during the day and drop below 9 knots at night.

Storm warning signals are displayed. (See chart.)

Pilots.-All vessels including yachts not having local knowledge of the channel are advised to take a local pilot both entering and leaving the inlet. Pilots are available by prior arrangement with the dockmaster at the city yacht pier.

Harbor regulations.-A dockmaster controls moorage at the city yacht pier. The city has a harbormaster, who can be contacted through the dockmaster.

Wharves.-A number of small private landings are on the east side of the city, north and south of the bridge. The city yacht pier is about 100 yards south of Route A1A highway bascule bridge which crosses the Matanzas River opposite the center of the city. The facilities are excellent, though the space is limited. There are four berths for transient boats of up to 60 feet; the depths in these slips were reported by the dockmaster in 1969 to be 5 feet. Moorage is also available at the long fueling float at the head of the pier.

Supplies.-Gasoline, diesel fuel, electricity, and water are obtainable at the city yacht pier. Provisions are available at the many stores in the city.

Repairs.-The repair yards are on San Sebastian River.

The Intracoastal Waterway enters the St. Augustine Inlet from the north through Tolomato River and continues southward through Matanzas

River. Clearance of the Bridge of Lions (Route A1A) crossing the Matanzas River at St. Augustine is given in chapter 12.

San Sebastian River flows past the west side of the city of St. Augustine and empties into the Matanzas River 1.4 miles south of the Route A1A highway bridge. In November 1968, the controlling depth in the channel, marked by daybeacons, was 7½ feet to Kings Street Bridge. In stormy southeasterly weather small boats may find a good haven in the river. The overhead power cable crossing the river about 300 yards south of the Kings Street Bridge has a clearance of 66 feet.

An extensive shrimp industry is conducted along the wharves in the upper part of the river, being supplied by seagoing shrimp boats during the shrimp season. Several small shipyards and shrimp boatbuilding yards are along the river. Shrimp boats up to 60 feet in length can be hauled out for general repairs. Supplies and fuel may be obtained at the wharves.

Chart 11486 (1244).-From St. Augustine Inlet to Ponce de Leon Inlet the coast continues straight, broken only by Matanzas Inlet. The 5-fathom curve is within 0.5 mile of the shore except off St. Augustine Inlet and Matanzas Inlet.

An **oceanic spring** is 8.2 miles southeastward of St. Augustine Light and 2.4 miles east of **Crescent Beach.** The location of the spring can be easily detected by the appearance of the water; noticeable swirls, similar to those in a swiftly running stream, can be seen at a distance of about a mile. At times, especially in rough weather, there is a marked disturbance of the water and yellowish color trails off to the northeastward. In choppy weather, a slick is the most noticeable feature. In fact, it has all the appearances of a shoal or reef.

A closer view shows a slick swirl with a slight overfall, the center of the swirl moving about 100 feet, first to the eastward and then to the westward, and a noticeable streak of current to the northeastward. The swirls and overfalls vary rapidly in intensity, as though large bubbles or intermittent volumes of water were being emitted. A boat will be thrown out of the swirl so that it is difficult to hold it in position.

A strong odor, quite similar to the smell of water from the various sulfur springs of Florida, is noticeable, and under favorable circumstances can easily be detected 2 miles away.

Matanzas Inlet (see chart 11483 (843-SC)) is 11 miles southward of St. Augustine Light. It affords an outlet for Matanzas River, which extends northward to St. Augustine and southward, following the coast for a distance of 8 or 10 miles to **Graham Swamp.** The inlet is obstructed by a shifting bar and is no longer used by boats of any type. Breakers extend all the way across the entrance. A water tank is prominent on the south side of the entrance at **Summer Haven.** The Intracoastal Waterway passes through a land cut of the Matanzas River just inside the entrance.

State Route A1A highway bridge across the inlet has a 41-foot fixed span with a clearance of 10 feet. An overhead power cable crossing on the west side of the bridge has a clearance of 32 feet. **Fort Matanzas National Monument** is about a mile northwestward of the inlet.

At **Marineland,** 13.6 miles southward of St. Augustine Light, is a conspicuous building housing an oceanarium.

Flagler Beach is 26.5 miles southward of St. Augustine Light. The hotel and ocean pier are good landmarks. The T-shaped pier extending offshore is 650 feet long and 20 feet wide.

Daytona Beach is a popular winter resort about 42 miles southward of St. Augustine Light. The buildings, water tanks, and radio towers are visible from seaward. The large recreation pier on the oceanfront is a prominent landmark for passing vessels. Facilities are described with the Intracoastal Waterway in chapter 12.

Chart 11484 (1245).-From Ponce de Leon Inlet to False Cape the coast is straight. The 5-fathom curve is about 0.5 mile offshore for a distance of 24 miles. Beyond this distance dangerous shoals will be found up to 15 miles offshore.

Ponce de Leon Inlet (see chart 11485 (843-SC)) is 53 miles southward of St. Augustine Light and 41 miles northwestward of Cape Canaveral Light. It is used by fishing parties, and shrimp and commercial fishermen bound for New Smyrna Beach or Daytona Beach, and an occasional stranger entering for an anchorage.

Ponce de Leon Inlet Approach Light (29°03.9'N., 80°55.0'W.), 70 feet above the water, is shown from a red and white diamond-shaped daymark on a white tower with a white house on the south side of the entrance to the inlet.

The entrance to the inlet is obstructed by shifting shoals which form a bar extending about 0.7 mile seaward. In July 1967, the controlling depths were 7 feet in the entrance and through the inlet, thence 8 feet in the unmarked natural channel through Indian River North from the inlet southward to the Intracoastal Waterway; and 10 feet in the unmarked natural channel leading northward through the Halifax River from the inlet to the Intracoastal Waterway. With a continued west wind there is sometimes very little water anywhere on the bar and breakers extend all the way across. Local knowledge is necessary for entering and a stranger should attempt it only in an emergency or when the sea is smooth. The entrance channel moves with the season; it leads north in the winter and south in the summer. The current is very strong. The mean range of tide is 2.3 feet; high water occurs about the same time as at Mayport. The entrance channel is marked by buoys which are frequently shifted in position with changing conditions.

Ponce de Leon Inlet is being improved under a Federal project which provides for the construc-

tion of twin jetties; for a 15-foot channel across the bar, a 12-foot channel through the inlet and southward in Indian River North to the Intracoastal Waterway, and a 7-foot channel leading from the inlet northward in the Halifax River to the Intracoastal Waterway; and for a weir and impoundment basin to reduce the silting in the inlet. In 1969, the jetties were completed and dredging was to be completed by March 1970.

A Coast Guard station is on the south side of the entrance to Ponce de Leon Inlet. In 1963, the controlling depth in the channel from the Intracoastal Waterway to the station was 9½ feet. **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service. **Contract physicians' offices** of the U.S. Public Health Service are in Daytona Beach and New Smyrna Beach. (See appendix for addresses.) Supply and repair facilities inside the inlet are described in chapter 12.

The Intracoastal Waterway is just inside the entrance to Ponce de Leon Inlet, passing through Halifax River from the north and Indian River North from the south.

Chart 11484 (1245).-About 10 miles southward of Ponce de Leon Inlet is **Turtle Mound,** a prominent hill 50 feet high. It is under the protection of the Florida State Historical Society. The original Indian name was **Mount of Surruque.** It was charted on Florida maps in 1564. Spanish galleons stopped here for repairs, wood, and water.

Eldora is a fishing camp 11.5 miles southward of Ponce de Leon Inlet.

False Cape, about 7.5 miles northward of Cape Canaveral Light, is the name given to a small part of the coast which it resembles when seen from seaward.

The **John F. Kennedy Space Center** occupies most of the large land area between the ocean and the Indian River, from Mosquito Lagoon on the north to Port Canaveral on the south. The huge "moon port" building at the center, said to be the world's largest building, is visible far from shore. When closer in, other buildings and gantry towers at the cape are also conspicuous from all directions.

Trawlers or other vessels should exercise caution while dragging the ocean floor within a 25-mile radius of Cape Canaveral, Florida, since it is known that missile debris, some of which may contain unexploded ordnance, exists in the area.

Cape Canaveral (Cape Kennedy), where the coast makes a sharp bend westward, is low and sandy. The shore in the vicinity of the cape is constantly moving eastward. **Cape Canaveral Light** (28°27.6′N., 80°32.6′ W.), 137 feet above the water, is shown from a white and black horizontally banded conical tower 1 mile inshore from the cape. A radiobeacon is at the light.

A **Security Zone** has been established to include certain land and water areas at Port Canaveral-Cape Canaveral and adjacent areas at John F. Kennedy Space Center. Limits and regulations are given below:

All land, water, and land and water bounded by and within the perimeter commencing at the intersection of the Cape Canaveral Barge Canal and Banana River at position 28-24.55 N., 80-39.8 W., due west along the northern shoreline of the Barge Canal for thirteen hundred (1,300) yards, thence due north to position 28-28.7 N., 80-40.5 W., on Merritt Island, thence on an irregular line from this position to the eastern shoreline of the Indian River to a position thirteen hundred (1,300) yards south of NASA Causeway at position 28-30.9 N., 80-43.7 W. (the line from the Barge Canal to the eastern shoreline of the Indian River is marked by a three (3) strand barbed wire fence), thence north on the shoreline of the Indian River to the NASA Causeway at position 28-31.5 N., 80-43.8 W. The line will continue west on the southern shoreline of the NASA Causeway to NASA gate number three (3) (permanent) then north to the northern shoreline of NASA Causeway and east on the northern shoreline of the causeway back to the shoreline on Merritt Island at position 28-31.6 N., 80-43.7 W., thence northerly along the shoreline to position 28-36.3 N., 80-44.4 W., thence due north to State Highway No. 402 (Beach Road). Thence west on the south side of Beach Road to its junction with Titusville Road (formerly State Road No. 406), thence along the southern edge of Titusville Road to the intersection of Titusville Road and Kennedy Parkway (formerly State Road A1A) at position 28-41 N., 80-43.3 W., thence northerly along the eastern edge of Kennedy Parkway to the Haulover Canal; thence northeasterly along the southern edge of the Haulover Canal to the eastern entrance to the canal, thence due east to a point in the Atlantic Ocean three (3) miles offshore at position 28-44.7 N., 80-37.85 W., thence southerly along a line three (3) miles from the coast to wreck buoy "WR6", thence to Port Canaveral Channel Lighted Buoy "10", thence westerly along the northern edge of the Port Canaveral Channel to the northeast corner of the intersection of the Cape Canaveral Barge Canal and Intracoastal Waterway in the Banana River at position 28-24.6 N., 80-38.7 W., northerly along the east side of the Intracoastal Waterway to NASA Causeway East (Orsino Causeway), thence westerly along the southern shoreline of NASA Causeway East to the shoreline on Merritt Island at position 28-31.2 N., 80-37.4 W. thence south on the shoreline to the starting point.

The area designated herein shall be closed to all vessels and persons, except those vessels and persons authorized by Commander, 7th Coast Guard District, or Captain of the Port, Port Canaveral, Fla., whenever space vehicles are to be launched by the U.S. Government. Closure of the Security

Zone, or specified portions of it, will be as specified by Captain of the Port, Port Canaveral, in locally promulgated public announcements.

The closing of the area will be signified by the display of a red ball from a 90-foot pole near the shoreline at approximately 28-35 N., 80-34.6W., and from a 90-foot pole near the shoreline at approximately 28-25.3 N., 80-35 W.

All persons and vessels are directed to remain outside of the closed area when the aforesaid signals are displayed. This order will be enforced by the Captain of the Port, Port Canaveral, Fla, and the U.S. Coast Guard personnel and vessels under his command. The aid of other Federal, State, municipal, and private agencies may be enlisted under the authority of the Captain of the Port in the enforcement of this order.

Penalties for violation of the above order: Section 2, Title II of the Act of June 15, 1917, as amended, 50 U.S.C. 192, provides as follows:

"If any owner, agent, master, officer, or person in charge, or member of the crew of any such vessel fails to comply with any regulations or rule issued or order given under the provisions of the title, or obstructs or interferes with the exercise of any power conferred by this title he shall be punished by imprisonment for not more than 10 years and may, at the discretion of the court, be fined not more than $10,000."

Broken ground and shoals extend 13 miles north and northeastward from Cape Canaveral. The outer shoals consisting of **Hetzel Shoal,Ohio Shoal,** and **The Bull** have a least depth of 11 feet. The inner shoals consisting of **Chester Shoal** and **Southeast Shoal** have depths of 2 to 18 feet. A lighted whistle buoy is 2.5 miles northeastward of Hetzel Shoal, and lighted bell buoys are off the southern end of Southeast Shoal. In a heavy sea the shoals are marked by breakers, but with a smooth sea there is nothing to indicate them except their relative positions to Cape Canaveral Light and the lighted buoys. Only small light-draft vessels should pass inside the outer shoals.

Several wrecks are eastward of Cape Canaveral within 13 miles of the shore. They have been cleared by a wire drag to a least depth of 43 feet.

The effect of the Gulf Stream may be expected well in on the shoals, and this should be kept in mind in approaching the cape from southward, as a vessel will generally overrun her log. In approaching the cape, stay in at least 15 fathoms from southward and at least 13 fathoms from northward, to avoid the shoals. Vessels are advised to use great care when navigating in the vicinity of the shoals off Cape Canaveral.

A **danger zone** for a missile testing area extends 3 miles offshore from False Cape to the entrance of Port Canaveral southwestward of Cape Canaveral; limits and regulations are given in **204.85,** chapter 2. **Canaveral Bight,** on the south side of the cape, is in the danger zone.

Chart 11478 (456).-Port Canaveral (Canaveral Harbor) is 4 miles southwest of Cape Canaveral Light and 150 miles south of the entrance to the St. Johns River. The town of **Cape Canaveral** is just southward of the port. The principal receipts into the harbor are petroleum products, cement, building materials, and newsprint. The shrimp and fishing fleet operates in and out of the harbor in season. A Coast Guard station is on the south side of the entrance channel, 0.6 mile west of the outer end of the south jetty.

Channels.-A Federal project provides for an entrance channel 37 feet deep and an inner channel leading to the turning basin 35 feet deep. The channel is maintained at or near project depths. (See Notice to Mariners and latest edition of chart for controlling depths.) The entrance to the harbor is protected by jetties. The approach channel is marked by a **310°** lighted range and lighted buoys; the entrance channel between the jetties is marked by a **270°** lighted range, a light, and lighted and unlighted buoys. Canaveral Barge Canal leads westward to the Intracoastal Waterway from the westerly end of the turning basin. (See chart 11484 (1245) and chapter 12.)

Dangers.-A **restricted area** has been designated around the Navy pier; limits and regulations are given in **207.171,** chapter 2.

Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. coastwise vessels who have on board a pilot licensed by the Federal Government. A pilot will board about 1 mile south of Southeast Outer Shoal Lighted Bell Buoy 2 (28°22.8'N., 80°25.4'W.). The pilot boat is equipped with VHF-FM channels 12 (156.60 MHz), 13 (156.65 MHz), and 16 (156.80 MHz), but no continuous radio watch is maintained. Advance notice of at least 24 hours should be given. In January 1974, pilots were accepting vessel traffic with a draft of not over 32 feet 6 inches at high water only.

Towage.-Two 1,800 hp tugs are stationed at the port; most ships use the tugs for docking and undocking.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Customs and **Agriculture** officials are stationed at the port. **Quarantine** and **Immigration** duties are either handled by these personnel or by officials sent from West Palm Beach. The harbor is a customs port of entry. A **contract physician's office** of the U.S. Public Health Service is in Cocoa Beach just south of the port. (See appendix for address.)

Harbor regulations.-The Port Director of the Canaveral Port Authority acts as harbormaster; a copy of the port tariff is available from his office, which is about 0.2 mile south of the main Port Authority wharf.

Wharves.-There are three public wharves in the harbor on the south side of the turning basin and along the barge channel: The 1,060-foot Port Authority wharf with reported 30-foot depths, a 400-foot wharf with reported 15-foot depths on the barge channel for barges and shallow-draft vessels, and 2,000 feet of docking facilities for use of the fishing fleet and small craft. Two dolphin-type tanker berths with reported 32-foot depths are for handling bulk products; one handles petroleum products and bulk cement, and the other handles petroleum products only. The wharves and piers on the north side of the harbor are the property of the Federal Government and are not used by private vessels.

Supplies.-Gasoline, diesel fuel, bunker C, water, and ice are available.

Communications.-Good State highways connect to U.S. Route 1 on the mainland.

Chart 11476 (1246).- From southward of the shoals at Cape Canaveral to Bethel Shoal, a distance of about 43 miles, the shore is straight. The 5-fathom curve is from 0.3 to 1 mile offshore along this section of the coast.

Two large water tanks are prominent about 4.5 miles southward of **Cocoa Beach,** and 13 miles southward of Cape Canaveral Light. **Indian Harbor Beach** is marked by a water tank. **Indialantic** is marked by a prominent white casino and a large water tank.

Sebastian Inlet (see chart 11472 (845-SC)) is 36.5 miles southward of Cape Canaveral Light. In 1963, there was a controlling depth of 5 feet from the Intracoastal Waterway through the dredged channel of the inside bar, thence 8 feet to the eastern entrance. It was reported by local fishermen that 12 feet could be taken across the bar in smooth seas. The western entrance is marked by private aids. The entrance is protected by a north jetty, marked by a privately maintained light, extending 600 feet from shore and a south jetty extending 500 feet from shore. A steel bulkhead leads in a west-northwest direction for about 1,500 yards from the south side of the inlet into Indian River. The inlet is used by local fishermen and party boats.

Sebastian Inlet is dangerous and particularly hazardous to small boats not designed for the open seas. Persons using this inlet should be experienced boatmen and have local knowledge. It is reported that shoaling exists just north of the south jetty and for about 200 yards to the east of the south jetty. Shoaling also exists in the general area south of the small spoil island between the bridge and the Intracoastal Waterway. Shoals are gradually building up and shifting. Minimum depth in the inlet varies; the bottom is rocky in spots.

It is further reported that the velocity of the tidal currents reaches 10 knots, and turbulence exists between the bridge and the end of the jetties. Anchoring east of the bridge is extremely hazardous, particularly by the stern. Except during flat calms, breaking and confused seas exist off the mouth of the inlet and inside the inlet as far as the bridge. Conditions worsen with increasing seas or winds and on an ebb tide. Small boats departing the inlet on a flood or slack tide can find it impossible to return on an ebb tide. While the inlet conditions are generally worse during the winter months, hazardous conditions develop rapidly in the summer in squalls and on ebb tides.

Additional information on local existing conditions can be obtained by contacting the Fort Pierce Coast Guard Station (telephone: 305-464-6100) and asking for the Coast Guard Auxiliary telephone number. A fixed highway bridge, State Route A1A, crossing the inlet has a clearance of 37 feet.

Thomas Shoal, with a least depth of 26 feet over it, is 7 miles eastward of Sebastian Inlet. **Bethel Shoal,** with depths of 29 to 30 feet over it, is 17 miles southeastward of the inlet and 11 miles offshore. A lighted whistle buoy is northeast of the shoal area. A 23-foot shoal spot is about 2.5 miles north-northwestward of the buoy.

Chart 11474 (1247).-From Bethel Shoal to Jupiter Inlet, a distance of about 50 miles, shoal areas and wrecks are over 10 miles offshore.

The elevated water tank at **Riomar,** 11.5 miles northward of Fort Pierce Inlet, is prominent.

Indian River Shoal, with depths of 10 to 30 feet over it, is about 8 miles northward of Fort Pierce Inlet and extends for about 3 miles offshore.

Chart 11475 (582).-Fort Pierce Inlet is 62 miles southward of Cape Canaveral Light and 33 miles northward of Jupiter Inlet Light. Care must be exercised in entering due to the strong currents. In southeasterly weather with an ebb tidal current the entrance is rough.

Fort Pierce, on the west shore of the Indian River inside Fort Pierce Inlet, is the St. Lucie County Seat. The receipts into the harbor are aragonite (limestone) and produce from the Bahama Islands and the Dominican Republic; there are no exports.

Several fishing vessels operate in and out of the harbor. It is the distributing point for supplies to the surrounding country. The Intracoastal Waterway passes through the Indian River east of the city. (See chapter 12.)

A Coast Guard station is on the south side of Fort Pierce entrance channel, on the west side of the cove immediately westward of **Faber Point.**

Prominent features.-The lights on the radio tower and water tank south of Fort Pierce turning basin are visible well to seaward in clear weather; another water tank north of the city is prominent. A large pink and white house is on the beach near the inner end of the south jetty. A tank near the beach, 1 mile south of the entrance, is very prominent. A 210-foot meteorological tower and a white nuclear reactor dome, about 7.2 miles and 8.7 miles, respectively, south-southeastward of the

entrance, are also prominent. (See chart 11474 (1247).) The tower is marked by a fixed red light about halfway up the tower and a flashing red light on top. The dome is scheduled to be marked by aircraft warning lights when it is completed in 1974. In 1973, cranes surrounding the dome were marked by fixed and flashing red lights. **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Channels.-A Federal project provides for an entrance channel 27 feet deep, and an inner channel and turning basin 25 feet deep. Depths in the channel may vary considerably between dredging operations. (See Notice to Mariners and latest edition of chart for controlling depths.) Two rubblestone jetties with revetment extensions protect the entrance. The channel is marked with lighted ranges, and lighted and unlighted buoys.

Dangers.-There are a number of shoals and wrecks in the approaches to the harbor; most of them are marked. A fish haven, about 1.7 miles long and from 0.8 mile to 1.2 miles offshore, is several miles northward of the entrance.

Tides.-The mean range of tide is 2.6 feet at the jetties and 0.7 foot at the city dock.

Currents.-The tidal currents in the inlet have a velocity of about 3 knots. (For predictions see the Tidal Current Tables.) It has been reported that a strong current, about 5 knots, runs through the cut parallel with the channel, but, at the turn in the channel, extreme caution should be used as the current sets across the channel, flood to the south and ebb to the north. Across Indian River the currents run parallel with the channel, which parallels the causeway fill. At the western end of this fill, cross currents are sometimes encountered, especially where the channel crosses the Intracoastal Waterway. Currents in this section are influenced by the winds.

Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. coastwise vessels which have on board a pilot licensed by the Federal Government. The pilot will board at the sea buoy. Advance notice of at least 24 hours should be given, as there is no pilot station. The pilot's home telephone number is 305-461-5502.

Towage.-A 400 hp tug is always available at Fort Pierce.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)A **contract physician's office** of the U.S. Public Health Service is in Fort Pierce. (See appendix for address.)

Customs.-Fort Pierce is a customs station; officials come from West Palm Beach.

Harbor regulations.-The pilot is the harbormaster at Fort Pierce. Due to tricky currents in the turning basin, running of lines is compulsory for all vessels. The pilot boat will render this service. All vessels moving from one wharf to another shall have the harbormaster aboard. The pilot boat will assist in this movement.

Wharves.-The active facilities at Fort Pierce are privately owned; there are two piers and a dolphin berth, though cargo is handled only at the northern pier and at the breasting dolphins. The northern pier (27°27.5'N., 80°19.4' W.) is owned by the Indian River Refrigeration Terminal Co. and is 425 feet long on the north side, 320 feet long on the south side, and 178 feet wide; vessels moor on both sides of the pier, and at the face if their length is less than the pier's width. Depths of 25 feet were reported alongside the pier in 1969. The bulk aragonite-receiving berth of the Ocean Industries Co. is at four breasting dolphins in the dredged area north of the basin (27°27.8'N., 80°19.3'W.) ; depths of 15 feet were reported at this berth in 1969. The southern pier (27°27.4'N., 80°19.4'W.) and the heads of the slips on each side of the private pier are owned by the port authority; small vessels sometimes moor there.

Supplies of all kinds can be obtained at Fort Pierce.

Repairs.-There are no repair facilities for large vessels at Fort Pierce; seagoing ships may be drydocked at Port Everglades and Jacksonville.

Communications.-Fort Pierce is served by the Florida East Coast Railway, by U.S. Route 1, and by several State highways. The airport, which has scheduled passenger service, is 3 miles northwest of the town.

Small-craft facilities.-The municipal yacht basin, just south of **Moore Creek,** has an approach channel from the Intracoastal Waterway which is immediately south of the bridge and parallel to it, thence along the waterfront to the basin; the northern part of the channel is marked by privately maintained daybeacons. Extreme caution should be exercised as strong cross-currents exist. The overhead power cable crossing this channel has a clearance of 85 feet. In April 1969, the controlling depth in the channel and basin was 6 feet. Berths, gasoline, diesel fuel, ice, water, and electricity are available. A restaurant and overnight accommodations are nearby. The yacht basin is controlled by a dockmaster. A marina on the west side of the Indian River just south of the Causeway Island bridge has open berths for about 20 boats with reported depths of 5 feet. Gasoline, diesel fuel, ice, water, electricity, and most yacht services are available. A 30-ton marine railway here can haul out boats up to 60 feet for all types of repairs. The facilities of a yacht club are on the south side of the Fort Pierce entrance channel, immediately westward of Faber Point. There are about 80 open berths with reported depths of 5 feet. Gasoline, diesel fuel, fresh water, ice, and electricity are available; the clubhouse facilities are restricted to yacht club members only, but motels and restaurants are nearby. A dredged channel marked by daybeacons leads from the Intracoastal Waterway to **Taylor Creek.** In May 1969, the controlling depth was 6 feet almost to the railroad bridge.

Chart 11474 (1247).-For a distance of 13 miles southward of Fort Pierce Inlet, broken ground with 18 to 28 feet over it extends from 2.5 to 6 miles offshore.

Capron Shoal has a least depth of 18 feet over it about 3.6 miles southeastward of Fort Pierce Inlet. A buoy is 300 yards northeastward of the 18-foot spot.

Pierce Shoal, with 21 to 30 feet over it, lies about 2 miles offshore, and 6 to 8.5 miles southeastward of Fort Pierce Inlet.

St. Lucie Shoal, with 15 to 30 feet over it, lies from 3 to 6 miles offshore, and 22 to 26 miles northward of Jupiter Inlet Light. It is the principal danger in this area. The northern end of the shoal is marked by a lighted whistle buoy and an unlighted buoy is southeast of a 15-foot spot at the southern end.

Several wrecks are eastward of the broken ground within 10 miles of the shore. The wreck about 5 miles northeastward of St. Lucie Shoal has been cleared by a wire drag to a depth of 42 feet. It is marked by a lighted buoy. The unmarked **dangerous wreck** (27°20.2′ N., 80°04.5′ W.) about 3.7 miles eastward of St. Lucie Shoal is covered 23 feet.

The boiler section of a small wreck is 1.9 miles north of St. Lucie Inlet, about 200 yards offshore. This wreck has a least depth of 3 feet and is dangerous to small craft operating close inshore.

Gilbert Shoal, with 17 to 30 feet over it, is 1 to 1.5 miles offshore about 3 miles north of St. Lucie Inlet.

Charts 11474 (1247), 11472 (845-SC), 11428 (855-SC).-St. Lucie Inlet, forming the mouth of the St. Lucie River and the south end of the Indian River, lies 20 miles south of Fort Pierce Inlet and 13.5 miles north of Jupiter Inlet Light. The ruins of a jetty extend about 0.2 mile offshore on the north side of the inlet. A rock ledge lies across the inlet and extends southward from the east end of the jetty ruins for a distance of a little over a mile. Extensive sandbars are north of the inlet channel between the Intracoastal Waterway and the ruins of the north jetty. Spoil banks are reported to exist south of the inlet channel from South Point to the channel entrance. It is further reported that shoaling builds up across the channel from both the north and south sides. Depths in the channel vary.

St. Lucie Inlet is dangerous and particularly hazardous to small boats not designed to the open seas. Persons using the inlet should be experienced boatmen and have local knowledge.

It is reported that tidal currents reach a velocity of 7 knots. Currents continue to flow 2 hours after high and low tides. Entrance is easiest during slack water. The mean range of tides at the entrance is 2.6 feet.

The approach is marked by a lighted whistle buoy. The entrance buoys are not charted, as they are frequently moved to mark the best water. It is reported that after heavy storms, buoys may be off station due to dragging or to shifting channels.

It is further reported that ground swells can make inlet passage impossible for all craft. Breakers occur throughout the entire channel as seas, ground swells, and winds increase, particularly on an ebb tide.

While the inlet conditions are generally reported to be worse during winter, hazardous conditions develop rapidly during summer squalls.

Additional information on local existing conditions can be obtained by calling the Fort Pierce Coast Guard Station (telephone: 305-464-6100) and asking for the Coast Guard Auxiliary telephone number.

St. Lucie River enters the sea through St. Lucie Inlet and connects with the Gulf coast via the Okeechobee Waterway. A highway bridge crossing the river 3 miles above the junction with the Intracoastal Waterway has a bascule span with a clearance of 21 feet at the center. The Florida East Coast Railway bridge at Stuart has a bascule span with a clearance of 7 feet at center. The bridge is on automatic operation, normally left in an open position and closed upon the approach of trains. (See **117.436a,** chapter 2, for details of operation.) The twin bridges of State Route A1A, adjacent to the west, have bascule spans with a clearance of 14 feet at the center. The overhead power cable at the bridge has a clearance of 75 feet over the main channel. Opening signals for the drawbridges are given in **117.240,** chapter 2.

Cross currents at the entrance to St. Lucie River create a hazardous condition for vessels and barges making the short turn from the Intracoastal Waterway. Vessels should stay 100 yards southward of a line between lighted buoy 4 and daybeacon 6 to avoid hitting the hard ledge on the north side of the channel.

St. Lucie River has several branches of some commercial importance. These, with the main river, form an important center for yachting and fishing in the winter.

Manatee Pocket is a protected body of water about 1 mile long and 0.2 mile wide. It had a controlling depth of 4½ feet in 1963. The entrance is 0.6 mile west of the intersection of the St. Lucie River and the Intracoastal Waterway. The channel at the entrance is marked by daybeacons. Gasoline, diesel fuel, and freshwater can be obtained at any of several marine service stations. Small boats can obtain protection from tropical storms in Manatee Pocket. The holding bottom is good. Yachts can anchor anywhere for overnight stops.

Port Salerno, a small town at the head of Manatee Pocket, has a flower-packing plant and a marl plant, and is headquarters for a fishing fleet. There are several boatyards; the largest has two marine railways that can haul out vessels up to 60 feet for engine and general repairs. There is also a machine shop on the premises, and there are

depths of 4½ to 5 feet alongside the pier. There are two resorts at Port Salerno with good facilities for yachts. Depths of about 5 feet to the slips are reported. They have, collectively, about 100 berths, gasoline, diesel fuel, water, ice, electricity, toilets, showers, restaurants, motels, and recreation facilities; stores and laundry facilities are nearby.

Pilots for the St. Lucie Inlet can be obtained at Manatee Pocket.

At **Port Sewall,** 1.2 miles above the junction of St. Lucie River and the Intracoastal Waterway, there is a boatyard which has two marine railways and can haul out boats up to 48 feet in length. Hull and engine repairs can be made; a machine shop is on the premises. In 1963, a draft of 3½ feet could be carried to the boatyard and there were 3½ to 4½ feet alongside. Dockage, gasoline, electricity, restrooms, water, ice, and marine supplies are available. Charter boats also may be obtained.

Rio is a small real estate development on the north bank of St. Lucie River, 3.5 miles above **Sewall Point.** A dredged channel a mile west of Light 21 leads to a marina; the controlling depth in the channel was 7 feet in May 1969. There are about 58 berths with water and electricity, and gasoline, diesel fuel, ice, toilets, showers, some marine supplies, mail service, a restaurant, overnight accommodations, and recreation facilities are available. Another marina in the slip 0.2 mile westward has about 30 berths, gasoline, diesel fuel, water, ice, electricity, and toilets. There is a marine railway which can haul out boats of up to 40 feet; hull and gasoline-engine repairs can be obtained.

Stuart is a progressive city on the St. Lucie River, 5 miles above Sewall Point. It is the county seat of Martin County and is on the Florida East Coast Railway, U.S. Highway No.1, and the Okeechobee Waterway. The city has a hospital and is the distributing center to the surrounding area, which is noted for its winter vegetables, citrus and tropical fruits, poultry raising, ranching, commercial fishing, and flowers.

The municipal pier, on the east side of the river 200 yards south of the U.S. 1 twin bridges, has berthage for two or three boats; in 1963, there were depths of 9½ feet at the end and 6 to 9 feet on the sides of the pier. An oil pier on the west side of the river 500 yards north of the twin bridges pumps gasoline and diesel fuel, and water and limited moorage are available.

There is a small protected basin in **Frazier Creek,** 0.3 mile south of the bridges. Gasoline, water, ice, showers, restrooms, motel, some marine supplies, and dockage for 18 boats up to 23 feet are available at the marina. There is also a 1½-ton mobile lift. In 1963, the controlling depth was 5 feet from the waterway to the highway bridge about 0.1 mile above the mouth. The bridge has a 33-foot fixed span with a clearance of 6 feet. **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilots for the St. Lucie Inlet and connecting waterways can be obtained through the Stuart Chamber of Commerce.

St. Lucie River divides into two forks west of Stuart. The **North Fork** extends several miles in a north-northwest direction. It is about 0.75 mile wide with an even bottom of 10 to 12 feet in depth. The South Fork is described as part of the Okeechobee Waterway, chapter 12.

Chart 11474 (1247).-From St. Lucie Inlet to Jupiter Inlet, a distance of 14 miles, several shoals and wrecks are within about 3 miles of the shore. A wreck, cleared by the wire drag to a depth of 31 feet, is 4.2 miles northeastward of Jupiter Inlet Light. The shoals and wrecks should be avoided by deep-draft vessels. The 20-fathom curve is a safe guide.

Jupiter Inlet Light (26°56.9′N., 80°04.9′W.), 146 feet above the water, is shown from a 105-foot red brick tower on the north side of the inlet, 94 miles south of Cape Canaveral Light. A radiobeacon is about 100 yards eastward of the light. The light is reported to be obscured by high-rise construction from 231° to 234° when within a range of 5.5 miles.

Charts 11474 (1247), 11472 (845-SC).-Jupiter Inlet, an opening in the beach just south of Jupiter Inlet Light, is 14 miles south of St. Lucie Inlet. It leads to Jupiter Sound on the north, Loxahatchee River on the west, and Lake Worth Creek on the south. A short stone jetty is on the north side of the entrance to the inlet, and a concrete apron is halfway across the entrance from the south side. In June 1967, the controlling depth was 4 feet over the bar to the Intracoastal Waterway. Small boats of the fishing fleet use the inlet. The Intracoastal Waterway is 0.5 mile inside the entrance to the inlet. (See chapter 12.) A silver radar dome 0.6 mile southward of the inlet is conspicuous.

Jupiter Inlet is dangerous and particularly hazardous to small boats not designed for the open seas. Persons using this inlet should be experienced boatmen and have local knowledge. It is reported that shallow sandbars exist from the lighthouse through the mouth of the inlet and that the sandbar at the junction of the Intracoastal Waterway and the entrance builds up continuously. A very shallow sandbar extends south and east from the north jetty across the entire inlet. The bar is very deceptive and usually lies 1 or 2 feet below the surface. The openings through the sandbar shift with rapidly changing weather conditions and can be very shallow.

It is further reported that tidal currents reach a velocity of 8 knots. Eddies and extreme turbulence accompany flood and ebb tides, particularly near the south jetty. Breaking and confused seas frequently exist over the sandbars off the mouth of the jetty. Conditions are worst with ebb tide and easterly winds. Near low water, long ground swells and wake from passing vessels can create dan-

gerous waves in seemingly calm seas. Conditions are most hazardous during the winter months.

Additional information on local existing conditions can be obtained by contacting the Lake Worth Inlet Coast Guard Station (telephone: 305-844-5030) and asking for the Coast Guard Auxiliary telephone number.

Chart 11466 (1248).-Between Jupiter Inlet and Lake Worth Inlet, a distance of about 10.5 miles, the coast is clear of shoals with the 10-fathom curve about 1 mile offshore.

Chart 11473 (291).-Lake Worth Inlet is a dredged cut through the barrier beach 11 miles south of Jupiter Inlet Light and 31 miles north of Hillsboro Inlet Light. The entrance is protected by two jetties and the cut by revetments.

Port of Palm Beach is a deepwater port development 1.1 miles west of the entrance to Lake Worth Inlet. The port borders the communities of **Riviera Beach** on the north and **West Palm Beach** on the south. It is 259 miles south of Jacksonville and 68 miles north of Miami. The principal cargoes are bulk petroleum products and cement, general cargo, and passengers. There is some barge traffic. An extensive roll-on/roll-off operation is conducted in the Bahama Island trade. All of the wharves and warehouses are owned by the Port of Palm Beach District. A Coast Guard station is on the south side of **Peanut Island,** 0.8 mile inside the entrance.

Prominent features.-The dominant landmarks in the area are the charted twin 300-foot stacks at the powerplant adjacent to the port terminal; they are marked with horizontal bands of white and orange and by flashing red lights near their tops.

Channels.-A Federal project provides for a 35-foot entrance channel, thence a 33-foot inner channel to a turning basin of the same depth at the Port of Palm Beach. (See Notice to Mariners and latest edition of chart for controlling depths.) Markers include a **271°30′** lighted entrance range, lights, and lighted and unlighted buoys. The north (right outside) quarter of the entrance channel tends to shoal along the north jetty.

Anchorage.-There is no deepwater anchorage in the harbor. Vessels may find temporary anchorage north or south of the sea buoy clear of the entrance range. Anchorage for craft drawing up to 8 feet is available in the vicinity of **Palm Beach.**

Dangers.-A reef in the form of a ridge with scattered boulders extends for about 300 yards eastward of Peanut Island about 25 feet north of the improved channel. The reef, with a least depth of about 4 feet over it, is extremely dangerous. On the ebb, the current sets across the reef in a northeasterly direction. Two fish havens are about 1.5 miles off on either side of the entrance.

Tides and currents.-The mean range of tide is 2.8 feet at the inlet and 2.6 feet at the Port of Palm Beach. The currents in the inlet are strong and must be carefully guarded against. The current velocity is 2.4 knots on the flood and 3.6 knots on the ebb. Current predictions may be obtained from the Tidal Current Tables.

Weather.-Winds are generally from an easterly direction from February through November reflecting the important effect of the sea breeze. Winds speed average about 7 to 9 knots and are stronger on most warm days when they may reach 17 knots or more. Hurricanes have caused winds estimated at 122 knots. (See the page T-4 for **West Palm Beach climatological table.**) **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage is compulsory for foreign vessels and for U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. coastwise vessels which have a pilot aboard licensed by the Federal Government. There is no pilot station, but a pilot can be contacted at all times through Lantana Radio Station WOE, on 472 kHz, or on VHF-FM channels 16 (156.80 MHz), 13 (156.65 MHz), and 28 (157.40 MHz). The pilot boat is a 26-foot double-ender with PALM BEACH PILOTS painted on the sides of the pilot house. The pilots board about 2 miles southeastward of the sea buoy.

Towage.-Tug service is available and can be obtained through the Port of Palm Beach District offices, located just north of the slips, or through the pilot.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Public Health Service, Customs, Immigration, Coast Guard, and Agriculture officials and offices are at the port. The Port of Palm Beach is a customs port of entry. A **documentation officer** of the Coast Guard is stationed here. A **contract physician's office** of the U.S. Public Health Service is at North Palm Beach. (See appendix for address.)

Harbor regulations.-Copies of the Port Tariff may be obtained at the offices of the Port of Palm Beach District at the terminal. A harbormaster assigns berths and enforces the harbor regulations. The Port of Palm Beach is a public corporation created by the State Legislature. Port regulations state it shall be unlawful for any vessel, boat, barge, or other watercraft of any kind to anchor in the channel or turning basin, except in cases of actual emergency.

Wharves.-The Port of Palm Beach has two slips and two marginal wharves north and south of the slips; the port district owns all of the facilities and operates most of them. There are over 143,000 square feet of warehouse space. The port operates its own belt line railroad which connects with the Florida East Coast Railway. Lifting facilities include two 150-ton and one 40-ton cranes, a 23-ton fork lift, and a 10-ton and a 5-ton cherry picker. All berths have fresh water and electric shore

power available to vessels, and have a deck height of 8½ feet. Slip 1 is the north slip, Slip 2 is the south slip.

Wharf No. 1: marginal wharf immediately north of Slip 1; 465 feet long; 27 feet alongside reported; cargo ramp just north of wharf; general cargo and passengers; operated by West India Shipping Co., Inc.

Wharf No. 2: north side of Slip 1; 690 feet long; 25 feet alongside reported; general cargo; operated by West India Shipping Co., Inc.

Head of Slip 1: three roll-on/roll-off ramps for shipment of general cargo by specialized vessels, chiefly those of the West India Shipping Co., Inc.

Wharf No. 3: south side of slip 1: 680 feet long; 25 feet alongside reported; served by bunkering pipeline; general cargo.

Wharf No. 4: head of pier which separates slips; 180 feet wide; 30 feet alongside reported; general cargo.

Wharf No. 5: north side of Slip 2; 630 feet long; 35 feet alongside reported; general cargo, bulk cement, and petroleum products; served by oil-receiving pipeline which connects to the storage tanks of the Belcher Oil Co.

Head of Slip 2: 225 feet long; 17 feet alongside reported; receipt of general cargo by barge and mooring various types of small vessels.

Wharf No. 6: south side of Slip 2; 605 feet long; 35 feet alongside reported; general cargo.

Wharf No. 7: marginal wharf immediately south of Slip 2; 190 feet long; 35 feet alongside reported; mooring small vessels and general cargo.

Supplies.-Freshwater is piped to the berths. Diesel oil is piped to Pier 3, and diesel fuel and gasoline can be delivered by tank truck. Provisions and some marine supplies are available.

Repairs.-Only minor repair work can be obtained for large ships. The nearest drydocks are at Jacksonville and Port Everglades.

Communications.-West Palm Beach and the Port of Palm Beach are served by two railroads (Seaboard Coast Line Railroad and Florida East Coast Railway), three commerical airlines, and passenger service to the Bahama Islands. The **Palm Beach International Airport** is 5.5 miles southwestward of the port area.

The Intracoastal Waterway passes through Lake Worth just eastward of Port of Palm Beach. Facilities in the area for yachts and small craft are given in chapter 12.

Chart 11466 (1248).-From Lake Worth Inlet the general trend of the coastline is south for 41 miles to Port Everglades. It is broken by several inlets of little importance. The coast is formed almost entirely by a low sand beach, with more or less conspicuous dunes partly covered by grass and scrub palmetto, and woods in the background. Numerous towns, tanks, radio towers, and scattered buildings are visible from seaward. Conspicious from offshore are the buildings and pier at Palm Beach, Hillsboro Inlet Light, and the large buildings and tanks at Fort Lauderdale.

The coast between Lake Worth Inlet and Port Everglades is fairly bold. The 20-fathom curve runs parallel to the beach and for a greater part of the distance is less than 2 miles from it. Several wrecks and obstructions are within 0.5 mile of the shore.

Palm Beach, a resort on the narrow island between Lake Worth and the sea, is connected to West Palm Beach by highway bridges. The ocean pier here is used only for amusement purposes. Several other towns and cities are along the shores of Lake Worth.

South Lake Worth Inlet (see chart 11467 (847-SC)), at the south end of Lake Worth, is a small dredged cut through the outside beach, about 100 feet wide. The entrance to the inlet is protected by jetties. In May 1967, the controlling depth over the bar and to the Intracoastal Waterway was 6 feet. The inlet is crossed by Route A1A highway bridge which has a fixed span with a clearance of 17 feet. South Lake Worth Inlet is dangerous and particularly hazardous to small boats not designed for open seas. Persons using this inlet should be experienced boatmen and have local knowledge. The channel is unmarked.

It is reported that shoaling exists, commencing about 100 yards south of the end of the north jetty and extending to the south. Submerged rocks extend 15 feet east of the end of the south jetty.

Tidal currents through the inlet reach a reported velocity of 8 knots, and with an easterly wind it is impassible because of breakers at the entrance. There is a strong undertow when the tide is ebbing. Eddies and extreme turbulence accompany flood and ebb tides.

It is further reported that except during a flat calm, breaking and confused seas exist in the channel from the bridge to the mouth of the inlet. Conditions worsen as seas and winds increase, particularly when the current is running. Conditions are more hazardous during winter.

Additional information on local existing conditions can be obtained by contacting the Lake Worth Inlet Coast Guard Station (telephone: 305-844-5030), and asking for the telephone number of the Coast Guard Auxiliary.

Boca Raton Inlet (see chart 11467 (847-SC)) is a narrow dredged cut through the beach 5 miles northward of Hillsboro Inlet Light. It is used mostly by party fishermen. The hotel at **Boca Raton** is a prominent landmark. The mouth of the inlet is protected by short jetties. In April 1969, the channel was opened by dredging to about 5 feet, but due to continuous shoaling lesser depths may be encountered. The bar channel shifts with the winds.

Boca Raton Inlet is dangerous and particularly hazardous to small boats not designed for open seas. Persons using this inlet should be experienced boatmen and have local knowledge. The channel is unmarked.

It is reported that shoaling exists 30 yards outside of the inlet. Depth at low tide varies from 1 to 3 feet. A sandbar protrudes out of water inside the inlet on the north side. A sandbar extends underwater to within 30 feet of the south jetty. Shoaling and sandbars are continually shifting.

Tidal currents through the narrow channel reach a reported velocity of 7 knots.

It is further reported that except during a flat calm, breaking and confused seas exist at the mouth of the inlet. Conditions worsen as seas and winds increase, particularly during ebb tide. Breaking seas at the mouth of the inlet will extend 200 feet inside inlet mouth. Conditions are more hazardous during winter.

Additional information on local existing conditions can be obtained by calling the Fort Lauderdale Coast Guard Station (telephone: 305-522-1381) and asking for the telephone number of the Coast Guard Auxiliary.

Highway A1A bridge crossing the inlet has a 45-foot bascule span with a clearance of 23 feet at the center; opening signals are given in **117.240**, chapter 2.

Hillsboro Inlet Light (26°15.6'N., 80°04.9'W.), 136 feet above the water, is shown from an octagonal pyramidal skeleton tower with central stair cylinder, lower third of structure white, upper two-thirds black, on the beach on the north side of the inlet. A radiobeacon is at the light.

Hillsboro Inlet (see chart 11467 (847-SC)), 31 miles southward of Lake Worth Inlet, connects with Hillsboro River and the Intracoastal Waterway. It has considerable importance as a base for party fishermen who run out into the Gulf Stream. In April 1973, shoaling to 2½ feet was reported in the privately maintained channel. The entrance channel is marked by privately maintained lights and a midchannel buoy. A jetty, partially awash at low tide, extends from the northern entrance point. Rocky reefs are reported to extend northward and southward of the respective entrance lights; the southern reef is reported to dry at its southern end at low tide. The current in the entrance is reported to set northward across the channel on the flood, and southward on the ebb.

Route A1A highway bridge crossing the inlet has a bascule span with a clearance of 13 feet; opening signals and special drawbridge regulations are given in **117.240** and **117.442**, chapter 2. On the flood tide the current past the bridge is reported to be as much as 5 to 6 knots. An overhead power cable at the bridge has a clearance of 64 feet. Yacht landings are on the south shore on either side of the bridge. A depth of 5 feet is at the landings. Gasoline, diesel fuel, electricity, ice, restrooms, showers, restaurants, motel, supplies, some marine hardware, and freshwater are available.

Southward of Hillsboro Inlet shoaling is rapid; depths of 6 to 8 fathoms have been found 1.5 miles offshore. A wreck 3.2 miles south of Hillsboro Inlet Light and 0.4 mile offshore has a depth of about 10 feet over it. Two small rock islets on each side of a stranded vessel were formed by the jettisoning of a cargo of cement about 5 miles south of Hillsboro Inlet Light and 0.4 mile offshore. They were blasted away during World War II, but until the depth over them has been determined, the area should be avoided by light-draft vessels.

Fish havens are from 1.5 to 5 miles north of Port Everglades and extend from 1 to 1.5 miles offshore.

A submerged groin is 1 mile north of the entrance of Port Everglades and 0.4 mile offshore.

Chart 11470 (546).-Port Everglades is a deep-water port on the east coast of Florida, 301 miles south of Jacksonville and 948 miles from New York. Many of the world's large passenger vessels call at this major cruise port. Although principally a consumer port, considerable foreign commerce passes through. Petroleum, about 85 percent of the total, is the principal commodity handled; others include asphalt, bulk cement, steel products, glass, foreign cars and other vehicles, meat and dairy products, lumber, newsprint, citrus fruits, and a variety of general cargo. Two unmarked jetties protect the harbor entrance which is virtually landlocked.

Prominent features .-The most prominent objects seen when approaching the port are four stacks painted with red and white bands about 0.5 mile south of the entrance channel. These stacks are marked by red aircraft lights at night. A bank of eight bulk-cement silos about 0.2 mile north of the stacks and two tanks in Port Everglades are also prominent. There are numerous tall hotel buildings on the north side of the entrance close westward of the north jetties. **Port Everglades Approach Light** (26°05.7'N., 80°06.4'W.), 349 feet above the water, is shown from the roof of a building; the light is obscured from 030° to 180°. The numerous hotels and several tanks along the beach, and tanks, and radio and television towers in Fort Lauderdale are other conspicuous objects.

Because of the low shoreline good radar targets are not available in the approach to Port Everglades. Further, heavy small-craft traffic in the entrance makes it difficult to identify the entrance buoys by radar.

Channels.-A Federal project provides for a 500-foot-wide entrance channel 40 feet deep converging at the jetties to a 300-foot-wide channel 37 feet deep leading to a turning basin 37 feet deep at the main port facilities with north and south extensions 31 feet deep. (See Notice to Mariners and latest edition of chart for controlling depths.)

A lighted whistle buoy marks the entrance, and channel markers include lighted and unlighted buoys, lights, and a **269½°** lighted entrance range.

Dangers.-Two submerged breakwaters, extending almost 0.7 mile offshore on either side of the entrance, are unmarked. A large spoil area north of

the entrance channel has very little water on it and at times appears above the water as an island; it is reported to be building up to the northwestward. A **Naval restricted area** extends 2.5 miles offshore and 2 miles southward of the south edge of the entrance channel; for limits and regulations, see **207.171f**, chapter 2.

Two fish havens, parallel to the shore and up to 1.5 miles offshore, are about 2.7 miles northward of the entrance channel; the outermost is marked at its northern end by a private unlighted buoy.

Anchorage.-The usual anchorage is between the sea buoy and the outer entrance buoys northward of the entrance range. Deep-draft vessels should await the pilot before anchoring off the entrance. Anchoring south of the entrance channel by vessels with a draft in excess of 12 feet is prohibited. (See **207.171f**, chapter 2.)

Tides and currents.-The mean range of tide is 2.5 feet at the entrance. The tidal currents in the entrance average about 1 knot. Current swirls of varying characteristics are often encountered in the turning basin and make handling of ships difficult. Prevailing winds from the southeast and east coupled with a rising tide are the most hazardous. Caution should be exercised to avoid striking the piers or the rocky sides of the turning basin.

Weather.-Prevailing winds are southeasterly from March through October and northwesterly to easterly for the other months. Precipitation occurs during all seasons but the 5-month period June through October produces about 63 percent of the annual rainfall (about 56 inches). The area is subject to hazards of tropical cyclones at irregular intervals, and chances of hurricane-force winds in any given year are about one in seven. **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade, drawing more than 6 feet of water. Pilotage is optional for U.S. coastwise vessels which have on board a pilot licensed by the Federal Government. The pilots board at the sea buoy, day or night. The two 37-foot pilot boats are painted gray with white superstructure and have PILOT in black letters on the hull. They fly code flag **H** by day and show pilot lights white over red at night. They monitor VHF-FM channels 13 (156.65 MHz), 14 (156.70 MHz) and 16 (156.80 MHz), when working ships. Pilots, tugs, and the harbormaster's office have VHF communication facilities. Advance notice should be given to the Port Everglades Authority by radio, by radiotelephone through the Fort Lauderdale Marine Operator, or by prior arrangements with the ship's agent.

Towage.-Three large diesel tugs with up to 4,200 hp are available for docking and undocking.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A **contract physician's office** is maintained in Fort Lauderdale. (See appendix for address.) There are five general hospitals and several smaller private hospitals in the area.

Customs.-Port Everglades is a port of entry. The Customhouse is in the port area.

Immigration and agriculture inspectors are available at the port.

Harbor regulations are established by the Port Everglades Authority. The administration, operation, and maintenance of the port are under the direction and supervision of the port director. The harbormaster assigns berths and enforces the regulations. A copy of the port tariff is available at the port office which is in the Administration Building close westward of Pier 1.

Wharves.-Port Everglades has numerous deep-water berths adjacent to the main entrance channel. All the berths are owned and operated by the Port Everglades Authority. The port has over 100 acres of open storage space and over 500,000 square feet of covered storage available. Privately owned facilities provide over 9 million barrels of storage space for petroleum products. Most berths in Port Everglades have freshwater, electric shore power connections, and pipeline connections available for handling petroleum products, asphalt, molasses, and other bulk liquids and for bunkering vessels while alongside. Heavy lift cranes up to 300 tons and modern cargo handling equipment are available at the port. All berths have access to the highways, and most have rail connections. The alongside depths given for each facility described are reported depths. (For information on the latest depths, contact the Port Everglades Authority.) Only the major facilities are described. (For a complete description of the port facilities, refer to the Port Series, a Corps of Engineers publication.)

Berths 1, 2, and 3: east side of pier 4; 1,600 feet long; 33 feet alongside; deck height, 8 feet; general cargo and passengers; 132,000 square feet of covered storage.

Berth 4: south side of Pier 4; 700 feet long; 37 feet alongside; deck height, 8 feet; general cargo, receipt of lumber and shipment of scrap metal; rail connections; 24,000 square feet of covered storage.

Slip No. 2 Pier: between Piers 2 and 4; 295-foot berth; 35 feet alongside; operated by National Ocean Survey, NOAA; mooring research vessels.

Berth 5: north side of Pier 2; 722 feet long; 37 feet alongside; deck height, 7 feet; general cargo; rail connections; 15,000 square feet of covered storage.

Berth 6: face of Pier 2; 378 feet long; 37 feet alongside; deck height, 7 feet; general cargo; rail connections

Berths 7 and 8: south side of Pier 2; 1,200 feet long; 37 feet alongside; deck height, 7 feet; general cargo; rail connections; 81,000 square feet of covered storage.

Berths 9 and 10: north side of Pier 1; 1,200 feet long; 37 feet alongside; deck height, 7 feet; general cargo; rail connections.

Berth 11: face of Pier 1; 500 feet long; 37 feet alongside; deck height, 7 feet; receipt and shipment of petroleum products, receipt of lumber; pipelines to storage tanks; rail connections.

Berths 12 and 13: south side of Pier 1; 1,200 feet long; 37 feet alongside; deck height, 7 feet; receipt and shipment of petroleum products, receipt of lumber; pipelines to storage tanks; rail connections.

Berth 13A: between Piers 1 and 3; 302 feet long; 37 feet alongside; deck height, 7½ feet; general cargo.

Berths 14 and 15: north side of Pier 3; 1,200 feet long; 37 feet alongside; deck height, 8 feet; general cargo and passengers; receipt of lumber and bulk cement.

Berths 16, 17, and 18: east side of Pier 3; 1,650 feet long; 37 feet alongside; deck height, 9 feet; general cargo and passengers; receipt of lumber and bulk cement; 176,000 square feet of covered storage; rail connections.

Berths 19 and 20: Pier 5; 1,300 feet long; 33 feet alongside; deck height, 8 feet; general cargo and passengers; 80,000 square feet of covered storage.

Berths 21 and 22: west side of Pier 7; 1,325 feet long; 34 feet alongside; deck height, 9 feet; passengers.

Berth 23: north side of Pier 7; 260 feet long; 33 feet alongside; deck height, 9 feet.

Berths 24 and 25: east side of Pier 7; 1,368 feet long; 37 feet alongside; deck height, 9 feet; passengers.

Berths 26 and 27: east side of Pier 9; 1,337 feet long; 37 feet alongside; deck height, 8 feet; receipt and shipment of general cargo.

Supplies of all kinds in any quantity can be obtained, and all types of marine supplies are available in Port Everglades. Water is piped to all berths. Fuel oil and diesel oil are available by pipelines to all berths except Berths 26 and 27. Arrangements can be made for special blended fuels.

Repairs.-There are no major repair facilities for large vessels in Port Everglades. The nearest major repair facility is in Jacksonville.

A shipyard on the Intracoastal Waterway 0.5 mile south of the Port Everglades Turning Basin, dredged to a reported 31 feet, has a syncrolift capable of lifting out vessels of 4,200 tons, 350 feet long, and 80 feet wide. This facility also has a 1,000-ton floating drydock that can haul out vessels up to 200 feet in length and 40 feet wide. The shipyard has machine, electrical, welding, paint, and carpenter shops.

Several machine, electrical, electronic, and marine engine repair firms located off the waterfront can make above-waterline repairs to vessels.

Communications.-The Florida East Coast Railway and the Seaboard Coast Line Railroad serve the port through a beltline owned by the port but leased and operated by Seaboard Coast Line Railroad. Truck and barge lines serve the port and local and interstate bus service is available. Many domestic and overseas airlines serve the port through the **Fort Lauderdale-Hollywood International Airport,** a mile south of the port.

Small-craft facilities.-Yachting and small-craft facilities are centered at Fort Lauderdale close northward of the port and are described with the Intracoastal Waterway in chapter 12.

Chart 11467 (847-SC).-Port Laudania, just south of Port Everglades, is used by small ships handling general cargo, grain, heavy equipment, and sand. The 3.1-mile route from Port Everglades entrance to the port is through the main channel, thence southward for 1.8 miles in the Intracoastal Waterway and westward for 0.9 mile in the Dania Cut-Off Canal to a 540 by 310-foot turning basin on the north side. In 1965, the reported controlling depth from the Intracoastal Waterway to the turning basin was 10 feet. An overhead power cable across the Dania Cut-Off Canal has a clearance of 80 feet. Facilities include 1,440 feet of wharfage with 11 feet alongside, eight ramps for roll-on/roll-off loading, 11 acres of open storage, over 10,000 square feet of enclosed warehouse storage, fresh water, fuel and lubricants by truck, ship repair service, and a machine shop. Truck service is available, and railroad sidings are nearby. Small-craft facilities in the area are described in chapter 12.

Chart 11466 (1248).-Between Port Everglades and the Miami Harbor entrance, 20 miles to the southward, the general trend of the coastline is south, and it is formed almost entirely by a low sand beach. The large buildings and tanks in Hollywood, Miami Beach, and Miami are particularly conspicuous from seaward.

This section of the coast is also fairly bold, and the 20-fathom curve runs parallel to the beach at a distance of about 2 miles until in the Miami Harbor entrance where the curve of the shore becomes south-southwestward and the 20-fathom curve lies about 4 miles offshore. Inside this curve shoaling is rapid, and northward of the Miami Harbor entrance 6 to 8 fathoms are found in places 1.5 miles from the beach.

Hollywood is a popular resort 5 miles south of Port Everglades and about 1 mile west of the Intracoastal Waterway. The Hollywood Beach Hotel, a very prominent structure, is on the ocean beach east of the city.

Charts 11468 (1248), 11467 (847-SC).-Bakers Haulover Inlet has been dredged through the barrier beach at the north end of Biscayne Bay, 11.6 miles south of Port Everglades, to provide circulation of water in the bay. The channel, in 1963, had a controlling depth of 13 feet over the bar and to the highway bridge, thence 8 feet northward to the Intracoastal Waterway. In 1974, shoaling to 2 feet

was reported extending 20 feet south into the channel from the north jetty and extending 15 feet west of the end of the north jetty. It was also reported that a sunken rock may exist in this shoal area; caution is advised. Route A1A highway bridge over the inlet has a fixed span with a clearance of 32 feet; an overhead power cable just east of the bridge has a clearance of 53 feet. Current velocities of about 2.9 knots on the flood and 2.5 knots on the ebb have been recorded in the inlet. (For predictions see the Tidal Current Tables.)

Many charter-boat fishermen use the inlet in good weather. A 700-foot fishing pier about 0.2 mile north of the inlet is marked by two lights. Several prominent hotels are south of the inlet. The Intracoastal Waterway is 0.4 mile inside the entrance.

Chart 11468 (547).-Miami Harbor is a deepwater port on the east coast of Florida under the jurisdiction of the Metropolitan Dade County Seaport Department. It is 324 miles south of Jacksonville, 971 miles from New York, and 151 miles from Key West. It is principally a consumer port, but considerable foreign commerce passes through, and it is of great importance as a cruise port. The principal commodities handled are petroleum products, bananas, lumber, steel products, seafood products, meat, sugar, newsprint, building materials, foreign cars and other vehicles, fertilizer, and general cargo. Two unmarked jetties protect the harbor entrance, known as **Government Cut,** which was dredged to form a deepwater entry to the port.

Miami, the State's most populated city, covers most of the west shore of Biscayne Bay north of Key Biscayne and is 5 miles from the Gulf Stream, a fact which accounts for its year-round healthful climate. It is an internationally famous winter resort and a popular yachting center, particularly in winter. A large number of small boats that fish and cruise along the Florida Keys operate out of the port.

Miami Beach occupies the barrier beach that separates the ocean from the upper part of Biscayne Bay and is also an important yachting center. A number of causeways, with bridges over the channels, form good highway connections with Miami and the mainland communities. The city is principally residential, except for some shops and amusement places. The numerous large hotels take up most of the beach and along Biscayne Bay. Marinas, yacht basins, and numerous small private landings are on the west side of the city along the canals and other waterways off Biscayne Bay. A fishing pier extends out into the sea about 0.3 mile north of the jetties. The Coast Guard base and a commercial terminal are northward of the main ship channel near the east end of the MacArthur Causeway. Miami Beach City Yacht Harbor is on Meloy Channel at the southwestern end of Miami Beach.

Prominent features (see also chart 11466 (1248)).-The numerous tall buildings and hotels in Miami and along the ocean front at Miami Beach are visible for miles in all directions. A very prominent landmark in Miami Beach is the tall green and black building of a saving and loan company at about 25°47′26″N., 80°07′56″W., on which the red obstruction lights and an illuminated time and temperature sign, flashing from 7 a.m. to midnight, can be seen over 16 miles offshore. A tank on south Miami Beach close northward of the entrance is prominent. A tall stack and water tank on Virginia Key, the abandoned lighthouse on Cape Florida, the aviation light at **Miami International Airport,** a number of radio and television towers, and numerous other tanks and towers are also prominent.

Radar targets in the approaches to Miami Harbor are poor, except for the land and jetty configurations. Heavy small-craft traffic in the vicinity of the sea and entrance buoys may make visual or radar identification of these buoys difficult. In making a night approach, the many lights on Miami Beach may make identification of navigational aids difficult.

Boundary lines of inland waters.-The lines established along the Florida Reef and Keys from Miami to Marquesas Keys are described in **82.55,** chapter 2.

Channels.-A Federal project provides for a 30-foot channel from the sea to the inactive municipal terminal at Miami with turning basins of the same depth, one between the main channel and the north side of Fisher Island and the other off the municipal terminal. The channel and turning basins are maintained at or near project depths. (See Notice to Mariners and latest edition of chart for controlling depths.) The area between the main channel and the Port of Miami Terminal (Dodge Island) has depths of 30 to 35 feet. Mariners are advised that abrupt shoaling may be encountered along the northerly and southerly edges of the dredged channel.

The area in Miami Harbor from the turning basin off the inactive Municipal Terminal to Light 21 is used intermittently as a seaplane operating area.

A shoal marginal area about 100 feet wide extends between the northern edge of the channel and the MacArthur Causeway along almost its entire length.

A lighted buoy marks the entrance; channel markers include lighted and unlighted buoys, lights, and a **249°30′** lighted entrance range. A radiobeacon is on the inshore end of the south jetty.

A **115°30′-295°30′ measured nautical mile** is on the north side of the main channel along the MacArthur Causeway. The 15-foot-high range markers are white piles with orange bands.

Meloy Channel branches from the main channel at the inner end of the land cut and extends northwestward along the southwest shore of

Miami Beach to MacArthur Causeway. The controlling depth in the channel and along the municipal wharf along its eastern edge was 11 feet in 1963. The western edge of the channel is partially marked by two daybeacons.

Fishermans Channel leads westward from the turning basin at Fisher Island for about 1.4 miles thence west-northwestward to a junction with Dodge Island Channel; controlling depth is about 6½ feet. The channel is marked by daybeacons. A dangerous unmarked sunken wreck, covered 2 feet, lies in the northern half of the channel about 800 yards westward of the turning basin at Fisher Island.

Dodge Island Channel, a privately dredged channel, leads south-southwestward from the main ship channel along the east end of Dodge Island, thence west-northwestward along the south side of Dodge Island, thence west-southwestward to a junction with the Intracoastal Waterway and the entrance to Miami River. In January 1972, controlling depths were 23 feet to a point off the NOAA Ship Basin and Engineering Facility, thence 15 feet at midchannel in the remaining part of the channel along the southern side of Dodge Island, thence 12 feet to the junction with the Intracoastal Waterway and the entrance to Miami River.

A depth of about 11 feet can be carried from the southeast corner of Dodge Island to Fishermans Channel.

Other channels in Biscayne Bay are discussed with the Intracoastal Waterway in chapter 12.

Anchorages.-The anchorage area is north of the sea buoy; limits and regulations are given **110.188,** chapter 2. There is no anchorage for deep-draft vessels in the harbor. Yachts and small craft usually moor at marinas or yacht basins in Biscayne Bay or on Miami River, but when these are crowded in winter, they must anchor in the bay. Good anchorage for yachts and small craft is found along the west side of Miami Beach from MacArthur Causeway northward to Bakers Haulover Inlet and southward along the Miami waterfront from the marina at Bay Front Park to Dinner Key Marina. The harbormaster or dockmaster usually assigns berths. Vessels unable to pass quarantine usually anchor outside the harbor.

Dangers.-Shoals extend about a mile offshore northward of the entrance, and vessels approaching from the northward should keep at least 1.5 miles offshore until within 4 miles of the entrance and then haul out for the sea buoy. The outer reefs, for about 10 miles south of the entrance, are unmarked except for the northerly red sector in Fowey Rocks Light, and vessels approaching from that direction should stay outside this sector until well up before closing the sea buoy.

Tides.-The mean range of tide is 2.5 feet at the harbor entrance and 2 feet in the bay. Daily predictions for Miami Harbor are given in the Tide Tables.

Currents.-Strong tidal currents run in the entrance between the jetties; the current velocity being about 2 knots. A northerly wind causes a considerable southerly set across the ends of the jetties. Vessels are advised to favor the southerly side of the entrance channel during southerly winds, as a pronounced northerly set may be experienced. Daily predictions for Miami Harbor entrance are given in the Tidal Current Tables.

Weather.-Miami has an essentially subtropical marine climate which features a long, warm summer with abundant rainfall, followed by a mild, dry winter. The area is subjected to winds from the east to southeast about half the time. The marine influence is evidenced by the low daily temperature range and the annual precipitation. At Miami Beach the normal annual rainfall is about 46 inches while the airport, some 9 miles inland, records over 59 inches on the average. The greatest frequency of tropical cyclones occurs in September and October, but the area is susceptible from June through November.

The National Weather Service office is at the Miami International Airport west of the city. **Barometers** can be compared at their office or by telephone (634-3915 or 634-7687). (See page T-5 for **Miami climatological table.**) **Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for coastwise vessels which have on board a pilot licensed by the Federal Government. The pilots' office is on the north side of the entrance close northward of the jetty. Pilots board at the sea buoy, day or night. The pilot boat will come out to meet any vessel making the signal for pilot, code flag **G.** The 36-foot pilot boats are painted black with buff deck and housing. By day they fly the code flag **H,** by night white over red lights. Channels 16 (156.80 MHz), 14 (156.70 MHz), 13 (156.65 MHz), and 12 (156.60 MHz) are monitored when the pilots are working ships. Arrangements should be made in advance by radio, radiotelephone through the Miami Marine Operator (telephone 531-7643) or through the ship's agent.

Towage.-There are large tugs of up to 2,000 hp available in the port. **Salvage,** wrecking, and diving equipment is available.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) An **outpatient clinic** of the U.S. Public Health Service is maintained in the Federal Building in Miami. There are more than 10 public and private hospitals in Miami and 3 at Miami Beach. Many others are in the surrounding area.

Customs.-Miami is a customs port of entry. Vessels are usually boarded on arrival at the dock.

Immigration.-There is an Immigration Service office in the city; vessels are usually boarded on arrival at the dock.

Coast Guard.-The **district office, Marine Inspection Office,** and **documentation officer** are in downtown Miami. (See appendix for addresses.) The **Captain of the Port** is at the Coast Guard base on Causeway Island, 1.2 miles inside the outer end of the entrance north jetty.

Agricultural quarantine.-All vessels arriving from a foreign port are inspected. (See appendix for address of inspectors.)

Harbor regulations are established by the Metropolitan Dade County Seaport Department. The Seaport Director assigns berths and enforces the regulations. It is unlawful for any vessel or other craft to proceed at a speed which will endanger other vessels or structures. Official signs are posted indicating limiting speeds through critical portions of the harbor or waterways.

Wharves.-The Port of Miami has over 30 deepwater berths adjacent to the Miami Harbor Channel; these include the berths at the Port of Miami Terminal on Dodge Island, and the privately owned facilities on the north side of Fisher Island and just west of Causeway Island.

The facilities at the Port of Miami Terminal on Dodge Island are owned and operated by the Seaport Department of Metropolitan Dade County and have freshwater, electric shore power, and telephone connections. These facilities have highway connections and are served by a beltline railway which connects with the Florida East Coast Railway and the Seaboard Coast Line Railroad. The facilities on Dodge Island are connected to Miami by a highway-railway causeway with a bascule bridge over the Intracoastal Waterway. Fisher Island can be reached only by water transportation.

General cargo at the port is usually handled by ship's tackle; forklifts to 10-ton capacity are available. Crawler and truck cranes with capacities to 200 tons may be obtained from crane rental services in Miami.

The depths alongside each facility are reported depths. (Contact the Seaport Department, Metropolitan Dade County, or private operator for latest depths.) Only the major facilities are described. (For a complete description of the port facilities, refer to the Port Series, a Corps of Engineers publication.)

Piers 1, 2, and 3 at the inactive Municipal Terminal at the head of the harbor at Miami are in disrepair and no longer being used. The Florida East Coast Railway Wharf in the southwest corner of the basin southward of Pier 3 is the only remaining active facility at the terminal. The wharf has a 540-foot west face and a 256-foot south face; 12 to 14 feet alongside; deck height, 6 feet; roll-on/roll-off facility for highway trucks and trailers transporting general cargo between Miami and the West Indies; owned by Florida East Coast Railway and operated by Trailer Marine Transportation.

Port of Miami Terminal (Dodge Island) (25°46.5'N., 80°10.2'W.)

Northwest corner of Dodge Island: Berth 6, 504 feet long; Berth 7, 330 feet long; deck heights, 7½ feet; 25 feet alongside; used for passenger service.

North side of Dodge Island, Bays 1-54: 6,480 feet long; 32 feet alongside; deck height, 8 feet; western 2,400 feet used for passenger service, remaining 4,080 feet used for general cargo; 83 acres of open storage and more than 388,000 square feet of covered storage.

East side of Dodge Island, Bays 55-70: 2,000 feet long, providing 1,384 feet of berthing space, with two 100-foot by 50-foot roll-on/roll-off platforms; 25 to 29 feet alongside; deck height, 8 feet; 50,000 square feet of covered storage; general cargo from roll-on/roll-off trailer ships.

South side of Dodge Island, Bays 71-76: 735 feet long, providing 815 feet of berthing space with dolphins; 27 to 28 feet alongside; deck height, 8 feet; 50,000 square feet covered storage; receipt and shipment general cargo, roll-on/roll-off trailers.

South side of Dodge Island, at southeast corner of the island: 500 feet of berthing space eastward of a 100-foot roll-on/roll-off platform; 25 feet alongside; deck height, 8 feet; general cargo from roll-on/roll-off trailer ships.

South side of Dodge Island, about 500 yards westward of southeast corner of the island: Ship basin and complex of NOAA Ship and Ocean Engineering Facility; 26 feet reported in basin; berthing of research vessels.

Fisher Island (25°45.8'N., 80°08.5'W.)

Belcher Oil Company Wharf: north side of Fisher Island; face 800 feet long west of slip; 19 to 32 feet alongside; west side of slip 490 feet; 15 to 20 feet alongside; deck height, 6 feet; receipt of petroleum products, bunkering vessels; pipelines to storage tanks; owned and operated by Belcher Oil Co.

Terminal west of Causeway Island (25°46.2'N., 80°08.8'W.)

Albury and Company Terminal: west of Causeway Island; south side facing main channel 757 feet long; 31 feet alongside; east side 930 feet long; 16 to 30 feet alongside; berthing at this wharf is only on an ebb tide; deck height, 9 feet; general cargo; 43,000 square feet of covered storage; fresh water and electric shore power connections; owned by Causeway Terminal and operated by Albury and Co.

Belcher Oil Company Wharf (25°46.2'N., 80°08.9'W.): facing main channel west of Albury and Company Terminal; face 200 feet; 27 feet alongside; deck height, 6 feet; receipt of petroleum products and asphalt; bunkering vessels; pipelines to storage tanks; freshwater connections; owned and operated by Belcher Oil Co.

Supplies of all kinds in any quantity can be obtained, and all types of marine services are available in Miami. Freshwater is piped to most berths. Fuel oil and diesel oil are available at the oil ter-

minals and by tank barge; most vessels bunker by barge while alongside.

Repairs.-There are no major repair facilities for large vessels in Miami. The nearest major repair facilities are at Jacksonville and Tampa. The Port Everglades Shipyard in Port Everglades has a syncrolift capable of lifting out vessels of 4,200 tons, 350 feet long, and 80 feet wide.

Marine repair firms along the Miami River offer a wide range of services, including construction, repair, and conversions to small coastal and interisland vessels. The largest marine railway is capable of hauling out vessels up to 700 tons and 185 feet; the largest vertical boat lift is capable of hauling out vessels up to 500 tons and 125 feet. The largest shaft machined in the port is 20 feet by 34 inches. Cranes up to 100 tons are available.

Several machine, electrical, electronic, and marine engine firms located off the waterfront can make above-the-waterline repairs to vessels berthed at the port.

Communications.-Miami is the main line terminus for the Florida East Coast Railway and the Seaboard Coast Line Railroad. Both lines have freight service farther south to Homestead and Florida City. The city beltline railroad connects them with the port. Considerable ocean shipping calls at the port, and a number of cruise ships operate from the port the year-round.

Local and interstate bus and truck lines operate over the excellent highways and freeways to and in the city and numerous domestic and overseas airlines serve the port through the Miami International Airport west of Miami.

Chart 11467 (847-SC).-Miami River trends westward then northwestward through the heart of the city of Miami for about 2.8 miles, where the **South Fork** of the river flows into it from the westward. The river continues on northwestward for another 1.1 miles to a junction with the Tamiami and Miami Canals. The **Miami Canal** continues northwestward to Lake Okeechobee and the **Tamiami Canal** westward to **Sweetwater** in the Everglades. Miami River and Miami Canal are navigable for about 5 miles to a dam just below the NW. 36th Street highway bridge.

The Miami Canal is reported to be navigable for small boats for about 10 miles above the dam. A crane at the dam will lift them over.

In 1963, the controlling depth was 11 feet to the Tamiami Canal, thence 9 feet in Miami Canal to the dam. The South Fork had depths of 10 feet at the entrance to 4 feet at a fixed bridge about 0.3 mile above the mouth. Currents in Miami River are strong on the ebb and cause swirls at the bends.

The minimum clearance of the 11 drawbridges crossing Miami River and Miami Canal from the mouth to the head of navigation at the dam about 5 miles above the mouth is 6 feet; drawbridge regulations and opening signals are given in **117.240, 117.448, and 117.449,** chapter 2. The drawbridges over Miami River from NW. 5th Street through NW. 22nd Avenue may at times be closed to marine traffic because of special events being held at the Orange Bowl. Advance notice of such closures will be published in the Local Notice to Mariners.

The triple spans of Interstate Highway 5 bridge cross the river 0.7 mile above the mouth; the vertical clearance is 75 feet. Another fixed highway bridge, 2.1 miles above the mouth, has a clearance of 75 feet.

A highway bascule bridge with a reported 35-foot span and a clearance of 6 feet crosses the Tamiami Canal just above its junction with Miami River. (See **117.240,** chapter 2, for drawbridge regulations and opening signals.)

The river and canals are important parts of the Miami waterfront, for both commerical and pleasure craft. There are commercial wharves, yacht basins, marine repair plants, and oil-terminal wharves on the banks of Miami River and Miami Canal to just above the Seaboard Coast Line Railroad bridge about 0.2 mile below the dam. The principal wharves can accommodate any vessel able to enter the river.

There are listed below cargo-handling facilities of firms along the Miami River and Canal engaged in trade with the West Indies using LST type vessels and barges:

Allright Auto Parks Wharf: north shore of the Miami River, 600 yards above mouth; east face 320 feet long, west face 100 feet long; 15 feet alongside; deck height, 5 feet; receipt of bananas; highway connections; owned by Tatcher Enterprises, Inc. and operated by Banana Supply Co., Inc.

Elmo Seafoods Wharf: south shore of the Miami River, 0.9 mile above mouth; face 150 feet long; 15 feet alongside; deck height, 5 feet; receipt of fish and shipment of general cargo to Bahama Islands; highway connections; freshwater and electric shore power connections; owned and operated by W.G. Kreidt.

Shaw Brothers-Pure Oil Company Wharf: north bank of Miami Canal, about 100 yards above junction with Tamiami Canal; face 450 feet long; 15 to 21 feet alongside; deck height, 6 feet; receipt of shrimp, meat, and petroleum products; fueling of vessels by tank truck; 18,000 cubic feet of cold storage space available; railway and highway connections; freshwater and electric shore power connections; owned and operated by Shaw Brothers Shipping Co.

Antillean Marine Company Wharf: adjacent westward of Shaw Brothers-Pure Oil Company Wharf; face 577 feet long; 21 feet alongside; deck height, 6 feet; general cargo; 16,000 square feet of covered storage available; railway and highway connections; freshwater and electric shore power connections; owned by Antillean Marine Co. and operated by Johnson Shipping Co.

Charts 11468 (547), 11467 (847-SC).-Small-craft facilities are distributed along the east and west shores of Biscayne Bay from above Baker Haulover Inlet to Dinner Key, on Miami River, and on Tamiami and Miami Canals. Marine railways, lifts, and launching ramps are available. Gasoline, diesel fuel, freshwater, ice, berthing with electricity, marine hardware, provisions, and telephone services are available about the harbor. Hull, engine, and electronic repairs can be made. There are many large hotels, motels, tourist homes, and restaurants. (For details on facilities, channel depths, bridges, etc., between Bakers Haulover Inlet and Miami Harbor Channel, see chapter 12.)

During the winter tourist season, when berthing space is at a premium, many craft have to anchor in the bay off the facilities. There are dockmasters at most of them to advise and assist in finding a secure berth. Many of the large hotels at Miami Beach have their own docks.

The City of Miami Miamarina is at the northeast corner of **Bay Front Park,** which extends from the Dodge Island Causeway southward to Miami River and fronts on the beautiful Biscayne Boulevard. The marina caters to private, commercial and sightseeing vessels. The facility has over 200 slips accommodating craft up to 100 feet. Gasoline, diesel fuel, water, electricity, laundromat, and telephones are available; U.S. Customs and U.S. Department of Agriculture officials are stationed at a dock at the marina; they also handle immigration and U.S. Public Health Service matters. Depths of 9 feet are reported in the basin. A **dockmaster** is at the marina.

11. MIAMI TO KEY WEST

This chapter describes the Florida Keys and the various passages that lead through it from the Straits of Florida and Hawk Channel to Florida Bay and the Gulf of Mexico. Also discussed are Key West Harbor and the small-craft basins at Key West, Boot Key Harbor, Safe Harbor, and several other small-craft harbors along the Florida Keys.

Strangers using Hawk Channel and the various passages through the Florida Keys can obtain the services of fishing boat captains and other qualified fishermen at Miami or Key West who will act as **pilots** or **guides.**

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Chart 11460 (1112).-The **Florida Keys** consist of a remarkable chain of low islands, beginning with Virginia Key and extending in a circular sweep to Loggerhead Key, a distance of about 192 miles. For some 100 miles of that distance they skirt the southeast coast of the Florida Peninsula, from which they are separated by shallow bodies of water known as Biscayne Bay, Card Sound, Barnes Sound, Blackwater Sound, and Florida Bay. Biscayne Bay has depths of 9 to 10 feet for most of its length, and the other bodies of water are shallow, containing small keys and shoals, and of no commercial importance except as a cruising ground for small boats. Westward of Florida Bay the Florida Keys separate the **Straits of Florida** from the Gulf of Mexico.

The keys are mostly of coral formation, low, and generally covered with dense mangrove growth, though some are wooded with pine, and on a few are groves of coconut trees. Most of the keys that are connected by U.S. Highway 1 to Key West are inhabited. Key West is the most important of the keys.

The openings under the viaduct and bridges are indicated on the charts. Drawbridges are over Indian Key Channel, Channel Five, Jewfish Creek, and Moser Channel. Overhead power cables run parallel to U.S. Highway 1 from Tavernier to Big Coppitt Key. All clearances are greater than those of the adjacent fixed bridges. Cables are submerged at the movable spans of drawbridges. Small craft with local knowledge use these channels to go from the Straits of Florida to Florida Bay and the Gulf of Mexico. Strangers should not attempt passage without a pilot or guide.

The tidal currents are strong through the openings between the keys. Wind effects may at times be expected to modify the velocities shown in the tidal current tables.

The Florida Keys are skirted on the side next to the straits throughout their extent by the **Florida Reefs,** a chain of dangerous reefs and shoals lying at an average distance of about 5 miles from the line of keys. The reefs are hazardous because they are not marked by breakers in smooth weather and only a few show above the water. On the outer edge of and between the reefs the water shoals abruptly.

In the seaward approach to the reefs, warning of their proximity usually will be given by the difference in color of the water, from deep blue to light green, or by the **Bank Blink,** described in chapter 3. Too much reliance in these warnings, however, may lead to trouble. In clear weather the lights and daybeacons make navigation along the reefs easy, but in thick weather soundings should be relied upon for safety. Fifty-fathom soundings indicate a distance of 2 to 3 miles from the reefs, and great caution should be used in approaching them closer. Fog is not frequent in this locality.

The water always becomes milky following windy weather. The usual color of the water on the reefs is bluish green, and the shoal patches show dark, shading through brown to yellow as they approach the surface. The shoal sand patches show as a bright green. At depths of 10 to 15 feet grass patches on the bottom look quite similar to rocks. When piloting in this area chose a time so that the Sun will be astern, conning the vessel from aloft or from an elevated position forward, for then the line of demarcation between deep water and edges of the shoal will be indicated with surprising clarity.

Prominent features.-The outer part of the Florida Reefs is marked by lights from Miami to Key West. Several lights marking the Hawk Channel are also visible from seaward. In addition, several lighted radio towers and microwave towers along the keys and the aero light on Boca Chica Key and at the Key West International Airport are prominent.

Boundary lines of inland waters.-The line established along the Florida Reefs and Keys from Miami to Marquesas Keys is described in **82.55,** chapter 2.

Dangers.-Vessels proceeding through the channels inside the Florida Reefs should exercise extreme caution because of the numerous rocks, shoals, wrecks, and pile structures which exist. The chart should be examined carefully to determine the position of these dangerous obstructions so they may be avoided.

Hawk Channel is the navigable passage inside Florida Reefs and outside the keys from Cape Florida to Key West, a distance of about 127

miles. It varies in depth from 9 to 34 feet, and is 0.25 mile wide at its narrowest part. Light-draft vessels, bound southward and westward, may use this channel with great advantage, avoiding entirely the adverse current of the Gulf Stream and finding comparatively smooth water in all winds, except when passing the large openings between the reefs in southerly winds. These openings are principally between Alligator Reef Light and American Shoal Light. Steamers or sailing vessels with a leading wind may run the courses through this channel without difficulty. Sailing vessels drawing more than 7 feet are advised not to try to beat through without a pilot.

Reports indicate that the current in Hawk Channel usually sets fair with the channel, except alongside the open area between Hawk Channel and Biscayne Bay where a fairly strong cross current exists, particularly on an ebb tide. Possible cross currents should be guarded against, especially in the vicinity of the openings between the keys.

Local fishing-boat captains and fishermen who will act as pilots or guides are generally available at Miami or Key West. The channel is marked with lights, lighted buoys, daybeacons, and buoys. However, strangers should not attempt passage at night without local knowledge. Vessels may anchor at night where the bottom is soft. Known anchorages are discussed in a later section. The holding ground is poor where the bottom is hard. Tows use the channel.

The **Intracoastal Waterway** between Miami and Key West is described in chapter 12. This waterway on the western and northern side of the keys passes southward through Biscayne Bay, Card, Barnes, and Blackwater Sounds and connecting waterways in Florida Bay to Moser Channel. From there it is necessary to pass either through Moser Channel and proceed to Key West via Hawk Channel, a distance of 40 miles, or to remain on the northern side of the keys and proceed to Key West via Big Spanish Channel and the Gulf of Mexico, a distance of 54 miles. The waterway route is through smooth waters, except in Hawk Channel and the Gulf of Mexico.

Florida Bay, northward of the Florida Keys and southward of the mainland of Florida, is a triangular-shaped body of water extending in a general east-and-west direction from Barnes Sound to Cape Sable. The depths are shallow and irregular, and the bottom is mostly coral with a thin covering of silt in the eastern part. From April to October the waters of the bay are clear and the shoals plainly discernible, but during the winter the water is frequently milky and the shoals indistinguishable.

In the eastern part of the bay are numerous ridges and reefs which show bare or nearly bare. Numerous small wooded keys dot the area. Only small craft can navigate this part of the bay which is frequented by small motor yachts, spongers, fishing craft, and the flatbottomed shoal-draft boats of the inhabitants of the keys. The western part of the bay is comparatively clear, with depths ranging from 7 to 13 feet. Many charted shoal areas with lesser depths are scattered throughout this part of the bay; the chart is the best guide. The bottom is covered with loggerhead sponges and small coral heads.

Charts 11466 (1248), 11465 (848), 11451 (141-SC).-Norris Cut is a shallow inlet just south of the Main Channel to Miami Harbor between Fisher Island and **Virginia Key.** A prominent stack and tank are near the center of Virginia Key.

Key Biscayne is connected to the mainland by a bridge-causeway which crosses Bear Cut, Virginia Key, and Biscayne Bay. The highway bridge over Bear Cut has a 38-foot fixed span with a clearance of 13 feet. A shoal, reported bare at mean high water, extends about 0.6 mile in a north-south direction about 0.2 mile off the eastern shore of Key Biscayne.

Two tall apartment hotels on the easterly side of Key Biscayne and the red tower of an abandoned lighthouse on **Cape Florida** on the south end of the key are prominent. In 1969, another hotel was under construction between the two hotels.

Biscayne Channel leads through the shoals south of Cape Florida into Biscayne Bay. It is partially dredged, but the channel has shoaled. In 1963, the reported controlling depth was 7 feet. The channel is marked by lights, lighted buoys, and daybeacons. Craft whose draft is close to the limiting depth of the channel should exercise extreme caution in navigating it. Several channels leading through the shoals between Biscayne Channel and Key Biscayne are used by local boats.

Two prominent, 150-foot-high radio towers are on the south side of the outer end of Biscayne Channel about 0.9 mile southward of Cape Florida.

Cape Florida Anchorage, with depths of 12 to 20 feet, is about 300 yards westward of the south end of Cape Florida with the abandoned lighthouse tower bearing northward of 069°.

Miami South Channel is a dredged cut leading from Biscayne Bay, westward of Virginia Key, to the Miami waterfront. One branch of it leads into the Miami River, and the other leads directly to the basin off **Bay Front Park.** The Intracoastal Waterway southward to Key West passes through Miami South Channel. Clearance of the Rickenbacker Causeway bridge is given in chapter 12.

Fowey Rocks Light (25°35.4'N., 80°05.8'W.), 110 feet above the water, is shown from a brown, octagonal, pyramidal skeleton tower on pile foundation enclosing a white dwelling and stair cylinder.

Fowey Rocks Anchorage, 1.3 miles westward of Fowey Rocks Light, is fairly well sheltered, and can be used by vessels with a 14-foot draft or less.

Charts 11462 (1249), 11465 (848), 11463 (849-850), 11451 (141-SC).-Bowles Bank Anchorage, 6.5 miles south-southwestward of

Fowey Rocks Light (25°35.4'N., 80°05.8' W.), is good in all winds. It has depths of 14 to 16 feet and soft bottom in places, and lies about 0.5 mile north of the light of Bache Shoal and eastward of the north end of **Elliott Key.**

Legare Anchorage, 7 miles southward of Fowey Rocks Light, lies between the reefs westward of **Triumph Reef.** The bottom is mostly hard, but there are some soft spots on which vessels may anchor and ride out a gale. The entrances are not marked, and the anchorage is not generally used.

Caesar Creek Bank Anchorage, 12 miles south-southwestward of Fowey Rocks Light, is good in all winds. It lies on the west side of Hawk Channel between **Margot Fish Shoal** and **Caesar Creek Bank,** with depths of 10 to 12 feet, soft bottom.

Excellent anchorage for small craft will be found in **Caesar Creek,** just north of Caesar Creek Bank. The entrance is marked by a light, and privately maintained stakes mark the channel. There was a depth of 4 feet on the bar in March 1967.

There is also a secure anchorage between **Adams Key, Meigs Key,** and **Elliott Key.** A draft of 4 feet, in 1963, could be carried into Biscayne Bay through a privately marked channel which leads along the northwest side of Adams Key. It is reported, however, that this passage is seldom used.

Pacific Reef, 13.4 miles southward of Fowey Rocks Light, is marked by **Pacific Reef Light** (25°22.3'N., 80°08.5'W.), 45 feet above the water and shown from a white, square, pyramidal skeleton tower on a pile foundation. A channel, marked by daybeacons, leads from the ocean north of Pacific Reef Light to Caesar Creek; the controlling depth was 8 feet in 1963.

Angelfish Creek, 17.5 miles southwestward of Fowey Rocks Light, is used by vessels proceeding to Card Sound. The controlling depth through the creek was 4 feet in February 1967. The channel is marked by lights and daybeacons. The outer end of the creek offers good protection, but the bottom is rock ledge and the anchor should be buoyed.

Ocean Reef Harbor is on the east side of **Key Largo,** 19.5 miles southwestward of Fowey Rocks Light. A privately dredged channel leads to the harbor. In February 1967, the controlling depth in the channel was 6 feet. A light is off the end of the entrance channel which is marked by privately maintained stakes. The harbor has good anchorage. A small-craft facility is on the north side of the harbor. Gasoline, water, ice, marine supplies, a 2-ton portable lift, and hull, engine, and electrical repairs are available.

A privately dredged channel, about 0.4 mile northward of the entrance to Ocean Reef Harbor, leads to a residential area. The channel, marked by piles, had a centerline depth of 6 feet in February 1967.

Key Largo Anchorage, 20 miles southwestward of Fowey Rocks Light, is good in all winds. It has a depth of 14 feet, soft bottom, 4.5 miles northwestward of Carysfort Reef Light.

Turtle Harbor, a well-sheltered anchorage between the reefs lying northwestward of Carysfort Reef Light, is entered from the Straits of Florida by a marked passage 5 miles northeastward of the light. Vessels of 15-foot draft can use this passage in smooth water. Depths in the approach range from 27 to 38 feet, and at the anchorage from 25 to 28 feet. A buoy, 2.5 miles northwestward of Carysfort Reef Light, marks the center of the anchorage area. Vessels can enter Hawk Channel from this harbor by proceeding about 0.4 mile south of the anchorage buoy and then taking a westerly course.

Carysfort Reef Light (25°13.3'N., 80°12.7'W.), 100 feet above the water, is shown from a brown, octagonal, pyramidal skeleton tower on pile foundation, enclosing a conical dwelling and stair cylinder.

The Elbow is a reef, 5.3 miles southwestward of Carysfort Reef Light, on which several wrecks have occurred. It is marked on its seaward edge by a light.

Molasses Reef, 15.5 miles southwestward of Carysfort Reef Light, is marked by a light. The entrance to **Molasses Reef Channel,** which has a controlling depth of about 8 feet, is just south of the light. The shoalest part of the channel is marked by daybeacons.

The **John Pennekamp Coral Reef State Park (Key Largo Coral Reef Reserve)** comprises the offshore reef area from the vicinity of Angelfish Creek to near Molasses Reef. The area has been established for the protection of the coral reef formation and its associated marine life. Regulations for the preserve are available at the headquarters of the Florida Board of Parks on the south side of Largo Sound.

El Radabob Key, locally known as **Julia Island,** is an island westward of The Elbow, about 10 miles southwestward of Carysfort Reef Light. It is about 5 miles long and 0.5 miles wide, and in general is covered with dense mangrove growth. The island is separated from Key Largo on the west by Largo Sound, South Sound Creek and North Sound Creek.

Largo Sound, between El Radabob Key and Key Largo, is about 1.8 miles long and 0.8 mile wide, and is entered southward of El Radabob Key. General depths in the sound are from 1 to 6 feet. A dredged channel leads from Hawk Channel through **South Sound Creek** thence 0.3 mile into the sound. The channel is well marked by lights and daybeacons. In 1972, the controlling depth was 5 feet, and in 1967, a depth of 4 feet could be carried to the headquarters of the Florida Board of Parks on the south side of the sound. Mariners are advised to stay well to the center of the channel as the sides are composed of coral rock. A public marina, at the southwest end of Largo Sound, has berthage with electricity, gasoline, ramps, a 2-ton fixed lift, freshwater, ice, marine supplies, and hull and engine repair facilities.

Rock Harbor, about 3 miles southwestward of El Radabob Key and 5.7 miles northwestward of the light on Molasses Reef, has small-craft facilities where gasoline, diesel fuel, water, and ice can be obtained. Also available are berths with electricity, launching ramps, a 5-ton fixed lift, and a marine railway that can handle craft up to 30 feet.

Tavernier, about 5 miles southwestward of Rock Harbor and 20 miles southwestward of Carysfort Reef Light, is one of the larger settlements on the Florida Keys. A channel, marked by a light and daybeacons, leads to Tavernier Harbor from Hawk Channel. Gasoline, supplies, motels, and charter party fishing boats are available. The small-craft facilities on the bay side at Tavernier and in Tavernier Creek are described with the Intracoastal Waterway, chapter 12.

Tavernier Key Anchorage is 2 miles eastward of Tavernier. Anchor according to draft from northward to eastward of Tavernier Key, hard bottom.

Storm warning signals are displayed. (See chart.)

Charts 11452 (1250), 11449 (851-852), 11451 (141-SC).-Alligator Reef Light (24°51.1'N., 80°37.1'W.), 136 feet above the water, is shown from a white, octagonal pyramidal skeleton tower on pile foundation, enclosing a square dwelling and a stair cylinder.

Indian Key Channel, northwestward of Alligator Reef Light, is about 200 yards wide and leads from the Straits of Florida to Florida Bay via the unnamed channel east of **Lignumvitae Key.** it is marked by daybeacons. In 1968, shoaling to less than 5 feet was reported in the channel to just north of the bridge. The highway viaduct across the channel has a 38-foot bascule span with a clearance of 8 feet at center. (See **117.240,** chapter 2, for drawspan regulations and opening signals.)

Storm warning signals are displayed. (See chart.)

Channel Five, 8.4 miles westward of Alligator Reef Light, is a natural channel that had a controlling depth of 7 feet on the ocean side and 7½ feet on the bay side in 1963. However, a draft of 9 feet may be taken from the ocean with local knowledge. At times a strong current sets through the channel. The highway viaduct across the channel has a bascule span with a clearance of 8 feet at the center. (See **117.240,** chapter 2, for drawspan regulations and opening signals.) Vessels drawing up to 3 feet can follow the marked route leading westward and northwestward in Florida Bay to Cape Sable and Flamingo.

Flamingo, on the north side of Florida Bay about 9 miles east of East Cape (25°07' N., 81°05'W.), is a visitor's center in **Everglades National Park.** (See chart 11433 (598-SC) for Everglades National Park.)

A dredged channel leads from the bay to the entrance to **Flamingo (Buttonwood) Canal.** The controlling depth was 5 feet in 1963. A marina at the visitor's center, on the west side of the entrance to the canal, has berthing with electricity at the piers with 5 feet alongside. Gasoline, diesel fuel, water, ice, provisions, fishing supplies, restaurant, motel, boat rental, a 2-ton fixed lift, and limited marine supplies are available. There is a marine lift that can handle craft up to 40 feet in an emergency with permission of the park authorities. A highway bridge about 0.5 mile above the entrance to the canal has a 45-foot fixed span with a clearance of 10 feet. A 300-foot tower and an 86-foot standpipe east of the canal about 0.3 mile northeast of the visitor's center are prominent.

Storm warning signals are displayed. (See chart.)

Tennessee Reef Light (24°44.7'N., 80°46.9'W.), 49 feet above the water, is shown from a small black house on hexagonal, pyramidal skeleton tower on piles, about 0.7 mile off the southwestern end of **Tennessee Reef.**

Long Key Anchorage, 3 miles north-northwestward of Tennessee Reef Light, has soft bottom in depths of 15 to 18 feet, but it is exposed to southerly winds.

Turtle Shoal Anchorage, 20 miles southwestward of Alligator Reef Light and 1 mile westward of **East Turtle Shoal Light 45** (24°43.3'N., 80°56.0'W.), has soft bottom in a depth of 27 feet. It is a fair anchorage in fine weather. **West Turtle Shoal** to the southwestward affords another anchorage area in depths of 24 to 36 feet about 1 mile to its westward.

A well-protected yacht basin and a marina are at **Duck Key,** about 3 miles north-northeastward of East Turtle Shoal Light. Private daybeacons mark the channel entrance to Duck Key. In 1972, a reported depth of 10 feet could be carried to the yacht basin, thence 5 feet to the marina beyond. Berths, electricity, gasoline, diesel fuel, and water are available at the yacht basin and marina. A launching ramp, ice, and marine supplies are also available at the marina. Hotels and restaurants are nearby.

Valhalla on **Crawl Key,** about 3 miles northwestward of East Turtle Shoal Light 45, has a marina where gasoline, water, berthage with electricity, provisions, a 3-ton marine hoist, and a launching ramp are available. The controlling depth was 4 feet in the entrance channel and 10 feet alongside the pier in 1963.

Key Colony Beach, about 3 miles southwestward of Valhalla, is a protected harbor westward of **Fat Deer Key.** The controlling depth was 8 feet, in 1963, in the privately marked entrance channel. Gasoline, diesel fuel, water, berthing with electricity, and a launching ramp are available; hull, engine, and electronic repairs can be made.

Sister Creek, about 3.8 miles southwestward of Key Colony Beach and 4 miles northeastward of Sombrero Key Light, is a narrow passage between **Boot Key** and **Vaca Key.** It connects Hawk Channel to the southward with Boot Key Harbor to the northward, and has several arms which provide secure refuge during heavy weather. Vessels tie to

the mangroves. The entrance to the creek between **West Sister Rock** and **East Sister Rock** is marked by a light and daybeacons. Rocks awash extend well into the channel from the east side. In 1963, the controlling depth was 4 feet to Boot Key Harbor.

Boot Key Harbor, on the south side of the town of **Marathon,** is entered southward of **Knight Key** about 4.5 miles northward of Sombrero Key Light. The entrance channel is marked by a light and daybeacons; the color of the banks is also a good guide for the narrow entrance channel. Daybeacons also mark the channel through the harbor for a distance of about 1.5 miles. In 1963, the controlling depth was 7 feet. In 1969, shoaling was reported along the southerly side of the entrance channel; caution is advised. A highway bridge over the channel has a 48-foot bascule span with a clearance of 26 feet at the center. (See **117.240,** chapter 2, for drawspan regulations and opening signals.) An overhead power cable on the west side of the bridge has a clearance of 65 feet.

A group of four radio towers on the southwestern end of Boot Key and three radio towers about 1.1 miles east-northeastward of the first group are prominent.

Boot Key Harbor is a secure refuge and has excellent small-craft facilities. Several marinas and a boatyard in the western part of the harbor can provide berthage with electricity, gasoline, diesel fuel, water, ice, launching ramps, marine supplies, and hull, engine, and electrical repairs. The boatyard on the north side of the harbor, about 300 yards westward of the highway bridge, has a marine railway that can handle craft up to 105 feet in length; a 150-ton marine lift is also available. There are several fish wharves in the harbor where fuel and some services can be obtained. The small-craft facilities on the bay side at Marathon are described in chapter 12.

In 1968, an 8-foot private channel was reported dredged through the shallow eastern part of Boot Key Harbor. The channel leads eastward from near the vicinity of Daybeacon 20 to a marina where berthage with electricity, gasoline, diesel fuel, water, ice, and engine and electrical repairs can be obtained. This marina and Boot Key Harbor proper can also be reached from the southward via Sister Creek as previously described.

A Coast Guard station is on the bay side at Marathon. Also in Marathon are **contract physicians' offices** of the U.S. Public Health Service. (See appendix for addresses.)

Storm warning signals are displayed. (See chart.)

Charts 11442 (1251), 11449 (852), 11445 (853-854).-*Sombrero Key Light* (24°37.6'N., 81°06.6'W.), 142 feet above the water, is shown from a brown, octagonal, pyramidal skeleton tower on pile foundation, enclosing a square dwelling and stair cylinder.

Moser Channel is northwestward of Sombrero Key Light and 95 miles southwestward of Miami. It affords a passage for vessels of 7 to 8 feet in draft between the Florida Keys from the Straits of Florida to Florida Bay. The highway bridge across the channel has a swing span with a clearance of 23 feet. (See **117.240,** chapter 2, for drawspan regulations and opening signals.)

The tidal current at the bridge has a velocity of about 2 knots. Wind effects modify the current velocity considerably at times; easterly winds tend to increase the northward flow and westerly winds the southward flow. Overfalls that may swamp a small boat are said to occur near the bridge at times of large tides. (For predictions, see the Tidal Current Tables.)

Route.-A route with a controlling depth of 8 feet, in 1963, from the Straits of Florida via the Moser Channel to the Gulf of Mexico is as follows: From a point 0.5 mile 336° from the center of the bridge, pass 200 yards west of the daybeacon at Red Bay Bank, thence 0.4 mile east of the light on Bullard Bank, thence to a position 3 miles west of Northwest Cape of Cape Sable (chart 11431 (1253)), thence to destination.

Bahia Honda, 10 miles northwestward of Sombrero Key and between Bahia Honda Key on the east and **Spanish Harbor Keys** on the west, is the deepest channel between the Straits of Florida and Florida Bay. In 1963, the controlling depth was 8 feet from Hawk Channel to Little Pine Key. The passage is crossed by two fixed highway bridges. The southernmost has a clearance of 20 feet and the northernmost 23 feet. The direction of the current should be carefully watched when turning northwestward after passing under the bridges in order to avoid being grounded on the banks on either side of the channel. These banks are usually visible. Currents through the passage have a velocity of about 2 knots. (For predictions at the southernmost bridge, see the Tidal Current Tables.) From Bahia Honda, vessels may proceed via Big Spanish Channel to the Gulf of Mexico as described in chapter 12.

A marina with two boat basins is at the Bahia Honda State Park, on the bayside and near the western end of **Bahia Honda Key.** Depths of 5 feet are reported in the unmarked entrance channel, and 7 to 15 feet in the basins. Berths, electricity, gasoline, water, and some marine supplies are available.

Newfound Harbor Keys Anchorage, 16 miles westward of Sombrero Key Light, is in depths of 19 to 22 feet in the channel northeastward of the light at the west end of the keys. **Newfound Harbor Channel** to the northward is clearly defined by the appearance of the water. A strong current sets fair with the channel. In 1963, the controlling depth was 7 feet to the western of two bridges at the head, 3.4 miles above the entrance. Both bridges have 25-foot fixed spans with clearances of 8 feet under the westerly span and 4 feet under the easterly span.

Niles Channel, 18 miles westward of Sombrero Key Light, is the best channel from the Straits of Florida to the Gulf of Mexico between Bahia Honda and Key West. The controlling depth, in 1963, was 4 feet from Hawk Channel through Niles Channel and **Cudjoe Channel** to the Gulf. The south entrance to Niles Channel is marked by daybeacons, and the narrowest parts of the two channels are marked by private stakes. The highway bridge crossing Niles Channel has a 25-foot fixed span with a clearance of 8 feet. Caution should be exercised to avoid piling on the north side of the bridge.

Loggerhead Key Anchorage, 19 miles westward of Sombrero Key Light, is in a depth of 15 feet, soft bottom, about 0.8 mile eastward of Loggerhead Key. This is a fair anchorage in all but easterly to southerly winds. When going to the anchorage, pass at least 0.3 mile eastward of the buoy 1 mile southeastward of the key.

Bow (Sugarloaf) Channel, about 4 miles westward of Niles Channel and northward of American Shoal Light, is marked by daybeacons from Hawk Channel to the highway bridge. The highway bridge across the channel has a 20-foot fixed span with a clearance of 8 feet. An overhead power cable about 700 yards south of the bridge has a clearance of 31 feet. Currents are strong and set fair with the channel, north with the flood and south with the ebb. The channel is not recommended for a draft of over 2 feet without a pilot. The controlling depths, in 1963, were 4 feet from Hawk Channel to the highway bridge, thence 3 feet to the Gulf of Mexico via Johnston Key Channel. Cudjoe Bay, eastward of the channel, offers fair holding ground for fishing boats.

American Shoal Light (24°31.5'N., 81°31.2'W.), 109 feet above the water, is shown from a brown, octagonal pyramidal skeleton tower on pile foundation, enclosing a brown dwelling and white stair cylinder.

West Washerwoman Anchorage, 4.3 miles northwestward of American Shoal Light, has depths of 23 feet, soft bottom. Another anchorage in a depth of 24 feet, soft bottom, is 5 miles westward of **Ninefoot Shoal Light** (24°34.1' N., 81°33.1'W.).

Saddlebunch Harbor, 10.5 miles eastward of Key West, is a good hurricane anchorage for small craft. The northwest end of the harbor is obstructed by the ruins of a bridge.

Stock Island Channel, entered about 12.4 miles west-southwestward of American Shoal Light, leads from the Straits of Florida to a point in Hawk Channel just southward of Boca Chica Channel and the entrance to Safe Harbor. The entrance is marked by a light and the channel by unlighted buoys.

Boca Chica Key, 5 miles eastward of Key West, is the site of the Key West U.S. Naval Air Station. **Boca Chica Channel,** with a centerline controlling depth of 13 feet, in 1963, from Hawk Channel to the naval air station basin on the west side of the key, is marked by a light at the entrance, thence by lights and daybeacons. An overhead power cable has a clearance of 60 feet across the channel. The basin provides a good hurricane anchorage for small vessels.

Safe Harbor, 4 miles eastward of Key West, is a medium-draft harbor on the south side of Stock Island. Conspicuous objects include a powerplant and desalination plant on the east side and a sand-and-gravel plant at the head of the harbor.

The controlling depth was reported to be 20 feet through the entrance with deeper water inside, in April 1972. A light marks the approach and daybeacons mark the channel.

Petroleum is received by barge at a facility on the east side of the harbor near the entrance; depths of 18 feet are reported alongside.

In the fishing harbor on the west side are seafood packers and cold-storage facilities. A shipyard in this area has a 90-ton marine lift that can handle craft up to 85 feet. A 300-ton floating drydock that can handle craft up to 80 feet in length and 12-foot draft is also available. Hull and engine repairs can be made. A marina on the east side has berths with electricity, and depths of 15 feet alongside. At the southeast end of Stock Island there is a boatyard and marina operating a 12-ton mobile hoist. Gasoline, diesel fuel, ice, and water are available at the fish piers and marina, and at the latter are marine supplies, launching ramps, and boats for hire. Open storage is available.

Cow Key Channel, between Stock Island and Key West, is privately marked by daybeacons and had a controlling midchannel depth of 2 feet in 1963. The channel is narrow, and a shoal which bares extends about 100 yards southward from Daybeacon 1 on the west side of the channel. Shallow-draft craft can pass through the highway bridge between the keys. The bridges have 16-foot spans with a clearance of 8 feet. A small marina just south of the bridge has gasoline, water, ice, boat rental, and some marine supplies. Hull and engine repairs can be made. North of the bridges the channel is unmarked and difficult to follow.

Charts 11441 (584), 11447 (576).-Key West Harbor is 134 miles and 151 miles southwestward of Miami Harbor via the inside and coastwise routes, respectively. The harbor proper lies in front of the city of Key West, protected on the eastern side by the island and on the other sides by reefs and sand flats. The harbor is entered through breaks in the reef by five principal channels with depths of 13 to 34 feet, and by several minor channels.

Key West ,on the island of the same name near the western end of the Florida Keys, is a winter resort and the site of the U.S. Naval Base. Commercial fishing is one of the leading industries, but commerce is mostly in crude and refined oils.

Dumping grounds have been established in the Straits of Florida about 40 miles south-southeastward of Key West. (See **205.80 (a), and (b) (6),** chapter 2, for limits and regulations.)

Prohibited dumping grounds have been established in the Straits of Florida south of Key West Harbor, within the Main Ship Channel and in the approaches and entrance to the channel. (See **205.80 (a), and (c) (2),** chapter 2, for limits and regulations.)

Prominent features.-Easy to identify when standing along the keys is a 300-foot-high radio tower at the U.S. Naval Base north of Fort Taylor, the hotel cupola, and the Naval Hospital cupola. Numerous tanks, lookout towers, and masts are prominent, but difficult to identify. Also conspicuous are a white radar dome on Boca Chica Key and the white dome of the National Weather Service station at Key West International Airport. From southward, a six-story apartment complex on the southern shore just westward of the airport is prominent; it is lighted by yellow lights at night.

Sand Key Light (24°27.2'N., 81°52.7'W.), 109 feet above the water, is shown from a brown square pyramidal skeleton tower, enclosing a stair cylinder and square dwelling on pile foundation, on **Sand Key.**

Boundary lines of inland waters.-The lines established for the Key West area are described in **82.55** and **82.60,** chapter 2.

Channels.-Main Ship Channel is the only deep-draft approach to Key West. Federal project depth is 34 feet from the Straits of Florida to a turning basin off the U.S. Naval Station and inside the station basin, thence 30 feet to an upper turning basin off Key West Bight, and thence 12 feet to and including a turning basin in the bight. (See Notice to Mariners and latest editions of the charts for controlling depths.) The channel from the entrance to the upper turning basin is marked by lighted ranges and other aids to navigation.

Northwest Channel is a medium-draft passage between Key West Harbor and the Gulf of Mexico. In January 1974, the controlling depth was 15 feet, with local knowledge. Vessels drawing up to 13 feet can pass directly across the reefs from the Gulf to the Straits of Florida by way of Northwest Channel and Main Ship Channel. The Gulf end of the channel is shifting westward.

The jetties on either side of the Gulf entrance to Northwest Channel are 0.3 to 0.5 mile from the centerline of the channel, and only the outer part of the east jetty shows above low water. The channel is marked by lighted ranges, and lighted and unlighted buoys. The inner range is difficult to identify until within a mile of the front light. The pilings and platform of a former lighthouse are 0.3 mile southwestward of the west jetty.

Smith Shoal (see chart 11439 (1252)), about 4.5 miles northward of the northern entrance to Northwest Channel, is covered 11 feet and marked on its northeast end by **Smith Shoal Light** (24°43.2'N., 81°55.0'W.). The light marks also the northern approach to the channel and is shown 47 feet above the water from a small black house on a white, hexagonal, pyramidal skeleton tower on piles. A relatively flat-topped coral head, covered by a least depth of 11 feet, is about 3.3 miles west-southwestward of the light.

Southwest Channel, a convenient approach to Key West from southwestward, has been swept to a depth of 23 feet and is marked by buoys. In 1961, this depth was confirmed for midchannel. A general course following the aids leads to the outer anchorage and Main Ship Channel. Strangers should not attempt passage at night.

West Channel, a passage leading westward from Key West between the keys and outer reefs, is deep and fairly well marked. It is used by small boats bound toward the Dry Tortugas.

Calda Channel leads northward from Man of War Harbor to the open waters of the Gulf. The channel is narrow and crooked, but is well marked by daybeacons and a light at the northerly end. The controlling midchannel depth was 5 feet in 1963. The channel should be used only with local knowledge and during good visibility.

Garrison Bight (Barque) Channel, well marked, leads around the north end of Fleming Key, thence southward to a dredged section of the channel which leads along the north side of Trumbo Point into Garrison Bight. In 1972, the reported controlling depth was 8 feet. An overhead power cable crosses the entrance and the northerly part of the bight; clearances are 50 feet at the entrance and 34 feet elsewhere. A causeway with bridge crosses over the southwesterly part of the bight; the 44-foot fixed span has a clearance of 19 feet.

Garrison Bight can also be reached via an unmarked channel which leads from Man of War Harbor eastward between Fleming Key and the north shore of Key West to the junction with the dredged section of Garrison Bight Channel at Trumbo Point. A depth of about 6 feet can be carried to the junction. The channel is crossed by a 42-foot fixed span highway bridge with a clearance of 18 feet which connects Fleming Key with Key West. Garrison Bight has excellent small-craft facilities; these are described later in the chapter.

The Intracoastal Waterway from Miami to Key West connects with Garrison Bight Channel off the north end of Fleming Key.

Measured course.-South of **Sand Key** is a measured course 6,510 feet long on course **089°38'-269°38'.** The westerly front range marker is 140 yards north of Sand Key Light, and the easterly front marker is 50 yards north of **Rock Key** to the eastward of the light. The rear markers are about 600 yards north of the front markers. All are slatted white daymarks with vertical black trim.

Anchorages.-The best anchorage is north of the city in **Man of War Harbor** where depths are 14 to 26 feet. This, the usual quarantine anchorage, is protected against heavy seas by Frankfort and

Pearl Banks, coral banks, on the west and **Fleming Key** on the east. Small craft usually anchor in **Key West Bight** or at the Municipal Marina or at the Key West Yacht Club in **Garrison Bight** on the north side of the city.

Vessels can anchor west of the city in depths of 20 to 26 feet, taking care, however, to avoid the reefs which rise abruptly in some places along the edges of the channels. The outer anchorage, southwest of **Fort Taylor**, is somewhat exposed, but has depths of 22 to 36 feet and is safe for vessels with good ground tackle. The anchorage area at Key West is one of the best for large vessels south of Chesapeake Bay.

Dangers.-A **naval restricted area** is off the south side of Key West near its southwestern end; limits and regulations are given in **207.173**, chapter 2. Waters near naval facilities at Key West are **restricted;** limits and regulations are given in **207.173a**, chapter 2.

A **naval explosives anchorage area** has been established about 2.5 miles southwestward of Key West. (See **110.189a**, chapter 2, for limits and regulations.)

A **naval operating danger area** is in the Straits of Florida and Gulf of Mexico westward of Key West; limits and regulations are given in **204.95**, chapter 2.

Caution.-Craft approaching Key West, Boca Chica, and Safe Harbor from the eastward through Hawk Channel should be mindful that submerged rocks and reefs extend up to 0.6 mile off the keys and give little or no indication of their presence under certain conditions.

Tides.-The mean range of tide is 1.3 feet at Key West, and 2.5 feet at the Northwest Channel jetties. Daily predictions for Key West are given in the Tide Tables.

Currents.-In the southern approaches to Key West within the 10-fathom curve just inside the entrance to the main channel, the tidal currents are weak and set northward on the flood and southward on the ebb at 0.4 knot. In the main channels west of Fort Taylor, the flood (northerly) and ebb (southerly) currents are 1.0 knot and 1.7 knots, respectively. North of Key West, in the upper turning basin, the tidal currents set northeastward on the flood at 0.8 knot and southwestward on the ebb at 1.1 knots. In Northwest Channel about 2.5 and 5.5 miles, respectively, from Key West, the currents are 1.2 knots and 0.6 knot. Daily predictions for Key West are given in the Tidal Current Tables, however, both the time and velocity of the tidal current are influenced by the winds.

Weather.-Because of its nearness to the Gulf Stream, and the tempering effects of the Gulf of Mexico, Key West has a notably mild, tropical-maritime climate in which average temperatures during the winter are only about 14° F. lower than in summer. Prevailing easterly tradewinds and sea breezes suppress the usual summertime heating.

The rainy season is June through October when more than 50 percent of the annual average falls in the form of showers and thunderstorms. Early morning is the favorite time for diurnal showers. Occasional easterly waves and tropical cyclones bring excessive rainfall amounts. (See page T-5 for **Key West climatological table.**)

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade and coastwise vessels drawing more than 6 feet. Pilotage is optional for U.S. coastwise vessels having on board a pilot licensed by the Federal Government. Vessels are boarded day or night at Key West Entrance Lighted Whistle Buoy (24°27.7'N., 81°48.1'W.). Various boats will be used by the pilot to meet vessels. Pilots may be arranged for through the Key West Pilots (telephone 305-296-5512), or through the Key West marine operator on VHF-FM channels 16 (156.80 MHz) and 26 (157.30 MHz), or through the ships' agents. The marine operator telephone number at Key West is 305-294-6655. The pilots request a 24-hour notice of time of arrival. Fishermen are available as pilots for Hawk Channel.

Towage.-There is no commercial tug service for vessels. Key West is the regular station for a large 3,800 hp salvage tug. General equipment is available for heavy salvage work.

Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) Vessels subject to boarding are required to anchor in Man of War Harbor if size and draft of vessel permit; larger vessels anchor in the outer harbor.

A **contract physician's office** of the U.S. Public Health Service is at Key West. (See appendix for address.) In addition to the county and Naval hospitals, two private hospitals are available.

Agriculture quarantine inspections are conducted at the vessel's berth. Officials maintain an office in the Federal Building.

Immigration officials maintain an office in the Federal Building; vessels are inspected at their berths.

Customs.-Key West is a port of entry. Vessels are inspected at their berths. Officials maintain an office in the Federal Building.

Coast Guard.-The **Captain of the Port** is at the Coast Guard Base. The Marine Inspection Office at Miami maintains a **documentation office** at the Federal Building in Key West.

Harbor regulations.-The **harbormaster** has direct supervision of the port, of anchoring and mooring all vessels, and collection of port dues. A **speed limit** of 5 m.p.h. is enforced in the Main Ship Channel from about 1 mile southward of Fort Taylor to the inner harbor. The harbormaster can be contacted through City Hall.

Wharves.-Municipal Wharf (24°33'35"N., 81°48'28"W.) is also known as **Mallory Wharf.** It is 870 feet long and has a deck height of about 7 feet. The northerly half is owned by an oil company,

and the southerly half is owned and operated by the city of Key West as a general cargo facility and yacht moorage. In 1972, depths of about 20 feet were reported along the northerly half, and 23 feet along the southerly half. Water and electrical shore power connections are available at the wharf.

Pier D-3 (24°34.0'N., 81°48.0'W.), south side has two 375-foot berths with roll-on/roll-off ramps at each berth. In 1974, 24 feet was reported alongside the inner berth and 26 feet alongside the outer berth. Covered storage space of 6,000 square feet and 45,000 square feet of open storage is available. Water is available at the pier. The pier is operated by the Key West Port and Transit Authority. The only other deepwater wharves in the port are those of the U.S. Navy. Commercial fish wharves are in Key West Bight and Safe Harbor. Charter boats and yachts use Garrison Bight.

Supplies.-Gasoline, diesel fuel, provisions, and marine supplies can be obtained in Key West.

Repairs.-There are no commercial drydocks or major repair facilities for deep-draft vessels in Key West; the nearest such facilities are at Tampa, and Jacksonville, Fla. There are three repair yards at Key West, two inside Key West Bight and one to the westward of the bight. The largest yard is inside the bight and has a marine railway that can haul out vessels up to 160 feet for hull and engine repairs. Larger vessels can obtain above-waterline repairs. A 25-ton mobile hoist at the yard westward of the bight can haul out craft up to 40 feet. Radio and electronic repairs can be made. Additional repair facilities are at Safe Harbor.

Small-craft facilities.-Berthage, electricity, gasoline, diesel fuel, water, ice, some marine supplies, food, and lodging are available in Key West, and hull, engine, electrical, and electronic repairs can be made. Small craft moor in Key West Bight, in Garrison Bight at the Municipal Marina or at Key West Yacht Club, which are at the southwest and eastern ends of the bight, respectively. A causeway across the southwestern part of Garrison Bight has a small-craft opening. The highway bridge over the opening has a 44-foot fixed span with a clearance of 19 feet at the center. An overhead power cable crossing the northern part of Garrison Bight and the entrance has a clearance of 50 feet over the entrance and 34 feet elsewhere. Anchorage in 6 to 8 feet is available at the Municipal Marina and at the Key West Yacht Club. Anchoring or mooring elsewhere in Garrison Bight, except in an emergency or as a shelter during bad weather, is not permitted. Public small-boat ramps are in Garrison Bight and at the foot of Simonton Street.

Communications.-There are no rail connections at Key West. Movement of freight in and out of the port is by vessel or truck. The Overseas Highway (U.S. Route 1) connects the city with Miami and points north, and there is air service to Miami. Bus service is available to mainland points.

Information about the Florida Reefs west of Key West and the Gulf of Mexico is contained in United States Coast Pilot 5, Atlantic Coast-Gulf of Mexico, Puerto Rico, and Virgin Islands.

12. INTRACOASTAL WATERWAY, ATLANTIC SECTION

The part of the **Intracoastal Waterway** described here is the toll-free **"canal"** which affords continuous protected passage behind the Atlantic Coast and the Florida Keys for more than 1,243 statute miles between Norfolk, Va., and Key West, Fla. **Route 1,** the basic route, follows Albemarle and Chesapeake Canal (Virginia Cut) to Albemarle Sound; **Route 2,** the alternate route, is through Dismal Swamp Canal to the sound.

Also described in this chapter is the Okeechobee Waterway, which junctions with the Intracoastal Waterway in St. Lucie Inlet.

The Intracoastal Waterway is used by commercial light-draft vessels and tows unable to navigate long stretches in the open ocean, and by pleasure craft. Small-boat and recreation facilities are found along the waterway. Supervision of the waterway's construction, maintenance, and operation is divided among five U.S. Army Engineer Districts (Norfolk, Wilmington, Charleston, Savannah, and Jacksonville) whose district-office addresses are listed in the appendix.

Mileage.-The Intracoastal Waterway (I.W.) mileage is zeroed in 36°50.9'N., 76°17.9'W., off the foot of West Main Street, Norfolk, Va., and progresses southward to I.W. Mile 1243.9 at Key West, Fla., in 24°33.7'N., 81°48.5' W.

Distances along the Intracoastal Waterway are in statute miles to facilitate reference to the small-craft charts; all other distances are nautical miles. Mileage conversion tables are on page T-22.

Channels.-The Federal project for the Intracoastal Waterway via Albemarle and Chesapeake Canal provides for a least depth of 12 feet from Norfolk, Va., (I.W. Mile 0.0) to Fort Pierce, Fla., (I.W. Mile 965.6), thence 10 feet to Miami, Fla., (I.W. Mile 1089.0), and thence 7 feet to Key West, Fla., (I.W. Mile 1243.9). The Miami to Key West section of the waterway has been completed only as far as Cross Bank (I.W. Mile 1152.5); the remainder has been deferred for restudy. Although no work has been performed on this section of the waterway, a channel, marked in accordance with I.W. markings, leads from Cross Bank to Key West along the northwesterly side of the Florida Keys. The channel has a controlling depth of about 5 feet and is exposed to winds from the northwest.

The controlling depths for the Intracoastal Waterway are published in local Notices to Mariners.

The alternate route of the Intracoastal Waterway through the Dismal Swamp Canal and the Okeechobee Waterway is described later in this chapter.

Bridges and cables.-(See pages T-20 and T-21 for controlling clearances of bridges and cables crossing the waterway.)

General drawbridge regulations and opening signals for bridges over the Intracoastal Waterway are given in **117.240,** chapter 2. **Special drawbridge regulations** for certain bridges that supplement the general regulations are referenced with the area description of the waterway.

As a public service and to assist in the management and safety of the Intracoastal Waterway, VHF-FM frequencies 156.80 MHz (Channel 16) and 156.65 MHz (Channel 13) are monitored at some of the bridges.

Emergency mooring facilities are available for passing vessels on a "first come" basis at several points along the waterway between Neuse River and Holden Beach, N.C., (Mile 188.5 to Mile 325.0), and are referenced in geographical sequence. Each is parallel to the channel and provides 400 feet of berthing space. The dolphins at the extreme ends at each site are marked by white scotch-lite reflectors to assist with identification at night.

Caution.-When running with a fair tide or in windy weather, exercise caution when approaching and passing bridges and sharp turns. Many of the overhead cables over the waterway carry high voltage, and a margin of safety should be allowed when weather is unfavorable.

Locks.-Great Bridge Lock (mile 11.5) is the only lock on the Intracoastal Waterway between Norfolk and Key West via Albemarle and Chesapeake Canal. It is 600 feet long, 75 feet wide, 16 feet over the sills, and has a lift of 2.7 feet. (See **207.160,** chapter 2, for regulations governing use, administration, and navigation of locks and floodgates.)

Locks on the Dismal Swamp Canal and the Okeechobee Waterway are described later in this chapter.

Ferries.-A cable ferry crosses the Intracoastal Waterway at Mile 411.5. The cable is suspended during crossings and is dropped when the ferry docks. **Do not attempt to pass a moving cable ferry.**

Aids to navigation.-Intracoastal Waterway aids have characteristic yellow markings which distinguish them from aids to navigation marking other waters. (See U.S. Coast Guard Light Lists or Chart 1 (Nautical Chart Symbols and Abbreviations) for illustrations of special markings.)

Lights and daybeacons should not be passed close aboard because those marking dredged channels are usually placed back from the bottom edge of the channel and others may have rip-rap mounds around them to protect the structures.

Charts.-Navigation of the Intracoastal Waterway can be made easier by use of the special small-craft series which the National Ocean Survey publishes.

Tides.-Under ordinary conditions the mean range of tide in the waterway is from nontidal to about 7 feet. In many sections, the tide depends on the force and direction of the wind. Severe hurricanes have raised the water surface 10 feet or more above low water, in some localities.

Cross currents.-Where two streams cross, the current will have a greater velocity in the deeper channel. This is noticeable along the Intracoastal Waterway where it follows a dredged canal cutting across a winding stream. Cross currents will also be noticed where either an inlet from the ocean or a drainage canal enters the waterway.

Weather.-Storm warning signals are displayed at various places along the Intracoastal Waterway and connecting channels. Display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Chart 12206 (829-SC).-Norfolk, on the east bank of the Elizabeth River in Norfolk Harbor 26 miles inside the entrance to Chesapeake Bay, is one of the major ports of the United States. Supply and repair facilities are available at the marinas and yacht basins in Norfolk Harbor. A detailed description of the port is contained in **United States Coast Pilot 3, Atlantic Coast, Sandy Hook to Cape Henry.**

From the City Wharf at the foot of West Main Street in Norfolk, **Mile 0.0,** the Intracoastal Waterway follows the Southern Branch of Elizabeth River to its junction with Deep Creek where the waterway divides into two routes. The mean range of tide in Southern Branch and Deep Creek is about 2.5 to 3 feet. **Naval restricted areas** are on both sides of the river; limits and regulations are given in **207.153,** chapter 2.

The **speed limit** is 6 knots from Eastern Branch to the Norfolk and Portsmouth Belt Line Railroad bridge, **Mile 2.6.** (See **207.154,** chapter 2.) This bridge has a lift span with a clearance of 6 feet down and 142 feet up. At **Mile 2.8,** Jordan (State Route 337) highway bridge has a lift span with a clearance of 15 feet down and 145 feet up. The Norfolk and Western Railway bridge at **Mile 3.6** has had its swing span removed, and, in 1973, was being modified to a vertical lift bridge with design clearances of 135 feet up and 10 feet down. U.S. Routes 460 and 13 highway bridge and the Norfolk and Western Railway bridge at **Mile 5.8** have bascule spans with a clearance of 7 feet; large vessels must exercise caution when making the turns to these bridges because of the current. The overhead power cables at **Miles 6.5 and 6.7** have clearances of 145 feet and 127 feet, respectively. Interstate Highway Route 64 bascule bridge at **Mile 7.1** has a clearance of 65 feet. (See **117.245 (a) through (e), (f), (26a), and (26b),** chapter 2. for drawbridge regulations.)

The **Albemarle and Chesapeake Canal (Virginia Cut),** about 10 miles long, connects Southern Branch of Elizabeth River with North Landing River.

Route 1.-Via the Albemarle and Chesapeake Canal to North River.-From **Mile 7.6** at the entrance to Deep Creek, the basic route continues through Southern Branch, the Albemarle and Chesapeake Canal, North Landing River, Currituck Sound, Coinjock Bay, and North Carolina Cut to North River. The route is well marked and easily followed in daylight; strangers are advised against running at night.

At **Mile 8.1,** the Norfolk and Portsmouth Belt Line Railroad bridge across Southern Branch has a hand-operated swing span with a clearance of 7 feet; span usually kept in the open position. Virginia Highway 166 bridge at **Mile 8.8** has a bascule span with a clearance of 12 feet. At the entrance of **Sykes Creek, Mile 9.3,** there is a small-craft basin with reported depths of 6 feet in the approach and alongside the berths. Berthage with electricity, water, gasoline, diesel fuel, ice, and some marine supplies are available. A marine railway in the basin can handle craft up to 35 feet for hull repairs.

Great Bridge Lock, Mile 11.5, at the Southern Branch end of the Albemarle and Chesapeake Canal, is a tidal guard-lock 600 feet long, 75 feet wide, 16 feet over the sills, and a lift of 2.7 feet. Maximum length of tow allowed in the lock is 530 feet. Vessels and tows wider than 45 feet will not be permitted to pass through the lock without prior permission of the District Engineer. Tie-up dolphins are available at Great Bridge for temporary mooring when passage through the lock is delayed. There is no periodic tide southward of the lock; the water level depends on the force and direction of the winds. All vessels passing through the lock are required to list their registry, tonnage, and passengers.

Great Bridge, a town on the south side of the Albemarle and Chesapeake Canal at **Mile 12.0,** has telephone and bus connections with Norfolk. State Route 168 highway bridge across the canal at the town has a swing span with a clearance of 6 feet. (See **117.350,** chapter 2, for drawbridge regulations.)

A privately owned marine basin is on the south side of the canal a short distance eastward of Great Bridge. Reported depths of 12 feet are in the approach and 9 feet alongside the piers in the basin. Berthage with electricity, water, gasoline, diesel fuel, ice, and some marine supplies are available. A marine railway that can handle craft up to 110 feet and a 40-ton fixed lift are in the basin; hull, engine, and electronic repairs can be made.

From Great Bridge, the Albemarle and Chesapeake Canal continues eastward almost in a straight line for a distance of about 7 miles. The Norfolk Southern Railway bridge at **Mile 13.9** has a bascule span with a clearance of 7 feet. Virginia Highway 604 bridge at **Mile 15.2** has a swing span with a clearance of 4 feet.

North Landing, Mile 20.2, is a small town at the junction of Albemarle and Chesapeake Canal and North Landing River. State Route 165 highway bridge over North Landing River at North Landing has a swing span with a clearance of 6 feet. VHF-FM channels 16 (156.80 MHz) and 13 (156.65 MHz) are monitored at the bridge.

A small-craft facility at North Landing has gasoline, water, a launching ramp, and some marine supplies.

North Landing River is narrow and crooked for a distance of about 9 miles below the Albemarle and Chesapeake Canal. The worst bends have been bypassed by dredging through the marshy points; the remaining bends are usually easy. The old channels through the cut-off bends have numerous wrecks, partially visible at mean low water, and some submerged wrecks which are dangerous to navigation. At **Pungo Ferry, Mile 28.3,** State Route 726 highway bridge across the river has a swing span with a clearance of 7 feet.

A small-craft facility is in the basin on the east side of the river just northward of the highway bridge. Depths of 7 feet are reported in the approach and alongside the berths. Berthage with electricity, gasoline, diesel fuel, water, ice, and some marine supplies are available.

From **Mile 30.2,** the route is through a dredged cut in the open waters of North Landing River and **Currituck Sound,** thence into **Coinjock Bay** and through North Carolina Cut to the head of North River. **Munden** is a town on the east side of North Landing River at **Mile 32.0;** the wharf is in ruins. **Currituck** is a town on the west side of the mouth of North Landing River opposite **Mile 41.5.** A toll-free passenger-auto ferry, operated by the State Highway Commission, runs from Currituck to Knotts Island, N.C.

Coinjock, Mile 49.9, is a town on the Norfolk-Hatteras Highway, midway along the **North Carolina Cut.** U.S. Route 158 highway bridge across the cut here, has a swing span with a clearance of 4 feet. VHF-FM channels 16 (156.80 MHz) and 13 (156.65 MHz) are monitored at the bridge. An overhead power cable on the north side of the bridge has a clearance of 85 feet. Berthage with electricity, gasoline, diesel fuel, water, ice, and marine supplies can be obtained at the small-craft facilities northward and southward of the bridge. Two marine railways, the larger of which can handle craft up to 60 feet, and a 6-ton fixed lift are available at the facilities on the west bank of ths cut northward of the bridge; hull, engine, and electronic repairs can be made. A launching ramp is at the facility on the east side of the cut southward of the bridge.

Storm warning signals are displayed. (See chart.)

A canal 22 feet wide branches northeastward from North Carolina Cut about 1 mile northward of the Coinjock Bridge, and connects with Currituck Sound through **Parker Creek.** In 1970, depths of about 4 feet were reported in the canal. Tree stumps in the canal limit its use to outboards only; caution is advised.

North River is about 14 miles long from North Carolina Cut to the entrance from Albemarle Sound and has a general depth of about 9 feet outside the dredged cut of the Intracoastal Waterway. The channel is marked by lights and daybeacons, and a **004°** lighted range marks the section through the bar at the mouth of the river. On the east side of the river, near the mouth, is the town of **Jarvisburg, Mile 63.0;** the dock is in ruins.

Route 2.-Via Dismal Swamp Canal to Albemarle Sound.-This alternate route from the entrance to **Deep Creek, Mile 7.6,** leads westward from the Southern Branch to Dismal Swamp Canal, thence through Pasquotank River to Albemarle Sound.

Vessels that proceed with care and follow the chart can navigate this route without difficulty. Extra caution is required in Deep Creek, Turners Cut, and the numerous sharp bends in the upper reaches of the Pasquotank River. Winds sometimes cause a variation of 1 to 2 feet in water level.

Dismal Swamp Canal, a 19-mile-long nontidal summit-level section, is controlled by a lock at each end. "NO WAKE" signs have been posted in the canal. Vessels shall proceed at a speed to cause minimum wake.

Channels.-Federal project depths are 10 feet in Deep Creek, 9 feet in Dismal Swamp Canal, and 10 feet in Pasquotank River. Controlling depths are published in the local Notices to Mariners.

Bridges and cables.-(See pages T-20 and T-21 for controlling clearances of bridges and cables crossing the Intracoastal Waterway.)

General drawbridge regulations and opening signals for bridges over the Intracoastal Waterway are given in **117.240,** chapter 2. **Special drawbridge regulations** for certain bridges that supplement the general regulations are referenced with the area description of the waterway.

Locks.-There are two locks on the alternate route, one at the upper end and the other at the lower end of the Dismal Swamp Canal. **Deep Creek Lock** (Mile 10.6) and **South Mills Lock** (Mile 33.2) have the same dimensions; 300 feet long, 52 feet wide, 12 feet over sills, and lift of 12 feet. Vessels and tows wider than 35 feet will not be permitted to pass through the locks without prior permission of the District Engineer. Regulations governing use, administration, and navigation of locks and floodgates are given in **207.160,** chapter 2.

At times, due to low water, navigation may be restricted or the canal closed. During restricted operations at Deep Creek Lock, boats up to 20 feet can be moved from one level to the other by a marine railway. Locks and bridges are operated only between the hours of 0600 and 2200 daily.

At Deep Creek Lock, **Mile 10.6,** vessels are required to list their registry, tonnage, and passengers. A dock about 100 feet long is at the lock. The town of **Deep Creek** is at **Mile 11.1** , and U.S. Route 17 highway bridge across the canal here has

a bascule span with a clearance of 4 feet. Just south of the bridge is a bulkhead with 4 to 8 feet alongside where gasoline and some supplies may be obtained; there is a small-boat launching ramp.

An overhead power cable with a clearance of 111 feet is at **Mile 12.7.**

At **Mile 21.5,** a 30-foot-wide feeder ditch runs in a straight line westward from the Dismal Swamp Canal for about 3 miles to **Lake Drummond;** the ditch has a controlling depth of 4 to 5 feet, and the lake has depths of 3 to 5 feet. Lake Drummond is about 2.2 miles in diameter and the water level is about 6 feet higher than the canal. Flow of water from the lake is regulated by a series of gates or wickets in the feeder ditch at the Corps of Engineers reservation 0.5 mile from the lake. Boats up to 18 feet are moved overland past the gates by a small railway. All persons entering or leaving Lake Drummond through the feeder ditch are required at the gates to register their name, address, and purpose of visit. Visitors are warned of the dangers of being lost in the swamps and the menace of poisonous snakes, and are cautioned to take precautions to prevent forest fires. After winter and spring runoffs of water from Lake Drummond, there is a tendency for shoals to build up at the intersection of the Dismal Swamp Canal and the feeder ditch.

Diesel fuel by tank truck, and gasoline are available on the east side of the canal at **Mile 31.5.** Supplies are available at **South Mills, Mile 32.4.**

U.S. Highway 17 bridge across the canal at **Mile 32.6** has a bascule span with a clearance of 4 feet. The **South Mills Lock** of the Dismal Swamp Canal is at **Mile 33.2.** Tieup dolphins are available for temporary mooring when passage through the lock is delayed.

Turners Cut is a canal which extends in nearly a straight line from the south end of Dismal Swamp Canal to the Pasquotank River **Mile 37.0.**

Pasquotank River has a length of 12 miles from the south end of Turners Cut to Elizabeth City, and thence 15 miles to Wade Point Light at the entrance from Albemarle Sound. The narrow upper part of the river has been improved by dredging, where necessary, to attain the project depth of the waterway. From Elizabeth City to the mouth, the river varies in width from 0.5 to 3 miles, has general depths of 8 to 12 feet, and is well marked by lights.

The Norfolk Southern Railway bridge across Pasquotank River at **Mile 47.7** has a hand-operated swing span with a channel width of 42 feet and a clearance of 3 feet.(See **117.245 (a) through (e) and (g) (1),** chapter 2, for drawbridge regulations.) The overhead power cable along the south side of the bridge has a clearance of 85 feet.

Knobbs Creek is a nontidal fresh water stream on the north side of Elizabeth City and enters Pasquotank River at **Mile 50.2.**

A dredged channel leads from Pasquotank River to a turning basin about 0.9 mile above the entrance, thence to the Norfolk Southern Railway bridge at the head of navigation about 1 mile above the entrance. In 1959-June 1974, the controlling depths were 9 feet on the centerline to the basin, thence 5½ feet in the basin, thence 2½ feet on the centerline to the head of navigation.

Elizabeth City, Mile 50.7, on the west bank of Pasquotank River, is one of the most important towns on the inland waters of North Carolina, and has rail, airline, and highway connections with Norfolk. Waterfront bulkheads have 20 to 27 feet alongside, and a vessel can usually find a berth. Anchorage can be had in depths of 7 to 12 feet on the north side of the channel just below the city. U.S. Route 158 highway bridges across the river at **Mile 50.7** have bascule spans with least clearances of 2 feet. The river water is practically fresh.

Weather.–Close to the Albemarle Sound and the Atlantic Ocean, Elizabeth City enjoys mild winters and warm summers. Although the average daily maximum temperature is near 90°F in July, a reading of 100°F or more is reached, on the average, only 1 day per year. Winds blow most frequently from the southwest, except in the fall when the prevailing direction is northeast.

Rainfall averages around 50 inches annually. Fall is the driest time of the year, while winter rains come from low-pressure systems. Summer rainfall is principally in the form of brief showers and thunderstorms. **Storm warning signals are displayed.** (See chart.)

The Marine Inspection office of the U.S. Coast Guard, in Wilmington, N.C., maintains a **documentation office** in Elizabeth City.

Complete supply and repair facilities, restaurants, and hotel and motel accommodations are available at Elizabeth City. Small-craft facilities on both sides of the river southward of the bridge have about 3,600 feet of berthing space available. Gasoline, diesel fuel, water, ice, and marine supplies can be obtained.

A boatyard on the south side of the river about 0.4 mile south of the bridge has a 60-ton fixed lift, and a marine railway that can handle craft up to 200 feet. Another boatyard just to the northward has a marine railway that can handle craft up to 65 feet in length. Both facilities can make hull, engine, and electronic repairs.

Elizabeth City has railroad freight connections with the Norfolk Southern railway and highway connections with U.S. Routes 17 and 158 and State Route 168. A commercial airline serves the local airport.

A Coast Guard air base is on the southwest side of the river about 3 miles southeastward of U.S. Route 158 highway bridge at Elizabeth City.

Newbegun Creek enters Pasquotank River about 8.5 miles below Elizabeth City. **Weeksville,** the principal town on the creek, is 3 miles from the mouth. The controlling depth in 1963 was about 4 feet over the bar and in the main part of the creek. The creek is unmarked.

Route 2 continues down the Pasquotank River, passing northward of Pasquotank River Entrance Light, and then turns southward across Albemarle Sound to join with Route 1 at the light at the entrance to Alligator River.

Chart 11553 (831-SC).-From the vicinity of the light at the entrance to North River, Route 1 continues across Albemarle Sound for 12.7 miles to the light at the entrance to Alligator River, where alternate Route 2, via the Dismal Swamp Canal rejoins the basic route. The passage across the sound to Alligator River is marked by lights. In heavy weather the passage is uncomfortable and even dangerous for open boats. The rise and fall of the water level in Albemarle Sound depends on the wind.

Alligator River extends in a southerly direction, for about 20 miles, then turns west and narrows. The channel of the Intracoastal Waterway has been dredged the entire length of the wider part of the river and for about 4 miles through its western reach to the land cut connecting with Pungo River. The channel is well marked by lights and daybeacons. U.S. Route 64 highway swing bridge with a clearance of 14 feet crosses the waterway at Mile 84.2 opposite **East Lake** on the eastern shore.

Alligator River and Little Alligator River are discussed in more detail in chapter 4.

The route of the waterway passes from Alligator River to the **Alligator River-Pungo River Canal** at **Mile 105.0,** a land cut extending about 21 miles in a southwesterly direction. At **Mile 113.8,** State Route 94 highway bridge over the canal has a swing span with a clearance of 7 feet. The channel is through the south draw. VHF-FM channels 16 (156.80 MHz) and 13 (156.65 MHz) are monitored at the bridge. An overhead power cable just west of the bridge has a clearance of 100 feet. **Fairfield Canal,** just east of the bridge, is a privately owned land drainage canal which makes off in a southerly direction from the main channel; it is not navigable.

Caution.-Mariners are advised to exercise extreme caution when navigating the Alligator River-Pungo River Canal. Controlling depths, published in the Local Notice to Mariners, are generally for less than the 90-foot project width. Continuous bank erosion is caused by passing boats and tows. Both sides of the canal are foul with debris, snags, and submerged stumps. Navigation near midchannel is recommended unless otherwise specified in Local Notice to Mariners.

At **Mile 125.9** Wilkerson (U.S. Route 264) highway bridge over the Alligator River-Pungo River Canal has a swing span with a clearance of 8 feet. The channel is through the south draw. VHF-FM frequencies 156.80 MHz (Channel 16) and 156.65 MHz (Channel 13) are monitored at the bridge. An overhead power cable just east of the bridge has a clearance of 100 feet. The canal enters **Wilkerson Creek** at the bridge. Gasoline is available on the north side of the canal at the bridge. The route is then through the dredged cut in the creek to **Pungo River,** southwestward and westward to abeam of Belhaven, then southward in Pungo River to Pamlico River.

Belhaven, 1.5 miles westward of **Mile 135.8,** is on the northeastern side of the entrance to **Pantego Creek.** The harbor is protected by breakwaters at the creek entrance and is an excellent shelter for small craft. Gasoline, diesel fuel, water, ice, berths, and marine supplies can be obtained at the small-craft facilities on the north side of the creek. One of these facilities has a marine railway that can handle craft up to 60 tons for hull and engine repairs. The town and the channel into the harbor from Pamlico River are discussed in chapter 4.

From abeam of the light off **Grassy Point** at **Mile 142.3** in the lower part of Pungo River, the route leads for 4.4 miles until 0.7 mile past the light off **Wades Point** on the west side at the mouth of Pungo River; thence across Pamlico River for 3.2 miles to the light at the entrance to Goose Creek.

Wright Creek on the west side of Pungo River at Mile 143.0, and Pamlico River, the approach to the important town of Washington are discussed in chapter 4.

The route of the Intracoastal Waterway follows the dredged channel through **Goose Creek** and its tributary, **Upper Spring Creek,** to the land cut which connects with **Gale Creek** and Bay River.

The Hobucken (State Routes 33 and 304) highway bridge, crossing the land cut at **Mile 157.2,** has a swing span with a clearance of 6 feet. An overhead power cable on the south side of the bridge has a clearance of 85 feet. VHF-FM channels 16 (156.80 MHz) and 13 (156.65 MHz) are monitored at the bridge. There are several small-craft facilities on both sides of the land cut in the vicinity of the bridge; gasoline, diesel fuel, water, ice, and berthage with electricity are available. Engine repairs can be made at one of the facilities. Depths of 5 to 12 feet are reported alongside the berths. A Coast Guard station is on the west side of the land cut just north of the bridge.

The town of **Hobucken,** about 1 mile east of the bridge, has a landing on **Jones Bay,** which is discussed in chapter 4.

From Gale Creek, the route of the Intracoastal Waterway is down **Bay River** to the light off **Maw Point Shoal** at **Mile 167.1,** then up the Neuse River. Bay River is the approach to Bayboro and other small towns; Neuse River is the approach to the important city of New Bern. Both rivers are discussed in chapter 4.

Chart 11541 (833-SC).-The town of **Oriental** is west of **Mile 181.3** on the north side of Neuse River opposite **Garbacon Shoal.** Fuel, supplies, and repair facilities are available here. The town and its waterfront are discussed in chapter 4.

The Intracoastal Waterway leaves Neuse River about 15 miles above the mouth and follows a

dredged channel through Adams Creek to **Adams Creek Canal,** a land cut about 5 miles long which connects with the head of **Core Creek** An **emergency mooring facility** is on the north side of the channel at **Mile 188.5.** (See beginning of this chapter for details.) State Route 101 highway bridge over Adams Creek Canal at **Mile 195.8** has a swing span with a clearance of 16 feet; navigation is through the east draw. VHF-FM channels 16 (156.80 MHz) and 13 (156.65 MHz) are monitored at the bridge. Overhead power cables on both sides of the bridge have a clearance of 85 feet. Gasoline, diesel fuel, water, ice, a launching ramp, and some marine supplies are available at a small-craft facility on the east side of the waterway close southward of the bridge.

An **emergency mooring facility** is on the west side of the channel at **Mile 198.0.** (See beginning of this chapter for details.)

From Core Creek the route of the Intracoastal Waterway is through **Newport River** to Morehead City. At **Mile 202.2, Gallant Channel** branches off from the through route of the waterway and leads to Beaufort, which is described in chapter 5.

Calico Creek extends westward from **Mile 203.6** through a dredged channel which leads to a yacht basin at its head about 0.6 mile from the waterway. In 1967, the channel had a centerline controlling depth of 6 feet; depths of 7 feet were reported in the basin. The channel is marked by daybeacons and buoys. Berthage with electricity, gasoline, diesel fuel, and water can be obtained, and hull, engine, and electronic repairs can be made. A barge repair facility is on the northwest side of the basin; this facility is described in chapter 5.

At **Mile 203.8,** the adjacent Beaufort and Morehead railroad bridge and U.S. Route 70 highway bridge cross the channel. The highway bridge has a fixed span with a clearance of 65 feet, and the railroad bascule span has a clearance of 4 feet. An overhead power cable between the two bridges has a clearance of 88 feet, and an overhead power cable southward of the highway bridge has a clearance of 25 feet except at the channel where it is submerged. Caution is advised when running with a fair current or approaching the bridges in windy weather. (See the Tidal Current Tables for predictions.)

Caution.-Just southward of these bridges the route of the waterway passes through the deepwater turning basin at Morehead City. Small-craft operators are cautioned that large oceangoing vessels may be engaged in docking or undocking maneuvers in the basin. The turns off the North Carolina State Ports Authority are blind for craft traveling in either direction on the waterway.

Morehead City, Mile 204.3, and its deepwater port are discussed in length in chapter 5. At **Mile 204.7,** a dredged channel leads northward from the waterway thence westward along the south side of the city and rejoins the waterway at **Mile 205.0.** In 1968, the channel had a controlling depth of 12 feet; daybeacons mark the channel. There are several small-craft facilities along the south side of the city where berthage with electricity, gasoline, diesel fuel, water, ice, provisions, and marine supplies can be obtained. A 100-ton fixed lift and a marine railway can handle craft up to 85 feet are also available. Hull, engine, and electrical repairs can be made. Supplies and hotel and motel accommodations are available in the city.

From Morehead City the waterway follows a dredged channel through **Bogue Sound.** The Atlantic Beach highway bridge over Bogue Sound at **Mile 206.7** has a swing span with a clearance of 13 feet. (See **117.355,** chapter 2, for drawbridge regulations.) It has been reported that this bridge may not open during periods of high winds. A power cable 20 yards west of the bridge has a clearance of 28 feet along the causeway, but is submerged where it crosses the channel.

The summer resorts, **Money Island Beach, Mile 205.7,** and **Atlantic Beach, Mile 207.0,** are at the south end of the bridge, 2 and 3 miles, respectively, west of Fort Macon. The buildings at the beaches are conspicuous. Boats reach the beaches through two dredged channels that branch off from the Intracoastal Waterway at **Mile 205.5. Money Island Channel** leads southwest to the beach, and **Causeway Channel** leads west to the causeway, thence south along the east side of the causeway to the beach. The channels are marked by lights. In May 1973, the controlling depths were 4 feet in the Causeway Channel and Money Island Channel. There are several piers at the beaches where berthage with electricity, gasoline, diesel fuel, and water may be obtained and small-boat launching ramps are available. Caution should be exercised in approaching these channels from the Intracoastal Waterway because of the shoal area off the entrance.

An **emergency mooring facility** is on the south side of the channel at **Mile 207.0.** (See beginning of this chapter for details.)

At **Mile 209.2,** a dredged channel with a depth of 5 feet in January 1974, leads northward from the waterway into **Peletier Creek** The channel is marked by daybeacons. Several small-craft facilities in the creek can provide berthage with electricity, gasoline, diesel fuel, water, ice, and marine supplies, and make hull, engine, and electronic repairs. The largest of three marine railways here can handle craft up to 70 feet; mobile hoists up to 20-tons are also available.

In **Spooner Creek, Mile 210.5,** on the north side of Bogue Sound 3.8 miles west of Atlantic Beach highway bridge, there is a marina with 6½ feet of water reported alongside the piers. Berthage with electricity, gasoline, diesel fuel, water, and ice are available. In 1967, the controlling depth in the marked entrance channel was 4½ feet.

An **emergency mooring facility** is on the north side of the channel at **Mile 216.0.** (See beginning of this chapter for details.)

A fixed highway bridge with a clearance of 65 feet crosses the waterway at Mile 226.0.

An **emergency mooring facility** is on the north side of the channel at **Mile 226.0.** (See beginning of this chapter for details.)

At **Bogue Inlet,** the waterway passes around the head of the marshes to **Swansboro, Mile 228.9.** A water tank in town is prominent. A side channel with a controlling depth of about 12 feet branches off from the Intracoastal Waterway at Mile 228.9 near Light "46C" and extends along the waterfront of Swansboro and to a turning basin near the highway bridge. A boatyard in a small cut near the east end of the highway bridge has a marine railway that can haul out vessels up to 50 feet for hull, engine, and electronic repairs. About 0.2 mile southwestward of the Swansboro end of State Route 24 highway bridge, there is a **T** -shaped yacht basin pier about 400 feet long with 12 feet reported alongside where electricity, gasoline, diesel fuel, water, ice, and marine supplies can be obtained; a 30-ton mobile hoist is also available here. There are other small-craft facilities along the waterfront and close to Swansboro that can provide services.

From Swansboro, the route of the waterway follows cuts through the marshes to New River. **Prohibited and danger areas** are along the waterway from **Mile 235.1 to mile 240.7.** (See **204.56 (e) and** (f), chapter 2, for limits and regulations.) State Route 210 highway bridge at **Mile 240.7,** has a swing span with a clearance of 12 feet; the northwest draw only is used.

An **emergency mooring facility** is on the south side of the channel at **Mile 244.0.** (See beginning of this chapter for details.)

At **Mile 244.5,** a channel marked by lights and daybeacons leads to a turning basin at the Marine Corps facility at the head of **Mile Hammock Bay.** The controlling depth was 11 feet in 1963. At **New River Inlet** the waterway passes around the head of the marshes in New River to the land cuts southward. **New River** is the approach to the town of Jacksonville, described in chapter 5. Except at slack water, dangerous cross currents will be encountered in crossing the inlet.

At **Swan Point, Mile 247.0,** just south of New River Inlet, there is a small-boat launching ramp and a pier with 5 feet reported alongside where gasoline, water, and some marine supplies can be obtained.

The route continues through **Alligator Bay** and **Stump Sound.** At **Mile 252.3,** a fixed highway bridge with a clearance of 65 feet crosses the waterway. An overhead power cable with a clearance of 85 feet is close southwestward of the bridge. State Routes 50-210 highway bridge at **Mile 260.7** has a swing span with a clearance of 12 feet. The overhead power cable at the bridge has a clearance of 105 feet.

Just north of and on the east side of the highway bridge at **Mile 260.7** there is a bulkhead for berthing with 6 feet reported alongside. Gasoline, diesel fuel, water, electricity, and some marine supplies may be obtained; a small-boat launching ramp is available.

From Stump Sound the Intracoastal Waterway leads through **Topsail Sound** and **Middle Sound.** At **Mile 263.7,** a channel leads southeastward from the waterway thence southwestward along the barrier beach in Topsail Sound. The channel and the facilities along the barrier beach are described in chapter 5.

A pontoon drawbridge crosses the waterway at **Mile 278.1.** An overhead power cable just northward of the bridge has a clearance of 85 feet.

Pages Creek, on the north side of the waterway at **Mile 279.0,** has a yacht basin with an **L** -shaped pier about 250 feet long that has a depth of about 4 feet alongside. Berthage with electricity, gasoline, water, ice, a launching ramp, and some marine supplies are available. A marine railway here can handle craft up to 30 feet for hull and engine repairs. At **Mile 279.8,** on the north side of the waterway, there is a yacht basin where berthage, gasoline, diesel fuel, ice, and marine supplies are available. A marine railway here can handle craft up to 65 feet for hull, engine, and electrical repairs. Depths of 5 feet are reported alongside the berths. Another small-craft facility is at **Mile 279.9,** close southward of the yacht basin. Gasoline, berthage with electricity, water, ice, and some marine supplies are available. Depths of 3 feet are reported alongside the berths.

State Route 74 highway bridge over the waterway at **Wrightsville, Mile 283.1,** has a bascule span with a clearance of 20 feet at the center. Overhead power and TV cables at the bridge have a least clearance of 72 feet.

There are several small-craft facilities southward of the bridge at Wrightsville. These facilities have berthage with electricity, gasoline, diesel fuel, water, ice, launching ramps, and marine supplies, and can make hull, engine, and electronic repairs. Two marine railways, the larger of which can handle craft up to 75 feet, and fixed and portable lifts are also available.

At **Mile 284.0,** a privately dredged channel leads westward from the waterway to a basin in **Bradley Creek.** In 1964, the channel and basin had reported depths of 6 feet. A small-craft facility with piers is on the south side of the basin. Berthage with electricity, gasoline, diesel fuel, water, ice, a launching ramp, some marine supplies, and a 40-ton mobile hoist are available. Hull, engine, and electronic repairs can be made. **Wrightsville Beach** on the outer coast, and **Masonboro Inlet** are discussed in chapter 5.

From Wrightsville the waterway continues south through **Masonboro Sound** and **Myrtle Grove Sound.**

Chart 11534 (835-SC).-The Intracoastal Waterway continues down Myrtle Grove Sound to

Snows Cut. The shallow channel from the waterway to Carolina Beach at the south end of Myrtle Grove Sound is discussed in chapter 5.

Snows Cut connects Myrtle Grove Sound with Cape Fear River. U.S. Route 421 highway bridge over Snows Cut at Mile **295.7** has a fixed span with a clearance of 65 feet. An overhead power cable 0.1 mile west of the bridge has a clearance of 85 feet. The ebb current is 1.6 knots, and the flood current is 1.4 knots. (For predictions, see the Tidal Current Tables.)

An **emergency mooring facility** is on the south side of the channel at **Mile 297.0.** (See beginning of this chapter for details.)

From the western end of Snows Cut, the Intracoastal Waterway leads south-southwestward through a dredged channel to a junction with the main channel of Cape Fear River and thence southward to **Southport** where fuel, supplies, and repair facilities are available. It has been reported that at night some mariners have missed the turn at the junction in Cape Fear River due to the bright lights on the piers at the Sunny Point Army Terminal and the lighted aids marking the channel leading alongside the terminal; caution is advised.

Another dredged channel, known as **Wilmington Short Cut** and marked by lights and daybeacons, leads northward from the western end of Snows Cut for about 1.7 miles where it connects with the main channel in Cape Fear River to the city of Wilmington, about 11.5 miles above Snows Cut. In November 1970-February 1971, the controlling depth in Wilmington Short Cut was 9 feet for a width of 100 feet. Wilmington and Southport are discussed in chapter 5.

An **emergency mooring facility** is on the north side of the channel at **Mile 307.0.** (See beginning of this chapter for details.)

At Southport, **Mile 308.9,** the route of the Intracoastal Waterway leaves Cape Fear River and proceeds westward through land cuts to Lockwoods Folly River. It has been reported that some mariners have attempted to enter the land cut by passing southward of the light at the entrance thereby going aground.

State Route 133 highway temporary pontoon bridge with a horizontal clearance of 77 feet crosses the waterway at Mile **311.8.** (See **117.356,** chapter 2, for drawbridge regulations and opening signals.) An overhead power cable on the west side of the bridge has a clearance of 90 feet. In 1973, a fixed highway bridge with a design clearance of 45 feet was under construction immediately westward of the temporary pontoon bridge; when completed it will replace the temporary bridge. A small-craft facility is on the north side of the waterway close eastward of the bridge. Depths of 12 feet are reported alongside the berths. Berthage with electricity, gasoline, diesel fuel, water, ice, and a launching ramp are available; minor hull and engine repairs can be made.

At **Mile 313.8,** on the south side of the waterway opposite Beaverdam Creek, there is a yacht basin with a 200-foot pier with reported depths of 6 feet alongside. Berthage with electricity, gasoline, diesel fuel, water, ice, and some marine supplies are available, and minor hull and engine repairs can be made.

The waterway from Beaverdam Creek to Pinner Point, a distance of about 4.5 miles, is unmarked and reported to be very narrow at low tide. Caution is advised when transiting this section of the waterway.

At **Mile 316.6** an overhead power cable with a clearance of 100 feet crosses the waterway.

In **Lockwoods Folly River,** the waterway passes around the head of marshes just inside Lockwoods Folly Inlet. A small-craft facility off the waterway and about 0.4 mile southward of **Mile 320.0** has a launching ramp, berths with electricity, gasoline, diesel fuel, water, ice, and some marine supplies. A 3-ton fixed lift is also available, and hull and engine repairs can be made. Depths of 7 feet and 5 feet are reported in the approaches and alongside ths berths, respectively.

An **emergency mooring facility** is on the south side of the channel at **Mile 320.0.** (See beginning of this chapter for details.)

State Route 130 highway bridge over the waterway at **Holden Beach, Mile 323.6,** has a swing span with a clearance of 13 feet. An overhead power cable on the west side of the bridge has a clearance of 90 feet.

An **emergency mooring facility** is on the north side of the channel at **Mile 325.0.** (See beginning of this chapter for details.)

The waterway passes around the head of the marshes inside **Shallotte Inlet** and proceeds westward by way of cuts through the marshes and sloughs. **Shallotte River, Mile 329.5,** causes strong currents in the waterway.

A boatyard at **Bowen Point,** locally known as **Shallotte Point, Mile 329.6,** has a marine railway that can handle craft up to 85 feet; hull, engine, and electronic repairs can be made. Berths with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available at the boatyard and at other small-craft facilities nearby and in Shallotte River. The facilities in Shallotte River are discussed in chapter 6.

An overhead power cable with a clearance of 85 feet crosses the waterway at **Mile 331.0.**

At **Mile 333.7,** State Route 904 highway bridge crosses the waterway. It has a swing span with a clearance of 13 feet. An overhead power cable close westward of the the bridge has a clearance of 85 feet. At **Mile 337.9,** A pontoon bridge crosses the waterway. An overhead power cable just east of the bridge has a clearance of 85 feet.

The North Carolina-South Carolina State line crosses at **Mile 340.8** just before the waterway enters Little River.

The waterway joins **Little River** at **Mile 341.8.** **Calabash Creek** extends northeastward from Little River just north of the waterway cutoff. In 1963, the controlling depth was 3 feet to the town of **Calabash,** N.C., 0.6 mile above the entrance. A small-craft facility at the town has berthage with electricity, water, ice, and a launching ramp.

The town of **Little River,** S.C., at **Mile 344.3,** has considerable pier space along its waterfront. Berths with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available; engine repairs can be made. The mean range of tide at Little River is about 5 feet. **Storm warning signals are displayed.** (See chart.)

A yacht basin is off the south side of the waterway at **Mile 347.0;** depths of 7½ feet and 12 feet are reported in the approach and alongside the berths, respectively. Berths with electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available. A 40-ton mobile hoist and a marine railway that can handle craft up to 65 feet are also available; hull, engine, and electronic repairs can be made.

A fixed highway bridge, with a clearance of 65 feet at the center, crosses the waterway at **Mile 347.2.** U.S. Route 17 highway bridge over the waterway at **Mile 347.3** has a swing span with a clearance of 7 feet. (See **117.360,** chapter 2, for drawbridge regulations. Overhead power and telephone cables, crossing the waterway from immediately westward to 0.4 mile westward of the swing bridge, have a least clearance of 69 feet.

From Little River, the waterway follows a long land cut southwestward to Socastee Creek and Waccamaw River. Near **Windy Hill, Mile 354.0,** there is a yacht basin with reported depths of 8 feet alongside the berths. Berthage with electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available. A marine railway here can handle craft up to 65 feet in length; hull, engine, and electronic repairs can be made. The basin is about 10 miles northeastward of Myrtle Beach proper. **Storm warning signals are displayed;** see chart.

At **Mile 365.4,** the Seaboard Coast Line Railroad bridge has a bascule span with a clearance of 16 feet. Close westward, U.S. Route 501 highway bridge to Myrtle Beach has a fixed span with a clearance of 65 feet. Overhead cables at the bridges and for about 0.25 mile southwestward have a minimum clearance of 80 feet.

A yacht basin at **Mile 368.1** has berthage with electricity, gasoline, diesel fuel, water, ice, a launching ramp, and some marine supplies. A 35-ton mobile lift is also available; hull and engine repairs can be made. Depths of 9 feet and 10 feet are reported in the approach and alongside the berths, respectively.

State Route 544 highway bridge over the waterway at **Socastee, Mile 371.0,** has a swing span with a clearance of 12 feet; navigation is through the southeast draw. Overhead power cables in the vicinity of the bridge have a minimum clearance of 94 feet.

The route of the waterway enters **Waccamaw River** at **Enterprise Landing, Mile 375.2,** and follows the river to Winyah Bay. The direction of flow of the current in the waterway changes at Enterprise Landing. The mean range of tide at the landing is about 2 feet.

Bucksport, on the west side of Waccamaw River at **Mile 377.5,** has a yacht basin where berths with electricity, gasoline, diesel fuel, ice, marine supplies, and a launching ramp are available. A marine railway in the basin can handle craft up to 40 feet; hull and engine repairs can be made. Depths of 10 feet are reported alongside the berths.

A yacht basin at **Wachesaw Landing, Mile 383.4,** about 6 miles south of Bucksport, has berthage with electricity, gasoline, diesel fuel, water, and ice. A marine railway in the basin can handle craft up to 65 feet; hull, engine, and electronic repairs can be made. Depths of 10 feet are reported alongside the berths.

U.S. Route 17 highway bridge over the Waccamaw River at **Mile 402.1,** has a fixed span with a clearance of 65 feet for a width of 90 feet. About 0.1 mile northeastward of the bridge the fixed portions of a former swing bridge remain providing an opening of about 600 feet between the fixed portions.

Georgetown, Mile 403.0, at the head of Winyah Bay and just inside the mouth of **Sampit River,** is about a mile northwestward of the waterway. Supplies, hotel accommodations, and repair facilities are available at Georgetown. The mean range of tide is 3.3 feet. The town is discussed at greater length in chapter 6.

The Intracoastal Waterway leaves Winyah Bay by way of **Western Channel** at **Mile 407.3,** and proceeds southward through the **Estherville-Minim Creek Canal** at **Mile 410.6.** A cable ferry crosses the canal at **Mile 411.5.** An overhead power cable over the canal at **Mile 413.6** has a clearance of 97 feet. Southwest of the canal, the waterway crosses **North Santee River** and **South Santee River** and proceeds by way of cuts through the marshes to the vicinity of **Casino Creek (Mile 425.5).**

Chart 11518 (837-SC).-From the vicinity of Casino Creek the waterway continues through the marshes and a land cut to the mouth of **Jeremy Creek (mile 430.0). McClellanville** is on the side channel through Jeremy Creek, 0.6 mile northward of the waterway. Boats lie alongside the piers on the east side of the McClellanville channel. In October 1971-February 1972, the controlling depth was 8 feet in the channel for a midwidth of 80 feet, and in 1963, there was 8 feet alongside the piers. A marine railway of the National Wildlife Refuge, available for do-it-yourself repairs, is on the east side of Jeremy Creek just north of the waterway. The mean range of tide at McClellanville is 5.1 feet. Gasoline, diesel fuel, water, and provisions are available.

Storm warning signals are displayed. (See chart.)

From McClellanville the waterway follows land cuts and sloughs through the marshes back of **Bull Bay**; thence through shoal **Sewee Bay** and along **Price Creek**; through the marshes and along **Capers Creek**; behind **Dewees Island** and across **Dewees Creek** to the land cuts behind **Isle of Palms** and Sullivans Island. A ferry crosses the waterway at **Moores Landing** at **Mile 445.4**.

On **Hamlin Creek** opposite **Mile 460.5**, east of **Breach Inlet**, there is a marina where berthage, electricity, gasoline, and water are available. The several outlets to the ocean along this stretch are described in chapter 6.

State Route 703 highway bridge to **Sullivans Island** over the waterway at **Mile 462.2** has a swing span with a clearance of 31 feet. (See **117.365** , chapter 2, for drawbridge regulations.) The overhead power cable at the bridge has a clearance of 89 feet.

The route of the waterway enters the lower east side of **Charleston Harbor** between Sullivans Island and the town of **Mount Pleasant**, which is about 1 mile north of the waterway and is reached through a well-marked channel that branches off from the waterway at **Mile 464.2**.

Complete supply and repair facilities are available at **Charleston, Mile 469.0.** The city is described at length in chapter 6. The mean range of tide at Charleston is 5.2 feet. **Storm warning signals are displayed.** (See chart.)

The route of the waterway leaves Charleston Harbor at **Mile 469.3** by way of **Wappoo Creek.** State Route 171 highway bridge over Wappoo Creek at **Mile 470.8** has a bascule span with a clearance of 33 feet at the center. (See **117.370**, chapter 2, for drawbridge regulations.) Extreme caution is advised when running through the bridge with a current. In 1974, mooring dolphins were reported to be on both sides of the bridge. An overhead power cable with a clearance of 100 feet is close westward of the bridge. Cross currents from the old creek are encountered on the ebb in the west approach, and are noticeable on the flood in the east approach due to the bends in the channel. Vessels should proceed slowly and with caution to avoid washing away of the banks east of the bridge.

From Wappoo Creek, the route of the waterway is through **Elliott Cut** and **Stono River** to Wadmalaw River. Strong currents have been reported on the ebb and flood in Elliott Cut. At **Mile 472.0** is an overhead power cable with a clearance of 100 feet. The Seaboard Coast Line Railroad bridge over Stono River at **Mile 477.0** has a swing span with a clearance of 6 feet. Extreme caution is advised when running through the bridge with a current. Cross currents are noticeable on the flood in the south approach. The mean range of tide at the bridge is 5.5 feet.

The John F. Limehouse Highway Bridge over Stono River at **Mile 479.3** has a swing span with a clearance of 12 feet. The overhead power cable at the bridge has a clearance of 92 feet. Caution is advised when running through the bridge with a current. A slight cross current is noticeable on the flood and ebb at both approaches.

At **Mile 480.1, Rantowles Creek** enters from the north (see chart 11521 (1239)). The Seaboard Coast Line railroad bridge 0.6 mile above the mouth has a 41-foot lift span which is not required to be opened; clearance in the down position is 4 feet. (See **117.245 (a) through (e) and (h) (1)**, chapter 2, for drawbridge regulations.) About 1.3 miles above the mouth U.S. Route 17 highway bridge has twin 37-foot fixed spans with clearances of 9 feet. **Wallace Creek** enters Rantowles Creek from the west 0.1 mile above the railroad bridge. State Route 162 highway bridge, 0.7 mile above the mouth of Wallace Creek, has twin 38-foot fixed spans with clearances of 9 feet. Overhead cables between the mouth and the bridge have a minimum clearance of 8 feet.

The route of the waterway enters **Wadmalaw River** at **Mile 486.7.** The town of **Yonges Island** is at **Mile 490.2.**

From Wadmalaw River, the route of the waterway follows **Dawho River, North Creek,** and **Watts Cut** to South Edisto River. State Route 174 highway bridge over Dawho River at **Mile 501.3** has a swing span with a clearance of 8 feet. An overhead power cable just west of the bridge has a clearance of 100 feet. Extreme caution is advised when running through the bridge with a current. Cross currents from Dawho River are encountered on the ebb in the west approach and are noticeable on the flood in the east approach.

Careful steering is required in the Dawho River between **White Point** and the entrance to the cutoff. The channel is well marked, but strong currents are experienced. Strong currents are also found at the crossings of the cutoff with the river. The mean range of tide in Dawho River is 6.3 feet.

The waterway follows **South Edisto River** from Watts Cut to **Fenwick Cut,** thence along the **Ashepoo River** for a short distance to **Ashepoo-Coosaw Cutoff,** thence along the **Coosaw River** to Brickyard Creek.

The entrance to **Brickyard Creek** near Brickyard Point, **Mile 529.1,** is between marshy shores, but the marsh on the south side is narrow and terminates just inside the creek in a red eroded bank leading up to somewhat higher ground; this bank is visible for some distance along the Coosaw River. The mean range of tide at the entrance to Brickyard Creek is 7.3 feet.

On the west side of Brickyard Creek at **Mile 531.8,** and about 4 miles north of the swing bridge at Beaufort, there is a Marine Corps Air Station fuel pier. In 1963, there were depths of 9 to 11 feet alongside.

Albergottie Creek, Mile 532.4, about 3.4 miles north of the swing bridge at Beaufort, runs in a westerly direction from the junction with Beaufort

River and Brickyard Creek. The creek, in 1963 had a controlling depth of 5½ feet for a distance of 2 miles. A Marine Corps Air Station pier on the north side of the creek had depths of 6 to 10 feet alongside in 1963.

The waterway continues along Brickyard Creek and into **Beaufort River.** On the west side of the waterway at **Mile 536.0** is the town of **Beaufort,** where fuel, supplies, repair facilities, and hotel accommodations are available. The town is described at length in chapter 7.

The Ladies Island (U.S. Route 21) highway bridge over Beaufort River at Beaufort has a swing span with a clearance of 30 feet. (See **117.380,** chapter 2, for drawbridge regulations and opening signals.) Extreme caution is advised when running through the bridge with a current; cross currents are encountered in the approach on flood and ebb.

The waterway follows Beaufort River past **Port Royal,** at **Mile 541.5,** and into **Port Royal Sound,** which is described at length in chapter 7.

Chart 11507 (839-SC).-After crossing Port Royal Sound, the route of the waterway enters **Skull Creek** at **Mile 553.3** and follows it to **Calibogue Sound,** thence down the sound to the mouth of Cooper River. **Seabrook Landing,** on the south side of Skull Creek, is at **Mile 553.6.**

At **Hilton Head Harbor, Mile 557.0,** on the south side of Skull Creek, there is a small-craft facility where berths with electricity, gasoline, diesel fuel, water, ice, and a 2-ton fixed lift are available; hull, engine, and electronic repairs can be made. In 1969, depths of 13 feet were reported alongside the berths. A county pier with depths of 8 feet alongside in 1963, is at Hilton Head Harbor.

At **Mile 557.6,** State Route 46 highway bridge crosses the waterway. It has a swing span with a clearance of 30 feet. During flood tide, vessels will encounter a strong cross current on the north side of the bridge, and should exercise caution when approaching the bridge from the northward. An overhead power cable at the bridge has a clearance of 91 feet.

Small-craft facilities on Palmetto Bay and at Harbour Town on Hilton Head Island, eastward of the waterway at about **Mile 564.3,** are discussed in chapter 7.

The route follows **Cooper River** to Ramshorn Creek at **Mile 568.6.** An overhead power cable with a clearance of 55 feet crosses Cooper River 1.8 miles northward of its junction with Ramshorn Creek. At **Mile 569.2** an overhead power cable crossing **Ramshorn Creek** has a clearance of 105 feet. The tides meet in Ramshorn Creek. Between the creek and Walls Cut the route follows **New River.** Care is required as cross currents may be encountered in New River.

The mean range of tide in **Walls Cut, Mile 572.4,** is 7.1 feet. The route is through the cut and along **Wright River** for a short distance, thence through **Fields Cut** and into Savannah River at **Mile 575.6.** The Savannah River ebbs through the cut, and strong cross currents may be experienced at the ends of it; these currents cause a shoal to build up and encroach from westward at the east end of the cut. (For predictions, see the **Tidal Current Tables.**)

Savannah River is the approach to the important city of **Savannah,** about 8 miles upstream from the Intracoastal Waterway crossing. Savannah has complete supply and repair facilities, and is described at length in chapter 7. Portions of the Savannah Port Authority Wharves on the south side of Savannah River about 8 miles westward of Fields Cut are suitable for berthing large yachts and transient tugs when space is available; there is a charge for berthage. Arrangements for berthing are made through the harbormaster and payment is made to the Savannah Port Authority. Wharves in Savannah Harbor are not as suitable for small craft as those at Thunderbolt and Isle of Hope. Berthage of small craft in Savannah Harbor exposes them to pounding against the wharves by the surge of vessels plying Savannah River.

Daily predictions for Savannah River are published in the **Tidal Current Tables.**

The Intracoastal Waterway leaves the Savannah River at **Mile 576.2** and enters **Elba Island Cut,** which leads into **St. Augustine Creek.** At the junction of St. Augustine Creek and **Wilmington River, Mile 578.3,** a cutoff channel extends northeastward from the waterway to Savannah River South Channel, thence along the southern side of Elba Island to a junction with Savannah River; the cutoff channel is marked by daybeacons and buoys, and in 1966, the centerline controlling depth was 7 feet.

A highway bridge crossing Wilmington River at **Mile 579.9** has a bascule span with a clearance of 21 feet. An overhead power cable close southward of the bridge has a clearance of 85 feet.

Victory Drive (U.S. Route 80) highway bridge over Wilmington River at **Mile 582.8** has a bascule span with a clearance of 21 feet.

No cross currents are experienced during either flood or ebb; the currents follow the direction of the channel. Ebb currents flow southward and are very strong. Mooring dolphins for tieing-up or breaking-up tows are on both sides of the bridge. When proceeding against the current, a tow may be taken through without breaking up. When proceeding with the current, a tow should be secured to the dolphin and await a favorable current or be broken up and taken through singly.

Thunderbolt, Mile 582.8, is a small town and pleasure resort on the west bank of Wilmington River. There are several marinas and boatyards on both banks of the river where berthage with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. Fixed lifts up to 100 tons, and several marine railways are also available; the largest railway can handle craft up to 125 feet. Hull, engine, and electronic repairs can be made. Bus transportation is available to Savannah.

At **Mile 585.5** the route leaves the Wilmington River and enters **Skidaway River.** On the east side of Wilmington River about 0.8 mile east-southeastward from the Intracoastal Waterway and the Wilmington River-Skidaway River junction, there is a yacht club pier with depths of 11 feet alongside reported in 1969. Berths with electricity, gasoline, and water are available. Turners Creek, about 0.6 mile eastward of the junction, is described in chapter 8.

Isle of Hope, Mile 590.0, is a pleasure resort on the north side of Skidaway River with several small wharves and a boatyard. The boatyard has berthage with electricity, gasoline, diesel fuel, water, ice, marine supplies, a 2-ton fixed lift, and a marine railway that can handle craft up to 55 feet; hull, engine, and electronic repairs can be made. **Storm warning signals are displayed.** (See chart.)

There is an **anchorage area** for small craft in Skidaway River off Isle of Hope; limits and regulations are given in **110.179,** chapter 2.

Skidaway Narrows, between Skidaway River and Burnside River, is easily navigated by small craft, and by larger vessels when speed is reduced sufficiently to accommodate the sharp turns. The velocity of current in the narrows is about 1 knot. Predictions are given in the **Tidal Current Tables.** A double-bascule highway bridge with a clearance of 22 feet crosses Skidaway Narrows at **Mile 592.8.**

Vernon View, Mile 596.3, on the north shore of Burnside River, has several small privately owned piers where gasoline may be obtained in an emergency. In 1963, there were depths of 1 to 7 feet at the piers.

At **Mile 596.9,** the Intracoastal Waterway enters **Vernon River,** proceeding thence to **Hell Gate, Mile 601.4,** and **Ogeechee River.** The ebb currents setting out of the Ogeechee River are particularly strong.

The waterway enters **Florida Passage** at **Mile 605.8** and joins **Bear River** at **Mile 608.5.** The current is swift in the lower part of Bear River.

St. Catherines Sound, Mile 618.0, becomes quite rough in moderately bad weather, especially with strong east and northeast winds. Strong cross currents may be encountered during freshets in **Medway River.** The course across St. Catherines Sound is marked by lights and should be followed closely. Failure to do so has resulted in many rescue calls by the Coast Guard.

The waterway leaves St. Catherines Sound through **North Newport River** and at **Mile 623.8** joins **Johnson Creek.** An alternate route leaving the waterway at **Mile 618.0** proceeds through **Walburg Creek** and joins the main route at **Mile 623.1.** This alternate route is not marked and is seldom used. Good anchorage can be found in Walburg Creek.

The Intracoastal Waterway leaves Johnson Creek and enters **South Newport River** at **Mile 629.0,** and follows the river to Sapelo Sound at **Mile 632.0. Sapelo Sound** is somewhat rough when there are strong east or northeast winds. The sound is described in chapter 8.

The route leaves Sapelo Sound through **Sapelo River** and enters **Front River** at **Mile 639.0.** In 1963, the controlling depth was 1½ feet for 6 miles up the Sapelo River above this junction to the landing at **Pine Harbor** (chart 11510 (574)).

Continuing down Front River, the waterway passes through **Creighton Narrows** and joins **Old Teakettle Creek** at **Mile 643.4. Shellbluff Creek** flows into Old Teakettle Creek at **Mile 644.1.** In emergency, gasoline may be obtained at **Valona,** 0.7 mile up **Shellbluff Creek** (chart 11510 (574)).

At **Mile 648.3,** the route enters **Doboy Sound,** described in chapter 8. The waterway leaves Doboy Sound via **North River** at **Mile 650.0** and at **Mile 651.8** the route passes **Darien River.**

Little Mud River connects the waterway with **Altamaha Sound** at **Mile 655.5.** The **Altamaha River** enters Altamaha Sound from westward.

The Intracoastal Waterway enters **Buttermilk Sound** at **Mile 660.0** and continues down **Mackay River.**

Two alternate routes branch off the waterway on the Mackay River. The first, at **Mile 665.8,** proceeds down the **Frederica River** past the ruins of **Fort Frederica (Oglethorpe Barracks),** now a National Monument, and rejoins the waterway at **Mile 674.2.** The controlling depth was 9½ feet in 1963. This first alternate route is not marked.

The second alternate route leaves Mackay River at **Mile 670.7** and enters **Back River,** proceeding down through **Plantation Creek** to Brunswick River (see chart 11489 (841-SC)). This route bypasses St. Simon Sound and is a more sheltered route in easterly weather. In March 1974, the midchannel controlling depth was 1 foot. Although the second alternate route is the shorter to Brunswick, mariners are advised to use Plantation Creek only on the higher stages of the tide. The mean range of tide is about 7 feet. The bridges over Back River are described in chapter 8.

At **Mile 670.7, Troup Creek** empties into the west side of Mackay River. A small-craft facility is on the west side of the creek about 1.1 miles above the mouth. Berthage with electricity, gasoline, diesel fuel, water, ice, marine supplies, and a 2-ton fixed lift are available; engine and electrical repairs can be made.

At **Mile 674.2** the main route joins Frederica River and follows it to St. Simons Sound. A highway bridge over the river at **Mile 675.5** has a lift span with clearances of 9 feet down and 85 feet up. A strong east-to-west ebb current sets across the channel. There are mooring dolphins on each side of the bridge.

During flood tide, the current flows northward in the direction of the channel and is very strong. Vessels should exercise great caution while passing through this bridge, especially with a light tow proceeding south. When proceeding with the tide, tows should stop at the dolphins to await favorable current or be broken up and taken through singly.

On **Lanier Island,** just south of the highway bridge, there is a boatyard with a 420-foot pier with reported depths of 20 feet alongside. The yard has berthage with electricity, gasoline, diesel fuel, water, ice, a 6-ton fixed lift, and a marine railway that can handle craft up to 70 feet; hull and engine repairs can be made.

Chart 11489 (841-SC).-From Frederica River, the waterway continues through **St. Simons Sound** and **Brunswick River** to Jekyll Creek. About 3.4 miles up Brunswick River from **Mile 679.4** is the city of **Brunswick,** at which hotel accommodations, fuel, supplies, and repair facilities are available. The city is described at length in chapter 8.

The Intracoastal Waterway follows **Jekyll Creek** southward from Brunswick River to Jekyll Sound. The entrance is marked by a lighted range and protected by a jetty on its west side, the outer end of which is marked by a light. Jekyll Island Range Front Light is about 25 yards to the westward of this light. The jetty covers at high tide, but is marked by daybeacons. To enter, be guided by the range, lights, and daybeacons.

A marina at **Mile 683.6** has a pier 300 feet long with reported depths of 7 feet alongside, and a 2-ton small-boat hoist that can launch or pick up boats. Gasoline, diesel fuel, water, ice, and electricity are available.

At **Mile 684.3** State Route 50 highway bridge crossing the waterway has a lift span with clearances of 9 feet down and 85 feet up. From Jekyll Creek the waterway enters **Jekyll Sound** at **Mile 685.7** and continues across St. Andrew Sound.

St. Andrew Sound, which has the most hazardous exposure along the waterway south of Port Royal Sound, is very rough during periods of strong north, northeast, or east winds. A protected route bypassing St. Andrew Sound leaves the waterway at **Mile 686.0.** This alternate route passes through **Little Satilla River, Umbrella Cut, Umbrella Creek, Dover Cut, Dover Creek, Satilla River, Floyd Creek,** and rejoins the waterway in Cumberland River at **Mile 695.8.** The controlling depths for this alternate route are published in local Notice to Mariners.

From St. Andrew Sound the waterway enters **Cumberland River,** passing by **Cumberland Wharf, Mile 694.6,** and **Cabin Bluff, Mile 700.2.** The Cumberland River becomes **Cumberland Dividings** and joins with **Cumberland Sound** at **Mile 704.0.**

The waterway continues down Cumberland Sound past the St. Marys River and into **Amelia River** to **Fernandina Beach, Mile 717.0,** where hotel accommodations, fuel, supplies, and repair facilities are available. Fernandina Beach is described at length in chapter 8.

At **Mile 719.8** the waterway enters **Kingsley Creek.** Two bridges cross the waterway at **Mile 720.7.** The first, the Seaboard Coast Line Railroad bridge, has a swing span with a clearance of 5 feet; an island is alined with the center fenders of this bridge. The second, State Route A1A highway bridge, has a bascule span with a clearance of 21 feet. An overhead power cable on the south side of the bridge has a clearance of 80 feet. The mean range of tide at the bridge is 6 feet. Flood and ebb currents are normal to the bridge openings and are relatively high; velocities up to 2.5 knots on the flood and 3 knots on the ebb may be expected, especially with favoring winds. Caution is advised. (For predictions, see the Tidal Current Tables.)

At **Mile 722.8,** the waterway enters **South Amelia River** and for a distance of about 4.5 miles the channel is narrow and winds through shoals and marsh islets. Although the channel is well marked by daybeacons and lights, it is the most difficult part of this section of the route. At low water, the extensive mudflats and oyster beds on each side of the channel are well defined. **Amelia City** is at **Mile 724.3.** The piers are privately owned, and there are no facilities except a restaurant. The southernmost pier, owned by the restaurant, is in poor condition, but boats may tie up to it at their own risk. The waterway enters **Nassau Sound** at **Mile 729.0.** The sound is described in chapter 8.

At **Mile 729.5,** the Intracoastal Waterway leaves Nassau Sound through a cut about 0.9 mile long and then enters **Sawpit Creek.** The waterway continues along Sawpit Creek and Gunnison Cut to the junction of Sisters Creek with Fort George River at **Mile 735.0.**

Fort George River is marked by daybeacons and trends southward from the waterway to Fort George River Inlet, described in chapter 8.

The waterway continues down **Sisters Creek.** (For current predictions in the creek see the Tidal Current Tables.)

At **Mile 739.2,** near the junction of Sisters Creek and St. Johns River, State Route 105 highway bridge crossing the waterway has a bascule span with a clearance of 24 feet at the center. An overhead power cable about 50 feet west of the bridge has a clearance of 80 feet. Caution is advised at the bridge, because cross currents are encountered during both flood and ebb.

The facilities of a drydock and shipbuilding company are on the east bank of the creek, south of the bridge, and on the St. Johns River just eastward of the creek mouth. The firm builds steel-hulled tugs and fishing vessels and does all types of underwater and topside work on commercial and Government vessels; work on pleasure craft, except for very large yachts, is not done here. There is a 500-ton marine railway which handles vessels up to 150 feet, several mobile cranes, complete shop facilities, and four berths for vessels of up to about 100 feet. The marine railway is on the St. Johns River side of the yard, while the construction work is done on the Sisters Creek side.

The **St. Johns River, Mile 739.5,** is the approach to the important city of **Jacksonville,** 16 miles west

of the junction with the Intracoastal Waterway, where complete supply and repair facilities are available. It is described in chapter 9.

The Intracoastal Waterway continues south across St. Johns River and into **Pablo Creek.** An overhead power cable with a clearance of 89 feet crosses the waterway at Mile **741.8.** At **Mile 744.7** the Atlantic Boulevard (State Route 10) highway bridge has a fixed span with a clearance of 65 feet over the waterway. The mean range of tide at the bridge is 2.9 feet. There are strong tidal currents in the immediate vicinity of the bridge. On the flood the current in the channel flows southward and at right angles to the bridge at a velocity of 3.5 knots at strength. On the ebb the current flows northward and sets about 10° to the right of the axis of the channel at a velocity of 5.5 knots at strength. The currents at a distance of 100 yards either side of the bridge are much weaker with practically no turbulence and give no warning of the strong current at the bridge. Current predictions are given in the Tidal Current Tables. An overhead power cable 25 feet north of the bridge has a clearance of 80 feet.

A landing at a fish camp is on the east side of the waterway just northward of the Atlantic Boulevard (State Route 10) highway bridge. Berthage with electricity, gasoline, diesel fuel, water, ice, and a launching ramp are available.

A shipyard is in the basin dredged into the west side of the waterway just north of the bridge. The yard mostly builds large steel-hulled vessels, but does some repair work on the larger commercial boats, such as tugs and fishing vessels. A 1,000-ton floating drydock, a 250-ton marine railway, several mobile cranes, and complete machine, welding, and other shop facilities are available at the yard.

Another shipyard is in the basin on the west side of the waterway just southward of the bridge. The dredged entrance cut leaves the waterway about 200 yards south of the bridge; in 1963, there was a controlling depth of 7 feet in the cut and 8 feet in the basin. Repairs are made to commercial vessels, and steel tugs and barges are built. Two vertical-lift ways are available, the largest of which can handle craft up to 100 feet. An overhead power cable at **Mile 745.8** has a clearance of 90 feet.

Beach Boulevard (U.S. Route 90) highway bridge across the waterway at **Mile 747.5** has a bascule span with a clearance of 37 feet at the center. An overhead power cable 35 feet north of the bridge has a clearance of 80 feet.

Two excellent yacht basins are on the east side of the waterway just north and south of the bridge. A restaurant is about 300 yards from the basins, and a shopping center is within a mile. The north yacht basin has open and covered berthing space for 135 boats of up to 125 feet, with water and electricity at each berth. Depths are reported to be 8 feet. Gasoline, diesel fuel, ice, and marine supplies are available. There are complete repair facilities, including a 20-ton hoist and machine and woodworking shops; hull, engine, and electronic repairs can be made. The south yacht basin has about 30 covered slips for boats up to 65 feet, and 24 open berths. Depths are reported to be 12 feet. The face of the fuel pier, about 300 feet long, is on the Intracoastal Waterway and parallel to the channel; diesel fuel and gasoline are pumped. Water, electricity, ice, and some marine supplies are available. There are a 20-ton fixed hoist and a marine railway that can handle vessels up to 60 feet for all types of repairs.

Storm warning signals are displayed. (See chart.)

Numerous snags and old piling, many covered at high water, are on both sides of the waterway for a distance of about 5.7 miles from the vicinity of **Oak Landing, Mile 749.8,** to **Palm Valley Landing, Mile 755.5.** Particular care should be taken in this section to stay in the center of the channel.

At **Mile 750.1** the waterway leaves Pablo Creek and enters a long cut.

The Palm Valley Highway Bridge crossing the waterway at **Mile 758.8** has a bascule span with a clearance of 9 feet at the center. The mean range of tide at the bridge is 2 feet. A landing at a fish camp is on the east side of the waterway just north of the bridge. Berthage with electricity, gasoline, diesel fuel, water, ice, and a launching ramp are available.

The route continues through the long cut to **Tolomato River** at **Mile 760.9.**

Chart 11485 (843-SC).-Guana River enters Tolomato River on the east side opposite **Mile 770.5.** A privately marked channel in Guana River leads up to a dam at **South Ponte Vedra Beach** (chart 11489 (841-SC)). The centerline controlling depth was 4 feet in 1963.

At**Mile 773.5,** is a marine railway that can haul out boats up to 60 feet, for hull repairs. Emergency gasoline engine repairs can be made, and gasoline and water are available.

The **Vilano Beach** (State Route A1A) highway bridge crossing the Tolomato River at **Mile 775.8** has a lift span with clearances of 5 feet down and 83 feet up. The mean range of tide at the bridge is 4.2 feet. Tidal currents run at angles to the bridge and caution is imperative. Flood currents up to 1 knot and ebb currents up to 1.5 knots may be expected during normal weather. An overhead power cable 70 yards south of the bridge has a clearance of 100 feet.

The waterway continues on beyond St. Augustine Inlet and enters **Matanzas River;** the river separates **Anastasia Island** from the mainland. At **Mile 777.9,** Route A1A highway bridge, known as the **Bridge of Lions,** and which connects Anastasia Island with St. Augustine, has a bascule span with a clearance of 25 feet at the center; drawbridge regulations are given in **117.432,** chapter 2. The range of tide at the bridge is 4.2 feet. Caution is advised because the tidal currents, particularly ebb, run at right angles to the bridge. It is advisable to

drift large tows through this opening with favorable currents. Normal flood currents of 1 knot and ebb currents of 1.5 knots may be expected.

St. Augustine Inlet and **St. Augustine** are described in chapter 10.

In the broader sections of the river above St. Augustine, the channel is very narrow and contorted, extending between shoals visible at low water.

San Sebastian River flows into Matanzas River at **Mile 780.0** and is described in chapter 10.

In 1974, a fixed highway bridge, with a design clearance of 65 feet, was under construction across the river at **Mile 780.4.**

At **Mile 788.6, Crescent Beach** (State Route 206) highway bridge over Matanzas River has a bascule span with a clearance of 9 feet at the center. In 1974, a bascule bridge with a design clearance of 22 feet was under construction immediately northward of the existing bridge; when completed it will replace the existing bridge. Gasoline may be obtained at a fishing camp just south of the bridge on the east side of the waterway.

About a mile northward of Matanzas Inlet, near **Mile 792.3,** the waterway leaves Matanzas River and enters a land cut.

Caution.-It is reported that navigation in the Intracoastal Waterway opposite the breakthrough at Matanzas Inlet at about Mile 794.0 is hazardous during flood and ebb tides. Signs reading "DANGER TURBULENT WATER" have been placed on the north and south of the inlet to warn mariners of this condition.

Matanzas River continues eastward and southward about 1.2 miles to Matanzas Inlet. Route A1A highway bridge crossing the inlet has a 41-foot fixed span with a clearance of 10 feet. The inlet is described in chapter 10. Route A1A highway bridge crossing Matanzas River about 0.8 mile southward of the inlet has a 31-foot fixed span with a clearance of 12 feet; the one crossing the river 1 mile farther south has a 29-foot fixed span with a clearance of 12 feet. The overhead power cables at these bridges have a minimum clearance of 32 feet.

About 2 miles southward of Matanzas Inlet near **Mile 796.0,** the Intracoastal Waterway re-enters Matanzas River. At **Mile 796.6** is the oceanarium at **Marineland** where many types of marine life are exhibited; an admission fee is charged. The Marineland boatslip has depths of about 6 feet and is crossed by an overhead power cable with a clearance of 43 feet. The guest berths at Marineland are at the wharf just southward of the boatslip. There is space for about 18 boats, with reported depths of 6 feet. Gasoline and diesel fuel are available; a restaurant and overnight accommodations are nearby. New docking facilities at Marineland were scheduled for completion in the fall of 1969.

A marina at **Mile 800.2** on the east side of the waterway has 10 open berths with reported depths of 6 feet. Gasoline, diesel fuel, water, ice, and electricity are available.

An overhead power cable with a clearance of 85 feet crosses the waterway at **Mile 803.6. State Route 11 highway bridge at Flagler Beach, Mile 810.6,** has a bascule span with a clearance of 14 feet at the center. An overhead power cable 70 feet north of the bridge has a clearance of 94 feet.

A highway bridge at **Mile 816.0** has a bascule span with a clearance of 15 feet at the center. An overhead power cable 25 feet north of the bridge has a clearance of 85 feet.

The waterway enters **Halifax River** at **Mile 818.4** and continues to **Ormond Beach.** A yacht basin at **Mile 821.8** has a 2-ton fixed lift and a marine railway that can handle craft up to 40 feet; hull and engine repairs can be made. A machine shop and carpenter shop are on the premises. Berthage with electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available. Depths of 5 feet are reported in the approaches and alongside the berths. The Ormond Beach Bridge over the waterway at **Mile 824.9** has a bascule span with a clearance of 21 feet at the center. (See **117.433,** chapter 2, for drawbridge regulations and opening signals.)

Daytona Beach, Mile 830.0, is a large resort city with stores, motels, hotels, and restaurants. The city has excellent yacht facilities, and marine supplies can be obtained. The U.S. Public Health Service maintains a **contract physician's office** in Daytona Beach. (See appendix for address.)

Four bridges with bascule spans cross Halifax River at Daytona Beach. Seabreeze Bridge at **Mile 829.1** has a clearance of 20 feet at the center. Main Street Bridge at **Mile 829.7** has a clearance of 22 feet at the center. Broadway Bridge at **Mile 830.1** has a clearance of 20 feet at the center; an overhead cable on the south side of the bridge has a clearance of 98 feet over the main channel. South Bridge at **Mile 830.6** has a clearance of 21 feet at the center.

Just south of the fourth bridge at **Mile 830.7,** a marked channel leads westward from the waterway to the City Dock on the north side of the Municipal Yacht Basin. In 1960, the channel had a controlling depth of 6½ feet on the centerline. The fuel pier and the dockmaster's office are on the southern side of the channel opposite the east end of the City Dock. There are several berths on the east and south sides of the basin with reported depths of 6½ feet alongside. Gasoline, diesel fuel, water, ice, and electricity are available; meals and lodging are nearby. At the Halifax River Yacht Club, which is on the west side of the basin, reciprocal courtesies are extended to visiting members of other yacht clubs. Berths with electricity, gasoline, diesel fuel, water, and ice are available. Depths of 5 feet are reported alongside.

(See page T-4 for **Daytona Beach climatological table.**) **Storm warning signals are displayed.** (See chart.)

The primary facilities for yachts, other than the Municipal Yacht Basin, are at two boat works. One is 0.3 mile south of Seabreeze Bridge at **Mile 829.4.** There are about 75 open and covered berths for boats up to 60 feet with depths of 8 feet reported alongside. Gasoline, diesel fuel, water, ice, electricity, and marine supplies are available; groceries, motels, and restaurants are nearby. A marine railway can handle craft up to 65 feet for all types of repairs. A fixed 20-ton hoist, a machine shop, and a carpenter shop are also available.

The entrance channel to the other marina and boat works leaves the Intracoastal Waterway 0.5 mile south of the entrance to the Municipal Yacht Basin at **Mile 831.2.** The marked channel, which had a controlling depth of 6 feet in 1963, leads to an almost land-locked basin. There are about 150 open and covered berths with depths of 10 feet reported alongside. Gasoline, diesel fuel, water, ice, electricity, and marine supplies are available; groceries and restaurants are nearby. A 400-ton lift, 250-ton and 200-ton marine railways, and a mobile hoist are available for haul outs of vessels up to 110 feet for all types of repairs. The yard has carpenter, machine, and electrical repair shops and a sail loft.

State Route A1A bridge across the waterway at **Port Orange, Mile 835.5,** has a bascule span with a clearance of 20 feet at the center. (See **117.433,** chapter 2, for drawbridge regulations and opening signals.) A boatyard and a marina are on the east side of the waterway, north of the bridge. The boatyard 0.3 mile north of the bridge and the marina adjacent to the bridge have gasoline, diesel fuel, water, ice, electricity, marine supplies, and launching ramps. A 30-ton mobile lift and a marine railway that can handle craft up to 55 feet are available at the boatyard; hull, engine, and electronic repairs can be made. Machine and carpenter shops are on the premises. Reported depths of 8 feet and 3 feet are alongside the boatyard and marina, respectively.

The waterway continues down the Halifax River to **Mile 840.0** where it enters **Ponce de Leon Cut.** Strong cross currents may be felt at times in this cut, due to the currents from **Spruce Creek** veering from one side to the other.

Inlet Harbor, 0.5 mile southeast of the waterway at **Mile 839.6,** is a small fishing port. Controlling depth from the waterway to the harbor, in 1963, was 10 feet, thence 5 feet or more to the community of Ponce Inlet. The channel is along the north shore and is not marked. The wharf at Inlet Harbor has depths of about 8 feet alongside. Berthage with electricity, gasoline, diesel fuel, water, and ice are available. A marine railway here can handle craft up to 65 feet for hull repairs.

At the community of **Ponce Inlet,** about 1 mile below Inlet Harbor inside the north side of Ponce de Leon Inlet, there are several small-craft facilities where berthage with electricity, gasoline, diesel fuel, water, ice, and some marine supplies are available. A boatyard here has a marine railway that can handle craft up to 55 feet for hull and engine repairs; a 2-ton fixed lift is also available.

Ponce de Leon Inlet is described in chapter 10.

The waterway leaves Ponce de Leon Cut and enters **Indian River North** at **Mile 843.5,** about a mile southward of Ponce de Leon Inlet, and follows the river southward for about 15.5 miles through the marshes to Mosquito Lagoon. In some places the river is narrow and crooked, requiring careful steering and close attention to the channel daybeacons.

Coronado Beach Highway Bridge at **Mile 845.0** has a bascule span with a clearance of 14 feet at the center.

At **New Smyrna Beach, Mile 846.1,** there are several small-craft facilities where berths with electricity, gasoline, diesel fuel, water, ice, marine supplies and repairs can be obtained. Two of the facilities have mobile lifts that can haul out craft for hull and engine repairs; the largest lift has a 5-ton capacity. The Municipal Yacht Basin at **Mile 846.1** has berthage with electricity, diesel fuel, water, ice, and marine supplies. In 1969, the controlling depth from the Intracoastal Waterway to and in the basin was 8 feet.

The U.S. Public Health Service maintains a **contract physician's office** in New Smyrna Beach. (See appendix for address.)

New Smyrna Beach Highway Bridge at **Mile 846.5** has a double bascule span with a clearance of 24 feet. During flood (southerly flow) current from Sheephead Cut makes a cross current in a westerly direction north of the bridge. Boats with tows proceeding southward during a flood current are advised to allow for the cross current. An overhead power cable close northward of the bridge has a clearance of 85 feet.

The Intracoastal Waterway through Mosquito Lagoon and Indian River is through open water making the route rough at times, particularly during strong winds.

At **Mile 868.5** the waterway enters **Haulover Canal,** a cut through the 0.4 mile-wide strip of land separating Mosquito Lagoon from the Indian River. Jetties, which have brush-covered sand deposits piled along their outer sides, extend almost 0.4 mile from shore at each end of the cut, giving the canal a total length of about 1.2 miles.

Wind tides are quite pronounced at times producing strong currents in the canal. Southerly winds will build up the water level on the Indian River side of the canal and at the same time lower the water level on the Mosquito Lagoon side. Northerly winds will cause the reverse effect. At such times the normal water level varies as much as 2 feet, with currents through the channel up to 1.5 knots setting in the direction of the wind.

At **Mile 869.2,** a highway bridge crosses near the center of Haulover Canal; the bridge has a bascule span with a clearance of 27 feet at the center. Overhead power cables northeastward of the

bridge have clearances of 85 feet. If a vessel must stop before passing through the bridge and a strong current is running, care should be taken to prevent setting against the rocky sides of the canal. A marina with reported depths of 8 feet alongside is close southwestward of the bridge. Berthage with electricity, gasoline, diesel fuel, water, ice, marine supplies, and a launching ramp are available.

At **Mile 869.8,** the waterway enters **Indian River,** which extends southward for about 119 miles from Haulover Canal to St. Lucie Inlet. In general, it is a broad lagoon quite shallow in places. The spoil banks alongside the channel have built up in recent years and now appear as small islets on which are mangrove and other trees.

The river is nontidal except in the vicinity of Fort Pierce and for a short distance above the St. Lucie Inlet where the depth may vary as much as 2 feet under the influence of strong northerly and southerly winds.

At **Mile 876.6,** a causeway and railroad bridge across the waterway has a bascule span with a clearance of 7 feet. The span is automatically operated; it is normally in the open position, but will close on the approach of trains. (See **117.435,** chapter 2, for drawbridge regulations.)

A well-protected yacht basin is at **Titusville,** Mile 878.4; the basin is connected to the waterway by a marked dredged channel which had a reported controlling depth of 7 feet in 1965. At the marina and boatyard at the south end of the basin, there are open and covered berths for about 60 boats with reported depths alongside of 10 feet; gasoline, diesel fuel, water, ice, and electricity are available. The yard can haul out boats up to 50 feet for hull, engine, and electronic repairs. A machine shop is on the premises, and there is a launching ramp.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

The principal industries at Titusville are fishing, growing of flowers and citrus fruits, and tourism; the town is on the only public highway approach to the John F. Kennedy Space Center at Cape Canavaral. State Route 402 highway bridge across the waterway here has a swing span with a clearance of 9 feet; drawbridge regulations are given in **117.436,** chapter 2.

A highway bridge crossing the waterway at **Mile 885.0** has a bascule span with a clearance of 27 feet at the center. (See **117.436,** chapter 2, for drawbridge regulations.) An overhead power cable at **Mile 888.6** has a clearance of 85 feet over the main channel and 35 feet elsewhere between **Jones Point** and **Merritt Island.**

At **Mile 890.2,** a channel with a controlling depth of 6 feet, in 1963, leads to a turning basin with a least depth of 5 feet at **Courtenay,** 1.5 miles east of the waterway.

An overhead power cable at **Mile 893.6** has a clearance of 85 feet over the main channel and 25 feet elsewhere, between **City Point** and Merritt Island.

Charts 11485 (843-SC), 11478 (456), 11484 (1245).-Canaveral Barge Canal, Mile 893.8, connects the Intracoastal Waterway with Port Canaveral described in chapter 10. A Federal project provides for a 12-foot channel from the Intracoastal Waterway through land cuts in Merritt Island, thence across Banana River, thence through a barge lock, and thence to the deepwater turning basin at Port Canaveral. (See Notice to Mariners and latest editions of the charts for controlling depths.) The lock, about 1.5 miles westward of the turning basin, has a width of 90 feet and a length of 600 feet, and is in operation between the hours of 0600 and 2200 daily. (See **207.160,** chapter 2, for canal and lock regulations.) The channel is well marked by aids to navigation. Limiting clearances are 25 feet at the center for the drawbridges and 60 feet for the overhead power cables. (See **117.240, 117.437,** and **117.438,** chapter 2, for drawbridge regulations and opening signals.)

A fish camp is on the south side of Canaveral Barge Canal, about 1.5 miles eastward of the Intracoastal Waterway close westward of State Route A1A highway bascule bridge. Berthage with electricity, gasoline, water, ice, and a launching ramp are available.

A toll road causeway and bridges crossing Indian River at **Mile 894.0** have twin fixed spans with clearances of 65 feet over the main channel, and twin 30-foot fixed spans over a relief channel at the west end of the causeway with clearances of 12 feet.

At **Cocoa, Mile 897.4,** a causeway and twin fixed bridges with clearances of 65 feet cross the waterway. An overhead power cable about 0.1 mile southward of the bridges has a clearance of 88 feet over the main channel.

Northward of and parallel with the causeway on the east side of Indian River, a privately dredged channel, which had a controlling depth of 6 feet in 1963, leads to a yacht basin. A marina is at the southeast end of the basin, and another small-craft facility is on the north side. In 1969, depths of 4 to 7 feet were reported alongside the piers at these facilities. A marine railway at the marina can handle craft up to 50 feet for hull, engine, and electronic repairs. Engine repairs can be made at the other facility. Berthage with electricity, gasoline, diesel fuel, water, ice, launching ramps, and marine supplies are available at both facilities.

At **Mile 901.5,** a privately maintained channel marked by daybeacons leads to a marina on Merritt Island. In 1963, the controlling depth was 5 feet from the waterway to the marina. A marine railway here can handle craft up to 55 feet for hull, engine, and electronic repairs. Berthage with electricity, gasoline, and water are available.

At **Mile 909.0,** twin fixed highway bridges with clearances of 65 feet over the main channel cross Indian River.

Charts 11472 (845-SC), 11484 (1245), 11476 (1246).-At **Mile 910.7** on the west side of Indian River, a privately marked channel leads to a small yacht basin which has open and covered berths for boats up to 50 feet; depths of 8 feet are reported alongside. Gasoline, diesel fuel, water, ice, and electricity are available. Engine and electronic repairs can be made.

Banana River has its southern entrance at **Mile 914.2** opposite Eau Gallie and about 0.1 mile north of the highway bridge crossing Indian River. The river is used by small boats as a harbor of refuge during hurricanes and storms. In 1966, the controlling depth was 2 feet from the entrance of the river for 16 miles to the Canaveral Barge Canal leading eastward to the turning basin at Port Canaveral.

A marina on the south side of the entrance to Banana River, has about 30 open berths with reported depths of 6 feet alongside. Gasoline, diesel fuel, ice, water, electricity, some marine supplies, and a 15-ton mobile hoist are available; hull, engine, and electronic repairs can be made. The Eau Gallie Yacht Club, which has excellent facilities for yacht club members, is in the basin on the east side of the river just inside the entrance.

A highway bridge across the Banana River about 0.5 mile above the entrance has a swing span with a clearance of 8 feet. A marina on the east side of the river immediately southward of the bridge has about 60 berths with reported depths of 6 feet alongside. Gasoline, diesel fuel, water, ice, electricity, marine supplies, and a 60-ton mobile hoist are available; hull and engine repairs can be made. A motel is adjacent to the marina.

Twin fixed highway bridges with clearances of 43 feet over the channel cross Banana River about 4.3 miles above the mouth.

An Air Force **prohibited area** is at the base on the east bank of the Banana River about 5.8 miles above the mouth. (See **207.171d**, chapter 2, for limits and regulations.)

Newfound Harbor is at the southeastern end of Merritt Island, 10 miles above the entrance to Banana River. The harbor is shoal and about 4 miles long in a north-south direction. Several shoals and obstructions have been reported in Newfound Harbor, About 3.7 miles above the entrance, State Route 520 highway bridge has a 35-foot fixed span with a clearance of 7 feet.

Across the entrance to **Sykes Creek** at the north end of Newfound Harbor there is a highway bridge that has a 30-foot fixed span with a clearance of 15 feet. An overhead power cable close northwestward of the bridge has a clearance of 23 feet. About 0.1 mile above the bridge, the center 45-foot section of a former bridge has been removed and the other portions remain as fishing piers. Twin 30-foot fixed span highway bridges with clearances of 15 feet cross the creek about 2.2 miles above the mouth.

A marina is on the west side of Banana River about 12 miles above the southern entrance, and 2.1 miles north of **Buck Point,** the eastern entrance point of Newfound Harbor. 'Berthage' with electricity, gasoline, diesel fuel, and water are available. A marine railway here can handle craft up to 50 feet; hull, engine, and electronic repairs can be made. Depths of 4½ feet are reported in the approach, and 8 feet alongside the berths.

Cocoa Beach causeway (State Route 520), crossing the Banana River, 3.5 miles north of Buck Point, has a fixed span with a clearance of 36 feet. An overhead power cable on the north side of the bridge has a clearance of 82 feet.

About 16 miles above the entrance and 6.4 miles north of Buck Point, the Banana River is crossed by U.S. Route A1A toll-road causeway and bridges. The twin fixed spans over the main river channel have a clearance of 36 feet; the 30-foot twin spans over the relief channel at the west end of the causeway have clearances of 14 feet.

About 0.2 mile northward of U.S. Route A1A causeway-bridges, the Canaveral Barge Canal crosses the river channel and leads to Port Canaveral. **Saturn Barge Channel** extends northward from Canaveral Barge Canal to the head of Banana River and to two side channels in Banana Creek leading eastward and westward to turning basins at missile test installations; a side channel, extending eastward from the Saturn Barge Channel, 5 miles northward of the Canaveral Barge Canal, leads to a basin on the cape. The channels are marked by lights, daybeacons, and buoys, and had a controlling depth of 8 feet in June 1968. An overhead power cable crosses Saturn Barge Channel about 0.6 mile northward of Canaveral Barge Canal with a clearance of 65 feet.

Banana River above the Canaveral Barge Canal and the adjacent land areas lie within a Security Zone. Limits and regulations are given under the description of Cape Canaveral in chapter 10.

A **prohibited area** in upper Banana River, about 3 miles above the Canaveral Barge Canal, is adjacent to a missile-test annex; limits and regulations are given in **207.171a,** chapter 2.

The NASA Parkway causeway and bridge crosses Banana River 6.5 miles above the Canaveral Barge Canal. The bridge has a bascule span over the navigation channel with a clearance of 24 feet at the center. (See **117.240** and **117.245a,** Chapter 2, for drawbridge regulations and opening signals.) A NASA space center **restricted area** is on the east side of the river just north of the NASA Parkway causeway. (See **207.171e,** chapter 2, for limits and regulations.) An overhead power cable with a clearance of 85 feet crosses the river about 3.0 miles north of the NASA Parkway causeway bridge.

Chart 11472 (845-SC)-The Intracoastal Waterway continues through Indian River southward for about 74 miles to St. Lucie Inlet.

The city of **Eau Gallie, Mile 914.4,** has an excellent yacht basin. The highway causeway (State Route 3) crossing the river here has a swing span across the Intracoastal Waterway with a clearance of 9 feet; drawbridge regulations are given in **117.436,** chapter 2. About 200 yards south of the bridge, an overhead power cable crosses the waterway with a clearance of 90 feet at the main channel. An overhead cable on the south side of the relief bridge at the east end of the causeway has a clearance of 35 feet.

About 0.5 mile south of the causeway at **Mile 914.9,** a marked channel leads to a yacht basin inside the mouth of Eau Gallie River. The controlling depth in the channel was 8 feet in 1969; general depths in the basin, between the point where the river widens out and the U.S. Highway 1 bridge across the river, are 3 to 4 feet. This basin affords good shelter from storms. A city ordinance restricts speed to no wake in Eau Gallie River. There are two marinas in the basin, one on the north side and one on the west side just below the highway bridge. There are berths for about 80 boats with water and electricity; gasoline, diesel fuel, and ice are available; both marinas have a marine supply store, and a shopping center is nearby. The marina on the north side has machine shops and two marine railways which can handle craft up to 70 feet. All types of repairs and maintenance can be obtained. **Storm warning signals are displayed.** (See chart.)

About 0.5 mile above the mouth of Eau Gallie River, U.S. Route 1 highway bridge has a fixed span with a clearance of 12 feet. About 0.1 mile above the highway bridge, the Florida East Coast railroad bridge has a 44-foot fixed span with a clearance of 12 feet.

Melbourne, Mile 918.2,has yacht facilities on Crane Creek. The highway causeway (State Route 516) here has a swing bridge span across the Intracoastal Waterway with a clearance of 6 feet; drawbridge regulations are given in **117.436,** chapter 2.

At **Mile 918.7,** about 0.5 mile south of the bridge, a marked channel leads westward from the Indian River to two marinas and a fishing camp on the north side of **Crane Creek;** the reported controlling depth was 4½ feet in 1975. Depths in the basin formed by the widening of Crane Creek below the highway bridge are about 5 feet. There are berths for about 60 boats of up to 50 feet. Gasoline, diesel fuel, ice, water, electricity, and marine supplies are available; restaurants and motels are nearby. A 4-ton fixed lift and a marine railway that can handle craft up to 50 feet are also available; hull and engine repairs can be made. **Storm warning signals are displayed.** (See chart.)

About 0.2 mile above the mouth of Crane Creek, U.S. Route 1 highway bridge has a 36-foot fixed span and a clearance of 15 feet. About 175 yards westward of the highway bridge, the Florida East Coast railroad bridge has a 40-foot fixed span and a clearance of 14 feet. Overhead power cables close westward and 500 yards westward of the railroad bridge have clearances of 25 and 40 feet, respectively.

At **Mile 921.2,** an overhead power cable with a clearance of 95 feet, crosses the waterway at the main channel.

Turkey Creek is on the west side of Indian River at **Mile 921.3.** About 0.4 mile above the entrance, U.S. Route 1 highway bridge has a 33-foot fixed span with a clearance of 13 feet. About 300 yards above the highway bridge, the Florida East Coast railroad bridge has a fixed span with a clearance of 10 feet. Overhead power cables at the railroad bridge have a minimum clearance of 21 feet. A shoal, bare at low water, is in the middle of the entrance to Turkey Creek. In 1966, a depth of 4 feet was reported in the natural channel to the eastward of the shoal area.

A marina is on the south side of Turkey Creek between the two bridges. Berthage with electricity, gasoline, a launching ramp, water, marine supplies, and a 2-ton mobile lift are available. Depths of 3 feet are reported alongside the berths.

At **Mile 923.0,** on the west side of the river, there is a marina where gasoline, berthage with electricity, water, ice, a launching ramp, and a 25-ton mobile hoist are available; hull and engine repairs can be made. Depths of 5 feet and 12 feet are reported in the approaches and alongside the berths, respectively.

At **Mile 933.3,** a marina on the east side of the river has berthage with electricity, gasoline, diesel fuel, water, ice, and some marine supplies. Hull, engine, and electronic repairs can be made. Depths of 4 feet and 10 feet are reported in the approaches and alongside the berths, respectively.

A yacht basin is on the west side of the Indian River at **Mile 934.1.** Berths for about 60 boats, gasoline, diesel fuel, ice, water, and electricity are available. The channel to the basin is privately marked and had reported depths of 6 feet in 1967.

At **Mile 935.0,** a marina on the east side of the river has berthage with electricity, gasoline, water, ice, a launching ramp, and some marine supplies; engine repairs can be made. Depths of 6 feet are reported in the approaches and alongside the berths.

Sebastian Creek, Mile 935.4, is used by local fishing boats going to **Roseland,** 1.1 miles above the mouth. U.S. Route 1 highway bridge across the entrance to the creek has a 43-foot fixed span with a clearance of 13 feet; avoid the piles of the old bridge 0.3 mile upstream. About 1 mile above the highway bridge, the Florida East Coast railroad bridge has a 46-foot fixed span with a clearance of 12 feet. Two overhead power cables at the railroad bridge, one on the east side and the other on the west side, have clearances of 17 feet and 60 feet, respectively. About 300 yards above the railroad bridge an overhead power cable has a clearance of 23 feet.

A marina is on the north side of Sebastian Creek just westward of U.S. Route 1 highway bridge. Berthage with electricity, gasoline, water, ice, and a launching ramp are available. A marine railway here can handle craft up to 20 feet for hull and engine repairs. Depths of 3 feet are reported in the approaches and alongside the berths.

Sebastian is a fishing town at **Mile 938.3.** There are two small marinas here which have gasoline, ice, water, and limited berthing facilities. Engine repairs can be made. Reported depths of 6 feet can be taken to the southerly marina, and 4 feet to the northerly one. A marine railway that can handle craft up to 40 feet is available between the two marinas. A **special anchorage area** has been established off the town of Sebastian. (See **110.1, and 110.73a,** chapter 2, for limits and regulations.)

A fixed highway bridge across the waterway at **Mile 943.3** near **Wabasso** has clearance of 65 feet. The bridge and causeway between the mainland and the island westward of the Intracoastal Waterway has a 46-foot center span with a clearance of 9 feet. An overhead power cable crossing Indian River on the north side of the Wabasso causeway, with a clearance of 40 feet from the mainland to the bridge, is submerged at the Intracoastal Waterway, thence a clearance of 50 feet to the eastern shore of the river.

The waterway is crooked and subject to strong currents in narrow places from about 1 mile north of the Wabasso Bridge to about 4 miles south of it. Caution must be observed at the bends where vision is limited.

At **Mile 946.3,** a privately marked channel with a controlling depth of 6 feet in May 1969, leads off to the northwestward to a waterfront development at **Hobart Landing,** about a mile south of Wabasso. An overhead power cable crosses the channel; clearance is unknown.

Vero Beach, Mile 951.9, is an active ocean resort and yachting center. State Route 60 highway bridge over the waterway here has a bascule span with a clearance of 22 feet at the center.

(See **117.438a,** chapter 2, for drawbridge regulations and opening signals.)

About 0.2 mile north of the bridge, a marked channel leads eastward from the waterway for about 0.4 mile to the piers of Vero Beach Yacht Club. In May 1969, the controlling depth in the channel was 9 feet; depths of 6 to 14 feet are reported alongside the piers. There are open berths for about 90 boats with water and electricity. Gasoline, diesel fuel, ice, and many other services and facilities are available. A 10-ton hoist can haul out boats up to 30 feet; engine and hull repairs can be obtained. A marina just north of the east end of the bridge has gasoline, water, ice, and some marine supplies. A marina immediately south of the west end of the bridge has about 20 berths with reported depths of 5 feet. In May 1969, the controlling depth was 3 feet from the waterway to the marina. Gasoline, diesel fuel, ice, water, electricity, a restaurant, and a motel are available, and a shopping center is nearby. There is a 5-ton mobile hoist, and hull, engine, and electronic repairs can be obtained. About 0.4 mile southward of the bridge, a channel leads east from the waterway to Riomar Bay Yacht Club. There are about 36 berths with reported depths of 8 feet. Gasoline, diesel fuel, ice, water, electricity, and complete clubhouse and recreation facilities are available.

Storm, warning signals are displayed. (See chart.)

From Vero Beach to the St. Lucie Inlet the Indian River is broad and quite shallow, but the Intracoastal Waterway route is well marked and easy to follow. Spoil banks parallel the channel at a distance of several hundred yards and are mostly covered with mangrove and a few Australian pines.

Overhead power cables at **Mile 952.4** and **Mile 954.9** have clearances of 80 and 85 feet, respectively.

State Route A1A highway bridge north of Fort Pierce at **Mile 964.8** has a bascule span with a clearance of 26 feet at the center.

Fort Pierce, Mile 965.6, has supply and repair facilities. The town and Fort Pierce Inlet are described in chapter 10.

At **Mile 965.8,** State Route A1A highway bridge crossing the waterway at Fort Pierce has a swing span with a clearance of 6 feet. A strong cross current exists at this bridge. Vessels proceeding north or south should not approach the bridge until it is fully opened for passage. At all times maintain sufficient headway to avoid being carried against the fender system. Slow-moving southbound vessels, intending to make the sharp turn westward immediately after passing through the draw, should be especially cautious when both wind and current are from the south, to avoid being pushed against the bridge system. An overhead power cable south of the bridge has a clearance of 85 feet.

In 1972, a fixed highway bridge with a design clearance of 65 feet was under construction immediately southward of State Route A1A highway swing bridge. Upon completion, it will replace the existing bridge.

Overhead power cables at **Mile 974.2** have clearances of 90 feet.

Jensen Beach, Mile 981.4, is a winter resort on the west bank of the Indian River. State Route 707A highway bridge crossing the waterway here has a bascule span with a clearance of 24 feet at the center.

At **Mile 982.8,** a privately marked dredged channel leads westward from the waterway to a marina in a protected basin. In May 1969, the controlling depth was 4 feet from the waterway to the basin entrance; depths of 5 to 6 feet were reported alongside the piers. Berthage with electricity, gasoline, water, and some marine supplies are available. A 4-ton mobile hoist and a marine railway that can handle craft up to 40 feet are available; hull and engine repairs can be made.

At **Mile 983.5**, a dredged channel marked by private daybeacons leads from the Intracoastal Waterway to a marina in a small basin. The marina is part of a resort and has excellent facilities. There are about 40 berths for boats up to 120 feet. In May 1969, the channel had a controlling depth of 7 feet; depths of 8 feet were reported in the basin. Gasoline, diesel fuel, water, ice, electricity, and a 3-ton hoist are available. Two restaurants, a motel, and complete recreational facilities are also available.

State Route A1A highway bridge across the waterway at **Mile 984.9** has a bascule span with a clearance of 28 feet at the center.

The junction of the Intracoastal Waterway and Okeechobee Waterway is at **St. Lucie Inlet, Mile 987.8.** St. Lucie Inlet and River, Port Salerno, Port Sewall, and Stuart are described in chapter 10.

Extreme caution is advised when crossing St. Lucie River. Cross currents will give a vessel an east or west set, depending on the direction and velocity of the current in the river. Vessels should be able to stay in the channel by using the ranges on each side of the intersection. To make a turn from the Intracoastal Waterway into St. Lucie River or vice versa, allowance must be made for the cross currents to prevent swinging too wide or too short.

Chart 11428 (855-SC).-Okeechobee Waterway.-From its junction with the Intracoastal Waterway in St. Lucie Inlet, Okeechobee Waterway follows St. Lucie River westward to South Fork, through South Fork and St. Lucie Canal, and enters Okeechobee Lake at Port Mayaca. It crosses the southern part of the lake and exits at Moore Haven into Caloosahatchee Canal and thence into Caloosahatchee River, San Carlos Bay, and the Gulf of Mexico. From San Carlos Bay, the Gulf section of the Intracoastal Waterway follows an inside route along the west coast of Florida to Anclote River, thence outside to Carrabelle Ship Channel in St. George Sound, and thence inside again through the remainder of Florida, Alabama, Mississippi, Louisiana, and Texas to Brownsville. The Gulf section is described in **United States Coast Pilot 5, Atlantic Coast-Gulf of Mexico, Puerto Rico, and Virgin Islands.**

Mileage in the Okeechobee Waterway is measured westward from Mile 0.0 at the Intracoastal Waterway junction in St. Lucie Inlet. The total length of the Okeechobee Waterway is about 155 miles from the Atlantic Waterway to the Gulf of Mexico. Mileage signs (statute miles) have been erected throughout the waterway.

Distances along the Okeechobee Waterway are in statute miles to facilitate reference to the small-craft charts; all other distances are in nautical miles. Mileage conversion tables are on page T-22.

Channel.-The Federal project for the Okeechobee Waterway provides for a channel with a depth of 8 feet from the Intracoastal Waterway near Stuart via Okeechobee Lake Route 1 to Fort Myers; thence 10 feet to Punta Rassa; thence 12 feet to the Gulf of Mexico; a channel 6 feet deep in Taylor Creek from the town of Okeechobee to the lake, and a depth of 6 feet for Route 2 along the south shore of Lake Okeechobee from Port Mayaca westward to Clewiston. Controlling depths are published in local Notice to Mariners.

Sounding datums.-Depths charted in St. Lucie River from the Intracoastal Waterway to St. Lucie Lock are referred to mean low water; from St. Lucie Lock, up to St. Lucie Canal, across Lake Okeechobee, and down the Caloosahatchee Canal to W.P. Franklin Lock, depths are referred to mean sea level; in the Caloosahatchee River from W.P. Franklin Lock to Fort Myers, the datum is a low-water plane which is 0.1 foot below mean sea level; and from Fort Myers to the Gulf of Mexico, the datum is mean low water. Actual available depths are shown on gages displayed at each lock.

Hurricane gates are in the levee at Clewiston Industrial Canal, Miami Drainage Canal, Hillsboro Canal-North New River Drainage Canal, and West Palm Beach Beach Drainage Canal. Pumping stations are at the hurricane gates at Miami Drainage Canal, Hillsboro Canal-North New River Drainage Canal, and West Palm Beach Drainage Canal. The gates are opened or closed only for pumping, and are not opened for boats. Depths of 10 feet may be taken over the sills. All gates have a width of 50 feet. These canals are not navigable and have filled with hyacinths and other obstructions.

Tides.-The mean range of tide is 2.6 feet at St. Lucie Inlet, at Fort Myers 0.7 foot, and at Punta Rassa 1.7 feet. At the eastern end of the waterway, tidal influence is perceptible to St. Lucie Lock (Mile 15.1) and at the western end, at low-water stage, is perceptible at Ortona Lock (Mile 93.5). Cross **currents** at the junction of St. Lucie River with the Intracoastal Waterway make the short turn at that point hazardous.

Weather.-Storm warning signals are displayed at various places along the Okeechobee Waterway and connecting channels. Display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published by the National Weather Service.

Bridges and cables.-(See pages T-20 and T-21 for controlling clearances of bridges and cables crossing the Okeechobee Waterway.) Limiting clearances of bridges and overhead power cables over Taylor Creek are mentioned in the area description of the creek.

General drawbridge regulations and opening signals for bridges over the Okeechobee Waterway and Taylors Creek are given in **117.240**, chapter 2. **Special drawbridge regulations** for certain bridges that supplement the general regulations are referenced with the area description of the waterway and the creek.

Government mooring facilities.-There is a Government yacht basin with 4 slips available for

overnight mooring of medium size boats at the Moore Haven Lock; similar facilities are available in the Government yacht basin below Ortona Lock. Government-owned tieup dolphins are located on the waterway immediately above and below St. Lucie and Moore Haven Locks, and in the old River channel on the upstream and downstream sides of W.P. Franklin Lock.

Locks:-Three of the four locks in the waterway have a length of 250 feet, width of 50 feet, and depth over the sill of 10 feet. The old St. Lucie Lock, adjacent to the new lock is used as an auxiliary; it has a length of 130 feet, width of 30 feet, and depth over the sill of 6 feet. The W.P. Franklin Lock at Olga, **Mile 121.4,** has a length of 400 feet, width of 56 feet, and depth over the sills of 14 feet.

General regulations governing bridges and locks and the handling of tows are given in **207.160,** chapter 2. The four navigation locks on the Okeechobee Waterway are operated from 0600 to 2200 daily; operating personnel are not on duty at other hours.

Maintenance of the Okeechobee Waterway and operation of the locks are in charge of the Corps of Engineers area office at Clewiston. Before any attempt is made to pass through any portion of this route, the latest information regarding available depths, operations of the locks, and other existing conditions should be obtained from the office of the Corps of Engineers at Clewiston or at the Federal Building, 400 West Bay Street, Jacksonville. The telephone number of the Clewiston area office is 983-8101.

Public address systems are installed at all four locks as an aid to navigation and a safety feature. Craft approaching any of the locks should approach for passage only upon receiving instructions from the lock tender through the loudspeaker system or by standard light signal.

Caution.-The St. Lucie, Moore Haven, Ortona, and W.P. Franklin Locks are used, when conditions require, for discharging water from Lake Okeechobee. All vessels approaching these locks during periods of discharge should exercise caution. The depth over the upper sill of St. Lucie Lock is reduced from 13.5 feet to 8 feet when water is being discharged from Lake Okeechobee.

St. Lucie Inlet and **St. Lucie River** to Stuart, Mile 7.5, are discussed in chapter 10. **South Fork** of St. Lucie River begins at **Mile 7.7** and trends southward into St. Lucie Canal.

Palm City, Mile 9.5, is a small town on the west bank of South Fork. A small boatyard for hull, engine, and electronic repairs on the east bank of the river, just south of the Palm City Bridge, has a marine railway that can haul out boats up to 40 feet. Gasoline, water, ice, electricity, wet covered storage for 15 boats up to 45 feet, limited marine supplies, and cottages are available at the yard and a restaurant is close by. In 1963, a controlling depth 4½ feet could be carried from the waterway to the yard and alongside. The fixed highway bridge over the waterway here has a clearance of 55 feet. The overhead power cable just north of the bridge has a clearance of 55 feet. During periods of high water in Lake Okeechobee, shoaling may occur in the vicinity of the bridge.

At **Mile 10.1,** Okeechobee Waterway enters St. Lucie Canal from South Fork, which then continues southeastward. South Fork above the junction is deep and winding, affording good protection for small boats during hurricane weather. About 2 miles up this fork is a fixed highway bridge with a clearance of 4 feet. Current was observed to be flowing up the river at this bridge.

St. Lucie Canal is crossed at **Mile 14.5** by the Sunshine State Parkway bridge, which has a fixed span with a clearance of 55 feet.

The **St. Lucie Lock, Mile 15.1,** has a width of 50 feet, length of 250 feet, and a controlling depth of 11 feet over the sill. High water in Lake Okeechobee may cause the lock to be closed to navigation for parts of the day. Caution should be used when approaching the lock when it is being used to discharge water from Lake Okeechobee. Limited tieup facilities are available at the lock.

Overhead power and telephone cables crossing St. Lucie Canal at **Mile 17.1** have clearances of 55 feet. State Route 71A highway bridge crossing the canal at **Mile 17.1** has a clearance of 6 feet. (See **117.439a,** chapter 2, for drawbridge regulations.)

At **Mile 23.7,** overhead power and telephone cables crossing the waterway have a least clearance of 55 feet.

At **Mile 24.7,** overhead power and telephone cables, with a least clearance of 57 feet, cross the waterway.

At **Mile 25.4,** overhead power cables with a least clearance of 62 feet cross the waterway; another overhead power cable with a clearance of 75 feet crosses at **Mile 27.0.**

Near **Indian Town,** State Route 710 highway bridge at **Mile 28.1,** has a fixed span with a clearance of 54 feet. The hand-operated swing span of the Seaboard Coast Line Railroad bridge at **Mile 28.5** has a channel width of 47 feet and a clearance of 6 feet; drawbridge regulations are given in **117.439,** chapter 2. An overhead telephone cable at the bridge has a clearance of 58 feet, and overhead power and telephone cables 0.7 mile west of the bridge have a clearance of 74 feet.

At **Mile 29.5,** there is a marina on the north side of the canal with 33 slips where craft up to 120 feet can be accommodated. Gasoline, diesel fuel, water, ice, electricity, some marine supplies, and a snack bar are available. There is a surfaced launching ramp, a 3-ton marine lift, and a mechanic on call for minor engine repairs. Provisions, supplies, restaurants, and motels are available close by. In 1963, the controlling depth in the entrance and in the basin was 6 feet.

The minimum clearance of the overhead power cables at **Miles 33.6, 34.5, 36.3, 37.8, and 38.3** is 55 feet.

Port Mayaca, Mile 38.0, has no piers, but one wall of the lock is still present and can be used to tie up. Some supplies are available in the community. The Florida East Coast Railway bridge across the waterway here has a lift span with clearances of 6 feet down and 48 feet up. (See **117.436a,** chapter 2, for drawbridge regulations.)

U.S. Routes 98-441 highway bridge at **Mile 38.8** has a swing span with a clearance of 10 feet. The channel is through the north draw.

The waterway enters **Lake Okeechobee** at **Mile 38.9.** The lake is an approximately circular freshwater lake in southern Florida, about 26 miles from the Atlantic coast, 50 miles from the Gulf coast, and 90 miles from the south end of the mainland. It varies in width from 22 to 30 miles and is shoal along its west and southwest sides with depths of 10 to 14 feet in the center. The shoal areas are generally filled with a thick growth of watergrass, which makes it necessary to equip boats with weedless propellers if operating in the lake for any length of time.

Taylor Creek empties into Lake Okeechobee at its northernmost extremity. A lock at the mouth of the creek is 60 feet long and 50 feet wide, and has a depth of 5.5 feet over the sill. (See **207.170d,** chapter 2, for regulations.) About 3.5 miles above the mouth of the creek is the town of **Okeechobee,** which has rail and highway connections. A dredged channel leads from the lake to the highway bridge at Okeechobee. In 1971, the controlling depth was 5 feet to the highway bridge. The approach channel from the lake to the mouth of Taylor Creek is marked by a light and daybeacons; the remainder of the channel to Okeechobee is unmarked. There are two fishing camps in the creek just above the mouth where gasoline, water, ice, launching ramps, and some marine supplies are available.

U.S. Route 441 highway bridge about 0.2 mile above the mouth of Taylor Creek has a 40-foot bascule span with a clearance of 9 feet. (See **117.245 (a) through (e) and (h) (29),** chapter 2, for drawbridge regulations.) Overhead power cables north and south of the bridge have a minimum clearance of 40 feet. State Route 70 highway bridge crossing the creek of Okeechobee has a 40-foot swing span with a clearance of 3 feet.

Kissimmee River flows into the north side of Lake Okeechobee about 5.3 miles southwest of Taylor Creek. State Route 78 highway bridge about 0.5 mile above the river entrance has a removable span with a channel width of 36 feet when open and a clearance of 20 feet; drawspan regulations are given in **117.240 and 117.245 (a) through (e) and (h) 26 (i).** chapter 2. The overhead power cable at the bridge has a clearance of 71 feet. In 1963, the centerline depth in the entrance channel was 5 feet to the State Route 78 highway bridge, thence 15 feet for another 1.4 miles.

North Lake Shoal extends 4 miles off the northwest shore of the lake. **Observation Shoal** is an extensive sand shoal extending as much as 7 miles off the southwest shore of the lake. **Rocky Reef** extends across the south end of the bay between **Observation Island** and **Bacom Point;** depths of 2 to 7 feet are over it in places. The channel of Route 1 through the reef is marked by lights and daybeacons. **Halifax Bank** is a sand shoal toward the south end of **South Bay.**

Shelter may be found in Taylor Creek at the north end of the lake, in **Pelican Bay** at the southeast corner of the lake, and in the canals. Where depths are sufficient in the watergrass off the west and southwest sides of the lake, anchorage in moderate weather can be made, as the holding bottom is good and protection is afforded by the watergrass.

Route 1 across Lake Okeechobee from Port Mayaca follows a southwesterly course to Rocky Reef, thence a southerly course in the channel through the reef which is marked by lights and daybeacons, and then turns westward and thence southwestward and joins Route 2 at Clewiston.

Clewiston, at **Mile 65.0** via Route 1 and **Mile 75.7** via Route 2, is an agricultural community on the southwest side of the lake. It is on a branch of the Seaboard Coast Line Railroad. There are several hotels, motels, restaurants, and a shopping district in the city. The area offices and general headquarters of the Corps of Engineers are on the east side of the canal at the east side of town. Gasoline, diesel fuel, some marine supplies, and provisions can be obtained along the west side of the canal; engine repairs can be made. Dock space is available along the bulkhead of the Clewiston Industrial Canal south of the levee. The depth alongside is 4 feet. An overhead power cable that has a clearance of 37 feet crosses the canal about 400 yards south of the hurricane gate.

Routes 1 and 2 combine into one route at Clewiston.

Route 2 leaves St. Lucie Canal at **Mile 38.9** and follows the southern perimeter of the lake. It is marked by daybeacons and is the route most used. It is recommended during periods of rough water and high winds in Lake Okeechobee. Levees are along the southern bank of this route.

Canal Point is at **Mile 47.4** on Route 2. **West Palm Beach Drainage Canal** joins the lake here; at the lock in the canal an overhead power cable has a clearance of 80 feet.

Pahokee, Mile 50.6, is a town on the southeast side of the lake with a protected boat basin which had a depth of 6 feet, in 1963. Gasoline, diesel fuel by truck, and electricity are available at the pier in the basin; depths of 6 to 10 feet were reported alongside the pier.

The only bridge crossing Route 2 is at **Mile 60.7.** State Route 717 highway bridge, connecting the mainland at **Belle Glade** with **Torry Island** and **Kreamer Island,** has a swing span with a clearance of 11 feet. The channel is through the west draw. (See **117.245 (a) through (e) and (h) (28),** chapter 2,

for drawbridge regulations.) An overhead power cable at the bridge has a clearance of 75 feet. Gasoline, water, ice, electricty, diesel fuel by truck, and launching ramps are available at boat landings on both sides of the bridge. South of the bridge, on Torry Island, there is a wharf maintained by the city with depths of 4 feet alongside; there are three surfaced launching ramps and a public picnic area.

About 0.3 mile below the bridge at **Mile 61.0** the **Hillsboro Drainage Canal** and **North New River Drainage Canal** join the lake.

The **Miami Drainage Canal** joins the lake at **Lake Harbor, Mile 67.2.**

Route 2 continues northwestward to Clewiston where it joins Route 1 and combines into one route westward. Mileage westward of Clewiston is based on use of Route 1.

Moore Haven Lock, Mile 78.0, has a width of 50 feet, a length of 250 feet, and a least depth of 10 feet over the sills. Two standby areas have been established for vessels waiting to pass through. The first area is about 275 yards northwest of the lock at the junction of the canals, and the second area is 150 yards southwest of it. During periods of discharge through the lock, the currents and turbulence are extremely hazardous to all craft. Under no circumstances shall any craft approach nearer to the lock than the standby areas until discharge has been stopped and the water pool stabilized.

A public address system at the Moore Haven Lock is an aid to navigation and safety feature. Craft coming to the lock should approach the passage only upon receiving instructions from the locktender through the loudspeaker system, and enter the lock chamber only after signal from him.

Freshwater is available at the lock. A Government boat basin with four slips for medium-sized boats is just west of the lock. In 1963, there were depths of 6 to 30 feet in the basin.

The waterway between Moore Haven Lock and Ortona Lock passes through **Caloosahatchee Canal.**

The Seaboard Coast Line Railroad bridge, at **Mile 78.3,** has a hand-operated swing span with a clearance of 5 feet; the channel is through the east draw. (See **117.245 (a) through (e) and (i) (1),** chapter 2, for drawbridge regulations.) The span required about 15 minutes for opening and westbound vessels should signal for opening the bridge while still in Moore Haven Lock. An overhead power cable about 150 yards south of the bridge has a clearance of 75 feet. At **Mile 78.4** U.S. Route 27 highway bridge has a bascule span with a clearance of 23 feet at the center. (See **117.245 (a) through (e) and (i) (1-a),** chapter 2, for drawbridge regulations.)

There is a small-boat basin on the west side of the canal between the railroad and highway bridges. Gasoline, diesel fuel by truck, water, ice, electricity, launching ramp, wet covered storage for 20 boats 20 feet long, and some marine supplies are available. A depth of 3½ feet can be carried from the waterway to the basin. An overhead cable with a clearance of 18 feet crosses the entrance to the basin. Provisions can be obtained in the town of **Moore Haven** at **Mile 78.5,** on the west bank of Caloosahatchee Canal about 0.5 mile south of the lock. There are hotels, motels, and restaurants; some supplies can be obtained. Bus service is available. The town dock is on the west side of the canal just south of the highway bridge; water and electricity are available on the dock, and a small fee is charged for dockage. There is a depth of 9 feet alongside the dock. Gasoline and diesel fuel may be obtained at a small fuel pier at the south edge of town.

At **Mile 82.1,** the canal passes through shallow, freshwater **Lake Hicpochee,** about 5 miles long and 2.5 miles wide, soft mud bottom. Most of the surface is covered with hyacinth and saw grass. Spoil banks on both sides of the canal are overgrown to a height of about 12 feet and have only a few open spots where the lake can be seen.

At **Citrus Center, Mile 88.8,** a marina on the south side of the waterway has berths with electricity, water, gasoline, and diesel fuel.

Ortona Lock, Mile 93.5, has a width of 50 feet, a length of 250 feet, and a depth of 11 feet over the sills. During periods of heavy discharge through the spillway with the lock gates closed, the currents sweep toward the spillway. Navigators approaching the lock should exercise extreme caution and maintain maximum possible control at all times. A boat basin, a ramp, and a 180-foot wharf are about 500 yards west of the lock on the north bank.

The waterway enters **Caloosahatchee River** through a land cut west of Ortona Lock. Normal current in the river and canal is about 1.5 knots; however, velocities are increased considerably during freshets.

An overhead power cable about 0.2 mile westward of Ortona Lock has a clearance of 76 feet.

At **Mile 94.0,** the Seaboard Coast Line Railroad bridge crossing the river has a hand-operated swing span with a clearance of 7 feet; the channel is south of the pivot pier. Westbound vessels should signal for opening of the bridge while still in Ortona Lock and anticipate delay awaiting the full opening. Full control should be maintained at all times.

LaBelle, Mile 102.9, has a pier and turning basin. Groceries and docking space may be obtained here. In 1963, there were depths of 7 to 9 feet alongside the pier. State Route 29 highway bridge crossing here, has a bascule span with a clearance of 28 feet at the center. (See **117.245 (a) through (e) and (i)(1-a),** chapter 2, for drawbridge regulations.) The overhead power cable at the bridge has a clearance of 76 feet.

At **Denaud, Mile 108.2,** a highway bridge has a swing span with a clearance of 9 feet. An overhead power cable west of the bridge has a clearance of 79 feet. (See **117.245 (a) through (e) and (i)(1-a),** chapter 2, for drawbridge regulations.)

Alva, on the north bank at **Mile 116.0,** has a small pier where gasoline, water, and some marine supplies can be obtained. State Route 873 highway bridge crossing the waterway here, has a bascule span with a clearance of 23 feet. (See **117.245 (a) through (e) and (i)(1-a),** chapter 2, for drawbridge regulations.) The overhead power cable at the bridge has a clearance of 77 feet.

W. P. Franklin Lock, ,Mile 121.4, has a length of 400 feet, width of 56 feet, and a depth of 14 feet over the sill. At **Olga, Mile 122.8,** an overhead power cable crossing the waterway has a clearance of 75 feet.

At Mile 124.0, just below Olga, there is a small marina where gasoline, diesel fuel, water, ice, berths with electricity, a launching ramp, and some marine supplies are available. A depth of 4½ feet was alongside the small pier on the waterway in 1963.

At **Mile 125.6, Trout Creek** enters the waterway. **Owl Creek** branches from Trout Creek about 0.7 mile above the entrance. There are two entrances from the waterway into Trout Creek. The controlling depth, in 1963, was 5 feet in the western entrance and 7 feet in the eastern entrance. At Owl Creek there is a small-craft facility where berths, electricity, gasoline, diesel fuel, water, storage, a 65-foot marine railway, and a 30-ton hoist are available; hull and engine repairs can be made. Small craft can be put in freshwater storage behind a dam here.

A highway bridge crossing the river at **Mile 126.2** has a bascule span with a clearance of 27 feet at the center. (See **117.245 (a) through (e) and (i)(1-a),** chapter 2, for drawbridge regulations.)

At **Mile 128.0,** two overhead power cables have a minimum clearance of 80 feet. In 1974, a fixed highway bridge, with a design clearance of 55 feet, was under construction across the river at **Mile 128.9.**

Orange River enters the waterway at **Mile 129.0.** A reported depth of 5 feet was available at a boatyard and a marina about 0.5 mile and 0.6 mile, respectively, above the mouth. The channel is marked by private daybeacons. Reported depths alongside were 10 feet at the boatyard and 8 feet at the marina. Berths, electricity, gasoline, diesel fuel, water, ice, marine supplies, storage, and launching ramps are available; hull and engine repairs can be made. A 65-foot marine railway is at the boatyard, and a 3-ton hoist is at the marina.

Orange River is a hurricane refuge for small yachts. The river is crossed by State Route 80 highway bridge 0.8 mile above the mouth. It has a 40-foot bascule span with a clearance of 11 feet; drawbridge regulations and opening signals are given in **117.240 and 117.245 (a) through (e) and (i)(2),** chapter 2. Adjacent to the bridge are overhead power cables with a minimum clearance of 41 feet. From the bridge to 2 miles above the mouth, other overhead cables have a minimum clearance of 36 feet.

The Caloosahatchee River is crossed at **Mile 129.9** by a Seaboard Coast Line Railroad bridge which has a hand-operated swing span with a channel width of 49 feet and a clearance of 2 feet. An overhead power cable at **Mile 132.5** has a clearance of 80 feet over the main channel and one at **Mile 133.4** has a clearance of 75 feet over the main channel.

Edison Memorial Bridge (U.S. Route 17), which crosses Caloosahatchee River at **Fort Myers, Mile 134.5.** has a bascule span with clearances of 10 feet at the center and 6 feet at the fenders; drawbridge regulations are given in **117.462,** chapter 2.

Fort Myers, on the south bank of Caloosahatchee River 14 miles above the mouth, is the commercial center for this part of the State. The city's hotels, communications, and boating facilities are discussed in **United States Coast Pilot 5, Atlantic Coast-Gulf of Mexico, Puerto Rico, and Virgin Islands.**

Chart 11472 (845-SC).-South of St. Lucie Inlet, the Intracoastal Waterway enters **Great Pocket** at **Mile 988.3,** proceeds to a canal at **Mile 990.1,** and continues through **Peck Lake** and **South Jupiter Narrows** to **Hobe Sound.**

State Route 708 highway bridge at **Mile 995.9** has a bascule span with a clearance of 10 feet at the center.

The waterway continues in Hobe Sound to **Conch Bar, Mile 1001.3,** and thence through **Jupiter Sound** to Jupiter Inlet. At **Mile 1004.1,** near the southern end of Jupiter Sound, State Route 707 highway bridge crossing the waterway has a bascule span with a clearance of 25 feet. An excellent marina is in the basin on the east side of the waterway immediately south of the bridge. There are about 25 open berths with reported depths of 6 feet. Gasoline, diesel fuel, water, ice, electricity, a restaurant, and overnight accommodations are available.

Jupiter Inlet is discussed in chapter 10.

The waterway continues into **Loxahatchee River** at **Mile 1004.5.** U.S. Route 1 highway bridge across the waterway at **Mile 1004.8** has a bascule span with a clearance of 26 feet at the center. Piers of a former bridge extend from shore on both sides of the channel just west of the bridge. About 0.3 mile westward of the bridge, the waterway makes a sharp turn just eastward of two other bridges, crosses Loxahatchee River, and enters Lake Worth Creek.

Caution is advised when crossing Loxahatchee River. Vessels are to give ONE LONG BLAST on approaching the bend and then proceed at reduced speed on the righthand side of the channel. Overtaking vessels must never attempt to pass another vessel proceeding in the same direction on bends where visibility ahead is restricted to such an extent that a collision with an unseen approaching vessel may result. (See CG-169-Rules of the Road, published by the Coast Guard.)

Care must be taken not to confuse the route of the waterway with the passage through the two bridges just westward of the sharp turn across the Loxahatchee River at **Mile 1005.1.** State Route A1A highway bridge crossing the river has a 45-foot bascule span with a clearance of 6 feet. The Florida East Coast railroad bridge has a 40-foot bascule span with a clearance of 4 feet; drawbridge regulations for the railroad bridge are given in **117.240** and **117.436a,** chapter 2. The overhead power cable at this bridge has a clearance of 64 feet. The river shoals beyond these bridges. A fixed highway bridge with a 34-foot removal span and a clearance of 11 feet crosses the north fork of the river about 2 miles above the railroad bridge. An overhead power cable north of the bridge has a clearance of 38 feet.

A marina with excellent facilities is immediately east of the U.S. Route 1 bridge on the south side of the river at **Jupiter.** There are about 20 berths for boats up to 65 feet with reported depths of 5 feet alongside. Gasoline, diesel fuel, water, ice, electricity, and complete marine supplies are available. There is a 35-ton mobile lift, and complete repair work, alterations, and boatbuilding are performed. A smaller marina adjacent to the eastward has berths, gasoline, water, electricity, some marine supplies, and a 6-ton lift; hull and engine repairs can be made. A **contract physician's office** of the U.S. Public Health Service is at Jupiter. (See appendix for address.)

The highway bridge at **Mile 1006.2** has a bascule span with a clearance of 15 feet at the center.

At **Mile 1007.1,** an overhead power cable has a clearance of 83 feet across the waterway. The highway bridge crossing the waterway at **Mile 1009.3** has a bascule span with a clearance of 14 feet at the center.

A small boatyard on the west bank of the waterway at **Mile 1011.7** has a marine railway that can haul out vessels up to 55 feet for hull and engine repairs. A 3-ton mobile hoist, gasoline in cans, diesel fuel by truck, and water are available.

A highway bridge at **Mile 1012.6** has a bascule span with a clearance of 25 feet at the center.

At **Mile 1013.7** the waterway is crossed by U.S. Route 1 highway bridge. It has a twin bascule span having a clearance of 25 feet at the center. The overhead power cable on the east side of the bridge has a clearance of 85 feet.

Just southeastward of the bridge is a yacht basin with 100 open berths for boats up to 100 feet long; water, electricity, and telephone connections are at each berth. Depths are reported to be 10 feet. Gasoline, diesel fuel, ice, restaurants, a motel, and recreation facilities are available. Engine and electronic repairs can be made.

The Intracoastal Waterway enters **Lake Worth** at **Mile 1014.1** and traverses the lake from one end to the other. The lake is a long, narrow, and shallow body of water separated from the ocean by an island varying in width from 0.1 to 0.5 mile. Considerable dredging has been done in Lake Worth for private channels and for real estate development. Local knowledge is necessary to carry the best water outside the limits of the marked channels.

There are many excellent and complete marinas and repair yards for yachts along the shores of Lake Worth.

Little Lake Worth, at the north end of Lake Worth, has a basin which in 1969, has depths of 12 to 14 feet. State Route 703 highway bridge across the entrance has a 27-foot fixed span with a clearance of 8 feet. A dredged unmarked channel leading northward into Little Lake Worth from the Intracoastal Waterway, at **Mile 1014.2,** has a controlling depth of 9 feet, in 1969, to the cut, thence 2½ feet, in 1963, to the basin.

State Route 703 highway bridge crossing the waterway at **Mile 1017.2,** connecting **Riviera Beach** and **Singers Island,** has a bascule span with a clearance of 14 feet at the center. (**See 117.439b,** chapter 2, for drawbridge regulations.) In 1974, a fixed highway bridge, with a design clearance of 65 feet, was under construction immediately southwest of the existing bridge.

There are a number of marinas, fuel piers, and repair facilities on both sides of Lake Worth between the bridge and the Port of Palm Beach. Berths, gasoline, diesel fuel, ice, water, electricity, restaurants, motels and marine supplies are available. A privately marked channel with a reported controlling depth of 7 feet leads westward from the Intracoastal Waterway about 0.3 mile south of the bridge to a marina and repair yard. There are about 35 berths with complete service available. There is a 100-ton elevator and a 25-ton mobile hoist; complete repair service, including diesel engine work, can be obtained. A repair yard on the west side of the lake about 0.4 mile south of the bridge has a marine railway which can haul out boats up to about 100 feet; hull repairs can be obtained. The privately marked channel leading to the yard from the waterway had a controlling depth of 8 feet in 1963.

Lake Worth Inlet, Mile 1018.4, and the ship channel leading to the basin at the **Port of Palm Beach,** are described in chapter 10.

Anchorage for yachts drawing up to 14 feet is available in the buoyed channel on the east side of Lake Worth leading southward from Port of Palm Beach main ship channel; the best area is 0.8 mile south of the ship channel.

On the west side of the lake at **Mile 1019.8** there are three boat storage and repair yards. The first has a 6-ton portable lift that can handle boats up to 32 feet for hull, engine, and electronic repairs. There is berthage for 25 boats with reported depths of 5 feet alongside. Gasoline, diesel fuel, water, electricity, and marine supplies are available.

The second yard has a marine railway that can haul out boats up to 70 feet. Engine, hull, and electronic repairs can be made, and machine shop

work is done. Dry storage facilities and some overnight wet storage are available. There is berthage for 50 boats with depth of 5 to 11 feet alongside. Gasoline, diesel fuel, water, electricity, ice, a restaurant, motel, and marine supplies are available; there is a 14-ton crane.

The third repair yard has two piers over 300 feet long and a 166-foot by 92-foot wet storage shed; depths of about 10 feet alongside are reported. There are open and covered berths for about 75 boats. Repair facilities include a 160-ton fixed lift and a marine railway which can handle craft up to 105 feet and 90 feet, respectively, and well-equipped machine and carpenter shops. Complete repairs can be made. Gasoline, diesel fuel, water, ice, electricity, and marine supplies are available at the yard, and motels and stores are nearby. In 1963, the controlling depth was 8 feet from the Intracoastal Waterway to the repair yards.

West Palm Beach, Mile 1021.9, on the west shore of Lake Worth, is a resort city which is also of considerable commercial importance. The city has complete supplies and services for yachts. **Storm warning signals are displayed.** (See chart.)

The long pier of a marina is at **Mile 1021.6** in West Palm Beach, about 0.1 mile north of the highway bridge. Palm Beach Yacht Club is at the marina. There are open berths for about 44 boats of up to 120 feet, with depths of 42 to 11 feet alongside. Gasoline, diesel fuel, water, ice, electricity, and a restaurant are available. The controlling depth was 6½ feet in 1963, from the waterway to the pier.

Flagler Memorial Bridge, Mile 1021.8, has a bascule span with a clearance of 17 feet at the center; drawbridge regulations are given in **117.440,** chapter 2.

About 0.1 mile south of the bridge, a privately maintained and marked channel leads westward to the West Palm Beach Municipal Marina. The controlling depth in the channel was 10 feet, in 1963, with the same depth along the offshore face. In the northern slips of the yacht basin there was 6 to 11 feet. There is adequate berthing space for 150 boats; gasoline, diesel fuel, water, electricity, and ice are available; restaurants, motels, hotels, provisions, and marine supplies are close by; the dockmaster's office is at the head of pier 3.

Royal Park (State Route A1A) bridge, **Mile 1022.6,** has a bascule span with a clearance of 14 feet at the center; drawbridge regulations are given in **117.440,** chapter 2.

A yacht basin just south of the bridge and on the east side of the waterway has berthage for 75 boats with depths of 6 to 20 feet alongside and there is ample water from the waterway. Water and electricity are available on the piers. There are no other facilities.

Chart 11467 (847-SC).-From West Palm Beach, the waterway continues southward to the south end of Lake Worth at **Mile 1034.3,** thence through a cut to Lake Wyman at **Mile 1045.7.**

Southern Boulevard Bridge, **Mile 1024.7,** has a bascule span with clearance of 14 feet at the center. (See **117.440a,** chapter 2, for drawbridge regulations.)

In **West Palm Beach Canal, Mile 1026.8,** there is a marina with berthage for 60 boats with reported depths of 6 feet alongside. In 1963, there was a controlling depth of 5 feet from the waterway to the marina. Gasoline, water, electricity, restaurant, motel, provisions, and marine supplies are available. A marine railway can haul boats up to 35 feet for minor hull, electronic, and engine repairs. U.S. Route 1 highway bridge crossing the canal about 0.3 mile above the mouth has a reported 39-foot bascule span with a clearance of 8 feet; drawbridge regulations are given in **117.441a,** chapter 2.

At **Lake Worth, Mile 1028.8,** State Route 802 highway bridge crossing the waterway has a bascule span with a clearance of 38 feet at the center and 35 feet elsewhere. **Caution.**-The open bascule span overhangs the channel above a vertical clearance of 88 feet.

A repair yard is in the yacht basin on the west side of the lake at **Mile 1030.6.** The yard has a 200-ton fixed lift, and a marine railway that can handle craft up to 90 feet; hull, engine, and electronic repairs can be made. Berths with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. In 1963, depths of 6 feet were available from the waterway to the basin.

At **Lantana, Mile 1031.0,** a highway bridge crossing the waterway has a bascule span with a clearance of 13 feet at the center. A small-craft facility at **Mile 1033.1** has a 40-ton mobile hoist, and a marine railway that can handle craft up to 60 feet; hull and engine repairs can be made. Berthage with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available.

At **South Lake Worth Inlet, Mile 1033.7,** easterly winds cause strong currents that have great velocity and must be reckoned with when navigating the Intracoastal Waterway. The inlet is discussed in chapter 10.

The waterway enters a cut at **Mile 1034.3.** A highway bridge crossing the waterway at **Boynton Beach, Mile 1035.0,** has a bascule span with a clearance of 10 feet at the center.

Just north of the bridge on the western shore of the lake there are three small-craft facilities where berths with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. A marine railway that can haul out vessels up to 35 feet for hull, engine, and electronic repairs is available.

At **Mile 1035.8,** a highway bridge with a bascule span and clearance of 25 feet crosses the waterway.

The Eighth Street highway bridge over the waterway at **Mile 1038.7** has a bascule span with a clearance of 9 feet at the center.

Just south of the bridge on the west side of the waterway there is a boatyard that makes hull, engine, and electronic repairs. The yard has berthage

with electricity, gasoline, diesel fuel, water, ice, some marine supplies, and a 25-ton fixed lift.

At **Delray Beach, Mile 1039.6,** the Atlantic Avenue highway bridge has a bascule span with a clearance of 12 feet at the center. A yacht basin on the east side of the waterway south of the bridge has berths, electricity, gasoline, diesel fuel, water, and ice are available. A marina on the west side of the waterway about 1 mile south of the bridge at **Mile 1040.6** has berthage with electricity, gasoline, diesel fuel, water, ice, some marine supplies, and a 30-ton mobile hoist; hull, engine, and electronic repairs can be made.

A highway bascule bridge with a clearance of 21 feet (25 feet at the center) crosses the waterway at **Mile 1044.9.**

At **Mile 1045.7,** the waterway enters **Lake Wyman,** crosses the lake through a dredged channel, marked by lights and daybeacons, and then continues southward to Lake Boca Raton and Boca Raton Inlet.

The highway bridge at **Boca Raton, Mile 1047.5,** has a bascule span with a clearance of 6 feet at the center. Just south of the west side, is a surfaced launching ramp. The waterway enters **Lake Boca Raton** at **Mile 1047.7.** Boca Raton Inlet leads from the lake to the Atlantic Ocean; it is described in chapter 10.

The waterway leaves Lake Boca Raton at **Mile 1048.1** and enters a long land cut. Crossing the north end of the land cut at **Mile 1048.2,** a highway bridge has a bascule span with a clearance of 9 feet at the center. Care should be exercised at this bridge as strong currents may be encountered; the sides of the canal are rocky.

Just north of the bridge is the Boca Raton Hotel and Marina. Berths, electricity, gasoline, water and ice are available. Minor engine and electronic repairs can be made. Depths of 6 feet are reported alongside the piers.

Hillsboro Drainage Canal enters the Intracoastal Waterway from the west at **Mile 1049.9** near **Deerfield Beach.** The confluence of the canal and the waterway on the north side of the bridge creates a dangerous condition in the channel. During periods of maximum discharge through the canal, hazardous currents develop in the Intracoastal Waterway channel about 100 yards north of Deerfield Beach Bridge.

Vessels proceeding southward should not approach the bridge until it is fully opened for passage, and should at all times maintain sufficient headway to avoid being carried toward the east fender system by the flow of water from Hillsboro Drainage Canal that generates considerable cross current, especially during periods of flood.

About 0.8 mile up Hillsboro Drainage Canal, U.S. Highway 1 bridge, has a 32-foot fixed span with a clearance of 9 feet. Just below the bridge is a marina and repair yard. Half of the finger piers are covered. Berthage with electricity, gasoline, and water are available. A 20-ton mobile hoist is available at the yard; hull, engine, and electronic repairs can be made. In 1963, the controlling depth was 8 feet from the Intracoastal Waterway to the marina; in 1969, depths of 8 feet were reported alongside the piers.

Just below the canal, at **Mile 1050.0,** the Intracoastal Waterway is crossed by the Deerfield Beach highway bridge that has a bascule span with a clearance of 21 feet at the center. (See **117.442,** chapter 2, for drawbridge regulations and opening signals.) The wreckage of a steel hull barge lies awash against the east bank about 100 yards south of the bridge.

Just south of the bridge on the west side of the waterway is a marina with berthage for 40 boats with 6 feet reported alongside. The controlling depth was 7 feet, in 1963, from the waterway into the basin. Gasoline, diesel fuel, water, ice, electricity, restaurant, and marine supplies are available.

Hillsboro Inlet, at **Mile 1053.9,** is described in chapter 10. Between Hillsboro Inlet and **Pompano Beach,** including **Lake Placid,** there are several marinas and repair facilities that have marine lifts, vertical lifts, and marine railways, the largest of which can handle boats up to 90 feet for complete hull, engine, and electronic repairs. Gasoline, diesel fuel, water, ice, electricity, restaurants, motels, marine supplies, and launching ramps are available. In 1963, depths of 4½ to 8 feet were available alongside at various marinas and depths of 4½ to 12 feet in the approaches.

At **Mile 1055.0** a double-leaf bascule highway bridge with a clearance of 15 feet crosses the waterway. (See **117.442a,** chapter 2, for drawbridge regulations and opening signals.)

Near **Pompano Beach, Mile 1056.0,** there is a highway bridge with a bascule span with a clearance of 15 feet at the center. (See **117.443,** chapter 2, for drawbridge regulations and opening signals.)

Just north of the bridge, on the east side of the waterway, a yacht basin has finger piers with depths that vary from 10 feet near the waterway to 7 feet at the inner end of the basin; the piers have water and electricity. Gasoline, diesel fuel, ice, and some supplies are available, and there is berthage for 83 boats.

A marina on the west bank of the waterway, 1.4 miles south of the bridge at Pompano Beach, has dry and wet storage, and berthage for 75 boats with 6 to 11 feet alongside and 9 feet in the approach. Gasoline, diesel fuel, water, ice, electricity, and some supplies are available.

At **Mile 1059.0,** a highway bridge over the waterway near **Lauderdale-by-the-Sea** has a bascule span with a clearance of 15 feet.

At **Mile 1060.5,** the Oakland Park Beach Boulevard highway bridge over the waterway near **Oakland Park** has a bascule span with a clearance of 22 feet at the center.

At **Mile 1062.6,** the two Sunrise Boulevard highway bridges, at Fort Lauderdale, have bascule spans with a minimum clearance of 16 feet at the center; drawbridge regulations are given in **117.446 (b), (c), and (d),** chapter 2.

Middle River enters the waterway from westward about 0.6 mile south of the Sunrise Boulevard bascule bridges; the controlling depths, in 1963, were 6 feet to the Sunrise Boulevard highway bridge 0.9 mile above the mouth, thence 5 feet to the U.S. Route 1 bridge 2.2 miles above the mouth, and thence 3 feet in South Fork to the fixed bridge. The Sunrise Boulevard highway bridge about 0.9 mile above the mouth has a 27-foot fixed span with a clearance of 6 feet. A mile north of the bridge is an overhead power cable with a clearance of 38 feet. A small marina just south of the bridge has charter boats and berthage for 15 boats with 7 to 11 feet alongside. Gasoline, water, ice, electricity, restaurant, motel, hardware, and supplies are available. U.S. Route 1 highway bridge has a 29-foot fixed span with a clearance of 8 feet.

An overhead power cable with a clearance of 44 feet crosses the river just south of and parallel to the more northerly of the U.S. Route 1 bridges. A highway bridge across the north fork of the river about 0.7 mile above U.S. Route 1 highway bridges has a 33-foot fixed span with a clearance of 6 feet. In 1974, a fixed highway bridge, with a design clearance of 4½ feet, was under construction across the north fork of the river about 2.2 miles above the mouth.

Fort Lauderdale, Mile 1065.0, a large and colorful city known as the "Venice of America," is served by the Florida East Coast Railway and the Seaboard Coast Line Railroad. Navigable waters include the myriad of manmade canals in addition to the natural waterways. The canals between the man-made islands are used by the riparian owners and their guests.

All facilities for yachts are available at Fort Lauderdale, and several thousand yachts base here in the winter season. There are many bathing and recreation facilities, hotels, restaurants, and shopping centers in the city. A monument marks the original site of Fort Lauderdale, built in 1838 during the Seminole War.

At **Mile 1064.0,** Las Olas Boulevard highway bridge has a bascule span with a clearance of 31 feet at the center. (See **117.446 (a)** and **(d),** chapter 2, for drawbridge regulations.)

The large Bahia Mar yacht basin, consisting of two divided basins and an outer wharf, is on the east side of the Intracoastal Waterway about 0.4 mile southward of Las Olas Boulevard Bridge. Depths of 7 to 14 feet are alongside the face of the wharf, and decreasing depths from 11 to 5½ feet at the finger piers in the basins. The office of the yacht basin's dockmaster is in the administration building on the outer wharf. The dockmaster makes all berthing arrangements. Gasoline, diesel fuel, water, electricity, showers, ice, restaurant, motel, shopping center, and marine supplies are available. All kinds of supplies are available in the city, and oil companies will make deliveries of gasoline and diesel fuel directly to boats. A Coast Guard station is at the southeast corner of the southerly basin.

Storm warning signals are displayed. (See chart.)

The boatyard at the southeast corner of the yacht basin makes major repairs and has three vertical lifts for small boats up to 50 feet. A depth of 8 feet can be carried to the boatyard.

New River, the main navigation channel in this area, enters the waterway from westward at **Mile 1065.0.** In 1963, the controlling depth was 8 feet from the Intracoastal Waterway to the junction of South Fork, thence 5 feet through the fork and South New River Canal to the junction with Dania Cut-Off Canal. At Tarpon Bend, 0.6 mile above the mouth, the channel is narrow and there are strong currents; also, heavy traffic can be expected here.

Above the junction of New River with the Intracoastal Waterway, New River and South Fork are crossed by the following bridges with bascule spans and overhead cables: U.S. Route 1 passes through a tunnel under the river at Southeast Sixth Avenue; at 1.1 miles, Southeast Third Avenue highway bridge, clearance 16 feet; at 1.3 miles, South Andrews Avenue Bridge, clearance 5 feet; an overhead power cable at the bridge has a clearance of 60 feet; at 1.4 miles, Florida East Coast Railway bridge, clearance of 3 feet; an overhead power cable just above the railway bridge has a clearance of 80 feet; at 1.7 miles, the William H. Marshall Memorial Bridge with a clearance of 20 feet at the center; the overhead power cable just above this bridge has a clearance of 80 feet; on the South Fork, 0.8 mile above the mouth of the fork, Southwest 12th Street bridge has a clearance of 21 feet; at 2.8 miles, Seaboard Coast Line Railroad bridge, clearance 2 feet; the overhead power cable at the bridge has a clearance of 71 feet; at 3.8 miles, State Highway 84 bridge has a 40-foot bascule span with a clearance of 21 feet; drawbridge regulations and opening signals for the bridges are given in **117.240** and **117.446c,** chapter 2. An overhead power cable close southward of the bridge has a clearance of 65 feet.

In 1969, two parallel fixed highway bridges were under construction across South Fork at 1.7 miles; design clearance is 55 feet.

The mean range of tide at the Andrews Avenue Bridge, New River, is 1.8 feet. The range increases towards the mouth of the river and is 2.3 feet at the Bahia Mar yacht basin, Fort Lauderdale. Strong currents may be encountered above the Southeast Sixth Avenue Tunnel; strangers going upriver are advised to obtain information from the City Dockmaster.

Speed in New River is limited to no wake.

Both banks of New River between Southeast 6th Avenue Tunnel and Florida East Coast railroad

bridge are owned by the city. Along the bulkheads, berths with water and electricity are provided for yachts. Arrangements for space are made with the city dockmaster, whose office is on the river between Southeast 6th Avenue Tunnel and Southeast Third Avenue. He has police powers over all the waterways within the city limits.

South New River Canal joins the South Fork of New River with the Dania Cut-Off Canal. Overhead power cables across it have a minimum clearance of 45 feet.

A number of large storage yards are on New River about 2.5 miles above the city-owned berthing area. Several repair yards and storage basins are up the river. The largest shipyard has a marine railway that can haul out vessels up to 140 feet . Any hull or engine repairs can be made, and machine shops are available. Some yards have cranes of up to 50-ton capacity for rail-water or truck-water transfer.

From New River, the Intracoastal Waterway continues southward through the **Stranahan River.** At **Mile 1065.9,** Fort Lauderdale Southeast 17th Street (State Route A1A) highway bridge has a bascule span with a clearance of 25 feet at the center; drawbridge regulations are given in **117.446 (e),** chapter 2. **Speed** in Stranahan River is limited to no wake.

The entrance channel to the Lauderdale Yacht Club is on the west side of Stranahan River about 0.4 mile north of the Fort Lauderdale Southeast 17th Street bridge. The channel to the club from the Intracoastal Waterway is marked by privately maintained piles. Depths of 7 feet are reported in the channel, and 5 feet alongside the pier and bulkhead. Water, electricity, and dockage are available for members.

There are three marinas on the west side of Stranahan River. Two are close northward of the Southeast 17th Street highway bridge, and the other is near the head of Seminole River, the first canal extending westward just north of the bridge. These facilities have berthage with electricity, gasoline, diesel fuel, water, ice, and marine supplies; hull, engine, and electronic repairs can be made. Also available in the area are mobile hoists up to 12 tons and a marine railway that can handle craft up to 42 feet. In 1963, the controlling depth in **Seminole River** was 12 feet from the Intracoastal Waterway and 4 feet near the head.

The **Mercedes River** extends eastward from the Intracoastal Waterway at **Mile 1065.7** to **Lake Sylvia.** A highway bridge crossing the river has a 26-foot fixed span with a clearance of 7 feet. A large marina on the south side of the entrance has gasoline, diesel fuel, water, ice, electricity, restrooms, showers, unlimited berthing, marine hardware, motel, restaurant, and provisions available. Depths alongside the piers and bulkheads are 15 to 4½ feet. In 1963, the controlling depth in Mercedes River from the waterway to the bridge was 8 feet.

A highway bridge over **Marietta River,** which extends southward from Mercedes River, has a 23-foot fixed span with a clearance of 8 feet. From just south of the bridge, **Marion River** extends eastward into **Mayan Lake** from Marietta River.

Port Everglades, Mile 1066.3, and Port Laudania on Dania Cut-Off Canal are described in chapter 10.

Dania Sound, which is about 1.6 miles long, lies between the Intracoastal Waterway and the ocean. Two highway bridges cross the sound, one at the north end and the other at the south end. The bridge at the north end has a 26-foot fixed span with a clearance of 14 feet, and the one at the south end has a 41-foot fixed span with a clearance of 18 feet. Overhead power and telephone cables at the bridges have a mimimum clearance of 30 feet.

The waterway enters a land cut at **Mile 1067.5,** and **Dania Cut-Off Canal** enters the cut at **Mile 1068.8.** The canal was constructed by the county for drainage purposes, and during floodwater periods it may cut through to the ocean. In 1965, the canal had a reported controlling depth of 10 feet to the first turn about 0.9 mile above the Intracoastal Waterway, thence 5½ feet to the powerplant at the intersection with South New River Canal, a distance of about 5 miles. An overhead power cable with a clearance of 80 feet crosses the canal about 0.6 mile westward of the intersection with the Intracoastal Waterway.

A large marina, about 1 mile along the canal from the waterway, has berthage with electricity, gasoline, diesel fuel, ice, water, and marine supplies. A 40-ton fixed lift, and a marine railway that can handle craft up to 65 feet are available; hull, engine, and electronic repairs can be made.

A yacht basin is in the canal at **Dania,** 1.7 miles from the waterway. Berthage with electricity, gasoline, water, ice, and a 2-ton mobile hoist are available; hull and engine repairs can be made. West of the yacht basin, bridges, overhead cables, pipelines, and other obstructions restrict the channel width to 29 feet and overhead clearance to 10 feet.

Dania Beach (State Route A1A) highway bridge, **Mile 1069.4,** has a bascule span with a clearance of 22 feet at the center. The highway bridge across the waterway at **Mile 1070.5** has a bascule span with a clearance of 22 feet at the center. Just south of the bridge and on the east side of the waterway there are several places where some supplies may be obtained. Depths are 8 to 12 feet alongside the bulkhead.

At the southeast corner of **North Lake, Mile 1072.0,** the Hollywood City Yacht Basin has berthage for 75 boats with depths of 4½ to 12 feet alongside. Gasoline, diesel fuel, water, ice, electricity, restaurant, and some marine supplies are available; there is a small-boat launching ramp.

Hollywood, Mile 1072.2, is about 1 mile west of the waterway. On the ocean side east of the city is

the Hollywood Beach Hotel, a very prominent structure. Several marine service stations are on the east side of the waterway. Berthage, gasoline, diesel fuel, water, ice, electricity, and other supplies are available. There are no repair facilities.

Hollywood Beach (State Route 820) bridge, **Mile 1072.2,** has a bascule span with a clearance of 11 feet at the center. (See **117.446a,** chapter 2, for drawbridge regulations.) In 1975, a bascule highway bridge, with a design clearance of 25 feet, was under construction across the waterway about 0.1 mile southwest of the existing bascule span.

At **Hallandale Beach, Mile 1074.0,** State Route 824 highway bridge has a bascule span with a clearance of 22 feet; drawbridge regulations are given in **117.446a,** chapter 2.

On the east bank of the waterway at **Golden Beach, Mile 1076.1,** there is a marina with berthage for 15 boats with depths of 3½ to 5½ feet alongside. Water, ice, electricity, restaurants, motels, and some marine supplies are available. There are no repair facilities.

At **Mile 1076.3,** the waterway enters shallow **Dumfoundling Bay.** A dredged channel, marked by privately maintained daybeacons, leads west from the waterway at **Mile 1076.5** to an industrial area. Controlling depth was 7 feet in April 1967. Care is required here as spoil banks are close aboard on both sides of the dredged channel through the bay. A sharp turn to the south is necessary to enter **Biscayne Creek** at **Mile 1077.3.**

Maule Lake, on west side of the waterway at **Mile 1077.3,** is entered through a privately marked channel leading from the waterway at the southwest corner of Dumfoundling Bay. The controlling depth in the channel, in April 1967, was 8 feet, and depths in the lake were 5 to 14 feet over rocky bottom. At a marina on the west shore of the lake is berthage for 280 boats with depths from 18 to 8 feet alongside; controlling depth is 8 feet to the piers. All facilities are available, and there is a 100-ton vertical lift capable of handling any boat that can reach the marina for complete marine repairs.

At **Mile 1078.0,** State Route 826 highway bridge crossing the waterway, has a bascule span with clearance of 19 feet at the center; the overhead power cable 55 yards north of the bridge has a clearance of 80 feet.

On the east bank of the waterway, at **Mile 1078.0** and just south of the highway bridge, there are two small marinas with berthage for 49 boats. Gasoline, diesel fuel, water, ice, electricity, marine supplies, motels, and restaurants are available. There is a 15-ton marine lift that can handle boats up to 30 feet. Hull, engine, and electronic repairs may be obtained. The controlling depth was 6 feet, in 1963, from the waterway to the marinas, and there were depths of 7 to 8 feet alongside.

Oleta River leads westward from Biscayne Creek, at **Mile 1078.0,** and continues on into Maule Lake. The controlling depths, in April 1967, were 3 feet from the Intracoastal Waterway to the highway bridge 1.5 miles above the entrance, thence 2½ feet into Maule Lake. This highway bridge over the river has a 21-foot fixed span with a clearance of 4 feet. Another fixed bridge with a clearance of 23 feet crosses the river about 0.3 mile above the entrance. Berthage for 100 boats with depths of 6 to 3½ feet alongside the piers is available at a marina 0.5 mile above the entrance, and at a small-boat facility just south of the bridge 1.5 miles above the entrance. The controlling depth leading to the piers was 4 feet in April 1967. Gasoline, water, ice, electricity, and some marine supplies are available. There is a 55-ton vertical lift that can handle boats up to 55 feet for hull and engine repairs; there are launching ramps at both facilities.

The Intracoastal Waterway enters the northern end of **Biscayne Bay** at **Mile 1078.5.** The bay is a shallow body of water extending about 33 miles southward, and is unexcelled as a yachting and small-boating area. The upper part of the bay is very shallow, about 2 miles wide, and is separated from the Straits of Florida by a narrow peninsula, Virginia Key, and by Key Biscayne. The remainder of the bay south of Miami has an average width of about 7 miles, general depths of 9 to 10 feet with several places having depths of 13 to 15 feet, and is separated from Hawk Channel by a number of keys and coral banks through which there are several narrow and shallow channels. In the lower part of Biscayne Bay and in the bays and sounds southward, the water is so clear on calm days that the bottom can be seen at considerable depths. On windy days, the water becomes milky and opaque.

On the east side of the Intracoastal Waterway at **Mile 1079.6** is an entrance to a large municipal marina for the use of yachtsmen and party fisherman. In 1963, there were depths of 7 to 13 feet in the entrance and at the finger piers, and 9 to 15 feet in the channel leading southward about 0.3 mile to Bakers Haulover Inlet. Gasoline, diesel fuel, water, ice, restrooms, showers, restaurant, and electricity are available. There is berthage for 58 boats; a charge is made for docking. A launching ramp is also available. A dockmaster assigns berths. **Storm warning signals are displayed.** (See chart.)

Bakers Haulover Inlet is described in chapter 10.

Bal Harbour, a private development, is immediately southward of Bakers Haulover Inlet. Several large hotels are conspicuous landmarks.

At **Mile 1080.4,** a dredged channel marked by privately maintained daybeacons leads south-southeasterly to Bal Harbour yacht basin that has a depth of 14 feet. The channel had a controlling depth of 6 feet in 1963. The yacht basin is for members only, but other craft may take refuge here during bad storms.

Indian Creek extends southward about 6 miles along the eastern part of Biscayne Bay from Bal

Harbour to Collins Canal in Miami Beach. In 1963, the controlling depth was 5 feet in Indian Creek. A highway bridge across the creek from Bal Harbour to **Bay Harbor Islands** has a 43-foot fixed span with a clearance of 12 feet. An overhead power cable on the north side of the bridge has a clearance of 51 feet. About 0.5 mile southward, the bridge at **Surfside** has a 40-foot fixed span with a clearance of 12 feet. The bridge between **Atlantic Heights** and **Normandy Isle** has an 18-foot fixed span with a clearance of 6 feet.

On the east side of **Allison Island,** Indian Creek is crossed by a bridge with a bascule span having a clearance of 11 feet. (See **117.446d,** chapter 2 for drawbridge regulations.) A highway bridge over the channel west of the island has a 23-foot fixed span with a clearance of 6 feet. Southward of Allison Island, fixed bridges crossing Indian Creek limit the channel to a minimum width of 41 feet and a clearance of 12 feet.

From the southern end of Indian Creek, **Collins Canal** leads southwesterly along the southeast side of the prolongation of **Venetian Causeway.** In April 1967, the controlling depth was 3 feet in the canal. Fixed bridges crossing the canal limit the channel width to 47 feet and the clearance to 5 feet.

At **Mile 1080.9,** a channel on the west side of the Intracoastal Waterway leads northwestward to the west shore, follows the shore in a northerly direction to **New Arch Creek,** and follows the creek about 0.8 mile westward to three marinas where berths with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. A 35-ton mobile hoist is also available; hull, engine, and electronic repairs can be made. Depths of 3 to 8 feet are reported alongside the piers. The controlling depth in the channel was 6 feet in April 1967. The channel is marked by piles. It was reported in 1968, that four of the piles along the north side of the channel below the turn had been broken off below the low-water line and remained as hazardous obstructions.

At **Mile 1081.4, Broad Causeway** (125th St.) highway bridge crossing the Intracoastal Waterway has a bascule span with a clearance of 16 feet at the center. (See **117.446e,** chapter 2, for drawbridge regulations and opening signals.)

Miami Beach Channel, about 0.5 mile south of Broad Causeway, is a natural channel that leads southeastward to **Biscayne Point,** thence along the west and south sides of **Normandy Isle,** thence along the east shore of the bay southward to Venetian Causeway and Collins Canal in **Miami Beach,** and thence along the west side of Miami Beach southward of MacArthur Causeway and **Meloy Channel.** In 1967, the controlling depths were 7 feet from the waterway southward to the Julia Tuttle Causeway, thence 9 feet to Meloy Channel.

Four bridges cross the channel. At Normandy Isle the easterly bascule span of the 79th Street Causeway has a clearance of 25 feet at the center. The large marina on **Treasure Island** at the west end of the bridge has ample berthage and all services available. Depths at the piers are about 12 feet. The easterly fixed span of the 36th Street Causeway has a clearance of 35 feet; Venetian Causeway bascule span between Rivo Alto Island, the most easterly of the Venetian group, and Belle Isle has a clearance of 9 feet. The fixed bridge near the east end of MacArthur Causeway has a clearance of 35 feet; drawbridge regulations and opening signals are given in **117.240** and **117.447,** chapter 2.

There is a boatyard on the channel just north of the eastern end of Venetian Causeway. The yard has a 125-ton fixed lift, and a marine railway that can handle craft up to 100 feet; complete hull, engine, and electronic repairs can be made. Berthage with electricity, gasoline, diesel fuel, water, ice, and marine supplies are available. Depths of 7 feet are reported alongside the piers.

A marina on Miami Beach Channel, just north of the MacArthur Causeway Bridge, has berthage with electricity, gasoline, diesel fuel, water, ice, some marine supplies, and a 2-ton fixed lift; hull, engine, and electronic repairs can be made. On the south side of the bridge on Meloy Channel, is a charter-boat facility and a marina with similar services. Meloy Channel is described in chapter 10.

At **Mile 1083.8,** a dredged channel leads southeastward from the Intracoastal Waterway to a private yacht basin in **Harbor Island** just north of the 79th Street Causeway. In April 1967, the controlling depth was 7 feet. The channel is marked by privately maintained piling.

Seventy-Ninth Street Causeway, Mile 1084.6, has a bascule span over the waterway that has a clearance of 25 feet at the center.

There is a marina on the north side of the causeway between the Intracoastal Waterway and Harbor Island. The controlling depth in the channel leading north of the causeway to the marina was 5 feet in 1963. Gasoline, water, ice, and some marine supplies are available.

Little River flows into the west side of Biscayne Bay at **Mile 1084.9.** Yachts tie up along the banks of the river. In April 1967, the controlling depth was 6 feet to the highway bridge about 0.6 mile above the mouth. The bridge (U.S. Route 1) has a 34-foot fixed span with a clearance of 8 feet. Boats that can clear this bridge can continue upstream to the dam at the Florida East Coast Railway bridge, which is the head of navigation. The controlling depth was 3 feet, in 1963, from the highway bridge to the dam.

A boatyard is on the north shore of Little River, about 0.6 mile above the mouth. The yard has a 17-ton marine lift, and a marine railway that can handle craft up to 55 feet. Gasoline, water, ice, electricity, and marine supplies are available. There is berthage for about 50 boats with 7 to 10 feet alongside. There is a machine shop on the premises; hull and engine repairs can be made.

Julia Tuttle (Thirty-Sixth Street) Causeway, Mile 1087.1, has a fixed span over the waterway with a clearance of 56 feet, which is the least overhead clearance of the fixed bridges over the main route of the Intracoastal Waterway between Norfolk and Miami.

Venetian Causeway, Mile 1088.6, has a bascule span over the waterway with a clearance of 8 feet at the center. **MacArthur Causeway, Mile 1088.8,** has a bascule span over the waterway with a clearance of 35 feet. Drawbridge regulations for both bridges are given in **117.447,** chapter 2.

At **Mile 1089.4,** the waterway is crossed by combined highway and railroad bridges with bascule spans having minimum clearance of 22 feet at the center. The bridges connect with **Port of Miami (Dodge Island).** (See **117.446f,** chapter 2, for drawbridge regulations and opening signals.)

Miami, Miami Beach, and **Miami Harbor, Mile 1089.1** are described in chapter 10. **Storm warning display** locations are listed on NOS charts and shown on Marine Weather Services Charts published by the National Weather Service.

Fishermans Channel (Railroad Channel) leads southeastward from the waterway at **Mile 1089.8,** thence eastward to the deepwater channel at Fisher Island; it is used by yachtsmen and charterboat fishermen. In 1963, the controlling depth was 5 feet; the channel is marked by daybeacons. About 1.1 miles westward of Fisher Island, a natural channel leads southward from Fishermans Channel to Rickenbacker Causeway. The channel is little used and marked only at the north entrance. It had a controlling depth of 6 feet in 1963.

At **Mile 1090.5,** a dredged channel leads north-northwest from the waterway, west of **Claughton Island,** to the mouth of the Miami River. This channel is the approach to Miami River from the south. In 1967, the centerline controlling depth was 8 feet. A highway bridge with a 49-foot fixed span and a clearance of 8 feet crosses the channel from the mainland to Claughton Island.

From Miami the Intracoastal Waterway continues southward along the waterfront, thence through Miami South Channel to **Rickenbacker Causeway** at **Mile 1091.6.** The causeway has a bascule span over the waterway with a clearance of 23 feet at the center; drawbridge regulations are given in **117.447a,** chapter 2.

Northeastward of the Bay Bridge of Rickenbacker Causeway on the west side of Virginia Key is the Commodore Ralph Munroe Marine Stadium, a marine race course, which had a reported depth of 6 feet. The grandstand on the south side and the Seaquarium southeastward of it are prominent.

About 0.5 mile south of Rickenbacker Causeway there is a Coast Guard **seaplane operating area;** limits and regulations are given in **207.172,** chapter 2.

About 2 miles south of Rickenbacker Causeway, **Crandon Park Marina Channel,** privately marked by lights and daybeacons, and a **140°** lighted range leading into the basin, leads northeasterly in **Bear Cut** to the Dade County Yacht Basin in the bight of Northwest Point, Key Biscayne. The controlling depth from Bear Cut to and including the basin was 10 feet in 1967. The basin is used by party fishing boats. Gasoline, diesel fuel, water, ice, electricity, restaurant, and dockage for 122 boats are available, with depths of 7 to 12 feet alongside. A 4-ton marine lift and a launching ramp are here. The highway bridge over Bear Cut has a 38-foot fixed span with a clearance of 13 feet. A buoy marks the eastern approach to Bear Cut outside the keys. **Storm warning signals are displayed.** (See chart.)

About 2.3 miles southward of Rickenbacker Causeway are two channels leading westward to the facilities at **Dinner Key** in **Coconut Grove.** Both channels are marked. The northerly channel had a controlling depth of 5 feet in April 1967. In 1971, a submerged obstruction was reported near the northern edge of the northerly channel, close westward of Daybeacon 6.

The yacht repair yard and the Coral Reef Yacht Club are reached through the northern channel. The boatyards have extensive yacht storage; gasoline, diesel fuel, water, electricity, and repair facilities are available. There are two vertical-lift docks and hoists, the largest of which can lift boats up to 55 feet. Marine supplies are available, and there is a launching ramp.

Dinner Key Channel, the southerly channel, leads to the large **Dinner Key Yacht Basin.** The channel is marked by lights and daybeacons. The controlling depth in the channel was 8 feet on the centerline, in April 1967, with 5½ to 7 feet in the basin. The yacht basin is maintained by the city of Miami and has five piers with water and electrical connections; a charge is made for berthage assigned by the dockmaster. There is berthage for 370 boats with depths of 5 to 8 feet alongside. There is a launching ramp; a restaurant is at the head of the piers.

Several privately owned marinas and boatyard are northward and southward of the city yacht basin. Gasoline, diesel fuel, water, ice, and marine supplies can be obtained. Fixed lifts up to 37 tons, and a marine railway that can handle craft up to 28 feet are available at the boatyards; complete engine, hull, and electronic repairs can be made.

Storm warning signals are displayed. (See chart.)

Four-Way Channel is 3 miles south of Rickenbacker Causeway and leads westward to some private piers and a mooring area; the controlling depth in the channel was 5 feet on the centerline in April 1967. A privately maintained unlighted **296°** range and daybeacons mark the entrance channel.

Entrada Channel, about 0.5 mile southward of Four-Way Channel, is marked by daybeacons privately maintained. In April 1967, the controlling depth was 4 feet.

Coral Gables Waterway is 4.2 miles south of Rickenbacker Causeway. It is a dredged channel

through coral, and extends westward about 2 miles inland to U.S. Route 1 highway bridge. The canal, used for drainage purposes, has no docks along the banks; craft tie up to the banks. The controlling depth was 5 feet in April 1967. The entrance is marked by a light and daybeacons.

Coral Gables is a picturesque resort that joins Miami on the southwest. The tower of a hospital is a conspicuous landmark that shows over the lower part of Biscayne Bay.

At **Matheson Hammock Beach, Mile 1097.5,** on the west side of Biscayne Bay, there is a marina which has berthage for 80 boats with depths of 4 to 7 feet alongside the piers. There is a launching ramp, and gasoline, diesel fuel, water, ice, and electricity are available. The two entrance channels are marked by privately maintained daybeacons and a **347°** lighted range. The channels, in November 1966, had a controlling depth of 4 feet. The remains of a daybeacon structure, at the entrance to the south channel in about 25°40′25″N., 80°15′28″W., are reported to be a hazard to navigation; caution is advised.

Charts 11465 (848), 11451 (141-SC).-Snapper Creek Canal, about 1.3 miles south of Matheson Hammock, is a drainage canal navigable to a salinity structure about 1.3 miles above the entrance. A yacht basin with services is just upstream of the highway bridge 1 mile above the entrance. The fixed bridge has a 20-foot span with a clearance of 11 feet. In November 1966, the entrance to the canal had shoaled to 3 feet.

At **Kings Bay, Mile 1102.2,** on the west side of Biscayne Bay 9 miles southward of Rickenbacker Causeway, there is a yacht and country club. There is berthage for 150 boats with depths of 7 to 10 feet alongside the piers. Gasoline, water, ice, electricity, and restaurant are available and there is a launching ramp. **Cutler Channel,** leading to the yacht basin and a powerplant, is marked by a light, buoys, and daybeacons, privately maintained. The reported controlling depth in the channel was about 3 feet in January 1973.

The Intracoastal Waterway crosses **Featherbed Bank** at **Mile 1107.6** and is marked by daybeacons and lights. Another channel through Featherbed Bank about 2.5 miles eastward of the waterway is marked by lights and daybeacons. In October 1966, the controlling depth was 8 feet. Care must be taken to stay in the center of the channel; the appearance of the water is the best guide, as the shoals on each side are usually visible. The daybeacon northeastward of Featherbed Bank is not easily seen at a distance. A good landmark is the tower resembling a lighthouse on the key northward of **Sands Key.**

From **Mile 1109** to **Mile 1113.2** the Intracoastal Waterway passes through an Air Force training area. Mariners are urged to exercise caution because training drills utilizing small one-man rafts are conducted daily in the area.

Charts 11463 (849), 11451 (141-SC).-The **Homestead Bay Front Park Marina** at the entrance to **North Canal,** 5 miles west of **Mile 1111.5,** is entered just south of **Convoy Point.** The entrance is marked by a privately maintained light and daybeacons. In March 1967, the controlling depths were 3 feet at the entrance light, thence 6 feet to and alongside the piers. Slips are available for berthing 70 boats up to 40 feet, and there is a 3-ton small-boat hoist and a launching ramp. Gasoline, water, ice, electricity, bait, and tackle are available at the basin. **Storm warning signals are displayed.** (See chart.)

A barge channel on the west side of Biscayne Bay, with a controlling depth of 8 feet in March 1967, leads from water of the same depth in the bay for a distance of about 3.1 miles to a powerplant on **Turkey Point, Mile 1113.7.** The channel is marked by a light and buoys. Two 415-foot stacks at the powerplant are prominent.

Caesar Creek, 1.2 miles southeast of **Mile 1115.0,** between **Elliott Key** and **Old Rhodes Key,** connects Biscayne Bay with Hawk Channel. The controlling depth was 4 feet, in February 1967. The channel is privately marked across the shoals northwestward of Adams Key.

The Intracoastal Waterway leaves Biscayne Bay via a straight dredged cut through **Cutter Bank** at **Mile 1117.3** and enters **Card Sound.** The sound is a body of water about 5 miles long and 2.7 miles wide with depths of 7 to 12 feet in the center.

Angelfish Creek, 1.5 miles southeast of **Mile 1120.0** between **Palo Alto Key** on the north and **Key Largo** and **Angelfish Key** on the south, connects Card Sound with Hawk Channel. The controlling depth, in February 1967, was 4 feet. The channel is marked by lights and daybeacons.

Good anchorage in depths of 9 feet is available in Card Sound on the south side of **Pumpkin Key,** 1.5 miles southeast of **Mile 1121.8.**

Gasoline, diesel fuel, lubricating oil, water, ice, and electricity are available at the Key Largo Anglers Club, 1.8 miles southeast of **Mile 1122.4.** A lift is available for hauling out boats up to 35 feet. A prominent microwave tower is a good landmark on the westerly side of the Card Sound and Little Card Sound area.

From Card Sound the waterway follows **Card Point Cut,** a dredged cut across **Card Bank, Mile 1124.4,** the shoal that separates Card Sound from **Little Card Sound.** Little Card Sound has depths of 7 to 8 feet in the center.

The waterway enters a dredged channel through the shoal that separates Little Card Sound and **Barnes Sound** opposite **Barnes Point, Mile 1126.8.** A fixed highway bridge with design clearance of 65 feet crosses the waterway at Barnes Point. Barnes Sound is about 6 miles long and 3 miles wide, with depths of 7 to 10 feet in the center.

Near the south end of Barnes Sound the waterway enters **Jewfish Creek, Mile 1132.8.** The highway bridge crossing the creek at **Cross Key,**

Mile 1134.1, has a bascule span with a clearance of 11 feet at the center. An overhead power cable about 25 yards northward of the bridge has a clearance of 80 feet. The two powerline suspension towers are marked by many fixed red lights which are prominent for night navigation. On the southwest side of the bridge are two marinas where gasoline, diesel fuel, water, electricity, ice, lodging, and restaurant facilities are available. There is berthage for 40 boats at one and 30 boats at the other. Each has a launching ramp and a 1-ton marine lift. Engine repairs may be obtained at the larger one, and some supplies are available. The piers at the two marinas have depths of 4 to 8 feet alongside. **Storm warning signals are displayed.** (See chart.)

The waterway continues southward into **Blackwater Sound,** a body of water about 3 miles square that has depths of 7 to 8 feet in the center. A dredged cut leads from Blackwater Sound into the southern part of Lake Surprise in the northeast end of the sound. In February 1967, the controlling depth in the dredged cut was 3 feet. In 1974, it was reported that Lake Surprise was an excellent harbor of refuge, used frequently as an overnight anchorage by small craft.

The waterway follows **Dusenberry Creek** from Blackwater Sound to **Tarpon Basin.**

Charts 11463 (850), 11451 (141-SC).-The waterway follows an east-to-west course across Tarpon Basin and on the west side exits through **Grouper Creek** into **Buttonwood Sound;** in the eastern end of the creek, the deepest water is close to the south bank. Tarpon Basin is reported to offer good shelter from winds from any direction, but the holding ground is poor with thick grass over the bottom.

From Buttonwood Sound, which has a depth of 6 to 8 feet, the Intracoastal Waterway follows **Baker Cut, Mile 1143.0,** into **Florida Bay.** The route across the bay crosses many bars and is well marked by lights and daybeacons.

Community Harbor, a bight on the southerly end of Key Largo and 1 mile southwest of **Mile 1150.0,** is the bayside waterfront of **Tavernier.** The entrance is marked by daybeacons and stakes. In 1963, the controlling depth was 3 feet to the wharf. A marina at the southern end of the harbor has berths with electricity, gasoline, diesel fuel, water, ice, and marine supplies. A 16-ton mobile hoist is available for hauling out vessels for hull, engine, and electronic repairs. **Storm warning signals are displayed.** (See chart.)

Tavernier Creek, just westward of Tarvernier, in 1963, had a controlling depth of 3 feet to Hawk Channel and is frequently used by local fishing craft. A bridge near the southern end of the creek has a 36-foot fixed span with a clearance of 10 feet. A strong current sets through the bridge; at maximum flood and ebb the difference in height of water on opposite sides of the bridge is about 1 foot. Gasoline, diesel fuel, water, ice, and some marine supplies are available at the small-craft facilities near the bridge.

Cross Bank, Mile 1152.5, is crossed by **Cowpens Cut,** a straight dredged channel marked by lights and daybeacons.

At **Mile 1155.0,** in **Cowpens Anchorage,** there is a marina that can berth 50 boats. The controlling depth to the anchorage was 3 feet in 1963, but at the piers there was 6 to 17 feet. There is a launching ramp and gasoline, diesel fuel, water, ice, electricity, restaurant, and motel are available. Boat rental, bait, and tackle may be obtained.

Snake Creek, 1.3 miles south of **Mile 1156.0** between **Plantation Key** and Windley Key, is used by local fishing boats as a passage between the bay and the ocean. In 1969, it was reported that the controlling depth through the creek was 3½ feet. The entrance to the creek from the ocean side is marked by daybeacons and a light. The bridge across the creek had a 35-foot fixed span with a clearance of 10 feet. An overhead power cable at the bridge has a clearance of 26 feet. On the north side of the bridge there is a small marina and a fishing camp with berthage for 20 boats. Depths at the piers are 4 to 6 feet. Gasoline, diesel fuel, water, ice, some marine supplies, and a launching ramp are available. Currents are strong through the creek, and especially at the bridge. Gasoline, water, and ice are available at the wharf at the ocean entrance on Windley Key.

Windley Harbor, 1.7 miles south of **Mile 1157.2,** is a good but seldom used refuge that is well protected from all directions; the main channel west of **Wilson Key,** in 1963, had a controlling depth of 6 feet. A highway bridge over the channel has a 40-foot fixed span with a clearance of 10 feet. An overhead power cable close northward of the bridge has a clearance of 26 feet. **Storm warning signals are displayed.** (See chart.)

Upper Matecumbe Key is 2 miles southeast of **Mile 1160.0. Islamorada** is on the northeast part of the key, and **Matecumbe** is on the southwest part. The **Florida Key Memorial** is in about the middle of the key. **Storm warning signals are displayed.** (See chart.)

A yacht basin and a marina are about the center of the key on the northwest side. Gasoline, diesel fuel, water, ice, electricity, restaurant, launching ramp, engine repairs, supplies, 1-ton marine hoist, and berthage for 40 boats with 4 feet alongside the piers are available at the yacht basin. The controlling depth in the entrance channel to the basin was 4 feet in 1963. The marina has a 50-ton fixed lift and a marine railway that can handle craft up to 60 feet; hull, engine, and electronic repairs can be made. Also available are gasoline, diesel fuel, water, ice, and marine supplies. Depths of 3 feet are reported alongside the piers.

The Islamorada Coast Guard Station is at the southwestern end of Plantation Key at 24°57.2'N., 80°35.2'W. The U.S. Public Health Service main-

tains a **contract physician's office** in town. (See appendix for address.)

At **Mile 1160.7**, the waterway passes through **Steamboat Channel**, a dredged cut through **Shell Key Bank**. The channel in the cut is marked by lights and daybeacons.

Charts 11449 (851), 11451 (141-SC)-Shell Key Channel and **Race Channel**, just to the northwestward of Upper Matecumbe Key, are used by small sport-fishing craft able to pass under the highway trestle which has a 13-foot fixed span and a clearance of 6 feet. An overhead pipeline at the trestle has a clearance of 13 feet. These channels join to form **Teatable Key Channel** connecting the Intracoastal Waterway and Hawk Channel. In 1963, the controlling depth was 7½ feet from Hawk Channel to Florida Bay through Teatable Key Channel and Shell Key Channel.

A marina is on the southwest end of Upper Matecumbe Key. Gasoline, diesel fuel, electricity, water, ice, some marine supplies, and an 8-ton mobile hoist are available; hull, engine, and electronic repairs can be made. The dredged entrance channel to it had a controlling depth of 4 feet in 1963, and there is 4 feet alongside.

Lignumvitae Channel, 1.6 miles south of **Mile 1163.3** and west of Lignumvitae Key, forms a passage from the Intracoastal Waterway to Hawk Channel. The highway bridge across the channel has a 38-foot fixed span with a clearance of 8 feet at the center. Pilings supporting overhead power cables on the north side of the bridge somewhat restrict the channel; local knowledge is advised. Gasoline and water are available at the northern end of **Lower Matecumbe Key** in an emergency only. Indian Key channel is described in chapter 11.

Overhead power cables at the fixed bridges along the highway viaduct between Upper Matecumbe Key and Grassy Key have a minimum clearance of 26 feet, but are submerged at the drawbridges.

Peterson Key Bank, Mile 1165.0, is crossed by **Bowlegs Cut**. After passing through the cut, traffic may continue southwestward through Channel Five to Hawk Channel. The controlling depth in the channel was 7 feet in 1963.

Matecumbe Harbor, is at the southwest end of **Lower Matecumbe Key**, 1 mile southeast of **Mile 1168.8** via Channel Five. The entrance is marked by a light, and the remainder of the channel is privately marked. In 1963, the controlling depth was 3 feet in the entrance, with deeper water inside. Gasoline, diesel fuel, water, ice, electricity, and some marine supplies are available at a marina in the southern part of the harbor.

Channel Two, just west of Matecumbe Harbor, connects Florida Bay and Hawk Channel, and passes beneath the highway trestle. The controlling depth in the channel in 1963, was 8 feet. The trestle has a 34-foot fixed span with a clearance of 10 feet. In 1969, submerged pilings were reported to exist in Channel Two; caution is advised.

Channel Five, Mile 1170.6, one of the main routes by which boats can reach Hawk Channel, is described in chapter 11.

At **Mile 1169.9**, there is a marina on **Greyhound Key** where gasoline, water, ice, restaurant, motel, electricity, and some marine supplies are available. The controlling depth in the channel leading to the marina was 1 foot in 1963, with 3 feet alongside the pier.

At **Mile 1171.6**, there is a marina on **Long Key** where gasoline, water, ice, electricity, restaurant, motel, launching ramp, and marine supplies are available. Berthage is limited. The controlling depth in the channel leading to the marina and alongside the pier was 3 feet, in 1963. **Storm warning signals are displayed.** (See chart.)

At the west end of **Long Key**, 2.2 miles south of **Mile 1174.2**, gasoline is available at a small pier. **Conch Keys**, 2.4 miles west of the west end of Long Key, are marked by a water tank. The channel to the wharf, in 1963, had a controlling depth of 3 feet and was privately marked. Gasoline, water, and other services are obtainable at the wharf, on the bay side, which has 2 feet alongside.

At **Mile 1178.7**, the waterway goes through **Channel Key Banks** at **Channel Key Pass** ,which is marked by a light and daybeacons.

Charts 11449 (852), 11451 (141-SC).-At **Mile 1181.6** on **Grassy Key, storm warning signals are displayed**; see chart.

Marathon, on **Vaca Key** 1.5 miles south of **Mile 1192.0**, is the second largest town on the Florida Keys. There are several small-craft facilities on the north side of Vaca Key at Marathon where berthage with electricity, gasoline, diesel fuel, water, ice, launching ramps, and marine supplies are available. The largest marine railway in the area can handle craft up to 50 feet; fixed lifts up to 5 tons are also available. Hull, engine, and electronic repairs can be made.

Additional facilities on the south side of Vaca Key at Marathon, and in Boot Key Harbor are described in chapter 11.

A group of four radio towers on the southwest end of Boot Key south of Marathon and three radio towers about 1.1 miles to the east-northeastward of the first group are prominent.

A Coast Guard station is on the bay side at Marathon. The U.S. Public Health Service maintains a **contract physician's office** in town. (See appendix for address.) **Storm warning signals are displayed.** (See chart.)

Knight Key Channel, just west of Marathon, passes under the highway bridge trestle close westward of **Knight Key**. The controlling depth in the channel was 6 feet in 1963. The section of the Seven Mile Bridge between Knight Key and **Pigeon Key** is a fixed bridge with girder spans with clearances of 15 feet, except for the span about

200 yards westward of the western end of Knight Key which has a clearance of 19 feet.

Bethel Bank, Mile 1193.4, is a junction point in the Intracoastal Waterway. Vessels may follow the southern route via Moser Channel or Bahia Honda and Hawk Channel to Key West, or the northern alternate route via Big Spanish Channel and the Gulf of Mexico. The mileage along the northern route is suffixed by the letter "A". The southern route is about 14 miles shorter to Key West.

Pigeon Key, on the east side of Moser Channel, is marked by the white buildings of a marine laboratory. The viaduct passes high overhead at the key.

Moser Channel, Mile 1196.9, and **Bahia Honda,** 7 miles to the westward, connect Florida Bay Hawk Channel. These channels are described in chapter 11.

Chart 11445 (853).-The Intracoastal Waterway routes through Moser Channel and Bahia Honda rejoin at **Mile 1207.8,** about 2.1 miles south of the bridge over Bahia Honda, and then the route follows the aids in Hawk Channel to Key West. Hawk Channel is described in chapter 11.

Newfound Harbor Keys Anchorage, Newfound Harbor Channel, Niles Channel, Loggerhead Key Anchorage, Cudjoe Bay, and **Sugarloaf Channel** are discussed in chapter 11.

Chart 11445 (854).-From Hawk Channel, the Intracoastal Waterway joins the Main Ship Channel at **Mile 1241.9** about 0.5 mile southward of Key West, and then follows the main channel to **Key West, Mile 1243.7.** The supply and repair facilities at Key West are described in chapter 11.

Saddlebunch Harbor, Boca Chica Channel, and **Safe Harbor Channel** are discussed in chapter 11.

Charts 11448 (859), 11442 (1251).-Big Spanish Channel to Key West, north of Florida Keys.-The northern alternate route of the Intracoastal Waterway leads northwestward from Bahia Honda through **Big Spanish Channel** to Harbor Key Bank, thence along the north side of the Florida Keys to Northwest Channel, thence to Key West. The controlling depth for this route was 5 feet in 1963.

At **Mile 1214.2A** the waterway passes through a crooked channel marked by daybeacons southwest of **Big Spanish Key.** Caution should be exercised in this shoal area. Northward of the key the color of the water is a good indication of the channel location.

At **Harbor Key Bank Light, Mile 1218.3A,** the waterway enters the Gulf of Mexico, turns westward and follows a course of 246° for about 28 miles to the lighted bell buoy at the entrance to **Northwest Channel, Mile 1251.1A.** A course closer to the Florida Keys should not be attempted because the landmarks are difficult to identify and the bottom inside the 18-foot contour rises abruptly.

Use charts **11442 (1251)** and **11441 (584)** westward of Johnston Key to Northwest Channel, thence to **Key West, Mile 1260.3A.** Northwest Channel and Key West are described in chapter 11.

Charts 11448 (859), 11445 (854).-Inside passage from Big Spanish Channel to Key West.-At Mile 1207.1A, an inside route to Key West branches off to the westward, about 0.5 mile north of **No Name Key,** and passes south of **Porpoise Key,** thence winds through a narrow and crooked channel between the smaller keys northward of U.S. Highway 1. In 1963, the controlling depth in the channel was 3 feet. This shoal and winding route through the keys is primarily for use by local boatmen familiar with the area and should not be used without local knowledge. The aids marking this route do not show I.W. markings, and, being built less substantially than the standard type of structure, are more apt to be destroyed. Fresh strong winds from any direction may change the depth in the channel in a short period of time.

The recommended routes to Key West are via Hawk Channel or through Big Spanish Channel; these routes have been described earlier.

APPENDIX

National Ocean Survey.-Coast Pilots, Nautical Charts, Tide Tables, Tidal Current Tables, Tidal Current Charts, and Tidal Current Diagrams are sold by the National Ocean Survey and by authorized sales agents located in many U.S. ports and in some foreign ports. Mail orders should be addressed to National Ocean Survey, Distribution Division (C44), 6501 Lafayette Avenue, Riverdale, Md. 20840, and accompanied by a check or money order payable to NOS, Department of Commerce. Remittance from outside of the United States should be made either by an International Money Order or by a check payable on a U.S. bank. Chart catalogs, which include a listing of authorized sales agents, are free upon request. The National Ocean Survey maintains over-the-counter cash sales offices at 6501 Lafayette Avenue, Riverdale, Md.; at 6001 Executive Boulevard, Room 713, Bldg. 1, Washington Science Center, Rockville, Md. (small orders only); at 439 West York Street, Norfolk, Va.; at Lake Survey Center, 630 Federal Office Bldg. and Courthouse, Detroit, Mich.; at 1801 Fairview Avenue East, Seattle, Wash.; and at 632 Sixth Avenue, Room 303, Anchorage, Alaska.

National Ocean Survey Field Offices

Norfolk: Director, Atlantic Marine Center, NOS, National Oceanic and Atmospheric Administration, 439 West York Street, Norfolk, Va. 23510.

Detroit: Director, Lake Survey Center, NOS, National Oceanic and Atmospheric Administration, 630 Federal Building and U.S. Courthouse, Detroit, Mich. 48226.

Seattle: Director, Pacific Marine Center, NOS, National Oceanic and Atmospheric Administration, 1801 Fairview Avenue East, Seattle, Wash. 98102.

Coast Pilots

U.S. Coast Pilot 1, Atlantic Coast, Eastport to Cape Cod, November 1974.

U.S. Coast Pilot 2, Atlantic Coast, Cape Cod to Sandy Hook, January 1975.

U.S. Coast Pilot 3, Atlantic Coast, Sandy Hook to Cape Henry, July 1975.

U.S. Coast Pilot 4, Atlantic Coast, Cape Henry to Key West, July 1975.

U.S. Coast Pilot 5, Atlantic Coast-Gulf of Mexico, Puerto Rico, and Virgin Islands, July 1975.

U.S. Coast Pilot 7, Pacific Coast and Hawaii, June 1975.

U.S. Coast Pilot 8, Alaska-Dixon Entrance to Cape Spencer, 1969.

U.S. Coast Pilot 9, Pacific and Arctic Coasts, Alaska-Cape Spencer to Beaufort Sea, 1964.

Distances Between United States Ports, Fifth (1973) Edition.

New editions of Coast Pilots 1, 2, 3, 4, 5, and 7 are now published annually. When other Coast Pilots are computerized they will be issued on an annual basis. In the meantime, all the books, except Coast Pilots 1, 2, 3, 4, 5, and 7 should be used only by reference to the latest supplement which can be obtained free from National Ocean Survey, Distribution Division (C44), 6501 Lafayette Avenue, Riverdale, Md. 20840,

Tide Tables

Europe and West Coast of Africa.

East Coast, North and South America.

West Coast, North and South America.

Central and Western Pacific Ocean and Indian Ocean.

Tidal Current Tables

Atlantic Coast, North America.

Pacific Coast, North America and Asia.

Tidal Current Charts

Boston Harbor.

Narragansett Bay to Nantucket Sound.

Narragansett Bay

Block Island Sound and Eastern Long Island Sound.

Long Island Sound and Block Island Sound.

New York Harbor.

Delaware Bay and River.

Upper Chesapeake Bay.

Charleston Harbor, S.C., including the Wando, Cooper, and Ashley Rivers.

San Francisco Bay.

Puget South, Northern Part.

Puget Sound, Southern Part.

Tidal Current Diagrams

Block Island Sound and Eastern Long Island Sound.

Long Island Sound and Block Island Sound.

Publications.-A resume of the U.S. Government publications of navigational value is included for the ready reference of the mariner. In addition to the agents located in the principal seaports handling sales publications, certain libraries have been designated by the Congress of the United States to receive the publications as issued for public review.

Nautical Charts.-Coasts of the United States and Possessions: Published by National Ocean Survey: for sale by NOS and its agents. Mississippi River (Cairo, Ill., to Gulf of Mexico): Published and for sale by Mississippi River Commission, Vicksburg, Miss.

Black Warrior-Tombigbee Rivers System: Published and for sale by U.S. Army Engineer District, Mobile, Ala.

Alabama River: Published and for sale by U.S. Army Engineer District, Mobile, Ala.

Mississippi River (Cairo, Ill., to Minneapolis, Minn.) and Illinois Waterway (Mississippi River to Lake Michigan): Published and for sale by the U.S. Army Engineer District, Chicago, Ill.

Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River-St. Regis to Cornwall, Canada: Published and for sale by NOS and its sales agents.

Foreign countries: Published by Defense Mapping Agency Hydrographic Center (DMAHC); Office; for sale by that office and its sales agents.

Coast Pilots.-Coasts of the United States and Possessions: Published by National Ocean Survey; for sale by NOS and its sales agents.

Great Lakes Pilot: Published and for sale by NOS and its sales agents.

Sailing Directions (Foreign Countries): Published by Defense Mapping Agency Hydrographic Center (DMAHC); for sale by that office and its sales agents.

Tide and Tidal Current Tables, Tidal Current Charts, and Tidal Current Diagrams.-Published by National Ocean Survey; for sale by NOS and its sales agents.

Marine Weather Services Charts: Published by National Weather Service; for sale by NOS and its sales agents.

Notice to Mariners may be obtained free from the following: Local Notices to Mariners-District Commander of the local Coast Guard district; Weekly Notice to Mariners, coasts of the United States, Possessions, and foreign-Defense Mapping Agency Hydrographic Center (DMAHC); Local Notice to Mariners, Great Lakes-Commander, Ninth Coast Guard District, Cleveland, Ohio.

Special Notice to Mariners are published annually in Notice to Mariners 1. These notices contain important information of considerable interest to all mariners. Interested parties are advised to read these notices.

Light Lists.-United States and Possessions: Published by U.S. Coast Guard; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Foreign countries: Published by Defense Mapping Agency Hydrographic Center (DMAHC); for sale by that office and its sales agents.

Radio.-Radio Navigational Aids, Atlantic and Mediterranean Area (Pub. No. 117A); Radio Navigational Aids, Pacific and Indian Oceans Area (Pub. No. 117B); Weather Station Index (Pub. No. 119). Published by Defense Mapping Agency Hydrographic Center (DMAHC); for sale by that office and its sales agents. Worldwide Marine Weather Broadcasts, formerly Radio Weather Aids (Pub. No. 118). Published by the National Weather Service; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Miscellaneous.-The Nautical Almanac, The Air Almanac, and American Ephemeris and Nautical Almanac: Published by U.S. Naval Observatory; for sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

American Practical Navigator (Bowditch) (H.O. Publication No. 9), and International Code of Signals (H.O. Pub. No. 102): Published by the Defense Mapping Agency Hydrographic Center (DMAHC); for sale by its sales agents or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Rules of the Road, International-Inland (CG-169). Rules of the Road, Western Rivers (CG-184). Rules of the Road, Great Lakes (CG-172): Published by and free on application to the U.S. Coast Guard.

Port Series of the United States: Part 1 (Port administration and services) published by Maritime Administration, U.S. Department of Commerce; Part 11 (Port conditions and facilities) published by Corps of Engineers, U.S. Army. Both parts are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Official U.S. Coast Guard Recreational Boating Guide (CG-340): Published by U.S. Coast Guard; for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Marine Radio Telephony-How to correctly operate your radiotelephone set in the 2 MHz band; and Maritime Mobile VHF-FM Radio Telephony-Usage in the United States: Published by Radio Technical Commission for Marine Services; for sale by RTCM Services, c/o Federal Communications Commission, Washington, D.C. 20554.

Corps of Engineers Offices

Norfolk District: 803 Front Street, Norfolk, Va. 23510. Coastal and tributary waters of Virginia, including Chesapeake Bay and tributaries southward of Smith Point on the western shore and Onancock Creek southward on the eastern shore.

Wilmington District: 308 Federal Building, Wilmington, N.C. 28401. Coastal and tributary waters of North Carolina.

Charleston District: Federal Building, 334 Meeting Street, Charleston, S.C. 29402. Coastal and tributary waters of South Carolina.

Savannah District: 200 East St. Julian Street, Savannah, Ga. 31402. Coastal and tributary waters of Georgia and Fernandina Harbor, Fla.

Jacksonville District: Federal Building, 400 West Bay Street, Jacksonville, Fla. 32202. Coastal and tributary waters of Florida, except Fernandina Harbor.

Environmental Protection Agency (EPA).-Regional offices and States in the EPA coastal regions:

Region I (New Hampshire, Maine, Massachusetts, Connecticut, Rhode Island): J.F. Ken-

nedy Federal Bldg., Room 2303, Boston, Mass. 02203.

Region II (New Jersey, New York, Puerto Rico, Virgin Islands): 26 Federal Plaza, Room 908, New York, N.Y. 10007.

Region III (Delaware, Maryland, Virginia, District of Columbia, Pennsylvania): Curtis Bldg., 6th and Walnut Streets, Philadelphia, Pa. 19106.

Region IV (Alabama, Florida, Georgia, Mississippi, South Carolina, North Carolina): 1421 Peachtree Street, NE., Atlanta, Ga. 30309.

Region VI (Louisiana, Texas): 1600 Patterson Street, Suite 1100, Dallas, Tex. 75201.

Region IX (California, Hawaii, Guam): 100 California Street, San Francisco, Calif. 94102

Region X (Alaska, Oregon, Washington): 1200 Sixth Avenue, Seattle, Wash. 98101.

Coast Guard District Offices

Commander, Fifth Coast Guard District, Federal Building, 431 Crawford Street, Portsmouth, Va. 23705. Coastal waters and tributaries of Maryland, Virginia, North Carolina, District of Columbia, and that portion of Delaware containing the reaches of the Nanticoke River and the Chesapeake and Delaware Canal.

Commander, Seventh Coast Guard District, Federal Building, 51 Southwest First Avenue, Miami, Fla. 33130. Coastal waters and tributaries of South Carolina, Georgia, and Florida eastward of longitude 83°50′ W.; Puerto Rico and adjacent islands of the United States.

Coast Guard Captains of the Port

Hampton Roads Captain of the Port, 300 East Main Street, Norfolk, Va. 23510.

Wilmington Captain of the Port, Customhouse, Princess and Waters Streets, Wilmington, N.C. 28401.

Charleston Captain of the Port, 196 Tradd Street, Charleston, S.C. 29401.

Savannah Captain of the Port, Corps of Engineers Annex, 200 East Bryan Street, Savannah, Ga. 31401.

Jacksonville Captain of the Port, 2701 Talleyrand Avenue, Jacksonville, Fla. 32206.

Miami Captain of the Port, Coast Guard Base, 100 MacArthur Causeway, Miami Beach, Fla. 33139.

Key West Captain of the Port, Coast Guard Base, Key West, Fla. 33040.

Coast Guard Marine Inspection Offices

300 East Main Street, Norfolk, Va. 23510.

Federal Building, Wilmington, N.C. 28401.

Federal Building, 334 Meeting Street, Charleston, S.C. 29403.

Corps of Engineers Annex, 200 East Bryan Street, Savannah, Ga. 31401.

2701 Talleyrand Avenue, Jacksonville, Fla. 32206.

501 Northeast First Avenue, Miami, Fla. 33132.

Coast Guard Documentation Offices

Customhouse, Norfolk, Va. 23510.

P.O. Box 125, Elizabeth City, N.C. 27909.

Washington, N.C. 27889.

Beaufort-Morehead City P.O. Box 732, Morehead City, N.C. 28557.

Federal Building, Wilmington, N.C. 28401.

Federal Building, 334 Meeting Street, Charleston, S.C. 29403.

Room 401, Post Office Bldg., P.O. Box 8191, Savannah, Ga. 31402.

Federal Building, Brunswick, Ga. 31402.

2701 Talleyrand Avenue, Jacksonville, Fla. 32201.

Room 339, Federal Bldg., 1st and Sapodilla Streets, West Palm Beach, Fla. 33402.

501 Northeast First Avenue, Miami, Fla. 33132.

Post Office Bldg., Simonton and Caroline Streets, P.O. Box 753, Key West, Fla. 33040.

Coast Guard Stations.-The stations listed are in the area covered by this Coast Pilot. They have search and rescue capabilities and may provide lookout, communication, and/or patrol functions to assist vessels in distress. The National VHF-FM Distress System provides continuous coastal radio coverage outwards to 20 miles on 156.80 MHz (channel 16). After contact on channel 16, communications with the Coast Guard should be on 157.10 MHz (channel 22). If channel 22 is not available to the mariner, communications may be made on 156.60 MHz (channel 12). Selected stations guard the International Radiotelephone Distress, Safety and Calling Frequencies.

Virginia:

Norfolk Station (36°49.5′N., 76°17.3′W.). On the east side of the Southern Branch of Elizabeth River at statute mile 1.7 of the Intracoastal Waterway.

North Carolina:

Elizabeth City Air Station (36°15.8′N., 76°10.5′W.). About 3.5 miles southeastward of Elizabeth City, N.C., on the south bank of Pasquotank River.

Oregon Inlet Station (35°46.0′N., 75°31.5′W.). Northerly end of Pea Island, at Oregon Inlet Light.

Hatteras Inlet Station (35°12.5′N., 75°42.4′W.). Southern end of Hatteras Island, 1 mile southwestward of town of Hatteras.

Ocracoke Station (35°06.9′N., 75°59.1′W.). At Ocracoke, about 0.5 mile northward of Ocracoke Light.

Hobucken Station (35°14.8′N.,76°35.6′W.). On the Intracoastal Waterway at Mile 157.1 just north of the Hobucken Bridge.

Cape Lookout Station (34°36.1′N., 76°32.3′W.). About 1.5 miles south-southwestward of Cape Lookout Light.

Fort Macon Base (31°41.8′N., 76°40.9′W.). About 0.1 mile westward of Fort Macon.

Swansboro Station (34°38.8′N., 77°05.8′W.). About 1 mile east of Bogue Inlet, on West end of Bogue Banks.

Wrightsville Beach Station (34°11.3′N., 77°48.7′ W.). Southwestern end of Wrightsville Beach at Masonboro Inlet.

Oak Island Station (33°53.6'N., 78°02.1'W.). West side of mouth of Cape Fear River on Oak Island.

South Carolina:

Charleston Base (32°46.4'N., 79°56.6'W.). East side of Ashley River 0.8 mile above the Battery.

Georgia:

Tybee Island Station (32°01.3'N., 80°50.8'W.) near north end of Tybee Island, Ga.

St. Simons Island Station (31°08.7'N., 81°22.4' W.). Near south end of St. Simons Island.

Florida:

Mayport Base (30°23.3'N., 81°26.1'W.). On the east side of St. Johns River at the southerly end of waterfront at Mayport.

Ponce de Leon Inlet Station (29°03.9' N., 80°54.9'W.). At south side of entrance to the inlet.

Port Canaveral Coastal Search and Rescue Facility (28°24.5'N., 80°35.9' W.). South side of the entrance channel, 0.6 mile west of the outer end of the south jetty.

Fort Pierce Station (27°27.8'N., 80°18.4'W.). South side of Fort Pierce Inlet, 1.2 miles west of the outer end of south jetty.

Lake Worth Inlet Station (26°46.3'N., 80°02.7'W.). North side of entrance channel on the south side of Peanut Island, 0.8 mile west of the outer end of north jetty.

Fort Lauderdale Station (26°06.6'N., 80°06.4' W.). In yacht basin eastward of Intracoastal Waterway at Mile 1064.6.

Opa Locka Air Station (25°52.8'N., 80°15.2"W). Northwest part of Miami.

Miami Beach Base (25°46.2'N., 80°08.7'W.). On the north side of Miami Harbor Channel, 1.2 miles northwestward from outer end of north jetty.

Islamorada Station (24°57.2'N., 80°35.2'W.). At the southwestern end of Plantation Key.

Marathon Station (24°42.6'N., 81°06.4'W.). On the north side of Vaca Key, 1.1 miles eastward of Knight Key Channel.

Key West Base (24°33.5'N., 81°48.5'W.). At Pier "A" just northward of U.S. Naval Base.

Coast Guard Radio Broadcasts.-Urgent. safety, and scheduled marine information broadcasts are made by Coast Guard radio stations. In general, these broadcasts provide information vital to vessels operating in the approaches and coastal waters of the United States including Puerto Rico and the U.S. Virgin Islands. Transmissions are as follows:

Urgent and safety broadcasts: (1) **By radiotelegraph:** (a) Upon receipt, except within 10 minutes of the next silent period, for urgent messages only; (b) during the last 15 seconds of the first silent period after receipt; (c) repeated at the end of the first silent period which occurs during the working hours of one-operator ships unless the original warning has been cancelled or superseded by a later warning message.

(2) **By radiotelephone:** (a) upon receipt; (b) repeated 15 minutes later, (for urgent messages only); (c) text only on the first scheduled broadcast unless cancelled; (d) additional broadcasts at the discretion of the originator.

(3) Urgent broadcasts are preceded by the urgent signal: XXX for radiotelegraph; PAN for radiotelephone. Both the urgent signal and message are transmitted on 500 kHz and 2182 kHz, and 156.80 MHz (channel 16). Safety broadcasts are preceded by the safety signal: TTT for radiotelegraph; SECURITE for radiotelephone. After the preliminary signal 500 kHz and 2182 kHz, the station shifts to its assigned working medium frequency for the radiotelegraph broadcast and 2670 kHz for the radiotelephone transmission. Those stations broadcasting on VHF will announce on 156.80 MHz (channel 16), shifting to 157.10 MHz (channel 22).

Scheduled broadcasts.-The following Coast Guard radio stations make scheduled broadcasts, preceded by a preliminary call on 500 kHz and 2182 kHz, at the times and frequencies indicated:

Radiotelegraph:

NMN, Portsmouth, Va., 448 kHz, 1120 and 2020 e.s.t.

NMV, Mayport, Fla., 430 kHz, 1125 and 2025 e.s.t.

NMA, Miami, Fla., 440 kHz, 1100 and 2000 e.s.t.

Radiotelephone:

NMN, Portsmouth, Va., 2670 kHz, 0020 and 1220 e.s.t.

NMN-37, Fort Macon, N.C., 2670 kHz, 0630 and 1200 e.s.t.

NMB, Charleston, S.C., 2670 kHz, 1120 and 2320 e.s.t.

NMV-3, Mayport, Fla., 2670 kHz, 0120, 0620, 0820, 1020, and 1320 e.s.t.

NCF, Miami Beach, Fla., 2670 kHz, 0500, 0600, 0700, 0800, 0900, 1000, 1150, 1500, 1700, 2000, and 2350 e.s.t.

Customs Ports of Entry

Baltimore Region

Norfolk District: Norfolk and Newport News.

Miami Region

Wilmington District; Wilmington and Beaufort-Morehead City, Elizabeth City. Customs station: Washington, N.C. (supervised by Wilmington port of entry).

Charleston District: Charleston, Georgetown.

Savannah District: Savannah, Brunswick.

Tampa District: Fernandina Beach, Jacksonville, Port Canaveral.

Miami District: Miami, Key West, Port Everglades, West Palm Beach. Customs station: Fort Pierce (supervised by West Palm Beach port of entry).

Public Health Service Quarantine Stations.-Stations where quarantine examinations are performed:

Norfolk: U.S. Quarantine Station, Ft. Monroe, Va. 23351.

Miami: U.S. Quarantine Station, International Airport, Miami, Fla. 33159.

At other ports, quarantine and/or medical examinations are usually performed by Public Health Service contract personnel or by quarantine inspectors from the nearest quarantine station. Inquiries concerning quarantine matters should be directed to the nearest quarantine station.

Public Health Service Hospitals.

Norfolk, Va.: 6500 Hampton Boulevard, Larchmont.

Public Health Service Outpatient Clinics

Charleston, S.C.: Federal Building, 334 Meeting Street.

Savannah, Ga.: York and Abercorn Streets.

Jacksonville Fla.: Federal Building, 311 West Monroe Street.

Miami, Fla.: Federal Building, 51 Southwest First Avenue.

Public Health Service Contract Physician's Offices.

Virginia Beach, Va.: 1704 Sir William Osler Drive.

Hatteras, N.C.: Box 248, Route 12

Bayboro, N.C.: Pamlico Medical Center.

Sea Level, N.C.: Sea Level Clinic.

Morehead City, N.C.: 104 North Seventh Street and 1109 Arndell Street.

Wilmington, N.C.: 509 Princess Street, 1613 Medical Center Drive, 2205 Delaney Drive, 635 South Kerr Avenue.

Southport, N.C.: 1004 North Howe Street.

Daytona Beach, Fla.: 619 North Oleander Street.

New Smyrna Beach, Fla.

Cocoa Beach, Fla.: 25 North Orlando Avenue.

Jupiter, Fla.: P.O. Box 68.

Fort Pierce, Fla.: 503 North Seventh Street.

Fort Myers Beach, Fla.: 6875 Estero Boulevard.

Fort Lauderdale, Fla.: 1525 Southeast First Avenue.

Islamorada, Fla.: Keys Community Hospital.

Marathon, Fla.: 2805 and 6090 Overseas Highway.

Key West, Fla.: 422 Fleming Street.

Radio shore stations providing medical advice.-Messages to shore stations may be transmitted in code groups or plain language; messages should be signed by the master and be prefixed: "DH MEDICO".

The following stations maintain a continuous guard on 500 kHz and are most accessible in point of radio connection with medical relief facilities of the U.S. Public Health Service in the area covered by this Coast Pilot.

Portsmouth, Va. (NMN).

Jacksonville Beach, Fla. (NMV).

Lantana, Fla. (WOE).

Ojus, Fla. (WAX).

Miami, Fla. (NMA).

Department of Agriculture Quarantine Offices.-Maritime ports covered by this volume where agricultural Quarantine Inspectors are located and inspections conducted:

Virginia:

Norfolk: Room 209, U.S. Customhouse, 101 East Main Street 23510.

North Carolina:

Morehead City: N.C. Port Authority Pier Office Bldg. 28557.

Wilmington: Room 202, Federal Bldg., Princess and Water Streets 28401.

South Carolina:

Charleston: Room 219, Customhouse, Market and East Bay Streets 29402.

Georgia:

Savannah: U.S. Courthouse and Federal Bldg., 125-129 Bull Street 31401.

Florida:

Jacksonville: Federal Office Bldg., 400 West Bay Street 32202.

Port Canaveral: Canaveral Port Authority Bldg., Intersection of Avenue B and Second Street 32920.

West Palm Beach: 149 East Port Road, Riviera Beach 33404.

Port Everglades: Room 305, Amman Bldg., Eisenhower Boulevard, Fort Lauderdale 33316.

Miami: Room 1522, Federal Bldg., 51 S.W. 1st Avenue 33130.

Key West: Room 226, Federal Bldg., Simonton and Cordine Streets 33040.

Immigration and Naturalization Offices

Virginia:

Norfolk: Room 207, Bank of Virginia Building, 870 North Military Highway. 23502.

North Carolina:

Wilmington: Customhouse.

South Carolina:

Charleston: Federal Building, 334 Meeting Street.

Georgia:

Savannah: Room 203, Federal Building/Courthouse.

Florida:

Jacksonville: Post Office/Federal Building, 311 West Monroe Street.

West Palm Beach: Customs Immigration Building, 141 East Port Road, Riviera Beach.

Port Everglades: Room 304, Amman Building, 611 Eisenhower Boulevard 33316.

Miami: Federal Building, 51 Southwest First Avenue.

Key West: Post Office Building.

Federal Communications Commission Offices

District Field Offices:

Norfolk, Va.: Military Circle, 870 North Military Highway 23502.

Savannah, Ga.: (subdistrict office) Post Office Building 31402.

Miami, Fla.: 51 Southwest First Avenue. 33130.

National Weather Service Offices.-The following offices will provide forecasts and climatological data or arrange to obtain these services from other offices. They will also check barometers in their

offices or by telephone. (Consult local telephone directory for telephone number.)

Norfolk, Va.: National Weather Service Office, Room 236, U.S. Post Office Building; Norfolk Regional Airport; Atlantic Marine Center, NOS, 439 West York Street.

Wilmington, N.C.: New Hanover County Airport.

Charleston, S.C.: Municipal Airport.

Savannah, Ga.: Municipal Airport.

Jacksonville, Fla.: International Airport.

West Palm Beach, Fla.: Municipal Airport.

Miami, Fla.: National Hurricane Center, University of Miami, Coral Gables.

Radio Weather broadcasts.-Taped or direct broadcasts of forecasts and storm warnings are made by commerical and Coast Guard radio stations in the areas covered by this Coast Pilot. These are usually made several times a day; the transmission schedules are shown on the **Marine Weather Services Charts** for the following areas:

Manasquan, N.J., to Cape Hatteras, N.C.

Cape Hatteras, N.C., to Savannah, Ga.

Savannah, Ga., to Apalachicola, Fla.

The charts are for sale by the National Ocean Survey,

Distribution Division (C44), 6501 Lafayette Avenue, Riverdale, Md. 20840, and its authorized sales agents.

The weather broadcast schedule of Coast Guard radio stations are also listed in the description of Coast Guard marine services found elsewhere in this appendix.

VHF-FM Weather Broadcasts.-National Weather Service VHF-FM radio stations provide mariners with continuous FM broadcasts of weather warnings, forecasts, radar reports, and selected weather observations. These stations transmit on 162.55 or 162.40 MHz. Reception range is usually up to 40 miles from the antenna site, depending on terrain, type of receiver, and antenna used. The following VHF-FM radio stations are located in or near the area covered by this Coast Pilot:

KHB-37, Norfolk, Va., 162.55 MHz. (36°49'N., 76°28'W.)

KEC-84, New Bern, N.C., 162.40 MHz (35°08'N., 77°03'W.)

KHB-31, Wilmington, N.C., 162.55 MHz (34°10'N., 77°56'W.)

KEC-95, Myrtle Beach, S.C., 162.40 MHz (33°43'N., 78°53'W.)

KHB-29, Charleston, S.C., 162.55 MHz. (32°48'N., 79°50'W.)

KEC-85, Savannah, Ga., 162.40 MHz (32°05'N., 81°05'W.)

KHB-39, Jacksonville, Fla., 162.55 MHz (30°18'N., 81°40'W.)

KEC-50, West Palm Beach, Fla., 162.40 MHz. 26°41'N., 80°06'W.)

KHB-34, Miami, Fla., 162.55 MHz. (25°44'N., 80°17'W.)

Measured Courses.-The positions of measured courses are shown on the chart and their description is included in the Coast Pilots when information is reported to the National Ocean Survey. Courses are located in the following places covered by this Coast Pilot:

St. Johns River above Jacksonville; 11492 (685)

Southward of the entrance to St. Johns River; 11490 (569)

Miami Harbor Main Channel; 11468 (547)

South of Sand Key; 11441 (584)

The pages in the text describing the courses can be obtained by referring to the index for the geographic places; chart numbers follow the names.

CLIMATOLOGICAL TABLES

These tables were compiled from Environmental Data Service data. Sky cover is expressed in a range of 0 for no clouds to 10 for complete sky cover. The number of days is based on average cloudiness of 0 to 3, partly cloudy days on 4 to 7, and cloudy days on 8 to 10.

Heavy fog includes data referred to at various times in the past as "Dense" or "Thick". The upper visibility limit for heavy fog is 1/4 mile.

(a) means length of record in years.
(b) means climatological standard normals, 1941-1970.
* means less than one-half.
T means trace an amount too small to measure.

NORFOLK, VIRGINIA (Norfolk Regional Airport) 36°54'N., 76°12'W.; Elevation (ground) 24 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	25	25	(b)	25	25	25	25	25	15	20	19	25	25	25	25	25	25	25	25
Jan.	48.8	32.2	40.5	78	8	3.35	3.80	3.4	75	68	11.7	SW	56SW	57	6.3	9	6	16	10	1	*	2
Feb.	50.0	32.7	41.4	78	8	3.31	1.87	2.0	75	67	12.1	NNE	66SW	58	6.2	8	6	14	10	1	1	3
Mar.	57.3	38.9	48.1	85	20	3.42	3.18	0.7	73	62	12.4	SW	57W	63	6.0	9	7	15	11	*	2	2
Apr.	67.7	47.9	57.8	97	28	2.71	2.40	T	74	62	11.8	SW	62N	66	5.9	8	10	12	10	*	3	2
May	76.2	57.2	66.7	97	36	3.34	2.94	0.0	77	68	10.3	SW	53SW	67	6.1	8	10	13	10	0	5	2
June	83.5	65.5	74.5	101	45	3.62	6.85	0.0	80	68	9.5	SW	52W	68	5.8	8	11	11	9	0	6	2
July	86.6	69.9	78.3	103	56	5.70	5.64	0.0	82	72	8.7	SW	63SW	65	6.0	8	11	12	11	0	8	1
Aug.	84.9	68.9	76.9	99	52	5.92	11.40	0.0	85	75	8.7	SW	57NE	65	5.8	8	12	11	11	0	7	2
Sept.	79.6	63.9	71.8	98	45	4.20	6.79	0.0	84	76	9.6	NE	73W	64	5.7	9	10	11	8	0	3	2
Oct.	70.1	53.3	61.7	95	29	3.06	4.38	0.0	83	76	10.5	NE	78S	60	5.3	12	7	12	8	0	1	3
Nov.	60.5	42.6	51.6	85	20	2.94	3.35	T	79	70	10.8	SW	52SE	60	5.3	11	8	11	8	0	1	2
Dec.	50.6	34.0	42.3	79	14	3.11	2.12	1.3	76	68	11.1	SW	48NW	57	6.0	10	7	14	9	*	*	2
Year	68.0	50.6	59.3	103	8	44.68	11.40	7.4	79	69	10.6	SW	78S	63	5.9	108	105	152	116	2	37	23

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 105 in August 1918; lowest temperature 2 in February 1895; maximum monthly precipitation 15.61 in August 1942; minimum monthly precipitation 0.04 in October 1874; maximum monthly snowfall 18.6 in December 1892; maximum snowfall in 24 hours 17.7 in December 1892; fastest mile wind 80 W in June 1925.

CAPE HATTERAS, NORTH CAROLINA (Weather Service Building) 35°16'N., 75°33'W.; Elevation (ground) 7 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	16	16	(b)	16	16	16	16	16	6	11	12	16	16	16	16	16	16	16	16
Jan.	52.3	38.2	45.3	75	12	4.26	3.59	0.5	80	78	13.0	NNE	42NNE	52	6.2	9	7	15	11	*	1	3
Feb.	53.1	38.5	45.8	76	14	4.15	2.92	0.8	80	76	13.4	NNE	58SSW	56	6.1	9	4	15	11	*	2	3
Mar.	57.9	43.2	50.6	77	19	3.84	2.86	0.5	80	76	12.6	SW	60NNW	64	6.0	9	8	14	10	*	2	3
Apr.	66.3	51.5	58.9	85	26	3.07	5.60	0.0	79	77	12.5	SW	61SSW	66	5.7	9	9	12	9	0	4	2
May	73.8	60.2	67.0	88	39	3.28	3.28	0.0	82	80	11.5	SW	40SW	65	6.1	8	10	13	10	0	6	2
June	80.5	68.1	74.3	94	44	4.83	6.63	0.0	83	81	11.1	SSW	43NNE	65	6.3	7	10	13	9	0	6	1
July	83.8	72.1	78.0	95	54	5.90	5.53	0.0	85	83	10.5	SW	58S	66	6.7	6	9	16	13	0	10	*
Aug.	83.4	71.5	77.5	94	57	6.75	8.11	0.0	86	83	10.0	SW	48SW	65	6.4	6	11	14	12	0	9	1
Sept.	79.5	67.8	73.7	90	45	5.76	5.28	0.0	84	80	10.9	NE	72S	64	5.6	9	10	11	9	0	4	*
Oct.	71.3	59.1	65.2	86	33	4.79	4.08	0.0	82	79	11.8	NNE	60NNW	61	5.5	11	7	13	10	0	2	1
Nov.	63.1	48.8	56.0	81	22	4.45	4.02	T	81	78	11.8	NNE	54SW	59	5.4	11	7	12	9	0	1	1
Dec.	54.8	40.5	47.7	76	19	4.54	3.55	0.2	81	78	12.1	NNE	45NNE	48	5.9	10	7	14	9	*	1	2
Year	68.3	55.0	61.7	95	12	55.62	8.11	2.0	82	79	11.8	SW	72S	61	6.0	104	99	162	123	1	46	18

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 97 in June 1952; lowest temperature 8 in December 1880; maximum monthly precipitation 20.95 in June 1949; minimum monthly precipitation T in November 1890; maximum precipitation in 24 hours 14.73 in June 1949; maximum monthly snowfall 12.0 in December 1917; maximum snowfall in 24 hours 12.0 in December 1917; fastest mile wind 110 W in September 1944.

WILMINGTON, NORTH CAROLINA (New Hanover County Airport) 34°16'N., 77°55'W.; Elevation (ground) 28 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	10	10	(b)	22	22	10	10	22	12	22	22	22	22	22	22	22	22	22	22
Jan.	56.6	36.2	46.4	77	13	3.18	2.28	0.4	80	71	9.4	N	57S	57	6.1	10	6	15	10	*	*	2
Feb.	58.7	37.5	48.1	79	15	3.39	2.68	0.9	76	64	10.5	NW	66SW	59	5.8	10	5	13	10	*	1	2
Mar.	64.9	43.7	54.3	88	25	4.05	3.31	0.4	81	65	10.7	SSW	56SW	63	5.6	10	9	12	11	*	2	2
Apr.	74.3	52.2	63.3	95	30	2.94	3.52	0.0	80	65	10.9	SSW	56NE	71	5.3	11	8	11	8	0	3	2
May	81.4	60.9	71.2	97	42	3.97	4.95	0.0	83	70	9.7	SSW	46NE	70	5.7	9	11	11	9	0	5	2
June	86.8	68.2	77.5	100	49	5.58	7.73	0.0	85	74	8.7	SSW	54NW	67	6.0	7	12	11	11	0	8	2
July	88.8	72.0	80.4	99	59	8.34	5.63	0.0	86	78	8.3	SSW	42SW	64	6.3	6	12	13	14	0	11	1
Aug.	88.0	71.0	79.5	100	57	6.82	3.93	0.0	89	81	7.9	SW	72NE	63	6.2	7	12	12	12	0	9	1
Sept.	83.5	65.9	74.7	95	47	5.64	8.24	0.0	90	81	8.3	N	88N	62	5.8	9	10	11	9	0	3	3
Oct.	75.4	55.1	65.3	90	35	3.31	4.34	0.0	87	80	8.6	N	82SE	64	5.0	13	7	11	8	0	1	2
Nov.	66.8	44.3	55.6	85	20	3.01	4.82	T	84	75	8.5	N	59N	66	4.7	13	8	9	7	0	1	3
Dec.	58.2	36.7	47.5	81	20	3.36	3.23	0.4	82	75	8.7	N	47SW	60	5.6	11	7	13	9	*	1	3
Year	73.6	53.7	63.7	100	13	53.59	8.24	2.1	83	73	9.2	SSW	88N	64	5.7	116	107	142	118	1	45	23

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 104 in June 1952; lowest temperature 5 in February 1899; maximum monthly precipitation 21.12 in July 1886; minimum monthly precipitation .02 in October 1943; maximum precipitation in 24 hours 9.52 in September 1938; maximum monthly snowfall 12.1 in February 1896.

CHARLESTON, SOUTH CAROLINA (Municipal Airport) 32°54'N., 80°02'W.; Elevation (ground) 40 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	31	31	(b)	31	31	31	31	24	14	13	15	24	25	25	25	31	31	31	24
Jan.	59.8	37.3	48.6	83	11	2.90	2.26	T	84	73	9.2	SW	54W	56	6.3	8	8	15	10	0	1	4
Feb.	61.9	39.0	50.5	86	12	3.27	3.28	0.3	82	68	10.3	NNE	62SW	58	6.0	9	6	13	9	*	1	2
Mar.	67.8	45.1	56.5	90	21	4.75	6.63	0.1	83	67	10.4	SSW	51SW	65	5.9	9	9	13	11	*	2	2
Apr.	76.2	53.0	64.6	93	29	2.95	4.10	0.0	84	67	10.1	SSW	71NW	68	5.4	11	8	11	8	0	3	2
May	83.1	61.1	72.1	98	36	3.81	6.23	0.0	84	72	8.9	S	60N	68	5.9	8	12	11	9	0	7	2
June	87.7	68.1	77.9	103	50	6.30	10.10	0.0	86	75	8.5	S	65NW	64	6.3	6	12	12	11	0	10	2
July	89.1	71.2	80.2	101	58	8.21	5.81	0.0	88	79	8.0	SW	58N	63	6.6	4	13	14	14	0	14	1
Aug.	88.6	70.6	79.6	102	58	6.44	5.77	0.0	91	80	7.5	SW	69N	62	6.3	5	14	12	13	0	12	2
Sept.	84.5	65.9	75.2	99	42	5.17	8.84	0.0	91	82	8.1	NNE	46SE	61	6.1	7	11	12	9	0	5	2
Oct.	77.1	55.1	66.1	94	27	3.05	5.77	0.0	89	80	8.2	NNE	54W	65	5.2	12	8	11	6	0	1	3
Nov.	68.4	44.1	56.3	88	15	2.13	5.24	T	87	7[illegible]	8.2	N	55SW	64	5.0	13	7	10	7	0	1	4
Dec.	60.8	37.7	49.3	83	8	3.14	2.38	0.1	84	7[illegible]	8.7	NNE	54S	60	5.9	9	8	14	8	*	*	4
Year	75.4	54.0	64.7	103	8	52.12	10.10	0.5	86	74	8.8	NNE	71NW	63	5.9	101	116	148	115	*	57	29

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 104 in June 1944; lowest temperature 7° in February 1899; maximum precipitation in 24 hours 10.57 in September 1933.

SAVANNAH, GEORGIA (Municipal Airport) 32°08'N., 81°12'W.; Elevation (ground) 46 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	9	9	(b)	23	23	9	9	23	13	23	23	23	23	23	23	23	23	23	23
Jan.	61.1	38.7	49.9	81	9	2.92	2.80	T	84	69	8.7	WNW	46NW	54	6.1	9	7	15	9	0	1	5
Feb.	63.6	40.5	52.1	84	16	2.86	3.46	0.3	81	62	9.6	NE	44WNW	57	6.1	8	6	14	9	*	1	3
Mar.	69.5	46.4	58.0	90	26	4.41	4.65	T	83	59	9.6	WNW	40W	64	5.9	9	9	13	10	0	3	3
Apr.	77.8	54.3	66.1	95	33	2.93	3.66	0.0	85	60	9.3	SSE	40N	70	5.5	10	9	11	7	0	4	2
May	84.8	61.8	73.3	98	40	4.20	4.23	0.0	85	64	8.2	SW	42N	69	5.7	9	11	11	9	0	8	3
June	89.3	68.8	79.1	102	53	5.89	4.06	0.0	88	70	7.7	SW	66E	66	6.1	7	11	12	11	0	10	3
July	90.8	71.3	81.1	99	61	7.87	6.36	0.0	89	74	7.4	SW	51SE	65	6.4	5	15	11	15	0	16	1
Aug.	90.3	70.9	80.6	100	61	6.47	7.04	0.0	91	78	7.0	SW	58N	64	6.2	6	14	11	12	0	12	2
Sept.	85.4	66.9	76.2	97	43	5.57	5.87	0.0	91	76	7.7	NE	56NW	60	6.2	6	12	12	10	0	6	4
Oct.	78.2	55.9	67.1	93	33	2.81	3.57	0.0	88	75	7.9	NNE	37NE	64	5.0	12	8	11	6	0	1	4
Nov.	69.3	44.9	57.1	85	15	1.94	5.02	0.0	86	72	7.9	NNE	34W	63	5.1	12	7	11	6	0	*	5
Dec.	62.1	38.7	50.4	83	19	3.28	3.47	T	85	71	8.3	NE	37NW	56	5.9	10	7	14	8	0	*	4
Year	76.8	54.9	65.9	102	9	51.15	7.04	0.3	86	69	8.3	SW	66E	63	5.8	103	116	146	111	*	63	39

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 105 in July 1879; lowest temperature 8 in February 1899; maximum monthly precipitation 22.88 in September 1924; minimum monthly precipitation T in December 1889; maximum precipitation in 24 hours 11.44 in September 1928; fastest mile wind 90 in August 1940.

JACKSONVILLE, FLORIDA (International Airport) 30°30'N., 81°42'W.; Elevation (ground) 26 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	32	32	(b)	32	32	37	37	24	14	24	23	24	25	25	25	32	32	32	32
Jan.	64.6	44.5	54.6	85	19	2.78	3.02	T	87	74	8.6	NW	41NW	56	6.0	9	8	14	8	0	1	5
Feb.	66.9	45.7	56.3	88	19	3.58	6.22	T	85	68	9.8	WSW	52NE	60	5.8	9	7	12	8	*	1	4
Mar.	72.2	50.1	61.2	91	25	3.56	7.12	T	85	65	9.7	NW	44SW	66	5.7	9	10	12	8	0	3	3
Apr.	79.0	57.1	68.1	95	35	3.07	8.25	0.0	85	64	9.4	SE	48W	71	5.3	10	10	10	6	0	3	2
May	84.6	63.9	74.3	100	45	3.22	5.09	0.0	83	65	9.0	WSW	52N	69	5.4	10	12	9	8	0	6	2
June	88.3	70.0	79.2	103	56	6.27	5.93	0.0	86	72	8.7	SW	76NE	61	6.1	6	13	11	12	0	10	1
July	90.0	72.0	81.0	105	61	7.35	10.09	0.0	87	75	7.8	SW	49SW	60	6.4	4	15	12	15	0	16	1
Aug.	89.7	72.3	81.0	102	64	7.89	7.93	0.0	90	78	7.5	SW	52NE	57	6.2	5	15	11	15	0	13	1
Sept.	86.0	70.4	78.2	100	50	7.83	10.17	0.0	91	79	8.6	NE	82N	53	6.5	5	12	13	13	0	6	1
Oct.	79.2	61.7	70.5	96	38	4.54	6.66	0.0	90	78	8.9	NE	72E	55	5.6	10	9	12	9	0	2	3
Nov.	71.4	51.0	61.2	88	21	1.79	5.44	0.0	88	77	8.5	NW	60S	60	5.0	12	8	10	6	0	1	5
Dec.	65.6	45.1	55.4	84	12	2.59	3.70	T	88	77	8.3	NW	62N	56	5.9	10	8	13	8	0	1	5
Year	78.1	58.7	68.4	105	12	54.47	10.17	T	87	73	8.7	NW	82N	61	5.8	99	127	139	116	*	62	34

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 10 in February 1899; maximum monthly precipitation 23.32 in June 1932; maximum monthly snowfall 1.9 in February 1899; maximum snowfall in 24 hours 1.9 in February 1899.

DAYTONA BEACH, FLORIDA (Regional Airport) 29°11'N., 81°03'W.; Elevation (ground) 31 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	30	30	(b)	30	30	29	29	28	18	25		25	30	30	30	30	30	29	29
Jan.	69.1	47.6	58.4	85	23	2.05	2.21	0.0	88	78	9.2	NW	40W		5.8	9	10	12	7	0	1	6
Feb.	70.4	48.7	59.6	88	24	2.92	4.39	T	87	73	10.1	NNW	44SSW		5.7	9	8	11	8	0	2	3
Mar.	74.5	53.3	63.9	90	31	3.37	5.74	0.0	86	71	10.3	SSW	44SW		5.7	9	10	12	8	0	3	3
Apr.	80.2	59.2	69.7	96	35	2.39	4.00	0.0	85	70	10.1	E	46S		5.3	10	11	9	6	0	4	2
May	85.2	64.8	75.0	100	44	2.65	4.22	0.0	85	72	9.4	E	40WSW		5.3	10	11	10	8	0	8	2
June	88.4	70.4	79.4	102	57	6.60	6.28	0.0	87	76	8.6	SW	40W		6.4	6	12	12	12	0	13	1
July	89.6	72.3	81.0	99	65	6.69	3.90	0.0	88	79	7.7	SSW	40WSW		6.5	4	14	13	14	0	18	1
Aug.	89.4	72.8	81.1	99	65	6.84	4.41	0.0	91	81	7.5	E	50ESE		6.4	4	15	12	14	0	16	2
Sept.	87.0	72.0	79.5	99	52	7.10	6.34	0.0	90	81	9.0	E	58ESE		6.5	4	14	12	13	0	8	1
Oct.	81.4	65.2	73.3	95	41	5.52	9.29	0.0	87	78	9.7	NE	53NE		5.8	9	11	11	11	0	3	2
Nov.	75.1	55.1	65.1	89	27	2.13	5.15	0.0	88	79	8.9	NW	37W		5.1	10	11	9	7	0	1	3
Dec.	70.2	49.0	59.6	85	21	1.96	4.01	T	88	80	8.8	NW	40NNW		5.7	10	9	12	7	0	1	5
Year	80.0	60.9	70.5	102	21	50.22	9.29	T	87	76	9.1	E	58ESE		5.8	94	136	135	115	0	79	32

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 18 in January 1940; maximum monthly precipitation 24.82 in October 1924; maximum precipitation in 24 hours 12.85 in October 1924.

WEST PALM BEACH, FLORIDA (Palm Beach International Airport) 26°41'N., 80°06'W.; Elevation (ground) 15 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	9	9	(b)	35	28	9	9	31	14	24		25	28	28	28	31	31	31	31
Jan.	75.0	55.9	65.5	87	29	2.60	6.36	0.0	83	73	9.9	NW	48WNW		5.8	7	12	12	7	0	1	2
Feb.	76.0	56.2	66.1	87	35	2.60	4.70	0.0	81	69	10.4	SE	46WNW		5.7	8	10	10	7	0	1	1
Mar.	79.3	60.2	69.8	92	31	3.32	4.88	0.0	79	66	10.7	SE	51W		5.6	8	13	10	8	0	2	1
Apr.	82.9	64.9	73.9	99	45	3.51	15.23	0.0	77	64	10.8	E	55NW		5.5	8	13	9	7	0	4	1
May	86.1	68.9	77.5	96	56	5.17	7.04	0.0	76	68	9.6	ESE	45W		5.8	8	12	11	11	0	7	*
June	88.3	72.7	80.5	96	62	8.14	9.21	0.0	82	76	8.1	ESE	71E		6.9	4	12	14	14	0	13	*
July	89.6	74.1	81.9	96	68	6.52	5.83	0.0	84	75	7.5	ESE	45SSW		6.7	4	13	14	15	0	16	*
Aug.	90.2	74.4	82.3	97	68	6.91	5.89	0.0	84	74	7.4	ESE	86SE		6.6	3	16	12	16	0	16	*
Sept.	88.3	74.7	81.5	93	68	9.85	8.71	0.0	85	76	8.7	ENE	55NNE		7.0	3	13	14	17	0	11	*
Oct.	84.3	70.1	77.2	93	46	8.75	9.58	0.0	83	74	9.9	ENE	74SSE		6.3	6	13	12	14	0	5	*
Nov.	79.5	62.5	71.0	89	37	2.48	5.52	0.0	81	71	9.9	ENE	35NNW		5.6	7	14	9	8	0	1	1
Dec.	76.1	57.4	66.8	87	33	2.21	5.26	0.0	78	71	9.8	NNW	36ENE		5.5	9	12	10	7	0	1	1
Year	83.0	66.0	74.5	99	29	62.06	15.23	0.0	81	71	9.4	ESE	86SE		6.1	75	153	137	131	0	78	8

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 101° in July 1942.

MIAMI, FLORIDA (International Airport) 25°48'N., 80°16'W.; Elevation (ground) 7 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	9	9	(b)	31	31	9	9	24	15	16		25	24	24	24	31	24	24	25
Jan.	75.6	58.7	67.2	86	35	2.15	2.68	0.0	84	70	9.3	NNW	37NW		5.3	10	12	9	7	0	1	2
Feb.	76.6	59.0	67.8	87	36	1.95	5.73	0.0	82	66	10.1	ESE	38WNW		5.3	9	11	8	6	0	1	1
Mar.	79.5	63.0	71.3	90	37	2.07	7.07	0.0	82	65	10.4	SE	46NE		5.3	9	14	8	6	0	2	1
Apr.	82.7	67.3	75.0	96	46	3.60	5.18	0.0	80	64	10.5	ESE	32SW		5.4	8	15	7	6	0	3	1
May	85.3	70.7	78.0	93	61	6.12	8.42	0.0	82	70	9.4	ESE	37NW		5.8	6	15	10	10	0	7	*
June	88.0	73.9	81.0	94	67	9.00	7.63	0.0	87	76	8.2	SE	37SE		6.9	3	14	13	15	0	13	0
July	89.1	75.5	82.3	96	70	6.91	4.55	0.0	86	73	7.8	SE	38S		6.5	3	16	12	16	0	15	*
Aug.	89.9	75.8	82.9	96	70	6.72	6.92	0.0	87	74	7.6	SE	74N		6.5	2	18	11	17	0	16	*
Sept.	88.3	75.0	81.7	93	70	8.74	7.58	0.0	90	78	8.2	ESE	69ENE		6.8	2	15	13	17	0	11	*
Oct.	84.6	71.0	77.8	90	56	8.18	9.95	0.0	88	75	9.1	ENE	41NE		6.1	6	13	12	15	0	5	*
Nov.	79.9	64.5	72.2	87	40	2.72	7.93	0.0	84	70	9.3	N	32E		5.2	9	13	8	8	0	1	1
Dec.	76.6	60.0	68.3	85	34	1.64	4.38	0.0	83	69	8.9	N	38NW		5.2	10	12	9	7	0	1	1
Year	83.0	67.9	75.5	96	34	59.80	9.95	0.0	84	71	9.0	ESE	74N		5.9	77	168	120	128	0	75	7

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Airport locations: highest temperature 100 in July 1942; lowest temperature 28 in January 1940; maximum precipitation in 24 hours 12.58 in April 1942. City locations: lowest temperature 27 in February 1917; maximum precipitation in 24 hours 15.10 in November 1925; fastest mile of wind 122 from the South in October 1950. Miami Beach (Allison Hospital): Fastest mile of wind 132 from the East, September 18, 1926.

KEY WEST, FLORIDA (International Airport) 24°33'N., 81°45'W.; Elevation (ground) 4 feet. Year: 1973

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hr	Snow, sleet mean total	Humidity (percent): 0700 (local time)	1900 (local time)	Wind (Miles per hour): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	21	21	(b)	25	25	25	25	20	3	25	15	21	21	21	21	25	25	25	25
Jan.	75.6	65.8	70.7	85	46	1.67	4.43	0.0	83	77	12.1	NE	71N	70	5.1	11	12	8	7	0	1	*
Feb.	76.6	66.5	71.6	85	47	1.85	2.54	0.0	80	75	12.3	SE	63WNW	75	4.7	11	11	6	6	0	1	*
Mar.	79.4	69.8	74.6	87	53	1.56	3.10	0.0	79	73	12.6	SE	47SW	80	4.6	13	12	6	5	0	2	0
Apr.	82.5	73.6	78.1	89	55	2.17	3.15	0.0	77	71	12.7	ESE	48NNW	83	4.5	13	12	5	4	0	2	0
May	85.3	76.4	80.9	91	66	2.51	8.89	0.0	76	71	11.0	ESE	51E	79	5.0	10	14	7	7	0	4	0
June	87.9	79.1	83.5	94	68	4.55	4.00	0.0	78	73	9.9	SE	60SE	70	6.3	4	15	11	13	0	10	0
July	89.2	80.0	84.6	95	69	4.11	3.05	0.0	77	72	10.1	ESE	52ESE	75	6.3	4	17	10	13	0	13	0
Aug.	89.5	79.9	84.7	95	68	4.47	3.23	0.0	77	73	9.4	ESE	56S	75	6.2	3	18	10	15	0	14	0
Sept.	87.8	78.6	83.2	94	70	7.34	6.65	0.0	80	76	10.2	ESE	122NW	67	6.6	3	16	11	16	0	11	*
Oct.	84.0	75.2	79.6	93	60	5.57	8.47	0.0	82	76	11.3	ENE	84SE	66	5.8	8	12	11	13	0	4	*
Nov.	79.6	70.6	75.1	88	49	2.67	7.33	0.0	82	76	12.0	ENE	76NW	71	4.8	11	12	7	7	0	1	*
Dec.	76.4	66.6	71.5	85	46	1.52	4.60	0.0	83	77	12.0	NE	47N	73	5.0	11	12	8	7	0	1	*
Year	82.8	73.5	78.2	95	46	39.99	8.89	0.0	80	74	11.3	ESE	122NW	74	5.4	102	163	100	112	0	62	1

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 97 in August 1956; lowest temperature 41 in January 1886; maximum monthly precipitation 23.56 in October 1933; maximum precipitation in 24 hours 19.88 in November 1954.

METEOROLOGICAL TABLE FOR COASTAL AREA OFF CHESAPEAKE BAY ENTRANCE

Boundaries: Between 36°N. and 38°N., and from 73°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
% frequency	Wind ≧ 34 knots	6.0	3.3	3.3	0.9	0.5	0.9	0.2	0.2	1.5	1.8	2.8	2.7
	Wave height ≧ 10 feet	11.9	8.9	6.1	3.2	3.0	1.5	0.5	0.7	6.7	5.2	4.8	5.7
	Visibility < 2 naut. mi.	2.7	4.5	4.1	4.8	4.7	3.4	0.9	1.1	1.6	1.5	2.0	1.9
	Precipitation	9.3	9.2	7.1	6.5	5.3	4.4	5.0	4.8	5.7	6.1	6.5	7.5
	Sky overcast or obscured	36.7	36.4	33.1	29.2	26.1	22.6	20.5	21.3	22.2	23.6	25.8	32.2
	Thunder and lightning	0.4	0.4	0.5	0.7	1.5	1.7	2.4	3.0	1.2	0.8	0.4	0.4
	Temperature ≧ 85°F	0.0	0.0	0.0	*	0.1	1.5	5.1	4.4	1.5	0.1	0.0	0.0
	Temperature ≦ 32°F	6.9	6.4	1.4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.1
	Mean temperature (°F)	46.6	46.3	49.2	55.3	62.7	71.8	77.5	77.7	73.4	65.5	57.5	49.9
	Mean relative humidity (%)	75	74	76	78	79	81	82	80	78	76	73	74
	Mean cloud cover (eighths)	4.9	4.8	4.5	4.2	4.3	4.2	4.3	4.4	4.1	3.9	4.3	4.8
milli-bars	Mean sea-level pressure	1019	1017	1016	1016	1017	1016	1017	1017	1018	1018	1018	1019
	Extreme max. sea-level pressure	1046	1044	1044	1039	1037	1033	1034	1034	1040	1040	1041	1041
	Extreme min. sea-level pressure	983	975	983	974	994	991	981	990	991	992	981	983

METEOROLOGICAL TABLE FOR COASTAL AREA OFF CAPE HATTERAS AND CAPE LOOKOUT, N. C.

Boundaries: Between 34°N. and 36°N., and from 73°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
% frequency	Wind ≧ 34 knots	8.8	7.5	4.7	2.1	1.9	1.4	0.2	0.2	2.5	3.9	3.7	2.7
	Wave height ≧ 10 feet	15.2	17.8	12.0	8.2	6.6	3.6	0.9	1.8	10.7	11.0	7.8	8.8
	Visibility < 2 naut. mi.	1.8	2.0	1.8	1.2	1.0	0.9	0.4	0.8	0.9	0.9	0.9	1.4
	Precipitation	6.9	7.9	6.1	4.5	4.9	5.3	5.1	5.0	4.7	5.9	5.4	6.5
	Sky overcast or obscured	34.1	36.2	32.5	23.6	22.6	22.4	19.8	19.9	19.8	23.5	24.6	31.2
	Thunder and lightning	0.5	0.8	1.1	1.4	2.4	2.5	3.4	3.4	1.4	1.3	0.9	0.6
	Temperature ≧ 85°F	*	0.0	0.0	0.1	0.6	3.9	10.3	12.1	4.0	0.4	0.1	*
	Temperature ≦ 32°F	0.5	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Mean temperature (°F)	55.8	56.2	58.2	64.4	71.1	76.5	80.3	80.6	77.3	71.0	64.5	58.5
	Mean relative humidity (%)	74	74	73	74	77	80	80	79	77	74	72	73
	Mean cloud cover (eighths)	5.2	5.2	4.9	4.2	4.5	4.6	4.7	4.7	4.4	4.6	4.6	5.0
milli-bars	Mean sea-level pressure	1019	1017	1016	1017	1017	1016	1018	1017	1017	1017	1018	1019
	Extreme max. sea-level pressure	1044	1041	1041	1040	1035	1031	1034	1030	1040	1039	1037	1038
	Extreme min. sea-level pressure	984	984	982	988	990	997	1001	991	987	993	987	984

* 0.00-0.05%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

METEOROLOGICAL TABLE FOR COASTAL AREA FROM SAVANNAH, GA., TO CAPE FEAR, N. C.

Boundaries: Between 32°N. and 34°N., and from 75°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
% frequency	Wind ≧ 34 knots	5.6	5.9	4.5	1.0	1.6	1.0	0.5	0.2	1.8	6.7	3.4	3.1
	Wave height ≧ 10 feet	13.2	16.9	12.6	5.8	5.5	4.5	1.8	1.9	11.0	12.6	8.6	7.8
	Visibility < 2 naut. mi.	0.7	1.0	0.6	0.4	0.4	0.6	0.5	0.5	0.4	0.8	0.4	0.6
	Precipitation	6.4	6.1	5.8	3.1	4.6	5.4	5.3	4.9	4.7	5.3	4.3	5.2
	Sky overcast or obscured	31.9	32.4	29.6	19.1	18.8	20.3	17.4	17.7	20.5	22.1	20.5	27.9
	Thunder and lightning	0.6	0.8	1.4	1.6	2.5	3.0	3.2	4.0	2.2	1.6	1.1	0.5
	Temperature ≧ 85°F	*	0.0	0.1	0.1	1.3	5.7	14.8	15.2	6.1	0.7	0.2	0.0
	Temperature ≦ 32°F	*	0.3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*
	Mean temperature (°F)	60.9	61.2	63.3	68.7	74.4	78.3	81.4	81.7	79.3	73.9	68.2	62.9
	Mean relative humidity (%)	73	73	73	73	76	80	80	79	77	74	72	72
	Mean cloud cover (eighths)	5.1	5.1	4.9	4.1	4.2	4.6	4.6	4.6	4.7	4.6	4.5	5.0
milli-bars	Mean sea-level pressure	1019	1018	1017	1018	1017	1017	1018	1017	1017	1017	1018	1020
	Extreme max. sea-level pressure	1041	1039	1038	1035	1033	1033	1032	1028	1032	1034	1037	1037
	Extreme min. sea-level pressure	983	985	989	990	990	985	992	986	999	989	993	995

METEOROLOGICAL TABLE FOR COASTAL AREA FROM PONCE DE LEON INLET, FLA., TO SAVANNAH, GA.

Boundaries: Between 29°N. and 32°N., and from 78°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
% frequency	Wind ≧ 34 knots	2.4	4.5	1.7	0.6	0.7	1.4	0.4	0.1	2.7	2.9	1.9	2.0
	Wave height ≧ 10 feet	8.5	14.1	6.5	3.6	3.1	4.2	1.1	1.1	12.9	10.1	7.4	4.9
	Visibility < 2 naut. mi.	0.3	0.4	0.3	0.3	0.2	0.5	0.2	0.2	0.6	0.5	0.2	0.5
	Precipitation	4.6	5.0	3.8	2.6	2.8	4.1	3.6	3.3	5.1	4.2	3.0	3.2
	Sky overcast or obscured	26.7	24.6	21.2	15.2	12.6	15.5	11.7	12.6	18.5	17.9	15.5	21.8
	Thunder and lightning	0.8	0.9	1.5	1.6	2.4	2.8	4.0	4.4	2.7	1.9	1.2	0.6
	Temperature ≧ 85°F	0.1	0.1	0.2	0.5	3.1	10.3	23.0	23.3	11.4	2.6	0.3	0.3
	Temperature ≦ 32°F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean Temperature (°F)	65.3	66.1	68.2	72.2	76.8	80.2	82.7	82.8	81.0	76.7	71.8	67.3
	Mean relative humidity (%)	72	73	72	72	75	79	79	78	77	73	71	71
	Mean cloud cover (eighths)	5.0	4.8	4.6	4.0	3.8	4.4	4.2	4.4	4.7	4.5	4.4	4.7
milli-bars	Mean sea-level pressure	1020	1018	1018	1018	1017	1017	1018	1017	1016	1016	1018	1020
	Extreme max. sea-level pressure	1039	1038	1035	1032	1032	1031	1031	1030	1032	1033	1035	1038
	Extreme min. sea-level pressure	996	990	978	979	989	991	1000	987	982	990	998	1000

* 0.00-0.05%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

METEOROLOGICAL TABLE FOR COASTAL AREA FROM FLORIDA KEYS TO PONCE DE LEON INLET, FLA.

Boundaries: Between 25°N. and 29°N., and from 78°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
% frequency	Wind ≧ 34 knots	0.8	1.6	0.5	0.1	0.2	0.4	0.1	0.2	1.9	2.0	0.7	0.8
	Wave height ≧ 10 feet	3.8	6.6	3.5	2.0	2.2	1.9	0.6	0.8	6.4	7.3	4.9	3.6
	Visibility < 2 naut. mi.	0.4	0.2	0.2	0.3	0.3	0.4	0.3	0.2	0.4	0.4	0.3	0.2
	Precipitation	2.9	2.6	2.0	1.8	2.7	3.7	2.3	2.8	4.4	4.3	2.6	2.5
	Sky overcast or obscured	15.7	13.9	14.7	11.6	11.2	14.2	8.0	8.7	14.5	15.5	10.8	13.8
	Thunder and lightning	0.3	0.6	0.8	1.3	1.9	3.0	3.8	4.4	3.7	2.1	0.8	0.4
	Temperature ≧ 85°F	0.2	0.4	0.8	1.1	4.4	13.4	26.4	30.2	18.8	5.8	1.1	0.5
	Temperature ≦ 32°F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean temperature (°F)	69.5	69.9	71.8	74.5	78.1	81.1	83.1	83.5	82.3	79.0	74.8	71.1
	Mean relative humidity (%)	74	75	75	74	77	79	78	78	79	76	74	73
	Mean cloud cover (eighths)	4.2	4.1	4.0	3.8	3.7	4.3	3.9	4.1	4.5	4.4	3.9	4.2
millibars	Mean sea-level pressure	1019	1018	1018	1016	1016	1016	1017	1016	1014	1014	1017	1019
	Extreme max. sea-level pressure	1034	1034	1034	1033	1031	1031	1030	1035	1028	1030	1033	1033
	Extreme min. sea-level pressure	999	995	993	1000	998	995	1002	1000	987	975	981	976

METEOROLOGICAL TABLE FOR STRAITS OF FLORIDA

Boundaries: Between 23°N. and 25°N., and 79°W. and 83°W.

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
% frequency	Wind ≧ 34 knots	0.6	0.3	0.2	0.2	0.0	0.8	0.1	0.1	0.3	1.7	0.1	0.1
	Wave height ≧ 10 feet	2.3	2.1	1.7	1.5	0.4	0.9	0.3	0.3	0.8	3.7	1.5	0.8
	Visibility < 2 naut mi.	0.4	0.1	0.2	0.2	0.2	0.6	0.2	0.1	0.4	0.4	0.3	0.2
	Precipitation	1.1	2.3	1.6	1.2	2.1	3.5	2.0	1.8	3.4	4.0	2.2	2.0
	Sky overcast or obscured	12.1	10.5	9.3	7.1	9.1	14.0	6.2	5.7	11.1	12.9	10.2	12.6
	Thunder and lightning	0.3	0.7	0.3	0.5	1.3	2.5	4.0	4.1	5.2	2.7	0.8	0.3
	Temperature ≧ 85°F	0.3	0.5	1.2	2.9	7.5	18.6	35.3	42.8	28.7	9.7	2.5	0.7
	Temperature ≦ 32°F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean temperature (°F)	72.1	72.5	74.4	76.9	79.7	82.2	83.9	84.5	83.4	80.5	76.7	73.2
	Mean relative humidity (%)	77	77	77	76	77	79	77	76	78	77	76	77
	Mean cloud cover (eighths)	3.6	3.5	3.4	3.2	3.5	4.3	3.9	3.9	4.4	4.2	3.8	3.9
millibars	Mean sea-level pressure	1019	1018	1018	1017	1016	1016	1017	1016	1014	1014	1017	1019
	Extreme max. sea-level pressure	1035	1032	1031	1033	1026	1033	1032	1030	1028	1028	1032	1031
	Extreme min. sea-level pressure	1002	989	1002	1002	1000	995	999	1001	995	991	1001	1001

* 0.00-0.05%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

MEAN SURFACE WATER TEMPERATURE (T) AND DENSITY (D)

Stations	Years	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec		Mean	
		(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1	(T) °C	(D) 1
Virginia Beach, Va. 36°50'N., 75°58'W.	8	5.5	20.4	4.5	19.8	6.4	19.4	10.7	19.0	15.8	18.5	20.4	18.4	22.8	19.6	23.8	20.0	22.4	20.0	18.6	20.2	13.8	20.6	8.4	20.5	14.4	19.7
Diamond Shoal Light 35°09'N., 75°18'W.	5	16.6	26.2	15.6	26.2	14.8	25.6	16.7	25.8	21.1	26.4	24.4	26.5	26.2	26.4	26.9	26.5	25.7	25.7	23.2	26.0	19.3	25.8	18.0	25.9	20.7	26.1
Beaufort, N.C. 34°43'N., 76°40'W.	4	9.1	21.2	8.8	20.8	11.3	21.6	17.2	22.9	21.4	24.6	25.2	23.9	27.4	24.5	27.7	24.8	24.8	24.1	20.2	23.8	15.4	22.0	11.4	23.6	18.3	23.2
Southport, N.C. 33°55"N., 78°01'W.	9	10.9	15.1	10.9	13.8	13.1	12.5	17.8	13.9	22.7	16.0	26.3	18.8	27.9	17.4	27.9	18.7	25.6	19.0	21.2	19.4	16.3	18.1	11.7	16.6	19.4	16.6
Myrtle Beach, S.C. 33°41'N., 78°53'W.	17	9.1	25.2	9.6	25.0	12.6	24.4	17.3	24.4	22.1	24.9	26.0	25.3	27.9	25.8	27.7	26.4	25.8	25.9	21.3	25.6	15.7	25.6	10.7	25.5	18.8	25.3
Charleston, S.C. 32°47'N., 79°55'W.	27	10.6	12.0	11.0	10.4	13.9	9.1	18.6	9.5	23.2	10.7	26.9	11.1	28.6	12.2	28.6	13.1	26.6	13.8	22.0	14.8	16.8	14.2	11.9	13.0	19.9	12.0
Ft. Pulaski, Ga. 32°02'N., 80°54'W.	29	10.8	11.0	11.7	10.2	14.7	8.3	19.2	8.3	23.7	10.1	27 2	12.0	28.8	13.0	28.9	13.8	26.7	13.6	22.4	14.2	17.3	14.0	12.3	12.8	20.3	11.8
Brunswick, Ga. 31°08'N., 81°29'W.	8	12.7	16.1	13.0	14.3	16.1	12.9	20.9	14.5	24.6	16.9	27.5	17.6	28.8	17.5	29.2	17.8	26.9	17.6	23.0	17.8	18.2	18.7	14.2	18.6	21.3	16.7
Fernandina Beach, Fla. 30°40'N., 81°28'W.	25	13.5	21.6	14.1	21.1	16.7	20.5	20.7	21.5	24.6	23.0	27.4	23.6	28.4	23.4	28.4	23.1	27.4	21.6	23.5	20.6	18.9	21.8	14.5	22.4	21.5	22.0
Mayport, Fla. 30°24'N., 81°26'W.	25	14.0	17.0	14.5	17.0	16.8	16.6	20.4	19.0	24.1	21.0	26.9	21.2	28.0	18.7	27.8	18.0	27.4	17.0	23.8	15.1	19.4	15.3	15.3	17.1	21.5	17.8
Jacksonville, Fla. 30°21'N., 81°37'W.	13	14.3	6.1	15.7	6.4	19.1	6.8	23.1	7.1	26.8	10.1	29.1	9.0	30.6	6.3	30.4	5.7	28.5	7.3	24.6	5.9	20.2	5.3	15.8	6.2	23.2	6.8
Daytona Beach (ocean), Fla. 29°14'N., 81°00'W.	20	16.4	25.6	16.3	25.7	17.8	26.2	21.2	26.5	24.2	26.9	25.9	27.0	25.7	27.0	25.3	26.9	27.3	26.5	24.7	25.4	21.5	25.6	18.1	25.5	22.0	26.2
Daytona Beach (Halifax River), Fla. 29°13'N., 81°01'W.	2	18.1	16.6	14.8	17.8	20.1	10.0	25.4	9.8	27.6	13.6	29.2	15.0	30.1	8.8	30.8	6.1	29.1	6.7	25.7	7.6	23.0	10.5	19.1	15.0	24.4	11.5
Cape Kennedy, Fla. 28°15'N., 80°36'W.	2	17.3	26.5	17.8	26.7	18.9	26.0	21.7	27.0	25.0	27.2	25.2	27.2	26.1	27.3	26.8	27.2	28.0	27.0	25.6	26.3	23.1	26.3	19.2	25.8	22.9	26.7
Eau Gallie Beach, Fla. 28°08'N., 80°35'W.	16	18.4	26.5	18.7	26.7	20.1	26.8	22.3	27.1	24.7	27.2	26.2	27.1	26.0	27.1	26.7	27.0	27.9	26.9	25.7	26.4	22.9	26.3	19.9	26.7	23.3	26.8
Miami Beach, Fla. 25°46'N., 80°08'W.	26	21.7	26.6	22.1	26.8	23.3	27.0	25 1	27.1	27.1	27.2	28.8	27.0	30.1	26.9	30.3	26.8	29.3	26.3	26.9	25.9	24.4	26.3	22.6	26.5	26.0	26.7
Marathon Shores, Fla. 24°43'N., 81°02'W.	3	22.1	26.4	21.7	26.8	22.8	27.5	25.4	28.2	27.8	28.0	28.9	26.9	30.4	27.1	30.4	27.7	30.3	27.0	27.7	26.6	23.7	27.0	21.8	26.0	26.1	27.1
Key West, Fla. 24°33'N., 81°48'W.	38	21.8	26.8	22.3	26.9	23.8	27.1	25.8	27.3	27.9	27.5	29.6	27.2	30.4	27.3	30.6	27.3	29.7	26.9	27.5	26.7	24.4	27.0	22.3	26.9	26.3	27.1

F (Fahrenheit) = 1.8C (Celsius) +32

1 Density as used in this table is the specific gravity of the sea water or the ratio between the weight of a sea water sample and the weight of an equal volume of distilled water at 15°C (59°F). Obtain the pamphlet, "Surface Water Temperature and Density, Atlantic Coast, North and South America, C&GS Publication 31-1", for greater detail on temperatures and densities; for sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $1.00.

DETERMINATION OF WIND SPEED BY SEA CONDITION

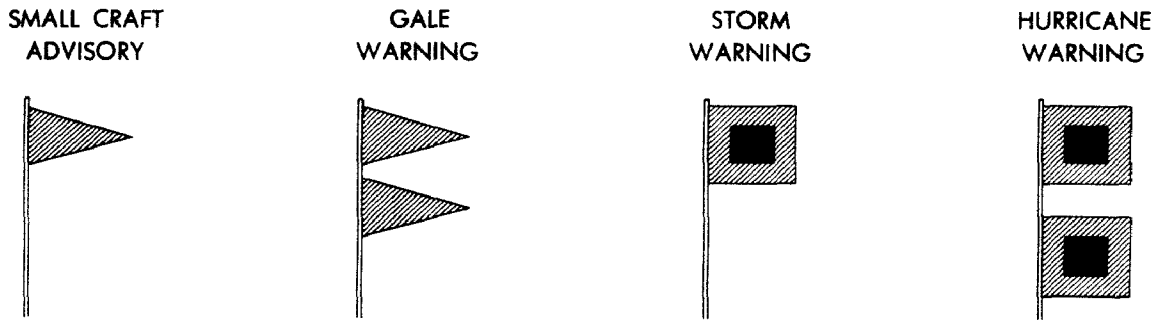
Miles per hour	Knots	Descriptive	Sea Conditions	Wind force (Beaufort)	Probable wave height (in ft.)
0-1	0-1	Calm	Sea smooth and mirror-like.	0	-
1-3	1-3	Light air	Scale-like ripples without foam crests.	1	1/4
4-7	4-6	Light breeze	Small, short wavelets; crests have a glassy appearance and do not break.	2	1/2
8-12	7-10	Gentle breeze	Large wavelets; some crests begin to break; foam of glassy appearance. Occasional white foam crests.	3	2
13-18	11-16	Moderate breeze	Small waves, become longer; fairly frequent white foam crests.	4	4
19-24	17-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many white foam crests; there may be some spray.	5	6
25-31	22-27	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere; there may be some spray.	6	10
32-38	28-33	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind; spindrift begins.	7	14
39-46	34-40	Gale	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind.	8	18
47-54	41-47	Strong gale	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble, and roll over; spray may reduce visibility.	9	23
55-63	48-55	Storm	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea is white in appearance. The tumbling of the sea becomes heavy and shocklike. Visibility is reduced.	10	29
64-72	56-63	Violent storm	Exceptionally high waves that may obscure small and medium-sized ships. The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility is reduced.	11	37
73 or more	64 or more	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very much reduced.	12	45

ATMOSPHERIC PRESSURE CONVERSION TABLE

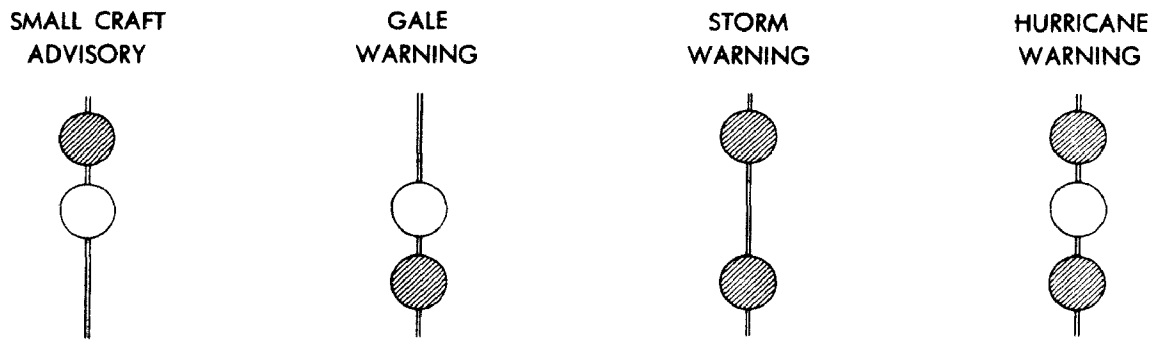
Inches	Millibars	Inches	Millibars	Inches	Millibars
28.44	963	29.32	993	30.21	1023
28.53	966	29.41	996	30.30	1026
28.62	969	29.50	999	30.39	1029
28.70	972	29.59	1002	30.48	1032
28.79	975	29.68	1005	30.56	1035
28.88	978	29.77	1008	30.65	1038
28.97	981	29.86	1011	30.74	1041
29.06	984	29.94	1014	30.83	1044
29.15	987	30.03	1017	30.92	1047
29.24	990	30.12	1020	31.01	1050

NATIONAL WEATHER SERVICE COASTAL WARNING DISPLAYS

DAYTIME SIGNALS



NIGHT (LIGHT) SIGNALS



Note: Shaded area represents the color RED on flags and lights.

EXPLANATION OF DISPLAYS

Small Craft Advisory: One RED pennant displayed by day and a RED light ABOVE a WHITE light at night, to alert mariners to sustained (more than two hours) weather or sea conditions, either present or forecast, that might be hazardous to small boats. Mariners learning of a Small Craft Advisory are urged to determine immediately the reason by tuning their radios to the latest marine broadcasts. Decision as to the degree of hazard will be left up to the boatman, based on his experience and size and type of boat. The threshold conditions for the Small Craft Advisory are usually 18 knots of wind (less than 18 knots in some dangerous waters) or hazardous wave conditions.

Gale Warning: Two RED pennants displayed by day and a WHITE light ABOVE a RED light at night to indicate that winds within the range 34 to 47 knots are forecast for the area.

Storm Warning: A single square RED flag with a BLACK center displayed during daytime and two RED lights at night to indicate that winds 48 knots and above, no matter how high the speed, are forecast for the area. However, if the winds are associated with a tropical cyclone (hurricane) the STORM WARNING display indicates that winds within the range 48 to 63 knots are forecast.

Hurricane Warning: Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day and a WHITE light between two RED lights at night to indicate that winds 64 knots and above are forecast for the area.

Note: A "HURRICANE WATCH" is an announcement issued by the National Weather Service via press and radio and television broadcasts whenever a tropical storm or hurricane becomes a threat to a coastal area. The "Hurricane Watch" announcement is not a warning, rather it indicates that the hurricane is near enough that everyone in the area covered by the "Watch" should listen to their radios for subsequent advisories and be ready to take precautionary action in case hurricane warnings are issued.

Note: A SPECIAL MARINE WARNING BULLETIN is issued whenever a severe local storm or strong wind of brief duration is imminent and is not covered by existing warnings or advisories. No visual displays will be used in connection with the Special Marine Warning Bulletin; boaters will be able to receive these special warnings by keeping tuned to a NOAA VHF-FM radio station or to Coast Guard and commercial radio stations that transmit marine weather information.

HOURS OF OPERATION OF FOG SIGNALS
(U.S. Coast Guard)

Light station	19 calendar years - 1950 thru 1968														Pre - 1950		
	Average													Max. 1 yr.	Ave.	For yrs.	Max. 1 yr.
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year				
Chesapeake Light Station, Va. (1) 36°54.3'N., 75°42.8'W.	52	72	56	51	46	32	19	16	20	22	20	31	437	863	652	14	1122
Cape Henry Light Station, Va. 36°55.6'N., 76°00.4'W.	55	67	42	35	37	28	11	20	21	22	29	44	411	582	359	65	667
Diamond Shoal Light Station, N.C. (2) 35°09.2'N., 75°17.8'W.	39	39	35	23	20	12	7	12	14	18	14	28	261	648	214	45	504
Frying Pan Shoals Light Station, N.C. (3) 33°29.1'N., 77°35.4'W.	17	20	11	6	16	11	5	7	14	13	7	11	138	547	95	37	246
Savannah Light Station, Ga. (4) 31°56.9'N., 80°41.0'W.	92	67	48	19	8	8	9	7	15	12	31	47	363	1067	182	57	821
St. Johns Lightship Fla. (5) 30°23.5'N., 81°18.0'W.	25	15	16	8	2	1	3	6	9	9	14	35	143	163	196	20	401

(1) Replaced lightship in September 1965.
(2) Replaced lightship in November 1966.
(3) Replaced lightship in November 1964.
(4) Replaced lightship in December 1964.
(5) Lightship discontinued in December 1954; record for 5 calendar years 1950-1954.

ATLANTIC OCEAN DISTANCES FOR DEEP-DRAFT VESSELS
MONTREAL, CANADA, TO PANAMA CANAL ZONE

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: New York, N. Y., is 1399 nautical miles from San Juan, P. R.

	MONTREAL, CANADA* 45°30.2'N., 73°33.0'W.	Cabot Strait 47°07.0'N., 60°17.0'W.	Gut of Canso (Lock) 45°39.0'N., 61°25.0'W.	Portland, Maine 43°39.4'N., 70°14.7'W.	Boston, Mass. 42°22.0'N., 71°03.0'W.	NANTUCKET SHOALS 40°30.0'N., 69°25.0'W.	NEW YORK, N. Y. 40°42.0'N., 74°01.0'W.	Philadelphia, Pa. 39°56.8'N., 75°08.3'W.	Baltimore, Md. 39°16.0'N., 76°34.5'W.	CHESAPEAKE BAY ENT. 36°56.3'N., 75°58.6'W.	Norfolk, Va. 36°50.9'N., 76°17.9'W.	DIAMOND SHOALS 35°08.0'N., 75°15.0'W.	Wilmington, N. C. 34°14.0'N., 77°57.0'W.	Charleston, S. C. 32°47.2'N., 79°55.2'W.	Savannah, Ga. 32°05.0'N., 81°05.7'W.	Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	Key West, Fla. 24°33.7'N., 81°48.5'W.	STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.	Tampa, Fla. 27°56.5'N., 82°26.7'W.	Pensacola, Fla. 30°24.0'N., 87°13.0'W.	Mobile, Ala. 30°42.5'N., 88°02.5'W.	NEW ORLEANS, La. (via SW Pass) 29°57.0'N., 90°03.7'W.	Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	Galveston, Tex. 29°19.0'N., 94°47.0'W.	Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	San Juan, P. R. 18°27.8'N., 66°06.7'W.	YUCATAN CHANNEL 21°50.0'N., 85°03.0'W.	Panama Canal (Atlantic Ent.) 9°23.5'N., 79°55.3'W.	PANAMA CANAL (Pacific Ent.) 8°53.0'N., 79°31.0'W.
Cabot Strait 47°07.0'N., 60°17.0'W.	681																													
Gut of Canso (Lock) 45°39.0'N., 61°25.0'W.	717	120																												
Portland, Maine 43°39.4'N., 70°14.7'W.	1276	595	484																											
Boston, Mass. 42°22.0'N., 71°03.0'W.	1318	637	526	100																										
NANTUCKET SHOALS 40°30.0'N., 69°25.0'W.	1311	630	519	203	163																									
NEW YORK, N. Y. 40°42.0'N., 74°01.0'W.	1534	853	742	426	386	223																								
Philadelphia, Pa. 39°56.8'N., 75°08.3'W.	1682	1001	890	575	535	372	240																							
Baltimore, Md. 39°16.0'N., 76°34.5'W.	1838	1157	1046	734	694	531	417	392																						
CHESAPEAKE BAY ENT. 36°56.3'N., 75°58.6'W.	1689	1008	896	584	544	381	267	242	150																					
Norfolk, Va. 36°50.9'N., 76°17.9'W.	1716	1035	923	611	571	408	294	269	173	27																				
DIAMOND SHOALS 35°08.0'N., 75°15.0'W.	1729	1048	936	628	588	425	345	322	267	117	144																			
Wilmington, N. C. 34°14.0'N., 77°57.0'W.	1948	1267	1155	847	807	644	564	541	486	336	363	219																		
Charleston, S. C. 32°47.2'N., 79°55.2'W.	2014	1333	1221	913	873	710	630	607	552	402	429	285	151																	
Savannah, Ga. 32°05.0'N., 81°05.7'W.	2088	1407	1295	987	947	784	704	681	626	476	503	359	227	102																
Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	2172	1491	1379	1071	1031	868	788	765	710	560	587	443	315	197	145															
Key West, Fla. 24°33.7'N., 81°48.5'W.	2479	1798	1690	1387	1347	1184	1109	1086	1031	881	908	764	667	572	543	462														
STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.	2540	1859	1751	1448	1408	1245	1170	1147	1092	942	969	825	728	633	604	523	73													
Tampa, Fla. 27°56.5'N., 82°26.7'W.	2772	2091	1983	1680	1640	1477	1402	1379	1324	1174	1201	1057	960	865	836	755	305	232												
Pensacola, Fla. 30°24.0'N., 87°13.0'W.	2977	2296	2188	1885	1845	1682	1607	1584	1529	1379	1406	1262	1165	1070	1041	960	510	437	347											
Mobile, Ala. 30°42.5'N., 88°02.5'W.	3011	2330	2222	1919	1879	1716	1641	1618	1563	1413	1440	1296	1199	1104	1075	994	544	471	389	89										
NEW ORLEANS, La. (via SW Pass) 29°57.0'N., 90°03.7'W.	3080	2399	2291	1988	1948	1785	1710	1687	1632	1482	1509	1365	1268	1173	1144	1063	613	540	502	288	269									
Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	3240	2559	2451	2148	2108	1945	1870	1847	1792	1642	1669	1525	1428	1333	1304	1223	773	700	697	504	491	441								
Galveston, Tex. 29°19.0'N., 94°47.0'W.	3242	2561	2453	2150	2110	1947	1872	1849	1794	1644	1671	1527	1430	1335	1306	1225	775	702	703	509	496	446	89							
Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	3347	2666	2558	2255	2215	2052	1977	1954	1899	1749	1776	1632	1535	1440	1411	1330	880	807	810	618	605	555	249	207						
San Juan, P. R. 18°27.8'N., 66°06.7'W.	2445	1764	1669	1531	1486	1334	1399	1395	1375	1225	1252	1114	1153	1138	1156	1121	966	1017	1249	1448	1448	1557	1717	1719	1824					
YUCATAN CHANNEL 21°50.0'N., 85°03.0'W.	2730	2049	1937	1629	1589	1426	1346	1323	1268	1118	1145	1001	904	809	780	699	251	192	404	533	562	587	691	696	769	1111				
Panama Canal (Atlantic Ent.) 9°23.5'N., 79°55.3'W.	3203	2522	2419	2189	2149	1986	1972	1955	1904	1754	1781	1637	1609	1563	1564	1513	1060	1001	1213	1342	1371	1396	1487	1493	1549	990	809			
PANAMA CANAL (Pacific Ent.) 8°53.0'N., 79°31.0'W.	3249	2568	2465	2235	2195	2032	2018	2001	1950	1800	1827	1683	1655	1609	1610	1559	1106	1047	1259	1388	1417	1442	1533	1539	1595	1036	855	46		

*Quebec, Canada - SUBTRACT 139 miles.

All tabular distances are by outside routes which can be used by the deepest-draft vessel that the listed ports can accommodate. Lighter-draft vessels can save considerable mileage by transiting Canso Lock (Canada), the Cape Cod Canal (Massachusetts), and the Chesapeake and Delaware Canal (Delaware-Maryland); see the detailed tables. Gulf of Mexico distances are through the Shipping Safety Fairways, recomputed in 1970 to conform with latest fairway revisions.

COASTWISE DISTANCES

NORFOLK, VA., TO KEY WEST, FLA.

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Norfolk, Va., is 503 nautical miles from Savannah, Ga.

	CHESAPEAKE BAY ENTRANCE 36°56.3'N., 75°58.6'W.	Norfolk, Va. 36°50.9'N., 76°17.9'W.	DIAMOND SHOALS 35°08.0'N., 75°15.0'W.	Morehead City, N.C. 34°42.8'N., 76°41.8'W.	Southport, N.C. 33°54.8'N., 78°01.0'W.	Wilmington, N.C. 34°14.0'N., 77°57.0'W.	Georgetown, S.C. 33°21.4'N., 79°16.9'W.	Charleston, S.C. 32°47.2'N., 79°55.2'W.	Port Royal, S.C. 32°22.3'N., 80°41.6'W.	Savannah, Ga. 32°05.0'N., 81°05.7'W.	Brunswick, Ga. 31°08.0'N., 81°29.7'W.	Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	St. Augustine, Fla. 29°53.6'N., 81°18.5'W.	Cape Canaveral, Fla. 28°24.6'N., 80°36.5'W.	Fort Pierce, Fla. 27°27.5'N., 80°19.3'W.	Stuart, Fla. 27°12.2'N., 80°15.6'W.	Port of Palm Beach, Fla. 26°46.1'N., 80°03.0'W.	Port Everglades, Fla. 26°05.6'N., 80°07.0'W.	Miami, Fla. 25°47.0'N., 80°11.0'W.	Key West, Fla. 24°33.7'N., 81°48.5'W.	STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.
Norfolk, Va. 36°50.9'N., 76°17.9'W.	27																					
DIAMOND SHOALS 35°08.0'N., 75°15.0'W.	117	144																				
Morehead City, N.C. 34°42.8'N., 76°41.8'W.	222	249	105																			
Southport, N.C. 33°54.8'N., 78°01.0'W.	315	342	198	133																		
Wilmington, N.C. 34°14.0'N., 77°57.0'W.	336	363	219	154	21																	
Georgetown, S.C. 33°21.4'N., 79°16.9'W.	365	392	248	184	87	108																
Charleston, S.C. 32°47.2'N., 79°55.2'W.	402	429	285	220	130	151	79															
Port Royal, S.C. 32°22.3'N., 80°41.6'W.	465	492	348	284	191	212	141	90														
Savannah, Ga. 32°05.0'N., 81°05.7'W.	476	503	359	295	206	227	154	102	51													
Brunswick, Ga. 31°08.0'N., 81°29.7'W.	527	554	410	346	260	281	210	156	110	104												
Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	533	560	416	352	265	286	216	166	120	115	50											
Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	560	587	443	379	294	315	247	197	152	145	82	53										
St. Augustine, Fla. 29°53.6'N., 81°18.5'W.	557	584	440	377	296	317	246	199	157	152	90	61	56									
Cape Canaveral, Fla. 28°24.6'N., 80°36.5'W.	612	639	495	438	367	388	324	283	251	251	195	169	167	120								
Fort Pierce, Fla. 27°27.5'N., 80°19.3'W.	647	674	530	476	407	428	368	329	298	298	242	216	214	167	69							
Stuart, Fla. 27°12.2'N., 80°15.6'W.	666	693	549	497	423	444	391	353	324	324	268	242	240	192	91	32						
Port of Palm Beach, Fla. 26°46.1'N., 80°03.0'W.	678	705	561	509	443	464	407	369	341	340	285	262	259	211	110	52	36					
Port Everglades, Fla. 26°05.6'N., 80°07.0'W.	720	747	603	550	485	506	449	411	383	382	327	304	301	253	152	94	78	46				
Miami, Fla. 25°47.0'N., 80°11.0'W.	743	770	626	573	508	529	472	434	406	405	350	327	324	276	175	117	101	68	27			
Key West, Fla. 24°33.7'N., 81°48.5'W.	881	908	764	711	646	667	610	572	544	543	488	465	462	414	313	255	239	207	165	151		
STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.	942	969	825	772	707	728	671	633	605	604	549	526	523	475	374	316	300	267	226	211	73	

Chesapeake Light (36°54.3'N., 75°42.8'W.) to: Norfolk, 42 miles; Baltimore, 165 miles.
Cape Fear River entrance buoy (33°49.5'N., 78°03.7'W.) to Wilmington, 28 miles.
Charleston Harbor entrance buoy (32°40.7'N., 79°42.9'W.) to Charleston, 12.3 miles.
Savannah Light (31°56.9'N., 80°41.0'W.) to Savannah, 25 miles.
St. Johns River entrance buoy (30°23.6'N., 81°19.2'W.) to Jacksonville, 24 miles.
Entrance buoy (24°27.7'N., 81°48.1'W.) to Key West, 6.3 miles.

Each distance is by shortest route that safe navigation permits between the two ports concerned. The navigator must make his own adjustments for non-direct routes selected to run with or avoid the Gulf Stream. For example, the table shows a distance of 561 miles by direct route from Diamond Shoals to Port of Palm Beach; distances via the routes shown in Chapter 3, Coast Pilot 4, are: Outer route, 572 miles; Gulf Stream route, 593 miles; Inner route, 628 miles.

INSIDE-ROUTE DISTANCES

NORFOLK, VA., TO FERNANDINA BEACH, FLA.

Figure at intersection of columns opposite ports in question is the nautical/statute mileage between the two. Example: Morehead City, N.C., is 445 nautical miles (512 statute miles) from Fernandina Beach, Fla.

Nautical Miles / Statute Miles	Norfolk, Va. 36°50.9'N., 76°17.9'W.	Elizabeth City, N.C. 36°18.1'N., 76°13.0'W.	Hertford, N.C. 36°11.6'N., 76°28.0'W.	Columbia, N.C. 35°55.0'N., 76°15.4'W.	Edenton, N.C. 36°03.3'N., 76°36.6'W.	Plymouth, N.C. 35°51.8'N., 76°45.6'W.	Manteo, N.C. 35°54.6'N., 75°40.2'W.	Belhaven, N.C. 35°32.1'N., 76°37.4'W.	Washington, N.C. 35°32.6'N., 77°03.7'W.	Ocracoke, N.C. 35°06.8'N., 75°59.1'W.	Oriental, N.C. 35°01.5'N., 76°41.8'W.	New Bern, N.C. 35°06.1'N., 77°02.1'W.	Beaufort, N.C. 34°43.1'N., 76°40.2'W.	Morehead City, N.C. 34°42.8'N., 76°41.8'W.	Swansboro, N.C. 34°41.0'N., 77°07.3'W.	Jacksonville, N.C. 34°44.7'N., 77°26.3'W.	Wrightsville, N.C. 34°13.1'N., 77°48.8'W.	Wilmington, N.C. 34°14.0'N., 77°57.0'W.	Southport, N.C. 33°54.8'N., 78°01.0'W.	Little River, S.C. 33°52.2'N., 78°36.6'W.	Bucksport, S.C. 33°39.0'N., 79°05.6'W.	Georgetown, S.C. 33°21.4'N., 79°16.9'W.	McClellanville, S.C. 33°04.7'N., 79°27.6'W.	Charleston, S.C. 32°47.2'N., 79°55.2'W.	Beaufort, S.C. 32°25.6'N., 80°40.2'W.	Savannah, Ga. 32°05.0'N., 81°05.7'W.	Thunderbolt, Ga. 32°01.5'N., 81°02.8'W.	Brunswick, Ga. 31°08.0'N., 81°29.7'W.	Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.
Norfolk, Va. 36°50.9'N., 76°17.9'W.				89*	102	102	113	121	92	138	180	151	184	207	204	205	230	266	283	314	308	344	377	405	430	467	536	585	583	685	717
Elizabeth City, N.C. 36°18.1'N., 76°13.0'W.					45	45	55	64	45	91	131	105	136	160	154	157	182	217	235	266	260	296	329	358	382	419	488	536	535	636	669
Hertford, N.C. 36°11.6'N., 76°28.0'W.						30	40	48	53	91	132	112	137	160	158	158	184	219	236	267	261	298	330	358	383	421	489	537	536	638	670
Columbia, N.C. 35°55.0'N., 76°15.4'W.							29	38	52	90	131	110	136	159	157	157	182	217	235	266	260	296	329	357	382	419	488	536	535	636	669
Edenton, N.C. 36°03.3'N., 76°36.6'W.								16	62	100	142	120	145	168	166	167	191	227	245	276	270	306	338	366	391	429	497	547	545	647	678
Plymouth, N.C. 35°51.8'N., 76°45.6'W.									70	109	150	130	154	178	175	175	201	237	254	285	280	315	349	376	402	438	508	556	555	656	688
Manteo, N.C. 35°54.6'N., 75°40.2'W.										81	121	70	105	127	127	127	152	186	205	236	231	267	299	326	352	388	457	506	505	606	639
Belhaven, N.C. 35°32.1'N., 76°37.4'W.											45	49	49	72	70	70	96	131	150	181	175	211	243	270	296	334	402	451	450	551	582
Washington, N.C. 35°32.6'N., 77°03.7'W.												69	64	87	85	85	110	146	163	194	189	224	258	285	311	348	417	465	464	565	597
Ocracoke, N.C. 35°06.8'N., 75°59.1'W.													47	71	68	68	93	129	147	178	173	208	241	268	293	331	399	449	448	549	580
Oriental, N.C. 35°01.5'N., 76°41.8'W.														26	25	25	51	86	105	136	130	166	198	226	251	289	357	406	405	506	537
New Bern, N.C. 35°06.1'N., 77°02.1'W.															44	44	69	105	123	154	148	184	216	245	270	307	376	425	423	525	557
Beaufort, N.C. 34°43.1'N., 76°40.2'W.																3	28	63	81	112	107	143	175	203	229	266	334	383	382	483	514
Morehead City, N.C. 34°42.8'N., 76°41.8'W.																	25	61	79	110	105	140	173	200	226	264	331	381	380	481	512
Swansboro, N.C. 34°41.0'N., 77°07.3'W.																		36	53	84	79	115	147	175	200	238	306	356	353	456	487
Jacksonville, N.C. 34°44.7'N., 77°26.3'W.																			55	86	81	116	148	177	203	239	308	357	356	457	489
Wrightsville, N.C. 34°13.1'N., 77°48.8'W.																				31	25	61	94	122	147	184	253	302	300	402	434
Wilmington, N.C. 34°14.0'N., 77°57.0'W.																					24	60	93	121	146	183	252	300	299	402	433
Southport, N.C. 33°54.8'N., 78°01.0'W.																						36	69	97	122	159	228	276	275	376	409
Little River, S.C. 33°52.2'N., 78°36.6'W.																							32	61	86	123	192	241	239	341	373
Bucksport, S.C. 33°39.0'N., 79°05.6'W.																								28	53	91	159	208	206	308	339
Georgetown, S.C. 33°21.4'N., 79°16.9'W.																									28	64	133	183	181	283	314
McClellanville, S.C. 33°04.7'N., 79°27.6'W.																										37	106	155	153	255	287
Charleston, S.C. 32°47.2'N., 79°55.2'W.																											69	120	119	220	251
Beaufort, S.C. 32°25.6'N., 80°40.2'W.																												49	47	150	181
Savannah, Ga. 32°05.0'N., 81°05.7'W.																													16	117	150
Thunderbolt, Ga. 32°01.5'N., 81°02.8'W.																														101	133
Brunswick, Ga. 31°08.0'N., 81°29.7'W.																															40
Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	77*	89	89	98	105	80	120	156	131	160	180	177	178	200	231	246	273	268	299	328	352	374	406	466	508	507	595	623			
Norfolk, Va. 36°50.9'N., 76°17.9'W.		39	39	48	56	39	79	114	91	118	139	134	136	158	189	204	231	226	257	286	311	332	364	424	466	465	553	581			
Elizabeth City, N.C. 36°18.1'N., 76°13.0'W.			26	35	42	46	79	115	97	119	139	137	137	160	190	205	232	227	259	287	311	333	366	425	467	466	554	582			
Hertford, N.C. 36°11.6'N., 76°28.0'W.				25	33	45	78	114	96	118	138	136	136	158	189	204	231	226	257	286	310	332	364	424	466	465	553	581			
Columbia, N.C. 35°55.0'N., 76°15.4'W.					14	54	87	123	104	126	146	144	145	166	197	213	240	235	266	294	318	340	373	432	475	474	562	589			
Edenton, N.C. 36°03.3'N., 76°36.6'W.						61	95	130	113	134	155	152	152	175	206	221	248	243	274	303	327	349	381	441	483	482	570	598			
Plymouth, N.C. 35°51.8'N., 76°45.6'W.							70	105	61	91	110	110	110	132	162	178	205	201	232	260	283	306	337	397	440	439	527	555			
Manteo, N.C. 35°54.6'N., 75°40.2'W.								39	43	43	63	61	61	83	114	130	157	152	183	211	235	257	290	349	392	391	479	506			
Belhaven, N.C. 35°32.1'N., 76°37.4'W.									60	43	56	74	74	96	127	142	169	164	195	224	248	270	302	362	404	403	491	519			
Washington, N.C. 35°32.6'N., 77°03.7'W.										41	76	59	59	81	112	128	155	150	181	209	233	255	288	347	390	389	477	504			
Ocracoke, N.C. 35°06.8'N., 75°59.1'W.											23	22	22	44	75	91	118	113	144	160	196	218	251	310	353	352	440	467			
Oriental, N.C. 35°01.5'N., 76°41.8'W.												38	38	60	91	107	134	129	160	188	213	235	267	327	369	368	456	484			
New Bern, N.C. 35°06.1'N., 77°02.1'W.													3	24	55	70	97	93	124	152	177	199	231	290	333	332	420	447			
Beaufort, N.C. 34°43.1'N., 76°40.2'W.														22	53	69	96	91	122	150	174	196	229	288	331	330	418	445			
Morehead City, N.C. 34°42.8'N., 76°41.8'W.															31	46	73	69	100	128	152	174	207	266	309	307	396	423			
Swansboro, N.C. 34°41.0'N., 77°07.3'W.																48	75	70	101	129	154	176	208	268	310	309	397	425			
Jacksonville, N.C. 34°44.7'N., 77°26.3'W.																	27	22	53	82	106	128	160	220	262	261	349	377			
Wrightsville, N.C. 34°13.1'N., 77°48.8'W.																		21	52	81	105	127	159	219	261	260	349	376			
Wilmington, N.C. 34°14.0'N., 77°57.0'W.																			31	60	84	106	138	198	240	239	327	355			
Southport, N.C. 33°54.8'N., 78°01.0'W.																				28	53	75	107	167	209	208	296	324			
Little River, S.C. 33°52.2'N., 78°36.6'W.																					24	46	79	138	181	179	268	295			
Bucksport, S.C. 33°39.0'N., 79°05.6'W.																						24	56	116	159	157	246	273			
Georgetown, S.C. 33°21.4'N., 79°16.9'W.																							32	92	135	133	222	249			
McClellanville, S.C. 33°04.7'N., 79°27.6'W.																								60	104	103	191	218			
Charleston, S.C. 32°47.2'N., 79°55.2'W.																									43	41	130	157			
Beaufort, S.C. 32°25.6'N., 80°40.2'W.																										14	102	130			
Savannah, Ga. 32°05.0'N., 81°05.7'W.																											88	116			
Thunderbolt, Ga. 32°01.5'N., 81°02.8'W.																												35			
Brunswick, Ga. 31°08.0'N., 81°29.7'W.																															
Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.																															

*51 statute miles via Dismal Swamp Canal

*44 nautical miles via Dismal Swamp Canal

INSIDE-ROUTE DISTANCES

FERNANDINA BEACH, FLA., TO KEY WEST, FLA.

Figure at intersection of columns opposite ports in question is the nautical/statute mileage between the two. Example: St. Augustine, Fla., is 271 nautical miles (312 statute miles) from Miami, Fla.

Nautical miles \ Statute miles	Norfolk, Va. 36°50.9'N., 76°17.9'W.	Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	St. Augustine, Fla. 29°53.6'N., 81°18.5'W.	Marineland, Fla. 29°40.1'N., 81°13.0'W.	Daytona Beach, Fla. 29°12.5'N., 81°00.7'W.	New Smyrna Beach, Fla. 29°01.7'N., 80°55.1'W.	Titusville, Fla. 28°37.3'N., 80°47.9'W.	Cocoa, Fla. 28°21.3'N., 80°43.1'W.	Eau Gallie, Fla. 28°07.9'N., 80°37.1'W.	Melbourne, Fla. 28°05.0'N., 80°35.5'W.	Vero Beach, Fla. 27°39.0'N., 80°22.4'W.	Fort Pierce, Fla. 27°27.5'N., 80°18.3'W.	Salerno, Fla. 27°08.8'N., 80°11.6'W.	Stuart, Fla. 27°12.2'N., 80°15.6'W.	Port Mayaca, Fla. 26°59.1'N., 80°36.8'W.	Clewiston, Fla. 26°45.6'N., 80°55.2'W.	Moore Haven, Fla. 26°50.0'N., 81°05.3'W.	Fort Myers, Fla. 26°38.9'N., 81°52.3'W.	Jupiter, Fla. 26°56.8'N., 80°05.4'W.	Port of Palm Beach, Fla. 26°46.1'N., 80°03.0'W.	Fort Lauderdale, Fla. 26°06.8'N., 80°07.2'W.	Port Everglades, Fla. 26°05.6'N., 80°07.0'W.	Miami, Fla. 25°47.0'N., 80°11.0'W.	Tavernier, Fla. 25°00.7'N., 80°31.3'W.	Matecumbe Harbor, Fla. 24°51.1'N., 80°44.5'W.	Marathon, Fla. 24°42.2'N., 81°06.7'W.	Flamingo, Fla. 25°08.5'N., 80°55.4'W.	Key West, Fla. 24°33.7'N., 81°48.5'W.
Norfolk, Va. 36°50.9'N., 76°17.9'W.		717	758	778	796	831	846	879	898	915	918	952	966	990	995	1026	1053	1066	1122	1005	1018	1064	1067	1090	1150	1170	1203	1208	1244
Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	623		41	60	79	114	130	162	181	198	201	235	249	273	278	310	336	349	406	289	302	348	350	373	435	453	486	491	527
Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	659	36		56	75	109	124	158	176	193	197	230	244	268	274	305	331	344	402	284	297	344	345	368	430	449	481	486	522
St. Augustine, Fla. 29°53.6'N., 81°18.5'W.	676	53	49		18	53	68	101	120	137	140	174	188	212	217	248	275	288	344	227	241	287	289	312	373	392	425	430	466
Marineland, Fla. 29°40.1'N., 81°13.0'W.	692	69	65	16		35	51	83	102	119	122	157	170	194	199	230	257	270	327	209	222	269	270	293	356	374	407	412	448
Daytona Beach, Fla. 29°12.5'N., 81°00.7'W.	722	99	95	46	30		16	48	67	84	87	121	135	159	165	196	222	235	292	175	188	235	236	259	321	339	372	377	413
New Smyrna Beach, Fla. 29°01.7'N., 80°55.1'W.	735	113	108	59	44	14		32	52	68	72	106	120	144	150	181	207	220	276	159	173	219	220	243	305	323	356	362	397
Titusville, Fla. 28°37.3'N., 80°47.9'W.	764	141	137	88	72	42	28		20	36	39	74	87	112	116	147	174	188	244	127	139	186	188	211	273	291	323	329	365
Cocoa, Fla. 28°21.3'N., 80°43.1'W.	780	157	153	104	89	58	45	17		16	21	54	68	92	98	129	155	168	224	107	121	167	168	191	253	273	304	311	346
Eau Gallie, Fla. 28°07.9'N., 80°37.1'W.	795	172	168	119	103	73	59	31	14		3	38	52	76	81	112	138	152	208	91	104	151	152	175	237	257	288	293	329
Melbourne, Fla. 28°05.0'N., 80°35.5'W.	798	175	171	122	106	76	63	34	18	3		34	47	71	77	108	135	148	205	87	100	147	148	171	234	252	284	290	326
Vero Beach, Fla. 27°39.0'N., 80°22.4'W.	827	204	200	151	136	105	92	64	47	33	29		14	38	44	75	101	114	170	53	67	113	114	137	199	219	250	257	292
Fort Pierce, Fla. 27°27.5'N., 80°18.3'W.	839	216	212	163	148	117	104	76	59	45	41	12		24	30	61	87	100	157	39	53	99	100	123	185	205	236	243	278
Salerno, Fla. 27°08.8'N., 80°11.6'W.	860	237	233	184	169	138	125	97	80	66	62	33	21		9	40	67	81	137	20	32	79	80	104	166	185	216	222	258
Stuart, Fla. 27°12.2'N., 80°15.6'W.	865	242	238	189	173	143	130	101	85	70	67	38	26	8		31	58	70	128	25	38	85	86	109	171	190	222	228	264
Port Mayaca, Fla. 26°59.1'N., 80°36.8'W.	892	269	265	216	200	170	157	128	112	97	94	65	53	35	27		26	40	96	56	69	116	117	141	203	221	253	259	295
Clewiston, Fla. 26°45.6'N., 80°55.2'W.	915	292	288	239	223	193	180	151	135	120	117	88	76	58	50	23		13	70	83	96	143	144	167	229	247	280	285	321
Moore Haven, Fla. 26°50.0'N., 81°05.3'W.	926	303	299	250	235	204	191	163	146	132	128	99	87	70	61	34	11		56	96	108	155	156	180	242	261	292	298	334
Fort Myers, Fla. 26°38.9'N., 81°52.3'W.	975	353	349	299	284	254	240	212	195	181	178	148	136	119	111	83	61	49		152	166	212	213	236	298	318	349	356	390
Jupiter, Fla. 26°56.8'N., 80°05.4'W.	873	251	247	197	182	152	138	110	93	79	76	46	34	17	22	49	72	83	132		14	60	61	84	146	166	197	204	239
Port of Palm Beach, Fla. 26°46.1'N., 80°03.0'W.	885	262	258	209	193	163	150	121	105	90	87	58	46	28	33	60	83	94	144	12		47	48	71	133	152	184	190	226
Fort Lauderdale, Fla. 26°06.8'N., 80°07.2'W.	925	303	299	249	234	204	190	162	145	131	128	98	86	69	74	101	124	135	184	52	41		1	24	86	106	137	144	178
Port Everglades, Fla. 26°05.6'N., 80°07.0'W.	927	304	300	251	235	205	191	163	146	132	129	99	87	70	75	102	125	136	185	53	42	1		23	85	105	136	142	177
Miami, Fla. 25°47.0'N., 80°11.0'W.	947	324	320	271	255	225	211	183	166	152	149	119	107	90	95	122	145	156	205	73	62	21	20		62	82	113	120	154
Tavernier, Fla. 25°00.7'N., 80°31.3'W.	999	378	374	324	309	279	265	237	220	206	203	173	161	144	149	176	199	210	259	127	116	75	74	54		22	54	60	96
Matecumbe Harbor, Fla. 24°51.1'N., 80°44.5'W.	1017	394	390	341	325	295	282	253	237	223	219	190	178	161	165	192	215	227	276	144	132	92	91	71	19		33	40	75
Marathon, Fla. 24°42.2'N., 81°06.7'W.	1045	422	418	369	353	323	309	281	264	250	247	217	205	188	193	220	243	254	303	171	160	119	118	98	47	29		39	48
Flamingo, Fla. 25°08.5'N., 80°55.4'W.	1050	427	423	374	358	328	315	286	270	255	252	223	211	193	198	225	248	259	309	177	165	125	123	104	52	35	34		84
Key West, Fla. 24°33.7'N., 81°48.5'W.	1081	458	454	405	389	359	345	317	301	286	283	254	242	224	229	256	279	290	339	207	196	155	154	134	83	65	42	73	

DISTANCES ON ST. JOHNS RIVER

FLORIDA

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Welaka, Fla., is 66 nautical miles from Jacksonville, Fla.

	St. Johns River Mouth 30°24.0'N., 81°23.8'W.	Mayport 30°23.7'N., 81°25.9'W.	Intracoastal Waterway Route 30°23.1'N., 81°27.7'W.	Broward River Mouth 30°24.6'N., 81°35.7'W.	Jacksonville 30°19.2'N., 81°39.0'W.	Doctors Lake, Inlet 30°08.9'N., 81°41.2'W.	Palatka 29°38.6'N., 81°37.6'W.	Crescent City 29°25.8'N., 81°30.3'W.	Welaka 29°28.8'N., 81°40.5'W.	Silver Springs, Oklawaha River	Moss Bluff Lock, Oklawaha River	Leesburg, Oklawaha River	Georgetown 29°23.1'N., 81°38.3'W.	Astor-Volusia 29°10.0'N., 81°31.4'W.	Sanford 28°49.1'N., 81°16.2'W.	Lake Harney 28°46.8'N., 81°03.2'W.
2																
4	2															
12	10	8														
20	18	16	8													
32	30	28	20	12												
68	66	64	56	48	36											
89	87	85	77	69	56	20										
86	84	82	74	66	54	18	26									
136	134	132	124	116	104	68	76	50								
145	143	141	133	125	112	76	85	58	14							
162	160	158	150	142	129	94	102	75	31	17						
95	93	91	83	75	62	26	35	8	56	65	82					
109	107	105	97	89	77	41	49	23	71	79	96	14				
143	141	139	131	123	111	75	83	57	105	113	131	49	34			
161	159	157	149	141	129	93	101	75	123	131	148	66	52	18		

Radio Bearing Conversion Table

Table of corrections, in minutes

[DIFFERENCE OF LONGITUDE IN DEGREES]

Mid. Lat.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
15°	4	8	12	16	19	23	27	31	35	40	43	47	50	54	58	62	66	70	74	78
16°	4	8	12	17	21	25	29	33	37	41	45	50	54	58	62	66	70	74	79	83
17°	4	9	13	18	22	26	31	35	39	44	48	53	57	61	66	70	75	79	83	88
18°	5	9	13	19	23	28	32	37	42	46	51	56	60	65	70	74	79	83	88	93
19°	5	10	15	20	24	29	34	39	44	49	54	59	63	68	73	78	83	88	93	98
20°	5	10	15	21	26	31	36	41	46	51	56	62	67	72	77	82	87	92	98	103
21°	5	11	16	21	27	32	38	43	48	54	59	64	70	75	81	86	91	97	102	108
22°	6	11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	96	101	107	112
23°	6	12	18	23	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
24°	6	12	18	24	31	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
25°	6	13	19	25	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
26°	7	13	20	26	33	39	46	53	59	66	72	79	85	92	99	105	112	118	125	131
27°	7	14	20	27	34	41	48	54	61	68	75	82	89	95	102	109	116	123	129	136
28°	7	14	21	28	35	42	49	56	63	70	77	84	92	99	106	113	120	127	134	141
29°	7	15	21	29	36	44	51	58	65	73	80	87	95	102	109	116	124	131	138	145
30°	7	15	22	30	38	45	53	60	68	75	83	90	98	105	113	120	127	135	143	150
31°	8	15	23	31	39	46	54	62	70	77	85	93	100	108	116	124	131	139	146	155
32°	8	16	24	32	40	48	56	64	72	79	87	95	103	111	119	127	135	143	151	159
33°	8	16	25	33	41	49	57	65	74	82	90	98	106	114	123	131	139	147	155	163
34°	8	17	25	34	42	50	59	67	75	84	92	101	109	117	126	134	143	151	159	168
35°	9	17	26	34	43	52	60	69	77	86	95	103	112	120	129	138	146	155	163	172
36°	9	18	26	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	168	176
37°	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	163	172	181
38°	9	18	28	37	46	55	65	74	83	92	102	111	120	129	139	148	157	166	175	185
39°	9	19	28	38	47	57	66	75	85	94	104	113	123	132	142	151	160	170	179	189
40°	10	19	29	39	48	58	68	77	87	96	106	116	125	135	145	154	164	174	183	193
41°	10	20	30	39	49	59	69	79	89	98	108	118	128	138	148	157	167	177	187	197
42°	10	20	30	40	50	60	70	80	90	100	110	120	130	140	151	161	171	181	191	201
43°	10	20	31	41	51	61	72	82	92	102	113	123	133	143	153	164	174	184	194	205
44°	10	21	31	42	52	63	73	83	94	104	115	125	135	146	156	167	177	188	198	208
45°	11	21	32	42	53	64	74	85	95	106	117	127	138	149	159	170	180	191	201	212
46°	11	22	32	43	54	65	76	86	97	108	119	129	140	151	162	173	183	194	205	216
47°	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	186	197	208	219
48°	11	22	33	45	56	67	78	89	100	111	123	134	145	156	167	178	190	201	212	223
49°	11	23	34	45	57	68	79	91	102	113	125	136	147	158	170	181	192	204	215	226
50°	11	23	34	46	57	69	80	92	103	115	126	138	149	161	172	184	195	207	218	230
51°	12	23	35	47	58	70	82	93	105	117	128	140	152	163	175	186	198	210	221	233
52°	12	24	35	47	59	71	83	95	106	118	130	142	154	165	177	189	201	213	225	236
53°	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
54°	12	24	36	49	61	73	85	97	109	121	133	146	158	170	182	194	206	218	231	243
55°	12	25	37	49	61	74	86	98	111	123	135	147	160	172	184	197	209	221	233	246
56°	12	25	37	50	62	75	87	100	112	124	137	149	162	174	187	199	211	224	236	249
57°	13	25	38	50	63	75	88	101	113	126	138	151	164	176	189	201	214	226	239	252
58°	13	25	38	51	64	76	89	102	115	127	140	153	165	178	191	204	216	229	242	254
59°	13	26	39	51	64	77	90	103	116	129	141	154	167	180	193	206	219	231	244	257
60°	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260

Example. A ship in latitude 39°51′ N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon located in latitude 40°37′ N., longitude 69°37′ W.

Radiobeacon station	Latitude	40°37′ N.
Dead-reckoning position of ship	Latitude	39°51′
Middle latitude		40°14′
Radiobeacon station	Longitude	69°37′ W.
Dead reckoning position of ship	Longitude	67°35′
Longitude difference		2°02′

Entering the table with difference of longitude equals 2°, which is the nearest tabulated value and opposite 40° middle latitude, the correction of 39′ is read.

As the ship is east of the radiobeacon, a minus correction is applied. The Mercator bearing then will be 299°−000°39′=298°21′. To facilitate plotting, subtract 180° and plot from the position of the radiobeacon the bearing 298°21′−180°, or 118°21′ (Mercator bearing reckoned clockwise from true north).

Distance of Visibility of Objects at Sea

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles
6	2. 8	48	7. 9	220	17. 0	660	29. 4	2, 000	51. 2
8	3. 1	50	8. 1	240	17. 7	680	29. 9	2, 200	53. 8
10	3. 6	55	8. 5	260	18. 5	700	30. 3	2, 400	56. 2
12	4. 0	60	8. 9	280	19. 2	720	30. 7	2, 600	58. 5
14	4. 3	65	9. 2	300	19. 9	740	31. 1	2, 800	60. 6
15	4. 4	70	9. 6	320	20. 5	760	31. 6	3, 000	62. 8
16	4. 6	75	9. 9	340	21. 1	780	32. 0	3, 200	64. 9
18	4. 9	80	10. 3	360	21. 7	800	32. 4	3, 400	66. 9
20	5. 1	85	10. 6	380	22. 3	820	32. 8	3, 600	68. 6
22	5. 4	90	10. 9	400	22. 9	840	33. 2	3, 800	70. 7
24	5. 6	95	11. 2	420	23. 5	860	33. 6	4, 000	72. 5
26	5. 8	100	11. 5	440	24. 1	880	34. 0	4, 200	74. 3
28	6. 1	110	12. 0	460	24. 6	900	34. 4	4, 400	76. 1
30	6. 3	120	12. 6	480	25. 1	920	34. 7	4, 600	77. 7
32	6. 5	130	13. 1	500	25. 6	940	35. 2	4, 800	79. 4
34	6. 7	140	13. 6	520	26. 1	960	35. 5	5, 000	81. 0
36	6. 9	150	14. 1	540	26. 7	980	35. 9	6, 000	88. 8
38	7. 0	160	14. 5	560	27. 1	1, 000	36. 2	7, 000	96. 0
40	7. 2	170	14. 9	580	27. 6	1, 200	39. 6	8, 000	102. 6
42	7. 4	180	15. 4	600	28. 0	1, 400	42. 9	9, 000	108. 7
44	7. 6	190	15. 8	620	28. 6	1, 600	45. 8	10, 000	114. 6
46	7. 8	200	16. 2	640	29. 0	1, 800	48. 6		

Conversion Table, Degrees to Points and Vice Versa

° ′	Points	° ′	Points	° ′	Points	° ′	Points
0 00	N	90 00	E	180 00	S	270 00	W
2 49		92 49		182 49		272 49	
5 38	N ½ E	95 38	E ½ S	185 38	S ½ W	275 38	W ½ N
8 26		98 26		188 26		278 26	
11 15	N x E	101 15	E x S	191 15	S x W	281 15	W x N
14 04		104 04		194 04		284 04	
16 53	N x E ½ E	106 53	ESE ½ E	196 53	S x W ½ W	286 53	WNW ½ W
19 41		109 41		199 41		289 41	
22 30	NNE	112 30	ESE	202 30	SSW	292 30	WNW
25 19		115 19		205 19		295 19	
28 08	NNE ½ E	118 08	SE x E ½ E	208 08	SSW ½ W	298 08	NW x W ½ W
30 56		120 56		210 56		300 56	
33 45	NE x N	123 45	SE x E	213 45	SW x S	303 45	NW x W
36 34		126 34		216 34		306 34	
39 23	NE ½ N	129 23	SE ½ E	219 23	SW ½ S	309 23	NW ½ W
42 11		132 11		222 11		312 11	
45 00	NE	135 00	SE	225 00	SW	315 00	NW
47 49		137 49		227 49		317 49	
50 38	NE ½ E	140 38	SE ½ S	230 38	SW ½ W	320 38	NW ½ N
53 26		143 26		233 26		323 26	
56 15	NE x E	146 15	SE x S	236 15	SW x W	326 15	NW x N
59 04		149 04		239 04		329 04	
61 53	NE x E ½ E	151 53	SSE ½ E	241 53	SW x W ½ W	331 53	NNW ½ W
64 41		154 41		244 41		334 41	
67 30	ENE	157 30	SSE	247 30	WSW	337 30	NNW
70 19		160 19		250 19		340 19	
73 08	ENE ½ E	163 08	S x E ½ E	253 08	WSW ½ W	343 08	N x W ½ W
75 56		165 56		255 56		345 56	
78 45	E x N	168 45	S x E	258 45	W x S	348 45	N x W
81 34		171 34		261 34		351 34	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ S	354 23	N ½ W
87 11		177 11		267 11		357 11	

INTRACOASTAL WATERWAY - ATLANTIC SECTION

Norfolk, Va., to Key West, Fla., and Okeechobee Waterway

CONTROLLING CHARACTERISTICS AND FACILITIES

June 1, 1972

(1) Mileage	Section	Charts	Channel dimensions (2): project depths	Channel dimensions (2): Project width: land cuts	Channel dimensions (2): Project width: water areas	Controlling lock dimensions: width	Controlling lock dimensions: length	Controlling lock dimensions: depth	Controlling clearances: Bridges: vertical	Controlling clearances: Bridges: horizontal	Controlling clearances: Overhead cables	Location of facilities (3)
0	Norfolk, Va. - Albemarle Sound (via Albemarle & Chesapeake Canal).	829-SC	12	90	125-250	75	600	16	142	80	85	Norfolk area; Great Bridge (M12); Pungo Ferry (M28.3); Coinjock (M49.9).
0	Norfolk, Va. - Albemarle Sound (via Dismal Swamp Canal).	829-SC	9-10	50-100	100	52	300	12	142	42	85	South Mills (M32.4); Elizabeth City (M50.7).
66.5	Albemarle Sound - Pamlico River.	831-SC	12	90	90	--	---	--	---	80	100	Belhaven, 1.5 miles westward from M135.8.
146.0	Pamlico River - Morehead City, N.C.	831-SC 833-SC	12	90	90	--	---	--	65	79	85	Hobucken Bridge (M157.2); Oriental (M182); Core Creek (M195.8).
204.3	Morehead City - Cape Fear River.	833-SC 835-SC	12	90	90	--	---	--	65	80	72	Morehead City - Beaufort area (M204.3); Swansboro (M228.9); Sears Landing (M260.7); Wrightsville (M283.1); Carolina Beach, 1.5 miles south from M295.2.
297.0	Cape Fear River - Georgetown, S.C.	835-SC	12	90	90	--	---	--	65	77	80	Southport (M309); Lockwoods Folly River (M320); Shallotte River (M330); Little River area (M345); Myrtle Beach (M368); Socastee Bridge (M371); Bucksport (M377.5); Wachesaw Landing (M383.4).
403.0	Georgetown - Charleston, S.C.	835-SC 837-SC	12	90	90	--	---	--	--	93	84	Georgetown (M403); McClellanville (M430); Mt. Pleasant, 1 mile north from M464.2.
469.0	Charleston - Savannah River.	837-SC 839-SC	12	90	90	--	---	--	--	65	91	Charleston (M469); Beaufort (M536); Hilton Head Harbor (M557); Savannah, 8 miles up Savannah River from M576.
576.0	Savannah River - Fernandina Beach, Fla.	839-SC 841-SC	12	90	90	--	---	--	85	100	85	Thunderbolt (M582.8); Isle of Hope (M590); Lanier Island (M675.5); Brunswick, 3.4 miles west of M679.4. Jekyll Id. (M683.6).
717.0	Fernandina Beach - St. Johns River.	841-SC	12	90	90-150	--	---	--	--	90	80	Fernandina Beach (M717); Mayport, 2 miles east of M739.5; Jacksonville, 16 miles up St. Johns River from M739.5.
739.5	St. Johns River - St. Augustine, Fla.	841-SC 843-SC	12	125	125	--	---	--	65	76	80	Atlantic Beach - Jacksonville Beach (M744-748).
778.0	St. Augustine - Cocoa, Fla. near Cape Kennedy.	843-SC	12	125	125	--	---	--	65	80	85	St. Augustine (M778); Marineland (M796.6); Ormand-by-the-Sea (M821.8); Daytona Beach (M830); New Smyrna Beach (M846.1); Haulover Canal (M869.2); Titusville (M878.4); Merritt Island (M897.4).
897.4	Cocoa - Fort Pierce, Fla.	843-SC 845-SC	12	--	125	--	---	--	65	80	80	Eau Gallie (M914.4); Melbourne (M918.2); Sebastian (M938.3); Vero Beach (M951.9).
965.6	Fort Pierce - St. Lucie Inlet.	845-SC	10	--	125	--	---	--	--	80	85	Fort Pierce (M965.6); Jenson Beach (M983).
987.8	St. Lucie Inlet - Fort Lauderdale, Fla.	845-SC 847-SC	10	125	125	--	---	--	--	80	83	Most towns and other places along route generally less than 10 miles apart.
1065.0	Fort Lauderdale - Miami, Fla.	847-SC	10	125	125	--	---	--	56	60	85	

1089.0	Miami - Cross Bank.	847-SC 141-SC	7	--	75	--	---	--	65	80	80	Miami area (M1089); Cross Key (M1134.1).
1152.5	Cross Bank - Marathon, Fla.	141-SC	5*	--	--	--	---	--	--	--	--	Islamorada (M1160).
1192.0	Marathon - Key West, Fla. (via Moser and Hawk Channels).	141-SC 853/ 854	5*	--	--	--	---	--	--	107	--	Marathon (M1192); Key West (M1244).
1192.0	Marathon - Key West, Fla. (via Big Spanish Channel and north side of Florida Keys).	141-SC 853 859 1251	5*	--	--	--	---	--	--	--	--	Marathon (M1192); Key West (M1260).
1192.0	Marathon - Key West, Fla. (via Big Spanish Channel and channel marked by daybeacons through Florida Keys).	141-SC 853/ 854 859	3*	--	--	--	---	--	--	--	--	Marathon (M1192); Key West (M1208).
	OKEECHOBEE WATERWAY											
0	St. Lucie Inlet - Lake Okeechobee.	855-SC	8	80	80	50	250	11	48	47	55	Port Salerno (M0.7); Port Sewell (M1.2); Rio (M5.6); Stuart (M7.5).
38.9	Route 1 to Moore Haven, Fla.	855-SC	8	100	100	--	---	--	--	--	--	Indian Town (M29.5); Clewiston (M65.0).
38.9	Route 2 to Moore Haven	855-SC	6	80	80	--	---	--	--	50	75	Pahokee (M50.6); Clewiston (M75.7).
78.0	Moore Haven - Fort Myers, Fla.	855-SC	8	90	90	50	250	10	--	49	75	Moore Haven (M78.0); Olga (M122.8).
134.5	Fort Myers - Gulf of Mexico (M154.6).	856-SC	10-12	--	100-200	--	---	--	55	90	--	Fort Myers (M134.5); Punta Rassa (M150.8).

*Reported controlling depths.
Dimensions and clearances are in feet.

(1) The Intracoastal Waterway mileage is in statute miles zeroed in 36° 50.9'N., 76°17.9'W., off the foot of West Main St., Norfolk, Va. Mileage for the Okeechobee Waterway is in statute miles and starts at the junction with the Intracoastal Waterway in St. Lucie Inlet.

(2) The depths and widths given are the project dimensions completed by the Corps of Engineers, U.S. Army. Where the Intracoastal Waterway follows deeper rivers and ocean channels, the dimensions are obviously greater. Since the channels are subject to frequent shoaling, depths may vary considerably from the project depths, particularly along the edges of the channels; see Notice to Mariners for controlling depths.

(3) Places where fuel, berths, repairs, and other marine supplies are usually available; refer to Coast Pilot text and small-craft charts for more details. Approximate mileage of facilities is given after the place name, thus: Elizabeth City (M50.7).

Conversion Tables

INTERNATIONAL NAUTICAL MILES TO STATUTE MILES

1 nautical mile 6,076.12 feet or 1,852 meters 1 statute mile = 5,280 feet or 1,609.35 meters

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0.000	1.151	2.302	3.452	4.603	5.754	6.905	8.055	9.206	10.357
10	11.508	12.659	13.809	14.960	16.111	17.262	18.412	19.563	20.714	21.865
20	23.016	24.166	25.317	26.468	27.619	28.769	29.920	31.071	32.222	33.373
30	34.523	35.674	36.825	37.976	39.126	40.277	41.428	42.579	43.730	44.880
40	46.031	47.182	48.333	49.483	50.634	51.785	52.936	54.087	55.237	56.388
50	57.539	58.690	59.840	60.991	62.142	63.293	64.444	65.594	66.745	67.896
60	69.047	70.197	71.348	72.499	73.650	74.801	75.951	77.102	78.253	79.404
70	80.554	81.705	82.856	84.007	85.158	86.308	87.459	88.610	89.761	90.911
80	92.062	93.213	94.364	95.515	96.665	97.816	98.967	100.118	101.268	102.419
90	103.570	104.721	105.871	107.022	108.173	109.324	110.475	111.625	112.776	113.927

STATUTE MILES TO INTERNATIONAL NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0.000	0.869	1.738	2.607	3.476	4.345	5.214	6.083	6.952	7.821
10	8.690	9.559	10.428	11.297	12.166	13.035	13.904	14.773	15.642	16.511
20	17.380	18.249	19.118	19.986	20.855	21.724	22.593	23.462	24.331	25.200
30	26.069	26.938	27.807	28.676	29.545	30.414	31.283	32.152	33.021	33.890
40	34.759	35.628	36.497	37.366	38.235	39.104	39.973	40.842	41.711	42.580
50	43.449	44.318	45.187	46.056	46.925	47.794	48.663	49.532	50.401	51.270
60	52.139	53.008	53.877	54.746	55.615	56.484	57.353	58.222	59.091	59.959
70	60.828	61.697	62.566	63.435	64.304	65.173	66.042	66.911	67.780	68.649
80	69.518	70.387	71.256	72.125	72.994	73.863	74.732	75.601	76.470	77.339
90	78.208	79.077	79.946	80.815	81.684	82.553	83.422	84.291	85.160	86.029

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

METERS TO FEET

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

TABLE FOR ESTIMATING TIME OF TRANSIT

Distance	Speed in knots																		
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	30
Nautical miles	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*	*Days-hours*
10	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1						
20	0-3	0-2	0-2	0-2	0-2	0-2	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
30	0-4	0-3	0-3	0-3	0-3	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-1	0-1	0-1	0-1	0-1	0-1
40	0-5	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-1
50	0-6	0-6	0-5	0-5	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-3	0-2	0-2	0-2	0-2	0-2	0-2
60	0-8	0-7	0-6	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-2	0-2
70	0-9	0-8	0-7	0-6	0-6	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-4	0-3	0-3	0-3	0-3	0-3	0-2
80	0-10	0-9	0-8	0-7	0-7	0-6	0-6	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-4	0-3	0-3	0-3	0-3
90	0-11	0-10	0-9	0-8	0-8	0-7	0-6	0-6	0-6	0-5	0-5	0-5	0-5	0-4	0-4	0-4	0-4	0-4	0-3
100	0-13	0-11	0-10	0-9	0-8	0-8	0-7	0-7	0-6	0-6	0-6	0-5	0-5	0-5	0-5	0-4	0-4	0-4	0-3
200	1-1	0-22	0-20	0-18	0-17	0-15	0-14	0-13	0-13	0-12	0-11	0-11	0-10	0-10	0-9	0-9	0-8	0-8	0-7
300	1-14	1-9	1-6	1-3	1-1	0-23	0-21	0-20	0-19	0-18	0-17	0-16	0-15	0-14	0-14	0-13	0-13	0-12	0-10
400	2-2	1-20	1-16	1-12	1-9	1-7	1-5	1-3	1-1	1-0	0-22	0-21	0-20	0-19	0-18	0-17	0-17	0-16	0-13
500	2-15	2-8	2-2	1-21	1-18	1-14	1-12	1-9	1-7	1-5	1-4	1-2	1-1	1-0	0-23	0-22	0-21	0-20	0-17
600	3-3	2-19	2-12	2-7	2-2	1-22	1-19	1-16	1-14	1-11	1-9	1-8	1-6	1-5	1-3	1-2	1-1	1-0	0-20
700	3-16	3-6	2-22	2-16	2-10	2-6	2-2	1-23	1-20	1-17	1-15	1-13	1-11	1-9	1-8	1-6	1-5	1-4	0-23
800	4-4	3-17	3-8	3-1	2-19	2-14	2-9	2-5	2-2	1-23	1-20	1-18	1-16	1-14	1-12	1-11	1-9	1-8	1-3
900	4-17	4-4	3-18	3-10	3-3	2-21	2-16	2-12	2-8	2-5	2-2	1-23	1-21	1-19	1-17	1-15	1-14	1-12	1-6
1,000	5-5	4-15	4-4	3-19	3-11	3-5	2-23	2-19	2-15	2-11	2-8	2-5	2-2	2-0	1-21	1-19	1-18	1-16	1-9
2,000	10-10	9-6	8-6	7-14	6-23	6-10	5-23	5-13	5-5	4-22	4-15	4-9	4-4	3-23	3-19	3-15	3-11	3-8	2-19
3,000	15-15	13-21	12-12	11-9	10-10	9-15	8-22	8-8	7-20	7-8	6-23	6-14	6-6	5-23	5-16	5-10	5-5	5-0	4-4
4,000	20-20	18-12	16-16	15-4	13-21	12-20	11-22	11-3	10-10	9-19	9-6	8-19	8-8	7-22	7-14	7-6	6-23	6-16	5-13
5,000	26-1	23-4	20-20	18-23	17-9	16-1	14-21	13-21	13-1	12-6	11-14	10-23	10-10	9-22	9-11	9-1	8-16	8-8	6-23
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The numbers of the largest scale charts on which the names appear follow the indexed items. The former C&GS chart numbers are shown in parentheses. Some geographic names are indexed more than once when the features appear in the regular text and are repeated in Chapter 12, Intracoastal Waterway, and when more than one place has the same geographic name. Charts published and sold by the Defense Mapping Agency Hydrographic Center are indicated by an asterisk.

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NOAA FORM 77-6
(10-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

COAST PILOT REPORT

PLEASE MAIL TO:

Director
National Ocean Survey
National Oceanic and Atmospheric Administration
ATTENTION: C324
Rockville, Maryland 20852

This record of your experience and observations when coasting, entering port, and/or following inside channels will be used to correct, amplify, or confirm the description now given in the Coast Pilot.

Please use additional sheets if more space is needed.

Additional report forms will be provided upon receipt of each report.

GEOGRAPHIC LOCATION

LATITUDE	LONGITUDE	CHART NUMBER	COAST PILOT NUMBER

VESSEL	MASTER/COMMANDING OFFICER
DATE OF OBSERVATION	OBSERVER

I. LANDMARKS: Mention those visible from seaward and useful for navigation (day and/or night); include natural ranges and indicate the pair of marks forming a range. Photographs of landmarks difficult to describe are solicited; each view should be labeled with the distance off and the direction towards which the camera was pointed.

TYPE	CHARTED		LATITUDE (Approximate)	LONGITUDE (Approximate)	DESCRIPTIVE INFORMATION HELPFUL IN IDENTIFICATION
	YES	NO			

II. RADAR: List best radar targets and, if known, give maximum useful radar range at which the object can be positively identified and used. Mention under remarks places you have observed radar returns to be misleading.

NAME OR TYPE OF FEATURE (*Include approximate latitude and longitude if necessary to identify on chart*)	MAXIMUM USEFUL RANGE

III. ROUTES: Where entrance and inside routes are not marked by aids to navigation, show recommended directions for Coast Pilot (latitude and longitude of entrance point, and distances and true courses made good); include natural steering ranges if available.

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IV. DANGERS: Mention those of concern to the navigator where special caution should be indicated in the Coast Pilot.

V. CURRENTS: Indicate places you have experienced conditions of current where special caution should be mentioned in the Coast Pilot.

VI. ANCHORAGES: Mention best anchorage in the area and other secure anchorages having good holding ground.

LOCATION *(Include anchorage bearings and natural ranges if available)*

TYPE OF BOTTOM OBSERVED:

	EXCEL	GOOD	FAIR	POOR	COMMENT
HOLDING QUALITY					
PROTECTION OFFERED					
ACCESSABILITY					

RECOMMENDED FOR VESSELS:

LENGTH	DRAFT
____ TO ____ FT.	____ TO ____ FT.

VII. REMARKS:

VIII. OTHER COAST PILOT CHANGES

U.S. COAST PILOT

NUMBER	EDITION	PAGE	LINE(S)

NOTE: Any chart(s) submitted with your report to show conditions will be replaced free of charge.

READ: STRIKE OUT: INSERT AFTER: *(Circle one)*