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COAST AND GEODETIC SURVEY
R. S. PATTON, *Director*

SERIAL NO. 590

UNITED STATES COAST PILOT

GULF COAST

KEY WEST TO THE RIO GRANDE

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2nd ed.
1936
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PREFACE

This publication covers the coast of the Gulf of Mexico, from Key West to the Rio Grande, including the harbors and adjacent navigable inland passages, and is based upon the work of the United States Coast and Geodetic Survey, including the results of a special examination in 1935. The territory covered is the same as covered by the previous edition of this publication and the Inside Route Pilot, Key West to the Rio Grande.

Navigators and others are requested to notify the Director, United States Coast and Geodetic Survey, of any errors or omissions that may be found in this publication, or of any additional matter which they think should be inserted for the information of mariners.

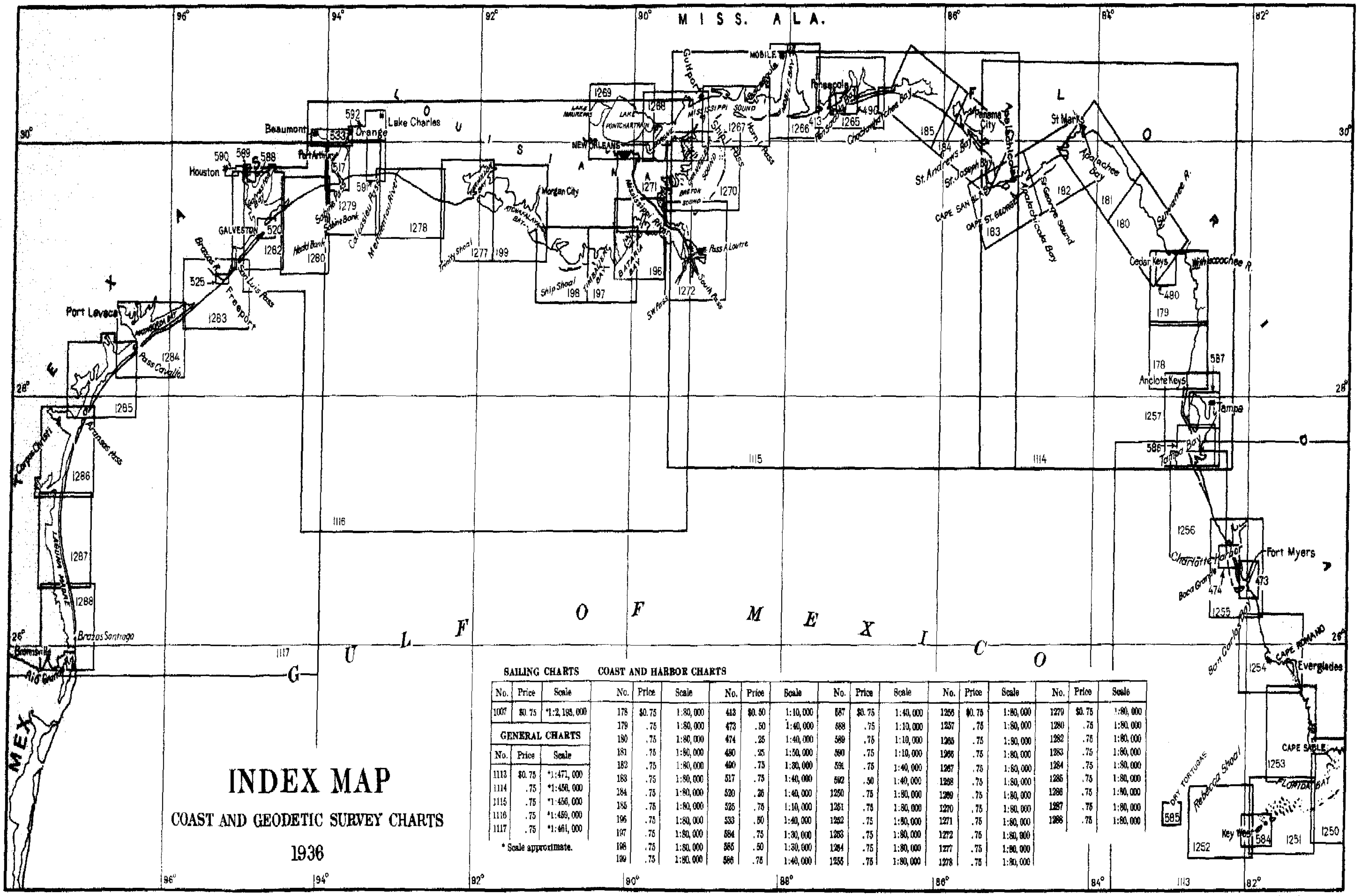
Corrections and additions affecting Coast Pilot volumes are included in Notice to Mariners, published weekly by the United States Department of Commerce. The aids to navigation mentioned in this pilot are those in existence, according to the latest available information, on March 18, 1936. A supplement is issued, giving the more important changes to the text, about a year after a Coast Pilot volume is published, and again at approximately yearly intervals thereafter until a revised edition appears. Each supplement is complete in itself and cancels all previous issues. The date of the latest supplement to each Coast Pilot is given in the list of Coast Pilots published quarterly in Notice to Mariners.

In using this volume, reference should be made to the latest Supplement and Notice to Mariners (both of which may be obtained free from sales agents or the Washington Office or Field Stations of this Bureau) and due regard should be given to the possibility of changes having occurred since the date of publication.

This edition was prepared by Lt. Comdr. Harold A. Cotton, United States Coast and Geodetic Survey, under the direction of Commander F. B. T. Siems, chief, coast pilot section. The United States Engineers, the United States Lighthouse Service and other authorities all cooperated in furnishing information.

R. S. Patton, *Director.*

March 18, 1936.



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COAST AND GEODETIC SURVEY CHARTS

1936

SAILING CHARTS

No.	Price	Scale
1007	$0.75	*1:2,185,000

GENERAL CHARTS

No.	Price	Scale
1113	$0.75	*1:471,000
1114	.75	*1:456,000
1115	.75	*1:456,000
1116	.75	*1:459,000
1117	.75	*1:461,000

* Scale approximate.

COAST AND HARBOR CHARTS

No.	Price	Scale	No.	Price	Scale	No.	Price	Scale	No.	Price	Scale	No.	Price	Scale
178	$0.75	1:80,000	413	$0.50	1:10,000	587	$0.75	1:40,000	1256	$0.75	1:80,000	1279	$0.75	1:80,000
179	.75	1:80,000	473	.50	1:40,000	588	.75	1:10,000	1257	.75	1:80,000	1280	.75	1:80,000
180	.75	1:80,000	474	.25	1:40,000	589	.75	1:10,000	1265	.75	1:80,000	1282	.75	1:80,000
181	.75	1:80,000	480	.25	1:50,000	590	.75	1:10,000	1266	.75	1:80,000	1283	.75	1:80,000
182	.75	1:80,000	490	.75	1:30,000	591	.75	1:40,000	1267	.75	1:80,000	1284	.75	1:80,000
183	.75	1:80,000	517	.75	1:40,000	592	.50	1:40,000	1268	.75	1:80,000	1285	.75	1:80,000
184	.75	1:80,000	520	.25	1:40,000	1250	.75	1:80,000	1269	.75	1:80,000	1286	.75	1:80,000
185	.75	1:80,000	525	.75	1:10,000	1251	.75	1:80,000	1270	.75	1:80,000	1287	.75	1:80,000
196	.75	1:80,000	533	.50	1:40,000	1252	.75	1:80,000	1271	.75	1:80,000	1288	.75	1:80,000
197	.75	1:80,000	584	.75	1:30,000	1253	.75	1:80,000	1272	.75	1:80,000			
198	.75	1:80,000	585	.50	1:30,000	1254	.75	1:80,000	1277	.75	1:80,000			
199	.75	1:80,000	586	.75	1:40,000	1255	.75	1:80,000	1278	.75	1:80,000			

UNITED STATES COAST PILOT GULF COAST—KEY WEST TO THE RIO GRANDE

The courses and bearings given in degrees are *true*, reading clockwise from 0° at north to 359°, and are followed by the corresponding *magnetic* course in points, in parentheses. General directions, such as northeastward, west-southwestward, etc., are magnetic.

Distances are in *nautical miles* and may be converted approximately to statute miles by adding 15 percent to the distances given.

Currents are expressed in knots, which are nautical miles per hour.

Except where otherwise stated, all depths are at *mean low water*.

In accordance with the desire of the International Hydrographic Bureau, each depth is followed, in parentheses, by its equivalent in meters.

Heights are given in feet with metric equivalent in parentheses.

The abbreviations *Bn.*, *Lt.*, and *dist.* are often used for *Beacon*, *Light*, and *distant*.

Use this Coast Pilot with reference to the latest Supplement that may have been published and the Notices to Mariners issued after the date of the edition of this pilot and the Supplement.

1. GENERAL INFORMATION

THE COAST

The information contained in this volume, United States Coast Pilot—Gulf Coast, relates to the Gulf of Mexico from Key West to the Rio Grande, including the harbors and adjacent inland waterways; it embraces that part of the coast of Florida bordering on the Gulf of Mexico and the coasts of Alabama, Mississippi, Louisiana, and Texas.

The entire Gulf of Mexico and the Atlantic coast northward to Cape Romain are shown on Chart No. 1007. The other charts covering that part of the coast included in this volume are indicated on the index map.

Within the limits of this volume the general coast line has a length of 1,629 miles, and is low and generally sandy, presenting no marked natural features to the mariner approaching it from seaward. The principal points and harbor entrances are marked by lighthouses,

which are the chief guides for approaching or standing along the coast.

Eastward of New Orleans, the back country is generally wooded and as far east as the St. Marks River frequently has an elevation of from 10 to 25 feet (3.0 to 7.6 m) or more.

Westward of New Orleans the country along the coast is generally low flat grass land, the only points of any elevation being several "islands" (small solitary hills) to the northwestward of Atchafalaya Bay and two similar but lower "islands" near Galveston. Belle Island (elev. 130 feet), Cote Blanche Island (elev. 70 feet), Weeks Island (elev. 204 ft.) and Avery Island (approx. elev. 200 feet) are 6, 28, 35, and 42 miles respectively northwestward of the mouth of the Atchafalaya River and High Island (elev. 40 feet) and Bryan Mound (approx. elev. 25 feet) are 27 miles northeastward and 38 miles southwestward, respectively, from Galveston.

From the south shore of the Florida mainland, the Florida Keys and Florida Reefs extend for more than 100 miles to the westward. They are of coral, sand, and shell formation with frequent shoal coral patches on the reefs. They form the northern boundary of the Straits of Florida, the northern approach and entrance to the Gulf of Mexico. Toward the western end there are several openings between the keys offering passage from the straits into the Gulf.

From Key West to Apalachee Bay the bottom is largely of a coral formation, with occasional spots of less depths than the surrounding bottom.

From Mississippi Sound to Galveston Bay the bottom is sand and silt, with several shoals lying well offshore, which change to some extent with severe storms; with the variable currents which are often encountered they are a serious menace to the navigator passing near them.

From Galveston to the Rio Grande the bottom is sandy, fairly regular, and free from off-lying dangers. In about latitude 27° N., where the trend of the coast changes from southwest to southeast, a counter current is formed which attains a considerable velocity of rotation and has been called the whirlpool of the Gulf. Vessels and barges disabled or broken adrift in the waters southeastward frequently go ashore abreast of this whirlpool.

Air-photo maps covering extensive sections of the coastal areas of the United States are published by the United States Coast and Geodetic Survey. These maps give detailed topographic features but no elevations, contours, or depths. For information as to depths, the nautical charts of the coast must be used. The maps vary considerably in size, being laid out to conform with the coast line as conveniently as possible. The average size is about 44 inches by 24 inches or a nearly equivalent area. The scale of the maps varies, the majority being on a scale of 1:20,000 but a 1:10,000 scale and at times a 1:5,000 scale is used. On these scales, the approximate area covered by an average sheet is 80 square miles (nautical), 20 square miles, and 5 square miles, respectively.

Index sheets showing the geographical layout of these maps may be secured from the Coast and Geodetic Survey, Washington, D. C. The maps are sold to the public at 75 cents per copy.

Along the Gulf coast of the United States, these air-photo maps are available for the following areas:

Southern Florida:
Cape Sable to Caloosahatchee River:
13 maps; scale 1:20,000.
Florida and Alabama:
Ochlockonee Bay to Mobile Bay:
27 maps; scale 1:20,000.
40 maps; scale 1:10,000.
Louisiana:
Mississippi Sound to Caillou Bay:
51 maps; scale 1:20,000.
Texas:
Brazos River to Corpus Christi Bay:
28 maps; scale 1:20,000.

Attention should be called to the fact that the above air-photo maps supplement the regular nautical charts of the coast. These maps give considerably more topographic detail than is shown on the charts and in some cases extend somewhat farther inland over areas not covered by the charts.

HARBORS, AND PORTS, REPAIRS, HOLIDAYS, DISTANCES, ETC.

Harbors and ports.—The most important places, either commercially or as harbors of refuge, are Charlotte Harbor, Tampa Bay, Withlacoochee Anchorage, St. George Sound and Apalachicola Bay, St. Josephs Bay, St. Andrews Bay, Pensacola, Mobile, Horn Island Pass and Pascagoula, Ship Island Pass and Gulfport, South and Southwest Passes and New Orleans, Atchafalaya Bay and River, Sabine Pass, Galveston Bay, and Aransas Pass.

Harbor entrances.—The entrance of every harbor on this stretch of the coast is more or less obstructed by a shifting sand bar over which the channel depth is changeable. Most of the entrances are being improved by dredging, and in some cases by jetties, which extend from both sides of the entrance seaward to deep water outside of the bars. At the improved entrances, more dependence can be placed on the channel depths, as given in this volume, than on the bars of the harbors not under improvement. Masters of vessels bound to the harbors along this coast should, in cases where the given depths approximate the draft of their vessel, inquire of local pilots what draft is being taken in and out over the bar at that time.

On the bars the buoys are moved from time to time to indicate the channel; but they are liable to be dragged out of position and cannot always be replaced immediately, so that a stranger must use the greatest caution. A stranger should, if possible, select a rising tide for entering the harbors on this coast.

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.

In southerly gales the sea breaks on some of the bars, and no stranger should then attempt to enter such harbors without the assistance of a pilot.

Supplies.—Tampa, Mobile, New Orleans, Galveston, and Houston are the principal ports where general supplies can be obtained; fuel oil, diesel oil, gasoline, coal, fresh water, ship chandlery, and provisions are available in suitable quantities (except no coal at Houston). Similar articles (except coal), but in more limited quantities, can be obtained at Key West, Fort Myers, Apalachicola, Panama City,

Pensacola, Gulfport, Morgan City, Beaumont, Freeport (quite limited), and Corpus Christi. Coal can be obtained at Pensacola and Gulfport and, by special arrangement, at most of the other ports, but 1 to 2 weeks may be required for delivery.

Repairs.—Tampa, Mobile, New Orleans, and Galveston are the principal places at which extensive repairs to the hulls and machinery of larger vessels can be made. There are facilities for repairing smaller vessels at Key West, Pensacola, Beaumont, and Orange. Small vessels and motorboats can be hauled out, and minor repairs to machinery can be made at many other places as mentioned under the descriptions of the different ports. The principal docking facilities are listed below.

Largest Drydocks and Marine Railways

Port	Name	Length of vessels hauled	Depth on sill at high water	Capacity
Florida:		*Feet*	*Feet*	*Tons*
Key West	Railway	160	8, 16	1, 000
Tampa	Drydock	400	25	[1] 10, 000
	Railway	260	18	3, 500
Panama City	do	160	12	--------
Pensacola	Drydock	380	20	6, 000
Alabama:				
Mobile	do	550	24	12, 000
	Railway	290	6, 10	2, 500
Mississippi:				
Pascagoula	do	135	9	300
Louisiana:				
New Orleans	Drydock	525	22	10, 000
Slidell	Graving dock	325	14	--------
Texas:				
Orange	Railway	235	[2] 15	1, 800
Beaumont	Drydock	345	17	2, 500
Galveston	do	520	22	10, 000
	Railway	250	15, 18	1, 200

[1] Under construction 1935.
[2] Forward draft restricted by pitch of ways ¾ inch to 1 foot.

Port facilities.—The principal facilities available at the various ports are described under the respective port headings. Fuller details regarding the facilities at most of the ports are given in the Port Series publications.

The **Port Series,** publications of the United States Army, Corps of Engineers, are complete reports covering the principal seaports of the United States. The volumes of the series are wide in their scope and treat the subjects of particular interest to the shipping world, such as the physical features of each port, its organization and practices, regulations regarding the movement of ships and goods, port dues and charges, water and rail connections, and character and commerce of the hinterland.

The information in all of these reports is generally prepared along similar lines; the general subjects covered include the following:

Port and harbor conditions.
Port customs and regulations.
Port services and charges.
Fuel and supplies.
Port and harbor facilities.
Communications.
The freight-rate situation.
Commerce reports.

Complete information regarding the **organization, administration** and **regulations** of the port are given under "Port customs and regulations."

The following volumes of the Port Series are available for the ports along the Gulf coast. They are sold by the Superintendent of Documents, Washington, D. C.

No. 3. Mobile, Ala., and Pensacola, Fla.:
- Part 1. Mobile, Ala. (revised 1929), price 50 cents.
- Part 2. Pensacola, Fla. (revised 1929), price 30 cents.

No. 5. New Orleans, La. (revised 1932), price 40 cents.

No. 6. Galveston, Houston, and Texas City, Tex.:
- Part 1. Galveston, Tex. (revised 1935), price 50 cents.
- Part 2. Houston, Tex. (revised 1935), price 35 cents.
- Part 3. Texas City and Corpus Christi, Tex. (revised 1935), price 35 cents.

No. 8. Jacksonville, Fernandina, Miami, Key West, Tampa, and South Boca Grande, Fla., price $1.10.
- Part 1. Jacksonville, Fla. (revised 1929), price 30 cents.
- Part 2. Miami and Tampa, Fla. (revised 1930), price 40 cents.

No. 14. Port Arthur, Sabine, Beaumont, and Orange, Tex. (revised 1933), price 40 cents.

No. 19. Pascagoula and Gulfport, Miss. (revised 1935), price 20 cents.

The publication, **Port and Terminal Charges at United States Ports**, also prepared by the United States Army Corps of Engineers and sold by the Superintendent of Documents, gives detailed information regarding all port services and charges (including dockage, wharfage, storage, handling charges, etc.) at practically all ports of the United States. Part 1 of this publication includes the more important governmental regulations affecting the movement of vessels, freight, and passengers. This information includes a digest of the more important regulations of the United States Public Health Service (quarantine and hospital services), the Customs Service, and the Immigration Service; it also includes a list of Federal documents which vessels are required to have.

In connection with the Customs Service, there is listed the United States ports at which bonded warehouses are established as well as those ports where, in the absence of bonded warehouses, the customhouse premises are used for the storage of bonded merchandise. There is also listed the Custom Collection Districts and the ports of entry for the United States.

A similar publication, **Shipping Charges at United States and Foreign Ports**, also prepared by the United States Army Corps of Engineers and sold by the Superintendent of Documents, contains information relative to services and charges of the United States consular officers abroad and of foreign consular officers stationed at the various seaports of the United States.

Offices of the Customs Service are located at the following ports within the limits covered by this volume. The headquarters for Custom Collection Districts are indicated by italics. Marine documents may be issued at all of these ports except those indicated by an (x) following the name.

Key West, Fla.
Boca Grande, Fla. (x)
Tampa, Fla.
Apalachicola, Fla.
Panama City, Fla. (x)
Pensacola, Fla.
Mobile, Ala.
Pascagoula, Miss. (x)
Gulfport, Miss.
New Orleans, La.
Lake Charles, La.
Orange, Tex. (x)
Beaumont, Tex. (x)
Port Arthur, Tex.

Sabine, Tex. (x)
Galveston, Tex.
Houston, Tex.
Corpus Christi, Tex.
Brownsville, Tex. (x)

Legal holidays.—The following are legal holidays in the States of Florida, Alabama, Mississippi, Louisiana, and Texas:

January 1, New Year's Day.
January 19, Lee's Birthday (except Louisiana and Texas).
February 22, Washington's Birthday.
April 26, Confederate Memorial Day (except Louisiana and Texas).
June 3, Davis's Birthday.
July 4, Independence Day.
September (First Monday), Labor Day.
General Election Day (except Alabama and Mississippi).
November 11, Armistice Day.
November (last Thursday), Thanksgiving Day.
December 25, Christmas Day.

In addition to the above, Texas observes "Texas Independence Day", April 21, and Florida observes "Memorial Day", May 30. In New Orleans and Mobile, "Mardi Gras" is also observed.

In the ports described in this volume stevedores are not prohibited by law, union rules, or other regulations from working ships on holidays, and it is possible to make arrangements in advance for work on such days. In most cases workmen receive extra pay for work on holidays, in accordance with rates fixed by agreement between the labor unions and ship operators.

Communication is by regular lines of coasting steamers, by rail, by airplane, and by telephone, telegraph, and radio. There are regular lines of steamers operating from the larger ports on the Gulf to trans-Atlantic and Caribbean Sea ports and there are steamer connections of some character with world ports in general. There are excellent railroad and highway connections between the ports and to all parts of the country. There are regular air lines into Tampa, New Orleans, Houston, Galveston, and Brownsville, and between Tampa and Habana and between Brownsville and Mexico City (via Tampico).

DISTANCES BETWEEN PORTS

The attention of mariners is called to the Coast and Geodetic Survey publication, Distances Between United States Ports—Serial No. 444. This publication may be secured from the sales agencies of the bureau at the various ports or from the Superintendent of Documents, Washington, D. C. (price 10 cents).

The Tables of Distances contained in this publication have been compiled with the purpose of giving, in condensed and convenient form, the distances between ports of the United States and its off-lying territories. For ready reference and for use in combining these tables with those issued by other nations, a number of distances from United States ports to foreign ports are also included.

The **Table of Distances** given on page 7 is taken from the above publication. This table covers practically all of the ports of any importance on the Gulf Coast of the United States from Key West to the Rio Grande. Each distance between two ports is along the shortest route marked by aids to navigation and affording a safe depth for the maximum draft that can enter both ports.

Distances between ports on the Gulf coast of the United States from Key West to the Rio Grande

From— \ To—	2 miles 170° true from Sand Key Light	Key West	Fort Myers	South Bocagrande	Sarasota	St. Petersburg	Tampa	Apalachicola	Port St. Joe	Panama City	Pensacola	Mobile	Gulfport	New Orleans	Morgan City	Lake Charles	Port Arthur	Beaumont	Galveston	Texas City	Houston	Brazosport	Corpus Christi	Brazos Santiago
Key West, Fla	11	------	134	138	177	226	232	374	393	404	465	508	524	570	637	785	731	761	764	768	807	778	874	850
Fort Myers, Fla	192	134	------	57	96	140	146	297	322	333	401	450	469	526	601	749	695	725	728	732	771	747	851	840
South Bocagrande, Fla	188	138	57	------	51	103	109	252	278	289	357	407	427	484	562	710	656	686	689	693	732	708	815	806
Sarasota, Fla	223	177	96	51	------	60	66	210	237	248	318	368	392	454	536	684	630	660	663	667	706	682	794	788
St. Petersburg, Fla	270	226	140	103	60	------	19	213	245	256	325	376	400	462	547	695	641	671	674	678	717	693	805	804
Tampa, Fla	276	232	146	109	66	19	------	219	251	262	331	382	406	468	553	701	647	677	680	684	723	699	811	810
Apalachicola, Fla	409	374	297	252	210	213	219	------	59	70	147	203	232	319	406	557	503	533	536	540	579	555	668	687
Port St. Joe, Fla	422	393	322	278	237	245	251	59	------	35	119	178	207	301	388	539	485	515	518	522	561	537	650	668
Panama City, Fla	433	404	333	289	248	256	262	70	35	------	109	170	199	297	384	535	481	511	514	518	557	533	646	669
Pensacola, Fla	492	465	401	357	318	325	331	147	119	109	------	83	112	227	314	465	411	441	444	448	487	463	576	599
Mobile, Ala	532	508	450	407	368	376	382	203	178	170	83	------	93	214	301	452	398	428	431	435	474	450	563	586
Gulfport, Miss	544	524	469	427	392	400	406	232	207	199	112	93	------	189	276	427	373	403	406	410	449	425	538	561
New Orleans, La	581	570	526	484	454	462	468	319	301	297	227	214	189	------	261	411	357	387	390	394	433	409	522	545
Morgan City, La	639	637	601	562	536	547	553	406	388	384	314	301	276	261	------	239	185	215	220	224	263	241	359	392
Lake Charles, La	787	785	749	710	684	695	701	557	539	535	465	452	427	411	239	------	54	64	127	131	170	160	291	346
Port Arthur, Tex	733	731	695	656	630	641	647	503	485	481	411	398	373	357	185	54	------	30	73	77	116	106	237	292
Beaumont, Tex	763	761	725	686	660	671	677	533	515	511	441	428	403	387	215	64	30	------	103	107	146	136	267	322
Galveston, Tex	766	764	728	689	663	674	680	536	518	514	444	431	406	390	220	127	73	103	------	9	48	53	185	245
Texas City, Tex	770	768	732	693	667	678	684	540	522	518	448	435	410	394	224	131	77	107	9	------	49	57	189	249
Houston, Tex	809	807	771	732	706	717	723	579	561	557	487	474	449	433	263	170	116	146	48	49	------	96	228	288
Brazosport, Tex	778	778	747	708	682	693	699	555	537	533	463	450	425	409	241	160	106	136	53	57	96	------	141	204
Corpus Christi, Tex	866	874	851	815	794	805	811	668	650	646	576	563	538	522	359	291	237	267	185	189	228	141	------	128
Brazos Santiago, Tex	839	850	840	806	788	804	810	687	668	669	599	586	561	545	392	346	292	322	245	249	288	204	128	------

NOTES.—Distances to Sand Key Light from ports east of Pensacola are via channel between Rebecca Shoal and Dry Tortugas; distances from Pensacola and ports westward are via route south of Dry Tortugas.

Distances to Key West are via Northwest Channel; distances along the route south of the keys may be obtained by adding 11 miles to the distances to Sand Key Light.

Distances between New Orleans and ports eastward are via South Pass; for ports westward they are via Southwest Pass.

All distances are along outside routes. Inside route distances will be found in table 27 of the publication, Distances Between United States Ports.

Descriptions and sailing directions for the coast covered by this table are contained in this volume.

PILOTS AND PILOTAGE

Pilots for Mobile cruise off the entrance to the Main Ship Channel, 5 miles to the southward of Fort Morgan. Pilots for Galveston and Houston cruise off Galveston entrance. Pilots for Southwest Pass and South Pass into the Mississippi River maintain lookouts at the mouth of the passes and can generally be found outside Southwest Pass. Pilots for Port Arthur, Beaumont, Orange, and Lake Charles maintain a lookout station on the south jetty of Sabine Pass and frequently cruise off the entrance. At Key West, South Boca Grande, Tampa, Pensacola, and Aransas Pass, pilots maintain lookout stations and meet ships on signal or by previous arrangement. At Panama City, Pascagoula, and Freeport, vessels are met by previous arrangement.

Pilotage is compulsory for certain vessels entering from sea but is not compulsory for the interior waters except the Mississippi River as far as New Orleans. Pilotage is compulsory for vessels in foreign trade and generally for United States coastwise vessels if without a pilot licensed by the Federal Government. Fuller information regarding pilotage at the various ports to and from sea is given under the respective port headings. Pilots for the inside routes may be found at the larger cities and towns; in general, the charge for piloting in interior waters is by special agreement with the pilot.

Pilotage rates for the States of Alabama, Mississippi, and Louisiana are given under the headings of the various ports of those States.

The following are extracts from the State statutes of Florida and Texas relating to pilotage:

Florida: The board of pilot commissioners of each port may fix the rates of pilotage which shall be paid by any vessel entering their port; but in no case shall they fix the rates greater than the rates now provided by law, as follows: All steamers or vessels entering any port or leaving the same shall be subject to pay to any licensed pilot performing duty on board, or to the pilot who shall first speak to such steamer or vessel, the following rates of pilotage: For steamers or vessels drawing 6 feet, or less than the same, $2 per foot; for steamers or vessels drawing from 6 to 10 feet, $3 per foot; for steamers or vessels drawing from 10 to 14 feet, $4 per foot; for steamers or vessels drawing from 14 to 20 feet, $5 per foot; for steamers or vessels drawing over 20 feet, $6 per foot. These rates shall apply to all steamers or vessels, whether owned wholly by citizens of this State or not: *Provided*, That all steamers or vessels carrying the regular United States mails shall pay half pilotage only: *Provided further*, That all steamers or vessels drawing less than 6 feet of water, and having a coastwise license, shall be exempt from paying whole or half pilotage, unless they employ a pilot.

Texas: The rate of pilotage on any class of vessels shall not in any port of this State exceed $4 for each foot of water which the vessel at the time of piloting draws, and whenever a vessel, except of classes below excepted, shall decline the service of a pilot offered outside the bar, and shall enter the port without the aid of one, she shall be liable to the first pilot whose services she so declined for the payment of half pilotage; and any vessel which after being brought in by a pilot shall go out without employing one shall be liable to the payment of half pilotage to the pilot who brought her in, or if she has come in without the aid of a pilot, though offered outside, she shall in so going out be liable for the payment of half pilotage to the pilot who has first offered his services before she came in; but if she has come in without the aid of a pilot, or the offer of it outside, she shall in case of going out without a pilot not be liable to half pilotage. At any port where vessels shall receive or discharge their cargoes at an anchorage outside the bar, such vessel shall be liable for pilotage at the above rate to such anchorage, but shall not be liable for or compelled to pay pilotage from such anchorage to the open sea; and if any vessel bound from the open sea to such anchorage while under way shall

decline the services of a pilot, and shall afterward receive or discharge any portion of her cargo at such anchorage on the lighters or otherwise, she shall be liable for the payment of half pilotage at the above rates to such anchorage to the first pilot whose services shall have been tendered to and declined by her, but not liable for any pilotage from such anchorage to the open sea; and when a pilot takes charge of a vessel 20 miles outside of the bar and brings her to it, he shall be entitled to one-fourth pilotage for such offshore service, in addition to what he is entitled to recover for bringing her in; but if such offshore service be declined, no portion of such compensation shall be recovered.

The following classes of vessels shall be free from any charge for pilotage, unless for actual service, to wit: All vessels of 20 tons and under; all vessels of whatsoever burthen, owned in the State of Texas and registered and licensed in the district of Texas, when arriving from or departing to any port in the State of Texas; all vessels of 75 tons and under, owned and licensed for the coasting trade in any part of the United States, when arriving from or departing to any port in the State of Texas; all vessels of 75 tons and under, owned in the State of Texas and licensed for the coasting trade in the district of Texas, when arriving from or departing to any port in the United States.

Harbor Masters are appointed for the principal ports and they have charge of the anchorage and berthing of vessels in their respective harbors. Harbor and anchorage regulations for certain ports are given under the respective port headings. The Port Series of publications (see page 4) give full information regarding port regulations. Federal laws prohibit the dumping of refuse material of any kind and of oil into the navigable waters of the United States.

Towboats are stationed at Tampa, Pensacola, Mobile, New Orleans, Port Arthur, Beaumont, Orange, Galveston, Houston, and Corpus Christi.

Salvage Equipment, consisting of tugs, lighters, pumps, derricks, diving apparatus, etc., is available at Key West, Tampa, Pensacola, New Orleans, Port Arthur, and Galveston. The more extensive equipment is available at Key West, Mobile, New Orleans, and Galveston.

Rules of the Road.—International Rules and Inland Rules to prevent collision of vessels are given in the appendix of this volume. They may be obtained in a printed pamphlet form from Bureau of Navigation and Steamboat Inspection or from the Superintendent of Documents.

Pilot Rules for certain inland waters of the Atlantic and Pacific coasts and of the coast of the Gulf of Mexico are published in pamphlet form by the Bureau of Navigation and Steamboat Inspection.

Pilot Rules for the rivers whose waters flow into the Gulf of Mexico and their tributaries (Pilot Rules for Western Rivers) are similarly published in pamphlet form.

Most of these pilot rules are given in the appendix of this volume. Copies of the pamphlets may be obtained from the Bureau of Navigation and Steamboat Inspection or from the Superintendent of Documents.

QUARANTINE AND MARINE HOSPITALS

Quarantine for all ports within the limits of this volume is enforced in accordance with the requirements of the United States Public Health Service. At ports in the State of Texas some local requirements also have to be complied with. Quarantine information

can be secured at the stations of the service and at American consulates, and will be furnished to vessels upon application, either by local officers of the service or by the United States Public Health Service at Washington, D. C. Port sanitary statements are issued by the United States Public Health Service and may be obtained at the stations of the service or from collectors of customs in all ports of the United States.

On account of the menace, every summer, of yellow fever to the ports on the southern coast of the United States because of the prevalence of this disease in Mexico, Central America, and South America, during the season April 1 to November 1, special restrictions are enforced. Since no authenticated cases of yellow fever have been reported recently from any of the Latin American countries, the special measures against the introduction of yellow fever during the close quarantine season have been modified. However, special vigilance is exercised because of the possibility that there may be latent foci of this disease which may become manifest at any time, making it necessary to enforce close quarantine.

The Public Health Service provides special arrangements for facilitating commerce, especially as this applies to the transportation of fruit between Mexican ports and Gulf ports. Information regarding such special measures can be secured from consuls at the various ports; the object is to assist steamship companies in complying with any quarantine measures in the port of departure which will tend to aid the quick dispatch of vessels upon their arrival at southern United States ports. On this account it is recommended that the masters of vessels, upon arrival at any of the Mexican Gulf ports, communicate at once with the American consul in order to ascertain whether any special precautions are required.

The following are the national quarantine stations within the limits covered by this volume:

Key West, Fla.
Boca Grande, Fla.
Tampa, Fla.[1]
Cedar Keys, Fla.
Carrabelle, Fla.
Port St. Joe, Fla.
Panama City, Fla.
Pensacola, Fla.[1]
Mobile, Ala.[1]
Pascagoula, Miss.
Gulfport, Miss.[1]
New Orleans, La.[1]
Morgan City, La.
Sabine, Tex.[1]
Galveston, Tex.[1]
Freeport, Tex.
Port Aransas, Tex.
Corpus Christi, Tex.
Brownsville, Tex.

Medical Relief.—American merchant seamen are entitled to free medical relief at the expense of the Government, through the United States Public Health Service at its established relief stations. A list of such stations in the region covered by this volume is given below.

An American merchant seaman is one "engaged on board in the care, preservation, or navigation of any registered, enrolled, or licensed vessel of the United States, or in the service, on board, of those engaged in such care, preservation, or navigation."

Free medical advice is also furnished seamen by radio; for information regarding the same, see Radio Service, page 34.

[1] Full fumigation facilities at these ports. Sulphur fumigation only at the remaining ports.

Relief stations of the Public Health Service are located at the addresses given, in the following ports:

MARINE HOSPITALS
Key West, Fla., Front and Emma Streets.
Mobile, Ala., St. Anthony and Bayou Streets.
New Orleans, La., 210 State Street.
Out-Patient Office, Customhouse.
Galveston, Tex., 43rd Street and Avenue N.
Out-Patient Office, 302 Customhouse.
SECOND-CLASS RELIEF STATIONS
Port Arthur, Tex., Federal Building.
THIRD-CLASS RELIEF STATIONS
Tampa, Fla., 416 Citrus Exchange Building.
Apalachicola, Fla., 128 Market Street.
Panama City, Fla.
Pensacola, Fla., 509 Thiesen Building.
Biloxi, Miss., 405 Lameuse Street.
Gulfport, Miss., 21 Durham Building.
Houston, Tex., 416–417 Medical Arts Building.
Corpus Christi, Tex., 408 Nixon Building, 601 Leopard Street.

AIDS TO NAVIGATION, UNITED STATES LIGHTHOUSE SERVICE

The lighthouses and one lightship, radiobeacons, radio direction-finder stations, and other aids to navigation are the principal guides and mark the approaches and channels to the principal ports. The buoyage is in accordance with the system adopted by the United States and is described below. The principal coast lights and **Heald Bank** Lightship are described in the text of this volume. Some of the light stations are equipped with radiobeacons and three with distance-finding apparatus. A list of the radiobeacons operated by the United States Lighthouse Service and the radio direction-finder stations operated by the United States Navy in the area covered by this volume are given under the heading, **Radio Service**. Descriptions of all aids to navigation will be found in the publications of the United States Lighthouse Service listed in the appendix under **Publications**.

Private aids to navigation, such as stakes and small floats, are not supervised by the Government, and are therefore not listed or indicated on the charts. When private aids are established similar to those maintained by the Government, they must be authorized by United States Lighthouse Service.

System of buoyage, colors, shapes, and numbers.—On the *right or starboard* side of the channel for the entering vessels are placed *conical or nun buoys*, painted *red*, and with *even numbers*, and on the *left or port side*, *cylindrical or can buoys*, painted *black*, and with *odd numbers;* the numbers for each side increase from seaward.

Obstructions, with channel ways on either side, are marked with buoys painted with *red and black horizontal bands*, which may be left on either side, with due caution as to the position of the buoy with relation to the obstruction, as shown on the chart. In general, obstruction buoys have no distinctive shape, but in the case of buoys with horizontal bands marking obstructions or bifurcations of channels, when it is desired to indicate the main channel, a can buoy with black band at the top is used when the important channel is to the right for the entering vessel, and a nun buoy with red band at the top when the important channel is to the left.

Fairways are indicated, where necessary, by buoys painted with *black and white vertical stripes;* such buoys are placed in good water in mid-channel or approaches, and may be passed close-to on either side. Mid-channel buoys have no distinctive shape at present.

Offshore Buoys along the Atlantic Coast are colored and numbered from north to south, and along the Pacific coast from south to north, conforming to the order of Light Lists; this does not apply to outside buoys which have a definite approach signification, and which are colored and numbered to conform to the approach. In channels not having a definite approach character, buoys are colored and numbered from north to south or from east to west on the Atlantic coast and from south to north or west to east on the Pacific coast.

For special markings along the Intracoastal Waterway, see page 13.

Bell buoys have a flat-topped float with skeleton superstructure supporting a bell. **Gong buoys** have a flat top with skeleton framework supporting a series of four gongs of varied tone. **Whistle buoys** are conical, with whistle at top. **Spar buoys** are long slender buoys of wood or iron. These classes of buoys, as well as lighted buoys, have not at present a shape distinction to indicate the side of channel or entrance, although a shape distinction is being introduced for wood spar buoys.

Anchorage Buoys are painted white.

Quarantine Anchorage Buoys are painted yellow.

Certain Other Special Buoys are in use locally, such as white with green top for dredging buoys, and black and white horizontally banded for fish-net areas in the fifth district.

Station Buoys, colored the same as the regular aids, are placed alongside of lightships and important buoy stations to mark them in case the regular aid is carried away. Lightship station buoys bear the letters "LS" above the initials of the station.

Colors of Lights for Buoys and Beacons.—*Red or white lights* are placed on the *right or starboard* side of a channel for the entering vessel, and *white or green lights* on the *left or port side.* White lights may be on either or both sides of the channel, but colored lights are only on the sides indicated respectively. The same rules apply to lights on fixed structures serving a purpose similar to that of buoys. Coast lights and lightships near channels or entrances may not conform to this system.

Lighted buoys are not at present uniformly differentiated as to shape, with respect to the side of the channel; they have bodies which contain the gas tanks or gas, and are usually surmounted by skeleton superstructures with lanterns; combination buoys have both light and bell, or light and whistle.

Caution Regarding Buoys.—Buoys are liable to be carried away, shifted, capsized, sunk, etc., lighted buoys may be extinguished, or whistling or bell buoys may not sound, as the result of storm, the accumulation of ice, running ice, or other natural causes, or collision, or other accidents. Buoys marking channels subject to frequent changes are moved as may be necessary and should be used only with local knowledge. Such buoys may not be charted.

Day Beacons are constructed and distinguished with special reference to each locality, and particularly with regard to the background upon which they are projected. Beacons on the sides of channels

are, when practicable, colored to conform to the coloring of buoys, subject to the above conditions as to background.

Reflectors are placed on some buoys or day beacons to enable the navigator, using a searchlight, to readily locate such aids.

Significance of light characteristics

A system of four characteristics of flashes is used on lighted buoys to distinguish their principal purposes, corresponding in part to the color distinctions that are made in buoys for use by day.

Characteristic of flashing	Purposes indicated	Color of light	Color of buoy
1. *Quick flashing.*[1]—Not less than 60 flashes per minute.	Isolated dangers, junctions, bifurcations, sharp turns in channels, narrow entrances.	White	Red and black, black and red, black, or red.
		Green	Black and red, or black.
		Red	Red and black, or red.
2. *Interrupted quick flashing.*[1]—Same speed as the preceding but with dark intervals of about 4 seconds.	Wrecks	White	Red and black, black and red, black, or red.
		Green	Black and red, or black.
		Red	Red and black, or red.
3. *Short-long flashes.*—Groups of a short and a long flash. Groups repeated about 8 times per minute.	Midchannels and fairways.	White	Black and white vertical strips.
4. *Slow flashing or flashing.*—Not more than 30 light periods per minute.	Channels sides and coasts.	White	Red or black.
		Green	Black.
		Red	Red.

[1] The first 2 characteristics (quick flashing) are shown on lighted buoys marking features requiring particular attention.

For a complete description of the significance of colors, shapes, and numbers of buoys and the characteristics of lights used on lighted buoys, see the introduction to the Light Lists published by the United States Lighthouse Service.

The United States Lighthouse Service has recently adopted a **uniform method of marking for the Intracoastal Waterway** to be generally applied south of Norfolk, both on the Atlantic and Gulf Coasts. The present aids will be changed as rapidly as practicable and all aids subsequently established will conform with this system.

In proceeding in a southerly direction along the Atlantic coast and thence generally westerly along the Gulf coast, the port hand is considered as on the left, starboard on the right, and aids are colored and numbered accordingly. The use of the triangle or square and the color yellow, as indicated below, will be characteristic of the aids marking any part of the Intracoastal Waterway.

Red Lights, starboard side, surmounting **red** superstructures with **red triangular** day marks with yellow borders, **even** numbers in white at the center of the day mark.

White or Green Lights, port side, surmounting **black** superstructures with **black square** day marks with yellow borders, **odd** numbers in white at the center of the day mark.

Day marks or unlighted beacons, starboard side, red triangles with yellow borders, **even** numbers in white at the center of the day mark.

Day marks or unlighted beacons, port side, black square with yellow borders, **odd** numbers in white at the center of the day mark.

Single pile structures on which the triangular or square day marks are not used will be fitted with a pointer board directed toward the channel. The top half of the **starboard piles,** including the pointer board, will be **red** with **even** white numbers; the top half of the **port**

piles, including the pointer board, will be **black** with **odd** numbers in white.

Where the Intracoastal Waterway traverses channels in rivers and inlets already marked as entered from seaward the numbering, coloring, etc., of aids in the latter will remain unchanged. In such cases a yellow triangle or square is added to day marks or to buoys to indicate the relation of the aid to the Intracoastal Waterway.

Light Lists, including fog signals; **Local Light and Buoy Lists,** including lights, fog signals, buoys, and day marks.—All aids to navigation maintained by the United States Lighthouse Service are described in these publications, which are for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., or by numerous sale agencies. The various lists published are given under Publications in the appendix of this volume. Each of these publications also lists the radio beacons operated by the United States Lighthouse Service and the radio direction-finder stations operated by the United States Navy.

Mariners are referred to the above publications for detailed information regarding the characteristics, power, visibility, etc., of lights, as well as a description of light structures and day marks, buoys, fog signals, etc. Such information is not given in this Coast Pilot volume except for a few of the more important aids.

The above light lists also contain (in the introduction) considerable information of general value to mariners. This includes a description of the character and power of lights and of light sectors and distances at which lights can be seen, information regarding the use of radio-beacon signals, distance-finding stations, and radio direction-finding stations and notes regarding sound-in-air fog signals, submarine oscillators and bells, whistle and bell buoys, lightships, and lighthouse tenders.

The **Notice to Mariners** is a weekly publication giving all changes in aids to navigation as well as recent chart correction data. This publication will be mailed free to mariners who apply to the Superintendents of Lighthouses, or single copies may be obtained or consulted at the offices of the Superintendents of Lighthouses, or the Coast and Geodetic Survey Field Stations, or other agencies distributing marine information.

Defects in Aids to Navigation.—Aids to navigation are protected by law, and mariners in their own interest should use every precaution to avoid collisions with them. Mariners are requested to report defects in the aids to navigation direct to the Superintendent of Lighthouses of the district concerned by commercial radio, by radio communication with lightships, or other prompt means.

Suggestions as to Aids to Navigation.—Mariners are also invited to send suggestions as to improvements or changes in aids to navigation directly to the Superintendents of Lighthouses, as listed below, or to confer with them, or to address the Commissioner of Lighthouses, Washington, D. C.

Dangers, Changes in Channels, Shoals, etc.—Mariners are requested to send important facts affecting the charts or other publications of the Coast and Geodetic Survey promptly to the Director of the Coast and Geodetic Survey, Washington, D. C., or to the nearest Coast and Geodetic Survey Field Station. The Field Stations are listed in the appendix of this volume.

Communication with outlying light stations.—All stations having radio communication facilities observe watch on 500 kilocycles during the first 15 minutes of each hour from 8 a. m. to 8:15 p. m. standard time for radiotelegraph communication. Information of importance in the maintenance of aids to navigation or other urgent matters from vessels may be transmitted at such times. Should the radio beacon be in operation for regular schedule, fog, or thick weather, it will not be interrupted for such communication except in matters of extreme urgency. Calling and brief communication can be carried on during the silent periods of the radio beacons. (See Light and Buoy Lists, United States Lighthouse Service, for signal characteristics and operating times.)

The district offices of the Lighthouse Service in the area covered by this publication are:

KEY WEST, FLA., Superintendent of Lighthouses, *Seventh District.*—Includes the waters of Florida from Hillsboro Inlet Light Station to Suwanee River.

NEW ORLEANS, LA., Superintendent of Lighthouses, *Eighth District.*—Includes the waters of Florida (from Suwanee River), Alabama, Mississippi, Louisiana, and Texas.

Radio broadcasts.—The United States Lighthouse Service makes official announcement from time to time of the more important Notice to Mariners data, covering the establishment of new aids to navigation, changes in existing aids, or emergency happenings relating to aids to navigation which shipping interests should receive without delay.

Broadcast announcements are preceded by the introductory words "Lighthouse Services—Notice to Mariners" and are concluded by a signature as "Lighthouse Superintendent New Orleans" and are transmitted by the stations listed in H. O. Publication No. 205 at the time and on the frequency designated. Emergency broadcasts announcing unusual happenings are made at any time using the 500-kilocycle frequency. Lighthouse Tenders also make emergency broadcasts in this manner when necessity therefor occurs.

These radio broadcasts are supplemental to other established means of disseminating Notices to Mariners and are not in lieu thereof.

Hydrographic Office Publication No. 205, Radio Aids to Navigation, gives a schedule of hydrographic broadcasts. The Hydrographic Office also publishes from time to time a schedule sheet of marine broadcasts from United States Naval Radio Stations; this covers the transmitting schedules for Time, Weather, Hydrographic, and Ice.

Determination of Compass Error by the Use of Navigational Ranges.—Navigational ranges provide a convenient means of determining compass error for the headings along the ranges when a vessel is entering or leaving a port or harbor. However, extreme caution should be exercised in the matter. Definite information as to the correct azimuth of any particular range is absolutely necessary; also, the permanency of the range should be taken into consideration.

The azimuths of channel ranges, which have been determined with sufficient accuracy for compass error determination, will be indicated in degrees and minutes in the Light Lists and in the Notice to Mariners. Azimuths given only in degrees should not be used for this purpose.

Channel ranges that are subject to changes in location may lead to serious misinformation if used for the determination of the compass error. If a change has taken place, the exact data relating to the change in azimuth may not be made immediately available in the Notices to Mariners or otherwise.

It is not considered good practice to derive the azimuth of a channel range from the chart. The scale of the chart and other considerations will usually prevent cartographic plotting of the azimuths to a degree of accuracy desired for the purpose of determining compass error. Furthermore, the chart may not show the latest known positions of the objects of the range (this will not effect the safe navigation of the channel, if the vessel follows the existing range beacons actually marking the channel).

Along short reaches of the channel ranges, sufficient time may not be available for the requisite steadying of the compass along the course of the range and this will cause inaccuracies in observing for compass error.

When a known area of local magnetic attraction would interfere with such use of ranges, a note describing local attraction will be found on the chart.

THE UNITED STATES HYDROGRAPHIC OFFICE

The Hydrographic Office of the United States Navy exists for the improvement of the means for navigating safely the vessels of the United States Navy and of the mercantile marine by providing accurate and cheap nautical charts, sailing directions, navigators, and manuals of instruction for the use of all vessels of the United States, and for the benefit and use of navigators generally.

The Hydrographic Office publishes nautical charts, light lists and sailing directions (pilots) for the navigable waters of foreign countries; it also publishes numerous special charts, books, manuals, and tables of interest to navigators and aviators.

The charts and coast pilots pertaining to the territorial waters of the United States and its possessions are published by the United States Coast and Geodetic Survey.

Among the publications of the Hydrographic Office are monthly pilot charts for the various oceans (one for Central American waters), a weekly hydrographic bulletin and a daily memorandum of information of interest to navigators. These publications can be secured by mariners who cooperate with the bureau by furnishing certain desired marine data.

The Hydrographic Office prepares navigational warnings for the Hydrographic radio broadcasts. The Hydrographic Office Publication No. 205, Radio Aids to Navigation, gives the broadcasting schedules of the United States Naval Radio Stations for Time, Weather, Hydrographic and Ice. An abstract of these radio broadcasting schedules is also published from time to time in sheet form convenient for posting in the ship radio room.

Branch Hydrographic Offices maintained at cities within the area covered by this volume are located as follows:

New Orleans, La., room 215, Customhouse.
Galveston, Tex., room 301, Customhouse.

In these offices, bulletins are posted giving information of value to mariners who can also avail themselves of publications pertaining to navigation and facilities for correcting their charts from standards. No charge is made for this service.

THE UNITED STATES ENGINEERS

The improvement of the rivers and harbors of the United States and miscellaneous civil works are under the charge of the Corps of Engineers, United States Army.

The miscellaneous civil works under the Corps of Engineers include the administration of the 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 approval of plans of bridges, the alteration of obstructive bridges, the establishment of anchorage grounds and harbor lines, the removal of sunken vessels obstructing or endangering navigation, the granting of permits for structures or operations in navigable waters, etc.

The attention of navigators is called to the various publications of the United States Engineers relative to matters of nautical interest, which are listed under Publications in the appendix of this volume.

The area with which this Coast Pilot is concerned lies within the South Atlantic and the Gulf of Mexico Divisions of the United States Engineers. Division Headquarters for the South Atlantic Division are at Norfolk, Va., and for the Gulf of Mexico Division at New Orleans, La. A list of the district offices and their locations in these divisions is given below. Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterway in the areas under their jurisdiction may be obtained direct from the District Engineer Offices.

DISTRICT OFFICES—UNITED STATES ENGINEERS

Jacksonville, Fla., District (South Atlantic Division):

Dyal-Upchurch Building, 4 East Bay Street, Jacksonville, Fla.

This district includes the waterways and harbors of the State of Florida, east of and including the Aucilla River, except Fernandina Harbor, St. Marys River, Ga. and Fla., and their tributaries; it also includes the watersheds of the Suwannee and Withlacoochee Rivers in the State of Georgia.

This district has suboffices at Miami Beach, Clewiston, and Tampa, Fla.

Mobile, Ala., District (Gulf of Mexico Division):

306 Staples-Powell Building, Mobile, Ala.

This district includes the western portion of the State of Georgia, the northwestern portion of the State of Florida, the State of Alabama, except the extreme northern portion, the eastern portion of the State of Mississippi, and a small portion of the State of Louisiana and Tennessee. It includes, specifically, the harbors on the coast of Mississippi and Alabama, the harbors in the northwestern portion of Florida, and all rivers flowing into the Gulf of Mexico west of and including Aucilla River, in Florida, to and including the Pearl River, La. and Miss.

This district has a suboffice at Panama City, Fla.

First New Orleans, La., District (Gulf of Mexico Division):

604 Union Building, New Orleans, La.

This district embraces the southern part of Louisiana, from Pearl River on the east to Sabine River on the west, and south of Red River including the Passes of the Mississippi River, that portion of the river between New Orleans and Baton Rouge, La., insofar as the removal of shoals obstructive to navigation is concerned, and that portion of the Intracoastal Waterway, Mobile Bay, Ala., to New Orleans, La., extending from the Inner Harbor Navigational Canal in Lake Ponchartrain to Long Point in Lake Borgne.

Galveston, Tex., District (Gulf of Mexico Division):

Trust Co. Building, Galveston, Tex.

This district includes all work of river and harbor improvements in Texas with the exception of the Red River Basin and Johnsons Bayou, La.

Suboffices for this district are maintained at Port Arthur, Houston, and Corpus Christi, Tex.

THE UNITED STATES BUREAU OF MARINE INSPECTION AND NAVIGATION (FORMERLY NAVIGATION AND STEAMBOAT INSPECTION)

The Bureau of Marine Inspection and Navigation under the Department of Commerce is charged with general supervision of the commercial marine and merchant seamen of the United States, except so far as supervision is lodged with other offices of the Government.

In addition to various other duties the Bureau is especially charged with the decision of all questions relating to the issuing of registers, enrollments, and licenses of vessels; investigates the operation of the laws relative to navigation; is charged with the enforcement and investigation of violations of the navigation and steamboat inspection laws; and is charged with the duty of inspecting vessels, the licensing of the officers of vessels, and the administration of the laws relating to such vessels and their officers for the protection of life and property. The Bureau certificates the able seamen who form the crew of merchant vessels, and the inspectors of the Service, together with other Government officers, especially detailed for that purpose, also certificates the lifeboat men.

For administrative purpose the Supervising Inspectors of the Service maintain 11 district offices, and Local Inspectors have offices in the more important cities having maritime interests.

Offices of the Bureau are maintained at the following ports along the coast of the Gulf of Mexico:

New Orleans, La., Rooms 212–214, Customhouse.
Galveston, Tex., 506 American National Insurance Building, 310 Twenty-first Street.
Mobile, Ala., Rooms 4 and 5, Federal Building.
Tampa, Fla., Room 406, Federal Building.

At New Orleans, there are offices of both Supervising Inspectors and Local Inspectors; at the other ports there are offices of Local Inspectors.

The licensed officer in command of any vessel shall report in writing and in person to the board of local inspectors nearest the port of first arrival any accident to said vessel involving loss of life, or damage to property to an approximate amount exceeding $500, and shall also report in like manner any casualty or loss of life from whatever cause of any person on board such vessel and any stranding or grounding, whether or not any damage has been sustained by the vessel.

THE UNITED STATES COAST GUARD

The United States Coast Guard is a military branch of the Government maintained for the purpose of enforcing the navigation and other maritime laws under the jurisdiction of the United States, rendering assistance to vessels in distress, saving life and property, destroying derelicts and removing obstructions and menaces to navigation. These duties include the International Ice Patrol, the Bering Sea Patrol, flood-relief work, patrol of regattas and marine parades, and rendering medical relief to deep-sea fishermen and to the natives of Alaska.

The Coast Guard makes no charge for its services to vessels in distress, and will respond promptly to all proper requests for assistance so far as the distribution and condition of its facilities will permit. However, it is not the purpose of the Coast Guard to compete or interfere with commercial enterprise in ordinary towing and salvage operations, but to confine its assistance activities to cases of actual or potential distress.

Instructions for obtaining the assistance of Coast Guard units are given on page 20 (without radio) and on page 24 (with radio).

Coast Guard stations are maintained at the places named in the following table. The stations are fully manned throughout the year and are supplied with boats, wreck guns, beach apparatus, and other appliances for affording assistance in case of shipwreck. Instructions to enable mariners to avail themselves fully of the assistance thus afforded will be found in the appendix, page 352.

The Coast Guard stations are provided with the International Code Signals and are prepared to send or receive signals in that code or by means of the Semaphore Code, the Occulting or Flashing-light Code, or the International Morse Wigwag Code. Telephone facilities are available at the stations for the summoning of Coast Guard cutters, tugs, or other assistance, or for communicating with telegraph lines.

Cautions.—Masters are particularly cautioned, if they should be driven ashore anywhere in the neighborhood of the stations, to remain on board until assistance arrives, and under no circumstances should they attempt to land through the surf in their own boats until the last hope of assistance from the shore has vanished. Often when comparatively smooth at sea a dangerous surf is running which is not perceptible 400 yards offshore, and the surf when viewed from a vessel never appears as dangerous as it is. Many lives have been lost unnecessarily by the crews of stranded vessels being thus deceived and attempting to land in the ship's boats.

All the following Coast Guard Stations are in the Eighth District, the commander of which is stationed at Galveston, Tex.

Coast Guard stations—Gulf of Mexico

Name of station	State	Location	Former number and designation for aviation purposes only
Santa Rosa	Florida	Santa Rosa Island, 2 miles east of Fort Pickens	212
Grand Isle	Louisiana	On Grand Isle, 1½ miles southwest of Grand Pass	214
Sabine	Texas	West side of Sabine Pass, three-fourths of a mile south of Sabine Pass Light.	216
Galveston	do	On Pelican Spit, west side of channel entrance to Galveston, Tex.	217
San Luis	do	Near west end of Galveston Island	218
Velasco	do	North side entrance Brazos River, one-half mile east-southeast of Brazos River Light.	219
Saluria	do	Northeast end Matagorda Island, 1½ miles north-northeast Matagorda Light.	220
Aransas	do	Northeast end Mustang Island, at Port Aransas	221
Brazos	do	South end Padre Island, about 1 mile north of Brazos Santiago; near Brazos Santiago Light.	222

Other Coast Guard Assistance Facilities.—Floating units are stationed at the following ports with larger vessels at the points marked with an asterisk (*).

Key West, Fla.
*St. Petersburg, Fla.
*Panama City, Fla.
Pensacola, Fla.
*Mobile, Ala.
*Pascagoula, Miss.
*Gulfport, Miss.
New Orleans, La.
*Galveston, Tex.
*Corpus Christi, Tex.

Air stations, with facilities for rendering assistance by airplane are maintained at Miami, Fla.; St. Petersburg, Fla., and at Biloxi, Miss. The Coast Guard amphibian planes are especially adapted to ambulance work.

Assistance or Distress Procedure.—Small craft or planes off the coasts of Florida, Alabama, Mississippi, Louisiana, or Texas may obtain the assistance of the Coast Guard by the following means:

Make the international or inland distress signal, if in sight of a vessel, lighthouse, or Coast Guard station. Passing vessels will inform the Coast Guard by radio.

Persons on shore telephone to "Coast Guard, Customhouse, Mobile, Ala., Dexter 1625" or to any nearby Coast Guard vessel or station. For Florida, telephone to "Coast Guard, Federal Building, Jacksonville, Fla., Jacksonville 32780, Extension 231 to 238."

If equipped with radio, call **NCU** "Any Coast Guard Unit" by key or in case of extreme emergency call **SOS** by key (or Mayday by voice) transmitting on 500 kilocycles (600 meters).

Coast Guard administrative offices are located as follows:

Boston, Mass., Customhouse.
New York, N. Y., Customhouse.
Washington, D. C., Wilkins Building.
Norfolk, Va., Post Office Building.
Jacksonville, Fla., Federal Building.
Mobile, Ala., Customhouse.

RADIO SERVICES

The supervision of radio communication in the United States, including the Hawaiian Islands, is controlled by the Federal Com-

munications Commission. Twice a month, the Commission issues a Radio Service bulletin, giving those current corrections to the international Berne publications that affect radio services of the United States. These publications are listed below. Interested parties can secure copies of this bulletin by addressing the Commission at Washington, D. C. At the present time this is the only publication of the Commission.

The Rules and Regulations of the former Federal Radio Commission are remaining in effect until such time as superseding regulations are promulgated by the present Commission. Changes in these **Rules and Regulations** are included in the above **Radio Service Bulletin.**

With the exception of the above **Radio Service Bulletin,** all radio information available from the Commission is incorporated into the publications of the International Bureau of the Telecommunication Union of Berne, Switzerland. They are published every 6 months; editions in English can be secured by sending remittance direct to the Bureau. The list of these publications is given below.

These Berne publications show, *name of station* and *owner or operator*, *geographical locations*, *call*, *frequencies*, *type of emission*, *power*, *hours of service*, and *rates*.

LIST OF BERNE PUBLICATIONS

1. List of Frequencies and Supplements, 40 Swiss gold francs, including postage.
2. List of Coast Stations and Ship Station, 3.60 Swiss gold francs, including postage.
3. List of Aircraft and Aeronautical Stations, 2.60 Swiss gold francs, including postage.
4. List of Broadcasting Stations and Supplements, 3.70 Swiss gold francs, including postage.
5. List of Stations Performing Special Services and Supplements, 5.50 Swiss gold francs, including postage.
6. List of Call Letters of Fixed, Land and Mobile Stations and Supplements, 9.30 Swiss gold francs, including postage.

NOTE.—Remittances should be made by international money order to the International Bureau of the Telecommunication Union, Berne, Switzerland.

Comprehensive information regarding navigational radio services can also be obtained from the **Hydrographic Office Publication No. 205, Radio Aids to Navigation,** which can be obtained from the Hydrographic Office, Navy Department, Washington, D. C., price $1.50. This publication lists radio stations throughout the world which perform services of value to navigation. It includes details of radio time signals, radio direction-finder stations, radiobeacon stations, radio weather bulletins, storm and navigational warnings, medical advice by radio, distress and emergency traffic, etc. Additions and changes to this publication are issued weekly in the Hydrographic Office Notice to Mariners and extracts affecting the publication will be mailed monthly to those not in receipt of the Notice to Mariners.

Radio References.—There is listed herewith publications giving information regarding the various radio services available to mariners.

The Berne List of Publications.
Hydrographic Office Publication No. 205, Radio Aids to Navigation.
United States Naval Radio Stations, Broadcast Schedules for Time, Weather, Hydrographic and Ice; issued from time to time by the Hydrographic Office.
Light Lists, United States Lighthouse Service.
United States Weather Bureau, Circular No. 1, Radio.

Further information regarding the radio services noted below can be secured from the above publications.

COMMERCIAL RADIO STATIONS

The following commercial radio stations are located on or near the Gulf of Mexico.

Station	Call	Owner
Jupiter, Fla	WMR	Mackey Federal Radio & Telegraph Co.
Palm Beach, Fla	WOE	Radiomarine Corporation.
Hialeah (Miami), Fla	WAX	Tropical Radio Telegraph Co.
Key West, Fla. (limited commercial business)	NAR	United States Navy.
Tampa, Fla	WPD	George Collins Warner.
Mobile, Ala	WNN	Tropical Radio Telegraph Co.
Fort Morgan, Ala	WIO	Do.
New Orleans, La	WNU	Do.
Port Arthur, Tex	WPA	Radiomarine Corporation.
Galveston, Tex	WGV	Do.
Beaumont, Tex	WOD	Magnolia Radio Co.
Baytown, Tex	KJV	Radiomarine Corporation.

TIME SIGNALS

Radio time signals are sent daily from the United States radio stations at Arlington, Va. (call letters NAA), and the Navy Yard, Washington, D. C. (call letters NAL).

For the latest information as to the time, frequency in kilocycles, and type of emission see Hydrographic Office Publication No. 205, Radio Aids to Navigation, issued by the Hydrographic Office, United States Navy.

As indicated in the table below, the time signal consists of the transmission of dots (·) and the omission of the dots (O) for various seconds preceding the hour signal. The hour signal is the beginning of the transmission of a dash (—) which is much longer than the others (i. e., 1.3 seconds).

In all cases the beginnings of the dots and the dash indicate the beginning of the seconds and the ends of the dots and the dash are without significance.

Repetitions.—In the case of the failure of a signal, it is repeated 1 hour later.

Hydrographic information, weather reports (see p. 26), and other information of benefit to shipping are also sent out from these stations.

Naval radio time signals

Minute interval during preceding hour	Seconds of minute intervals												
	1 to 28	29	30 to 50	51	52	53	54	55	56	57	58	59	60
Min.													
55 to 56	Dot (·) every second 1 to 28, incl.	O	Dot (·) every second 30 to 50, incl.	O	·	·	·	·	O	O	O	O	·
56 to 57		O		·	O	·	·	·	O	O	O	O	·
57 to 58		O		·	·	O	·	·	O	O	O	O	·
58 to 59		O		·	·	·	O	·	O	O	O	O	·
59 to hour		O		O	O	O	O	O	O	O	O	O	—

DISTRESS AND EMERGENCY RADIO TRAFFIC

Radio regulations, concerning distress, emergency, and safety traffic, are contained in the International Telecommunication Convention of Madrid, 1932, which has been ratified by many of the maritime nations. This publication, with the International Radiotelegraph Convention of Washington, can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 30 cents. Pertinent extracts from the Madrid Convention are given in Hydrographic Office Publication No. 205, Radio Aids to Navigation. The following items merit special attention.

Distress wave.—The wave of 500 kc (600 m) shall be the international distress wave. It shall be used for that purpose by ship stations and aircraft stations in requesting help from the maritime services. This wave must preferably be used in type A_2 and B. Vessels which cannot transmit on the international distress wave shall use their normal calling wave.

Times of listening on distress wave.—In order to increase safety of life at sea (ships) and over the sea (aircraft), all stations which normally listen on the waves of the authorized bands between 365 and 515 kc (822 and 583 m) must, during their working hours, make the necessary provisions to insure the watch on the distress wave twice per hour, for 3 minutes beginning 15 minutes and 45 minutes after the hour, Greenwich mean time. During these intervals, transmissions must cease in the bands 460 to 550 kc (652 to 545 m) and transmission of type B waves are forbidden.

Distress and urgent signals.—The international radio distress signal SOS indicates that a ship, aircraft, or other mobile station sending it is threatened by serious and imminent danger and requests immediate assistance. Many cases occur when the degree of danger is such as not to warrant the use of the SOS signal but assistance is required. The international urgent signal XXX has been provided for those cases to indicate that the calling station has a very urgent message to transmit concerning the safty of a ship, aircraft. or other mobile station or concerning the safety of some person on board or sighted from on board. Shipmasters are urged to refrain from the use of the SOS signal when the XXX signal will serve the purpose.

Priority of distress call.—The distress call shall have absolute priority over other transmissions. All stations hearing it must immediately cease all transmission capable of interfering with the distress traffic and must listen on the wave used for the distress call.

Distress call and message.—The distress call shall include the distress signal transmitted three times, the word DE and the call signal of the station in distress transmitted three times. The distress message shall follow as soon as possible; it shall include information regarding the position of the craft in distress, the nature of the distress, the nature of the help requested, and any further information which might facilitate assistance.

The distress call shall, as a general rule, be immediately preceded by the alarm signal. See below.

Repetition of distress call.—Any station which is not in a position to render assistance but which has heard a distress message for which acknowledgement of receipt has not immediately been given, must take all possible steps to attract the attention of stations which are in a position to furnish help.

In the United States, special instructions request that, if during distress traffic, it is evident that coastal radio stations are unaware of the disaster, some ship which is not taking an active part in the distress traffic, shall relay the distress message to the nearest Government or commercial shore station in order that the proper officials may be notified, that additional aid may be sent out from the coast, and that preparations may be made to receive survivors. In sending this message the greatest care must be taken not to interfere with the distress traffic; whenever possible the message should be sent on other than the distress wave.

Control of distress traffic.—The control of distress traffic shall devolve upon the station in distress or upon the station which for special reasons has sent the distress call. These stations may delegate the control of the distress traffic to another station.

Silence during distress traffic.—Any station which becomes aware of distress traffic must listen to this traffic even if it does not take a part in it. For the entire duration of distress traffic it shall be prohibited for all stations which are aware of this traffic and which are not taking part in it, either to use the distress wave of 500 kc (600 m) or the wave on which the distress traffic is taking place or to use type B waves.

Distress-signal interference.—The successful expedition of distress traffic requires the adherence of all the operators to the rules of procedure and non-interference. One of the most conspicuous difficulties in handling this traffic is the interference caused by the operator, who, no doubt, is anxious to assist, but by his efforts in trying to persuade another operator to maintain silence, is himself contributing to the confusion. It sometimes happens that several operators are trying to silence an operator that they feel is an offender while they themselves are offenders.

If one vessel is sending, when a distress signal is broadcast, it is easier to copy through her interference than add further interference by several vessels trying to stop her.

See page 25 for procedure to be followed to avoid distress-signal interference.

End of distress traffic.—A vessel having sent a distress call has started an extensive machinery of rescue, which not only extends to shipping within range but to Government agencies, and perhaps to the suspension of other traffic. So the responsibility devolves on such a ship to keep her position and condition known. Should her trouble become remedied, the fact should be immediately broadcast that radio traffic may be cleared and shipping proceed.

Urgent signal.—The urgent signal shall consist of the group **XXX** transmitted three times, with the letters or each group, as well as the consecutive groups well separated. The urgent signal shall have priority over all other communications except distress communications and all stations hearing it must take care not to interfere with the transmission of the message which follows the urgent signal. Stations hearing the urgent signal must listen for at least 3 minutes.

Alarm Signal.—The alarm signal shall consist of a series of 12 dashes sent in 1 minute, the duration of each dash being 4 seconds and the duration of the interval between dashes, 1 second. It may be transmitted by hand or by means of an automatic instrument. The only purpose of this special signal is to set automatic alarm apparatus into operation. It must only be used to announce that a distress call or message is to follow, or to announce the transmission of an urgent cyclone warning; in the latter case it can only be used by coast stations duly authorized by their government.

Safety signal.—The safety signal shall consist of the group **TTT**, transmitted three times, with the letters of each group, as well as the consecutive groups, well separated. This signal shall be followed by the word **DE** and three transmissions of the call signal of the station sending it. It announces that this station is about to transmit a message concerning the safety of navigation or giving important meteorological warnings.

REQUESTS FOR ASSISTANCE FROM VESSELS IN DISTRESS

Radio-equipped vessels in distress and requiring assistance should make use of the **distress signal SOS** or the **urgent signal XXX** as described on page 23. Services of the Coast Guard can be secured by using the radio call **NCU** "Any Coast Guard Unit" or by sending a message to any shore station addressed to Coast Guard. Shore radio stations will forward to the Coast Guard all information regarding vessels requiring assistance unless such information is contained in a message specifically addressed elsewhere.

Similarly a vessel sighting another vessel in distress may send the distress signal **SOS** or make a report of the facts by use of the urgent signal **XXX**, or the radio call **NCU** "Any Coast Guard Unit," or by calling direct any commercial or Government radio station which is capable of transmitting on 500 kc (600 m).

Such requests for assistance should be transmitted on the international distress wave 500 kc (600 m). See page 23. Small craft

can request assistance from the Coast Guard by using the frequency 2,670 as noted on page 26.

Any or all radio stations will forward such requests for assistance to the appropriate assisting agencies.

Information desired in requests for assistance.—If the following information is included in the original request for assistance, it will place the responsible Coast Guard officer in a position to determine immediately the types and number of vessels required to render adequate aid, thus greatly facilitating the work of the Coast Guard and avoiding any unnecessary delay in the dispatch of assistance.

1. Name, type, and nationality of vessel.
2. Position, course, and speed (including drift).
3. Nature of trouble and condition of vessel, sea, and wind.
4. Number of persons on board.
5. State whether or not Coast Guard assistance is required.

Recommended procedure for securing assistance and **avoiding distress traffic interference.**—As a result of conferences on distress traffic communications, the United States Coast Guard has adopted a recommended course of action, based on International Radio Regulations and established practice, to be taken by radio-equipped vessels in order to get assistance as quickly as possible. This recommended procedure is as follows:

When in distress.—Transmit your distress message on the international distress wave (see p. 23), giving all information which will leave no doubt as to your trouble and position. Approximately 10 minutes after the transmission of the original distress message, the ship in distress is requested to transmit slowly on the distress wave, "MO" and its own call signal for 3 minutes. This will enable ships and radio direction-finder stations in the vicinity to take radio bearings and to plot accurately the position of the distressed ship, thereby permitting assistance to be dispatched without difficulty and delay.

When another is in distress:

1. *Give absolute priority* to distress call and messages relating thereto.
2. *Cease all transmissions* capable of interfering with the conduct of distress communications.
3. Maintain *absolute silence* if within range and not actually taking part in the conduct of distress communications.
4. Concentrate attention on the distress case and *intercept all information possible.*
5. If unquestionably in vicinity of distressed vessel, *acknowledge receipt* of the distress message, if received, *giving your position* to the vessel in distress, stating action being taken.
6. Be extremely careful *not to interfere* with stations more favorably situated to handle the case.
7. Do not try to silence other units, i. e. "QRT", *unless you are in control.*

The vessel in distress controls: Permit him to handle the situation without being interferred with. The vessel in distress may delegate this control to some other station more favorably situated. Do not interfere with the station lawfully controlling the situation.

In Minor Cases of distress or other trouble.—Use the urgent signal **XXX,** or the general call for any Coast Guard Unit **NCU.**

United States Coast Guard Form 800–D is a card form covering the above recommended procedure. It is designed to be posted on the bridge and in the radio room of radio-equipped vessels; copies of this card can be obtained upon request from the Commandant, United States Coast Guard, Washington, D. C.

Small commercial and private craft, equipped with radio, may obtain the assistance of the Coast Guard by transmitting the distress message on the frequency 2,670 kc (112 m). The Coast Guard stands continuous watch on 2,670 kc (112 m) and will answer emergency calls made thereon. This distress frequency is employed, in addition to the 500 kc (600 m), because a suitable antenna is more easily accommodated on small craft than the relatively long aerial required for efficient operation at the lower frequency.

Small craft and airplanes, not equipped with radio, may obtain the assistance of the Coast Guard off the coast of Florida and along the Gulf coast by following the procedure given on page 20.

RADIOTELEGRAPHIC WEATHER BROADCASTS

Forecasts and general weather information are broadcast daily by the United States Weather Bureau from a number of Government and commercial radio stations for the benefit of marine, aviation, and commercial interests. Storm and hurricane warnings are broadcast whenever issued.

Storm warnings and **notices concerning the safety of navigation at sea** of an urgent nature are broadcast by United States naval radio stations (those whose call sign commence with N) immediately upon receipt and repeated hourly thereafter for a period of 12 hours or until superseded. Similar broadcasts are made by Ensenada, P. R. (via WPR).

Complete details relative to this service are published in circulars issued by the Weather Bureau, which, together with a card descriptive of storm warnings, may be obtained upon application to any United States Weather Bureau office. Details are also given in Hydrographic Office Publication No. 205, Radio Aids to Navigation. These publications give the schedules with times and frequencies of all broadcasts, together with tables for decoding as needed.

The General broadcast schedules are:

Washington, D. C. (via NAA and NSS).—A major marine bulletin, issued twice daily by the United States Weather Bureau, contains forecasts, warnings, atmospheric pressure distribution, and surface weather observations for the regions of the Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea, suitable for preparing weather maps at sea. This bulletin is rebroadcast by San Juan (via NAU). Base charts for the preparation of weather maps at sea will be supplied free by the United States Weather Bureau to masters of vessels who regularly take and forward weather observations to the Bureau or to the Hydrographic Office, United States Navy.

In addition to the above, the Arlington station (NAA) also broadcasts twice daily a North American Continental Weather Report (Angot Bulletin). This bulletin begins with the words "Angot Paris" and is in the new International Code.

It contains surface observations for the United States, Canada, the Atlantic Ocean, the Gulf of Mexico, and the Caribbean Sea.

San Juan, P. R. (via NAU).—A weather bulletin is broadcast daily during the period July 1 to November 15, inclusive, containing weather reports from stations in the West Indies, followed by weather forecasts, storm warnings, and a synopsis of atmospheric

pressure distribution. Hurricane warnings and advisory messages are broadcast whenever issued. The Washington Major Marine Bulletin is rebroadcast by this station.

Guantanamo Bay, Cuba, (via NAW).—The San Juan bulletin is rebroadcast from this station and hurricane warnings and advisory messages are broadcast whenever issued.

Local weather forecasts and information are broadcast from numerous stations along the Atlantic and Gulf coasts and about the Caribbean Sea. Stations making such broadcasts, together with full advice regarding the same, are listed in the Hydrographic Office Publication No. 205, Radio Aids to Navigation, and other publications noted under **Radio References** on page 21.

Tropical Storms.—During the hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea, and Southern North Atlantic Ocean are urged to cooperate with the United States Weather Bureau in order that more complete information may be supplied to ships and for the purpose of warning the inhabitants of coastal areas.

Reports should be sent when a storm is encountered or when the presence or formation of one is suspected. The nearer the ship is to the center of the storm, the more valuable is the radio weather report. It is realized that in such a situation the master and his officers are occupied with the duties of navigating the ship, but the dispatch of an observation by radio under those weather conditions may result in timely advices to other ships at sea and in warnings to the inhabitants of islands and coastal communities where life and property are in jeopardy.

These reports should be sent in the New International Code, form 5, preceded by the ship's name, but unsigned. Messages should be checked collect, and when in the Atlantic Ocean north of latitude 35° N., the observations should be addressed "Observer, Washington"; in the Gulf of Mexico, Caribbean Sea, and the Atlantic Ocean south of latitude 35° N., they should be addressed "Observer, Jacksonville." If a copy of the International Meteorological Code is not on shipboard it will be found in Hydrographic Office Publication No. 205, Radio Aids to Navigation, or a copy may be obtained on application to the United States Weather Bureau, Washington, D. C. If code is impracticable, the message may be sent in plain language, giving the ship's position, Greenwich time of observation, direction and force of the wind, state of the weather, and barometer reading.

Weather reports should not be sent when weather conditions are normal, except by ships with which specific arrangements have been made by the United States Weather Bureau.

RADIOBEACONS AND DISTANCE FINDING

The United States Lighthouse Service operates a system of radio beacons, established along the United States coasts. This system has recently been coordinated with that of the Lighthouse Administration of Canada in order that the methods of operating the radiobeacon system of the United States and Canada might become more effective. In order to facilitate the widest utilization of this system of navigational aids, there are issued at intervals radiobeacon charts,

upon which the radio beacons are shown, with their characteristics and operating schedules. These charts may be obtained free from the offices of the District Lighthouse Superintendents.

Radiobeacons are the most valuable fog signals and are also available for navigation in clear weather. All radiobeacons operate during fog or low visibility; also in clear weather during scheduled intervals. The clear weather schedules are given in the Light Lists, Hydrographic Office Publication No. 205, and other Radio References.

The radiobeacons in or near the area covered by this volume are given in the following table:

Radiobeacons

Station	Latitude N.		Longitude W.	
	°	′	°	′
Dry Tortugas Light Station, Fla	24	38	82	55
Egmont Key Light Station, Fla	27	36	82	46
Sand Island Light Station, Ala	30	11	88	03
South Pass West Jetty Range Front Light Station, La	28	59.5	89	08.5
Southwest Pass East Jetty Fog Signal Station, La	28	54	89	26
Sabine Pass Light Station, La	29	43	93	51
Heald Bank Lightship, Tex	29	06	94	12
Galveston Jetty Light Station, Tex	29	19.5	94	41.5
Aransas Pass Light Station, Tex	27	52	97	03.5
Cristobal Mole, Canal Zone	9	21.5	79	55

For details as to frequencies, geographic positions, signals, and thick and clear weather transmission, see Light List—Atlantic Coast, United States, of the Lighthouse Service or Hydrographic Office Publication No 205. Changes are announced in the Notices to Mariners.

These radiobeacons are intended for the use of vessels equipped with radio compasses; radiobeacons are now recognized to be all-weather aids to navigation as well as fog signals. While the use of radiobeacons should not lead a mariner to neglect other precautions such as the use of the lead, etc., during thick weather, the bearings will greatly reduce the dangers incident to navigation in the fog.

The bearing of the radiobeacon may be determined with an accuracy of approximately 2° and at distances considerably in excess of the range of visibility of the most powerful coast lights. The apparatus is simple and may be operated by the navigator without the assistance of a radio operator or with the knowledge of the telegraph code. The radio direction-finding apparatus consists of a radio receiving set, similar in operation to those used for radiotelegraph or radiotelephone reception, and a rotatable coil of wire in place of the usual antenna. By rotating the coil the intensity of the signal received from the transmitting station is made to vary, and by noting the position of the coil when the signal is heard at its minimum intensity, the bearing of the transmitting station is readily obtained.

It is important to note that the bearing of an incoming radio wave is subject to errors not unlike the deviation of the magnetic compass. Those using radio direction-finding apparatus aboard ship are cautioned to bear these errors in mind and to keep the radio

compass calibrated at all times. This may be done during clear weather by comparing the bearing obtained with the radio compass with the bearing as obtained by visual methods in general use. All radio bearings are subject to what is called "night effect", a variable error sometimes experienced near nightfall and sunrise. The uncertainty due to this cause may be lessened by taking repeated radio bearings.

The signals from the radio beacons have definite characteristics for identifying the station, and bearings may be obtained with even greater facility than sight bearings on visible objects. At some of the stations the radio and sound signals are synchronized for distance-finding purposes as explained under the following heading.

Distance Finding.—Radiobeacon stations that are equipped for distance finding transmit a special radio signal and sound a corresponding air or submarine signal at the same period of time. Thus, whenever the sound signal of a radiobeacon distance-finding station is operating, there is transmitted at the end of the radiobeacon minute of operation (1 minute out of every 3) a group of two radio dashes (a short dash and a long dash), 1 second and 5 seconds, respectively; and a group of two sound signals of corresponding length is sounded at the same time. These signals are uniformly the same for all the distance-finding stations, except that the long fog signal blast and corresponding long radio dash may be made as short as 3 seconds where desired. They are entirely distinctive and should not be confused with the characteristic signals which identify the stations.

The reception of the sound signal by a vessel will be delayed, depending upon the distance the sound has to travel; whereas the radio signal will be received practically instantaneously. This delay is measured by observing the time that elapses between hearing a part of the group of radio dashes and the corresponding part of the group of sound blasts, say the end of the long radio dash and the end of the long sound blast. This elapsed time in seconds (time interval of sound travel in air), divided by 5 (or more exactly 5.5), gives the approximate distance in nautical miles the observer is off the radiobeacon. The error of such observations should not exceed 10 percent.

The 1-second dash preceding the long dash is a stand-by signal, as is also the 1-second blast. The latter serves as an identification signal to assure the observer that he is taking time on the correct sound signal blast.

Where the submarine oscillator is synchronized with the radiobeacon, the method of distance finding is the same excepting that the interval of time in seconds (sound travel in water) is divided by 1.25 to obtain the distance in nautical miles.

Along the Gulf Coast the radiobeacons have been synchronized with sound signals for distance finding at the following stations:

South Pass, West Jetty.
Southwest Pass, East Jetty.
Heald Bank Lightship.

For further details, see Light Lists, published by the United States Lighthouse Service and other radio references.

Radio bearings from other vessels.—Any vessel equipped with a radio direction finder can give a bearing to a vessel equipped with a radio

transmitter. Such service will generally be furnished when requested, particularly by Government vessels. 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. Any radio station, the position of the transmitter of which is definitely known, may serve as a radio beacon for vessels equipped with a radio direction finder. However, mariners are cautioned that stations established especially for maritime service are more reliable and safer for use by the mariner, for numerous reasons.

Many navigators are using the ship's radio direction finder as a help in avoiding collision in fog, detecting with it the presence and observing the direction of approaching vessels.

Caution in approaching lightships.—The attention of mariners is directed to the serious dangers which may arise from the misuse of radio signals, and particularly to the danger of collision with lightships operating such signals. The mariner, who in thick weather approaches a radiobeacon directly ahead on a radio bearing and relies on hearing the fog signal in sufficient time to alter course to avoid danger, is taking an unjustifiable risk. The vagaries of sound fog signals are well known, and warnings regarding them are widely printed; such signals may not be heard with certainty in time to avoid collision. Safety demands that all precautions be taken in approaching lightships. The risk of collision can be avoided by getting the radiobeacon on the bow, taking successive bearings, and ensuring that the radio bearing does not remain constant; the angle between the course and the radiobeacon should increase for a vessel passing clear.

Nearly half of the radiobeacons on the coasts of the United States are placed on lightships, and these radio signals provide valuable marks for approaching the coasts and ports. In using radio bearings for approach, it is important that the courses at all times be set to pass safely clear. Radiobeacons offer to navigators a convenient means of checking this by methods well known in ordinary navigation, but sometimes overlooked in navigation by radio bearings. The navigator may check his position with respect to the lightship radiobeacon when steering to pass to one side, by taking successive radio bearings and using these with the intervening distances run, to ascertain the distances off from time to time. Radio cross bearings should also be taken, and the effect of currents should not be overlooked. Where warning radiobeacons and direct distance finding facilities are provided, they should be utilized. Soundings should not be neglected, as a few soundings in connection with a radio bearing or a chain of soundings alone usually give an excellent position. See Soundings and Echo Soundings, page 349.

The caution as to passing lightships at a safe distance, and approaching them using all care, of course applies to all lightships, whether or not they are provided with radiobeacons, and it applies also to radiobeacons at lighthouses which may be approached close-to.

In preparing these notes, advantage has been taken of many reports from practical mariners, who systematically make use of radio direction finders or radio-compasses in navigation, and it is appreciated that great interest is already taken in the problems of radiobeacon navigation. Further suggestions and reports on these subjects are

invited, and may be sent to the Commissioner of Lighthouses, Washington, D. C.

The Nantucket Lightship is equipped with a warning radiobeacon. (See Light List, Atlantic Coast.)

RADIO DIRECTION-FINDER STATIONS

United States naval direction-finder stations will furnish radio bearings to mariners of all vessels equipped with radiotelegraphic transmitters. While the use of these bearings should not lead a mariner to neglect other precautions, such as use of the lead, etc., during thick weather, these bearings will greatly reduce the dangers incident to navigation in the fog.

Accuracy of bearings.—The accuracy with which bearings can be taken depends on various conditions and, while bearings taken by a station can generally be considered accurate to within 2°, the Government cannot accept any responsibility for the consequences of a bearing being inaccurate.

In the case of bearings which cut the coast line at an oblique angle, errors of from 4° to 5° have been reported. Bearings obtained between about one-half hour before sunset and one-half hour after sunrise are occasionally unrelibale. It is probable that the accuracy of a bearing is also affected if the ship's transmitting instrument is not adjusted to the correct wave length. Bearings signaled as "approximate" or "second class" should be regarded with suspicion as being subject to considerable error. The maximum distance for which bearings from these stations are accurate is 150 miles.

Direction-finder stations used as radio beacons.—A naval direction-finder station when used as a radio beacon transmits upon request, its call sign for 45 seconds on 375 kilocycles (800 m).

For further information regarding radio bearings and radio-direction-finding stations see the Light Lists of the United States Lighthouse Service or Hydrographic Office Publication No. 205, Radio Aids to Navigation.

The following list of naval radio direction-finder stations will be of use to vessels navigating the approximate limits of this volume; these stations are noted on the charts by the symbol "N. R. C."

Naval radio direction-finder stations

Station (call letter)	Lat. N.			Long. W.		
	°	′	″	°	′	″
Galveston, Tex. (NKB)	29	20	01	94	45	13
South Pass (Port Eads), La. (NBX)	29	00	43.2	89	09	32.6

CONVERSION OF RADIO BEARINGS TO MERCATOR BEARINGS

The increasing use of radio directional bearings for locations of ships' positions at sea, especially during foggy weather, has made it particularly desirable to be able to apply these radio bearings taken on shipboard or sent out by the shore stations directly to the nautical chart. These radio 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 of a meridian would be represented on a

Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on his 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.

On page 33 is given a table of corrections for the conversion of a radio bearing into a Mercator bearing. 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 or direction-finder stations and of the ship by dead reckoning. The latter is scaled from the chart, and the former either scaled from the chart or taken from the list of radiobeacon and radio direction-finder stations found in the Light Lists published by the United States Lighthouse Service or Hydrographic Office Publication No. 205.

The table is entered with the difference 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.

When bearings are taken from the ship, 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 is 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° should be added to 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 radio bearings, a retrial should be made, using the new value as the position of the ship.

If the bearing is from a radio direction-finder station ashore, the sign of the correction will be reversed to that given when the bearing is taken from the ship.

Example.—A ship in latitude 39°50′ N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon of the Nantucket Shoals Lightship, located in latitude 40°37′ N., and longitude 69°37′ W.

Radio beacon station	Latitude, 40°37′ N.
Dead reckoning position of ship	39 50
Middle latitude,	40 14

Radiobeacon station	Longitude, 69°37′ W.
Dead reckoning position of ship	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.

The ship being east of the radiobeacon, the correction is minus. The Mercator bearing will then be 299° − 0°39′ = 298°21′. To facilitate plotting, add 180° and plot from Nantucket Shoals Lightship,

thus; 298°21′+180°=478°21′ or 118°21′, which true bearing should be laid off from the plotted position of Nantucket Shoals Lightship.

Table of corrections, in minutes

[Difference of longitude in degrees]

Mid. L.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
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	147	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

RADIO NAVIGATIONAL WARNINGS

In general, radio broadcasts of navigational warnings contain information of importance to the safety of navigation, such as the position of ice and derelicts, defects and changes to aids to navigation, advice about mine fields, etc.

In the United States, radio navigational warnings are compiled by the Hydrographic Office, Navy Department, and by the Bureau of Lighthouses, Department of Commerce. Those issued by the Hydrographic Office commence "Govt. Hydro." and end "Hydro"; those issued by the Bureau of Lighthouses commence "Govt. USLHS" and end "United States Lighthouse Service." Broadcasts frequently include warnings issued by both offices.

Scheduled broadcasts of navigational warnings are given in the Hydrographic Office Publication No. 205, Radio Aids to Navigation; a summary of such schedules is included in a sheet issued from time to time by the Hydrographic Office listing broadcasts of United States naval radio stations.

Major hydrographic broadcasts, generally covering the Atlantic and Gulf coasts of the United States, are sent out daily by Washington through Arlington (NAA) and Annapolis (NSS). Local broadcasts, for particular areas, are made from stations listed below. **Emergency broadcasts** are made immediately upon receipt of information regarding imminent dangers. Such emergency broadcasts are repeated hourly for a period of 12 hours or until superseded.

The masters of every ship, which meets with dangerous ice, a dangerous derelict, a dangerous tropical storm, or any other direct dangers to navigation, should communicate the information, by all the means of communication at their disposal, to ships in the vicinity and also to the competent authorities at the first point of the coast with which they can communicate.

Local Hydrographic Broadcasts

Station	Area covered by local broadcast
Boston, Mass. (NAD)	South of Lat. 45°00′ N. and north of Point Judith and Nantucket Shoal Lightship.
New York, N. Y. (NAH)	Lat. 42°00′ N. to Lat. 38°30′ N.
Norfolk, Va. (NAM)	Lat. 39°00′ N. to Lat. 33°00′ N.
Charleston, S. C. (NAO)	Lat. 35°00′ N. to Lat. 27°00′ N.
Key West, Fla. (NAR)	Coast of Florida east of Long. 85°00′ E. (except east coast north of Lat. 29°00′ N.) and important notices for Gulf of Mexico.
San Juan, P. R. (NAU)	Caribbean Sea north of Lat. 15°00′ N. and West Indian waters generally.
Pensacola, Fla. (NAS)	Gulf of Mexico.
Galveston, Tex. (NKB)	Gulf of Mexico.

MEDICAL ADVICE BY RADIO

Arrangements are made in various countries whereby mariners of all nationalities may obtain medical advice by radio. Requests for medical advice of an urgent nature should be preceded by the urgent signal in order to give them priority over all other radio traffic except distress communications. The International Code of Signals, 1931, contains a medical section. By use of this code in communicating with foreign stations, difficulties of language may be avoided. The case-stating system in this medical section gives the nature of the information which should be included in the request for medical advice. Whether the message is to be sent in code or plain language, it is recommended that the mariner read this section before preparing his message.

Free medical advice by radio may be obtained direct from the following stations of the United States Public Health Service. United States governmental and commercial radio stations will transmit free messages addressed to any of these stations. In order to avoid confusion and to make the practice uniform, replies will be signed "Marine Hospital No. —", or "Public Health Service Relief Station No. —", as the case may be. These hospitals and relief stations have copies of the International Code of Signals, 1931, for

use in communicating with ship masters who are unable to use the English language.

ATLANTIC COAST:
New York, N. Y., United States Marine Hospital.
Stapleton, N. Y., United States Marine Hospital.
GULF OF MEXICO:
Key West, Fla., United States Marine Hospital.
Port Arthur, Tex., United States Public Health Service Relief Station.
Galveston, Tex., United States Marine Hospital.

Coastal stations operated by the Radiomarine Corporation of America offer free medical message service to ships.

The messages are sent to the nearest United States marine hospital, or in some cases where there is none in the vicinity, to private physicians.

No radio charges are made on such messages when they are prefixed "DH Medico."

Stations of the Radiomarine Corporation are listed below:

Chatham, Mass. (WCC).
Chatham, Mass. (WIM).
Chatham, Mass. (WCM).
New London, Conn. (WSA).
Brooklyn, N. Y. (WNY).
Tuckerton, N. J. (WSC).
Savannah, Ga. (WSV).
Palm Beach, Fla. (WAX).
Galveston, Tex. (WGV).
Port Arthur, Tex. (WPA).

The United Fruit Co., Tropical Radio Telegraph Co., and affiliated companies have established a free medical service which is available to ships.

Mariners desiring to avail themselves of this service should use whichever of the following addresses is appropriate:

UNIFRUITCO Miami (Fla.).
UNIFRUITCO Preston (Cuba).
UNIFRUITCO New Orleans (La.).
UNIFRUITCO Puerto Barrios (Guatemala).
TELARAILCO (Tela, Honduras).
TRURAILCO (Truxillo, Honduras).
UNIFRUITCO Puerto Limon (Costa Rica).
UNIFRUITCO Almirante (Panama).
UNIFRUITCO Santa Marta (Colombia).

In addition to the above, all passenger steamers of the United Fruit Co. carry doctors, and free medical advice may be obtained from any of them by addressing a radiogram to "Ship's Doctor", followed by the name of the steamer.

In cases of emergency, free medical advice may be obtained by ships at sea by radio from the Panama Canal, through the radio stations at Gatun, Balboa, or Cape Mala. Such message should be addressed: "Govt. C. B., Medico, Pancanal", state briefly and clearly the symptoms to be treated, and be signed by the master.

Medical advice radiograms must be checked and sent "DH Medico." Such radiograms will be given preference over all messages except SOS calls.

Medical advice will be phrased in language intelligible to the layman. Complete details relative to the service furnished by all companies is published in the manual, Ship Sanitation and First Aid, issued by the Seaman's Church Institute of New York. This manual contains diagrams and a list of symptoms to be considered in preparing messages.

In addition to the above, current information on this subject can be secured by referring to the Hydrographic Office Publication No. 205, Radio Aids to Navigation.

WEATHER

Fog.—From November to April, inclusive, fog may occasionally be encountered near the coast at any point between San Carlos Bay and the Rio Grande. It is most dense in the vicinity of the harbor entrances, and the prominent points, such as Cape San Blas. Usually southerly winds bring it in, and northerly winds clear it away. See also the meteorological tables in the appendix.

The following table shows the number of hours per month that the fog signals were operated at the stated light stations on the Gulf coast of the United States during 1924. Although similar data are not available for a later date, the table indicates the possible monthly distribution of fog which may be an important consideration. The right-hand column in the table below gives the yearly averages for a number of years prior to 1929.

Hours of Fog at Gulf Coast Light Stations

Light station	January	February	March	April	May	June	July	August	September	October	November	December	Total 1924	Yearly average
Egmont Key, Fla	3	2	0	0	0	0	0	0	0	0	0	39	44	78
Merrill Shell Bank, Miss	57	30	48	27	0	0	0	0	0	56	89	133	440	227
Lake Borgne, Miss	53	7	3	11	0	0	0	0	0	24	34	90	222	208
New Canal, La	50	33	30	26	0	0	0	0	0	35	68	21	263	283
Chefuncte River, La	26	13	6	19	0	0	0	3	0	17	63	105	249	258
Pass Manchac, La	32	18	20	12	0	0	0	0	0	32	95	134	343	233
Amite River, La	36	17	34	29	0	0	0	0	16	77	79	114	402	257
South Pass Lightship	83	57	98	138	0	0	0	0	0	0	56	54	486	448
South Pass Jetty	88	99	112	175	0	0	2	2	2	2	77	64	621	----
Head of Passes, La	103	101	120	81	3	3	4	4	0	6	99	43	567	528
Cubits Gap, La	121	121	137	214	8	9	2	2	4	7	150	105	880	679
Bayou Villars, La	65	32	34	24	3	0	2	6	22	151	204	54	597	278
Timbalier, La	15	6	10	16	0	0	0	0	0	0	2	17	66	----
Ship Shoal, La	29	24	56	50	0	0	0	0	0	17	65	41	282	147
Point Au Fer Reef, La	63	40	43	21	0	0	0	2	0	5	52	61	285	292
Heald Bank Lightship	18	36	82	77	0	0	0	0	0	2	0	50	265	217
Galveston Jetty, Tex	65	32	105	100	6	7	5	8	13	182	76	85	684	522
Galveston Harbor, Tex	46	25	68	63	3	0	0	0	0	177	60	83	525	313
Red Fish Bar Cut, Tex	51	13	61	0	0	0	0	0	0	92	51	66	334	----

Northers.—From November to April, northers blow from northwest and north with considerable violence; their duration is from 1 to 4 days, the latter being exceptional. They occur more frequently, and are more strongly marked, along the coast of Texas than eastward; but their general characteristics are alike all over the Gulf of Mexico.

The indications of an approaching norther are invariably a slightly falling barometer, generally not more than 0.20 inch, and lowering temperature; it begins with a violet squall, during which the temperature may drop 20° in 10 minutes. After the first squall the wind gradually increases to a fresh gale, but does not reach its maximum velocity until after the barometer has begun to rise, and it will generally blow with full force for at least 24 hours. Sometimes the temperature drops to as low as 18° F. Some northers are dry—that is, unattended by precipitation—others are attended by cold rain, that may turn into sleet or snow.

Northers along the Gulf coast are not dangerous for large vessels, but small vessels are sometimes blown offshore. They affect, however, the depth of water in the harbors and on the bars by blowing

the water offshore, in some cases lowering the water by as much as 4 feet. This should be borne in mind by vessels attempting to enter the harbors on the Gulf coast, during or soon after a norther. Currents in narrow channels and in the Gulf are also greatly affected by northers.

Southeast gales are dangerous to shipping along the Gulf coast of the United States, westward of Apalachee Bay. They may occur at any time of the year, but are most dangerous in winter and early spring. During a heavy southeaster, the bars at the entrances to the harbors are made impassable for deep-draft vessels, on account of the heavy sea which breaks in depths of about 4 fathoms. The usual local indication of a southeaster is a breeze freshening at east-northeast or east, and hauling southward, accompanied by a falling barometer, a rising temperature, and an increasing swell. The lowest reading of the barometer is usually reached immediately after the wind gains its maximum velocity at southeast. When the wind hauls southward of southeast it is an indication that the gale is breaking, which is usually followed by heavy squalls; as it hauls westward of south, first rain squalls, and then clearing weather, may be expected unless, as is sometimes the case, the southeaster be followed by a norther. Southeast gales raise the water in the harbors along the Gulf coast, in some cases, to a height of 6 feet above the normal. Along the western coast of Florida, from Cape Romano to Apalachee Bay, southeast gales are not so dangerous to shipping; vessels can anchor in shoal water under the lee of the land and hold on until the gale abates.

STORM WARNINGS

Storm warnings are displayed by the United States Weather Bureau at numerous places on the coasts of the United States and the Great Lakes.

Small-craft warning.—A red pennant indicates that moderately strong winds that will interfere with the safe operation of small craft are expected. No night display of small-craft warnings is made.

Northeast storm warning.—A red pennant above a square red flag with black center displayed by day, or two red lanters, one above the other, displyed by night, indicate the approach of a storm of marked violence with winds beginning from the northeast.

Southeast storm warning.—A red pennant below a square red flag with black center displayed by day, or one red lantern displayed by night, indicates the approach of a storm of marked violence with winds beginning from the southeast.

Southwest storm warning.—A white pennant below a square red flag with black center displayed by day, or a white lantern below a red lantern displayed by night, indicates the approach of a storm of marked violence with winds beginning from the southwest.

Northwest storm warning.—A white pennant above a square red flag with black center displayed by day, or a white lantern above a red lantern displayed by night indicates the approach of a storm of marked violence with winds beginning from the northwest.

Hurricane, or whole gale warning.—Two square flags, red with black centers, one above the other, displayed by day, or two red lanterns, with a white lantern between, displayed by night, indicate

the approach of a tropical hurricane, or one of the extremely severe and dangerous storms which occasionally move across the Great Lakes and Atlantic coast.

These warnings are displayed at all stations on the Atlantic and Gulf coasts of the United States and at the following points about the Caribbean Sea:

Bermuda.
Habana, Cuba.
Guantanamo, Cuba.
Kingston, Jamaica.
Turks Island.
Port au Prince, Haiti.
Puerto Plato, Dominican Republic.
Puerto Rico (at numerous ports about the island).
St. Thomas, Virgin Islands.
St. Kitts Island.
Dominica Island.
Martinique Island.
St. Lucia Island.
St. Vincent Island.
Barbados Island.
Grenada Island.
Trinidad Island.
Curacao.
Bluefield, Nicaragua.
Belize, British Honduras.

The following are the **storm warning display stations** within the limits covered by this volume, "(n)" indicating that night signals are also displayed:

Florida:
- Apalachicola (n).
- Bagdad.
- Bocagrande.
- Carrabelle (n).
- Cedar Keys.
- Egmont Key.
- Everglades.
- Fort Myers (n).
- Fort Walton.
- Key West, corner Caroline and Elizabeth Streets.
- Key West, 611 Front Street.
- Key West, foot Duval Street (n).
- Palmetto.
- Panama City (n).
- Pensacola (n).
- Pensacola Bay Entrance.
- Pensacola Bay Air Station (n).
- Port St. Joe.
- Port Tampa (n).
- Punta Gorda.
- Punta Rasa.
- St. Petersburg (n).
- Sarasota.

Florida—Continued.
- Tampa.
- Tampa, Sedden Island (n).
- Tarpon Springs (n).
- Valparaiso.

Alabama:
- Fort Morgan.
- Mobile, Turner Terminals.

Mississippi:
- Bay St. Louis (n).
- Biloxi (n).
- Gulfport (n).
- Pascagoula (n).
- Pass Christian (n).
- Ship Island, Light Station.

Louisiana:
- Burrwood.
- Grande Isle.
- Morgan City (n).
- New Orleans.
- New Orleans, Jahnke Dry Dock (n).
- New Orleans, West End.
- Pilottown. (n).
- Port Eads.
- Slidell.

Texas:
- Aransas Pass.
- Corpus Christi.
- Flour Bluff.
- Freeport (n).
- Galveston, Quarantine Station (n).
- Heald Bank Light Vessel.
- Laporte.
- Matagorda (n).
- Orange.
- Palacios (n).
- Port Isabel (n).
- Port Aransas.
- Port Arthur (n).
- Port Lavaca (n).
- Port O'Connor.
- Rockport.
- Sabine.
- Seabrook.
- Seadrift.
- Shore Acres.
- Texas City, Terminal Co.'s elevator.

Weather forecasts are communicated to but no display made at Houston, Tex., and South Boca Grande and Clearwater, Fla. Storm warnings for the Lake Okeechobee district are similarly communicated to Belle Glade, Clewiston, and Sherman, Fla.

Officers of the United States Weather Bureau are maintained at Key West, Tampa, Pensacola, Mobile, New Orleans, Port Arthur, Galveston, Corpus Christi, and Brownsville. Any available information regarding weather conditions can be secured at these offices and barometer comparisons can be made with standards.

WEST INDIA HURRICANES

Tropical cyclones of the North Atlantic Ocean are usually designated as West India hurricanes, but actually many of these storms originate and die out far from the mainland and hundreds of miles from the West Indies. The storm area varies from about 100 miles to 500 or more miles in width, with a comparatively calm center some 10 or 20 miles in diameter. This center is an area of lowest atmospheric pressure around which the wind blows in a more or less circular course (spirally) in a direction contrary to the hands of a watch. In some respects the center, or "eye" is the most dangerous part of the hurricane and is therefore a region especially to be avoided; for although the air movement within it, if any, is usually light and fitful, the seas in this area in most cases are very heavy and confused, rendered so by the shifting violent winds surrounding it. The storm field advances in a straight or curved track, sometimes with considerable speed, at other times at a very slow rate. The highest rates of progression usually occur when the storm moves northward or northeastward over the United States, or in middle or higher latitudes over the ocean. The average speed is about 12 or 15 miles an hour.

Hurricanes form over a wide range of the ocean between the Cape Verde and the Windward Islands, over the western part of the Caribbean Sea, and in the Gulf of Mexico. While some move northward in the beginning, especially those that originate southeast of Bermuda, the majority take a westerly to northwesterly course. Of these some curve gradually northward, either to the eastward of or above the larger islands of the West Indies, then turn northeasterly or easterly near to or at considerable distance from the Atlantic coast of the United States. Others pass over or south of the greater islands and enter the Gulf of Mexico; thence curve northward or northeastward and strike some part of the east Gulf coast or continue to the westward and strike the west Gulf coast. Tracks of hurricanes are shown on the pilot charts of the North Atlantic Ocean and Central American waters, published monthly by the United States Hydrographic Office.

The hurricane season is likely to begin in June and close with November. The months of greatest frequency are August, September, and October. Hurricanes are most likely to be severe during August and the early half of September. During all the months of the season, however, the possibilities of encountering an intense storm are sufficiently great to warrant the mariner in keeping careful watch of the weather elements while in these waters.

Signs of approach.—One of the earliest signs of a hurricane is the appearance of high cirrus clouds which converge toward a point on the horizon that indicates the direction of the center of the storm. The snow-white fibrous mares' tails appear when the center is about 300 or 400 miles distant. Another usual early indication is a long, heavy swell propagated to a considerable distance, sometimes 2 or 3 days in advance, when there is no intervening land to interrupt it. This swell comes from the general direction in which the storm is approaching. There is usually a slight rise of the barometer at the outset, followed by a continuous fall. In front of the storm, if it is advancing in some westerly direction toward the observer,

the winds blow from a northerly point (northeast, north, or northwest); if in some northerly direction toward the observer, they will blow from an easterly point (southeast, east, or northeast). A further indication is a rough, increasing sea. If one or more of these signs be wanting, there is little cause for anticipating a hurricane.

As the storm center approaches the barometer continues to fall; the velocity of the wind increases and blows in heavy squalls, and the changes in its direction become more rapid. Rain in showers accompanies the squalls, and when closer to the center the rain is continuous and attended by furious gusts of wind; the air is frequently thick with rain and spume drift, making objects invisible at a short distance. A vessel on a line of the hurricane's advance will experience the above disturbances, except that as the center approaches the wind will remain from the same direction, or nearly so, until the vessel is close to or in the center.

Distance from center.—The distance from the center of a hurricane can only be estimated from a consideration of the height of the barometer and the rapidity of its fall, and the velocity of the wind and rapidity of its change in direction. If the barometer falls slowly and the wind increases gradually it may be reasonably supposed that the center is distant; with a rapidly falling barometer and increasing winds the center may be supposed to be approaching dangerously near.

Practical rules.—When there are indications of a hurricane, vessels should remain in port or seek one if possible, carefully observing and recording the changes in barometer and wind and taking every precaution 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 the sea room to maneuver so as to avoid the storm track and should use every endeavor to make a harbor or stand out of the straits to obtain sea room. Vessels unable to reach port and having sea room to maneuver should observe the following rules:

When there are indications of the near approach of a hurricane, sailing vessels should heave to on the starboard tack and steamers remain stationary and carefully observe and record the changes in wind and barometer so as to find the bearing of the center and ascertain by the shift of wind in which semicircle the vessel is situated. The safety of the vessel often depends on heaving to in time.

Bearings of center.—Facing the wind, the storm center will be 8 to 12 points to the right; when the storm is distant it will be from 10 to 12 points, and when the barometer has fallen five- or six-tenths it will be about 8 points.

A line drawn through the center of a hurricane in the direction in which it is moving is called the axis or line of progression, and facing in the direction of its path the semicircle on either side of the axis is called, respectively, the right-hand or dangerous semicircle and the left-hand or navigable semicircle.

To find in which semicircle the vessel is situated:

If the wind shifts to the right, the vessel will be in the right-hand or dangerous semicircle with regard to the direction in which the storm is traveling, in which case the vessel should be kept on the starboard tack and increase her distance from the center.

If the wind shifts to the left, the vessel will be in the left or navigable semicircle. The helm should be put up and the vessel run with the wind on the starboard quarter, preserving the compass course, if possible, until the barometer rises, when the vessel may be hove to on the port tack, or if there is not sea room to run, the vessel can be put on the port tack at once.

Should the wind remain steady and the barometer continue to fall, the vessel is in the path of the storm and should run with the wind on the starboard quarter into the navigable semicircle.

In all cases act so as to increase as soon as possible the distance from the center, bearing in mind that the whole storm field is advancing.

In receding from the center of a hurricane the barometer will rise and the wind and sea subside.

TIDES AND CURRENTS

Tide Tables for the Atlantic Ocean are published in advance annually by the United States Coast and Geodetic Survey, price 25 cents. This volume supplies full tidal data for the east coast of North and South America, the west and north coasts of Africa, and all of Europe.

It contains a table of full daily predictions of the times and heights of high and low waters for certain reference stations along the coasts, with full explanations for the use of this table. The use of Table 2 of the Tide Tables should be known to every navigator. By means of this table the predictions given for the reference ports are extended so as to enable one to obtain the predictions for each day for a large number of other stations.

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall below the plane of reference of the chart, mean low water. The water may also rise about the same amount above mean high water due to similar causes. Northers, occurring along the Gulf Coast from November to April, may lower the water from 4 to 5 feet.

Caution.—In using the Tide Tables, slack water should not be confounded with high or low water. For ocean stations there is usually but little difference between the time of high or low water and the beginning of ebb or flood current; but for places in narrow channels, land-locked harbors, or on tidal rivers, the time of slack current may differ by 2 or 3 hours from the time of high- or low-water stand, and local knowledge is required to enable one to make the proper allowances for this delay in the condition of tidal currents. To obtain the times of slack water, reference should be made either to figures given for various places in this volume of the Coast Pilot or to the Current Tables.

Current Tables for the Atlantic Coast of the United States are published in advance annually by the United States Coast and Geodetic

Survey. This volume, which sells for 10 cents per copy, includes the daily predicted times of slack water and the times and velocities of strength of flood and ebb for certain reference stations and a table of current differences and constants by means of which corresponding daily predictions may be readily obtained for numerous other places. These tables also include current diagrams for six bodies of water along the coast, which show in a graphical form the velocities of the flood and ebb currents and the times of slack and strength over a considerable stretch of the channel of these waterways.

Tides, Gulf of Mexico.—In the Gulf of Mexico the periodic tides are usually small and may, therefore, be greatly modified and sometimes entirely obliterated by fluctuations in the water surface due to the winds or other meteorological conditions.

At Key West the mean rise of the tide is less than 1½ feet, with high water occurring about 10 hours after the moon's meridian passage. Extreme variations in the level from 1½ feet below the plane of reference to 3 feet above may occur in this locality.

Along the western coast of the peninsula of Florida from Cape Sable to Apalachee Bay, the mean rise of the tide varies from 2 to 3 feet, with high water from 3 to 4 hours later than at Key West. Extreme tides from 3 feet below to 6 feet above the plane of reference have been observed on this coast.

Along the northern shore of the Gulf of Mexico from St. George Sound to the Rio Grande the tide is very irregular and generally diurnal—that is, during a large part of each month only one high and one low water will occur each day, especially near the time of the greatest north and south declination of the moon. When the moon is near the Equator two high and two low waters each day will generally occur, but the range of tide will be smaller at this time.

The mean rise of the tide along this shore is less than 2 feet, but fluctuations due to the wind from 3½ feet below to 4 feet above the plane of reference are not uncommon. During the severe storms that occasionally visit this region, high waters from 10 to 15 feet above the plane of reference have been reported at Galveston, Tex.

The periodic or astronomical tide, small at the mouth of the Mississippi River, gradually diminishes as it ascends the river until it finally becomes completely masked by the larger fluctuations resulting from meteorological conditions. At New Orleans the astronomical tide is so small as to be of no practical importance, although on some days during a month periodic fluctuations amounting to several tenths of a foot have been noted. There is, however, a large fluctuation in the level due to the condition of the river. The mean annual fluctuation at New Orleans is about 14 feet, the water being highest in the spring months and lowest during the autumn and early part of the winter. An extreme fluctuation of 21 feet in the river level at this city has been reported.

For more detailed information concerning the tides in the Gulf of Mexico, the Tide Tables for the Atlantic Ocean should be consulted.

Currents, Gulf of Mexico.—Under normal conditions, and at all seasons of the year, the waters passing northward through Yucatan Channel into the Gulf of Mexico spread out in various directions—westerly, northerly, and easterly. Taking the Gulf as a whole, the

winter winds are northeasterly and the summer winds southeasterly; as a consequence, during the winter season, the west-going branch or portion of the inflowing waters is driven southward upon Campeche Bank, and the northward flow, usually found in the deeper waters lying between Campeche Bank and the Mississippi Passes, practically disappears.

During most seasons of the year there is a fairly definite current setting from Yucatan Channel toward the Mississippi Passes and extending over about one-half of this distance; also a southeasterly current extending from near the Passes to the western end of Florida Strait.

The currents in the western end of the Gulf, from Vera Cruz to Galveston, are weak and uncertain. The currents in the deeper portions of the Gulf are due largely to prevailing winds.

Counter currents occur along the northern and western coasts of Cuba, in the Bay of Campeche, along the coast west of the Mississippi Passes, and probably off nearly the entire Gulf coast of Florida. The current along the Florida Keys is variable and uncertain.

The Gulf Stream is described separately under that heading. Mariners traversing the area through or adjacent to which the Gulf Stream passes should familiarize themselves as thoroughly as possible with this extraordinary ocean current.

STRAITS OF FLORIDA—CAUTION AS TO CURRENTS

The attention of navigators is called to the fact that most of the wrecks on Florida Reefs occur in the case of vessels bound southward, especially at night; they generally occur on reefs lying about halfway between the lights; and the region of maximum frequency of wrecks is between Carysfort Reef and Alligator Reef, and to a less extent between Fowey Rocks and Carysfort Reef and between Alligator Reef and Sombrero Key.

From a consideration of the data it can be stated that nearly all casualties are due to one cause—an underestimate of the strength of the Gulf Stream against the vessel. This leads to two errors in navigation: First, the distance made good over the bottom is less than assumed or indicated by the log, and when skirting the reefs the course is changed too soon for the next light and before sighting it; second, the vessel underrunning her log is closer to the reefs than indicated by the four-point bearing, and this error is greater for slow vessels than for fast ones.

At night, when bound southward and navigating at a safe distance from the reefs between Fowey Rocks and Sombrero Key, it is on the side of safety to assume that the vessel is steaming against a 3- or 4-knot current, and from one light to hold a course that will insure clearing the reefs until the next light is sighted. It is also well to remember that near the reefs there is a tidal current, possibly as much as 0.5 knot in places directly on and off the reefs on the rising and falling tides, respectively.

On the other hand, when bound northward and following Florida Reefs between Sombrero Key and Fowey Rocks it is on the side of safety to underestimate the velocity of the Gulf Stream with the vessel; the courses should be laid well clear of the reefs, which is

the usual practice. Vessels are rarely lost on Florida Reefs when bound northward, except when crossing the Stream from Habana and making the reefs in misty or rainy weather.

The following are extracts from a report of a stranding:

Rounded Great Isaac Light at a distance of 2¼ miles, steered by compass and log 227° true for 20 miles, and then steered 224° true. By bow and beam bearing Fowey Rocks Light was 12 miles distant when abeam, but on account of the northerly current it was probably about 7 miles. The vessel stranded on the north end of Long Reef, having had a northerly set of 17 miles, or an average of about 2¼ knots for the crossing from Great Isaac Light to Florida Reefs.

Along the keys there is a slight tidal drift, of not more than 0.5 knot, setting on and off the reefs. This current will probably not be noticeable at a greater distance from the reefs than 1 mile. Between the keys, in the passes connecting Hawk Channel and Florida Bay, the current has considerable velocity (3 to 4 knots) in the immediate vicinity of the openings, and is felt to some extent, probably, on and beyond the usual sailing line in Hawk Channel. When not influenced by winds the maximum current northwestward into Florida Bay and southeastward into Hawk Channel through the openings between the keys occurs about 1 hour before high and low waters, respectively, in the straits. The northwesterly current is increased by easterly winds and the southeasterly current by westerly winds, due to the effect of these winds in driving out or piling up, respectively, the water in Florida Bay.

CURRENTS, STRAITS OF FLORIDA TO CAPE HATTERAS

On the eastern side of the Gulf of Mexico for a distance of possibly 100 miles outside the 100-fathom curve, southeasterly currents prevail and velocities as high as 2.5 knots have been reported. The Gulf Stream investigations indicated that the strongest current into the Straits of Florida is found near the 1,000-fathom curve westward of Dry Tortugas, and that velocities of 1.5 to 2 knots are frequent in that locality. Approaching Dry Tortugas from the Gulf should therefore be regarded as a difficult run, as a vessel will overrun her log, and observations are the principal guide; currents may be expected at all times, but variations occur both in direction and velocity, due to the season of the year and the winds. Approaching the passage westward of Rebecca Shoal from northward, a number of vessels have stranded on New Ground Shoal.

From Florida Straits to Cape Hatteras, vessels follow the Gulf Stream, passing about 12 miles southwestward of Dry Tortugas Lighthouse, about 14 miles southward of Rebecca Shoal Lighthouse, then following Florida Reefs about 8 miles off, and passing Fowey Rocks at a distance of 10 to 12 miles and Jupiter Inlet Lighthouse 15 miles. 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. Frequently, high velocities will be carried between certain points and suddenly dropping off between others. The position should therefore be checked whenever possible by bearings. The ship speed plus supposed rate of current should not be assumed to

fix the position. The greatest velocity will be found between Carysfort Reef and Jupiter Inlet, ranging from 2 to 4½ knots.

From 15 miles off Jupiter Inlet Lighthouse make good the course 1°30′ true (N. ⅛ E. mag.) for 208 miles to latitude 30°25′ N., longitude 79°40′ W. This should lead from 12 to 18 miles outside the 100-fathom curve, and should give a current nearly equal to the average made between Fowey Rocks and Jupiter.

When approaching Diamond Shoal great care must be taken to have a correct location for the vessel. The currents are subject to wide variations, as indicated by the observations on the light vessels. 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 Diamond Shoal Lightship the current is said to set well to the east-northeast and at other times nearly north. Overallowance and this northerly set have been fatal to many vessels. If a northerly gale is encountered between Jupiter and Cape Hatteras, some navigators keep closer inshore to get on soundings before reaching Diamond Shoal.

THE GULF STREAM

The Gulf Stream sets eastward and northward through the Straits of Florida, and after passing between Fowey Rocks and Little Bahama Bank it continues northward and then northeastward, following the general direction of the 100-fathom (183 m) curve as far as Cape Hatteras.

In general, the Gulf Stream as it issues into the sea through the Straits of Florida may be characterized as a swift current of highly saline blue water whose upper stratum is composed of warm water. At its junction with ordinary sea water, the edges may frequently be recognized in moderate weather by the ripples which occur 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 to the eye. In addition, in the lower latitudes, the stream carries with it a quantity of weed known as gulf weed, which is familiar to all who have navigated its waters.

The axis of the Gulf Stream, or line of greatest velocity, lies from 10 to 20 miles eastward of the 100-fathom (183 m) curve.

Between Cuba and the Florida Reefs, off Habana, the axis of the stream is nearer the Cuban coast; but after making the bend between Salt Key Bank and Florida Reefs, the axis of the stream approaches the coast of Florida and lies from 4 to 11 miles outside the 100-fathom (183 m) curve.

The mean surface velocity of the Gulf Stream is 3.5 knots at a point 11½ miles east of Fowey Rocks and 2.2 knots at a point 60 miles south of Rebecca Shoal. These points are on the axis of the stream, or where the current is a maximum, the velocity of the stream decreasing gradually from these central points as the edges of the stream are approached. These velocities are affected considerably by prevailing winds.

The following tables give the mean surface velocity of the Gulf Stream in two cross sections in the Straits of Florida.

Mean surface velocity of Gulf Stream

Between Rebecca Shoal and Cuba

Distance south of Rebecca Shoal	Mean surface velocity observed
Nautical miles	*Knots*
20	0.3
35	0.7
50	2.2
68	2.2
86	0.8

Between Fowey Rocks and Gun Key

Distance east of Fowey Rocks	Mean surface velocity observed
Nautical miles	*Knots*
8	2.7
11½	3.5
15	3.2
22	2.7
29	2.1
36	1.7

On issuing into the sea northward of Little Bahama Bank the Gulf Stream loses the relatively great velocity which characterized it within the Straits. There is a gradual decrease to a velocity of about 2 knots off St. Augustine, Fla., in latitude 30° N. Here the Gulf Stream is joined by the Antilles Current, which flows northwesterly along the open ocean side of the West Indies before uniting with the Gulf Stream.

The Antilles Current, like the Gulf Stream, carries warm, highly saline water of clear indigo blue. The union of the two currents gives rise to a broad current possessing about the same characteristics as the Gulf Stream within the Straits except that the velocity is much reduced. The combined current turns more and more easterly so that off the coast of Georgia, the Gulf Stream bears northeast, maintaining this general direction past Cape Hatteras.

From within the Straits the axis of the Gulf Stream runs approximately parallel with the 100-fathom (183 m) curve as far as Cape Hatteras, a distance of about 800 geographical miles, but at varying distances from the shore, which sweeps northward in a sharper curve than does the 100-fathom (183 m) curve. Within the Straits it is about 10 miles offshore; in the bight off the coast of Georgia the distance is about 100 miles; and at Cape Hatteras it is about 35 miles.

Earlier systematic observations on the Gulf Stream dealt with the temperature of the water rather than its motion and the axis 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 current, nor is it to be assumed that the northerly set will be lost when the thermometer shows a region of cold sea water.

Within the Straits the lateral boundaries of the Gulf Stream can be fixed with considerable precision. When the stream issues into the sea it is not difficult to define the western limits since the waters

of the stream differ in color, temperature, salinity, and flow from the inshore coastal waters. On the east, due to the influx of the Antilles Current, the waters merge gradually with the waters of the Atlantic, and the limits of the stream cannot be fixed with precision. With regards to direction of flow, however, the limits may be fixed to include all waters flowing parallel to the axis but these limits vary with the seasons and with changing conditions of wind and weather.

Recent observations of the Coast and Geodetic Survey indicate that the inner limit of the Gulf Stream as far as Cape Hatteras may be approximately defined as the 50-fathom (91 m) curve.

Considering the outer edge as a line along which the current is still approximately parallel to the axis of the Gulf Stream, the width of Stream northward of its outfall is as follows: off Cape Canaveral about 70 miles; off the coast of Georgia, after its union with the Antilles Current, about 150 miles; off Cape Hatteras about 200 miles.

Off Cape Hatteras the wide-spreading current separates into numerous bands which is indicated by the juxtaposition of warm and cold bands of water of varying width. This feature, though not so marked, is also noticed below Cape Hatteras.

It has been noted that the western or inner side of 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 to the Banks of Newfoundland. In the vicinity of the Banks of Newfoundland, 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.

Beyond the Banks of Newfoundland the identity of the Gulf Stream, as such, is lost but its general direction is preserved by reason of the prevalence of westerly winds, and its set toward Europe is continued until the continental shores are approached, when, in the vicinity of the Azores, the current divides, one branch flowing to the northeastward and entering the Arctic regions and the other to the south and east in the direction of the African Coast.

As previously mentioned, daily and seasonal fluctuations as to location, velocity, and temperature have been demonstrated as occurring due to winds and variations in barometric pressure and in temperature in the region through which it flows. A further cause of fluctuation is found in the variations of the currents which feed it or which, like the Labrador Current, come in conflict with it. Variations due to tidal currents are now considered as only minor in character.

A steamer 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 1½ knots in a northeasterly direction for a distance of 40 miles from the 100-fathom (183 m) curve.

Crossing the Gulf Stream at Jupiter or Fowey Rocks, an average allowance of 2½ knots in a northerly direction should be made for the set of the current.

Crossing the stream from Habana, a fair allowance for the average current between 100-fathom (183 m) curves is 1.1 knots in an east-northeasterly direction.

The approximate mean positions of the inner edge and axis (point where greatest velocity may be found) are indicated in the following table:

Approximate mean position of the Gulf Stream

Locality	Inner edge	Axis
	Nautical miles	*Nautical miles*
North of Habana, Cuba		25
Southeast of Key West, Fla		45
East of Fowey Rocks, Fla		10
East of Miami Beach, Fla		15
East of Palm Beach, Fla		15
East of Jupiter Inlet, Fla		20
East of Cape Canaveral, Fla	10	45
East of Daytona Beach, Fla	25	75
East of Ormond Beach, Fla	25	75
East of St. Augustine, Fla. (coast line)	40	85
East of Jacksonville, Fla. (coast line)	55	90
Southeast of Savannah, Ga. (coast line)	65	95
Southeast of Charleston, S. C. (coast line)	55	90
Southeast of Myrtle Beach, S. C	60	100
Southeast of Cape Fear, N. C. (light)	35	75
Southeast of Cape Lookout, N. C. (light)	20	50
Southeast of Cape Hatteras, N. C	10	35
Southeast of Virginia Beach, Va	85	115
Southeast of Atlantic City, N. J	120	
Southeast of Sandy Hook, N. J	150	

At the western end of the Straits of Florida the limits of the Gulf Stream have not yet been well defined, and for this reason the location of the inner edge has been omitted for Habana, Cuba, and Key West, Fla., in the above table. Between Fowey Rocks and Jupiter Inlet the inner edge is deflected westward and lies very close to the shore line.

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 (183 m) 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 Coast and Geodetic Survey

charts: No. 1002, Straits of Florida; No. 1007, South Carolina to Cuba; No. 1112, Cape Canaveral to Key West; No. 1113, Alligator Reef to Habana. Chart No. 1001 shows also the position of the inner edge of the Gulf Stream from Chesapeake Bay to Straits of Florida.

WIND CURRENTS

There are given below the results of recent investigations on the currents caused by local winds. These investigations are based on observations made on a number of the lightships along the Atlantic coast from Nantucket Shoals Lightship to Brunswick Lightship. The results, therefore, apply more directly along the route between lightships but are applicable also to the coastal sailing routes farther offshore.

Direction of current due to wind.—It is evident that a wind continuing for some time will give rise to a current, the velocity of which increases with an increase in the velocity of the wind; and the mariner has taken it for granted that this current brought about by the wind sets in the same direction as the wind. But the results of careful observations show that this is not the case. Instead of setting with the wind, the current on the Atlantic coast of North America produced by local winds sets on the average about 20° to the right of the wind.

For example, a wind blowing from north will, on the North Atlantic coast, bring about a current that sets not south but about 20° to the right of south, or 200°. Similarly a wind from south will produce a current setting 20° to the right of north, or 20°. It is to be noted that while the current due to the wind will, on the North Alantic coast, set 20° to the right of the wind direction, the current which a vessel experiences at any time is the resultant of the combined actions of the tidal current, the wind current, and any other currents, such as the Gulf Stream or currents due to river discharge.

Velocity of current due to wind.—The velocity of the current brought about by winds of different velocities is given in the table below It will be seen that on the Atlantic coast of the United States the velocity of the wind current is about 1½ percent of the velocity of the wind.

Table of current velocity due to wind—North Atlantic coast

Wind velocity.....miles per hour..	10	20	30	40	50	60
Current velocity.....knots..	0.2	0.3	0.4	0.6	0.8	1.0

An easily remembered working rule to get the velocity of the current due to wind along the Atlantic coast is to multiply the velocity of the wind (in miles per hour) by 1½ and point off two places. This will give the velocity of the current in knots. For example, to determine the current due to a 40-mile wind we have $40 \times 1\frac{1}{2} = 60$, and pointing off two decimal places gives 0.60, or six-tenths of a knot.

VARIATION OF THE COMPASS

The magnetic variations for 1936 and annual increase at points mentioned are as follows:

Magnetic variation

Locality	Variation	Annual increase
	° ′	′
Key West	2 45 E.	0
Tampa Bay Entrance	2 30	0
Cedar Keys	2 30	0
Cape San Blas	3 45	0
Pensacola Bay Entrance	4 45	0
Mobile Bay Entrance	5 00	0
Mississippi River Entrance	5 45	1
Ship Shoal Lighthouse	6 45	1
Trinity Shoal	7 15	1
Sabine Bank Lighthouse	8 00	1
Galveston Bay Entrance	8 30	2
Brazos River Entrance	8 45	2
Aransas Pass	9 15	2
Brazos Santiago	9 15	2

INLAND WATERWAYS

The following data concerning the Intracoastal Waterway, from Boston to the Rio Grande, the Route across Florida, the New York Canal System, the Lakes to Gulf Waterway, and the other river channels tributary to the Mississippi are included for ready reference.

THE INTRACOASTAL WATERWAY

The Intracoastal Waterway affords a protected route, with the exception of various short sections, for vessels between Boston, Mass., and the Rio Grande, a distance of approximately 3,100 miles. No toll is charged for passage as the waterway is under Federal jurisdiction. Navigation is restricted, however, by the limiting depths, and horizontal and vertical clearances in the various sections of the waterway. The controlling horizontal clearance for the entire route is 39½ feet (12.0 m) at the Palm Valley bridge in Florida. The locks in the alternate route through the Dismal Swamp Canal have a controlling horizontal clearance of 36 feet (11.0 m). The height of the masts of vessels is restricted by the vertical lift bridge at Boynton, Fla., to 42.6 feet (13.0 m).

Boston to New York Harbor.—Between Boston and Long Island Sound it is necessary to pass through comparatively exposed waters and no inland route exists except for the passage through the Cape Cod Canal and its approaches.

The Cape Cod Canal extends from Cape Cod Bay to Buzzards Bay and with its approach channels affords a sea-level waterway 12.6 miles in length. The controlling depth on July 31, 1935, was 24 feet (7.3 m) at mean low water in the canal. Widening and deepening of the canal and the work of constructing two new high-level highway bridges and a vertical lift railroad bridge to replace the existing drawbridges is now nearly completed. The controlling vertical clearance through the canal is 135 feet (41 m) at high water.

From the canal, the route generally followed extends from Buzzards Bay to the Atlantic Ocean, thence through Block Island and Long Island Sounds and the East River to upper New York Bay, thence through the more open waters to lower New York Bay. There are numerous harbors on both sides of Long Island Sound.

An inland waterway extends along a portion of the south side of Long Island and affords a protected route from Gardeners Bay to East Rockaway Inlet with a controlling depth of 6 feet (1.8 m) in May 1935 at the south approach of the Shinnecock Canal.

New York Harbor to Delaware Bay.—An outside run between New York Bay and Delaware Bay is now necessary except for vessels whose draft permits use of the New Jersey Inland Waterway. This waterway is entered at its northern end through Manasquan Inlet, 23 miles south of Sandy Hook, and extends for 109 nautical miles to Cape May Inlet at Cape May. The waterway is maintained by the State of New Jersey as a 6-foot (1.8 m) project, but the controlling depth in October 1935 was reported to be 4 feet (1.2 m). Vessels are obliged to run outside from Sandy Hook to Manasquan Inlet, and to round Cape May and cross the lower reaches of Delaware Bay to the Chesapeake and Delaware Canal.

The Intracoastal Waterway formerly extended from New York Bay through the Raritan River, the Delaware and Raritan Canal, and the Delaware River to Delaware Bay. The Delaware and Raritan Canal, now under the jurisdiction of the State of New Jersey, has not been open to navigation since 1933.

Investigation of the New York Bay-Delaware River section of the Intracoastal Waterway is now actively in progress for the purpose of finding and recommending the most desirable route for a sea-level canal of adequate width and a minimum depth of 25 feet (7.6 m) across the State of New Jersey.

Delaware Bay to Norfolk.—The Chesapeake and Delaware Canal is a sea-level route which extends for a distance of 19 miles, from Reedy Point on the Delaware River 40 miles below Philadelphia, Pa., to the junction of Back Creek and Elk River, about 4 miles west of Chesapeake City, Md. In June 1934 the controlling depth was 10 feet (3.0 m), although the conditions are such that a draft of 12 feet (3.6 m) can usually be carried through by taking advantage of the tide.

From the junction of the canal into Chesapeake Bay to Norfolk, a distance of 210 miles through Chesapeake Bay, depths in excess of 12 feet (3.6 m) obtain.

Norfolk to Beaufort Entrance.—A sea-level waterway, paralleling the Atlantic coast, with a tidal lock at Great Bridge, Va., is afforded by the route through the Albemarle and Chesapeake Canal, the Alligator River-Pungo River Canal, and the sounds of North Carolina. The project for this waterway provides a depth of 12 feet (3.6 m) at mean low water, but the controlling depth was 11 feet (3.4 m) in the early part of 1935.

The alternate route to Albemarle Sound by way of the **Dismal Swamp Canal**, a lock canal, has a controlling depth of 9 feet (2.7 m).

Navigation is practicable throughout the year on both of the above-named routes.

Beaufort Entrance to Winyah Bay.—In June 1934 there was a controlling depth of 11 feet (3.4 m) from Beaufort Harbor to Swansboro, thence 10½ feet (3.2 m) to the Cape Fear River.

The new cut from Cape Fear River to Winyah Bay has not yet been completed, and vessels whose draft will not permit crossing the bar at Little River Inlet, S. C., are required to go outside from Cape Fear River to Winyah Bay, a distance of about 73 miles.

A depth of 8 feet (2.4 m) is available in the waterway to Little River Inlet from Cape Fear River, a distance of about 28 miles. In August 1935 the low water depth in Little River Inlet was about 4½ feet (1.4 m). The channel across the bar, although subject to change, is well buoyed. Navigation, however, should not be attempted except on a rising tide and only after securing local information. The distance from *Little River Inlet Lighted Bell Buoy to Winyah Bay Entrance Bell Buoy* is 47 nautical miles.

Winyah Bay to Charleston.—Dredging of this section of the waterway to a project depth of 10 feet (3.0 m) is now in progress (April 1935). In September 1935 it was reported that navigation was restricted to a draft of 3½ feet (1.1 m) at mean low water at one point and 5½ feet (1.7 m) at mean low water through several reaches between Minim Creek and Charleston.

Charleston to the St. Johns River, through the rivers and sounds of South Carolina and Georgia.—The project depth through the main waterway is 7 feet (2.1 m). The controlling depth for this section is in Brickyard Creek, north of Beaufort, S. C., where there is a depth of 5 feet (1.5 m) at mean low water.

St. Johns River to Miami.—This section of the waterway extends from the St. Johns River by way of the old Florida East Coast Canal through natural and connecting waterways to Miami on Biscayne Bay. A project depth of 8 feet (2.4 m) at mean low water is being maintained, although the controlling depth may be temporarily reduced by shoaling.

Miami to Key West.—The route north of the Florida Keys has a controlling depth of 4 feet (1.2 m), which occurs in the northern channel through Shell Key Bank.

The route through Hawk Channel has a controlling depth of 10 feet (3.0 m).

Anchorages, sheltered from all ordinary weather, may be found anywhere along these passages, in the lee of reefs and keys.

Key West to the Rio Grande.—The various inside routes and the sections of the Intracoastal Waterway along the Gulf Coast are described in geographical sequence in various parts of this volume and Section No. 34 of this volume, p. 35, gives a résumé of the entire inside route along the Gulf Coast.

Charts covering the routes along the Atlantic Coast and the Gulf of Mexico are published by the United States Coast and Geodetic Survey.

The inland waters are covered in the following publications of the Coast and Geodetic Survey:

United States Coast Pilot, Section B, covering the coast and inland waters from Race Point, Cape Cod, to Sandy Hook, including Long Island Sound, New York Harbor, and tributaries.

United States Coast Pilot, Section C, covering the coast and inland waters from Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays, and the inside route from New York to Norfolk.

United States Coast Pilot, Section D, covering the coast from Cape Henry to Key West.

Inside Route Pilot, New York to Key West.

United States Coast Pilot, Gulf Coast (this volume), covering the coast and inland waters of the Gulf of Mexico.

Additional information concerning the latest controlling depths in the Intracoastal Waterway can be secured at the various United States Engineer offices along the route.

THE ATLANTIC—GULF SHIP CANAL (PROPOSED)

The construction of a waterway across northern Florida to connect the Atlantic Ocean and the Gulf of Mexico has recently been begun.

The route of the canal is via the St. Johns River to Palatka, thence in a southern and western direction to the Oklawaha and the Withlacoochee Rivers to deep water in the Gulf of Mexico. When completed the canal will have a depth of 30 feet (9.1 m), mean sea level, and widths as follows: 300 feet to Jacksonville; 400 feet, Jacksonville to Palatka; 250 feet, Palatka to the Gulf of Mexico; from 500 to 1,000 feet in the channel in the Gulf. The total length from deep water to deep water will be about 195 miles.

ROUTE ACROSS SOUTH FLORIDA

The passage across Florida from the Intracoastal Waterway on the East Coast to San Carlos Bay on the Gulf of Mexico by way of the St. Lucie River, St. Lucie Canal, Lake Okeechobee, and the Caloosahatchee River has a controlling depth of about 2 feet (0.6 m). This occurs in that section of the Caloosahatchee River which lies between Moore Haven and Fort Myers. It is reported that improvement work will shortly be undertaken to deepen this section to 6 feet.

More detailed information regarding this route is given on page 103.

Latest information concerning this route can be secured at the United States Engineer District Office at Jacksonville, Fla., or at the office of the United States Engineers at Clewiston, Fla.

OTHER MOTORBOAT ROUTES IN FLORIDA

Much information on the waterways of Florida can be found in Senate Document No. 14, Seventy-first Congress, First Session, entitled "Inland and Coastal Waterways of Florida." Copies of this document can be secured from the Superintendent of Documents, Washington, D. C.

NEW YORK STATE CANAL SYSTEM

The New York State Barge Canal, known as the Erie Canal, affords an all-water route from the Hudson River on the east to Lake Erie. The canal is free for the use of both commercial and pleasure vessels. The canal was constructed for a depth of 12 feet throughout, but in 1930 the controlling depth was about 10 feet (3.0 m). Barges loaded to about 9½ feet use the canal regularly.

There are 35 locks, the usable dimensions being 300 feet in length, 44½ feet in width, and 12 feet (3.6 m) over the sills. The controlling clearance under fixed bridges is about 14½ feet (4.7 m).

If bound to Lake Ontario, the Erie Canal is followed to Three Rivers Point where the canalized Oswego River is entered and followed to Oswego on Lake Ontario. There are seven locks in the Oswego Canal, which is 24 miles in length. The locks are the same dimensions as those in the Erie Canal.

Troy to St. Lawrence River.—The Champlain Canal, Lake Champlain, and the Richelieu River afford an all-water route from Troy to the St. Lawrence River. The size of vessels using this route is limited by the locks in the Chambly Canal (Canadian), which have usable dimensions of 118 feet in length, 22 feet in width, and 6½ feet (2.0 m) of water over the sills. The locks of the Champlain Canal are the same design as those in the Erie Canal. The distance from Albany to Montreal via this route is 309 statute miles. The Canadian Government requires permits or let-passes from pleasure boats entering Canadian waterways, which may be obtained at their canal statistical offices at St. Johns and Prescot. American vessels when leaving Canada should report at the customs office.

Charts of the Erie Canal, Champlain Canal, Lake Champlain, and Great Lakes are published by the United States Lake Survey Office, Detroit, Mich., and sections of the New York State canals by the Superintendent of Public Works, Albany, N. Y.

Ice.—Navigation in the upper Hudson River and the New York State Canal System is usually obstructed by ice from the middle of December to the latter part of March.

LAKES TO GULF WATERWAY

The Lakes to Gulf Waterway by way of the Illinois Waterway System and the Mississippi River affords passage for vessels from Chicago on Lake Michigan to the Gulf of Mexico, a distance of 1,630 statute miles.

The Illinois Waterway System permits a draft of 9 feet (2.7 m) to be taken from Chicago to the Mississippi River. The limiting clearance under fixed bridges between Chicago and Grafton, Ill., is 13½ feet (4.1 m) at high water.

Charts of the Illinois Waterway System may be obtained from the District Engineer, First District, United States Engineer office, 333 North Michigan Avenue, room 1325, Chicago, Ill.

The Mississippi River.—This section of the waterway follows the natural and improved channels of the Mississippi River.

Grafton to Cairo.—The project depth is 9 feet (2.7 m) throughout, but this has not been attained between Grafton and St. Louis during very low waters. Between Grafton and the mouth of the Missouri River a channel depth of at least 6 feet can usually be depended upon, though during periods of very low water the controlling depths may be as little as 5 feet (1.5 m). Except for some delays during periods of very low water, navigation is relatively easy. The least vertical clearance of 44.6 feet (13.6 m), extreme high water, is at Merchants Bridge, St. Louis, Mo.

Cairo to Baton Rouge.—The project depth of the channel is 9 feet (2.7 m). This dimension is greatly exceeded during medium and

high stages, and at low stages except across under-water sand bars where channel dredging is necessary. Year-round navigation is easy except during periods of exceptionally low water, when some difficulty is experienced with large tows. The controlling vertical clearance is 56 feet (17 m) above the highest water on record at the fixed bridge at Vicksburg, Miss.

Baton Rouge to the Gulf of Mexico.—This section of the waterway is a ship channel navigated by large ocean-going vessels. Navigation is safe and easy at all seasons. The river current is sluggish for low water flows but during times of high water reaches 6 miles per hour. The effect of tide is felt as far north as Baton Rouge. On the completion of the bridge now being constructed 2 miles above New Orleans the controlling vertical clearance will be 135 feet (41.1 m) above ordinary high water.

Charts of the Mississippi River may be obtained from the office of the Mississippi River Commission, Box 665, Vicksburg, Miss.

Ice.—Navigation of the Illinois Waterway System is stopped by ice from about December 1 to March 1, and in the section of the Mississippi River between Grafton and Cairo usually between December 15 and February 15.

OTHER RIVER CHANNELS TRIBUTARY TO THE MISSISSIPPI RIVER

Upper Mississippi River.—A 9-foot (2.7 m) project depth has been adopted for the channel improvement of the Upper Mississippi from Grafton to St. Paul and Minneapolis. At present a channel with a controlling depth of 6 feet (1.8 m) is available to Minneapolis.

Charts and information relative to improvements and navigation may be obtained from the Mississippi River Commission, Box 665, Vicksburg, Miss.

Missouri River.—A 6-foot (1.8 m) project has been adopted for the Missouri River from its outlet into the Mississippi River 15 miles above St. Louis, to Sioux City. The section between the mouth and Kansas City is now open to navigation.

Charts and information relative to improvements and navigation may be obtained from the United States Engineer Offices, 232 Manufacturers Exchange Building, Kansas City, Mo., and City National Bank Building, Omaha, Neb.

Ohio River.—A 9-foot (2.7 m) project on the Ohio River has been completed and an excellent channel to Pittsburgh, and beyond, is available.

Charts and information relative to improvements and navigation may be obtained from the United States Engineer office, Custom House, Cincinnati, Ohio.

Red, Arkansas, and Ouachita Rivers.—These rivers flow into the Mississippi River between New Orleans and Cairo. The Red and Arkansas Rivers have not been improved to any great extent, but will accommodate light-draft river boats. The Ouachita River has been canalized to Camden, Ark., and provides a depth of 6½ feet (2.0 m).

Charts and information relative to improvements and navigation may be obtained from the United States Engineer Offices, P. O. Drawer 667, Vicksburg, Miss., and P. O. Box 97, Memphis, Tenn.

Intracoastal Waterway.—Connection with the Intercoastal Waterway is made at New Orleans, La.

Ice.—Navigation in the upper reaches of the Mississippi River, and in the Missouri and Ohio Rivers is obstructed by ice in the winter months.

MISCELLANEOUS

Bridge Regulations.—Regulations for the lighting of bridges over navigable waters, also for lights on sheer booms, piers, dams, and similar obstructions to navigation are prescribed by the Department of Commerce. A copy of these regulations (see list of Publications, p. 342) will be sent free of charge to any shipmaster, pilot, or bridge owner on application to the Commissioner of Lighthouses, Department of Commerce, Washington, D. C.

The following regulations have been prescribed by the War Department to govern the operation of drawbridges which are now or may hereafter be constructed across all navigable waterways of the United States discharging their waters into the Atlantic Ocean south of and including Chesapeake Bay, and the Gulf of Mexico, excepting the Mississippi River and its tributaries:

1. The 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.

2. *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, horn, or megaphone shall be sounded *from the vessel* when within reasonable hearing distance of the bridge.

When the draw of the bridge can be opened immediately, the draw tender shall reply by three distinct blasts of a whistle, horn, or megaphone or by three loud and distinct strokes of a bell.

When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the draw tender shall reply by two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell.

3. *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.

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

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

4. 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 5 seconds by the same signals for the second bridge, and so on, thus giving at intervals of about 5 seconds, separate signals for each bridge the vessel desires to pass.

5. 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 draw tender shall reply as prescribed and in turn to the signal of each vessel.

6. 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 that bridge can be opened immediately, the bridge tender 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.

7. The draw shall be opened with the least possible delay, upon receiving the prescribed signal: *Provided*, That the draw span 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 draw span.

8. When a bridge tender is about to close a draw, he shall sound two distinct blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell.

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

10. These regulations shall be in force on and after January 1, 1930, and shall supersede the general bridge regulations approved October 12, 1925.

Protection of Navigable Waters.—There are given below extracts from the laws of the United States for the protection and preservation of the navigable waters of the United States.

That it shall not be lawful to throw, discharge, or deposit, or cause, suffer, or procure to be thrown, discharged, or deposited either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever other than that flowing from streets and sewers and passing therefrom in a liquid state, into any navigable water of the United States, or into any tributary of any navigable water from which the same shall float or be washed into such navigable water; and it shall not be lawful to deposit, or cause, suffer, or procure to be deposited material of any kind in any place on the bank of any navigable water, or on the bank of any tributary of any navigable water, where the same shall be liable to be washed into such navigable water, either by ordinary or high tides, or by storms or floods, or otherwise, whereby navigation shall or may be impeded or obstructed.

That it shall not be lawful to tie up or anchor vessels or other craft in navigable channels in such a manner as to prevent or obstruct the passage of other vessels or craft; or to voluntarily or carelessly sink, or permit or cause to be sunk, vessels or other craft in navigable channels; or to float loose timber and logs, or to float what is known as sack rafts of timber and logs in streams or channels actually navigated by steamboats in such manner as to obstruct, impede, or endanger navigation. And whenever a vessel, raft, or other craft is wrecked and sunk in a navigable channel, accidentally or otherwise, it shall be the duty of the owner of such sunken craft to immediately mark it with a buoy or beacon during the day and a lighted lantern at night, and to maintain such marks until the sunken craft is removed or abandoned, and the neglect or failure of the said owner so to do shall be unlawful; and it shall be the duty of the owner of such sunken craft to commence the immediate removal of the same, and prosecute such removal diligently, and failure to do so shall be considered as an abandonment of such craft, and subject the same to removal by the United States as hereinafter provided for.

That, except in case of emergency imperiling life or property, or unavoidable accident, collision, or stranding, and except as otherwise permitted by regulations prescribed by the Secretary as hereinafter authorized, it shall be unlawful for any person to discharge, or suffer, or permit the discharge of oil by any method, means, or manner into or upon the coastal navigable waters of the United States from any vessel using oil as fuel for the generation of propulsion power, or any vessel carrying or having oil thereon in excess of that necessary for its lubricating requirements and such as may be required under the laws of the United States and the rules and regulations prescribed thereunder. The Secretary is authorized and empowered to prescribe regulations permitting the discharge of oil from vessels in such quantities, under such conditions, and at such times and places as in his opinion will not be deleterious to health or sea food, or a menace to navigation, or dangerous to persons or property engaged in commerce on such waters, and for the loading, handling, and unloading of oil.

Fishweirs.—Regulations prescribe that fishing structures and appliances in navigable waters of the United States shall be lighted for the safety of navigation, as follows:

The lights shall be displayed between sunset and sunrise. They shall be placed at each end of the structure excepting where the inner end terminates in such situation that there is no practicable navigation between it and the high-water line of the adjacent coast, in which case no inner light shall be displayed. The outer light shall be white and the inner light shall be red. The size, capacity, and manner of maintenance of the lights shall be such as may be specified in the War Department permit authorizing the erection of the structure or appliance.

When several structures or appliances are placed on one line with no navigable passage between them, they will be considered, for lighting purposes, as one structure.

Lighthouse tenders, when working on buoys in channels or other frequented waters, may display a red flag (international signal code flag B) and a black ball at the fore as a warning to other vessels to slow down in passing. Passing vessels will facilitate the work of the Lighthouse Service by a proper observance of the signals.

Special signals for surveying vessels.—The following signals have been prescribed for vessels of the United States engaged in hydrographic surveying:

By day a surveying vessel of the Coast and Geodetic Survey, under way 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.

Vessels of the Coast and Geodetic Survey shall carry the above-described marks while actually engaged in hydrographic surveying and under way, including drag work. Launches and other boats shall carry the prescribed marks when necessary.

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 the other vessels or obviate the necessity for a strict observance of the rules for preventing collisions of vessels.

By night a surveying vessel of the Coast and Geodetic Survey, under way and employed in hydrographic surveying, shall carry the regular lights prescribed by *The Rules of the Road.*

A vessel of the Coast and Geodetic Survey, 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 3 feet if necessary.

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 regulation, required to be carried.

The **wire drags** used by the Coast and Geodetic Survey 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. Steamers 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.

2. GENERAL SAILING DIRECTIONS, OUTSIDE COAST

The following tabulated Directions are for deep-draft vessels bound for any of the principal ports along the Gulf coast and coming either from the Straits of Florida or from another Gulf Coast port.

Caution.—These tabulated Directions should be used in conjunction with the general information given concerning currents, depths, etc. General information regarding **Tides and Currents** is given on page 41. The Directions for approaching the entrances to the various ports give information regarding currents and depths to be encountered en route. The monthly **pilot chart** for Central American Waters also gives information regarding currents in the Gulf of Mexico.

COURSES AND DISTANCE BETWEEN GULF COAST PORTS

	Course	Distance	Page reference
FROM KEY WEST, (¼ mile east from *Smith Shoal Light,* Northwest Channel:	° *True*	*Nautical miles*	73
TO TAMPA, *Tampa Bay Lighted Whistle Buoy*	342½	182	131
TO CHARLOTTE HARBOR, *Entrance Lighted Bell Buoy*	349	119	115
FROM REBECCA SHOAL, 3 miles east from *Pulaski Shoal Light:*			
TO TAMPA, *Tampa Bay Lighted Whistle Buoy*	356	176	131
TO CHARLOTTE HARBOR, *Entrance Lighted Bell Buoy*	10	120	115
FROM DRY TORTUGAS, 11½ miles 225° true from *Dry Tortugas Lighthouse:*			
TO (PANAMA CITY) 13 miles 215° true from *Cape San Blas Lighthouse*	336½	327	
Thence to *St. Andrew Bay Entrance Lighted Bell Buoy*	340	39	167
TO PENSACOLA, *Caucus Cut Entrance Lighted Whistle Buoy*	327	414	179
TO MOBILE, *Mobile Entrance Lighted Whistle Buoy*	322	431	191
TO PASCAGOULA AND GULFPORT, *Horn Island Pass Bar Whistle Buoy* (See Position 14, Table of Coastwise Courses)	319½	449	197 202
TO *SOUTH PASS Lighted Whistle Buoy*	309½	422	235
TO *SOUTHWEST PASS Entrance Lighted Whistle Buoy*	307½	432	236
TO (SABINE PASS) *Ship Shoal Lighted Whistle Buoy* (See Position 21, Table of Coastwise Courses)	300	494	282
TO (GALVESTON Entrance) 1 mile southwestward of *Heald Bank Lightship*	294½	661	
Thence to *Galveston Bar Lighted Whistle Buoy*	303	26	305
TO CORPUS CHRISTI, *Aransas Pass Lighted Whistle Buoy*	285	778	331
TO *BRAZOS-SANTIAGO Entrance Lighted Whistle Buoy*	277	772	334

COURSES AND DISTANCE BETWEEN GULF COAST PORTS—Continued

	Course	Distance	Page-reference
TO TAMPA, *Tampa Bay Lighted Whistle Buoy*:			131
FROM NORTHWEST CHANNEL (Key West), ¼ mile east of *Smith Shoal Light*	° *True* 342½	*Nautical miles* 182	73
FROM REBECCA SHOAL, 3 miles east of *Pulaski Shoal Light*	356	176	
FROM PANAMA CITY, *St. Andrew Bay Entrance Lighted Bell Buoy* to 13 miles 215° true from *Cape San Blas Lighthouse*	160	39	167
Thence to *Tampa Bay Lighted Whistle Buoy*	129½	177	
FROM PENSACOLA, *Caucus Cut Entrance Lighted Buoy 1A*	124½	280	179
FROM *MOBILE, Mobile Entrance Lighted Whistle Buoy*	119	310	191
FROM *SOUTH PASS Lighted Whistle Buoy*	104	338	235
FROM *SOUTHWEST PASS Entrance Lighted Whistle Buoy*	102½	354	236
FROM (SABINE PASS) *Ship Shoal Lighted Whistle Buoy* (Position 21, Table of Coastwise Courses)	98	433	
TO PANAMA CITY, *St. Andrew Bay Entrance Lighted Bell Buoy*:			167
FROM TAMPA, *Tampa Bay Lighted Whistle Buoy* to 13 miles 215° true from *Cape San Blas Lighthouse*	309½	177	131
Thence to *St. Andrew Bay Entrance Lighted Bell Buoy*	340	39	
FROM PENSACOLA (See Table of Coastwise Courses).			
FROM MOBILE, *Mobile Entrance Lighted Whistle Buoy*	91	120	191
FROM *SOUTH PASS Lighted Whistle Buoy*	69	189	235
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse* to 13 miles 215° true from *Cape San Blas Lighthouse*	336½	327	
Thence to *St. Andrew Bay Entrance Lighted Bell Buoy*	340	39	
TO PENSACOLA, *Caucus Cut Entrance Lighted Whistle Buoy 1A*:			179
FROM *CAPE SAN BLAS LIGHTHOUSE* bearing 21° true and distant 7.1 miles (Position 9, Table of Coastwise Courses)	293½	107	
FROM TAMPA, *Tampa Bay Lighted Whistle Buoy*	304½	280	131
FROM *DRY TORTUGAS LIGHTHOUSE,* 11.4 miles 225° true from the lighthouse	327	414	
FROM *SOUTH PASS Lighted Whistle Buoy*	51	123	235
FROM MOBILE, *Mobile Entrance Lighted Whistle Buoy*	79	41	191
NOTE.—Deeper draft vessels should keep about 2 miles farther offshore than the direct course between the two buoys.			
FROM PANAMA CITY (See Position 11, Table of Coastwise Courses)	------	------	167

COURSES AND DISTANCE BETWEEN GULF COAST PORTS—Continued

	Course	Distance	Page reference
	° *True*	*Nautical miles*	
TO MOBILE, *Mobile Entrance Lighted Whistle Buoy*:			191
FROM PENSACOLA, *Caucus Cut Entrance Lighted Whistle Buoy 1A*	259	41	179
NOTE.—Deeper draft vessels should keep about 2 miles farther offshore than the direct course between the buoys.			
FROM TAMPA, *Tampa Bay Lighted Whistle Buoy*	299	310	131
FROM *DRY TORTUGAS LIGHTHOUSE*, 11.4 miles 225° true from the lighthouse	322	431	
FROM SOUTH PASS, 2 miles southeastward from *South Pass Lighted Whistle Buoy*	37	89	235
TO HORN ISLAND PASS BAR *Whistle Buoy* (Position 14, Table of Coastwise Courses):			197
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse*	319½	449	
FROM *PASS A LOUTRE Lighted Whistle Buoy* 2, 1 mile off buoy	19½	65	
TO SOUTH PASS *Lighted Whistle Buoy*:			235
FROM MOBILE, *Mobile Entrance Lighted Whistle Buoy*	217	89	191
NOTE.—This course and distance is to a position 2 miles southeastward of *South Pass Lighted Whistle Buoy*, passing 1½ miles off *Pass A Loutre Lighted Whistle Buoy*.			
FROM PENSACOLA, *Caucus Cut Entrance Lighted Whistle Buoy*	231	123	179
FROM PANAMA CITY, *St. Andrew Bay Entrance Lighted Bell Buoy*	249	189	167
FROM TAMPA, *Tampa Bay Lighted Whistle Buoy*	284	338	131
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse*	309½	422	
TO SOUTHWEST PASS *Entrance Lighted Whistle Buoy*:			236
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse*	307½	432	334
FROM *BRAZOS-SANTIAGO Entrance Lighted Whistle Buoy*	67½	445	
FROM *SHIP SHOAL Lighted Whistle Buoy* (See Position 21, Table of Coastwise Courses.)			
TO SABINE PASS, *Sabine Pass Lighted Whistle Buoy* (Position 24, Table of Coastwise Courses):			282
FROM *DRY TORTUGAS LIGHTHOUSES*, 11.4 miles 225° true from the lighthouse to *Ship Shoal Lighted Whistle Buoy 2*	300	494	
Thence courses given in Table of Coastwise Courses, Positions 21 to 24.			

COURSES AND DISTANCE BETWEEN GULF COAST PORTS—Continued

	Course	Distance	Page reference
TO GALVESTON ENTRANCE, *Galveston Bar Lighted Whistle Buoy* (Position 25, Table of Coastwise Courses):			305
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse* to 1 mile southwestward of *Heald Bank Lightship*	° *True* 294½	*Nautical miles* 661	
Thence to *Galveston Bar Lighted Whistle Buoy*	303	26	
FROM *BRAZOS-SANTIAGO Entrance Lighted Whistle Buoy*	34½	233	334
NOTE.—This course leads to a position 3 miles south of *Galveston Bar Lighted Whistle Buoy*.			
TO CORPUS CHRISTI, *Aransas Pass Lighted Whistle Buoy* (Position 29, Table of Coastwise Courses):			331
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse*	285	778	
FROM *SHIP SHOAL Lighted Whistle Buoy 2*	261	321	
(See Position 21, Table of Coastwise Courses.) NOTE.—See also Table of Coastwise Courses.			
TO BRAZOS-SANTIAGO *Entrance Lighted Whistle Buoy* (Position 30, Table of Coastwise Courses):			334
FROM *SOUTHWEST PASS Entrance Lighted Whistle Buoy*	247½	445	236
FROM DRY TORTUGAS, 11.4 miles 225° true from *Dry Tortugas Lighthouse*	277	772	
FROM GALVESTON, 3 miles south of *Galveston Bar Lighted Whistle Buoy*	214½	233	305
NOTE.—See also Table of Coastwise Courses.			

COASTWISE COURSES AND DISTANCES—GULF OF MEXICO

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
Directions for Northwest Channel, Key West, are given on p. 73.			
1. **Smith Shoal Light** bearing 270° true, distant ¼ mile:	°	*Points*	*Nautical miles*
Direct	357	N. ½ W	95.0
Reverse	*177*	*S. ½ E*	*95.0*
2. **Sanibel Island Lighthouse** bearing 357° true (directly ahead) and distant 9 miles:			
Direct	38	NE. ⅞ N	7.0
Reverse	*218*	*SW. ⅞ S*	*7.0*
3. **Caloosa Lighted Bell Buoy 2:**			
Direct	270	W. ¼ S	13.8
Reverse	*90*	*E. ¼ N*	*13.8*
Passing 1.6 miles south Sanibel Island. Directions: Caloosahatchee River, p. 100.			

COASTWISE COURSES AND DISTANCES—GULF OF MEXICO—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
4. **Sanibel Island Lighthouse** bearing 69° true, distant 9.8 miles:	°	*Points*	*Nautical miles*
Direct	334	NNW. ½ W	18. 0
Reverse	*154*	*SSE. ½ E*	*18. 0*
Passing 2 miles off Captiva Island.			
5. **Charlotte Harbor Entrance Lighted Bell Buoy:**			
Direct	331	NNW. ⅞ W	66. 0
Reverse	*151*	*SSE. ⅞ E*	*66. 0*
Passing 6 to 7 miles offshore and avoiding 29-foot (5.8 m) spot, half mile inshore of course 2½ miles north of *Charlotte Harbor Entrance Lighted Bell Buoy.*			
Directions: Charlotte Harbor, p. 115.			
6. **Tampa Bay Lighted Whistle Buoy:**			
Direct	348½	N. by W. ⅜ W	79. 5
Reverse	*168½*	*S. by E. ⅜ E*	*79. 5*
Directions: Tampa Bay, p. 131.			
7. **Seahorse Reef Light** bearing 45° true, distant 5 miles. *Seahorse Reef Spit Bell Buoy 3*, bearing 56° true, distant 2.6 miles:			
Direct	78	ENE. ⅝ E	3. 7
Reverse	*258*	*WSW. ⅝ W*	*3. 7*
7A1. **Seahorse Reef Spit Bell Buoy 3,** bearing 303° true, distant 1.4 miles:			
Direct	27½	NNE. ¼ E	9. 3
Reverse	*207½*	*SSW. ¼ W*	*9. 3*
Passing 1 mile off, abeam of the bell buoy.			
7A2. **Cedar Keys Main Entrance Light 1;** 100 yards eastward of light:			
Directions; Cedar Keys, p. 144.			
7. **Seahorse Reef Light** bearing 45° true, distant 5 miles. *Seahorse Reef Spit Bell Buoy 3* bearing 56° true distant 2.6 miles:			
Direct	319	NW	75. 0
Reverse	*139*	*SE*	*75. 0*
7B1. **Ocklockonee Shoals Sea Buoy** "Ochlockonee 24":			
See position 8A2 below.			
7. **Seahorse Reef Light** bearing 45° true distant 5 miles; *Seahorse Reef Spit Bell Buoy 3* bearing 56° true, distant 2.6 miles:			
Direct	304	NW. by W. ¼ W	90. 0
Reverse	*124*	*SE. by E. ¼ E*	*90. 0*
7C1. **East Pass Lighted Buoy 1:**			
Directions: East Pass, p. 158.			
7. **Seahorse Reef Light** bearing 45° true, distant 5 miles. *Seahorse Reef Spit Bell Buoy 3* bearing 56° true, distant 2.6 miles:			
Direct	289½	WNW. ⅝ W	101. 0
Reverse	*109½*	*ESE. ⅝ E*	*101. 0*

COASTWISE COURSES AND DISTANCES—GULF OF MEXICO—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
8. **Cape St. George Outer Shoal Whistle Buoy** "St. George 28":	°	*Points*	*Nautical miles*
Direct	62	NE. by E. ¼ E	41. 5
Reverse	*242*	*SW. by W. ¼ W*	*41. 5*
NOTE.—**East Pass** lies between position 8 and 8A1.			
From position 8, a course 51° true (NE. ¼ E. mag.) for 26.4 miles will lead to *East Pass Lighted Buoy 1*. This course crosses spots with 17 feet (5.2 m) and passes 1¼ miles off St. George Island. A draft of 4 fathoms (7.3 m) can be carried by not approaching St. George Island closer than 2 miles.			
From position 8A1, a course 259° true (WSW. ¾ W. mag.) for 16.4 miles leads to *East Pass Lighted Buoy 1*.			
Directions: East Pass, p. 158.			
8A1. **South Shoal Whistle Buoy 26:**			
Direct	68	NE. by E. ¾ E	9. 7
Reverse	*248*	*SW. by W. ¾ W*	*9. 7*
8A2. **Ochlockonee Shoals Sea Buoy** "Ochlockonee 24":			
Direct	359	N. ⅜ W	10. 0
Reverse	*179*	*S. ⅜ E*	*10. 0*
Caution not to approach too close to Ochlockonee Shoals.			
8A3. **St. Marks Channel Sea Buoy:**			
Directions: St. Marks River, p. 149.			
8. **Cape St. George Outer Shoal Whistle Buoy** "St. George 28":			
Direct	285½	WNW. ⅞ W	19. 5
Reverse	*105½*	*ESE. ⅞ E*	*19. 5*
Passing ½ mile south of Lighted Bell Buoy 30.			
NOTE.—**West Pass** lies between positions 8 and 9.			
From position 8, a course 322° true (NW. ¼ N. mag.) for 10.5 miles leads to *West Pass Bell Buoy*. Avoid shoals inside "St. George 28" buoy.			
From *Cape San Blas Outer Shoals Lighted Bell Buoy 30*, a course 72° true (ENE. mag.) for 10.4 miles leads to *West Pass Bell Buoy*.			
Directions: West Pass, p. 159.			
9. **Cape San Blas Outer Shoals Lighted Bell Buoy 30** bearing 93° true, distant 2½ miles. *Cape San Blas Lighthouse* bearing 21° true, distant 7.1 miles:			
Direct	348	N. by W. ⅝ W	18. 8
Reverse	*168*	*S. by E. ⅝ E*	*18. 8*
Passing 2¼ miles off St. Joseph Bay Spit.			
10. **St. Joseph Bay Entrance Whistle Buoy:**			
Direct	315	NW. ⅜ W	20. 1
Reverse	*135*	*SE. ⅜ E*	*20. 1*
Directions: St. Joseph Bay, p. 162.			

COASTWISE COURSES AND DISTANCES—GULF OF MEXICO—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
11. **St. Andrews Bay Entrance Lighted Bell Buoy:**			
Direct	277	W. ¼ N	80. 5
Reverse	*97*	*E. ¼ S*	*80. 5*
Direction: St. Andrew Bay, p. 167.			
12. **Caucus Cut Entrance Lighted Whistle Buoy 1A** (off Pensacola Bay Entrance):			
Direct	259	WSW. ⅝ W	41. 0
Reverse	*79*	*ENE. ⅝ E*	*41. 0*
Directions: Pensacola Bay, p. 179.			
Deeper draft vessels should take a course about 2 miles further off shore between Pensacola and Mobile.			
13. **Mobile Entrance Lighted Whistle Buoy:**			
Direct	276	W. ⅛ N	24. 3
Reverse	*96*	*E. ⅛ S*	*24. 3*
Directions: Mobile Bay, p. 191.			
14. **Horn Island Pass Bar Whistle Buoy:**			
Direct	269	W. ½ S	23. 5
Reverse	*89*	*E. ½ N*	*23. 5*
Directions: To Pascagoula, p. 197.			
15. **Ship Island Light** bearing 29° true distant 2.3 miles. On *Gulfport Channel Entrance Lighted Range*, ¾ mile south of *Ship Island Pass Lighted Buoy 1:*			
Direct	125	SW. by W. ⅜ W	18. 0
Reverse	*305*	*NE. by E. ⅜ E*	*18. 0*
Passing 3 miles off and 8½ miles past *Chandeleur Lighthouse:*			
Directions: To Gulfport, p. 202.			
16. **Chandeleur Lighthouse** bearing 285° true and distant 9 miles:			
Direct	193	S. ¾ W	52. 0
Reverse	*13*	*N. ¾ E*	*52. 0*
Passing 4 miles off Chandeleur Islands.			
17. **Pass a Loutre Lighted Whistle Buoy 2** bearing 295° true, distant 1 mile:			
Direct	221	NE. ⅞ E	14. 2
Reverse	*41*	*SW. ⅞ W*	*14. 2*
Keeping clear of shoal area off Southeast Pass.			
18. **South Pass Lighted Whistle Buoy:**			
Direct	221	NE. ⅞ E	1. 3
Reverse	*41*	*SW. ⅞ W*	*1. 3*
Directions: South Pass, p. 235.			
19. **South Pass Lighted Whistle Buoy** bearing 41° true, distant 1.3 miles:			
Direct	253	WSW	17. 0
Reverse	*73*	*ENE*	*17. 0*
20. **Southwest Pass Entrance Lighted Whistle Buoy:**			
Direct	259	WSW ⅜ W	83. 0
Reverse	*79*	*ENE ⅜ E*	*83. 0*
Directions: Southwest Pass, p. 236.			
21. **Ship Shoal Lighted Whistle Buoy 2:**			
Direct	292	WNW ⅝ W	73. 5
Reverse	*112*	*ESE. ⅝ E*	*73. 5*

COASTWISE COURSES AND DISTANCES—GULF OF MEXICO—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
22. **Trinity Shoal Lighted Whistle Buoy:**			
Direct	297	WNW. ¼ W	64. 0
Reverse	*117*	*ESE. ¼ E*	*64. 0*
Passing 5 miles northeast of *Sabine Bank East End Lighted Whistle Buoy 1.*			
23. **Sabine Pass Approach Lighted Bell Buoy 6:**			
Direct	277	W	24. 0
Reverse	*97*	*E*	*24. 0*
24. **Sabine Pass Lighted Whistle Buoy 1:**			
Directions: Sabine Pass, p. 282			
Alternate route (depth 32 feet (9.8 m)).			
22. **Trinity Shoal Lighted Whistle Buoy:**			
Direct	287	W. ⅞ N	75. 5
Reverse	*107*	*E. ⅞ S*	*75. 5*
Heading for *Sabine Bank Light* and passing 5 miles south of *Sabine Bank East End Lighted Whistle Buoy*, and 1½ miles off 23-foot (7.0 m) spot southward of that buoy.			
22A. **Sabine Bank Light** bearing 287° true, distant 4½ miles; *Sabine Bank Whistle Buoy 2* bearing 197° true, distant 1¼ miles:		NW. ⅜ W	13. 5
Direct	318	*SE. ⅜ E*	*13. 5*
Reverse	*138*		
Passing ½ mile northeastward of *Sabine Bank Lighted Bell Buoy* and 2¼ miles northeastward of *Sabine Bank Light.*			
24. **Sabine Pass Lighted Whistle Buoy:**			
Directions: Sabine Pass, p. 282.			
24. **Sabine Pass Lighted Whistle Buoy:**			
Direct	252	SW. by W. ¾ W	47. 5
Reverse	*72*	*NE. by E. ¾ E*	*47. 5*
Passing 7 to 8 miles offshore.			
25. **Galveston Bar Lighted Whistle Buoy:**			
Direct	180	S. ¾ E	3. 0
Reverse	*0*	*N. ¾ W*	*3. 0*
Passing 4 to 5 miles offshore.			
Directions: Galveston Bay, p. 305.			
26. **Galveston Bar Lighted Whistle Buoy** bearing 0° true, distant 3 miles:			
Direct	235½	SW. ¼ W	38. 0
Reverse	*55½*	*NE. ¼ E*	*38. 0*
27. **Brazos River Entrance Lighted Bell Buoy:**			
Direct	180	S. ¾ E	3. 0
Reverse	*0*	*N. ¾ W*	*3. 0*
Directions: Brazos River, p. 313.			
28. **Brazos River Entrance Lighted Bell Buoy** bearing 0° true, distant 3 miles:			
Direct	235	SW. ⅛ W	111. 0
Reverse	*55*	*NE. ⅛ E*	*111. 0*
Course passes 10.5 miles off *Matagorda Lighthouse* at a point 69 miles from position 28 and 42 miles from position 29.			

COASTWISE COURSES AND DISTANCES—GULF OF MEXICO—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
29. **Aransas Pass Lighted Whistle Buoy:**			
Direct	185	S. ⅜ E	104.0
Reverse	*5*	*N. ⅜ W*	*104.0*
Directions: Aransas Pass, p. 331.			
30. **Brazos-Santiago Entrance Lighted Whistle Buoy;** *Brazos-Santiago Lighthouse* bearing 277° true, distant 2.6 miles			
Directions Brazos-Santiago, p. 334.			

3. KEY WEST HARBOR

(Chart 584)

This harbor is large and commodious and one of the best anchorages for large vessels south of Chesapeake Bay. It lies northward of a broken line of the Florida Reefs in latitude 24°33′ N. and longitude 81°49′30″ W. 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 submerged reefs and sand flats. It has a length of 2 miles and a width of about one-fourth mile. Southwest of the harbor proper there is a large anchorage area protected by the reef. The harbor is entered through breaks in the reef, there being five main channels with depths of 13 to 30 feet (4.0 to 9.1 m), and several minor channels. A depth of 26 feet (7.9 m) can be taken into the harbor, where this depth extends for 800 feet off the wharves. There are no bridges across the ship channels at this port.

Sand Key Lighthouse (Lat. 24°27′.2, Long. 81°52″.7) is a brown pyramidal, skeleton tower, on pile foundation, inclosing dwelling and stair cylinder. The light is group flashing white (flash 0.5 second, eclipse 1.5 seconds, flash 0.5 second, eclipse 7.5 seconds), with four red sectors, 109 feet (33 m) above the water, and visible 16 miles.

Key West Lighthouse is a buff conical tower, with green lantern. The light is occulting white (light 6 seconds, eclipse 6 seconds), with 3 red sectors, 91 feet (27.7 m) above the water, and visible 15 miles.

Northwest Passage Unused Lighthouse (Old Tower) is a white dwelling on brown pile foundation, 47 feet (14.3 m) high, standing in 4 feet of water, at the northwesterly entrance to Northwest Channel. The light is discontinued.

Smith Shoal Light (Lat. 24°43′.2; Long. 81°55′.0) on Smith Shoal off the northwest entrance to Northwest Channel is a black tank house on a white hexagonal, pyramidal, skeleton tower on piles. The light is flashing white, 47 feet (14.3 m) above the water, and visible 12 miles.

Channels.—There are several channels or approaches to the harbor, leading between the reefs and coral banks which surround it; they have been examined by means of a wire drag, and the dangers are shown on the chart. These channels are easy to follow in a sailing vessel in the daytime with a fair wind, but it is not safe for a

stranger to attempt to beat into the harbor. **Main Ship Channel** and **Northwest Channel** are principally used and, in conjunction, furnish a direct route across the reef for vessels drawing up to 18 to 19 feet (5.5 to 5.8 m).

Southeast Channel is marked by buoys and at night by the easterly edge of a red sector in Key West Lighthouse; it leads over lumpy bottom with 14 to 18 feet (4.3 to 5.5 m) over the coral heads, and it is not recommended for vessels of over 13 feet (4.0 m) draft. The course through the channel is 321° true (NW. ⅜ N. mag.) for Key West Lighthouse.

Main Ship Channel has an improved depth of 30 feet (9.1 m) for a width of 300 feet and is well marked by buoys and lights. This channel is used by the deeper-draft vessels and by strangers.

Southwest Channel is convenient for vessels approaching from southwestward; it has a navigable depth of 24 feet (7.3 m) if closely followed, and is marked by several buoys. Vessels of 16-foot (4.9 m) draft can make one course nearly to the anchorage by heading for Key West Lighthouse, bearing 55° true (NE. ⅝ E. mag.) in the daytime, and by standing on the edge of a red sector of that light at night, and this is about the deepest draft of the vessels using the channel. Strangers should not attempt it at night.

West Channel is a passage leading westward from Key West between the outer reefs and the keys. The channel is deep and is fairly well marked by buoys and lights. It is used by small boats bound toward Dry Tortugas.

Northwest Channel has been improved. The jetties on either side at the entrance are from ¼ to ½ mile off the channel and the outer portion of the east jetty is exposed. In June 1935 the controlling depth was 20 feet (6.1 m) for a width of 150 feet. This channel affords a passage from Key West Harbor to the Gulf of Mexico and is well marked. The mean range of the tide at the north entrance is about 2½ feet (0.8 m) and high and low waters occur about 2 hours later than at Key West.

Calda Channel extends northward from Man-of-War Harbor and forms a passage with a controlling depth of about 7 feet (2.1 m) to the Gulf of Mexico. The channel is narrow but well marked by beacons and *Calda Channel Light* at the north end.

Prominent features.—When standing along about 6 miles southward of the Florida Keys, the Casa Marina Hotel shows prominently about 1 mile east of Whitehead Point. As the entrances from the southward are approached, the city, Key West Lighthouse, and the cupola of the Colonial Hotel will be seen near the western end of Key West Island, and Fort Taylor will show prominently a little westward of the island. The naval radio towers are conspicuous north of the fort, the north tower being distinctively painted. Sand Key Lighthouse will be seen about 7 miles southwestward of Key West lighthouse.

Eastern Triangle Light (flashing red), a black tankhouse on a red, triangular, pyramidal, skeleton structure, on piles, is midway between the entrance buoys of the Main Ship Channel and Key West Lighthouse, and can be readily distinguished from outside the reefs.

Key West (population 12,831 by the 1930 census), on Key West Island, near the western end of the Florida Keys, is the only city

of any size on the west and north shores of the Straits of Florida. It was the terminus of the Florida East Coast Railroad, and has steamship communication with New York, Habana, Tampa, New Orleans, and Galveston. A number of steamers and small sailing vessels enter and clear from this port, over half of which are from or for foreign ports.

The city was once of considerable commercial importance but this has fallen off in late years. The commerce consists of canned goods, fish, fruits, crude and refined oils, and general merchandise. The greatest draft of vessels coming to the port is 26½ feet (8.1 m) and the average draft is 14 feet (4.3 m).

The city is lately developing into a winter resort. There are several winter hotels and one hotel is open throughout the year.

Terminal facilities.—The depth at the piers and wharves ranges from 10 to 26 feet (3.0 to 7.9 m), according to the locality. The five railroad piers, with an approximate berthing space of 5,500 feet, are used for general freight and passengers, and transferring and storage of oils. Prior to the hurricane of September 1935 there was an ocean car ferry to Habana; this car ferry terminus has been transferred from Key West to Hollywood Harbor (Port Everglades), Fla. Three other privately owned facilities are used for general freight and have a berthing space of about 2,000 feet. In addition, there are three Government-owned piers with a berthing space of about 2,000 feet. There are facilities for the storage of oils and general cargo and three piers have transfer sheds.

There is a 15-foot (4.6 m) spot about 10 feet off the middle of the outer face of the lighthouse wharf. There is a depth of 13½ feet (4.1 m) at the middle of the outer face.

Anchorage.—The best anchorage is in the inner or Man-of-War Harbor, where the depth is 3½ to 4½ fathoms (6.5 to 8.2 m); this anchorage is northward of the city between coral banks, which prevent a heavy sea. Vessels can anchor anywhere off the city northward of Fort Taylor, or in the entrance to the Northwest Channel abreast of the city in 3½ to 5 fathoms (6.5 to 9.1 m), taking care, however, not to get too close to the reefs, which in some places rise abruptly at the edge of the channels. The outer anchorage, about 1 mile from Fort Taylor, with the fort bearing between 36° true (NE. by N. mag.) and 328° true (NW. by N. mag.), has depths of 4½ to 6 fathoms (8.2 to 11.9 m) and is somewhat exposed but is safe for vessels with good ground tackle.

Small craft generally anchor in the cove on the north side of the city southward of the railroad wharf.

Pilotage is compulsory for vessels in foreign trade and for other vessels except when there is a pilot on board licensed by the Federal Government. Pilotage is optional for vessels drawing 6 feet of water or less, if such vessels have a coastwise license. Vessels carrying United States mails pay half pilotage only. Pilots can always be had by making signal from outside the reefs; they will take vessels in at night. The pilot boats are fast motorboats which can reach vessels in 20 minutes from shore. The usual procedure is to radio ahead for a pilot. Pilots for Hawk Channel can also be had at Key West. Pilot rates are as follows:

	Per foot of draft
6 feet or less	$2
6 to 10 feet	3
10 to 14 feet	4
14 to 20 feet	5
Over 20 feet	6

Vessels drawing 14 feet or less are charged $10 for shifting or changing anchorage and those drawing over 14 feet are charged $20 for such service.

Towboats.—Key West is the regular station for a large salvage tug and several smaller tugs are also available.

The Harbormaster has direct supervision of the port. He has charge of anchoring and mooring all vessels and collects all port dues.

Quarantine.—A Federal Quarantine Station is located at Key West. Vessels are boarded off Fort Taylor. The quarantine anchorage is in Man-of-War Harbor northward of Fleming Key.

Customs and Immigration.—Both of these Federal Services have offices in Key West.

Supplies.—There are excellent facilities for securing fuel oil, gasoline, etc. Only a small quantity of coal is available. Key West has no local source of fresh water other than rain water, a considerable quantity of which is available from storage and is supplied to vessels through pipe lines. Well water is also supplied by the railroad; it is soft and good for boiler purposes. The usual charge for water is $10 per 1,000 gallons. Provisions of various kinds and some ship chandler's stores are obtainable.

Being less than an hour's run off the main route for ships passing about the south end of Florida, Key West is a convenient call for fuel and provisions.

Arrangements can be made for the pilot boat to deliver supplies and provisions to vessels in the Gulf Stream. Such services can include delivering orders or taking off sick seamen for the marine hospital at Key West.

Repairs and Salvage Facilities.—There is a marine railway 160 feet long, with a lifting capacity of about 1,000 tons. Vessels of 8 feet (2.4 m) draft forward and 16 feet (4.9 m) aft can be hauled out. Repairs to the hull of wooden vessels can be made and there is a machine shop where ordinary repairs can be made. Boiler and blacksmith work can be done but there is no foundry.

Key West is the regular station of one of a chain of salvage tugs. General equipment as needed for heavy salvage work is available.

Storm warnings (day and night) are displayed at the Weather Bureau signal mast at the Navy Yard. Small craft warnings are displayed on the building of the William Curry Sons Co. and the Lumley-Roberts Co. Storm warnings are also displayed at American Shoals Lighthouse.

A United States Marine Hospital is located at Key West; there are also two smaller hospitals.

Communications.—Prior to the hurricane of September 1935, the Florida East Coast Railroad connected with Miami and points north and maintained a car ferry service to Habana; there was also a highway connecting with Miami, with two ferry sections along the route. Sections of the railroad and the highway were destroyed during the

hurricane. Highway communication, in conjunction with ferry service, will no doubt soon be resumed but no information is available (1935) regarding the repair of the railroad.

There are telephone, telegraph, and cable connections and a radio telephone and telegraph station (NAR) controlled by the United States Navy but available for general public service. Meacham Airport, a commercial field located 2½ miles east of the city has daytime facilities for servicing aircraft. There is seasonal air service to Miami. At the south end of the submarine base, there is a ramp for seaplanes; it is for Government use only except in emergency or by permission.

Small Boat Facilities.—The principal anchorage for small boats is in the cove on the north side of the city southward of the railroad wharf. Depths up to 6 to 8 feet (1.8 to 2.4 m) can be taken to the boat landings here. There is a marine service station and marine ways capable of hauling boats up to about 70 feet long and 6 feet (1.8 m) draft.

The former submarine base, just inside Fort Taylor, is now being used as a public yacht basin and furnishes good berths for small craft. Truck delivery of gasoline can be secured.

There is good anchorage for small boats drawing less than 3 feet (0.9 m) in the basin between the railroad and the highway fills on the north side of the island, about a mile east of the town. The draw in the railroad bridge has a 27-foot clear opening and 7 feet (2.1 m) headroom at low water.

A meteorological table for Key West is given in the appendix.

The Port Series, volume No. 8, gives further detailed information regarding the port of Key West. (See p. 4.)

Tides.—The mean rise and fall of the tide is about 1¼ feet (0.4 m). Daily predictions of the times and heights of high and low waters will be found in the Tide Tables, Atlantic Ocean.

Currents.—The tidal currents in Key West Harbor and Northwest Channel set fair with the channels, and the times of maximum current at these places are nearly simultaneous, the strength of the flood (north flowing) occurring about 2½ hours before high water, and the ebb about 2 hours before low water, at Key West. Slack water occurs about one-half hour and 2 hours, respectively, after high and low water at Key West. The average velocity at strength of both flood and ebb is about 1 knot between Whitehead Spit and Kingfish Shoals, 1½ knots in Man-of-War Harbor and its entrance, and 1½ knots in Northwest Channel abreast of Middle Ground. These normal conditions are greatly modified by winds.

Winds.—The prevailing winds are easterly, the strongest north in winter and easterly during the hurricane months. See also the meteorological tables in the appendix.

DIRECTIONS, KEY WEST HARBOR

The approaches to Key West Harbor have been examined by means of a wire drag, and the dangers are shown on the chart.

Key West Entrance Lighted Whistle Buoy (flashing white) is moored in 91 feet (27.7 m) on the Main Ship Channel range, 4¼ miles eastward of Sand Key Lighthouse and 5 miles, 176° true, from Key West Main Ship Channel Front Range Light. *Main Entrance*

Buoys 1 and 2 mark the 24-foot (7.3 m) spots at the sides of the channel, about one-fourth mile northward of the entrance buoy.

Key West Main Ship Channel Range marks the axis of the channel up to *Eastern Triangle Light.* The front light (fixed red) of the range is mounted on a white skeleton structure, solid day mark on the inshore end of the causeway leading to Fort Taylor; the rear light (fixed red) of the range is mounted on a white iron mast near the southeast corner of a concrete and iron shed, white stripe down roof and side of shed.

Main Ship Channel.—Courses and Distances for the Main Ship Channel are given below. Courses and Distances leading to the entrance to this channel are given in United States Coast Pilot, Section D.

Courses and Distances

Main Ship Channel

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. **Sand Key Lighthouse,** bearing 270° true and distant 4.2 miles:			
Direct	356	N. ⅝ W	0.6
Reverse	*176*	*S. ⅝ E*	*0.6*
Keeping to eastward of entrance buoy to avoid wreck with unknown depth over it which lies westward of the buoy.			
2. **Key West Entrance Lighted Whistle Buoy**—close to eastward of buoy:			
Direct (Key West Main Ship Channel Lighted Range ahead).	356	N. ⅝ W	2.8
Reverse (above Lighted Range astern)	*176*	*S. ⅝ E*	*2.8*
Inland Rules commence inside this position			
3. **Eastern Triangle Light,** bearing 90° true and distant 100 yards:			
Direct	335	NNW. ½ W	2.0
Reverse	*155*	*SSE. ½ E*	*2.0*
Heading for *Kingfish Shoal Light,* with *Northwest Channel Inner Range Front Light 13* showing slightly to eastward.			
4. **Whitehead Point Spit Lighted Buoy 6** bearing 120° true, distant 600 yards:			
Direct (Key West Harbor Lighted Range ahead).	24	N. by E. ⅞ E	2.0
Reverse (Key West Harbor Lighted Range astern	*204*	*S. by W. ⅞ W*	*2.0*
Passing 100 yards off submarine base mole and 150 yards off the wharves. There is anchorage ground in 4 to 5 fathoms (7.3 to 9.1 m) northwestward of the mole.			
5. **Man-of-War Harbor.**			

Northwest Channel.—Northwest Channel has been examined by means of a wire drag, and the dangers are shown on the chart. The following courses led in a least depth of about 20 feet (6.1 m) in 1935.

Courses and Distances for approaching *Smith Shoal Light* are given on page 59, and also under **Coastwise Courses** (Position No. 1). The following Courses and Distances led in a least depth of about 20 feet (6.1 m) in 1935.

Courses and Distances

Northwest Channel

For reverse direction, read upward	Course (Reverse course in *italics*)		Distance
	True	Magnetic	
1. **Smith Shoal Light** bearing 270° true, distant ¼ mile:	°	*Points*	*Nautical miles*
Direct (Northwest Channel Entrance Lighted Range ahead).	171	S. by E. ⅛ E	5. 2
Reverse (Above Lighted Range astern)	*351*	*N. by W. ⅛ W*	*5. 2*
Passing 200 yards west of *Northwest Channel Entrance Lighted Bell Buoy 1. Northwest Bar Front Light* is the front range light of both the above and the following range (see Position 3).			
Inland Rules commence inside *Northwest Channel Entrance Lighted Bell Buoy 1.*			
2. **Northwest Channel Buoy 3** bearing 90° true distant 150 yards:			
Direct and Reverse	-----	Various	. 4
Haul gradually to eastward, passing between *Northwest Bar Front Light* and *Channel Lighted Buoy 5.*			
3. **Northwest Channel Buoy 7** abeam and Northwest Channel Turn Lighted Range astern:			
Direct (Northwest Channel Turn Lighted Range astern and Northwest Channel Turn, Easterly, Lighted Range ahead).	118	SE. by E. ¾ E	. 85
Reverse (Above Turn, Easterly, Range astern and above Turn Range ahead).	*298*	*NW. by W. ¾ W*	*. 85*
Passing southwest of buoys 7A and 9, and northeast of buoy 6.			
4. **Northwest Channel Buoy 6** bearing 90° true and distant 225 yards; Northwest Channel Inner Lighted Range ahead:			
Direct (Northwest Channel Inner Lighted Range ahead).	139	SE. ⅛ S	2. 9
Reverse (Above Range astern)	*319*	*NW. ⅛ N*	*2. 9*
Passing between *Channel Lighted Buoy 6A* and the front range light to the northeastward, thence southwestward of buoys 11, 11A, and 11B, and northeastward of buoy 8.			
5. **Northwest Channel Inner Range Front Light 13** bearing 139° true and distant ¼ mile. Position on previous range, 250 yards past buoy 8:			
Direct	157	SSE. ¼ E	0. 85
Reverse	*337*	*NNW. ¼ W*	*0. 85*
Deep draft vessels favor *Northwest Channel Buoy 10.*			

Courses and Distances—Continued

Northwest Channel—Continued

For reverse direction, read upward	Course (Reverse course in *italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
6. **Channel Lighted Buoy 15** bearing 67° true, distant 150 yards.			
Direct	148	SE. ⅞ S	1. 1
Reverse	*328*	*NW. ⅞ N*	*1. 1*
Northwest Channel Inner Range Rear Light on range with *Key West Lighthouse* just clears the 11-foot (3.3 m) spot on the south side of the Middle Ground. Vessels drawing 14 feet (4.3 m) or less can cross the Middle Ground by passing about 400 feet south of the *Inner Range Rear Light.*			
7. **Kingfish Shoal Light** bearing 270° true, distant 125 yards:			
Direct	167	S. by E. ⅜ E	0. 9
Reverse	*347*	*N. by W. ⅜ W*	*0. 9*
Continue on course until in edge of red sector of Key West Lighthouse with lighthouse bearing 69° true.			
8. **Key West Lighthouse** bearing 69° true, distant 1.3 miles; on edge of red sector as above:			
Direct	69	NE. by E. ⅞ E	0. 4
Reverse	*249*	*SW. by W. ⅞ W*	*0. 4*
Heading for the lighthouse until *Key West Harbor Lighted Range* comes on.			
9. **Key West Lighthouse** bearing 69° true, distant 0.95 mile; on edge of red sector as above:			
Direct (Key West Harbor Lighted Range ahead).	24	N. by E. ⅞ E	1. 7
Reverse (Key West Harbor Lighted Range astern).	*204*	*S. by W. ⅞ W*	*1. 7*
Passing 100 yards off submarine base mole and 150 yards off the wharves. There is anchorage ground in 4 to 5 fathoms (7.3 to 9.1 m) northwestward of the mole.			
10. **Man-of-War Harbor.**			

4. FLORIDA KEYS, WESTWARD OF KEY WEST

(Charts 1252 and 1351)

This section is the western end of the remarkable chain of low islands, with intervening reefs and shoals, beginning with Virginia Key, in about latitude 25°45′ N., longitude 80°09′ W., and extending in a circular sweep to the Dry Tortugas, in latitude 24°38′ N., longitude 82°55′ W. From Florida Bay westward to Dry Tortugas they separate the waters of the Straits of Florida from the Gulf of Mexico.

Westward of Key West there is a succession of shoals, reefs, and keys, mostly of a coral formation and very irregular in outline. The keys are low, small in extent, and, except for the Dry Tortugas, largely covered with a dense growth of mangrove. Fresh water in limited quantities is found on Marquesas Key and some rain water is caught and stored at Dry Tortugas.

About 5½ miles south of the main chain of keys and reefs, and extending westward from Sand Key Lighthouse for a distance of 40 miles or more, is a line of reefs, shoals, and generally broken ground which rises abruptly from the deep water of the Straits of Florida. **Satan Shoal, Vestal Shoal, Coalbin Rock, Cosgrove Shoal, Marquesas Rock,** and a 17-foot (5.2 m) spot 2¼ miles westward of Marquesas Rock are the most dangerous of those known at present. This line of reefs is marked by several buoys; a light marks Cosgrove Shoal and a lighted bell buoy marks the 28-foot (8.5 m) shoal, 13 miles 135° true from *Rebecca Shoal Lighthouse*, at the western end of the line of reefs and shoals.

As a measure of safety, when standing westward of Key West and bound into the Gulf of Mexico, vessels of the deepest draft should avoid this broken ground, including the areas with depths less than 10 or 12 fathoms lying southward and westward of Rebecca Shoal and Dry Tortugas. A course which leads 1 to 2 miles south of the buoys, 12 miles south of Rebecca Shoal Lighthouse, and 8 miles south of Dry Tortugas Lighthouse on Loggerhead Key is as close as this broken ground should be approached when skirting it. The hand lead cannot be depended upon to insure clearing the dangers.

The **currents** near the edge of the bank in this locality are variable, being influenced by the winds, by differences of barometric pressure in the Gulf and outside, and by the tides. There are strong tidal currents through the passages westward of Rebacca Shoal, a velocity of 1½ knots north and south having been observed in the passage. The tidal current on and off the edge of the reef should also be taken into consideration by vessels in these waters.

For about 11 miles westward of Key West Harbor there is an extensive shoal area with a number of small scattered keys on it. White sand beaches make the three southernmost keys easily distinguishable from the southward.

There are several small boat channels across the above shoal ground westward of Key West. These passages are unmarked, but the dangers are readily discernible.

A channel, good for a depth of 3 to 4 feet (0.9 to 1.2 m), leads westward through the reefs from Key West to Boca Grande Channel. From *Northwest Channel Inner Rear Range Light*, it leads to a position about five-eighth mile northeastward, and three-eighth mile north, of **East Crawfish Key**, three-eighth mile south of **Snipe Key**, and one-half mile north of **Barracouta Key**. Then the course is about west to the narrow channel which leads in a southwesterly direction past the northwestern end of **Boca Grande Key**.

From near Snipe Key there is a channel good for about 4 feet (1.2 m) leading southward to West Channel, passing three-eighth mile westward of **West Crawfish Key**. Another channel, good for about 3 feet (0.9 m) leads southward to West Channel from a position 2 miles

west of Barracouta Key. Head a little to the eastward of **Ballast Key**, the small key eastward of **Man Key**, taking care to avoid a shoal extending three-fourths mile northward from Ballast Key. When east of the northern end of Ballast Key, pass through a narrow opening in the shoal (about 30 feet wide), heading for the key and then continue southward.

Boca Grande Channel, lying about 15 miles westward of Key West, between Boca Grande Key and Marquesas Keys, affords a short cut across the shoals from the Straits of Florida to the Gulf of Mexico; but it is seldom used, as the Northwest Channel from Key West has deeper water, is better marked, and cuts off more distance for vessels coming from or bound to points northward or eastward. Boca Grande Channel is good for a depth of about 11 feet (3.4 m) and is marked by two beacons and one channel buoy. It is used only by local boats of about 6 feet or less draft. A 2° (N. ⅛ W. mag.) course will lead through the marked channel.

A good anchorage for small boats drawing less than 5 feet (1.5 m) can be had three-fourths mile northeastward of Boca Grande Key.

Marquesas Keys are a number of keys, roughly circular in outline, lying westward of Boca Grande Channel; they are about 4 miles long and 3 miles broad and surrounded by an extensive shoal area.

A good anchorage (locally known as **Mooney Harbor**) for small boats drawing 4 feet (1.2 m) or less can be had inside the keys by approaching the opening between **Couch Key** and **Round Island** from a south by east direction, passing well to eastward of the coral heads at low tide 1 mile south of the opening.

Other small boat harbors are reported at the eastern end and in the northwest corner of the keys.

Extending in a westerly direction for a distance of 18 miles from Marquesas Keys is an extensive shoal, the western part of which is known as **The Quicksands**. The general width of the shoal between the 18-foot (5.5 m) curves is about 4½ miles, with depths of only 2 to 6 feet (0.6 to 1.8 m) over it in spots. At the western end of The Quicksands is **Halfmoon Shoal**, with a least depth of 10 feet (3.0 m) on it. A red buoy, 4A, marks the location of a wreck.

About 5 miles north of The Quicksands is **New Ground**, a narrow ridge 5½ miles long in a general east and west direction, ⅜ mile wide, and with a least depth of 4 feet (1.2 m). Its western extremity is marked by *New Ground Rocks Lighted Whistle Buoy*. On the northern side of New Ground the water shoals abruptly, and vessels should keep in not less than 13 fathoms (23.8 m) to insure clearing the shoal.

On the southern side of New Ground, and between it and The Quicksands, is a questionable channel, 2¼ miles wide, with depths of 28 to 35 feet (8.5 to 10.7 m). Spots having 19 to 22 feet (5.8 to 6.7 m) over them are found 7 miles eastward of New Ground, and the bottom inside of the 10-fathom (18.3 m) curve is generally broken. There are indications of a ridge, of which New Ground is the western end, extending eastward to **Smith Shoal**, and the locality should be approached with caution by all except light-draft vessels. A shoal, with 2½ fathoms (4.6 m) of water over it, lies 3⅜ miles 255° true from Smith Shoal, partly verifying the existence of the ridge mentioned.

Ellis Rock, 4 miles NW. ¾ W. from Marquesas Keys is marked by a beacon.

Between Halfmoon Shoal and Rebecca Shoal is a channel used by steamers with local knowledge drawing as much as 18 feet (5.5 m), but it is not recommended for a stranger because of the broken nature of the bottom. Within a radius of 2¾ miles from the buoy on **Halfmoon Shoal,** and between southeast and west of it, are a number of spots, with least found depths of 20 to 22 feet (6.1 to 6.7 m), rising abruptly from depths of 6 to 7 fathoms (11 to 12.8 m).

Another spot, known as **Isaac Shoal,** lies nearly 2 miles southeast by east from Rebecca Shoal and has a least depth of 14 feet (4.3 m). The shoals are of the nature of coral heads, rising very abruptly from the deep water surrounding them, and there are probably other shoals not found by the survey. It is also probable that there are less depths than found by the survey on the charted shoals.

Currents.—In the channel between Halfmoon Shoal and Rebecca Shoal slack water before the flood (northerly) occurs about 2 hours after the time of low water at Key West, and slack water before the ebb (southerly) occurs about 2 hours after the time of high water at Key West. The average velocity of the current at strength is three-fourths knots. The times of slack water and the velocity of the current are considerably influenced by the winds.

Rebecca Shoal, a coral bank quite small in extent and with a least depth of 9 feet (2.7 m) over it, lies about 7 miles westward of Halfmoon Shoal.

Rebecca Shoal Lighthouse (Lat. 24°34′.7; Long. 82°35′.2) is a white dwelling on a brown pile foundation on the southerly edge of the shoal. The light is group flashing white (3 flashes every 15 seconds), 66 feet (20.1 m) above the water, and visible 14 miles. A sector, in which the flashes are red, covers Isaac and Halfmoon Shoals and The Quicksands.

So far as is now known the passage between Rebecca Shoal and Dry Tortugas is clear. The lower part of the passage, south of a line from Rebecca Shoal Lighthouse to Tortugas Harbor Unused Lighthouse and west of a line extending NNE. and SSW., and passing 1 mile west of Rebecca Shoal Lighthouse, has been examined with the wire drag. Included in the dragged area are the three 10-fathom (18.3 m) spots on a line about 9 miles south of the northern limit of the drag work. Until more detailed surveys have been made of the remainder of this locality, vessels of the deepest draft should use this passage with great caution, as there are probably undiscovered spots with less depths than those now charted. A vessel is reported to have struck an obstruction 2 miles 285° true (WNW. ⅞ W. mag.) from Rebecca Shoal Lighthouse. No obstruction was found here with the drag set to a depth of 33 feet (10 m) or over. A vessel is also reported to have struck an obstruction with about 18 feet over it 11 miles 147° true (SE. ⅞ S. mag.) from Rebecca Shoal Lighthouse.

Rebecca Shoal Channel immediately to the westward of Rebecca Shoal Lighthouse is frequently used by vessels bound from the Straits of Florida to points on the west coast of Florida. But in accordance with the above comment relative to shoals in this area, this passage should be used with caution and vessels should continue

a considerable distance past the lighted bell buoy before heading to the northward. This passage is well lighted.

Vessels bound for Mobile, New Orleans, etc., pass to the westward of Dry Tortugas.

Dry Tortugas (Chart 585) is a group of small sandy reefs and keys about 10 miles long in a northeast and southwest direction and about 5 miles wide, lying 58 miles westward of Key West. **Pulaski Shoal**, the northeastern end of this group, is 12 miles northwestward of Rebecca Shoal and is marked by *Pulaski Shoal Light* on the east side of the shoal. The keys are irregular in form, and in general rise abruptly from deep water, with fairly good channels between them. As the keys are low and generally barren of vegetation, with only seven of them showing above high water, they are not readily distinguished; but **Fort Jefferson** and Tortugas Harbor Unused Lighthouse on **Garden Key**, and Dry Tortugas Lighthouse, on **Loggerhead Key**, are good landmarks. On a clear day they may be seen at a distance of 10 to 12 miles, Garden Key having the appearance of a bare rocky island. **Bird Key**, a small key lying three-fourths mile southwestward of Fort Jefferson, is a national bird reservation.

Changes have been reported in depths and shoreline in vicinity of Garden Key as follows: Bird Key is almost entirely washed away; only a narrow ridge of white sand remaining. Long Key has built up and now extends southwestward to the vicinity of the channel abreast of Garden Key and is covered with bushes. The low-water area has extended to a point 100 yards southward of the south end of Garden Key and beyond the line of the face of the wharf prolonged. The slip back of the wharf has filled and is bare at low water. Caution should be exercised when navigating in this vicinity.

When approaching Dry Tortugas from eastward or southeastward, the lead is of little use to give warning of danger, as 10 to 15 fathoms (18.3 to 27.4 m) is found close to the reefs in many places. The shoal extending south of Middle Key can be cleared by keeping south of the range: Dry Tortugas Lighthouse and the unused lighthouse on Garden Key; the buoy N2 is on this range. Approaching from northwestward or southwestward, the water shoals more gradually; but in thick weather a depth of 10 fathoms (18.3 m) is as close as any vessel should approach, unless sure of her position.

Tortugas Harbor Unused Lighthouse on Garden Key is a brown, hexagonal, pyramidal tower, 67 feet (20.4 m) high.

Dry Tortugas Lighthouse (Lat. 24°38′.0; Long. 82°54′.2) on Loggerhead Key is a conical tower, lower half white, upper half black. The light is flashing white (light 1 second, eclipse 19 seconds), 151 feet (46 m) above the water and visible 19 miles. A radiobeacon has been established at the light. (See Light List or Hydrographic Office Publication No. 205.)

There are two buoyed channels known as Southeast and Southwest, which lead to the anchorages among the reefs, and on a clear day no difficulty need be experienced by a medium-draft vessel in entering, as the shoals are readily distinguishable by the difference in color of the water. All of the channels, except that part of Southwest Channel southward and westward of buoy 2, have been closely developed by survey with lead, but have not been dragged to develop the least depths. The bottom is so rocky and broken and the rocky heads are

so small in extent that vessels should exercise the greatest caution, even in the buoyed channels, where the depths are not more than about 10 or 12 feet (3 or 3.6 m) greater than the draft.

Southeast Channel leads between the reefs making off eastward from Long and Bush Keys and those making off westward from East, Middle, and Sand Keys. This channel has depths of 30 feet (9.1 m) or more, but it should be used with caution by vessels drawing over 18 feet (5.5 m).

Southwest Channel leads between the reefs making off southwestward and westward from Garden and Bird Keys and those extending southwestward from Loggerhead Key. The least found depth on the usual course is 6 fathoms (11 m), but it has not been closely developed outside of buoy 2. *Tortugas Outside Lighted Whistle Buoy* marks the entrance to the channel.

Northwest Channel has been abandoned and the buoys have been discontinued.

There are numerous places among the reefs where vessels can anchor and find shelter from winds from different quarters, according to circumstances. The **anchorage** affording best shelter from all winds, although somewhat open to the northward, is northward and northwestward of Garden Key. It has good holding ground, and the depths range from 8 to 10 fathoms (14.6 to 18.3 m). Excellent anchorage for small vessels and boats is found in the deep water known as **Bird Key Harbor**, close eastward of Bird Key, and also in what is known as Tortugas Harbor, the narrow channel leading to the wharf at Fort Jefferson through the reefs that surround Garden Key. Both entrance channels are from the northward and are well marked. The entrance to Bird Key Harbor is narrow and care is required to avoid the shoals on either side. These anchorages are used principally by the fishermen who frequent these waters. Fort Jefferson has been abandoned but has recently been renovated as a work relief project.

Currents.—Current observations taken between Loggerhead Key and White Shoal indicate that the current changes from southward to northward about one-quarter hour after low water at Key West, and from northward to southward about one-quarter hour after high water at Key West. Velocities at strength of current approximate 1½ knots. The velocities as well as the times of slack water are considerably influenced by the winds.

There are no regular **pilots** for Tortugas Harbor, but a competent fisherman or lighthouse keeper will usually come out and assist vessels to enter.

For 10 miles westward of Dry Tortugas the bottom is broken and irregular, and consists of coral rock with patches of sand and broken shell. The shoalest part of this area, known as **Tortugas Bank**, lies 7 miles west of Loggerhead Key, and has a least found depth of 38 feet (11.6 m), but it has not been closely developed. Depths of less than 10 fathoms (18.3 m) are found for a distance of 2½ miles in all directions. Between Tortugas Bank and Dry Tortugas the depths range from 10 to 19 fathoms (18.3 to 34.7 m). Tortugas Bank should be avoided by deep-draft vessels, especially during heavy weather.

5. KEY WEST TO SAN CARLOS BAY

(Charts 1251, 1250, 1253, 1254, 1255)

From Cape Sable to San Carlos Bay the coast is low, sandy, and generally wooded, with few distinguishing features. Back of the coast is an extensive swampy region, practically uninhabited, known in the southern part as **The Everglades.** Off the coast the water is generally shoal, and the 10-fathom (18.3 m) curve roughly approaches a line drawn north-northwestward from Key West to Tampa Bay Entrance. This part of the coast is seldom approached by deep-draft vessels.

Vessels of moderate draft, bound from Key West up the west coast of Florida, can lay a straight course from Northwest Channel to Sanibel Island Lighthouse, at the entrance to San Carlos Bay, a distance from Key West of 118 miles. This course lies well clear of all dangers, and the lighthouse on Sanibel Island is a good landfall during the day or night. However, on account of the frequency of northers during the winter months, this track is not recommended for small power boats, and the route across Florida Bay is to be preferred.

Small boat facilities.—The best places to take on fuel and supplies and to make repairs are Key West, Everglades, and Fort Myers; some supplies can be had at Marco and Naples and minor machine repairs can be made at Naples.

Local guides acquainted with this coast can be found at Key West, Everglades, and Marco and generally at the larger resort towns between Miami and Tampa.

Courses and distances for small craft crossing Florida Bay to Cape Sable are given under **Directions** and similar small craft routes through Florida Bay toward Biscayne Bay are described in the Inside Route Pilot, New York to Key West.

KEY WEST TO CAPE ROMANO

The northern side of the Florida Reef extends 33 miles east-northeastward from the north entrance to Northwest Channel. There are depths of but 1 to 2 feet (0.3 to 0.6 m) along the edge of the reef and *Harbor Key Bank Light* and *Bull Frog Bank Light* mark the northern extension of the reef where the depths increase to the general depths of Florida Bay.

This section of the Florida Reef immediately to the eastward of Key West is from 7 to 13 miles in width to Hawk Channel which extends along the south side of the reef. The southern portion of the reef is covered by numerous islands, many of considerable size, which extend across the reef in a general northwest-southeast direction. These islands, or keys, are mostly covered with a growth of trees or heavy mangrove and the passages between them are invariably shallow.

The northern portion of the reef, between the islands and the Gulf, is mostly a wide expanse of open water with numerous mangrove keys scattered over it.

Across this northern portion of the reef, a small boat channel extends from Key West to Big Spanish Channel. This small boat channel follows a circuitous route between reefs and keys but is

well marked by numerous beacons. This channel is good for a depth of about 2 feet (0.6 m) at low water and about 4 feet (1.2 m) at high water. The channel commences at the south side of Fleming Key in Key West Harbor and enters Big Spanish Channel just south of Porpoise Key. Chart 1251 is the best guide for this route but local knowledge is advisable before making the passage.

Big Spanish Channel, 26 miles eastward of Key West, is the first channel in this direction through which any considerable draft can be taken from Hawk Channel to the Gulf of Mexico. This channel extends northwestward from Bahia Honda Harbor for about 8 miles and then northward for about 4 miles along the west side of Big Spanish Key and a shoal extending north from this key to the Gulf. *Harbor Key Bank Light* marks the east side of the north end of the channel. The controlling depth is about 4½ feet (1.4 m) and is found about 1 mile south of Big Spanish Key. At high water the effective depth is increased about 2 feet. The channel is well marked.

Between Northwest and Big Spanish Channels, several small boat channels lead southward from the Gulf on to the Reef. The first of these is Calda Channel leading to Key West; this is described on page 68.

Jewfish Channel (Harbor Channel), 6 miles eastward of Calda Channel and about 8 miles northeast of Key West, leads from the Gulf to **Jewfish Lake** which lies to the eastward of East Harbor Keys. The channel is not marked but it is clear and the middle grounds are visible at any tide. A depth of 5 feet (1.5 m) can be taken over the bar at mean low water and thence 7 feet (2.1 m) through the channel and into the lake which affords fair anchorage in a moderate blow but is too exposed for a hurricane anchorage.

Johnson Key Channel, 13 miles eastward of Calda Channel, passes between Johnson and Sawyer Keys and forms a connection between the Gulf of Mexico and the shallow-draft boat channel northward of the keys from Big Spanish Channel to Key West. The channel had a controlling depth of 4 feet (1.2 m) in 1935; it is not marked and the entrance from the Gulf is hard to see and follow except at low tide. Johnson Key Channel is an excellent anchorage for small craft except in severe blows, being fairly well protected by keys and extensive shoals.

Sugarloaf Channel, is a southern extension of Johnson Key Channel; it furnishes a shallow draft connection between Hawk Channel and the small boat route north of the keys. This channel extends between Sugarloaf Key and Cudjoe Key and is well marked. The controlling depth is about 2 feet (0.6 m) and the controlling vertical clearance is 6 feet (1.8 m) under the highway bridge. Passage through the channel should not be attempted without local knowledge.

Florida Bay (charts 1251 and 1250) lying northward of Florida Keys, and between them and the south coast 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 months the water is frequently milky and the shoals indistinguishable.

In the eastern part of the bay there are numerous ridges and reefs, which show bare or nearly bare, and there is also a large number of small wooded keys. This part is navigable only for small craft, and is mostly frequented by small motor yachts, spongers, fishermen, and the inhabitants of the keys, who generally use flat-bottomed boats of 3 to 4 feet (0.9 to 1.2 m) draft. The western part of the bay is comparatively clear, with depths ranging from 7 to 13 feet (2.1 to 4.0 m), and the bottom is covered with loggerhead sponges and small coral heads.

Moser Channel, 39 miles eastward of Key West, affords a passage between the Florida Keys from Hawk Channel to Florida Bay, which is used by vessels of 6 to 7 feet (1.8 to 2.1 m) draft, coming either from Key West or from the east coast of Florida, and bound to points on the west coast. By this route small craft find comparative shelter in the shallow waters of Florida Bay, and protected anchorages are at no great distance apart. Moser Channel is crossed at its southerly end by a drawbridge with an opening 106 feet wide on each side of the central pier. It is a girder bridge with 18 feet headroom through 65-foot openings.

A strong tidal **current** is always found, except at slack water, in Moser Channel in the vicinity of the bridge, and during spring tides there are overfalls which may swamp a small boat. This tidal current is caused by the difference in the tides on the south and north sides of the keys. Winds also affect the currents very noticeably. The northerly current is increased by easterly winds and the southerly current by westerly winds, due to the effect of these winds in driving out or piling up, respectively, the waters in Florida Bay. The flood current runs northward and the ebb current southward through the draw of the bridge.

Cape Sable (chart 1253), on the north side of Florida Bay, is the southwestern point of the mainland of Florida. It is low and wooded and has three points, known, respectively, as **East Cape, Middle Cape,** and **Northwest Cape.** A white sand beach extends completely about the cape. The three points are relatively steep-to and are partially cleared, with a growth of grass and coconut palms (palmettos on Northwest Cape).

A good anchorage for small vessels can be had 1½ miles east and southeast of East Cape, in 8 to 10 feet (2.4 to 3.0 m) of water. There is good holding ground here, in even marl bottom, and it is well protected from northerly winds. There is also good anchorage in 7 feet (2.1 m) of water, three-fourths of a mile eastward of the easternmost horizontally striped beacon.

A drainage canal opens into the Bay 1 mile east of East Cape, into which a depth of 2 to 3 feet (0.6 to 0.9 m) can be carried at low water by approaching from a due south direction. It affords good protection for any boat that can enter. Only trappers and fishermen frequent this locality.

From Northwest Cape the coast trends about north for 20 miles, and then northwestward for 30 miles to Cape Romano. For the greater part of this distance it is broken by innumerable small islands and keys, known as the **Ten Thousand Islands,** among which is a network of small rivers and bayous leading to the interior. The islands and keys are generally lumps of mud, low and densely wooded, and nearly impossible of identification by a stranger. They

are small in size, mostly awash at high water, and fringed with oyster reefs.

There are no prominent objects along this section of the coast. Shark River Bluff, Shark Point, and Highland Point can be identified as protruding points with a slightly higher growth of timber.

The depths for a distance of 10 miles from the coast are shallow, and for 2½ miles from the coast there is found a depth of 7 feet (2.1 m) or less. With local knowledge 3 to 6 feet (0.9 to 1.8 m) can be carried into many of the rivers.

Ponce de Leon Bay is a nearly rectangular bight, 2 miles wide by 1½ miles long, in the west coast of Florida, 7 miles north of Cape Sable Northwest Cape. **Shark Point**, on the north side of the entrance, and **Shark River Bluff**, the point on the south side, are heavily wooded to the water's edge, and stand out in bold relief against the tree line at the head of the bay. The head and the northern part of the bay are shallow, but there is a good and convenient anchorage for vessels of 6 feet (1.8 m) draft in the southern half of the entrance, from one-fourth to one-half mile northwestward of the southern shore. Several narrow streams empty into the head of the bay.

Directions, Ponce de Leon Bay.—The shore from Northwest Cape to **Ponce de Leon Bay** can be followed at a distance of 1 mile until the south side of the entrance bears northeast. Then follow this shore at a distance of three-eighths to one-half mile, and when the coast south of **Little Shark River** (the little river 1 mile south of the bay) is shut out, anchor in 7 to 10 feet (2.1 to 3 m). Approaching from northward, keep at least 3 miles off shore until a northeast course will clear the south shore of the bay from three-eighths to one-half mile, and then stand in on this course until the coast south of Little Shark River is just shut out. Here there will be shelter from winds east of north or south, and the shoal northwest of the position will afford considerable protection from that direction. Boats drawing up to 5 feet (1.5 m) can continue into the southernmost of the entrances on the east side of the bay.

The rivers and inland lakes to the north of Northwest Cape are frequented by yachting, hunting, and fishing parties, particularly during the winter season. Without local information, guides are generally necessary and can be secured at the numerous resort towns along the Florida coast from Miami to Tampa or are sometimes available locally. These rivers furnish good anchorages for such boats as can cross the bars off the entrances or proceed into the rivers.

Photostats of survey sheets which afford information in greater detail than can be shown on the scale of Chart 1253 and also including areas beyond the limits of this chart, may be obtained at a nominal cost from the Director, Coast and Geodetic Survey, Washington, D. C.

The area some 10 miles east and southeast of Ponce de Leon Bay consists of a complicated network of tidal channels around thousands of mangrove islets. These channels lead or enlarge into Oyster, Whitewater, and Tarpon Bays, from which in turn shallow rivers lead back into the Everglades.

A controlling depth of 5 feet (1.5 m) can be carried to the southern two of the many entrances on the east side of Ponce de Leon Bay. There is a 3½-foot (1.1 m) shoal area in the middle of the southern-

most entrance with depths of 8 to 10 feet (2.4 to 2.7 m) on either side of this shoal. Several shoals of about 4 feet (1.2 m) lie in the area within ⅜ mile of the broad point on the southern shore of the bay. A channel leads through this area direct to the southernmost entrance, but it is unmarked. Generally 5 feet (1.5 m) can be carried through the various passes into Oyster and Tarpon Bays by giving a good berth to the points, which often have tidal bars projecting out from them.

Oyster Bay lies about 2 miles southeast of the southeast corner of Ponce de Leon Bay. It is about 1½ miles wide in an easterly direction, and 4 miles long in a north-south direction. The southern end of Oyster Bay leads into Joe River, a tidal channel running some 10 miles in a southeasterly direction to the southern end of Whitewater Bay. Five feet (1.5 m) can be carried through Oyster Bay and Joe River by avoiding occasional bars.

Numerous channels lead from Oyster Bay easterly through a belt of mangrove about 2 miles wide into Whitewater Bay. Whitewater Bay is about 10 miles long and 5 miles wide, with frequent low mangrove islands and salt water from 2 feet (0.6 m) to 6 feet (1.8 m) deep. At its southern end a creek leads into Coot Bay, which is about a mile in diameter and 3 feet (0.9 m) deep. A trail practicable for automobiles during the winter season leads from the south end of Coot Bay to the road to Miami. There are several channels leading from Whitewater Bay to Joe River. Joe River is used by boats going to and from Whitewater and Coots Bays, as it is the southernmost passage, easy to follow, and deep enough for all boats which can cross the bays.

Little Shark River, with an entrance about 2 miles south of Ponce de Leon Bay, affords a good channel into Oyster Bay for vessels drawing 6 feet (1.8 m) or less. It also affords an anchorage of limited extent but good protection. Occasional snags have been noticed on the middle ground off the entrance. Boats should favor the north side.

Little Shark River Point, on the west side at the entrance to the river is marked by *Little Shark River Light;* above the light, two beacons mark alternate points along the river entrance channel.

Shark River is the name generally used for the channel at the middle of the east side of Ponce de Leon Bay which leads most directly inland. The point on the south side of the entrance to this channel was cleared some years ago, and the low second-growth mangrove distinguishes it from the other channels. About 1 mile from the entrance on the south bank of this channel are the ruins of an old mill. Some 8 miles in an east-northeasterly direction the channel enlarges into a bay about ½ mile wide and 3 miles long called Tarpon Bay. Five feet (1.5 m) can be carried through Shark River and Tarpon Bay. Shallow rivers lead from the north and east of Tarpon Bay back into the Everglades.

Harney River, with an entrance about 2 miles north of Shark Point, gives a good passage for small boats to Tarpon Bay. Numerous bars at the entrance limit the practicable depth to 2½ feet (0.7 m) at low water.

Broad and Rodgers Rivers.—About 3½ feet (1.1 m) can be carried over the bar 1½ miles southwest of the entrance to Board River, and

a 4-foot (1.2 m) channel leads to and through the middle one of the mouths of Broad and Rodgers Rivers into Broad River. Vessels drawing up to 3½ feet (1.1 m) can anchor just outside the mouths of these rivers and obtain protection from the sea from the bars outside. These rivers run back to the Everglades some 15 miles. About 6 miles from the coast they connect with a chain of numerous shallow water bays and creeks which extend northward paralleling the coast for some 60 miles. Launches drawing up to 18 inches (0.4 m) can traverse these inside passages from Broad River to Naples.

Lostmans River.—The north entrance to Lostmans River was well staked in 1928. About 3 feet (0.9 m) at low water can be carried some 10 miles back into this river which drains a large area of shallow bays. Guides for yachting, hunting, and fishing can be obtained here, and there is a store where limited amounts of gasoline, oil, and groceries can usually be obtained.

About the only habitations along this section of the coast are a few dwellings about the entrance to Lostmans River and a small group of dwellings on the south side of Wood Key (Porpoise Point) about 3 miles north of Lostmans River.

Seminole Point (locally known as **Plover Point**) and **Pavilion Key**, 24 and 30 miles, respectively, northward of Northwest Cape, are fairly prominent when coming up the coast at a distance of 2 or 3 miles from it. Seminole Point is the southwest end of **Plover Key**, and is the most westerly land seen until Pavilion Key is picked up. After leaving Seminole Point, Pavilion Key is the extreme offshore key to the northwest.

Snake Key.—A good anchorage for boats of not over 4 feet draft, of limited extent but with protection in all weather, can be had between the keys of the group northwest of Snake Key. Approach the south end of the group on an east-by-north course and follow the shore about 50 yards off until in the landlocked harbor between the keys.

There is also a small boat anchorage off the easterly point of the south end of Pavilion Key; it is good for a draft of 4 to 5 feet (1.2 to 1.5 m). The approach passes close to the westward of the small key ¼ mile south-southeast of Pavilion Key.

Chatham and Huston Rivers offers a connection to the system of shallow bays which parallel the coast. About 2 feet (0.6 m) can be carried up these rivers at low water, but local knowledge is necessary to avoid numerous bars.

About ¼ mile west from Outer Point of Rabbit Key, there is wreckage dangerous for light-draft vessels.

Jewel Key, 6 miles northward of Pavilion Key, and 1 mile east-southeastward of **Pelican Key**, marks the entrance of the main channel to Chokoloskee. Jewel Key is a small flat island with a clump of mangroves on the northern end.

Chokoloskee is a post office and small settlement about 3 miles east-northeast of Jewel Key. Gas, oil, water, ice, and some general supplies can be bought here. The best channels to Chokoloskee are Jewel Key Pass and Rabbit Key Pass. Three feet (0.9 m) of water, at high tide, can be carried through Chokoloskee Bay from Chokoloskee to the town of Everglades; the channel, however, is not marked and local knowledge is necessary to carry this depth of water.

Rabbit Key Pass is sometimes used by local fishermen to enter Chokoloskee Bay and to go to the town of Chokoloskee. To enter, pass

300 yards northwest of Rabbit Key and steer 25° true (NNE. mag.). Pass 150 yards eastward of the small key 1 mile from Rabbit Key, swing around to a position about 250 yards north of this key and then steer 48° true (NE. mag.) for the opening between the Keys. About 4 feet (1.2 m) of water can be carried at high tide into this pass and about 3 feet (0.9 m) to Chokoloskee. This pass is not marked and local knowledge is necessary to go to Chokoloskee. Jewel Key Pass is the one generally used, and is recommended for strangers.

Jewel Key Pass, or **Chokoloskee Pass,** is the main channel to the town of Chokoloskee. To enter, pass 200 yards southeast of Jewel Key on a northeasterly course. Leave the small island east of Jewel Key about 200 yards on the starboard hand and continue in a general east by northerly direction for 1¾ miles. The channel turns southeasterly here for ½ mile and then turns in a generally east-northeasterly direction, but is very crooked. The upper part of the channel is sometimes marked by stakes, and piles with pointers, but strangers should proceed carefully to avoid the numerous oyster bars. About 3½ feet (1.1 m) of water can be carried at low tide to Chokoloskee and 5 to 6 feet (1.5 to 1.8 m) at high tide but strangers may find difficulty in keeping the channel.

Vessels of less than 3 feet (0.9 m) draft can enter the channel by passing about 150 yards north of Jewel Key.

Indian Key Light 1 (Lat. 25°48′.0; Long. 81°28′.1) is a flashing white light on a black, triangular, superstructure on piles 32 feet (9.8 m) high, and located in 9 feet (2.7 m) of water, off the southern end of **Indian Key.**

Indian Key Anchorage (chart 1254), 30 miles northwestward of Shark Point and 10 miles below Big Marco River, is well protected from all winds and is good for drafts under 7 feet (2.1 m). The anchorage is easily entered during daylight or dark and presents no difficulties after Indian Key and Indian Key Light have been made out. **Indian Key** is about 1,000 yards long and 200 yards wide and lies with its major axis in a north-northeast and south-southwest direction; it is wooded and resembles, except for its shape, all neighboring keys. The anchorage is northeast of the key and is more easily reached by the passage east of the key as on this side depths of 7 to 13 feet (2.1 to 4 m) extend close to the key. Vessels of deeper draft should avoid the 6-foot (1.8 m) spot 275 yards off the northeast point of the key. A red nun buoy (No. 2) lies 3½ miles 206° true (SSW. ⅛ W. mag.) from Indian Key and 9½ miles 61° true (NE. by E. ¼ E. mag.) from *Cape Romano Shoals Lighted Whistle Buoy*, and serves as a guide to the anchorage.

Everglades, a small town about 6 miles northeastward of Indian Key, is the county seat of Collier County. It is the center for extensive truck farming and for both commercial and sport fishing. It is the southern terminus of a branch of the Atlantic Coast Line Railroad to Haines City. It is close to and connected with the Tamiami Trail, the State highway between Fort Myers and Miami. There is a post office, telegraph office, various stores, several machine shops, a hospital, one year-round and one seasonal hotel, an ice and power plant and a sawmill (near by). There is free dockage and free water along the river front which has been bulkheaded so as to give

excellent berths to vessels which can enter the river. Gasoline, distillate, ice, and general stores can be obtained; also fishing supplies and a moderate stock of yacht supplies. There is a small marine railway at Port du Pont, about a mile further up the river, which can haul out vessels up to 6 feet (1.8 m) draft and about 100 feet long. In 1935, a second railway was to be installed which could accommodate a 250-ton dredge. There are numerous guide boats available for fishing, hunting, etc., in the immediate vicinity as well as in the Shark River section. The best channel leading to Everglades is Indian Key Pass or Ship Channel. In 1935, 5 feet (1.5 m) could be carried through this pass at low tide and 7 feet (2.1 m) at high tide.

Storm warnings are displayed on the river front approaching the town.

Directions for Indian Key Anchorage and Pass (Ship Channel).—From the Red Buoy off Indian Key, steer 30° true (NNE. ½ E. mag.), passing 100 yards southeastward of **Indian Key Light**. Good anchorage can be found about 700 yards northeast of Indian Key in 8 to 12 feet (2.4 to 3.7 m) of water, or about a mile northeast of the Key, between Beacons 3 and 5, in 14 feet (4.3 m), gravel bottom. The channel beyond Beacon 3 extends in an east-northeast direction to Beacon 7 and thence east by south for about a mile. From here the channel turns northeast and is very crooked for some distance. Numerous beacons mark either side of the channel; the even-numbered beacons have red reflectors and the odd-numbered beacons have green reflectors. There is a straight dredged channel across **Chokoloskee Bay** into **Barron River.** The town of **Everglades** is about half a mile above the entrance to Barron River, and **Port du Pont,** a small industrial section, is about a mile farther up the river. The controlling depth in 1935 was 5 feet (1.5 m) at low water at a point just south of the derdged cut across Chokoloskee Bay.

West Pass begins 3 miles west-northwest of Indian Key Light. It extends in a generally east-northeasterly direction, passing north of Tiger Key to the head of Chokoloskee Bay about 3½ miles from Tiger Key, and thence down the Bay to Barron River and Everglades. The draft through Chokoloskee Bay is limited to 2 feet (0.6 m) at low tide. This pass is not marked.

Fakahatchee is a small settlement on the Bay locally known as **Fakahatchee Bay**, about 2 miles northeast of Round Key. **Fakahatchee Pass** to Fakahatchee passes about 400 yards west of Round Key and extends in a northeasterly direction. There are no supplies obtainable at Fakahatchee.

Dismal Key Channel begins between **Horse Key** and the key ½ mile to westward, and extends in a generally northeast direction to the head of Fakahatchee Bay. It takes its name from **Dismal Key,** a high shell key about 1½ miles northeast of Horse Key. There is no settlement here and the pass is used only by fisherman and trappers.

CAPE ROMANO TO SAN CARLOS BAY

Cape Romano (Lat. 25°50.′7; Long. 81°40.′9) is the southern point of a large island which lies 75 miles northward from Northwest Passage Unused Lighthouse. Here the coast changes its trend from northwest by west to north-northwest.

Northward of Cape Romano the deep water approaches the coast much more closely than it does southward of the cape and the coast is quite regular in outline although broken by many small inlets. At a distance of ½ mile from the shore the depth is 12 feet (3.7 m) or more, except at the entrances of Big Marco Pass and Big Carlos Pass, where shoals extend 1 mile offshore. With the exception of Caximba, Big Marco, and Big Carlos Passes the mouths of the inlets are so small as to be difficult to recognize unless close to the shore. The only objects that can be readily identified by a stranger are the lighted beacon in the mouth of Caximba Pass, and another in the mouth of Big Marco Pass and several large buildings and a wharf on the Gulf coast at Naples, 24 miles below San Carlos Bay.

Cape Romano Shoals, extending 10 miles in a general southerly direction from the cape, consist of a number of irregular patches with 2 to 11 feet (0.6 to 3.4 m) over them. These shoals are marked by *Cape Romano Shoals Lighted Whistle Buoy 16*, moored in about 4 fathoms off their southern end. There is a strong tidal current around the shoals, particularly during spring tides, and on the seaward side of the shoals. The flood current sets southward and the ebb northward.

Cape Romano Anchorage is eastward of Cape Romano Shoals and affords fair anchorage in 12 feet (3.7 m); vessels of less draft can stand well up and anchor in 7 to 8 feet (2.1 to 2.4 m), southeastward of the cape.

Proceeding northward behind Cape Romano from Indian Key, the highest point on the skyline in the direction of Caxambas furnishes a good leading mark for skirting the coast by one or two miles. This is an old building, surrounded by cocoanut palms on Laconda Heights about one mile southeast of Caxambas. As Gullivan Bay is approached, *Coon Key Light* and Coon Key will be picked up a little on the starboard bow.

Coon Key Light, a flashing white light mounted on a white, triangular, slatted structure, is located off the southern end of the shoal making southeast from Coon Key.

Coon Key marks the southern approach to Big Marco River and also the route through Caximba Pass. Approaching from southeastward, Coon Key can be seen from the deck of a launch at a distance of 7 miles. At that distance it shows clear of all adjacent keys, and Cape Romano can be seen only in a few detached spots near its western end. As the key is approached the land back of it becomes visible on each side, but Coon Key always stands well above all land in that vicinity. At low tide an extensive reef can be seen west of the key and a short stretch of yellow-sand beach about the south and southeast side of the key. When nearly up to Coon Key a narrow gap can be seen east of it between the back keys; this is the entrance to Big Marco River.

Caxambas Pass and **Big Marco Pass and River** (chart 1254) offer a safe inside route behind Cape Romano for small vessels. Guides for these passes can be secured at Everglades and Marco or at any of the resort towns along the coast of Florida between Miami and Tampa.

Caxambas Pass extends from the outside coast about 5½ miles northwestward of Cape Romano to *Coon Key Light*. The western entrance is obstructed by a shifting bar over which the channel depth

is about 4 feet (1.2 m). The channel is marked by two buoys and *Caxambas Pass Light 2.*

Directions for Caxambas Pass.—Caxambas Pass is well marked and the beacons should be followed as found. The controlling depth through the inside passage was 3 feet (0.9 m) in 1935 and the distance from Coon Key Light to the western entrance to the pass is about 6 miles. The principal shoals and otherwise difficult sections are as follows; the arrangement is for proceeding northward.

Approach *Coon Key Light* on a course 305° true (NW. by W. 1/8 W. mag.) and sound across the shoal area.

Coon Key Light.—Pass not less than 100 yards to southward.

The island shown southeast of Bn. 2 is the eastern end of extensive tidal flats.

Bns. 2 and 4.—Pass close-to.

From Coon Key Light to Bn. 4.—There are shallow oyster bars to the southward and a mud bank to the northward between Bns. 2 and 4.

Bns. 4 to 1.—Favor north shore.

Bn. 1.—Wide turn to northwest, about half way to north shore.

Bns. 3 and 5.—Favor north shore.

Bns. 6 to 19.—Proceed slowly through this group of beacons. The intermediate beacons are quite close together and require a rather sharp S turn but are otherwise not difficult to follow. In 1935 the shoalest depths were 3 feet (0.9 m) just west of Bn. 9 and 3½ feet (1.1 m) between Bns. 8 and 17.

Beyond Bn. 19.—Avoid oyster bars to the southward.

Proceeding from Caxambas through the western entrance to the pass, favor the north shore, as there are extensive flats and oyster bars to the southward of the beacons.

Bn. 4.—Immediately to the westward of this beacon, the channel tends sharply to the southward for a short distance.

Bn. 2 to Caxambas Pass Light.—Keep close along the sand beach of the key to the northward till past the light.

When past the light, head up for the mid-channel buoy and then for the red buoy, No. 4 (which leave to southward), keeping a sharp lookout for breakers and shoal waters. The channel on the outside is shifting constantly.

Caxambas (meaning "place of wells") is a small fishing village on the north shore of **Caxambas Bay**. There is a post office, a telephone, a clam factory, and a store where small quantities of supplies can be obtained. A third-class highway through Marco connects with the Tamiami Trail to Fort Myers and Miami. Fresh water, gasoline, and oil may be obtained. A launch carrying gasoline and freight makes triweekly trips to Punta Gorda and Everglades.

Big Marco Pass and Big Marco River together offer a convenient and safe passage for small vessels past Cape Romano and are much used by yachts and small craft. Big Marco Pass, 8 miles northward of Cape Romano and 33 miles southward of San Carlos Bay, is marked by *Big Marco Pass Light 1* inshore on the north side of the pass. The channel across the bar changes from time to time and in 1935 had a controlling depth of about 6 feet (1.8 m) at low tide. It is marked by buoys which are shifted as often as practicable to conform to changes in the channel. *Big Marco Sea Lighted Buoy 2*

marks the entrance and two black and white vertical striped buoys mark the channel, the outer a second-class can in 16 feet (4.9 m) and the inner a third-class nun in six feet (1.8 m). Shoals extend 1½ miles seaward on each side of the channel and are generally indicated by breakers or by discolored water.

Big Marco River trends eastward and then southward from Big Marco Pass to the Gulf at **Gullivan Bay**, 4 miles northeastward of Cape Romano. The river is about 8 miles long and affords a through passage for a draft of 2½ feet (0.7 m) at mean low water. The channel is very narrow and crooked but is well marked by beacons. The southern approach is across a shoal having a least depth of 4 feet (1.2 m) at mean low tide and is marked by *Coon Key Light*, off the southeast end of Coon Key. It is protected from all directions except between southeast and southwest, and a wide expanse of gradually shoaling depths greatly reduces any possible sea from these directions. At high tide a draft of 4½ feet (1.4 m) can be taken through the river, but good local knowledge is necessary.

Marco is a small settlement on the south bank of Big Marco River 1 mile in from the light. It is a distributing point for this vicinity and has a small hotel and a general store where gasoline, water, and some supplies, including ship chandlery, can be obtained. There is a post office, telephone, and a large clam canning factory. One road leads to Caxambas and another to the Tamiami Trail connecting with Fort Myers and Miami. There is no highway bridge across the river and passengers and vehicles are ferried across on signal. The wharf is on the east bank of Collier Creek leading to Smokehouse Bay; about 3 feet (0.9 m) can be taken to this wharf at low water. When entering the creek, pass to the west of Beacon 6 as there is a shoal reaching out to the beacon from shore. Local guides can be secured at Marco. A railroad bridge, swing span, opening 50 feet wide, crosses the river at Bear Boint to the center of Marco Island and the town of Collier City which is the railroad terminus.

Directions for Big Marco River and Pass.—The pass is well marked and the beacons should be followed as found. The controlling depth through the inside passage was 2½ feet (0.7 m) at low water and 4½ feet (1.4 m) at high water in 1935. The distance from Coon Key light to the western entrance to the pass is about 11 miles. The principal shoals and otherwise difficult sections are as follows; the arrangement is for proceeding northward.

Approach *Coon Key Light* on a course 324° true (NW. ⅝ N. mag.), heading for the northern end of Coon Key and passing 400 yards to the eastward of *Coon Key Light*. Proceed slowly across the bar here, sounding continuously until past the south end of the key and in deeper water. Gradually approach the north end of the key and then pass over to the north shore. From Bn. 2 to Bn. 3 there is relatively deep water.

Bns. 3 to 3A.—Channel on east side.

Bns. 3A to 10A.—Channel along south and west shore.

Bns. 10A to 3B.—Proceed slowly. A shoal narrow channel along the west side of a small island. A 2½-foot (0·7 m) spot was the shoalest point in the passage in 1935.

Bns. 12 to 14.—Channel along south side.

Bns. 14 to 16.—Channel along north side.

Bns. 16–7–18.—Narrow channel passing to the east side of small island. Depth of 4½ feet (1.4 m) in 1935.

Bn. 20.—Large shoal area to northward.

Bns. 9 to 11.—Favor north shore; large shoal to southward. There was a depth of 5 feet (1.5 m) opposite Bn. 11 in 1935.

Between Bns. 11 and 22 there is a railroad drawbridge which is usually open. It has a swing span with a 50-foot opening.

Bn. 22 to cannery.—Head for the cannery stack with the north side of the draw astern (or vice versa in the opposite direction). Pass south of Bn. 22 which is a little south of the range.

Pass close by the cannery wharf.

There is deep water in the river from this point to the pass.

When leaving Marco, pass to the westward of Bn. 6 at the entrance to Collier Creek, thence north of Bn. 4, south of *Big Marco Pass Light* and north of Bn. 2. From the last beacon, follow the two channel buoys to *Big Marco Sea Lighted Buoy 2* but be guided by breakers and discolored water. There was a controlling depth of about 6 feet (1.8 m) at low water in a narrow channel over the bar in 1935. This channel frequently changes, and the buoys are shifted as often as practicable to conform to the changes.

Inside Passage from Marco to Naples.—A shallow inside passage extends from Marco to Naples. The southern entrance is north of Bn. 4 in Big Marco Pass, whence the passage extends northward through creeks and small dredged channels. A low-water depth of about 4 feet (1.2 m) can be carried as far as Little Marco Pass but barely 2 feet (0.6 m) from there to Gordon Pass. The passage is not marked and is quite difficult to follow; it should only be attempted with local information. The outside route is generally used between Big Marco Pass and Gordon Pass.

Little Marco Pass, 3½ miles north of Big Marco Pass, generally has a depth of 3 to 4 feet (0.9 to 1.2 m) at high tide. It is identified by a growth of tall Australian pine just to the northward of the pass.

Gordon Pass, 2 miles south of Naples, is not marked. In 1935 the bar extended off the north point to beyond the line of old piling; the entrance channel followed along the south side of this bar in a general northeasterly direction. There was a controlling depth of 5 feet (1.5 m) at high tide and 3 feet (0.9 m) at low tide. Just inside the north point of Gordon Pass there are a few dwellings and a small store; gasoline and oil are obtainable.

Gordon Pass to San Carlos Bay.—There is no inside passage from Gordon Pass to San Carlos Bay. Boats proceeding along the coast must pass outside.

Naples, a small town 10 miles north of Big Marco Pass, is a terminus of the Seaboard Air Line Railway. The Atlantic Coast Line Railroad continues through Naples to Collier City on Marco Island. There is a post office, telegraph office, a hotel, several general stores, and an ice and power plant. A long fishing pier, with 15 feet (4.6 m) of water at the end extends into the open Gulf off the town. There is a tall water tank on the south side of the town which can be seen for a considerable distance along or off shore. On Naples Bay, on the east side of the town, there are small ways for hauling out boats up to 40 feet long and 4 feet (1.2 m) draft. Gasoline, fresh water, ice, and a limited amount of general supplies and pro-

visions can be obtained. There is a machine shop which can handle usual small boat repairs. Naples is on the Tamiami Trail connecting with Fort Myers, Everglades, and Miami; there is also road connection to Marco. There is telephone connection with Fort Myers, Marco, and Everglades.

Naples Bay is a yacht harbor and anchorage for small boats behind the town of Naples. The entrance is through Gordon Pass. At high tide about 5 feet (1.5 m) can be carried through Gordon Pass and 4½ feet (1.4 m) through the inside passage to Naples Bay. The tidal range is about 2 feet.

Big Hickory and **Big Carlos Passes,** 9 and 6 miles, respectively, southward of San Carlos Bay, are used to some extent by small local boats, but are shallow and subject to frequent changes. They are not marked and should not be attempted by a stranger.

Estero Pass opens into the eastern end of San Carlos Bay 3 miles east of Sanibel Island Lighthouse. Small vessels can find secure anchorage just inside the pass. The channel is narrow at the entrance which is marked by *Estero Pass Light.* Beyond the light, the channel widens and is not difficult to follow for a considerable distance into the pass.

A concrete highway bridge with swing draw crosses the pass. The draw span is 57 feet wide with a clearance, when closed of 10 feet (3.0 m) at mean low water. A draft of 9 feet (2.7 m) can be taken to a safe anchorage inside the entrance and about 4 feet (1.2 m) can be carried through **Matanzas Pass** and **Estero Bay** and out Big Carlos Pass but strangers should not proceed further than a mile or two inside the bridge. Beyond this point the channel is narrow and crooked and local information is necessary. There are several landings and a couple of small stores just inside the bridge. The highway leads to Fort Myers.

Sanibel Island Lighthouse (Lat. 26°27′.2; Long. 82°00′.8) is a brown skeleton tower inclosing a stair cylinder, on **Point Ybel,** at the westerly side of the entrance to San Carlos Bay. The light is a group flashing white (2 flashes every 10 seconds), 98 feet (29.9 m) above the water, and visible 16 miles.

DIRECTIONS, KEY WEST TO SAN CARLOS BAY

Vessels of moderate draft can take a direct course between *Smith Shoal Light* and *Sanibel Island Lighthouse.* From a position ¼ mile east of Smith Shoal Light, a course 357° true (N. ½ W. mag.) for 95 miles leads to a position with Sanibel Island Lighthouse directly ahead and distant 9 miles and with *Caloosa Lighted Bell Buoy 2* (Position No. 26 below) bearing 38° true (NE. ⅞ N. mag.) and distant 7 miles. Or a course 0° true (N. ¼ W.) for 101 miles will lead directly to the bell buoy. Directions for Northwest Channel are given on page 72 and for Caloosahatchee River on page 100.

Vessels of 6 feet (1.8 m) or less draft can follow the keys, either north of them or through Hawk Channel from Key West to Moser Channel and thence to Cape Sable and follow the coast to San Carlos Bay. Courses and distances for the Hawk Channel route are tabulated below. The route via Cape Sable greatly reduces the distance

between protected anchorages and by keeping in shallow water and behind some shoals there is less sea with which to contend.

From outside Northwest Channel, a course 48° true (N. E. mag.) for 51½ miles leads from abeam *Northwest Channel Entrance Lighted Bell Buoy* to a position 1½ miles off Northwest Cape (Position No. 21 below). Or boats using Calda Channel can stear 22° true (N. by E. ¾ E.) for 2 miles through the shoals off the entrance to the channel (verify channel through the shoals) and then 45° true (NE. ¼ N. mag.) for 47½ miles to a position 1½ miles off Northwest Cape (Position No. 21 below). The International Rules apply north of a line extending from *Northwest Channel Entrance Lighted Bell Buoy 1* to East Cape, Cape Sable.

Courses and Distances for the most protected and most usually used route for small boats from Key West to San Carlos Bay are tabulated below. The total distance via this route between Key West Harbor and Caloosa Lighted Bell Buoy is 181 miles and the limiting draft across Florida Bay is about 6 feet (1.8 m). The Inland Rules apply as far as a position off East Cape and the International Rules north of this position.

Courses and Distances

Key West to San Carlos Bay, via Hawk Channel and Florida Bay

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. On Key West Harbor Range, off the railroad piers:	°	*Points*	*Nautical miles*
Direct (Key West Harbor Lighted Range astern).	204	N. by E. ⅞ E	1. 2
Reverse (Key West Harbor Lighted Range ahead).	*24*	*S. by W. ⅞ W*	*1. 2*
Passing off Key West wharves and submarine base mole.			
2. On Key West Harbor Range—abeam Fort Taylor Shoal Lighted Buoy 8:			
Direct	178	N. ⅜ W	0. 7
Reverse	*358*	*S. ⅜ E*	*0. 7*
3. Whitehead Point Spit Lighted Buoy 6:			
Direct	109	SSE. ½ E	2. 1
Reverse	*289*	*NNW. ½ W*	*2. 1*
4. Hawk Channel Turn Buoy, vertical striped; at intersection of north edge of red sector of Sand Key Lighthouse and east edge of red sector of Key West Lighthouse:			
Direct	*78*	ENE. ¾ E	12. 7
Reverse—continue course 5	*258*	*WSW. ¾ W*	*12. 7*
Passing to southward of *Boca Chica Vertical Striped Buoy* and north of Pelican Key Beacon 55.			
5. Nine-Foot Shoal Light, 200 yards north of:			
Direct—continue course 4	78	ENE. ¾ E	15. 7
Reverse	*258*	*WSW. ¾ W*	*15. 7*
Passing nearly ½ mile south of Loggerhead Key Beacon 34 and 1¼ miles south of New Found Harbor Beacon 2.			

Courses and Distances—Continued

Key West to San Carlos Bay, via Hawk Channel and Florida Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
6. **Bahia Honda Key Buoy,** vertical striped:			
Direct	64	NE. by E. ½ E	6. 0
Reverse	*244*	*SW. by W. ½ W*	*6. 0*
7. **Molasses Key** bearing 320° true, distant 1¼ mile:			
Direct	12	N. ⅞ E	1. 7
Reverse	*192*	*S. ⅞ W*	*1. 7*
Heading 300–400 yards east of the center of the draw until the draw bears 334° true distant 0.3 mile. Care to verify channel approaching and through draw.			
8. **Drawbridge, Moser Channel** bearing 334°, distant 0.3 mile:			
Direct	334	NNW. ½ W	0. 3
Reverse	*154*	*SSE. ½ E*	*0. 3*
Care to verify channel approaching and passing through draw:			
9. **Drawbridge, Moser Channel:**			
Direct	0	N. ¼ W	0. 7
Reverse	*180*	*S. ¼ E*	*0. 7*
See Note No. 1, page 96.			
10. **Drawbridge, Moser Channel** bearing 180° true distant 0.7 mile:			
Direct	66	NE. by E. ⅝ E	2. 7
Reverse	*246*	*SW. by W. ⅝ W*	*2. 7*
11. **Bethel Bank Light 16,** southeastward of:			
Direct	58	NE. by E	5. 7
Reverse	*238*	*SW. by W*	*5. 7*
12. **Bamboo Key Light 13,** northwestward of:			
Direct	73	ENE. ¼ E	7. 2
Reverse	*253*	*WSW. ¼ W*	*7. 2*
Passing north of *Grassy Key Light 11* (½ mile) and of *Channel Key Light 9* (¾ mile).			
13. **Channel Key Light 5,** between light and Channel Key Beacon 8:			
Direct	86	E. ½ N	0. 9
Reverse	*266*	*W. ½ S*	*0. 9*
Channel through shoal is visible.			
14. **Channel Key Beacon 4,** southeastward of:			
Direct	53	NE. ½ E	3. 0
Reverse	*233*	*SW. ½ W*	*3. 0*
Heading 5° to the north of *Long Key Light 1* and passing ¼ mile southeast of Beacon 2.			
15. **South Shoal Beacon 2** bearing 260° true, distant ½ mile:			
Direct	314	NW. ¼ W	2. 3
Reverse	*134*	*SE. ¼ E*	*2. 3*
16. **East Horseneck Shoal Light 1,** northeastward of:			
Direct—Reverse	-----	Various	0. 6
Making an S turn to southward through East Horseneck Shoal.			

Courses and Distances—Continued

Key West to San Carlos Bay, via Hawk Channel and Florida Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
17. **East Horseneck Shoal Light 2,** southwestward of:			
Direct	319	NW. ⅛ N	3.9
Reverse	*139*	*SE. ⅛ S*	*3.9*
Passing ⅓ mile northeast red and black beacon.			
18. **North Shoal Light 5,** northeastward of:			
Direct	310	NW. ⅝ W	3.3
Reverse	*130*	*SE. ⅝ E*	*3.3*
See Note No. 2, page 96.			
19. **Schooner Bank Light 6** bearing 45° true, distant ⅜ mile:			
Direct	320	NW. ¼ N	15.0
Reverse	*140*	*SE. ¼ S*	*15.0*
Passing ⅜ mile off *Oxfoot Bank Light 10* and 1¼ miles off *Cape Sable Anchorage Light 14.*			
The International Rules apply north of a position off East Cape, Cape Sable.			
20. **Middle Cape,** bearing 45° true, distant 1½ miles:			
Direct	335	NNW. ⅜ W	5.2
Reverse	*155*	*SSE. ⅜ E*	*5.2*
See Note No. 2, page —.			
21. **Northwest Cape,** bearing 70° true, distant 1½ miles:			
Direct	09	N. ⅝ E	5.3
Reverse	*189*	*S. ⅝ W*	*5.3*
Passing about 1½ miles offshore. The 6-foot (1.8 m) curve reaches about 1 mile off Northwest Cape.			
See Note No. 1, page 96.			
22. **Shark River Bluff** (south shore Ponce de Leon Bay), bearing 45° true, distant 3.0 miles. Position 1½ miles offshore:			
Direct	340	NNW	18.2
Reverse	*160*	*SSE*	*18.2*
Passing 3.3 miles off Shark Point and 2.7 miles off Highland Point.			
23. **Seminole Point** (SW. point of Plover Key), bearing 45° true, distant 2 miles:			
Direct	318	NW	14.8
Reverse	*138*	*SE*	*14.8*
Passing 2.7 miles off Pavilion Key.			
23A1. **Indian Key Light 1,** bearing 30° true, distant 1½ miles:			
Direct	307	NW. ⅞ W	9.2
Reverse	*127*	*SE. ⅞ E*	*9.2*
23A2. **Coon Key Light,** bearing 312° true, distant 1 mile.			
23. **Seminole Point** (SW. point of Plover Key) bearing 45° true, distant 2 miles:			
Direct	284	W. by N	21.7
Reverse	*104*	*E. by S*	*21.7*
Passing close by the *Lighted Whistle Buoy 16* and continuing on course for 2 miles beyond buoy.			

Courses and Distances—Continued

Key West to San Carlos Bay, via Hawk Channel and Florida Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
24. **Cape Romano Shoals Lighted Whistle Buoy 16** bearing 104° true, distant 2 miles:	°	*Points*	*Nautical miles*
Direct	344	N. by W. ⅝ W	16. 9
Reverse	*164*	*S. by E. ⅝ E*	*16. 9*
25. **Big Marco Sea Lighted Buoy 2:**			
Direct	343	N. by W. ¾ W	28. 1
Reverse	*163*	*S. by E. ¾ E*	*28. 1*
26. **Caloosa Lighted Bell Buoy 2.**			

NOTE 1.—From position No. 9 at the drawbridge crossing Moser Channel, a 356° true (N. ½ W. mag.) course for 3¼ miles leads to a position 250 yards westward of Beacon 2. Then steer 19° true (N. by E. ½ E. mag.) for 3 miles, then change course to 354° true (N. ¾ W. mag.) for three-fourths mile, which will lead 400 yards westward of Beacon 1, which marks the northern edge of a 3-foot (0.9 m) shoal. Continuing on this course for 25 miles leads to Position No. 21.

This route leads well to the westward of the shoaler portion of Florida Bay and does not give as much protection as the route for which courses are given above.

NOTE 2.—Sandy Key Channel, to the east and north of Schooner and Oxfoot Banks, is good for a depth of 5 to 6 feet (1.5 to 1.8 m). From Position No. 18 steer 334° true (NNW. ½ W. mag.) for 5.7 miles to a position about 750 yards north-northeastward of Sandy Key Channel Beacon 9, passing about the same distance off Schooner Bank Beacon 7. Follow the beacons and sound through the shoal area to the north of Oxford Bank. From a position ¼-mile southwestward of Sandy Key Channel Beacon 12, a course 312° true (NW. ½ W. mag.) for 10.6 miles leads to Position No. 20, passing ½ mile southwestward of Cape Sable Anchorage Light 14.

6. SAN CARLOS BAY

(Charts 473 and 1255)

Santa Carlos Bay is 110 miles 365° true (N. ⅝ W. mag.) from Northwest Passage Lighthouse and about 20 miles southward of Charlotte Harbor. It is connected with the latter by two shallow bodies of water known as Pine Island Sound and Matlacha Pass. It is largely filled with shoals, on which the depths vary between 1 and 6 feet (0.3 and 1.8 m), and is of commercial importance chiefly as the approach to Caloosahatchee River. San Carlos Bay and adjacent waters are the resort of tourists and fishermen during the winter months, and are frequented principally by small local vessels and yachts.

The eastern part of the bay can be entered from the Gulf by a dredged channel (project dimensions, 200 feet wide and 12 feet (3.7 m) deep), which leads to Punta Rasa and the mouth of the Caloosahatchee River. The channel is subject to gradual shoaling, and is redredged from time to time. In 1935, the controlling depth was 11½ feet (3.5 m). Several beacons and Punta Rasa Range lights mark its axis.

A swash channel, with depths of 4 to 7 feet (1.2 to 2.1 m) leads close around the south side of the eastern point of Sanibel Island, but it is unmarked and continually shifting.

There is a narrow channel, marked by beacons, with a least depth of 11 feet (3.4 m), leading along the northeast side of Sanibel Island to the wharf at St. James City.

Punta Rasa is a small settlement on the point 2 miles north of Sanibel Island Lighthouse. It is a point of refuge for such coasting vessels as can enter the bay. There is a small wharf available for vessels drawing up to 12 feet and not excessive length. Pilots (not licensed) can be secured here by signaling the cable station or by telephoning to Fort Myers. Roads lead to Fort Myers and to Estero Island and there is an automobile ferry to Sanibel Island which operates daily throughout the year. There is a telegraph and cable station. Only rain water in very limited quantities is available. Gasoline and oil can be obtained. There is daily boat service with Fort Myers and settlements in Pine Island Sound. Arrangements can be made for having fresh water and fuel oil delivered from Fort Myers.

Matthews Wharf, on the northeast side of Sanibel Island, about 1½ miles west of the light, is a small settlement and winter resort. It is the outlet for the fruit and gardens produce grown in this vicinity. There is a hotel and general store here. Gasoline, oil, supplies, and water in small quantities can be obtained. A telephone line connects with Punta Rasa and Fort Myers. There is daily boat service with Fort Myers and the settlements in Pine Island Sound.

Sanibel is located on the northeast side of Sanibel Island, 2 miles westward of the light. There is a hotel, post office, and daily boat service here, but no supplies can be had. A draft of 6 feet (1.8 m) can be carried to the wharf.

There is an automobile ferry to Punta Rasa which operates throughout the year.

St. James City is a post office and small fishing town on the southern end of Pine Island. Gasoline, oil, ice, and a few supplies can be obtained. The fresh water is poor. A draft of 11 feet (3.6 m) can be carried here through the channel, but there is a depth of only about 9 feet (2.7 m) at the face of the dock. A road leads to the northern end of the island and connects with the county road across Little Pine Island and Matlacha Pass to Fort Myers. There is daily boat service to Fort Myers and the settlements in Pine Island Sound.

Anchorage.—Good anchorage for vessels of too great a draft to enter the bay can be found in 15 to 25 feet (4.6 to 7.6 m), sticky bottom, from 3 to 4 miles southeastward of Sanibel Island Lighthouse and near buoy 1. With northerly winds there is good anchorage under the southern end of Sanibel Island in 16 to 24 feet (4.9 to 7.3 m), with the lighthouse bearing anywhere between northeast and north by west. The anchorage off Punta Rasa is good, but the tidal currents at times have considerable velocity. There is a good anchorage along the shore of Sanibel Island inside the lighthouse. The currents have considerable velocity, but bottom with spots of good holding ground can be found. Off St. James City there is an excellent anchorage in 12 to 18 feet (3.7 to 5.5 m) with good holding ground. At this point the tidal currents have less velocity than at any of the other anchorages in San Carlos Bay.

Pilotage is not compulsory and there are no licensed pilots. Some competent person generally can be found at Punta Rasa to pilot vessels into the bay or up the Caloosahatchee River.

Storm warnings are displayed at Fort Myers.

Currents.—Slack water before the flood occurs about 2 hours before the time of high water at Key West, and slack water before the ebb

occurs about 2 hours before the time of low water at Key West. The mean velocity of the current at strength is ¾ knot.

DIRECTIONS, SAN CARLOS BAY

Directions to San Carlos Bay from Key West are given on page 92. **Coastwise Courses and Distances** to San Carlos Bay are given on page 93.

To enter San Carlos Bay from southward keep at least 1½ miles off the coast southward of Sanibel Island Lighthouse until up to *Caloosa Lighted Bell Buoy 2* or until on the Punta Rasa Range. Then steer 317° true (NW. mag.), keeping Punta Rasa Range lights in line ahead, which lead along the axis of the dredged cut. The cut is also marked by beacons. The bank on the northeast side of the channel is about 3 feet above high water and at Beacon 10 is grass covered.

To go to Caloosahatchee River.—Hold Punta Rasa Range until abeam of Beacon 12. From this point, courses and distances to Fort Myers are given on page 100.

To enter the anchorage north of Fishermans Key.—Bring the lower wharf at Punta Rasa to bear about southeast by south over the stern and steer midway between the cluster of keys on the west side of the channel north of Punta Rasa and the small round key northwest of these. Go slowly after leaving the channel, and look out for a long sand spit that extends northeast from the end of Fishermans Key. When past this spit, follow the north side of Fishermans Key at a distance of 100 yards and anchor off the middle of the key in a depth of 6 feet (1.8 m), mud bottom.

To go to Pine Island Sound.—Leave Punta Rasa Range at red Beacon 6 and steer about 263° true (W. ⅞ S. mag.) to clear the north shore of **Point Ybel** (east end of Sanibel Island, on which is the lighthouse of that name) about 225 yards. Then see directions for Pine Island Sound on page 109.

CALOOSAHATCHEE RIVER

(Chart 473)

Caloosahatchee River rises in Lake Okeechobee and flows 73 miles in a westerly direction, emptying into San Carlos Bay near Punta Rasa. For a distance of 17 miles from the mouth the river has an average width of about 1 mile, but above that point it is a narrow, crooked stream, only 50 to 100 feet wide in many places during the dry season.

From the mouth of the river, a channel 100 feet wide and 10 feet (3.0 m) deep has been dredged to a turning basin at Fort Myers, a distance of 14 miles. The channel is subject to change and is redredged from time to time. In 1935, there was a least depth of 11½ feet (3.5 m) into San Carlos Bay and 9½ feet (2.9 m) to Fort Myers. Above Fort Myers, a depth of about 5 feet (1.5 m) can be carried to the boat yard on Orange River and a depth of about 4 feet (1.2 m) to La Belle. Along the upper portion of the river, the depth varies greatly with the seasons. At the close of the dry season, usually in March, but sometimes as late as May, the river has a depth of but 1 foot (0.3 m) at the shoalest point in its upper reaches.

There is a project for the improvement of the river above Fort Myers to provide a channel with a navigable depth of at least 6 feet (1.8 m) between Fort Myers and Lake Okeechobee. Refer to inside route across south Florida, page 103.

The Caloosahatchee River is tidal as far as La Belle. The tide which has a mean range of about 1.7 feet at its mouth gradually diminishes as it ascends the river. Freshets, lasting usually about 2 weeks, occur during the summer and early fall months and raise the river from 4 to 18 feet (1.2 to 5.5 m), depending upon the locality. Strong currents are prevalent in the upper reaches, especially during high river stages. Below Fort Myers there are strong ebb currents in the cuts at Shell and Mangrove Points, 2 and 2½ miles, respectively, above Punta Rasa.

The river is raised by southerly and lowered by northerly winds, the largest fluctuations being caused by hurricanes. During a severe hurricane in 1910 the river at Fort Myers was lowered from 6 to 8 feet and then raised about 2 feet above normal.

Fort Myers, on the south bank of the Caloosahatchee River, 14 miles above its mouth, is the commercial center for the country east and south of Charlotte Harbor, as far east as Lake Okeechobee and south to Cape Sable. It is on the Atlantic Coast Line and Seaboard Air Line Railroads and on the Tamiami Trail connecting Tampa and Miami. Other State highways lead to West Palm Beach (following the Caloosahatchee River and south shore of Lake Okeechobee) and to Punta Rasa where an automobile ferry connects with Sanibel Island. There is daily boat service with Punta Rasa and small settlements on Pine Island Sound. With navigation open in the upper reaches of the Caloosahatchee River into Lake Okeechobee there is water communication with the Atlantic coast by way of St. Lucie Canal.

Fort Myers is the distributing point for several oil companies, and a complete line of petroleum products is available (fuel oil on short notice). Provisions, ice, and some ship chandlery stores can be obtained. Local fresh water is not good for boiler use but a limited quantity of rain water is available, and water good for boiler use can be secured from Lake Okeechobee. Bituminous coal can be secured by arrangement with the railroad but no supply is kept on hand.

There are good facilities for making deck and engine repairs to small vessels as well as for storing such craft. Vessels up to 125 feet long and 7 feet (2.1 m) draft can be hauled out. Salvage equipment is available capable of handling vessels up to about 100 feet long. This is the only salvage equipment between Tampa and Key West. There are numerous stores and several machine shops, a municipal airport, a hospital, and both seasonal and year-round hotels.

Only coastwise ships enter Fort Myers, the largest vessel making the port regularly in 1935 being an oil tanker drawing 9 feet (2.7 m). Local pilots can be secured before entering by signaling the cable station at Punta Rasa or by radio through Tampa (station WPD). Arrangements can be made for delivering fresh water and fuel oil to vessels at Punta Rasa.

The river channel leads to a turning basin off the water front south of Lofton Island, and there are depths of 5 to 12 feet (1.5 to 3.7 m) at the various wharves.

The first bridge across the river is the highway bridge just north of the turning basin at Fort Myers. It is a bascule type with a draw having 80 feet horizontal clearance and 9 feet (2.7 m) vertical clearance (when closed) at mean high water. Between this bridge and the Orange River, 5 miles above Fort Myers, there are three additional bridges; all have swing draws with a minimum horizontal clearance of 50 feet.

Between the second and third bridges at Fort Myers, there is an aerial power cable having an overhead clearance of 93 feet above mean high water.

Orange River empties into the Caloosahatchee River from southeastward at a point about 5 miles above Fort Myers. A draft of 5 to 6 feet (1.5 to 1.8 m) can be carried at high tide to the boat yard about half a mile above the mouth. The channel from Fort Myers to the mouth of the Orange River is well marked. The yard can haul and repair boats up to about 75 feet long and 5 to 6 feet draft (1.5 to 1.8 m). The Seaboard Air Line Railway crosses the river about 2 miles above the mouth.

DIRECTIONS, CALOOSAHATCHEE RIVER TO FORT MYERS

The following Courses and Distances lead from San Carlos Bay to Fort Myers:

The International Rules apply outside of *Caloosa Lighted Bell Buoy*. The Inland Rules apply from *Caloosa Lighted Bell Buoy* to a line extending from the western point at Punta Rasa to Sword Point and the Pilot Rules for Western Rivers apply inside the latter line.

Courses and Distances

Caloosahatchee River

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. **On Punta Rasa Range,** range bearing 317° true. Beacon 12 bearing 47° true, distant 175 yds.:	°	*Points*	*Nautical miles*
Direct	5	N. ¼ E	1. 1
Reverse	*185*	*S. ¼ W*	*1. 1*
2. **Punta Rasa Beacon 3** bearing 275° true, distant 100 yds.:			
Direct	337	NNW. ¼ W	. 6
Reverse	*157*	*SSE. ¼ E*	*. 6*
There is a 9 ft. spot 150 yds. south of Beacon 5.			
3. **Punta Rasa Beacon 5** bearing 247° true, distant 50 ft.:			
Direct (Cut D Lighted Range ahead).	24	NNE	. 5
Reverse (Cut D Lighted Range astern)	*204*	*SSW*	*. 5*
4. **Intersection Cuts D and E Ranges** (south of Light 7):			
Direct (Cut E Range beacons ahead)	45	NE. ⅛ N	. 5
Reverse (Cut E Range beacons astern)	*225*	*SW. ⅛ S*	*. 5*
Favor northwest side of range.			

Courses and Distances—Continued

Caloosahatchee River—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
5. **Intersection Cuts E and F Ranges** (east of Light 9):			
Direct (Cut F Lighted Range astern).	67	NE. by E. ¾ E	.7
Reverse (Cut F Lighted Range ahead)	*247*	*SW. by W. ¾ W*	*.7*
East end of course about 125 yds. east of Beacon 13 off east end of small island.			
6. **Position 125 yds. east Beacon 13 on Cut F Range:**			
Direct—no range	86	E. ½ N	.9
Reverse—no range	*266*	*W. ½ S*	*.9*
Close to southward of Beacon 15 and north of Cut G east range mark.			
7. **Beacon 17, abeam,** on Cut G Range:			
Direct (Cut G Range beacons astern) (Cut G Lighted Range ahead).	81	E. by N	1.3
Reverse (Cut G Lighted Range astern) (Cut G Range beacons ahead.)	*261*	*W. by S*	*1.3*
Keep exactly on range. Submerged rocks on either side of cut. Spoil bank of earth to north of cut. Beacon 17A marks rocks that bare at half tide and also a wreck just awash at high tide.			
8. **Position 200 yards west Cut G Front Range Light,** on Cut G Range:			
Direct	67	NE. by E. ¾ E	.2
Reverse	*247*	*SW. by W. ¾ W*	*.2*
Between positions 200 yards on either side of *Cut G Front Range Light,* pass about 100 feet north of red Beacon 18 which is just north of the light.			
9. **Position 200 yards northeast of Cut G Front Range Light,** on Cut H–I–J:			
Direct (Cut H–I–J Lighted Range astern).	51	NE. ⅜ E	.6
Reverse (Cut H–I–J Lighted Range ahead.)	*231*	*SW. ⅜ W*	*.6*
Keep exactly on range passing 50 ft. to southward of Beacons 19–19A and 19B. There are 4-ft. shoals on either side of the course.			
10. **Beacon 19B.;** abeam of, on Cut H–I–J range:			
Direct—no range	33	NNE. ¾ E	.4
Reverse—no range	*213*	*SSW. ¾ W*	*.4*
Avoid 5-ft. shoal 100 yds. northeast Beacon 19B.			
11. **Caloosahatchee River Light 21,** 50 ft. east of:			
Direct—no range	20	N. by E. ⅝ E	.7
Reverse—no range	*200*	*S. by W. ⅝ W*	*.7*

Courses and Distances—Continued

Caloosahatchee River—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
12. Caloosahatchee River Beacon 23, 50 yds. east of:			
Direct—no range	38	NE. ¾ N	1.5
Reverse—no range	*218*	*SW. ¾ S*	*1.5*
Passing east of Light 25 and west of Beacon 26. There is a 4-ft. shoal on the north side of the channel between Beacon 23 and Light 25; also an 8-ft. shoal just southwest of Light 25. Vessels should not get too close to the north side of the channel.			
13. Caloosahatchee River Beacon 27, 50 ft. east of:			
Direct (Cut P Lighted Range ahead)	43	NE. ⅜ N	.9
Reverse (Cut P Lighted Range astern)	*223*	*SW. ⅜ S*	*.9*
Three 6- to 9-foot shoals are just off range on either side in the vicinity of Beacon 27–A.			
14. Cut P Front Range Light 28. Position on range 50 yds. southwest of light:			
Direct—no range	12	N. ⅞ E	.8
Reverse—no range	*192*	*S. ⅞ W*	*.8*
Passing east of Beacon 29 which marks a 5-ft. shoal.			
15. Caloosahatchee River Beacon 30, 30 yds. west of:			
Direct (Cut Q Lighted Range ahead)	14	N. by E. ⅛ E	1.7
Reverse (Cut Q Lighted Range astern)	*194*	*S. by W. ⅛ W*	*1.7*
Passing to east of Beacons 31 and 31–A.			
16. Intersection Cuts Q and R (south of Light 33):			
Direct (Cut R Range ahead)	26	NNE. ⅛ E	.5
Reverse (Cut R Range astern)	*206*	*SSW. ⅛ W*	*.5*
Light 35 in front, Beacon in rear.			
17. Intersection Cuts R and S (south of Light 35):			
Direct (Cut S Range beacons ahead)	44	NE. ¼ N	.4
Reverse (Cut S Range beacons astern)	*224*	*SW. ¼ S*	*.4*
Approach Beacon 37 (front beacon of Cut S Range) on the last course above; pass south of it and steer 58° true (NE. by E. mag.) for 0.8 mile to the turning basin just below the bridge at Fort Myers. Pass close to the ends of the wharves as there is a shoal on the north side of the channel here. The turning basin is 10 feet (3.0 m) deep, except on the north edge where it is 8 feet (2.4 m); it is between Beacons 39, 41, and 43 and the wharves. Outside of this dredged area the depth is 7 ft. (2.1 m) or less.			
Proceeding down the river, steer 238° true (SW. by W. mag.) from a position off the wharves to a position just south of Beacon 37. Beyond this beacon, follow the reverse courses given above.			

7. INSIDE ROUTE ACROSS SOUTH FLORIDA

During the period 1913 to 1926, the State of Florida constructed canals connecting Lake Okeechobee with the Caloosahatchee River on the west and with the St. Lucie River on the east. These canals were dug in connection with a drainage project for Lake Okeechobee and provided a waterway, navigable for shallow-draft vessels between the Atlantic Coast at St. Lucie River and the Gulf Coast at San Carlos Bay.

In 1930, the Lake Okeechobee Drainage Project was taken over by the Federal Government. The existing project provides for: (*a*) improving the Caloosahatchee River and canal from Fort Myers to Lake Okeechobee so as to give a navigable channel at least 6 feet (1.8 m) deep and 80 feet wide; (*b*) a levee and navigation channel 6 feet (1.8 m) deep (with Lake Okeechobee at elevation 14) and 80 feet wide along the south shore of the lake; (*c*) improving Taylor Creek to give a navigable channel 6 feet (1.8 m) deep and 60 feet wide from Lake Okeechobee to Okeechobee; (*d*) protecting the St. Lucie Canal from erosion and silting; (*e*) improving St. Lucie River to give a channel 6 feet (1.8 m) deep and 80 feet wide from St. Lucie Canal to Indian River.

At the end of June 1935 the existing project, which included other work than that indicated above, was about 60 percent complete. The approximate controlling depths were as follows: St. Lucie River, 9 feet (2.7 m); St. Lucie Canal, 8 feet (2.4 m); Lake Okeechobee from entrance to St. Lucie Canal to Clewiston, 6.5 feet (2.0 m); Lake Okeechobee from entrance to St. Lucie Canal to Moore Haven, 3.5 feet (1.1 m); Moore Haven to Fort Myers, 3.5 feet (1.1 m).

The entire construction project is in charge of the United States Engineers with field headquarters at Clewiston, Fla. Before attempting passage through any portion of this route, the latest information regarding available depths and other existing conditions should be secured from the offices of the United States Engineers, either at Clewiston or at the Dyal-Upchurch Building, 4 E. Bay Street, Jacksonville, Fla.

There are 11 draw bridges crossing the Caloosahatchee River, 5 crossing the St. Lucie Canal, and 2 crossing the St. Lucie River; all draws have a horizontal clearance of 50 feet or more.

The controlling vertical clearance for the entire route is at the vertical-lift railroad bridge crossing the St. Lucie Canal at Port Mayaca, near the lake entrance to the canal; this clearance is 47 feet (14.3 m) at mean low water when open.

Distances along the improved route across the State will be approximately as follows: Fort Myers to Moore Haven, 49 miles; Moore Haven to St. Lucie Canal, 31 miles across the lake and 44 miles through levee channel; St. Lucie Canal and St. Lucie River to Stuart, 28 miles; total distance Fort Myers to Stuart, 108 miles via route across the lake or 121 miles via the levee channel route. Fort Myers is 14 miles above Punta Rasa at the mouth of the Caloosahatchee River and Stuart is 5 miles above the junction of the St. Lucie and Indian Rivers.

Communications.—An improved highway extends across the State from Fort Myers to West Palm Beach; it passes close to the southward of the Caloosahatchee River and about the south shore of

Lake Okeechobee. There is an improved highway along the east side of the lake connecting with Okeechobee and there are also improved highways east and west from Okeechobee.

A branch of the Seaboard Air Line Railroad extends from Fort Myers to La Belle and a branch of the Atlantic Coast Line Railroad extends from Haines City through Moore Haven and Clewiston to Lake Harbor on the south shore of Lake Okeechobee. From the latter place, a branch of the Florida East Coast Railroad extends about the east side of the lake to Okeechobee and thence to the northern part of the State. The Seaboard Air Line Railroad from the interior of the State to the Atlantic Coast passes through Okeechobee.

Caloosahatchee River, Fort Myers to Lake Okeechobee.—This section at present follows the Caloosahatchee River to Lake Hicpochee and thence by a canal cut to Lake Okeechobee at Moore Haven, a distance of 57 miles. The controlling depth in June 1935 was 3½ feet (1.1 m). The shoalest spot is at Cooks Farm, near Ortona, about 15 miles west of Moore Haven. It has been reported that at the height of the dry season, in March and April, the depth at this point may not exceed 1 foot (0.3 m).

A total of 11 bridges cross the Caloosahatchee River between Fort Myers and Lake Okeechobee. There are three bridges at Fort Myers, the first of which has been described; the fourth is 4 miles above Fort Myers, just south of the mouth of the Orange River; the others are at Olga, Alva, Fort Denaud, La Belle, Goodno, and two at Moore Haven. All these bridges have a horizontal clearance of 50 feet or more. There are three locks in this section of the waterway. Lock No. 1 at Moore Haven is 148 feet long by 30 feet wide, with 4 feet (1.2 m) over the sill. Lock No. 2 at Citrus Center (12 miles west of Moore Haven) is 148 feet long by 30 feet wide, with 6.5 feet (2.0 m) over the sill. Lock No. 3 at Fort Thompson (19 miles west of Moore Haven) is 150 feet long by 30 feet wide, with 9.6 feet (2.9 m) over the sill.

Locks No. 2 and 3 are to be replaced with a new Lock No. 2 (dimensions 250 feet long by 50 feet wide, with a depth of 10 feet (3.0 m) over the sill) at Ortona, 15 miles west of Moore Haven, and Lock No. 1 at Moore Haven is to be enlarged to the same dimensions. The new Lock No. 2 will have a lift of 9 feet (2.7 m) and Lock No. 1 a lift of 2.0 feet (0.6 m).

The principal points for securing supplies and provisions are Fort Myers, La Belle, Moore Haven, and Clewiston. Gasoline, oil, water, and some provisions can also be secured at Olga, Alva, and Fort Denaud. There are marine ways for hauling small boats as well as a machine shop at both Moore Haven and Clewiston and there is also a machine shop at La Belle.

Directions, Fort Myers to Moore Haven.—From the turning basin, pass through the draw of the highway bridge and continue through the draws of the two bridges about 1 mile further upstream. From the last draw, the channel crosses to the north side of the river about a mile below Beautiful Island; on the north side it is marked by Beacons 45, 47, 49, and 51. Thence the channel passes north of Beautiful Island and through the draw of the railroad bridge. Above the bridge a practically straight course for about 1½ miles leads to a point where the main river divides; this reach is generally

staked. **Orange River** branches to the southward about ½ mile below the point where the river divides.

Take the north branch where the river divides. The south branch is known as Thompson's Cutoff; it can be used but the north branch is preferable. About one-half mile above the upper end of Thompsons Cutoff, the river narrows between well-defined banks.

About 2½ miles above Thompsons Cutoff, the river turns south, opposite Trout Creek on the north side and about one-half mile further turns east. About 1 mile further, the river makes a sharp U bend to northward; at the far end of this bend there is a left fork but the main channel is the right fork.

From this point east, the river is of rather uniform width between well-defined banks and there should be no difficulty remaining in the main channel. Just east of Fort Thompson (38 miles above Fort Myers) the channel enters a canal cut.

Bridges and locks along this route have already been described.

Lake Hicpochee is a shallow fresh-water lake 5 miles long and 2½ miles wide. Most of its surface is covered with hyacinth and saw grass. The bottom of the lake is soft mud. The channel across the lake is marked by four lights.

Lake Okeechobee (Charts 804 and 805) is an approximately circular fresh-water 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. The lake varies in width from 22 to 30 miles and is shoal along its west and southwest sides for a distance of 1 to 5 miles off shore. The east side of the lake is deep to within a few hundred yards of the shore. The center of the lake is comparatively deep. The shoal areas are generally filled with a thick growth of water grass which makes its necessary to equip boats with weedless propellers if operating in the lake for any length of time.

Observation Shoal is an extensive sand shoal extending as much as 7 miles off the southwest shore of the lake. A line of beacons mark the deep water to the east of the shoal from off Fishing Bay to south of **Observation Island**. **Rocky Reef** extends across the south end of the bay, between Observation Island and Bacon Point; there are depths of 3 to 4 feet (0.9 to 1.2 m) over it in places. Channels to the eastward and westward of Rocky Reef are marked by lights. **North Lake Shoal** extends 4 miles off the northwest shore of the lake. **Halifax Bank** is a sand shoal toward the south end of **South Bay**. There is a small rocky reef about 1½ miles east-northeastward of Clewiston. All these shoals and reefs are marked by lights.

The elevation of the water level in Lake Okeechobee is controlled by means of drainage through the canals; the lake elevation is generally maintained between 15 and 17 feet above mean low water at Punta Rasa, on the Gulf. On charts Nos. 804 and 805, the soundings are referred to an elevation of 15 feet above mean low water on the Gulf coast.

Levees, ranging in elevation from 31 to 36 feet above mean low water at Punta Rasa, have been constructed along the east, south, and southwest shores of the lake from St. Lucie Canal to Fishing Creek. A channel at least 6 feet (1.8 m) deep by 80 feet wide extends along the lake side of the levee. Approach channels lead from the lake into the levee channel at Clewiston and at Little Bare Beach, 4 miles southeast of Clewiston. There are also auxiliary floodway channels

leading from the lake into the levee channel at **Liberty Point**, just south of Observation Island, and at a point 5½ miles north of Moore Haven.

A levee will also be constructed on the north shore of the lake from Nubbin Slough to Kissimmee River.

From off the entrance to St. Lucie Canal, a line of beacons extends across the southeastern part of the lake for 14.7 miles in a 220° true (SW½ W. mag.) direction. This line of beacons marks a channel through Rocky Reef. From the south end of this line of beacons, other lines of beacons mark the approach channels to Little Bare Beach and to Clewiston and the auxiliary floodway channel to Liberty Point.

There will be hurricane gates in the levee at Okeechobee, at Clewiston, at Lake Harbor opposite the entrance to the Miami Canal, at the south end of Torry Island opposite the junction of the North New River and Hillsboro Canals, and at Canal Point opposite the entrance to the Palm Beach Canal. All these canals are drainage canals.

Shelter in bad weather can be found in the canals or in **Taylor Creek** into which a depth of 3 feet (0.9 m) can usually be carried. Taylor Creek should be navigated with caution on account of sunken logs and snags. The shoalest and most difficult part of this creek is in crossing the bar at Beacon 5. The bar shoals at times, but there are usually enough boats of about 3-foot (0.9 m) draft using the channel to keep it open to that depth. The entrance to the creek is marked by two lights and a beacon. The improvements now in progress provide for a channel 6 feet (1.8 m) deep by 60 feet wide through Taylor Creek from Lake Okeechobee to Okeechobee, with lake elevation at 14 feet above mean low water at Punta Rasa.

Good protection is also afforded in **Pelican Bay** at the southeast corner of the lake. Where depths are sufficient in the water grass off the west and southwest sides of the lake, anchorage in moderate weather can be made, as the holding bottom is good and good protection is afforded by the water grass.

Okeechobee (population 1,795 by the 1930 census) is 3 miles above the mouth of Taylor Creek at the north end of Lake Okeechobee. The town is on the Florida East Coast and Seaboard Air Line Railroads leading from the interior of the State to the Atlantic Coast and there are highways north to the interior of the State, east to Palm Beach, and about the south end of Lake Okeechobee to Fort Myers. There are stores where provisions and some supplies can be obtained. Vessels up to about 50 feet in length can be hauled out here, and there are machine shops to take care of necessary repairs. About 3 feet (0.9 m) is generally the controlling depth on the bar at the entrance to Taylor Creek.

Clewiston (population 2,284 by the 1930 census) is an agricultural community on the southwest side of Lake Okeechobee. The United States Engineers, engaged upon the improvement of the Lake Okeechobee Drainage project, have their field offices and general headquarters here. There are facilities for hauling out small boats and for making minor repairs. Some supplies and provisions can be obtained, and there is a commercial hotel. The town is on the main State highway between Fort Myers and West Palm Beach, and

there is also highway connection to Moore Haven. The Atlantic Coast Line Railroad connects with the interior of the State.

Moore Haven (population 612 by the 1930 census) is 11 miles northwest of Clewiston, at the entrance to the canal leading to the Caloosahatchee River and the Gulf. It is on a branch of the Atlantic Coast Line Railroad leading to the interior of the State, and there is an improved highway to Fort Myers and to Clewiston and thence east to Palm Beach. There are facilities for hauling out boats of moderate size and a machine shop to handle machinery repairs. Gasoline, provisions, and some supplies can be obtained, and there are hotel accommodations.

St. Lucie Canal.—This canal extends from a point near the center of the east shore of Lake Okeechobee to the South Branch of the St. Lucie River. The operation and maintenance of the canal is a Federal project in charge of the United States Engineers with local office at Clewiston. In June 1935, there was a controlling depth of 8 feet (2.4 m) in the canal but only 7 feet (2.1 m) over the sills of the locks.

The locks at each end of the canal are 30 feet wide and 150 feet long. Lock No. 1 is located at the lake entrance to the canal and Lock No. 2 is located at the upper end of the South Branch of the St. Lucie River, 21 miles from the lake and 6 miles from Stuart.

Five drawbridges cross the canal. The Conners Highway Bridge crosses at the lake entrance, to the westward of the lock, and about 1,000 yards to the eastward of the lock there is a railroad bridge. At Indiantown, about 10 miles east of the lake, there is a railroad bridge and a highway bridge and at Palm City, near the east end of the canal, there is a highway bridge. The horizontal clearances of these bridges is 50 feet or more and the vertical clearances range from 8 to 13 feet (2.4 to 4.0 m). The controlling vertical clearance for the entire route is at the vertical lift railroad bridge at Port Mayaca near the lake entrance to the canal; this clearance is 47 feet (14.3 m) when open.

Port Mayaca is a small settlement at the lake entrance to the canal. Gasoline and a few supplies can be obtained.

Directions, Lake Okeechobee.—The following routes about the lake are in use at the present time (1936).

Moore Haven to St. Lucie Canal.—Follow the levee channel as far as Liberty Point, just south of Observation Island. From Liberty Point enter the lake through the auxiliary floodway channel, marked by a row of beacons, on the course 95° true (E. ¼ S. mag.) for 10 miles and then follow the row of beacons across the southeast corner of the lake on the course 40° true (NE. ½ N. mag.) for 14.7 miles to *St. Lucie Canal Light.*

Moore Haven to Clewiston to St. Lucie Canal.—Follow the levee channel to Clewiston. From Clewiston, a marked channel extends for 2½ miles into the lake. From this point follow a line of beacons on the course 80° true (E. by N. mag.) for 4.7 miles and then follow the row of beacons across the southeast corner of the lake on the course 40° true (NE. ½ N. mag.) for 14.7 miles to *St. Lucie Canal Light.*

St. Lucie Canal to Taylor Creek and Okeechobee.—From the *St. Lucie Canal Light* steer 323° true (NW. ⅝ N. mag.) for 10 miles to *Taylor Creek Bar Light 1.* Then follow the channel marked by lights and

partly by a hyacinth fence on the west side, into the entrance of Taylor Creek. The creek is then followed for about 3 miles to Okeechobee.

St. Lucie River connects with the Indian River and with the Intracoastal Waterway along the Atlantic coast; these waters are described in the Inside Route Pilot, New York to Key West.

8. MATLACHA PASS AND PINE ISLAND SOUND

(Chart 1255)

Matlacha Pass is a shallow body of water, extending northward from San Carlos Bay to Charlotte Harbor, between **Pine Island** and the mainland. It is navigable for a draft of 2 to 3 feet (0.6 to 0.9 m), but the channel is narrow and crooked, with numerous oyster bars, and is not marked. It is used only by small craft with local knowledge, and strangers should not attempt it. A highway swing drawbridge crosses the pass at Little Pine Island.

Pine Island Sound, west of Pine Island, is the main thoroughfare between San Carlos Bay and Charlotte Harbor, a distance of about 15 miles. It is full of shoals and low islands, through which there is a crooked but well-marked channel, good for a depth of about 7 feet (2.1 m) at high tide. With the aid of the chart, a stranger should have no great difficulty in getting through with a draft of 5 feet (1.5 m), but for a greater draft he should take a pilot.

Wulfert is a store and post office on the northern end of Sanibel Island. There is a small wharf here with 5 feet (1.5 m) of water at the end. The inside channel behind **Buck Key** passes by this wharf and the steamer making daily trips to and from Fort Myers stops here. Gasoline and some provisions can be obtained.

Blind Pass separates Sanibel Island from **Captiva Island.** It is not marked and is only good for a draft of about 2 feet (0.6 m) at low tide. A bridge crosses this pass, having a 16-foot span and about 7-foot vertical clearance.

Captiva is located on Captiva Island, 5½ miles south of Captiva Pass. It is a fishing town and winter resort, and has a hotel, store, post office, and large outdoor school. Gasoline, oil, ice, and some general supplies can be obtained. Fresh water can be had in very limited quantities. A daily steamer from Fort Myers stops here, and a boat from Punta Gorda calls three times a week. There are two wharves here, each with 6 feet (1.8 m) of water at the end.

Captiva Pass, leading from the Gulf into Pine Island Sound at a point 6 miles southward of Boca Grande, is used to some extent by yachts and small fishing boats. In 1935 the channel extended rather straight out in a southwesterly direction from the center of the pass, with shoals on either side for about a mile offshore. There was a depth of about 6 feet (1.8 m) on the bar at low tide; the channel is not marked.

Anchorage at Captiva Pass.—There is a fair anchorage for small boats in a basin about 200 feet across and from 7 to 8 feet (2.1 to 2.4 m) deep, south of a small point in Pine Island Sound, one-half mile south of Captiva Pass. The holding ground is said to be good and the anchorage is well protected from all directions except east to southeast. This anchorage is reached from Captiva Pass by following

close along shore, inside the point on the south side of the pass. On approaching the point marking the entrance to the anchorage, pass inside the shoals, opposite the point, which are nearly bare at low tide, and between the point and some stakes. At the point, the channel bends sharply westward to the anchorage, which is close to the point and between it and a shoal that uncovers at low tide.

Redfish Pass, about 3½ miles south of Captiva Pass, is a new cut through Captiva Island. This channel is little used as it is winding and difficult, with frequent changes in depth and position.

Useppa Island is a winter resort. There is a large seasonal hotel here, several houses and a golf course. On the northwest side of the island, there is a natural small boat basin between the island and a small islet extending off the northwest point. There are two wharves on the eastern side of the island and a prominent tank on the north point, near the hotel. During the winter season there is boat service to Bokeelia. A depth of about 6 feet (1.8 m) can be taken to the two wharves on the eastern side of the island.

Horn Passage is a channel westward of **Buck Key,** good for about 4 feet (1.2 m) at high tide. The southern approach is through **Wulfert Channel,** good for about 4 feet (1.2 m) at high tide and the northern approach is through Captiva Channel, good for 5 feet (1.5 m) at low tide. The passage and channels are all well marked by beacons and stakes, and are easy to follow during daylight. This route leads past the towns of Wulfert and Captiva and is well protected in all weather.

Punta Blanca is a small settlement 3 miles south of Boca Grande. It is on the south point of the island along the east side of Pelican Bay. There is a small wharf here with 9 feet (2.7 m) of water at the end. Gasoline and some other supplies in very limited quantities are available at a small store. The boat shop, storage shed, and slipways were closed in 1935.

Pelican Bay anchorage is in **Pelican Bay** on the northeast side of Lacosta Island. It is a well-protected anchorage in 6 to 7 feet (1.8 to 2.1 m) of water. The entrance is about a mile south of the north end of Lacosta Island and is reported to be good for about 4 feet (1.2 m) at low tide.

Supplies and Repairs.—Provisions and some boat supplies can be obtained at most any of the settlements described above. Generally, only rain water is available and this in very limited quantities. Ice can be obtained at the settlements and at the fish houses located in the open sound. Fort Myers, Boca Grande, and Punta Gorda are the only places in the vicinity where repairs can be made.

DIRECTIONS, PINE ISLAND SOUND

The Inland Rules apply throughout these directions.

From the southward, Pine Island Sound is entered through San Carlos Bay. The distance from *Caloosa Lighted Bell Buoy 2* to Charlotte Harbor entrance via Jug Creek Shoal cut is 33 miles.

From *Caloosa Lighted Bell Buoy 2*, San Carlos Bay is entered on the Punta Rasa Lighted Range, course 317° true (NW. mag.)

To enter Pine Island Sound, leave the Punta Rasa Range at Bn. 6, 5.1 miles above the lighted buoy and steer 263° true (W. ⅞ S. mag.) for 1.2 miles to a position 225 yards north of Point Ybel at the west

side of the entrance to San Carlos Bay. Then steer 270° true (W. ¼ S. mag.), heading for Matthews Wharf.

Bn. 2.—Pass about 150 yards south of.

Bn. 1.—Pass east and north of, close to.

Bn. 4.—Pass south of, close to.

From Bn. 4, a straight course can he laid to the Sanibel Wharf.

Bn. 3.—Pass close-to.

Bn. 5.—Pass 50 yards to east and about 300 yards to northwest. From Bn. 5, a straight course can be laid to the wharf at St. James City.

Pine Island Sound Light 4 and Bn. 2.—Pass close-to.

Bns. 4A and 6.—Pass about 100–200 yards to southwest.

Bn. 1.—Pass about 50 yards to northeast.

Pine Island Sound Light 8.—Pass about 100 yards to south and west.

The channel forks here, one fork leading westward and northward through Wulfert Channel, Horn Passage, and Captiva Channel and the other leading northward through the central part of the sound.

To go through Horn Passage.

Bn. 1.—Pass close-to, to the northward

Follow the Wulfert Channel entrance range (Bn. 2 in line with a rear beacon) until near Bn. 2, passing north of a wreck lying about 150 yards southeastward of Bn. 2.

Bn. 2.—Pass close-to, to the southward.

Bns. 3–5–7.—Pass close-to, to the northward.

The channel is both narrow and shallow past these beacons. In 1935, the depth was but 2½ feet (0.7 m) at low tide (4 feet at high tide), between Beacons 2 and 3; the bottom is very soft mud.

The Wulfert wharf is about one-third mile west of Bn. 7.

Continue following beacons as found. As far as Bn. 6, off the southwest side of Buck Key, the channel is particularly narrow and shallow. Between Beacons 3 and 2A, the channel turns from southwestward to the northward, passing west of several small keys south of Buck Key.

Bns. 2A to 6.—Follow west side of channel. Depths of 3 feet (0.9 m), soft-mud bottom in 1935.

Bns. 6 to 5.—Pass to east side of channel, along west shore Buck Key, passing between sand bars.

Bns. 8 and 10.—Pass to westward.

Continue along shore of Captiva Island and to wharves at Captiva.

Captiva Range Front Bn.—Pass close-to, southeastward.

Continue on Captiva Range, passing close-to Bns. 6 and 4 and about 300 yards to southeastward of *Captiva Light 2.*

To go northward through the main channel:

Pine Island Sound Light 8.—Pass 100 yards to westward.

Bn. 10.—Pass close-to, to westward.

Bn. 12 and Pine Island Sound Light 14.—Pass close-to, to southwestward.

There is a dredged cut between this beacon and light.

There is a second dredged cut 350 yards to the northwestward to Light 14. The direction of the cut is 6° true (N. ⅜ E. mag.), and it extends about half a mile north of Light 14.

Bn. 16.—Pass about 400 yards southwestward.

Continue till *Pine Island Sound Light 3* and Bn. 5 are in range.

Pine Island Sound Light 3.—Pass close-to, to eastward.

Bn. 5.—Do not approach closer than one-fourth mile.

Bn. 7.—Pass about 250 yards to eastward.

A depth of 6 feet (1.8 m) can be carried to the wharf on the eastern side of Useppa Island. Two passages lead from here to Charlotte Harbor, one along the shore of Lacosta Island to Boca Grande and the other through a dredged channel north of Pine Island. The former is more convenient if bound for Punta Blanca or out to the Gulf, and the latter if bound up the harbor; both are good for about 7 feet (2.1 m) at mean low tide.

To leave by the western passage.—With Mondongo Island showing between *Pine Island Sound Light 9* and Bn. 11 W. head for it, passing about 200 yards to westward of Light 9 and close to eastward of Bn. 11 W.

Bn. 13 W. (Lighted Jan. 1 to June 1).—Pass about 150–200 yards northeastward.

Wharves at Punta Blanca.—Pass about 150 yards off.

Bn. 18 W.—Pass about 100 yards to westward.

Old Quarantine Wharf.—Pass about 200 yards to eastward.

To leave by the eastern passage:

Pine Island Sound Light 9.—Pass about 100 yards to southeast.

Bn. 18.—Pass about 100 yards to northwest.

Bn. 11.—Pass close-to to eastward.

Bns. 20 and 13 and Pine Island Sound Light 15 mark the cut through Jug Creek Shoal. Pass close-to.

From Pine Island Sound Light 15, a course can be laid northeastward toward Bn. 10 or northwestward toward Bn. 8. From any point more than three-fourths mile from the light toward Bn. 8, a course can be laid through Charlotte Harbor entrance.

From the northern end of the western passage, a course can be laid to clear the south side of the entrance of Charlotte Harbor by 300 yards or more.

Direction for Charlotte Harbor are given on page 115.

9. CHARLOTTE HARBOR

(Charts 474 and 1255)

Charlotte Harbor lies 126 miles 349° true (N. by W. ⅛ W. mag.) from Key West Northwest Channel and 63 miles 152° true (SSE. ¾ E. mag.) from Tampa Bay. It is the approach to the towns of South Boca Grande, Boca Grande, Punta Gorda, Cleveland, and numerous smaller settlements, and to Miakka and Peace Rivers. On the south side it opens into Pine Island Sound and Matlacha Pass, either of which affords an inside route for light-draft vessels to San Carlos Bay. On the north side it opens into Gasparilla Sound.

Charlotte Harbor is entered from the Gulf by **Boca Grande Channel**, which has been improved by dredging a cut 300 feet wide and 27 feet (8.2 m) deep, and vessels of about 27 feet draft have been taken out. In 1935 there was a 26-foot channel with an effective width of 300 feet.

A channel has been dredged across the shoals in Charlotte Harbor to Punta Gorda, near the mouth of Peace River. The channel is subject to change, and in 1933 had a depth of 9½ feet (2.9 m) for a width of 100 feet.

Prominent features.—In approaching the entrance to Charlotte Harbor from the southward or southwestward a water tank, 136 feet (41.6 m) high, and a yellow chimney, 125 feet (38.1 m) high, three-eighths mile north of the entrance, will be the first objects sighted in the daytime. At night the entrance lighted buoy and Gasparilla Island Lighthouse will be recognized first. Coming from northward a vessel will first sight a high water tank (103 feet (31.4 m)), 1¾ miles north of the entrance.

Boca Grande Rear Light is a white pyramidal skeleton tower, enclosing a stair cylinder, near the outside coast about half mile south of the town of Boca Grande. The light is fixed red, showing only on entrance range; it is 105 (45.7 m) feet above the water and visible 16 miles.

Gasparilla Island Lighthouse (Lat. 26°43′.0; Long. 83°15′.7) is a white frame dwelling on the south end of the island. The light is flashing white (flash 0.5 second, eclipse 9.5 seconds), 41 feet (12.5 m) above the water, and visible 12 miles.

Anchorage.—The best anchorage for large vessels is in deep water at the inner end of the entrance channel, in from 3 to 7 fathoms (5.5 to 12.8 m), with good holding bottom. There is a cable crossing at the narrowest part of the entrance. This is the anchorage used by vessels while waiting for a loading berth at the phosphate elevators. It affords excellent shelter from all winds, and is also used as a harbor of refuge by coasters and other vessels. Small vessels can anchor almost anywhere in Charlotte Harbor that suitable depth can be found. Good depths for small craft close inshore can be found anywhere within 1½ miles northward of the entrance and one-half mile off the east side of Gasparilla Island. Small craft can also use the lagoon at Boca Grande.

South Boca Grande, on the south end of Gasparilla Island inside the entrance, is a phosphate shipping port of considerable importance. Phosophate rock can be loaded aboard vessels at about 700 tons per hour by means of power conveyors. There is a T-shaped pier having a dredged depth of 30 feet (9.1 m) or more along the face. A second pier to the northward has been removed. These facilities are the property of the Seaboard Airline Railroad, which brings the rock from the interior of the State by rail; the port agent acts as harbor master. A small wharf about 75 feet north of the phosphate dock affords safe berthing for small craft. This wharf has 14 feet (4.2 m) at its end. Caution should be observed when mooring to these docks, for at times there is a current setting across them.

Pilotage is compulsory except in the case of American vessels whose masters or mates are licensed as pilots by the Federal Government. Further requirements in accordance with the laws of Florida relative to pilotage are given on page 8. Pilots board vessels just outside the entrance buoy on signal or by previous arrangement, using a small motor tender; they will take vessels in at night. The following pilotage rates are in effect:

From sea to anchorage, or from anchorage to sea

	Per foot
6 to 8 feet	$2.50
8 to 15 feet	3.50
15½ to 20 feet	4.50
20½ and over	5.50

Dockage rate

To and from dock	$15.00
Boat, running lines	15.00
Boat waiting on ship in stream—daylight service—per day	5.00
Changing anchorage	10.00
Boat transferring laborers to and from ship in stream for leveling cargo, daylight service	10.00
To quarantine ground	10.00

Towboats are not available at this port, but one or two motor tenders can be secured for towing service.

Quarantine is handled by the health officer who meets ships in port by special arrangement. Both the Customs Service and the Immigration Service have an inspector in port.

Facilities for oil bunkering are provided at the pier, but about 6 days' notice is required to secure a supply. There are no facilities for bunkering coal. Artesian well water is piped to the head of the pier. Water for both boiler and drinking purposes is brought to South Boca Grande by tank cars. Gasoline, provisions, and some supplies are available.

The railroad operates a machine and blacksmith shop capable of handling some repairs to vessel machinery. There are no other repair facilities at this port.

The **Port Series**, volume No. 8, gives further detailed information regarding the port of South Boca Grande. (See p. 4.)

An automobile ferry connects with the State highways to the northward, and there are hotel accommodations at Boca Grande.

Boca Grande is a winter resort and fishing station on the railroad 2 miles north of South Boca Grande. A small wharf, extending into Charlotte Harbor 2 miles north of the wharf at South Boca Grande, leads to the town. South of this wharf at Boca Grande is a small landlocked lagoon, in which small craft can find anchorage in depths of 4 to 5 feet (1.2 to 1.5 m), mud bottom. It is reached by a narrow dredged channel 6 to 7 feet (1.8 to 2.1 m) deep, about 200 yards south of the wharf. This channel is marked by a beacon on the south side at the entrance and by range beacons at the inshore end. These are maintained by private interests and during the winter season are lighted (Boca Grande Yacht Basin Lights). From this lagoon, an inside passage leads to the northward. There are boat landings and storage facilities both in the lagoon and along this inside passage.

Gasoline, rain water, ice, provisions, and some yacht supplies are obtainable. The business district of the town is about ½ a mile from the wharves. There is a post office, seasonal and year-round hotels, telephone and telegraph communication, through train connections and an automobile ferry to Placida connecting with a State highway.

There is a small marine railway in the lagoon which can haul boats up to about 40 feet long and 3½ feet (1.1 m) draft. Minor repairs can be made.

Matlacha Pass and Pine Island Sound are described under a separate heading preceding.

Gasparilla Sound extends northward from Charlotte Harbor for about 7½ miles, between **Gasparilla** and **Little Gasparilla Islands** and the mainland; it is navigable for vessels of 4 to 5 feet (1.2 to 1.5 m) draft having local knowledge, but there is no through channel to Lemon Bay. A railroad trestle with two draw openings, each 50 feet wide, crosses the sound north of Gasparilla Island.

Gasparilla Pass, through which passage may be made to or from the Gulf, usually has a depth of 6 feet (1.8 m), but it is unmarked. Both the depth and position of the channel are subject to frequent change. Gasparilla Sound and Pass are frequented only by fishermen and small coasters who have local knowledge. There is a good small boat anchorage inside the north point to the westward of Bird Island. The deep water is along the shore of Little Gasparilla Island.

Bokeelia is a post office and small settlement on the northern end of Pine Island. There is a wharf, to which a draft of 6 ft. (1.8 m) can be taken. Gasoline, oil, and some supplies can be obtained, but there is no fresh water available. A road connects with the southern end of Pine Island and with the mainland and there is boat service to Punta Gorda and the settlements on Pine Island Sound by boats on the fish runs out of Punta Gorda. There is also boat service to Useppa Island during the season.

Miakka River empties into the northern end of Charlotte Harbor from northward. A depth of 9 feet (2.7 m) can be taken into the mouth. There are no towns along the river, and it is used only occasionally by small vessels of 4 to 5 feet (1.2 to 1.5 m) draft. A railroad bridge and a highway bridge cross the river about 3 miles above its mouth. Thirty-six hours' notice is required to open these bridges.

Peace River empties into the northeastern corner of Charlotte Harbor from northeastward. It is navigable for a draft of about 5 feet (1.5 m) as far as Hull, a distance of about 15 miles above its mouth but caution is required to avoid snags in the upper portion.

Punta Gorda is a small city on the south bank of the Peace River near the head of Charlotte Harbor. It has both rail and highway connections with points to the north and south as well as to the interior of the state. A draft of about 8 feet (2.4 m) can be taken to the municipally owned pier. The channel to the pier is marked by a line of beacons. Vessels can anchor off the town in depths ranging from 6 to 9 feet (1.8 to 2.7 m). Gasoline, fuel oil, fresh water, provisions, ice, and marine supplies are available. Storm warnings are displayed from a tower on the waterfront.

Punta Gorda is the largest commercial fishing port south of Pensacola, and boats on fish runs connect with various points on Charlotte Harbor and Pine Island Sound.

There are several marine ways capable of hauling boats up to about 65 feet long, 5 feet (1.5 m) draft and 50 tons capacity. Both deck and machine repairs can be made. There are also boat storage facilities.

A conspicuous concrete bascule bridge crosses the river 1,500 yards above the municipal wharf. The draw has a horizontal clearance

of 75 feet and a vertical clearance of 14 feet (4.3 m) when closed. Just above the bridge, there is an aerial power cable having an overhead clearance of 90 feet (27 m) above mean low water; about 500 yards further up-stream there are the remains of a former concrete bridge.

At Cleveland, 3 miles above Punta Gorda on the same bank is a marine railway of 100 tons capacity capable of hauling vessels of 6-foot (1.8 m) draft. The channel from Punta Gorda to Cleveland is well marked.

The controlling depth in the channel from South Boca Grande to Punta Gorda was 9½ feet (2.8 m) in 1933. About 6 feet (1.8 m) can be carried to Cleveland at high tide. A tall water tank at Punta Gorda can be seen from many points on Charlotte Harbor.

Storm Warnings are displayed at Boca Grande and Punta Gorda.

Hospital.—The nearest general hospital is located at Arcadia, Fla., and the nearest marine hospital is at Key West, Florida. There is a relief station of the United States Public Health Service at Tampa, Fla.

Supplies and Repairs.—See South Boca Grande, Boca Grande, Punta Gorda, and Cleveland.

Tides and currents.—The main rise and fall of the tide in the harbor varies from 1 to 1½ feet, but the variations in the water surface due to the force and direction of the wind are as much as 4 or 5 feet at times, obliterating all traces of the normal tidal action.

The tidal currents in the entrance channel have considerable strength, especially the ebb current, which is said to attain occasionally an extreme velocity of 3 to 4 knots, dependent also upon the force and direction of the wind.

DIRECTIONS, CHARLOTTE HARBOR

Coastwise courses and distances to Charlotte Harbor entrance are given on page 63. Position 5.

On both sides of the entrance there are shifting shoals extending in a general southwesterly direction for 3½ miles. Their shoaler parts are usually marked by breakers. Near their western edges the shoals rise abruptly from 4 and 5 fathoms (7 and 9 m) of water, and the lead gives but poor warning of their proximity in approaching them.

Boca Grande Channel, the main channel, has a natural depth of 17 feet (5.7 m) for a width of nearly three-eighths mile, and a depth of 26 feet (7.9 m) in a dredged channel 300 feet wide. It is marked by buoys and lighted ranges. A draft of 25 feet (7.6 m) can be taken through Boca Grande Channel, but strangers are advised to take a pilot.

It is well to keep at least 5 miles offshore until *Charlotte Harbor Entrance Lighted Bell Buoy* is sighted, or steer for *Gasparilla Island Light*, or for the chimney and water tank at South Boca Grande, bearing 47° true (NE. ⅛ N. mag.), and stand in on this course until up to the entrance buoy. Then follow courses listed below.

The Inland Rules apply inside *Charlotte Harbor Entrance Lighted Bell Buoy.*

Courses and Distances

Charlotte Harbor

For reverse directions, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. **Charlotte Harbor Entrance Lighted Bell Buoy:**			
Direct (Boca Grande Range Lights ahead).	36	NE. by N	2. 6
Reverse (Boca Grande Range Lights astern).	*216*	*SW. by S*	*2. 6*
Passing east of *Charlotte Harbor Channel Lighted Bell Buoy* and Channel Buoys 3 and 3A and passing west of Channel Buoy 2.			
2. **Intersection Lighted Ranges—Boca Grande Range and Charlotte Harbor Inner Range:**			
Direct (Charlotte Harbor Inner Range Lights astern).	67	NE. by E. ¾ E	2. 2
Reverse (Charlotte Harbor Inner Range Lights ahead.	*247*	*SW. by W. ¾ W*	*2. 2*
Passing north of *Charlotte Harbor Channel Lighted Bell Buoy 4, Charlotte Harbor Channel Lighted Buoy 4A* and *Charlotte Harbor Channel Lighted Bell Buoy 6.*			
3. **Gasparilla Island Lighthouse** bearing 337° true dist. ¼ mile.			

To go to Punta Gorda.—From Boca Grande Entrance, head about 150 yds. to northward of Bn. 8; Course 72° true (ENE. ⅛ E. mag.).

Bns. 8 and 10.—Pass about 150 yds. to northward.

East of Bn. 10, head ⅜ mile south of Charlotte Harbor Light. This will lead through two dredged cuts, one immediately east of Bn. 10 and the other 1 mile west of the light.

Bn. 5.—Pass to southward.

There are dredged cuts to the southward of Charlotte Light. Use chart.

Bn. 7.—Pass 100 yds. to south and east.

Mangrove Point Light. Pass 100 yds. to eastward:

Course from Bn. 7, 355° true (N. ⅝ W.).

Course to Bn. 7, 175° true (S. ⅝ E.).

The Pilot Rules for Western Rivers apply north of *Mangrove Point Light.*

Peace River Light.—Pass 400 yards east and north.

East of Peace River Light.—Head to the northward of the draw in the bridge until past Grassy Point and then for Bn. 2A marking the entrance to the dredged cut to the municipal pier; a draft of about 9 feet (2.7 m) can be taken to this pier. Vessels can anchor in the deeper area between Bns. 2A and 4.

A break in the shoal along the north side of the Boca Grande Channel forms what is known as the **Swash Channel**, a narrow passage about 6 feet (1.8 m) deep, close to the southern end of Gasparilla

Island. This channel is used to a considerable extent by small local craft and is said to change but little. However, a stranger should attempt it only when the sea is so smooth that the shoals can be clearly seen.

10. CHARLOTTE HARBOR TO TAMPA BAY

(Charts 1255 and 1256)

From Charlotte Harbor to Tampa Bay the coast trends about northwest by north, and is a nearly straight sand beach, broken at a few places by small inlets. The shore is low, and wooded nearly to the water's edge, and has but few prominent features that can be recognized from offshore. The buildings at Boca Grande, at Sarasota, and at several of the inlets can be made out; there are three tall buildings and a water tower at Sarasota, a high water tank at Venice, and an uncompleted hotel on Quick Point opposite Sarasota which can be seen from some distance offshore. Some tall palmettoes, with a hotel and several buildings at Maria, near the northwesterly end of Anna Maria Key, are also good landmarks. The coast is clear, except in the vicinity of the entrances to Charlotte Harbor and Tampa Bay.

Back of the coast line are shallow bays and lagoons which can be entered with light-draft vessels by the various passes and inlets, but there is no continuous inside passage even for the lightest draft.

Knight Pass, 11 miles above the entrance to Charlotte Harbor, is a small and difficult entrance to **Lemon Bay**, a comparatively unimportant body of water, filled with shoals. **Bocilla Pass** is reported closed.

Venice Inlet (locally known as Caseys Pass) has a depth of about 2½ feet (0.8 m). A large bathhouse marks the north point at the entrance and there is a high water tank at Venice about a mile inside the inlet. In 1935, a course of about 108° true (ESE. ⅝ E. mag.) lead through the entrance channel. Inside, the channel is crooked and difficult for a stranger. The towns of **Venice** and **Nakomis** are located inside the inlet. A depth of about 2½ feet (0.8 m) can be carried to the landings off these towns. This inlet is the southern entrance to Little Sarasota Bay. Its improvement to provide a channel 8 feet (2.4 m) deep and 80 feet wide, protected by two converging jetties, was authorized in 1935.

Little Sarasota Bay, **Sarasota Bay**, and **Sarasota Pass** are connecting bodies of water, or lagoons, extending from Venice Inlet to the lower part of Tampa Bay, and are separated from the Gulf by a line of narrow keys. These waters vary in width from a few hundred feet to 3 miles and are very shallow. Cuts have been dredged through the shoals to give a depth of 3 feet (0.9 m) from Venice Inlet to Sarasota, and 7 feet (2.1 m) from Sarasota to Tampa Bay. In 1935 there was but 4–5 feet (1.2 to 1.5 m) through the shoals inside Longboat Inlet. The channel from Sarasota to Tampa Bay is well marked by beacons and is easily followed. A drawbridge crosses the extreme south end of Sarasota Bay to the north end of Sarasota Key and another crosses the bay from Sarasota to Sarasota Beach on the Cerol Isles. The draw in the latter is one-third mile west of Cedar Point. Both draws have a horizontal clearance of 55 feet and a vertical clearance of about 10 feet (3.0 m) when closed.

Musketeers Pass (locally known as **Midnight Pass**) is reported closed.

The light draft channel through Little Sarasota Bay is not marked and is rather difficult to follow. It is seldom used, boats usually going outside.

Osprey is a post office and store on the eastern side of Little Sarasota Bay, 5½ miles north of Venice Inlet. There is a small landing here, and gasoline and some supplies may be had. **Vamo** is a small settlement 1¾ miles north of Osprey, on the same side of the bay.

Big Sarasota Pass leads into Sarasota Bay 38 miles northwestward of Gasparilla Island Lighthouse and 20 miles southeastward of Tampa Bay Southwest Channel Entrance Buoy. It lies between Sarasota Key and the small islets north of this key and can be recognized, coming up the coast, when nearly up to Sarasota Point, by the low sandy west end of Sarasota Key. A water tower and three tall buildings at Sarasota will be seen as the pass opens. This pass is the southern entrance to Sarasota Bay and is good for about 6 feet (1.8 m) at low tide. The entrance to the pass is marked by *Big Sarasota Pass Light 1*. The structure is a white skeleton superstructure, with tankhouse, on piles, with light 47 feet (14.3 m) above the water. The channel across the bar is marked by two buoys.

New Pass.—The city of Sarasota has dredged a channel through New Pass to a depth of 22 feet (6.7 m), but United States Engineers report that it had a controlling depth of 8 feet (2.4 m) in June 1933. As the channel of this pass is constantly shifting, strangers should not attempt to enter without a local pilot. A sunken dredge formerly obstructing channel has been removed. In 1935 the channel passed close-by the south point at the entrance and was marked by two buoys inside *Sarasota Main Channel Lighted Buoy 1*; the channel was considerably south of the lighted *Main Channel Range* which could only be used for passing through the cut.

A drawbridge crosses the cut just south of the conspicuous uncompleted hotel on Quick Point. The bascule draw has a horizontal clearance of 110 feet and a vertical clearance of 15 feet (4.6 m) at low tide when closed.

Currents attain considerable velocity in New Pass.

There is a depth of about 8.0 feet (2.4 m) in a dredged channel leading from the pass to the **Payne Terminal** at the northern boundary of the town of Sarasota and about 10 feet (3.0 m) in the basin at the terminal. This channel is marked by the lighted *Barge Channel Range* and by beacons. Each of the front lights for the two channel ranges is obscured along the other range.

Sarasota (population 8,398 by the 1930 census), on the eastern shore of and toward the south end of Sarasota Bay, is one of the principal winter resorts of the west coast of Florida. It has railroad and highway communication to points north and south and to the interior of the State. A draft of about 7 feet (2.1 m) can be taken to the municipal pier inside of Cedar Point where there is extensive berthing space for small yachts as well as anchorage area in the immediate vicinity of the pier. Fresh water, gasoline, provisions, and supplies can be obtained here and also at Payne Terminal. Local guides for the west coast waters of Florida can be secured at Sarasota. There is a municipal airport 2 miles east of the city. There are oil storage plants, fish packing plants, and a

general warehouse at Payne Terminal. A narrow 6-foot (1.8 m) channel leads to **Bird Key** on which there is a large white residence.

Storm warnings are displayed at the municipal pier.

Whitaker Bayou (also known as **Hog Creek**) on the north side of the town and **Hudson Bayou** on the south side furnish excellent shelter for small craft. About 5 feet (1.5 m) can be carried through dredged channels into these bayous. There are two boat yards at Payne Terminal and another at Whitaker Bayou where boats up to about 45 feet long and 3½ feet (1.1 m) draft can be hauled and repaired.

There is a north and south channel between Bird Key and Coon Key. The north end is blocked by the causeway and bridge from Cedar Key to Coon Key but the channel provides a good anchorage site for small craft.

Longboat Inlet.—In 1932 the concrete bridge across this inlet was destroyed and the south end of Anna Maria Key was washed away. In 1935 there was only a small, low, bare islet in the former location of Ilexhurst. Sand flats extended northward to the new south shore of Anna Maria Key while Longboat Inlet extended into the Gulf from just south of the islet. The position of the inlet has been somewhat changed and the use of this channel is not recommended even for small boats. There are numerous old automobile wrecks in the present channel which have been struck by shallow-draft boats.

Longbeach, on the northern end of **Longboat Key**, is a small fishing village.

Cortez is a post office and small fishing village 1¾ miles north of Longboat Inlet, on the eastern side of Sarasota Pass. Gasoline, oil, fresh water, and general supplies can be had. There is telephone and telegraph connections and a tourist hotel. A bridge, with draw, connects the town of Cortez with Cortez Beach on Anna Maria Key. The bridge has a horizontal clearance of 60 feet. A draft of 5 to 7 feet (1.5 to 2.1 m) can be carried to the wharves at Cortez south of the bridge. The entrance to the wharves is north and east of *Sarasota Bay Light 11.*

DIRECTIONS, BIG SARASOTA PASS TO TAMPA BAY.

The controlling depth through Big Sarasota Pass was about 6 feet (1.8 m) in 1935. The project depth for the channel through Sarasota Bay to Tampa Bay is 7 feet (2.1 m) but there is often less water (4 to 5 feet in 1935) over a shifting bar just inside Longboat Inlet. The distance from *Big Sarasota Pass Light* at the south end of the route to *Sarasota Pass Light 1* at the north end of the route is 20 miles.

Approaching this pass, a vessel should keep at least 2 miles offshore until the tall buildings in Sarasota are in line with the northwest point of Sarasota Key. Head in for the shore, passing close to the entrance buoy No. 2 and the channel buoy. Inland rules apply inside this buoy.

Bns. 1A, 3, and 5.—Pass about midway between beacons and south shore, passing well south of *Big Sarasota Pass Light 1* and keeping off the shoaler ground south of Fishery Point.

Bns. 5, 7, and 9.—Pass to the south and east avoiding the shoal ground off the south end of Bird Key.

Big Sarasota Pass Light 4.—Pass west and north, giving good berth.

Cedar Point.—Pass about 100 yds. to southward and head for municipal concrete pier at Sarasota.

Directions, Sarasota Bay and Pass to Tampa Bay.—From a position northward of *Light 4* head for and pass through the draw of the bridge.

Bn. 27.—Pass west of, about 400 yards.

New Pass Main Channel Range Rear Light.—Pass east of, close to.

Sarasota Bay Light 28.—Round to eastward and northward.

West Channel, South Range, Front Light 26.—Approach from eastward on *South Entrance Range* (front Bn. 24 and a rear beacon), passing south of Bn. 25. Proceed northwestward on *West Channel South Range* (lighted). Several beacons mark the west side of the dredged cut and *Longbar Shoal Bn. 23* and *West Channel Light 21* mark the east side of the cut. There is a second range at the north end of this cut, viz., *West Channel North Range* (lighted).

West Channel North Range Front Light 19.—Approach from southward on *West Channel North Range* (lighted). When on *Longboat Inlet Side Range* (daymarks only), follow this range to westward, passing close to north end of Longboat Key.

Longboat Inlet Bn. 10.—This beacon marks the vicinity of a bar near the intersection of *Longboat Inlet Side Range* and *Longboat Inlet Lighted Range.* It is necessary to proceed with caution here, passing to the eastward of Bn. 10 and picking one's way through a shoal area. In 1935 there was a short, narrow channel with only about 4 to 5 feet (1.2 to 1.5 m). This channel is reported to shift frequently.

Longboat Inlet Light Range.—Follow this range from the bar in the vicinity of Bn. 10 to near the front light of the range, passing to west of Bn. 17 en route.

Bn. 13 and Sarasota Bay Light 11.—Pass to westward and through draw. The approach to the wharves at Cordez is to the north and east of Light 11.

Bns. 8 and 9 and Sarasota Pass Light 6.—Pass as indicated by color. *Sarasota Pass Lights 3, 4, and 6* on range.

Bulkhead Lighted Ranges.—From south of *Sarasota Pass Light 6*, follow the South Range to the front light, pass to westward of this light and also to westward of the *North Range Front Light.* Follow the North Range to north of *Sarasota Pass Light 4.*

Sarasota Pass Light 3.—Approach from southward with Lights 4 and 6 on range. Pass to southward.

Pass north of Bn. 2 and to the southward and westward of *Sarasota Pass Light 1* into Tampa Bay.

East Channel.—There is an old channel with 4 to 5 feet (1.2 to 1.5 m) extending from Sarasota Bay Bn. 25 to Longboat Inlet Bn. 17, passing east and north of Otter Island. This channel has recently been re-marked and, with certain conditions of the bar inside Longboat Inlet, it might be desirable to use this old channel.

If continuing northward to Boca Ciega Bay, steer the following courses and distances to *Point Pinellas Light,* 2½ miles eastward of Point Pinellas.

Sarasota Pass Light 1 to Terra Ceia Island Spit Buoy 4.

Course 31° true (NNE. ½ E. mag.). Distance 3.4 miles.

Terra Ceia Island Spit Buoy 4 to Tampa Bay Channel Lighted Bell Buoy 19.

Course 13° true (N. 7/8 E. mag.). Distance 1.9 miles.

From above Bell Buoy 19, follow Cuts A and B of the Tampa Bay Channel for 5.8 miles to a position 0.6 miles northeast of *Tampa Bay Channel Lighted Buoy 5B*. Then steer 328° true (NW. 7/8 N. mag.) for 1.6 miles on the *West Channel Lighted Range* to *Point Pinellas Light*.

Directions for Boca Ciega Bay to Anclote Anchorage are given on page 139.

Directions for Tampa Bay are given on page 131.

11. TAMPA BAY

(Charts 586, 587, and 1257)

Tampa Bay, at about the central point along the west coast of Florida, is 187 miles 343° true (N. by W. 3/4 W. mag.) from Key West Northwest Channel Entrance. It extends in a northeasterly direction for about 20 miles and is 6 to 7 miles wide. It is the approach to Hillsboro, Old Tampa, Sarasota, and several smaller bays and to the cities of St. Petersburg, Port Tampa, and Tampa. It is easy of access either day or night and is the largest deep-water harbor in the State of Florida. It is one of the important harbors on the Gulf Coast of the United States having a considerable foreign and coastwise trade in phosphate rock, lumber, tobacco, and general merchandise.

Off the entrance, shoals extend westward for about 5 miles from shore. Through these shoals there are two main ship channels, passing to either side of Egmont Key.

For a distance of 15 miles above the entrance, Tampa Bay has a general depth of from 3 to 5 fathoms (5.5 to 9 m) along its central line between broad shoals that extend far from the shores on all sides. Channels, with project dimensions of 30 feet (9.1 m) deep by 400 to 300 feet wide, are being dredged where necessary to give a depth of 30 feet (9.1 m) to Tampa and Port Tampa. The channels to these respective ports branch at the north end of Cut F, 3½ miles southwestward of Gadsden Point. All these channels are well marked by buoys, lights, and lighted ranges.

In 1936, the controlling dimensions of the various channels to Tampa and Port Tampa were as follows:

Egmont Channel (new); 27.5 feet (8.4 m) for a width of 150 feet.
Mullet Key Cut; 32 feet (9.8 m) for a width of 400 feet.
Tampa Bay Channel; 30 feet (9.1 m) for a width of 300 feet.
Hillsboro Channel; 29 feet (8.9 m) for a width of 200 feet.
Sparkman Channel; 24 (7.3 m) for a width of 250 feet.
Ybor Channel; 26.5 feet (8 m) for a width of 250 feet.
Garrison Channel; 32 feet (9.8 m) for a width of 275 feet.
Seddon Channel; 32 feet (9.8 m) for a width of 300 feet.
Port Tampa Channel; 30 feet (9.1 m) for a width of 300 feet.
Hillsboro River; 12 feet (3.7 m).

The old Egmont Channel at the entrance to the bay had a depth of 29 feet (8.9 m) for a width of 400 feet.

The entrance to the bay is divided by Egmont Key, forming the two ship channels known as Egmont Channel and Southwest Channel.

Egmont Channel, to the north of Egmont Key, is the most important one commercially. The project dimensions are 32 feet (9.8 m) deep by 600 feet wide. The channel is well marked by buoys, some of them lighted, and by Egmont Key range lights. Egmont Channel has a natural depth of about 21 feet (6.4 m) over a width of about half a mile.

Palatine Shoal lying 5 miles westward of Egmont Key Lighthouse, on the south side of the Egmont Channel, consists of several small lumps having 19 to 22 feet (5.8 to 6.7 m) over them. It is marked by a horizontally striped buoy which should be given a berth of one-quarter mile or more.

Southwest Channel to the south of Egmont Key has a depth of about 16 feet (4.9 m) and is marked by buoys. Egmont Key, 1½ miles long, lies between Egmont and Southwest Channels and the shoals making westward from it separate the two channels. This channel is subject to shoaling and should only be used with local knowledge.

Passage Key Inlet has a depth of 9 feet (2.7 m) in an unmarked shifting channel and is used only by small local vessels. Passage Key, formerly about 1 mile north of Anna Maria Key, has washed away and there are now several small sand spits left that shift in position during heavy weather.

Prominent features.—Approaching Tampa Bay entrance on a clear day, a water tank, 130 feet (39.6 m) high, located on Egmont Key, three-eighths mile south of the lighthouse, is usually the first object sighted. The large concrete hotel and tall water tank about a mile north of Pass-a-Grille are very prominent, especially if approaching from the northward. The tall water tank and houses near the southern end of Mullet Key, and a hotel and tall tank at Pass-a-Grille, can also be recognized when a little closer in. **Egmont, Mullet,** and **Anna Maria Keys** are low and wooded, and Egmont Key has a number of houses southward of the lighthouse. In thick or hazy weather nothing can be seen, and it is then advisable for vessels not sure of their position to anchor until the weather clears.

Egmont Key Lighthouse (Lat. 27°36′.0; Long. 82°45′.7) is a white tower, the top of which shows over the tops of the trees. It is prominent from offshore and from any point in the lower part of the bay. The light is group flashing white, 85 feet (25.9 m) above the water, and visible 15 miles. It has a red sector covering the *Southwest Channel Entrance Lighted Bell Buoy*. The fog signal is an air horn or a bell. A radiobeacon is located here. See Light List or Hydrographic Office Publication No. 205.

Sarasota Pass and Bay are described on page 117.

Anna Maria is a post office and small village on the northern end of Anna Maria Key. There is a wharf on the northeastern side of the key, with 9 feet (2.7 m) of water at the end. A road extends from Anna Maria to Bradentown by way of Cortez, and there is also telephone connection. Gasoline, water, ice, and some general supplies can be had here.

Manatee River is described on page 125.

St. Petersburg (population 40,425 by 1930 census), on the west side of Tampa Bay, is a large winter resort with a commercial ship

basin at the south of the water front. The name "Port of St. Petersburg" is applied to this basin. St. Petersburg is the terminus of two railroads and has rail and highway connections to all parts of the State. The Gandy Bridge, across the south end of Old Tampa Bay, furnishes a short route to Tampa and an automobile ferry from Pinellas Point to the opposite side of Tampa Bay connects with points south. A draft of 25 feet (7.6 m) can be taken from Tampa Bay entrance to a position abreast of St. Petersburg by following the improved channel to Port Tampa as far as Cut J, thence by the natural deep-water area extending to St. Petersburg. For drafts of less than 14 feet (4.3 m), the Point Pinellas Channel can be used, leaving the main ship channel near *Tampa Bay Channel Lighted Buoy 5 B* in Cut B. The depths to points along the water front are as follows: alongside the municipal pier, 14 feet (4.3 m); alongside the railroad pier, 13 feet (4.0 m); into the three city yacht basins, 9 to 10 feet (2.7 to 3.0 m); in the dredged channel to the Port of St. Petersburg (basin), 19 feet (5.8 m); into Bayboro Harbor, 11 feet (3.3 m). All these depths are subject to shoaling, particularly the entrance into Bayboro Harbor.

Port of St. Petersburg, the most southerly basin along the St. Petersburg water front, is about 500 yards long and 350 yards wide. There are depths of 21 feet (6.4 m) in the basin and 19 feet (5.8 m) through the entrance channel. A concrete wharf, with warehouse, along the north side of the basin provides berthing space for several vessels. This wharf has excellent road connection with the city. Coastwise steamers call at the Port of St. Petersburg.

Bayboro Harbor, immediately inshore from the Port of St. Petersburg ship basin, is another basin for smaller commercial rather than pleasure craft. Numerous fishing boats use this basin. There is a small shipyard here capable of hauling vessels up to 225 tons (length about 118 feet, draft about 10 feet (3.0 m)) and performing hull and machine repairs. From 5 to 6 feet (1.5 to 1.8 m) can be carried up the creek on the south side of Bayboro Harbor as far as the bridge. There are oil stations and some small commercial landings along the creek.

The new municipal pier is a large concrete structure, with a 2-story pavilion on its outer end; the pierhead is marked by two fixed red lights. The principal yacht basin is just south of the municipal pier. There are lights on the moles at either side of the entrance and a lighted range inshore leading through the entrance, the rear light being on top of a hotel. There is also a light on the end of the railroad pier, see subplan of St. Petersburg on chart 587. All these lights are maintained by private interests. The entrance channel to the Port of St. Petersburg basin is marked by *Channel Lighted Buoy 1*, by several beacons and by *Port of St. Petersburg Limited Range.*

All the yacht basins are enclosed by sea walls and furnish excellent protection to vessels up to about 100 feet long and about 8 feet draft. Larger vessels can go to the Port of St. Petersburg basin. The yacht basin just south of the municipal pier has slip berths for yachts along the north and west side and a public landing at the west end near the front range light.

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Cruising boats can be chartered, and local guides secured at St. Petersburg. Gasoline, Diesel oil, fresh water, provisions and yacht supplies are obtainable. There are numerous stores and hotels, two hospitals (U. S. Public Health Relief Station at Tampa) and two airports.

Storm warnings are displayed from a tower near the yacht basin.

Pilots for the Port of St. Petersburg only go to Tampa Bay entrance by previous arrangement. Vessels can communicate with the pilots by radio or telegram. Pilotage is in accordance with State statutes on page —; the present rates are as follows:

	Per foot of draft
6 feet and under	$2
6 to 10 feet	3
10 to 14 feet	4
14 to 20 feet	5
Shifting to Tampa or Port Tampa	25
Shifting to main ship channel	20

Vessels can arrange for **quarantine, customs,** and **immigration inspection** through the harbor master.

Coffeepot Bayou, 1 mile north of the Municipal Pier, makes a good yacht anchorage, in a fast developing residential section of St. Petersburg. A draft of 5 feet (1.5 m) can be carried through a dredged channel leading into this bayou. This channel is narrow but generally staked; it leads toward the north point at the entrance with the draw of the bridge in range. **Smack Bayou** is best entered by following along the bulkheading from the entrance to Coffeepot Bayou. It is only little used, by fishing vessels. The small basins on the south side of **Papy Bayou** furnish good protection for small boats during periods of very bad weather. The entrance channel is on line between Cut K Front Range Light and Mermaid Point, the south point at the entrance. The depth is about 2½ feet (0.8 m) at low water.

Big Bayou and Little Bayou are small boat harbors to the south of St. Petersburg. The entrance channels are narrow and crooked with depths of but 2 to 3 feet (0.6 to 0.9 m).

Mullet Key is the site of the former quarantine station. A draft of 16 feet (4.9 m) can be taken alongside the wharf. There is a large pile of rocks with a least depth of 2 feet just to the north and nearly in line with the face of this wharf; it is in a critical position for vessels landing with a strong flood current but is usually marked by a tide rip except at slack water.

Egmont Key is the site of the pilot station and lookout. There are three small piers just inside the north end to which a draft of 12 to 20 feet (3.7 to 6.1 m) can be taken.

Little Manatee River is on the southeast side of Tampa Bay opposite St. Petersburg. The entrance is marked by beacons, two of which are lighted. There is a crooked channel across a bar at the mouth of the river; about 4 feet (1.2 m) can be taken into the river and about 3 feet (0.9 m) to the highway bridge. There is no settlement on the river.

Boca Ciega Bay, on the north side of the lower part of Tampa Bay, is described on page 134.

MANATEE RIVER

(Chart 586)

Manatee River empties into the south end of Tampa Bay, just east of Sarasota Pass. It varies in width from ½ to nearly 1 mile for a distance of 10 miles from the mouth and then from 80 to 600 feet for about 8 miles to Rye. It has been improved by dredging and in 1933 the controlling depths were as follows: 11½ feet (3.5 m) to McNeil Point, 10 feet (3.0 m) to Bradenton, 7½ feet (2.3 m) to Rocky Bluff, and 3 feet (0.9 m) to Rye, the head of navigation. Through the Terra Ceia cut-off there was 5½ feet (1.7 m). The entrance of Manatee River, and also the channel as far as Rocky Bluff, are marked by Manatee River Entrance Buoy 2, and numerous beacons, many of which are lighted. The river is well protected from all directions and forms a good storm anchorage for small boats.

The largest towns on Manatee River are situated as follows: Bradenton, on the south bank, 4½ miles above the mouth; **Palmetto,** on the north bank opposite Bradenton; **Manatee,** on the south bank, 5½ miles above the mouth; and **Ellenton,** on the north bank, 8 miles above the mouth. There is both rail and highway connection to all parts of the State and occasionally steamboat service to Tampa. Manatee County is an important center for the raising of citrus fruit and vegetables.

Bradenton (population 5,986 by the 1930 census), the county seat and a winter resort, is the largest town on the river. There is a commodious city pier to which a draft of about 10 feet (3.0 m) can be carried. There is berthing space for larger vessels along the end of the pier and numerous berths for smaller craft inside the pierhead. The large building at the end of the pier has a concrete warehouse and a large auditorium. There are numerous stores, several hotels, two hospitals (one at Manatee), and a municipal landing field. Provisions and small boat supplies can be obtained and local guides are available.

The principal oil station on the river is at Palmetto opposite Bradenton. The old city pier at Palmetto is in disuse. There are only small landings at Manatee and Ellenton.

Storm warnings are displayed at the foot of the main street in Palmetto.

At **McKay Point** there is a shipyard with two marine railways capable of hauling vessels up to 125 feet long and 10 feet draft, and good facilities for hull and machine repairs. This yard has covered storage accommodations, in fresh water, for vessels up to 125 feet long and 8 feet (2.4 m) draft. Fresh water and gasoline are available and any deck or engine-room supplies can be secured. A paved highway connects with Palmetto. Off the yard, there is good anchorage in 15 feet (4.6 m) soft bottom.

The Manatee River channel is well marked and about the only directions necessary are to follow the navigation aids as found. There are four dredged cuts through the shallow area at the river mouth; cuts A, C, and D have range lights and cut B has lights at either end of the cut. Opposite Palmetto, the channel crosses the river on the lighted Bradenton Cut Range. One highway and two railroad

bridges cross the river immediately above Bradenton. The first is a bascule type and the others are swing draws; the controlling horizontal clearance is 57 feet at the second railroad bridge.

The Pilot Rules for Western Rivers are to be followed in the Manatee River inside Manatee River Entrance Buoy 2.

Terra Ceia Bay is on the southeastern side of Tampa Bay, just north of Manatee River. The entrance from Tampa Bay is between McGill and Snead Islands and is marked by two beacons. This channel is narrow and somewhat crooked; it is good for about 5½ feet (1.7 m) and is marked by several beacons. There is a dredged cut into the bay from the Manatee River just east of McKay Point; beacons mark both ends and the depth is about 5½ feet (1.7 m). There are no towns on the bay.

OLD TAMPA BAY

Old Tampa Bay is the northwest arm of Tampa Bay; it is about 12 miles long and 6 miles wide, except at the junction of the two bays, where it is 2½ miles wide. About three-fourths of the area of the bay has a depth ranging from 1 to 2½ fathoms (1.8 to 4½ m) and the remainder, along the shores, depths under 1 fathom (1.8 m). The entrance is partly closed by shoals, through which there is a dredged channel 300 feet wide and 30 feet (9.1 m) deep from Tampa Bay to a deep anchorage of small area off the wharves at Port Tampa. A highway bridge, known as the Gandy Bridge, crosses the bay about 1½ miles above Port Tampa. It is partly fill and partly concrete construction, and the draw, 2,333 yards from the eastern shore of the bay along the center line of the bridge, has a width of 75 feet. There is a second causeway, mostly fill, about 5 miles above the Gandy Bridge. The draw, a bascule span, is about 3 miles west of Rocky Point and has a horizontal clearance of 60 feet. Both bridges have a vertical clearance (when closed) of 15 feet (4.6 m) above mean low water.

The channel to Port Tampa is well lighted by buoys, lights, and lighted ranges and leads to a turning basin off the wharves 2,000 feet long by 550 feet wide. In the spoil areas to the east of Cut K, there are islands 5 to 10 feet (1.5 to 3.0 m) high.

Port Tampa is an important shipping port on the easterly shore of Old Tampa Bay just inside the entrance. The long docks, phosphate elevators, and oil tanks are conspicuous marks from Tampa Bay. A railroad and electric-car line connect Port Tampa with Tampa. A highway leads down to the passenger-line wharf from which there are semiweekly sailings to Habana via Key West.

Harbor Facilities.—See Tampa.

Port Tampa Swash Channel is a marked channel, about 1 mile off shore, leading around the southwest point of Interbay Peninsula; it has a depth of 7 to 8 feet (2.1 to 2.4 m).

Port Tampa Beach is less than half a mile north of the docks. There is a small yacht basin here and pleasure craft up to about 35 feet long and 3 to 4 feet (0.9 to 1.2 m) draft can be hauled, repaired, or stored. The dredged cut to the basin parallels the Port Tampa docks and has a depth of about 5 feet (1.5 m). There is generally a privately maintained lighted range marking this cut.

There is relatively deep water inshore eastward along the south side of the Gandy Bridge as far as the toll gate where small pleasure boats can be hauled out.

Sunset Park and Beach Park (on Cutbert Bayou) are residential sections, 4 and 5 miles, respectively, north of Port Tampa. No supplies can be had and only small boats can enter the basins.

Tampashores (formerly **Oldsmar**) is a small town on the north and east shore of De Soto Bayou. A draft of about 6 feet (1.8 m) can be carried from Old Tampa Bay through a channel usually marked by stakes to a municipal landing. Gasoline, ice, water, and some general supplies can be obtained; there is railroad, telegraph, and telephone communications.

Safety Harbor is a health resort on the western shore of Old Tampa Bay, 1 mile north of **Cooper Point**. A depth of about 8 feet (2.4 m) can be carried to within about half a mile of the wharf. A prominent tank 219 feet (67 m) high is located here, and is a good landmark for vessels navigating the bay. Gasoline, ice, water, and some supplies can be had here, and there is railroad, telegraph, and telephone communication with Tampa and St. Petersburg. A small basin has been dredged on the south side of the large fill to accommodate small boats up to about 4 feet draft. Only about 3 feet (0.9 m) can be taken in at low water.

Directions, Old Tampa Bay above Port Tampa.—From the docks at Port Tampa, a course 3° true (N. mag.) for 1.6 miles will lead to the draw in Gandy Bridge. Beyond the draw, a course 321° true (NW. ⅜ N. mag.) for 6.2 miles will lead to the draw in the Davis Causeway. Beyond this second draw, a course 288° true (WNW. ⅝ W. mag.) for 2.9 miles will lead to a position half a mile off the landing at Safety Harbor and from this point a course 18° true (N. by E. ⅜ E. mag.) for 1.3 miles leads into the entrance to De Soto Bayou. A depth of about 8 feet (2.4 m) can be carried to off the Safety Harbor landing and about 6 feet (1.8 m) to Tampa Shores on De Soto Bayou.

HILLSBORO BAY AND TAMPA

The northeastern arm of Tampa Bay is 8 miles long and 4 to 5 miles wide. It is full of shoals, but a channel 300 feet wide and 30 feet (9.1 m) deep has been dredged from the deep waters of Tampa Bay to Tampa at the head of Hillsboro Bay. The channel is well marked by buoys, lights, and lighted ranges.

The channel leads into Tampa along the east side of **Davis Island**. Off the south end of Seddon Island the channel divides, Seddon Channel continuing northwestward to a turning basin at the mouth of Hillsboro River and Sparkman Channel leading northward to another turning basin at the south end of Ybor Channel. Garrison Channel along the north side of Seddon Island connects the two turning basins. All of these channels are being dredged to a width of 300 feet and a depth of 30 feet (9.1 m), except the Hillsboro River Channel.

Excepting the Hillsboro River bridges, there is but one bridge crossing these ship channels. This is the bascule bridge of the Seaboard Air Line Railroad, crossing Garrison Channel to the Seaboard Air Line terminals on Seddon Channel; it has a horizontal clear-

ance of 110 feet and a vertical clearance of 4.7 feet (1.4 m) above high water when closed. See page 56 for bridge regulations.

Only small boats can pass around the north end of Davis Island which is connected with Tampa by a fixed bridge having a horizontal clearance of 34 feet and vertical clearance of 10 feet (3.0 m) above high water.

Hillsboro River flows nearly through the center of the city of Tampa to the head of Hillsboro Bay. There is a turning basin at the mouth of the river and a dredged channel 200 feet by 10 feet (3.0 m) above this turning basin to the second (Lafayette Street) bridge. A draft of about 7 to 8 feet (2.1 to 2.4 m) can be taken to the shipyard above the fourth bridge and about 6 feet (1.8 m) as far as Sulphur Springs, 8 miles above the mouth of the river. There are 10 bridges crossing the river through Tampa. The upper bridge, at Florida Avenue, 6½ miles above the river mouth, is the only fixed bridge. It has a horizontal clearance of 38 feet and a vertical clearance of 12 feet (3.6 m) above high water. The other bridges have draws with a minimum horizontal clearance of 50 feet and a minimum vertical clearance of 5 feet (1.5 m.) above high water, when closed. See page 56 for bridge regulations.

The river channel is generally staked for a short distance above the mouth of the river. Above Tampa, the stream is narrow and relatively deep except for several shoals with the controlling depth of about 6 feet (1.8 m). At Sulphur Springs there is a dam across the river.

Near **Dulaney Creek,** on the east shore of Hillsboro Bay, opposite the south end of Davis Island, there are uncompleted terminal facilities with a privately dredged channel connecting with the ship channel. The depth in this channel had shoaled to about 21 feet (6.4 m) in 1935.

Alafia River.—A large phosphate plant has been constructed at East Tampa just north of the mouth of the Alafia River. A 23-foot (7.0 m) channel has been dredged from the plant to the ship channel; it is well marked by pile beacons and is subject to shoaling. The southern entrance to the river has been closed, the new channel being now used to enter the river. Shallow draft vessels enter the new channel at *Alafia River Light.* About 6 feet (1.8 m) can be carried several miles up the river on high water.

Tampa (population 101,161 by 1930 census) is an important manufacturing and shipping port. Depths of 12 to 27 feet (3.7 to 8.2 m) can be taken alongside the numerous wharves, the majority of which are on Garrison and Ybor Channels along the south and east sides, respectively, of the business sections of the city. There is regular steamer service to most of the Atlantic and Gulf coast ports; also to West Indian, Pacific coast, and many foreign ports. The control of the harbor is vested in the city and there is a harbor master.

The following **harbor facilities** include both Tampa on Hillsboro Bay and Port Tampa on Old Tampa Bay.

Terminal facilities.—In Tampa, there are 10 general cargo terminals, with a total berthing space of about 5,000 feet. There is a large phosphate elevator on Seddon Channel, a lumber handling plant on the south side of Garrison Channel and a cement plant on Sparkman Channel with a total cambined additional berthing space of 4,300 feet. The Tampa Union Terminal on Ybor Channel provides

storage in a concrete warehouse for both perishable and nonperishable commodities and has mechanical equipment for handling cargo. There are numerous other wharves for handling oil, lumber, coal, sand and gravel, asphalt, etc.

All the principal wharves have rail and highway connections.

At Port Tampa there are two piers, each 1,800 feet long, with a 200-foot slip between them and affording a total berthing space of about 6,500 feet. The passenger-ship terminal is at the end of the south pier. There are three electrically operated phosphate elevators on the north pier and several oil plants on the south pier.

Anchorage.—There is no anchorage within 3 to 4 miles of Tampa but there are ample docking facilities almost in the heart of the city.

Outside the bar at Tampa Bay entrance, vessels with good ground tackle can anchor anywhere offshore in 6 to 8 fathoms (11 to 15 m) and ride out any gale except a hurricane. Inside the entrance, the usual anchorages are as follows: Southward of the old quarantine stations on Mullet Key in 5–6 fathoms (9–11 m); about 3 miles south of Port Tampa in natural depths of 30 to 32 feet (9.1 to 9.8 m); below and above the docks at Port Tampa in 20 to 26 feet (6.1 to 7.9 m); about the north end of Cut F, to the southeastward of Gadsden Point, in natural depths of 31 to 36 feet (9.4 to 11.0 m) except for one 29-foot (8.8 m) spot off the south side of the ship channel; and, for shoaler draft vessels, to the westward of the main channel in the central portion of Hillsboro Bay.

Pilotage is compulsory for vessels in foreign trade, for barges and schooners, and for other vessels except when the master or mates are licensed as pilots by the Federal Government. Pilotage is optional for vessels drawing 6 feet of water or less, if such vessels have a coastwise license. Vessels carrying United States mails pay half-pilotage only. Pilots can always be had by making signals outside the bar or by radio or telegram. The pilots have a lookout station on Egmont Key and use fast motorboats with a large P painted on the sides; they board vessels about two miles outside *Egmont Channel Lighted Bell Buoy 2*, located just north of Palatine Shoal. Vessels are taken in at night except these drawing in excess of 22 feet. The pilots always use 75th meridian time. Charges for pilotage, per foot of draft, are as follows:

8 feet and under	$2.50
15 feet and under	3.00
20 feet and under	4.50
Over 20 feet	5.50

Additional pilot charges are as follows:

Docking and undocking	$7.50
Shifting, dock to dock	10.00
Shifting between different terminal points on Tampa Bay	25.00

Towboats up to 100 feet in length can be had at Tampa.

The harbormaster functions under the statutes of the State of Florida, see page —. The decision of the harbormaster is final in all disputes involving shipmasters, dock owners, etc.

Dockage, Wharfage, Harbor Dues.—Dockage charges are included in wharfage. Wharfage charges are not assessed except at railroad terminals. There are some small harbor dues.

Quarantine.—The health officers meet incoming vessels in their own launch. Vessels bound for Tampa are boarded off Gadsden Point

at the south end of Cut A, while those bound for Port Tampa are boarded at the north end of Cut F. The quarantine station at Mullet Key has been discontinued.

Customs and Immigration.—The offices of both the customs and immigration services are located in the Federal Building on Florida Avenue between Zack and Twiggs Streets.

Repairs.—In 1935, a new 10,000-ton floating drydock was nearing completion. It will be capable of hauling vessels up to 400 feet long and 25 feet draft (7.6 m). The largest marine railway can haul out vessels of 3,500 tons, 260 feet in length and 18 feet (5.5 m) draft. There are complete facilities for repairs to the hull and machinery of vessels, including machine shops, boiler shops, foundry, forge and pattern shop, etc.

Wrecking and salvaging equipment is available, including tugs, barges, derricks, pumps, diving outfits, etc.

Supplies.—There are several oil bunkering plants at both Tampa and Port Tampa, with capacities of 1,000 to 3,000 barrels per hour. There is one coal bunkering plant in Tampa and another at Port Tampa; the combined storage capacity of these plants is about 25,000 tons. Fresh water and provisions can be secured at both Tampa and Port Tampa, and ship chandlers' stores can be had at Tampa. The water at Tampa is especially adapted for drinking purposes and for boiler use; both purified river water and spring water are available.

Storm warnings are displayed on the First National Bank building in Tampa and at the south end of Seddon Channel; at Port Tampa they are displayed at the end of the piers. Night signals are displayed at Seddon Channel and at Port Tampa. Storm warnings are also displayed at Egmont Key.

Hospital.—There is a relief station of the United States Public Health Service at Tampa, and the nearest marine hospital is at Key West. There are a number of public and private hospitals, principally Cooks and Municipal, with ample facilities.

Radio.—A privately owned radio station (transmitting and receiving), adjoining the Municipal Terminals on Ybor Channel, is used locally for communicating with ships. There is 12-hour service, with remote control to home of the operator during the remainder of the day. The call is WPD.

Air Lines.—A municipal airport is located 4½ miles northwest of the city and a seaplane base on Ballast Point. There is air service to Jacksonville and Habana.

Small Craft facilities.—The municipal boat landing is a long wharf along the west side of the Hillsboro River just above the second (Lafayette St.) bridge. Marjorie Park Yacht basin is along Seddon Channel, on the east side of Davis Island. There are several boat yards along the Hillsboro River; the largest can haul and repair boats up to 100 feet long and 6 feet (1.8 m) draft.

A **meteorological table** for Tampa is given in the Appendix.

The port series, volume No. 8 (part 2), gives further detailed information regarding the port of Tampa.

Tides.—The mean rise and fall of tides at Egmont Key is 1.4 feet and in Hillsboro Bay 2.2 feet. Strong winds may obliterate all traces of normal tidal action. A strong offshore wind sometimes

lowers the water surface at Tampa and in the dredged channels as much as 4 feet, and a continued southwest wind raises it by nearly the same amount.

Currents.—The tidal currents in the North Channel entrance usually have considerable velocity, and vessels should take care not to be set off the course. On the flood the current sets northeastward across the bar; on the ebb it sets straight out. Inside the bar a current of 1½ knots is often encountered.

DIRECTIONS, TAMPA BAY

In approaching Tampa Bay, it is well to keep in at least 6 fathoms and over 5½ miles offshore until *Tampa Bay Lighted Whistle Buoy* is sighted and then head for it. From the buoy, the following courses and distances lead in the improved channels to Tampa and Port Tampa. The dimensions of these channels have been given in preceding descriptions.

In order to distinguish the dredged cuts, the numbers on the buoys marking them are followed by a letter which distinguishes the cut.

Courses and Directions for approaching *Tampa Bay Lighted Whistle Buoys* are given on page 60, and also under **Coastwise Courses** (Position No. 6). The following Courses and Distances are from the entrance buoy:

The Inland Rules apply inside Tampa Bay Lighted Whistle Buoy, as far as the entrance to the Hillsboro River. Pilot Rules for the Western Rivers apply north of the Pratt Street Bridge at the entrance to the Hillsboro River.

Courses and Distances

Tampa Bay

For reverse direction, read upward	Course (*Reverse* course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. **Tampa Bay Lighted Whistle Buoy:**			
Direct (Egmont Key Lighted Range ahead).	98	E. ½ S	5. 6
Reverse (Egmont Key Lighted Range astern).	*278*	*W. ½ N*	*5. 6*
Channel buoys commence 3½ miles east of lighted whistle buoy.			
2. **Egmont Channel Lighted Bell Buoy 7:**			
Direct	81	ENE. ⅞ E	1. 7
Reverse	*261*	*WSW. ⅞ W*	*1. 7*
3. **Lighted Bell Buoy 12:**			
Direct	100	E. ⅝ S	3. 0
Reverse	*280*	*W. ⅝ N*	*3. 0*
4. **Lighted Bell Buoy 11:**			
Direct (Mullet Key Lighted Range ahead).	81	ENE. ⅞ E	3. 4
Reverse (Mullet Key Lighted Range astern).	*261*	*WSW. ⅞ W*	*3. 4*
5. **Lighted Bell Buoy 19:**			
Direct	62	NE. by E. ¼ E	2. 8
Reverse	*242*	*SW. by W. ¼ W*	*2. 8*

Courses and Distances—Continued

Tampa Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
6. Lighted Bell Buoy 1B:			
Direct (Cut B Lighted Range ahead)	38	NE. ⅞ N	3.4
Reverse (Cut B Lighted Range astern)	*218*	*SW. ⅞ S*	*3.4*
7. Lighted Bell Buoy 2C:			
Direct (Cut C Lighted Range ahead)	61	NE. by E. ¼ E	1.7
Reverse (Cut C Lighted Range astern)	*241*	*SW. by W. ¼ W*	*1.7*
8. Lighted Bell Buoy 1D:			
Direct (Cut D Lighted Range astern)	33	NNE. ¾ E	2.1
Reverse (Cut D Lighted Range ahead)	*213*	*SSW. ¾ W*	*2.1*
9. Lighted Bell Buoy 1E:			
Direct (Cut E Lighted Range ahead)	18	N. by E. ⅜ E	2.1
Reverse (Cut E Lighted Range astern)	*198*	*S. by W. ⅜ W*	*2.1*
10. Lighted Bell Buoy 1F:			
Direct (Cut F Lighted Range ahead)	0	N. ⅛ W	1.6
Reverse (Cut F Lighted Range astern)	*180*	*S. ⅛ E*	*1.6*
11. Lighted Bell Buoy 7F:			
TO PORT TAMPA			
11. Lighted Bell Buoy 7F:			
Direct (Cut G Lighted Range ahead)	279	W. ⅝ N	2.7
Reverse (Cut G Lighted Range astern)	*99*	*E. ⅝ S*	*2.7*
12. Position west of Lighted Buoys 6G to 2J:			
Direct (Cut J Lighted Range astern)	359	N. ⅜ W	1.1
Reverse (Cut J Lighted Range ahead)	*179*	*S. ⅜ E*	*1.1*
13. Lighted Bell Buoy 4J:			
Direct (no range)	13	N. by E	1.2
Reverse (no range)	*193*	*S. by W*	*1.2*
14. Lighted Bell Buoy 2K:			
Direct (Cut K Lighted Range astern)	22	N. by E. ¾ E	2.1
Reverse (Cut K Lighted Range ahead)	*202*	*S. by W. ¾ W*	*2.1*
15. Off Port Tampa Docks:			
TO TAMPA FROM LIGHTED BELL BUOY 7F			
11. Lighted Bell Buoy 7F:			
Direct (no range)	70	E. N. E	3.0
Reverse (no range)	*250*	*W. S. W*	*3.0*
16. Hillsboro Lighted Buoy 1:			
Direct (Cut A Lighted Range ahead)	61	NE. by E. ¼ E	1.3
Reverse (Cut A Lighted Range astern)	*241*	*SW. by W. ¼ W*	*1.3*
17. Cut A Front Range Light, southwest of:			
Direct (Cut C Lighted Range (S) astern. Cut C Lighted Range (N) ahead).	6	N. ⅜ E	5.5
Reverse (Cut C Lighted Range (N) astern. Cut C Lighted Range (S) ahead).	*186*	*S. ⅜ W*	*5.5*
18. Cut D Front Range Light:			
Direct (Cut D Lighted Range astern. Two stacks ahead).	334	NNW. ½ W	2.3
Reverse (Cut D Lighted Range ahead. Two stacks astern).	*154*	*SSE. ½ E*	*2.3*
19. Turning Basin, mouth Hillsboro River.			

Courses and Distances—Continued

Tampa Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
TO ST. PETERSBURG VIA WEST CHANNEL (CONTROLLING DEPTH 14 FEET (4.3 M))			
	°	*Points*	*Nautical miles*
1. **Tampa Bay Channel Lighted Buoy 5B:**			
Direct	354	N. ¾ W	1. 3
Reverse	*174*	*S. ¾ E*	*1. 3*
2. **West Channel Buoy 1**—position just to northward of buoy, on *West Channel Lighted Range:*			
Direct (West Channel Lighted Range ahead).	328	NW. by N	1. 0
Reverse (West Channel Lighted Range astern).	*148*	*SE. by S*	*1. 0*
Passing close northeast of *Pt. Pinellas Light.*			
3. **West Channel Buoy 5:**			
Direct	359	N. ¼ W	3. 5
Reverse	*179*	*S. ¼ E*	*3. 5*
4. **Channel Lighted Buoy 1** (St. Petersburg).			
TO ST. PETERSBURG FROM PORT TAMPA CHANNEL			
1. **Intersection of Cuts G and J Ranges:**			
Direct	248	SW. by W. ⅞ W	1. 2
Reverse	*68*	*NE. by E. ⅞ E*	*1. 2*
2. **Cut G Rear Range Light** bearing 339° dist. 0.7 mile. Head for pavilion on municipal pier:			
Direct	230	SW. ¼ W	1. 2
Reverse	*50*	*NE. ¼ E*	*1. 2*
3. **West Channel North Buoy** (vertical striped buoy off St. Petersburg):			
Direct	180	S. ⅛ E	0. 7
Reverse	*0*	*N. ⅛ W*	*0. 7*
4. **Channel Lighted Buoy 1** (St. Petersburg). Note.—*Cut G Front Range Light* and *Cut K Rear Range Light* may be used as a range for entering St. Petersburg Harbor but leads somewhat to the eastward of the deeper water.			

12. TAMPA BAY TO CEDAR KEYS

(Charts 1257, 178, 179)

At the entrance to Tampa Bay, depths of 18 feet (5.5 m) are found for nearly 5 miles offshore. Northward to Anclote Keys, the bottom is generally broken and spots with 18 feet (5.5 m) or less are found over 4 miles offshore. The coast is bordered by a line of long, narrow islands which, for the most part, overlap at their ends. The Gulf sides of these islands are straight or gently curving sand beaches, backed by dense growths of small pine and semi-tropical shrubs and timber. Between the chain of islands and the

mainland there is a continuous waterway of shallow bays and passages, having a least depth of 3 feet (0.9 m) (1925), the southern part of which is formed by Boca Ciega Bay and the northern parts by Clearwater Harbor and St. Joseph Sound. This inside channel is well marked for the entire distance with beacons.

Prominent features.—The principal objects which can be seen and easily identified are the following:

A large prominent hotel and a tall water tank at Pass a Grille Beach, about 1½ miles north of the south end of Long Key.

A United States Veterans' hospital building on Turtlecrawl Point; there is another large building and a tall tank nearby; the group shows clearly across the outer islands.

A large hotel at Belleair with a concrete chimney nearby and a tall tank just to the southward.

A very prominent tall building in the center of Clearwater.

Anclote Keys Lighthouse.

Between Anclote Keys and Cedar Keys there are no marks which can be identified from offshore.

Boca Ciega Bay extends 13 miles northwestward from the lower part of Tampa Bay to **The Narrows**, a narrow passage 4 miles long, connecting with Clearwater Harbor. The bay is generally shoal, but a channel 4 feet (1.2 m) deep has been dredged where necessary so that a least depth of 4 feet (1.2 m) can be taken from Tampa Bay to near the head of Boca Ciega Bay. This connects with a dredged channel 50 feet wide and 3 feet (0.9 m) deep through The Narrows to Clearwater Harbor. The cuts in Boca Ciega Bay and The Narrows have been marked with beacons with pointers, indicating the side on which they should be passed, but the channel is difficult to follow without local knowledge. Tidal currents in Boca Ciega Bay seldom exceed one-half knot.

An 8-foot (2.4 m) dredged **channel** leads from Tampa Bay to Boca Ciega Bay, extending westward from *Point Pinellas Light*, and is well marked by beacons. This depth can be carried to the wharves at Pass a Grille Beach by following the beaconed channel.

Pass a Grille is a passage between Pine and Long Keys leading from the Gulf to the lower part of Boca Ciega Bay. There are two entrance channels from the Gulf, both of which are well marked. The North Channel is the shorter but is good for only 4 to 5 feet (1.2 to 1.5 m); the South Channel is good for about 6 to 7 feet (1.8 to 2.1 m). These channels and depths change frequently but during favorable weather, the channels can usually be followed by the difference in the color of the water.

Pass a Grille Beach is a winter resort on the south end of Long Key. Depths of 8 to 10 feet (2.4 to 3.0 m) can be taken to the numerous wharves extending along the east side of the key from near the south end to the yacht basin at the head of the channel to the large prominent hotel. The northern portion of this channel offers good protection for small craft.

There are hotels and stores here, and gasoline, water, ice, and some yacht supplies can be obtained. Repairs can be made to small machinery and there is a slipways that can haul vessels up to 40 feet in length and 4-foot (1.2 m) draft.

There is highway connection with St. Petersburg via the Corey Causeway, 2 miles north of the hotel. A bascule span has 50 feet

horizontal clearance and 8 feet (2.4 m) vertical clearance when closed.

Gulfport is a small resort and fishing town on the north shore of Boca Ciega Bay. It is a suburb of St. Petersburg to which it is connected by an electric car line. About 6 feet (1.8 m) can be taken to the city dock.

John Pass leads from the Gulf to Boca Ciega Bay, 4 miles below its head, and 7 miles northward of Pass a Grille. This pass is used by small local boats and is not difficult when the sea is smooth. There are several small detached shoals, between which the channel winds. The shoals are dark in color and usually can be seen in time to sheer off, if moving slowly. The entrance to the channel is marked by a black can buoy, and the channel is marked by several beacons. The channel shifts frequently and the buoy is moved accordingly. A depth of about 4 feet (1.2 m) can be carried across the bar at low tide. The highway bridge crossing the pass has a bascule draw with a horizontal clearance of 60 feet and a vertical clearance (when closed) of 8 feet (2.4 m) above high water. The overhead cable crossing has a clearance of 66 feet.

There are small boat landings at **Jungle Estates** directly east of John Pass.

The shallow cove 1 mile northwest of **Turtlecrawl Point** has been dredged to form a small boat basin adjacent to the veterans' hospital. A depth of about 3 feet (0.9 m) could be taken into the basin in 1935.

Blind Pass is practically dry at low water (1935).

Indian Pass, formerly at the north end of Boca Ciega Bay, has been closed by the Government.

Clearwater Harbor is the southern portion of the inside waters extending from The Narrows, connecting with Boca Ciega Bay, on the south to Big Pass on the north. It has an average width of about 1 mile, but is mostly filled with shoals, between which there are narrow natural channels varying in depth from 6 to 20 feet (1.8 to 6.1 m). Cuts 50 feet wide and about 4 feet (1.2 m) deep connecting with these natural channels have been dredged from The Narrows through the shoals at the south end of the harbor.

At **Belleair**, about 1½ miles south of Clearwater, there is a large hotel with a private yacht basin with numerous individual slips. A depth of 6 to 7 feet (1.8 to 2.1 m) can be taken to these slips. The entrance is about the south end of the island.

The following various channels about Clearwater Harbor are well marked by numerous beacons which should be followed closely as some sections of the channels are quite crooked. On many of these beacons, lights are maintained by the city of Clearwater (see Light List) and on many others, there are colored glass reflectors.

Little Pass leads into Clearwater Harbor at the south end of Clearwater Beach Island; it is 12 miles northward of John Pass, 12 miles southward of Ancolote Keys Lighthouse and 1½ miles westward of the town of Clearwater. The entrance may be recognized by a small pavilion on the beach on the north side and by several beacons. From inside the entrance, the channel leads into the southern portion of Clearwater Harbor. In 1935 there was a controlling depth of 4 feet (1.2 m) near Beacon 10, at the southern entrance of the channel. There is a depth of about 5 to 6 feet (1.5 to 1.8 m) on the bar and

this depth can be carried to Clearwater by way of the Causeway Channel.

Big Pass is about 3 miles north of Little Pass and at the north end of Clearwater Beach Island. It leads along the east side of the island, past a large yacht club, and thence across the bay toward Clearwater, joining the Clearwater Harbor Channel off Stevens Creek. Another channel continues along the east side of Clearwater Beach Island to the causeway, passing a second large yacht club near the center of the island. In 1935 there was about 6 feet (1.8 m) on the bar, and this depth could be carried to Clearwater.

At times as much as 9 feet (2.7 m) is found in the channels of Little Pass and Big Pass, and a depth of 5 to 6 feet (1.5 to 1.8 m) can usually be depended upon, with Big Pass having the better depth of the two. On the bars the channels are subject to change, and the chart cannot be relied upon to show the latest condition. Inside the entrance the channels are fairly stable, and the chart is a good guide. Usually, when the sea is smooth, which is the only time that a stranger can enter safely, the channels can be discerned by the difference in color of the water.

Clearwater Harbor Channel is part of the inside route from Boca Ciega Bay to Anclote Keys. The channel passes close along shore opposite Clearwater and again opposite Dunedin. A depth of about 3 feet (0.9 m) can be taken through the inside route, but 5 to 6 feet (1.5 to 1.8 m) can be carried to Clearwater through Little Pass and Big Pass. The drawbridge in the causeway at Clearwater has a horizontal clearance of 50 feet and a vertical clearance of 6 feet (1.8 m) (when closed).

Causeway Channel leads along the south side of the causeway from the city pier, just south of the bridge, to a junction with Little Pass Channel at the south end of Clearwater Beach Island; a branch continues westward to a small-boat anchorage at the west end of the causeway.

Dunedin Channel branches westward from Big Pass just inside the entrance of the pass and leads to the wharves at Dunedin. There is but about 3 feet (0.9 m) in this channel southwest of Dunedin.

Clearwater is a winter resort (population 7,607 by the 1930 census) on the east shore of Clearwater Harbor opposite Little Pass. There are two railroads to St. Petersburg and Tampa and all points north; also paved highways to all parts of the State. There are two yacht clubs and a city pier that have protected basins and several coves where safe anchorage may be found. A draft of 6 feet (1.8 m) can be carried to the yacht clubs and to the city pier. A marine ways can handle boats up to about 50 feet in length and 4 feet (1.2 m) draft; general hull and engine repairs can be made. Gasoline, water, provisions, and some yacht supplies can be secured. Cruising boats can be chartered, and local guides are available. A causeway and drawbridge connect the mainland with Clearwater Island Beach. Storm warnings are available but are not displayed.

Dunedin is also on the east shore, 3 miles north of Clearwater and about opposite Big Pass; it is on the railroad and on the State highway. A draft of about 3 feet (0.9 m) can be taken to the wharves. A small-boat basin has been constructed behind a bulkhead just south of the city wharf. Gasoline, provisions, and some yacht supplies can be

had here. The water is very shoal from Dunedin southwestward for 2 miles to the channel leading to Big Pass, and although the best water is marked by beacons it is difficult to navigate.

St. Joseph Sound extends northward from the northern end of Clearwater Harbor nearly to Anclote Keys, and is separated from the Gulf for a part of the distance by a narrow strip of beach, known as Caladesi Islands. With a favorable tide a draft of a little more than 3 feet (0.9 m) can be carried through the sound, but in its present condition 3 feet (0.9 m) is all that a stranger should attempt to carry, and that on a rising tide. The best water is marked by beacons with pointers; but shoaling has occurred so that local knowledge is necessary to find the best water between beacons, especially southwestward of Dunedin.

Anclote Keys Lighthouse (Lat. 28°10′.0; Long. 82°50′.0) is a brown skeleton tower with an inclosing stair cylinder on the south end of Anclote Keys. The light is flashing white (light 1 second, eclipse 4 seconds), 101 feet (31 m) above the water, and visible 16 miles. The trees on the south end of the key are rather tall and can be made out well offshore.

Anclote Anchorage, between Anclote Keys and the mainland, is well protected from westerly gales and is considerably used. It is good for vessels of 7 feet (2.1 m) or less draft, and can be reached by passing either northward or southward of the keys. Both passages are marked by beacons. Vessels of a greater draft than 7 feet (2.1 m) can find anchorage westward of the keys; here they are exposed to westerly winds; but as the water shoals very gradually there is never a very heavy sea, and vessels with good ground tackle can ride out anything but a hurricane.

Directions, Anclote Anchorage.—To enter Anclote Anchorage from south of the keys bring Anclote Keys Lighthouse to bear 33° true (NNE. ¾ E. mag.) and steer for it on this course until up to *South Entrance Light 1.* From south of this light, head 56° true (NE. ¾ E. mag.) so as to leave *South Entrance Light 2* to starboard and Beacons 3 and 5 on the port hand. When half a mile eastward of Beacon 5, head about 9° true (N. ⅝ E. mag.) and select anchorage as desired anywhere within the next 3 miles.

Approaching Anclote Anchorage from northward, keep outside the 12-foot (3.7 m) curve and steer for Anclote Keys Lighthouse on any bearing eastward of 160° true (SSE. mag.) until *North Entrance Light 2*, lying 5½ miles north-northwestward of the lighthouse, is sighted. From this light steer 93° true (E. 1/8 S. mag.) to *North Entrance Light 4.* Then steer 132° true (SE. ½ E. mag.) for Bailey Bluff Beacon 1 (black). When still a half mile northwestward of this beacon, steer 185° true (S. ¼ W. mag.) with Anclote North Channel Beacon 3 in range with *Anclote River Light 1* at the entrance to the river channel. When North Anclote Beacon 6 is abeam and ½ mile distant, on the above course, steer 205° true (SSW. mag.) and select anchorage as desired anywhere within the next 3 miles.

Anclote River empties over a broad shoal east of Anclote Keys. A channel 100 feet wide and 6 feet deep has been dredged from Anclote Anchorage up to and past the wharves at Tarpon Springs to a turning basin, 200 feet wide and 500 feet long, below the county

bridge. The deepening of this channel to 9 feet (2.7 m) was authorized in 1935. The channel is well marked by lights and beacons. The controlling depth in the channel was 5½ feet (1.7 m) in 1935. The river, outside of this dredged channel, is very shallow and above the bridge is navigable for only a draft of 2 to 3 feet (0.6 to 0.9 m). The bridge has a swing draw 50 feet wide and with a vertical clearance of 6 feet (1.8 m) above low water when closed.

Anclote is a small settlement on the north bank of Anclote River.

Tarpon Springs (population 3,414 by 1930 census) is a winter resort and commercial fishing town on the south bank of the Anclote River about 4 miles above the entrance. It is the headquarters for the sponge-fishing fleet on the west coast of Florida, an industry employing upwards of 100 boats and 1,000 men. There are railroad and highway connections to all parts of the State, a municipal hospital, and several hotels. A draft of about 5½ feet (1.7 m) can be carried to the municipal landing, a marginal wharf over 300 feet long, at the Sponge Exchange just below the county bridge. Fresh water, gasoline, provisions, and some boat supplies can be secured at Tarpon Springs. There are several yards along the river with excellent facilities for hauling and repairing boats; there are also storage facilities. The limit for hauling is about 65 feet in length and 6 feet (1.8 m) draft. **Storm warnings** are displayed from a tower at the Sponge Exchange.

About half a mile below Tarpon Springs, **Kramer Bayou** and **Tarpon Bayou** branch off on the south side of the Anclote River. The junction is at the north end of a small island a short distance above Light 9 and immediately below Light 13; the river passes to the east of the island and the common entrance to the two bayous passes to the west of the island. At Chesapeake Point, this entrance channel again branches, Kramer Bayou leading to the west of the point and Tarpon Bayou to the east side of the point.

On the east arm of Tarpon Bayou, there is a small concrete-faced yacht basin with a public wharf at its head. About 3 feet (0.9 m) can be carried from the river through Tarpon Bayou to this yacht basin which is centrally located in the town of Tarpon Springs.

Directions, Anclote River.—The entrance to the dredged channel is marked by *Anclote River Light 1* and by South Entrance Beacon 4. There are lighted ranges for the first two cuts (A and B) and Anclove Keys Lighthouse is also on range with the first Cut A. Beyond Cut B, the river proper is entered. The channel is well marked by numerous lights and beacons of which the even numbered should be left to starboard and the uneven numbered ones should be left to port. When up to Beacon 24, continue straight ahead past Beacon 26, then round the bend to Beacon 11, and pass south of Light 13 and proceed in midchannel to the wharves.

To go to the yacht basin on the eastern arm of Tarpon Bayou, leave the river between Beacons 24 and 26, at the north end of a small island. Follow the marked channel, leaving beacons close by and favoring the eastern and northern banks. The channel leads south along the east side of Chesapeake Point, past a small bayou on the port hand and into the second passage on the north side. Keep about in the middle of this passage and look out for submerged

rocks. The public landing is on the north side, nearly at the head of the arm.

DIRECTIONS, BOCA CIEGA BAY TO ANCLOTE ANCHORAGE

A depth of 8 feet (2.4 m) can be carried across Boca Ciega Bay to Pass-a-Grille. The controlling depth through The Narrows and Clearwater Harbor is 3 feet (1.8 m). The distance from Point Pinellas Light to a position in Anclote Anchorage opposite Anclote Keys Lighthouse is 40 miles.

Boca Ciega Bay is entered from Tampa Bay at *Point Pinellas Light*, 2½ miles eastward of Point Pinellas. From the light, steer 266° true (W. ½ S. mag.), passing south of Bn. 2 and north of Bns. 1, 3, 5, 7, and 9.

Bns. 9 to 13.—From Bn. 9, small boats of less than 3 feet (0.9 m) draft can hold course across the shoal.

The main channel, good for 8 feet (2.4 m) turns northwest from Bn. 9 for 1 mile to Bns. 11 and 11A. Leave these beacons to southward, avoiding a 5-foot spot 300 yards northwest of Bn. 11A, and turn southwestward passing west of Bn. 13.

Bns. 4 and 6.—Pass south of.

Bns. 8 and 13A.—Pass between.

If going to Pass-a-Grille, head southwestward from Bn. 8, keeping in the middle of the channel, to Bn. 9; pass east and about 100 yards south of Bn. 9 and head for the wharves at Pass-a-Grille.

To continue through Boca Ciega Bay, head northward from Bn. 8. The channel is well marked by red beacons with even numbers along the right-hand side (east and north side) and black beacons with odd numbers along the left-hand side (west and south side). However, shoals frequently encroach on the channel and vessels using this passage should keep in dark water, the shoals showing greenish white. Chart 1257 is the guide; strangers should not attempt this inside passage without this chart.

One drawbridge crosses the bay to the eastward of Blind Pass and another 1½ miles north of John Pass. About half a mile north of the first bridge, there is an overhead wire crossing with a clearance of 51 feet (15.5 m) above mean high water. A drawbridge crosses The Narrows at Indian Rock Beach. The controlling bridge clearances are 50 feet horizontal and 5 feet (1.5 m) vertical (when closed). Through The Narrows there is a depth of barely 3 feet (0.9 m) but the channel is well marked by the beacons and by the spoil banks along the sides of the dredged cuts.

Bns. 7 and 10.—The channel forks; Little Pass Channel heads to the northwestward and the Clearwater Harbor Channel heads to the northeastward toward Clearwater. The inside route continues northward through the latter channel.

A highway causeway crosses Clearwater Harbor opposite Clearwater. The bascule draw is near the east shore; the horizontal clearance is 50 feet and the vertical clearance 8 feet (2.4 m) when the draw is closed. The public dock at Clearwater is just south of the bridge.

At Bn. 88, about 1½ miles north of the causeway bridge, the channel forks again, the Big Pass Channel heading northwestward

and the inside route continuing to the northeastward toward Dunedin. Between Bn. 88 and Dunedin, there is another shoal section of the inside route, the depths here being barely 3 feet (0.9 m).

The various channels about Clearwater Harbor are described on page 135.

The channel passes close off the wharves at Dunedin and continues northward through the central portion of St. Joseph Sound. Off the north end of the Caladesi Islands, the marked channel favors the western side of the sound. From Bn. 87 at the north end of the sound, a course 4° true (N. ⅛ E. mag.) for 3 miles passes 0.7 m eastward of *Anclote Keys Lighthouse* and leads to a position in Anclote Anclote Anchorage off the entrance to Anclote River.

Anclote Anchorage can be entered from the Gulf by passing either to the north or south of Anclote Keys. Directions are given on page 137.

Northward of Anclote Keys, for 60 miles, to Cedar Keys, the coast is low and fringed with marshes averaging a mile in width. The coast line is broken by a number of shallow creeks and rivers, which can be entered only by small boats. Innumerable small keys and islets lie near the coast, and broken ground extends as much as 15 miles offshore in places. As a general rule, the depths decrease gradually as the coast is approached, but there are many shallow spots and rocks with deeper water inside. These extend for a distance of 40 miles northward from Anclote Keys, 10 miles and more offshore, and are known under the general name of **St. Martin Reef.** The outer limit of shallow water and detached shoals is marked by St. Martin Outer Shoal Beacon 22, in a depth of 13 feet (4.0 m), at a position 16 miles 343° true (N. by W. ¾ W. mag.) from Anclote Keys Lighthouse.

Strangers should approach the coast with great care, and vessels of deep draft should keep in 5 to 6 fathoms (9.1 to 11.0 m). Small vessels of 3 to 4 feet (0.9 to 1.2 m) draft usually follow the coast more closely, especially during windy weather, and by keeping about 7 miles off find compartively smooth water. This section of the coast is frequently obscured by a hazy atmosphere, and the vessels standing inshore close enough to sight land are mostly spongers and fishermen; these sometimes anchor in shoal water behind shell reefs, in places where the bottom is soft, and ride out the heaviest gales. Vessels of moderate draft can anchor in from 3 to 5 fathoms (5.5 to 9.1 m) anywhere between Anclote Keys and Cedar Keys, and, as there is but little sea, they can ride out anything except a hurricane.

Bird Roosts, or **Racks,** have been built on the outermost shoals all along this coast between Tampa Bay and St. Marks River. They consist of a square platform on piles about 10 feet above the water, and make good landmarks. Since these racks are usually built on the outermost shoals, small boats can be assured of fairly good water by keeping outside of them.

New Port Richey (population 758 by 1930 census) is a small village on Pithlochascootie River about 2½ miles from the entrance. It is on a State highway and has telephone and railroad connections. There is extensive shoal area off the mouth of the river across which a draft of about 4 feet (1.2 m) can be carried at high water; there is fairly deep water in the river as far as the highway bridge. There is a small public wharf at New Port Richey, and gasoline, oil, and pro-

visions can be obtained. **Port Richey** consists of a few houses at the entrance to the river. There is a post office at both New Port Richey and at Port Richey. There is a scattered settlement along the river between the two places.

Hudson, about 14 miles north of Tarpon Springs, is a small settlement with a post office and one or two commercial fish houses on Hudson Creek. A draft of about 3 feet (0.9 m) can be carried into the creek on a favorable tide but the entrance is difficult. Hudson is on a State highway.

Aripeka is a post office and small settlement of a few houses on Indian Bay. It is on a State highway.

Bayport consists of a hotel, a few houses and a post office on Wekiwoochee River, 24 miles north of Tarpon Springs. There is a road to Brooksville, 18 miles away. A draft of about 3 feet (0.9 m) can be carried to Bayport on a favorable tide. The channel begins close to southward of Beacon Rock, a prominent rock bare at high tide lying 2¼ miles offshore, and continues in a generally west by south direction through the oyster reefs into Wekiwoochee River.

Chassahowitzka River empties into **Chassahowitzka Bay**, 33 miles north of Anclote Keys Lighthouse. There is considerable hunting in this locality. A draft of about 3 feet (0.9 m) can be carried, on a favorable tide, to a small fishing camp on the river. The channel is difficult for strangers. **Black Rock**, 2½ miles offshore from the entrance to the river, shows above water at all stages of the tide. **Chassahowitzka Point** on the north side of the bay, is a prominent high mangrove island. Bird Island is prominent in the mouth of the river.

Homosassa is a small fishing community on **Homosassa River**, about 4½ miles from the entrance. It has railroad, telephone, and telegraph connection with Crystal River. There are several stores and commercial fish houses, a couple hotels, and a post office. Gasoline, oil, ice, and provisions can be obtained. A draft of about 4 feet (1.2 m) can be carried to the village on a favorable tide but both the river entrance and channel are rocky. To enter the river, pass about 2¼ miles northwestward of Chassahowitzka Point and head in a generally northeasterly direction, keeping in dark water, as the shoals on each side will show light colored. The course leads about 1½ miles southward and southeastward of Homosassa Islands. When close to the shore the course turns eastward, then southward, and passes close to northward of Shell Island. Chart No. 179 is the guide.

A channel 5 feet (1.5 m) deep at mean low water and 40 feet wide through the four bars at the entrance to the river was authorized in 1935.

Homosassa Islands are prominent mangrove islands located about 2 miles offshore on the north side of **Homosassa Bay**.

Crystal River empties into the north side of Crystal Bay 46 miles northward of Anclote Keys Lighthouse and 23 miles east-southeastward of Cedar Keys. Approaching from the southwest, Mangrove Point is first picked up while Ford Island (midway between Mangrove Point and Mullet Key) appears as the highest land when approaching from the west or northwest. The entrance to the river is across a large shoal area and thence across Crystal Reefs through which a channel, 6 feet (1.8 m) deep and 60 feet wide has been

dredged; altho this channel is subject to shoaling, it had an effective depth of about 6 feet (1.8 m) in 1935. Most of the river channel is relatively deep but there is a shoal area at the river mouth with barely 6 feet which is the controlling depth which can be taken up the river.

The town of **Crystal River** (population 869 by 1930 census) is on a small basin on the north side at the head of the river, 6 miles above the entrance. It is on a State highway and has railroad, telegraph, and telephone connections. There are several commercial fish and oyster houses. Gasoline, oil, water, and provisions can be obtained and some repairs to small boats can be made. There is fresh water in the upper section of the river which has its source in numerous springs at the head of the river. The mean tidal range at the mouth of the river is about 2½ feet.

To enter Crystal River, keep at least 5 miles offshore until Crystal River Beacon 1, a black pyramidal structure 16 feet high, bears about E. by N. and then steer for it. Pass between this beacon and Crystal River Beacon 2, these two beacons marking the entrance to the dredged channel into the river. This channel is well marked by beacons which indicate the passages or dredged cuts through the numerous oyster bars over Crystal Reef. The river is entered at the north end of Shell Island where there is a shoal area with about 6 feet (1.8 m) at low water. The river is generally deep but there are shoaler areas off some of the points. Midchannel courses should be followed and a lookout kept for these shoaler areas. A draft of about 6 feet (1.8 m) can be carried to the outer basin at the head of the river but only 3 to 4 feet (0.9 to 1.2 m) can be taken into the inner basin and to the fish-house wharves. Keep to the right and close to the west end of a small island when entering the inner basin.

WITHLACOOCHEE ANCHORAGE AND RIVER

Withlacoochee Anchorage lies 46 miles northward of Anclote Keys Lighthouse, 14 miles southeastward of Cedar Keys, and 7½ miles offshore. The approach to the anchorage from deep water of the Gulf is marked by *Withlacoochee Entrance Buoy*, located 10½ miles 114° true (ESE. mag.) from *Seahorse Reef Light*. East Shoal Buoy 1 is located on the northeastern side of the anchorage and marks the channel leading to Port Inglis. The anchorage consists of a small basin among the shoals, locally known as the **Loading Pool,** which was formerly used by ocean-going vessels while loading cargoes brought out in lighters from Port Inglis. There is room in the pool for five vessels of not more than 16 feet (4.9 m) draft.

Withlacoochee River empties into the Gulf 7½ miles northeastward of Withlacoochee anchorage, from which a channel 85 feet wide and 10 feet (3.0 m) deep has been dredged through the reefs and shoals to Port Inglis at the mouth of the river.

In 1934, the controlling depths were as follows:

Gulf to Port Inglis (at mouth of river)	9.5 feet (2.8 m)
To Inglis (7 miles above mouth)	6.0 feet (1.8 m)
To Florida Power Co. lock (10 miles above mouth)	4.0 feet (1.2 m)
To Stocktons Ferry (34 miles above mouth)	4.0 feet (1.2 m)
To Croom (74 miles above mouth)	2.0 feet (0.6 m)

A tugboat of the Florida Power Corporation drawing about 7 feet makes regular trips as far as Inglis. Navigation is much obstructed

by water hyacinths. The lock through the dam (134 feet by 36 feet) is inoperative. The minimum draft to Croom is effective during low stages of the river.

There was formerly considerable shipment of phosphate rock from the Withlacoochee River but this rock is now shipped by rail and there is now relatively small commerce on the river.

Port Inglis has been nearly abandoned since shipment of phosphate rock by water has ceased, and there are only one or two families left here.

Yankeetown (population 157 by 1930 census) is a post office and the main town on the river. It is a small winter resort and fishing village, 3 miles above Port Inglis. There is a hotel and store here and gasoline, oil, and provisions can be obtained and some repairs to small boats can be made.

Inglis is a small settlement and post office 7 miles above the mouth of the river. Gasoline, oil, fresh water, and provisions can be obtained.

Tides and currents.—The mean rise and fall of tide is 2½ feet. A tidal current sets easterly from the loading pool during flood and westerly during ebb. The later is said sometimes to attain a velocity of 3 knots and must be taken into account by vessels coming in from the entrance buoy. A strong northeasterly wind may increase the velocity of the ebb current and a southwesterly wind may decrease it.

Directions, Withlacoochee Anchorage and River.—From the entrance buoy, steer 62° true (NE. by E. 3/8 E. mag.) for 5½ miles to East Shoal Buoy 1, which is on the northeast side of the anchorage. Then steer 65° true (NE. by E. 5/8 E. mag.) for 4 miles to Withlacoochee River Beacons 1 and 2, which mark the entrance to the dredged cut into the river. *Withlacoochee River Light* is located ¼ mile northeastward of beacon 1, the light is 34 feet high and beacon 1 is 15 feet high. Numerous beacons and spoil banks mark the dredged cut from here into the river.

13. CEDAR KEYS

(Chart 480)

Cedar Keys is a group of keys and islets, 90 miles northward of Tampa Bay. They are low, sandy, and covered with a growth of mangrove trees. The most prominent object from offshore is **Cedar Keys Unused Lighthouse** (Lat. 29°–05.8′; Long. 83°–03.9′), showing a white tower on **Sea Horse Key**, the most southerly key of the group. This tower shows to seaward from among the trees; it stands on a 45-foot mound on the south side of the key and its top is 75 feet high.

Seahorse Reef is a dangerous shoal with little depth over it, extending 11 miles southwestward from Seahorse Key. It is marked by *Seahorse Reef Spit Bell Buoy 3* off its outer end and by *Seahorse Reef Light*, 2 miles northeastward of the end.

Cedar Keys (population 1,066 by the 1930 census) is a small town on **Way Key**. The former railroad has been removed but a State highway connects with Bronson and Gainesville. A draft of 10½ feet (3.2 m) can be carried through the main ship channel and about 8 feet (2.4 m) can be taken alongside the wharves. Gasoline, water,

some provisions, and some supplies for small boats can be obtained. There is a limited supply of rain water which is used for drinking. Boats up to 50 feet in length and 4 to 5 feet (1.2 to 1.5 m) draft can be hauled; some repairs can be made but there is no machine shop. There are no regular pilots but local pilots are available. Depot Key, on the opposite side of the harbor, is practically deserted.

Storm Warnings (day only) are displayed at Cedar Keys.

Main Ship Channel, east of Seahorse Keys has a controlling depth of 10½ feet (3.2 m). Although somewhat crooked, the channel is well marked by beacons, lights, and lighted ranges and is not difficult to follow. The deepest draft now using the channel is about 9 feet (2.7 m).

Northwest Channel, north of North and Middle Keys is good for a draft of about 5 feet (1.5 m). Small craft bound up the coast, if their draft will permit, should enter by the Main Ship Channel and leave by Northwest Channel, rather than cross Seahorse Reef.

South Bar Channel, north of Depot Key, has a least depth of about 5 feet (1.5 m). There are only a few markers and the passage is somewhat difficult for stranger. It is used chiefly by local boats.

Anchorage.—Cedar Keys Harbor is protected on all sides by keys and shoals, and affords a safe anchorage for small vessels in all weathers. The best anchorages are off the town and off the northwest side of Depot Key; these anchorages are used by the smaller vessels. Good anchorage in 12 feet (3.7 m) is found in the channel just above *Cedar Keys Light 8* northeastward of Seashore Key. Shoals on both sides prevent a heavy sea, and the holding ground is good. Vessels waiting to enter the main ship channel can anchor in 14 feet (4.3 m), with Seahorse Key bearing 13° true (N. by E. mag.), distant 2½ miles. There is a small boat basin directly behind Cedar Keys. The entrance is through Boat Channel, passing north of Way Key; a draft of 4 to 5 feet (1.2 to 1.5 m) can be taken into Boat Channel.

Fog.—There is considerable fog in this locality during the winter months; southerly winds bring it in and northerly winds clear it away.

Tides and currents.—The mean rise and fall of tides at Cedar Keys is 2.4 feet. Outside the entrance the current sets eastward on the flood and westward on the ebb. Inside, the currents in general follow the channels.

Directions, Main Ship Channel.—Pass southard and well eastward of *Seahorse Reef Spit Bell Buoy 3* at the south end of Seahorse Reef and then steer northeastward until Cedar Keys Unused Lighthouse on Seahorse Key bears 16° true (N. by E. ¼ E. mag.) when it will be in range with Main Channel Beacon 3 which is ¼ mile northeastward of *Cedar Keys Main Entrance Light 1.* Pass 100 yards eastward of the light and follow the courses given below:

From the position to the east of *Cedar Key Light 17* (Position 6 below), boats of less than 5 feet draft can proceed to the northeastward, passing off the north side of Depot Key and to the eastward of Beacon 22 and on to the wharves at Cedar Keys. There is a controlling depth of about 5 feet (1.5 m) across the shoal to the eastward of Beacon 22.

Coastwise Courses and Distances to a position off Seahorse Reef Spit Bell Buoy 3 are given on page 63. (Position 7). The following Courses and Distances are for the Main Ship Channel.

The Inland Rules apply inside *Seahorse Reef Spit Bell Buoy 3.*

Courses and Distances

Main Ship Channel

For reverse direction, read upward	Course (Reverse courses in *Italics*)		Distance
	True	Magnetic	
1. **Cedar Keys Main Entrance Light 1;** 100 yds. eastward of Light:	°	*Points*	*Nautical miles*
Direct (Cut E Lighted Range ahead)	24	N. by E. ⅞ E	0. 9
Reverse (Cut E Lighted Range astern)	*204*	*S. by W. ⅞ W*	*. 9*
Passing Main Channel Beacons 3 & 5.			
2. **Cut E Front range Light 7** on range ahead and 600 yds. distant:			
Direct	45	NE. ¼ N	. 9
Reverse	*225*	*SW ¼ S*	*. 9*
3. **Main Channel Beacon 2** bearing 135° true and 200 yds. distant:			
Various courses	----	----	. 9
Passing westward of Beacons 4 & 6 and to west and north of *Cut E Rear Range Light 8.*			
4. **Cut E Rear Range Light 8** 100 yds. northwest of Light:			
Direct (Cut D Lighted Range ahead)	57	NE ⅞ E	1. 1
Reverse (Cut D Lighted Range astern)	*237*	*SW. ⅞ W*	*1. 1*
Passing north of Beacons 10, 12, and 14 and south of Beacon 9 and Light 11.			
5. **Front Range Light—Cuts D and B.** This is a front light for two ranges; pass it close-by to northwest:			
Direct (Cut B Lighted Range astern)	356	N. ⅝ W	. 5
Reverse (Cut B Lighted Range ahead)	*176*	*S. ⅝ E*	*. 5*
Passing east of Light 13 and Beacon 15.			
6. **Cedar Key Light 17.** Close-by to eastward:			
Various courses	----	----	. 5
Making an S turn to southwest; passing east and north of Light 17 and south and west of Light 16.			
7. **Cedar Key Light 16;** 125 yds. northwest of:			
Direct	39	NE. ¾ N	. 5
Reverse	*219*	*SW. ¾ S*	*. 5*
Passing east of Beacon 19 and west of Beacon 18.			
8. **Main Channel Beacon 20;** 125 yds. northwest of:			
Direct	58	NE. by E	. 5
Reverse	*238*	*SW. by W*	*. 5*
Passing north of Beacon 22.			
9. **Position off Cedar Keys wharves.**			

To leave by the Northwest Channel.—This channel leaves the main ship channel at *Cedar Keys Light 16*, passing around Piney Point (the most southerly point of Way Key) and the Middle Keys to *North Bank Light 1* which marks the outside entrance to the channel.

Sufficient directions are simply to use the latest edition of Chart 480 and be guided by the numerous beacons. The shoalest place in the channel is the vicinity of Beacon 5A, south of Piney Point where the controlling depth is about 5 feet (1.5 m).

To enter by South Bar Channel.—From a position 1 mile southwestward of *Withlacoochee River Light*, a course 318° true (NW. mag.) for 12½ miles leads to *South Bar Light 2*. Or, from *Withlacoochee East Shoal Buoy 1*, a course of 334° true (NNW. ½ W. mag.) for 11¾ miles leads to *South Bar Light 2*. Pass close to southwestward of *South Bar Light 2*, and steer 299° true (NW. by W. ⅝ W. mag.) with the south tangent of Dog Island nearly dead ahead. Approaching Beacons 1 and 6, pass between them, then round Beacon 1 and continue in a westsouthwesterly direction, passing south of Beacon 8 and thence to the wharves at Cedar Keys.

14. CEDAR KEYS TO ST. MARKS RIVER

(Charts 180 and 181)

From Cedar Keys the coast extends in a general northwesterly direction for about 75 miles, and then westerly for 10 miles to St. Marks River. Inland for 1 or 2 miles it is low and marshy and backed by pine forests. The shore line is broken by a number of unimportant creeks and rivers, some of which are navigable for a draft of 4 to 5 feet (1.2 to 1.5 m). Offshore for a distance of 10 miles the bottom is exceedingly irregular and broken, with coral heads and reefs everywhere in evidence. For light-draft vessels this shoal water affords fair anchorage, with considerable protection from heavy seas. This stretch of the coast is frequented mostly by spongers and fishermen, and strangers desiring to enter any of the rivers or creeks should employ one of them who is familiar with the route.

Suwannee Sound, beginning 4 miles north of Cedar Keys, is bounded on the west by a long line of narrow reefs known as **Suwannee Reef**, and on the east by the mainland. It is about 8 miles long and has an average width of about 3 miles. There are several entrances to the sound, the main one being Derrick Key Gap, through which a channel 6 feet (1.8 m) deep and 70 feet wide has been dredged. This channel is subject to shoaling, and in 1935 the controlling depth was about 4 feet (1.2 m). This channel is well marked by beacons. Ranch Bar Gap, 3½ miles northwest of Derrick Key is also good for about 4 feet (1.2 m) draft through an unmarked channel. West Gap, 6¼ miles northwest of Derrick Key is shallow and is only used by local boats on high water.

Suwannee River empties into Suwannee Sound through two mouths, known as **East Pass** and **West Pass**. A branch of West Pass is known as **Northwest Pass**. A channel 5 feet (1.5 m) deep has been dredged through the shoals at the entrance to East Pass. This channel is marked by beacons and is the main entrance to the river; it is subject to shoaling and in 1935 the controlling depth was about 3 feet (0.9 m). West Pass is little used and is good for only shallow draft boats. At high tide a draft of 3 feet (0.9 m) can be taken out Northwest Pass, and through an opening in the reefs to the Gulf, but the channel is not marked and should not be attempted by strangers.

A draft of about 3 feet (0.9 m) can be carried from the Gulf up the Suwannee River to Rolands Bluff (Branford), 68 miles above the mouth; from 2 to 3 feet (0.6 to 0.9 m) can be carried to the rapids 2½ miles below Ellaville, 115 miles above the mouth; and at high stages small boats can go to **White Springs,** 150 miles above the mouth. The river is tidal for 21 miles above the mouth. Above the tidal section the slope is steep and the current rapid. Extreme fluctuations occur due to freshets. Low water usually occurs in the winter and high water in the fall months. There is little commerce on the river.

Directions, Derrick Key to Suwannee River.—The passages through Derrick Key Gap and the East Pass into the river are both well marked by numerous beacons. Use the latest edition of chart 180 as a guide and follow the beacons closely.

North Bank Light 1.—Pass 300 to 400 yards to the westward of this light.

Bn. 2.—Pass 100 yards to westward.

Bn. 1.—Pass to eastward.

Bns. 3, 3A, 5, 7, 9, 11.—Pass to southward. There is an old bird rack near Bn. 3 which is a good mark for steering. The shoalest depth in the gap is generally between Bns. 3 and 3A; there was a controlling depth of about 4 feet (1.2 m) at this point in 1935.

Bn. 2.—Pass west and north of.

Bns. 1, 3, 5.—Pass east and north of. The channel turns westward at Bn. 3.

Bns. 4 and 6.—Pass west and south of. The channel turns north at Bn. 4.

From Bn. 6, a course 331° true (NNW. ¾ W. mag) [Reverse 151° true (SSE. ¾ E. mag.)] for 4 miles leads to Suwannee River East Pass Channel Bn. 2. Pass to the north and west of Bns. 2, 4, and 6 and to the east and south of Bns. 1 and 3. Beyond Bn. 3 there are usually a few stakes marking the channel into the river.

Pepperfish Keys are the only objects between Cedar Keys and St. Marks Lighthouse that a stranger can recognize. They lie from one-fourth to 1 mile off the mainland and on account of their separation from the general coast line can be made out at a distance of from 5 to 6 miles. Four bird racks have been built off Pepperfish Keys, the northernmost lying 1¼ miles west by north of the keys, and the others 2, 3, and 3½ miles south of this one. A white sand beach on the north end of Pepperfish Keys can be easily identified. A tall clump of trees on **Pine Point** is also prominent.

Good, protected **anchorage** for small boats can be found northeast of the westernmost Pepperfish Keys. There is 6 to 8 feet (1.8 to 2.4 m) of water here and the bottom is sand with patches of boulders. The approach to the anchorage is from the westward and extends in a generally east by south direction through an unmarked channel. Boats of less than 4 feet (1.2 m) draft can enter by passing to northward of the northernmost bird rack, and by keeping in dark water, as the shoals show light colored.

Steinhatchee River discharges into **Deadman Bay,** 38 miles northwestward of Cedar Keys. A draft of about 5 feet (1.5 m) can be taken into the river on a favorable tide, and good depths will be found inside, but the approach is obstructed by shoals and oyster bars. There are no marks that could be recognized by a stranger.

Jena is a small settlement just inside the mouth of the Steinhatchee River. There is a post office, telephone, and State highway connections. Gasoline, water, and provisions can be obtained and there is limited facilities for repairs to small boats.

There are high pine trees on Piney Point which can be seen well offshore on a clear day.

Fenholloway River empties into the Gulf 64 miles northwestward of Cedar Keys, and eastward of Apalachee Bay. It can be entered with a draft of 4 feet (1.2 m) on a favorable tide, but local knowledge is necessary. It is navigable for only a few miles from the mouth.

Aucilla River empties into Apalachee Bay at the bend in the coast line 10 miles eastward of St. Marks Lighthouse. A draft of 5 feet (1.5 m) can be taken into the river on a favorable tide, but the approach for a distance of 3 miles is a narrow winding channel, unmarked and difficult for a stranger.

St. Marks River enters the head of **Apalachee Bay**, 83 miles northwestward of Cedar Keys and 54 miles northeastward of Cape St. George. The approach is marked by *St. Marks Lighted Range* and a channel marked by lights and buoys leads between shoals to an anchorage known as **Spanish Hole**, which lies between oyster bars in the mouth of the river, one-half mile eastward of *St. Marks Rear Range Lighthouse*. A conspicuous wreck lies at the northeast side of Spanish Hole and *St. Marks Light* 1 marks the southwest side of it. The depths are 10 to 19 feet (3.0 to 5.8 m) with very shallow water close-by on all sides.

A channel 10 feet (3.0 m) deep and 100 feet wide has been dredged from the Gulf to the village of St. Marks; it is subject to shoaling but in 1935 the controlling depth was about 10 feet (3.0 m). This channel is narrow and crooked through the oyster bars in the mouth of the river but is well marked by numerous beacons.

Any draft that can enter the river can continue 4 miles above St. Marks to **Newport**, while a draft of about 6 feet (1.8 m) can be carried to **Wakulla Spring**, on the Wakulla river 7 miles above St. Marks, where there is a sawmill.

St. Marks Rear Range Lighthouse (Lat. 30°04′.5; Long. 84°10′.7) is a white, conical tower, with a 1-story dwelling attached. The light is fixed white, 82 feet (25 m) above the water, and visible 12 miles.

St. Marks is a small village on the north bank of St. Marks River, one-half mile above the junction with **Wakulla River**, a stream which empties into St. Marks River from northwestward, at a point 5 miles above the lighthouse. The principal industry is fishing. There is a boat landing, 1,000 feet long along the river front. Cruising boats can be chartered and local fishing guides can be secured at St. Marks. There is a post office and a general store, and telephone, telegraph, railroad, and State highway connections to Tallahassee, 19 miles away. Gasoline, oil, ice, provisions, and fresh water in limited quantities can be obtained; Diesel oil, fuel oil, and other supplies can be secured on short notice from Tallahassee. There are two marine ways, the largest capable of hauling boats up to about 80 feet long and 7 (2.1 m) feet draft and there is a machine shop, together with other facilities for boat repairs.

Local pilots (not licensed) for the river can be secured by telephoning from St. Marks Rear Range Lighthouse. Arrangements can be made for having supplies delivered to vessels at anchor in Spanish Hole.

The rock pile, formerly in the middle of the river off St. Marks, has been removed; it was the remains of an old railroad pier.

Directions, St. Marks River.—Bring *St. Marks Rear Range Lighthouse* to bear 357° true (N. ½ W. mag) and steer for it, passing close-by either side of *St. Marks Channel Sea Buoy*, from which the courses and distances listed below lead to (or from) the anchorage. The anchorage (Spanish Hole) is about half a mile west of St. Marks Rear Range Lighthouse, between oyster bars, and should be approached cautiously after rounding the inner buoy. Depths of 10 to 19 feet (3.0 to 5.8 m) are found in the channel and at the anchorage with very shallow water close-to on all sides. There is a conspicuous wreck on the northeast side of Spanish Hole and *St. Marks Light 1* is at the southwest side of it.

Above the anchorage, the channel through the oyster bars at the mouth of the river is well marked by numerous beacons. Keep 25 to 35 yards east of Beacon 3 and between Beacons 10 and 12 keep to the west side of the channel; there are shoals at these points. A mile and a half above Three Mile Point the river forks; the right fork is St. Marks River and the left fork the Wakulla River.

Courses and Distances to St. Marks Channel Sea Buoy are given under **Coastwise Courses**, page 64. The following courses and distances lead up the river as far as Spanish Hole.

Courses and Distances

St. Marks River Entrance

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. **St. Marks Channel Sea Buoy:**			
Direct (St. Marks Lighted Range ahead).	357	N. ½ W.	0.9
Reverse (St. Marks Lighted Range astern).	*177*	*S. ½ E.*	*0.9*
Passing to westward of East Bank Buoy 2.			
2. **St. Marks Front Range Light** PASSING 50 YARDS TO WESTWARD:			
Direct (Heading just to west of St. Marks Light 1).	336	NNW. ⅝ W.	1.3
Reverse	*156*	*SSE. ⅝ E.*	*1.3*
3. **Middle Ground Buoy 4,** passing 50 yards to westward:			
Direct	344	N. by W ¾ W.	0.7
Reverse (Heading to westward of St. Marks Front Range Light).	*164*	*S. by E. ¾ E.*	*0.7*
4. **St. Marks Light 1:**			
Pass 100 yards east of light and about same distance west of Long Bar Buoy 6.			
5. **Anchorage in Spanish Hole.**			

15. ST. MARKS RIVER TO CAPE SAN BLAS

(Charts 182 and 183)

From St. Marks River the general trend of the coast is about southwest by west for a distance of 54 miles to Cape St. George, and thence about west by north for a distance of 17 miles to Cape San Blas; but the coast line is very irregular and broken by numerous bays and entrances. The outer coast line is formed by a chain of narrow, wooded, sand islands, of which the most important are St. James, Dog, St. George, and St. Vincent. Cape San Blas is low and wooded. Between Dog and St. George Islands and the mainland are two important bodies of water, known as **St. George Sound** and **Apalachicola Bay**. The coral formation, which characterizes the coast of Florida from the Florida Keys to Apalachee Bay, gives way to a sand formation to the westward.

Shoals, with depths of as little as 3 feet (0.9 m) on them, extend several miles offshore from the eastern end of St. James Island, from Cape St. George, and from Cape San Blas; they shift frequently during storms and are dangerous to navigation, but are marked at their outer ends by buoys.

Air photo compilations are available for the coastal area from Apalachee Bay to Mobile Bay; see page 2.

ST. MARKS RIVER TO ST. GEORGE SOUND

(Chart 182)

Ochlockonee Shoal extends 8½ miles eastward of St. James Island, and, although separated from the mainland by lanes of moderate depths, there is no safe passage inside of it, except for small boats. *Ochlockonee Shoals Sea Buoy 24*, a first-class red nun, lies about 1 mile southeast of the shoal.

St. James Island extends westward from Apalachee Bay for a distance of 20 miles, and is separated from the mainland by Ochlockonee Bay and by three narrow connecting streams, known as Ochlockonee River, Crooked River, and Carrabelle River. Lighthouse Point, the southeastern end of St. James Island, may be seen from well offshore.

Ochlockonee Bay, Ochlockonee River, Crooked River, and Carrabelle River form an inside passage, about 38 miles long and 3 feet (0.9 m) deep at low tide, from Apalachee Bay to St. George Sound. A draft of 4½ feet (1.4 m) can be taken through on a favorable tide, but passage for all but small boats is obstructed by the bridges mentioned under Ochlockonee River.

Ochlockonee Bay is a shallow bay 5 miles long in an east and west direction and 1 mile wide. The approach to the bay is obstructed by shoals that probably shift from time to time, and the southern half of the mouth is entirely closed by oyster bars, but there is a narrow channel into the bay and to its head, good for about 4 feet (1.2 m) at low tide. This channel is north of the oyster bars on the south side and close to Ochlockonee Point, the northern side of the entrance.

A fixed highway bridge crosses the bay about 1½ miles inside the entrance; there is a boat opening with a horizontal clearance of 37

feet and a vertical clearance of 14 feet (4.3 m) above mean low water.

From Apalachee Bay the best water leads in a general west-northwesterly direction toward the south side of Ochlockonee Point, follows the point, at a distance offshore of about 150 yards, for three-fourths mile, and then leads in the middle of the bay until about 2 miles west of the point. Thence it follows close to the south shore until nearly up to Shell Point, identified by a high sand and shell bluff, and from there it leads through a channel, generally marked by bush stakes, to the mouth of the Ochlockonee River, favoring the north side in entering.

Ochlockonee River empties into the head of Ochlockonee Bay. It trends westward for a distance of 7 miles to Crooked River, then turns northward, and finally eastward. It has a low-water depth of 5 feet (1.5 m) or more for a distance of 29 miles. One railroad bridge and one highway bridge, both with fixed spans cross the river just below the junction with Crooked River at a place called McIntyre. These bridges have a horizontal clearance of 33 feet and a maximum vertical clearance of 9 feet (2.7 m) above mean low water.

Crooked River is a narrow, crooked, tidal stream 22 miles long, connecting Ochlockonee and Carrabelle Rivers. It is from 5 to 20 feet (1.5 to 6.1 m) deep, except in a few short stretches where the depth is only about 3 feet (0.9 m) at low water.

South Shoal extends southward from the east end of St. James Island for about 6 miles. The sea breaks on portions of the shoal even in good weather. *South Shoal Whistle Buoy 26* lies one-half mile off the southern end of the shoal.

Dog Island Reef, lying 5 to 6 miles off the shore of St. James Island, extends from a point about 5 miles west-southwestward of Lighthouse Point to the eastern end of Dog Island, and has depths of 2 to 6 feet (0.6 to 1.8 m) over a considerable part of it.

Directions, Inside Passage from Apalachee Bay to St. George Sound.—From *St. Marks Channel Sea Buoy* follow the course 236° true (SW. ¾ W. mag.) for 7½ miles to a position off the entrance to Ochlockonee Bay and then the course 237° true (WNW. ¾ W. mag.), heading for the south side of Ochlockonee Point. This last course will lead very close to shoals on each side and may have to be modified somewhat to avoid them. Go slowly and sound continuously until past the point.

When inside the point, follow the directions given in the last paragraph under Ochlockonee Bay above. These directions will carry into the Ochlockonee River.

Inside the river, turn southward at the first bend, one-half mile above the mouth and keep about in midriver, passing either side of the island which is about 3½ miles above the mouth. Leave the Ochlockonee River just above the two bridges and turn westward into Crooked River; Ochlockonee River here tends to the northward. For 17 miles westward the Crooked River is easily navigated but further westward to its mouth there are several points where caution is necessary. In 1935 the controlling depth through Crooked River was about 3 feet (0.9 m). Caution is necessary at the junction of the Crooked and Carrabelle Rivers to avoid a shoal where the two channels meet. Coming down the Carrabelle River, pass northward of the island in the reach above the town.

ST. GEORGE SOUND AND APALACHICOLA BAY

(Charts 182 and 183)

These adjoining bodies of water, 40 miles long and 3 to 6 miles wide, are separated from the Gulf by Dog, St. George, and St. Vincent Islands. Both the sound and the bay are generally shallow with numerous oyster reefs and shoals, all of which are dangerous to vessels striking them. A line of shoals, known as **Bulkhead Shoal**, extends in a northerly direction from St. George Island to the mainland and forms the dividing line between St. George Sound and Apalachicola Bay. A channel has been dredged across Bulkhead Shoal; it is well marked by a lighted range and buoys and with the aid of the chart can be readily followed by a stranger if the weather is clear. In 1935 the controlling depth in this channel was 9 feet (2.7 m).

Except in the vicinity of East Pass, St. George Sound and Apalachicola Bay are navigated principally by local oystermen, fishermen, towboats, and small craft of less than 7 feet (2.1 m) draft. The principal commerce consists of lumber, oysters, and fish. St. George Sound can be entered from the Gulf by Duer Channel and by East Pass. It can also be entered by open launches of 3 feet (0.9 m) draft coming from Ochlokonee Bay by way of Carrabelle River. Apalachicola Bay can be entered from the Gulf by way of West Pass, and also with a draft of about 5 feet (1.5 m) by an inside passage from St. Andrews Bay.

Duer Channel lies at the eastern end of St. George Sound between South Shoal and Dog Island Reef. It is subject to frequent change and is unmarked. It is occasionally used during stormy weather by light-draft vessels with local knowledge, as it gives access to the sheltered waters of St. George Sound, but it is difficult for a stranger. Local fishermen sometimes enter St. George Sound through the shoals close eastward of Dog Island.

Alligator Harbor is a shallow, unimportant body of water at the easterly end of St. George Sound, formed by a long narrow spit of land which extends westward from Lighthouse Point. There is a good anchorage east of **Peninsula Point** in 5 to 7 feet (1.5 to 2.1 m) of water, hard sand bottom. There is a narrow, crooked channel, with a depth of 7 feet (2.1 m), leading to it from Duer Channel, but for a stranger drawing over 5 feet (1.5 m) it is difficult to follow, as there are no marks.

Dog Island is a narrow, wooded island 5 miles long, and the first land sighted in approaching from southeastward. The western end is a low barren sand spit which is reported to be gradually shifting northward.

East Pass, the principal entrance to St. George Sound, lies between Dog and St. George Islands, 23 miles eastward of Cape St. George Lighthouse. A channel 150 feet wide by 20½ feet (6.2 m) deep has been dredged between the shoals extending 2 miles offshore. This channel is subject to change and, although it is well marked by buoys and a lighted range, it is somewhat difficult for a stranger. The range does not mark the best water, the channel being eastward of the range. The pass should be used only with local knowledge. In 1935 there was a controlling depth of 18 feet (5.5 m) on the range while 20½ feet (6.2 m) could be obtained by following the channel buoys which deviated slightly from the range. A **Swash Channel**, good for about

15 feet (4.6 m) leads northwestward from a point about one-third mile north of *East Pass Bell Buoy 5* to *Marsh Point Spit Buoy 1.*

Crooked River Rear Range Lighthouse (the rear light for the East Pass range) (Lat. 29°49′.7; Long. 84°41′.9) is on the north shore of St. George Sound, 2 miles west of the entrance to Carrabelle River. The light is group flashing white (flash 0.5 sec., eclipse 3.7 sec.; flashes 0.5 sec., eclipse 7.8 sec.), 115 feet (35.1 m) above water and visible 17 miles.

Carabelle River empties into St. George Sound, 5 miles northward of East Pass. A channel 100 feet wide and 10 feet (3 m) deep, marked by a range, has been dredged from the sound into the river and to the wharves at Carrabelle. Another channel, 100 feet wide and 18 feet (5.5 m) deep, has been dredged in an 18° true (N. by E. ⅜ E. mag.) direction to the lower end of the dredged channel into the river. The dredged channels are subject to change; in 1935 a depth of 8 feet (2.4 m) could be taken to the wharves, and the channel leading to the river was good for a depth of 12 feet (3.7 m). The river currents are rather strong on the ebb tide. Opposite Carrabelle, the river channel is narrow and care is necessary when docking, to avoid grounding on the west side. A highway bridge crosses the river about half a mile above Carrabelle; the horizontal clearance is 40 feet and the vertical clearance 11 feet (3.4 m) at mean low water. Pilot Rules for Western Rivers are to be followed inside *Carrabelle River Entrance Light 2.*

Carrabelle is a small town and former lumber shipping port on the east bank on the Carrabelle River, one-half mile above its mouth. It has a small commerce in fish, naval stores, and pulpwood. There is a post office and telephone and telegraph connections. It is on an improved State highway between Tallahassee and Pensacola and a branch of the Seaboard Airline Railway runs to Tallahassee. It has weekly steamer communication with Apalachicola, Panama City, Pensacola, and Mobile. Fuel oil, distillate, gasoline, fresh water, and some supplies can be had; supplies are limited in general to fishermen' needs. Limited repairs, including hauling, can be made to local fishing craft. **Storm warning signals** (day and night) are displayed on the bluff near the mouth of the river.

St. George Island extends about 21 miles westward from East Pass and is densely wooded except its eastern end, which, like the western end of Dog Island, is a low barren spit.

Cape St. George Shoal extends 7 miles southward from the cape and consists of several detached spots with moderate depths between them. *Cape St. George Outer Shoal Whistle Buoy "St. George 28"*, lies outside the shoal.

The wreck of the dredge *Gilmer* lies sunk in 13 fathoms about 18 miles southeast of Cape St. George in approximately latitude 29°19′ N., longitude 84°55′ W.

Cape St. George Lighthouse (Lat. 29°35′.3; Long. 85°03′.7) is a white conical tower on the west end of St. George Island. The light is fixed white, 72 feet (22 m) above the water, and visible 14 miles.

Cape San Blas Shoals, with depths of 3 fathoms (5.5 m) or less, extend 4 miles southward from the cape, and spots with 4 to 5 fathoms (7.3 to 9.1 m) over them are found 10 miles southward and southwestward from the cape. Deep-draft vessels should not approach the

cape closer than 11 or 12 miles in these directions. *Cape San Blas Outer Shoals Lighted Bell Buoy 30* lies 6½ miles southward of the cape. An area of broken ground extends from 7 miles southwestward to 5 miles westward of the lighted bell buoy and should be avoided by all except light-draft vessels.

A swash channel with 12 to 14 feet (3.7 to 4.3 m) crosses the shoals about 1¼ miles southeast of Cape San Blas; it is marked by *Cape San Blas Shoals Inner Buoys 1 and 3.* Close inshore, the foundation of an old lighthouse is marked by *Cape San Blas Tower Wreck Buoy* (red and black horizontal bands). There is a depth of 8 feet (2.4 m) over this old tower and the H. S. buoy is 62 yards south of it. The swash channel is used by local boats when the sea is smooth, but it is not recommended for a stranger. With a fresh breeze from any quarter south of east and northwest, rough water may be expected at the cape, and a breaking sea may extend far offshore. Between December and March fog is frequently encountered off Cape San Blas.

Cape San Blas Lighthouse (Lat. 29°40′.3; Long. 82°21′.3) is a brown pyramidal, skeleton structure enclosing a cylinder. The light is flashing white (flash 1 second, eclipse 19 seconds), 101 feet (31 m) above the water, and visible 16 miles.

St. Vincent Sound is a shallow and unimportant extension northwestward of Apalachicola Bay. It can be entered from Apalachicola Bay from eastward and through Indian Pass from westward. **Indian Pass** has a narrow shifting channel and is not marked. It is used only by small local fishing craft, and should not be attempted by a stranger. In 1935 there was a controlling depth of about 6 feet (1.8 m) across the bar about 1 mile west of the entrance to Indian Pass, and there was about the same depth just east of a narrow pass through the oyster bars, 3 miles inside the entrance.

West Pass enters Apalachicola Bay between **Sand Island** (the northwest tip of St. George Island) and **St. Vincent Island.** The pass is well marked but is subject to frequent change and should be used with caution. Shoals extend over 3 miles offshore, the bar channel being 3 miles west of Sand Island and about 1¼ miles off St. Vincent Island. *West Pass Bell Buoy* (black and white vertical stripes) marking the entrance is 10½ miles 73° true (ENE. ⅛ E. mag.) from *Cape San Blas Outer Shoals Lighted Bell Buoy 30* and 6½ miles westward of *Cape St. George Lighthouse.* A channel has been dredged through the outside bar 150 feet wide by 10 feet (3.0 m) deep, leading to West Pass Cut, the entrance channel into the bay. The outer end of the bar channel is marked by *West Pass Spit Lighted Buoy 2* and *West Pass Buoy 1;* the inner end is marked by *West Pass Cut Light 2* and there are several additional buoys marking the intervening channel. West Pass Cut, inside the bar channel, is marked by a lighted range. In 1935 there was a controlling depth of 10 feet (3.0 m) through the bar channel and through West Pass Cut.

A swash channel, used to a considerable extent by local fishermen, lies inside East Bank and close along the shore of Sand Island. It has a controlling depth of about 6 feet (1.8 m) and is passable in all but very severe weather.

Sand Island Cut is a dredged cut connecting West Pass with the Lower Anchorage leading eastward into Apalachicola Bay. It is marked by a lighted range.

St. George Channel is the channel across the open water of the bay from the Lower Anchorage to the entrance to the Apalachicola River. *St. George Light* with *Cape St. George Lighthouse* forms a range for this channel but does not mark the best water at the northeast end of the course. When about a mile from the *Outer Light* at the entrance to the river channel, it is necessary to haul over to the eastward and approach the river entrance channel on the Apalachicola Lighted Range. In 1935 the controlling depth of 7 feet (2.1 m) for entering Apalachicola was encountered just south of the Outer Light at the entrance to the river channel. For critical depths it is necessary to sound across this area.

In 1935 the controlling depths from West Pass to Apalachicola were as follows:

Sand Island Cut	14 feet (4.3 m)
St. George Channel (just south of Outer Light)	7 feet (2.1 m)
Apalachicola River Entrance Channel	10 feet (3.0 m)

Apalachicola (population 3,150 by the 1930 census) is on the north shore of the bay and on the west bank of the river by that name. It is on the Apalachicola Northern Railroad and on the State shore highway between Tallahassee and Pensacola. It has weekly steamer connection with Carrabelle, Panama City, Pensacola, and Mobile. There are numerous stores, one or two hotels, and a small machine shop.

When approaching the town, the municipal water tank will stand out sharply in all but the thickest weather. The new highway bridge across East Bay shows as a dark line reaching from Apalachicola to Godleys Bluff. The swing span of the bridge is close to Apalachicola, almost on the entrance channel range.

The entrance channel into the river is through a dredged cut (project 100 feet by 10 feet) extending about 2 miles south of the town. A jetty extends along the east side of the channel which together with the navigational aids makes the channel easy to follow. The Pilot Rules for Western Rivers apply northward of *Outer Light* near the end of the jetty. From opposite the north end of the jetty, the channel passes through the draw of the Apalachicola Bay Bridge (highway) to the wharves along the west bank at the mouth of the river. This bridge has a horizontal clearance of 120 feet through either side of the swing span and a vertical clearance of 30 feet (9.1 m) when closed. In 1935 the controlling depth to the docks was about 7 feet (2.1 m), this being through the shoal area off the south end of the entrance channel to the river. Along the upper section of the water front, the channel along the wharves is narrow, being separated from the main river channel by a shoal that extends southward along the west side to beyond the *Apalachicola Rear Range Light*. The depths at the wharves range from 3 to 11 feet (0.9 to 3.3 m).

The swing draw of the highway bridge has a horizontal clearance of 120 feet and a vertical clearance (when closed) of 30 feet above mean low water. About 2½ miles east of Apalachicola there is a small boat opening in the trestle work of the bridge; the horizontal clearance is 38 feet and the vertical clearance 19 feet above mean low water. There is a depth of 6 feet (1.8 m) at this opening.

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Supplies are generally limited to the needs of fishing craft and small yachts. Fuel oil, distillate, gasoline, oil, provisions, and fresh water can be obtained. Although the water is potable, rain water is much used locally.

Repairs.—There are rather good facilities for making repairs to small vessels, and there are several marine ways, the largest capable of hauling boats up to about 50 tons (length about 60 feet and draft about 6 feet (1.8 m)).

Anchorage.—Small vessels can anchor in the river anywhere south and west of the *Apalachicola Rear Range Light* but keeping clear of the shoal on the west side of the river. The depths vary from 5 feet (1.5 m) to 20 feet (6.1 m), and the bottom is good holding ground.

Apalachicola River, emptying into the northern part of Apalachicola Bay, is formed by the junction of the Flint and Chattahoochee Rivers, 98 miles northward of Apalachicola. Its mouth is obstructed by a broad shoal which has been improved by dredging an entrance channel 100 feet wide by 10 feet (3.0 m) deep. In 1935 there was a controlling depth of 7 feet (2.1 m) at the south entrance to this channel. This entrance channel has been described. About 23 miles above its mouth the Apalachicola River is joined on its west side by the Lower Chipola River which extends northward through Lee Slough to Dead Lake and to The Cut-off, the latter reentering the Apalachicola River 35 miles above its mouth. The Upper Chipola River flows into the upper end of Dead Lake.

A railroad bridge with 120-foot swing span crosses the river about 3 miles above its mouth.

In 1934, the controlling river depths above Apalachicola were as follows:

APALACHICOLA RIVER	5 feet (1.5 m)
(To junction Flint and Chattahoochee Rivers, 98 miles above the mouth of the river.)	
FLINT RIVER:	
To Bainbridge, 26 miles above mouth	4 feet (1.2 m)
To Albany, 88 miles above mouth	3 feet (0.9 m)
(Except extreme low water.)	
CHATTAHOOCHEE RIVER:	
To State line, 22 miles above mouth	4 feet (1.2 m)
To Columbus, 144 miles above mouth	2 feet (0.6 m)
CUT-OFF, LEE SLOUGH, AND LOWER CHIPOLA RIVER	5 feet (1.5 m)
UPPER CHIPOLA RIVER	3 feet (0.9 m)
(To Scott Ferry, 9 miles above mouth.)	

The available depths are at ordinary river stages; greater depths are usually available from January to June. The river is tidal in its lower reach, the effect of the tide being felt for approximately 25 miles above its mouth.

Pilots.—A pilot for St. George Sound and Apalachicola Bay can be secured at Carrabelle. No lookout is kept and previous arrangements are necessary to meet ships off the entrance to East Pass. Pilotage is compulsory for certain vessels in accordance with Florida State statutes as given on page 8. The pilotage rates are:

	Per foot of draft.
Draft less than 6 feet	$2
Draft 6 to 10 feet	3
Draft 10 to 14 feet	4
Draft 14 to 20 feet	5

Yachts do not require pilots but local guides are available at Apalachicola and Carrabelle if desired.

Towboats.—There are no towboats in this vicinity other than local fishing craft.

Anchorage.—Vessels drawing in excess of 7 to 8 feet (2.1 to 2.4 m) cannot proceed to the docks at Carrabelle or Apalachicola.

In St. George Sound, deeper draft vessels can anchor at several points just inside East Pass. These anchorage sites are; (a) inside the western end of Dog Island in about 20 feet (6.1 m); (b) just south of the entrance channel into Carrabelle River (to the westward of *South Spit Buoy 11*) in depths of 20 to 22 feet (6.1 to 6.7); and (c) to the northwestward of the east end of St. George Island in depths of 18 to 20 feet (5.5 to 6.1 m). At these anchorages, vessels can ride out any gale in safety. Smaller vessels can anchor closer inshore behind the hook at the east end of St. George Island or at various points about the sound in available depths.

In Apalachicola Bay vessels can anchor anywhere after passing inside of Sand Island. There is good anchorage in the area northward of the West Pass Range, on the extension of the Sand Island Cut Range, in depths of 10 to 12 feet (3.0 to 3.7 m) with good holding bottom. The area marked "Lower Anchorage" on the chart has depths of 12 to 15 feet (3.7 to 4.6 m). Lighter draft vessels can find good anchorage about 1 mile south of the entrance to the dredged channel leading into the mouth of the Apalachicola River, to the north and east of the mid-channel buoy.

Quarantine.—There is a quarantine officer stationed at Carrabelle; vessels are visited by arrangement.

Hospital.—A relief station of the United States Public Health Service is located at Apalachicola. The nearest marine hospital is Mobile.

Customs officers are stationed at Apalachicola with offices in the Post Office Building.

Storm warnings (both day and night) are displayed from the bluff near the river mouth at Carrabelle and from a signal tower near the post office in Apalachicola.

A **local variation** of the compass amounting to as much as 15° westerly has been observed at the south end of the entrance channel to Apalachicola, between the light and the beacon.

Tides and currents.—At East Pass the mean tidal range is about 1¾ feet. The tidal currents are strong, sometimes having a velocity of 3 to 4 knots, and ordinarily at least 1 knot. They usually set across the shoals at an angle with the channel, and great care should therefore be taken not to be set toward the shoals on either hand.

The mean range of tide at West Pass is about 1.5 feet. The currents are influenced by the winds and by freshets, and at times are very strong, especially the ebb; at flood they are generally weak. A velocity of 3 knots has been observed in the channel at a point inside the bar about 1¼ miles eastward of the bell buoy.

The ebb current runs out through West Pass and divides, part going to the southward over the breakers and part following the deeper water to the bar, the latter being the stronger.

In the Apalachicola River, the mean range of tide is about 1 foot at Apalachicola and the current is principally ebb. With strong

winds from the north and east, there will be little or no flood current or even slack water and the height of the water in the bay and river will be reduced a foot or more.

The tides meet somewhat to the westward of Bulkhead Shoals, the ebb current flowing eastward through the cut.

DIRECTIONS, ST. GEORGE SOUND AND APALACHICOLA BAY

East Pass.—Coastwise Courses and Distances for approaching East Pass are given on page 3, Position 7C1.

Coming from eastward on a clear day the trees on Lighthouse Point will be seen from southward of South Shoal buoy, and shortly afterwards the trees on the eastern end of Dog Island will be made out on the starboard bow. In a heavy sea, a deep-draft vessel should keep in 5 to 7 fathoms (9 to 13 m) until the *East Pass Lighted Buoy 1* marking the entrance to East Pass is about in range with *Crooked River Rear Range Lighthouse*, on the northwest side of the sound, and bearing about 334° true (NNW. 5/8 W. mag). Pass the lighted buoy on this course and pass the other buoys close by. If *Crooked River Range* can be picked up, it is of considerable assistance in keeping in the channel, but it does not mark the best water and it does not show well from outside the bar. In 1935, the channel was to the eastward of the range opposite the *Bell Buoy 5* marking shoals immediately to the westward at this point. The channel is narrow and subject to change and has shoals, with as little depth as 6 feet (1.8 m) over them, close by on both sides. Local knowledge is desirable when using East Pass. Inside the pass, chart 182 and the buoys are the guides.

Directions to Carrabelle.—

Dog Island Spit.—Pass 200–300 yards to west and north.

South Spit Buoy 11 to Carrabelle River Entrance Light 2.—Pass southeast of Buoy 11 and head for the light, passing northwestward of *Turn Buoy 2*. (To follow the former dredged cut as charted, pass 250 yards northwestward of Buoy 11 and head for the light; the bottom is rather flat and either course is practicable.) Two beacons mark shoal ground to the northwest of this course.

Carrabelle River Entrance Light 2.—Pass 50 yards west of.

Carrabelle River Bar Lighted Range.—Follow this range, Course 324° true (NW. 1/2 N. mag.), from *Entrance Light 2* to near the front range light and pass 50 yards east of the latter light. Thence favor the east shore to the first wharves and then less than 100 feet off the wharves. A depth of 12 feet (3.7 m) can be carried through this channel as far as the front range light and thence 8 feet (2.4 m) to the wharves.

There is a submerged wreck on the west side of the river, on the point about one-fourth mile above the rear range light.

Directions, St. George Sound to Apalachicola.—

East Pass to St. George Sound Turn Light.—Proceed about 300 yards northward of *East Pass Buoy 9* and head for the *Turn Light* on course 243° (SW. by W. 3/8 W. mag.). Course passes to southward of *Royal Bluff Shoal Buoy 2* and St. George Sound Channel Beacon and to the northward of Mud Island Flats Beacon.

St. George Sound Turn Light.—Pass south of, close-by.

Porter Bar Light.—Pass east of, close-by. Continue 100 yards past light.

Bulkhead Cut Turn Buoy 4.—Steer 268° true (W. ½ S. mag.) from the previous position and run on to *Bulkhead Cut Lighted Range* southeastward of Buoy 4.

Bulkhead Cut Lighted Range.—Pass close-by Buoys 4 and 6. The cut is narrow, with spoil banks close to the range on the southwest side. The course is 293° true (WNW. ¼ W. mag.).

Bulkhead Buoy 6 to position 1 mile to the southward of Apalachicola Outer Light.—Course 245° true (SW. by W. ½ W. mag.), distance 4.8 miles. Pass 260 yards south of *Norman Bar Buoy 8.* Approach the light on course 343° true (N. by W. ¾ W. mag.) heading 20–25 yards to the westward of the light. This course is somewhat to the east of the range but in 1935 led through the best water. With deeper water off the entrance to the river channel, approach the light of the *Apalachicola Lighted Range*, course 350° true (N. by W. ¼ W. mag.).

Apalachicola Channel.—Pilot Rules for Western Rivers apply inside *Outer Light.* Pass 20–25 yards to the westward of the *Outer Light* and continue along the west side of the jetty (25–50 yards off) on course 350° true (N. by W. ¼ W. mag.) with *Apalachicola Lighted Range* ahead. After passing Tow Head Island, head slightly to eastward to pass through the draw and thence to the wharves on the west bank of the river.

In 1935, the controlling depth from East Pass to Apalachicola was 7 feet (2.1 m), this depth being found to the westward of *Bulkhead Buoy 6* and also off the entrance to the Apalachicola Channel.

Directions, West Pass to Apalachicola.—The channel across the bar is subject to such frequent and marked changes that no definite courses can be given and strangers are advised not to attempt to enter without a pilot. The best water across the bar is indicated by *West Pass Spit Lighted Buoy 2* and by one black and three red buoys, all of which are shifted frequently to conform to changes in the channel. Red Buoys 2A and 2B are each equipped with red reflectors. Pass to the southward of the black buoy and to the northward of the red buoys and of *West Pass Cut Light 2* and thence onto *West Pass Cut Lighted Range* to the eastward.

West Pass Cut Lighted Range.—Course 70° true (NW. by W. ⅞ W.) Favor the St. Vincent Island shore and pass close-by *Turn Buoy 3* and continue about ¼ mile beyond buoy to next lighted range.

Sand Island Cut Lighted Range.—Course 133° true (SE. ½ E. mag). These lights are close inshore and of less intensity than the lights of the above range. When about ½ mile from the front light, bear to northward of the range, passing about 200 yards north of this light and about ¼ mile north of *St. George Light.*

St. George Lighted Range.—Course 32° true (NNE. ½ E. mag). Cape St. George Lighthouse, showing over the trees, is the rear range light. When half way across the bay, bear to the southeast of the range so as to approach *Outer Light* on either course 343° true (N. by W. ¾ W. mag.) or 350° true (N. by W. ¼ W. mag.) See "Directions, St. George Sound to Apalachicola", above.

INLAND WATERWAY, APALACHICOLA BAY AND ST. ANDREW BAY

This section of the Intracoastal Waterway provides a safe inland passage for small craft inside of Cape San Blas. The passage is partly through natural waterways, which have been improved where necessary by dredging, and partly by a canal, and in 1935 had a controlling depth of 5½ feet (1.7 m) and a width of 65 feet. The passage is tidal throughout, there are no locks, and it is free of toll. At **White City**, 18 miles above Apalachicola, there is a pontoon bridge across the canal which is swung open to accommodate all boats. There is a small store and gasoline pump here, and gasoline, oil, fresh water, and provisions can be obtained. At the post office and settlement of **Overstreet**, 30 miles above Apalachicola, a ferry (operated by cable) crosses the canal. Provisions can be obtained here, but there is no gasoline pump at the canal.

The distance from Apalachicola to Panama City via this passage is 53 miles, of which 24 miles is through canal and improved creeks. The route follows Apalachicola River for 5 miles, until 1¾ miles above the railroad bridge, **Jackson River** for 4 miles, thence **Lake Wimico, Searcy Creek, South Prong, Wetappo Creek,** and East Bay, an arm of St. Andrew Bay. The dredged channels across Lake Wimico and through the eastern part of East Bay from the mouth of Wetappo Creek, are marked by pile beacons.

In 1936, the depth of this waterway was being increased to 9 feet (2.7 m).

Directions.—Follow directions given above for entering the Apalachicola River and when through the draw of the highway bridge, haul over to the north bank of the river in the vicinity of the *Apalachicola Rear Range Light*, taking care to avoid the midriver shoal. Favor the northern side, pass northeastward of an island, and then head for the draw in the railroad bridge. This draw has a controlling horizontal clearance of 120 feet and a vertical clearance (when closed) of 7 feet (2.1 m) above mean high water. There are a few old piles from abandoned docks along the south and west side of the river at a short distance below the railroad bridge. When 1¾ miles above the bridge, take the left (west) fork into the **Jackson River** and pass northward of the island in that river. Jackson River is about 4 miles long and connects Apalachicola River with **Lake Wimico.** The channel across Lake Wimico is marked by beacons along the southwest side; it is a dredged cut 5 to 6 feet (1.5 to 1.8 m) deep and 65 feet wide. In 1935, the controlling depth was 5½ feet (1.7 m) between Beacons 17 and 19. Outside the dredged cut, the lake is shallow. The course through the channel is 307° true (NW. by W. mag.).

Entering **Searcy Creek** from the western end of Lake Wimico, keep in midstream and follow the natural channel until cut-offs are reached. These are recognized by the piles of old dredged material, now covered with trees and brush, along the banks. The western end of the canal connects with **South Prong,** which is a branch of **Wetappo Creek,** which empties into the east end of East Bay, an arm of St. Andrew Bay.

A dredged channel with a controlling depth (Feb. 1935) of 7 feet (2.1 m) extends from the mouth of Wetappo Creek through the eastern part of East Bay. The channel is very narrow, with shal-

low water close by on either side, and is marked by a row of day beacons along the south side. The dredged channel ends at Beacon 35, but the row of day beacons continues along the east side of the natural channel extending southwestward from this beacon, ending at Beacon 53, 1¾ miles south of Wetappo.

For Directions through East Bay, see page 168.

16. ST. JOSEPH BAY

(Chart 184)

St. Joseph Bay lies northward of Cape San Blas and is separated from the Gulf by a long narrow strip of land and succession of low sand hills, wooded in places, extending northward from the cape. The bay is 11½ miles long and varies in width from 2 miles at its entrance to 5½ miles at its widest part. It is one of the best harbors on the Gulf coast and is easily entered at any time by vessels of a moderate draft. The entrance is across shoals varying in depth from 15 to 19 feet (4.6 to 5.8 m), and has an improved channel 300 feet wide and 24 feet (7.3 m) deep. The dredged channel is subject to little change and is well marked by buoys and a slow range. The course from the entrance whistling buoy on the range is 62° true (NE. by E. ⅛ E. mag.). A swash channel having a depth of 14 feet (4.3 m) follows the shore of St. Joseph Point at a distance of one-fourth mile and passes between the shore and a shoal of about 8 feet (2.4 m) depth. The entire bay, except for the southern third and a narrow shelf along the sides, is free from shoals and is from 24 to 36 feet (7.3 to 11 m) deep. Small craft can find protected anchorages in **Eagle Harbor,** a small bight in the west shore 6 miles south of St. Joseph Point, and in the narrow sloughs in the south end of the bay.

Port St. Joe (population 851 by 1930 census) is a small town on the east shore of the bay, 5 miles in from St. Joseph Point. It is on the southern State highway between Tallahassee and Pensacola and has railroad communication with Apalachicola. In 1935, the long wharf near the town was in ruins; immediately north of it there is a wharf for small boats with a depth of 4 feet (1.2 m). A half mile farther to the northward there is a commercial fishery dock with 10 feet (3.0 m) at the outer end. Local pilots can be secured at Port St. Joe. There are telephone and telegraph connections, a post office, and a small hotel. Gasoline, oil, and water are available for small boats, and there are facilities for hauling and repairing small boats up to about 40 feet long and about 4 feet (1.2 m) draft.

The nearest customs officer is at Apalachicola. **Storm warnings** are displayed at Port St. Joe. Vessels going to Port St. Joe notify the customs officer at Apalachicola of their arrival, and he comes to the vessel at the first opportunity. To clear, the master goes to the customs office at Apalachicola.

The broken ground from the dredged channel into St. Joseph Bay northwestward to **St. Andrew Point** is known as **Bell Shoal.** It has depths of 16 feet (4.9 m) near the dredged channel, but much shoaler depths approaching St. Andrew Point. The point should be given a berth of 3 miles. **Crooked Island** is a long, narrow island extending northwestward from St. Andrew Point to the entrance of St. Andrew

Bay. It incloses a shallow, unimportant body of water known as **St. Andrew Sound.**

The tides in St. Joseph Bay are chiefly diurnal with an average rise and fall of about 1½ feet.

St. Joseph Point Rear Range Lighthouse (Lat. 29°55′.1; Long. 85°22′.8) is a white tower on a square dwelling. The light is fixed white, 63 feet (19.2 m) above the water and visible 13 miles.

Directions.—Courses and Distance to St. Joseph Bay from both Apalachicola Bay and St. Andrews Bay are given under **Coastwise Courses** on page 64. Courses and Distances from the entrance buoy into the bay are given below.

Smaller vessels can carry a depth of 12 to 14 feet (3.7 to 4.3 m) closer inshore from Apalachicola Bay by steering 278° true (W. ¼ N. mag.) for 9½ miles from *West Pass Bell Buoy* to the swash channel 2 miles off Cape San Blas; this channel is marked by two black buoys. After passing through this swash channel, haul in gradually for the shore north of the cape and follow the shore at a distance of ½ mile until the shore turns northeastward. Then close in to a distance of ¼ mile offshore and at that distance follow through the swash channel around St. Joseph Point.

Courses and Distances

St. Joseph Bay

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. St. Joseph Bay Entrance Whistle Buoy:			
Direct (St. Joseph Point Lighted Range ahead).	62	NE. by E. ⅛ E	3. 8
Reverse (St. Joseph Point Lighted Range astern).	*242*	SW. by W. ⅛ W	*3. 8*
Being guided by channel buoys across Bell Shoal.			
2. St. Joseph Bay Turn Buoy 7:			
Direct	116	ESE	2. 0
Reverse	*296*	*WNW*	*2. 0*
3. St. Joseph Bay Middle Ground Buoy 8, ¼ mile westnorthwestward of:			
Direct	151	SSE. ⅞ E	5. 0
Reverse	*331*	*NNW. ⅞ W*	*5. 0*
4. Position 1 mile off Port St. Joe wharf.			

17. ST. ANDREW BAY AND PANAMA CITY

(Chart 184)

St. Andrew Bay is a narrow irregularly shaped, landlocked harbor of moderate depth lying 27 miles northwestward of Cape San Blas. It is the approach to the tributary inlets of East, West, and North Bays and to several towns and villages. One of the largest paper mills in the world is located here and there is considerable commerce in paper products and a little commerce in lumber and naval stores.

Prominent features.—Approaching the entrance to St. Andrew Bay from seaward, the shore first appears as a low, unbroken line of woods. Upon nearer approach, the sand beach shows in an unbroken white line, with the exception of the entrances at East Pass which show as dark breaks in the white expanse. The new dredged cut will not show unless the vessel is on or near the line of the cut. The first landmarks to be seen are the smoke and tall stacks of the paper mill at Bay Harbor. Later the elevated water tank at St. Andrew will show. The entrance light is a poor mark in the daytime as it shows against a background of trees. From the cut, a tall hotel at Panama City is a prominent landmark. The water in the vicinity of the entrance is remarkably clear, and even in rough weather the outlines of the channel and spits can be distinguished by the difference in color of the water—deepest where it is darkest.

Entrance Channels.—A new entrance channel has been dredged from the Gulf into St. Andrew Bay about 4½ miles northwestward of **Hurricane Island**. This channel is a straight cut through the peninsula south of **Alligator Point**, extending from deep water in the Gulf, in the direction 52° true (NE. ¼ E. mag.) to deep water in St. Andrew Bay. The entrance is protected by jetties. The project depth is 27 feet (8.2 m) over a width of 300 feet, deepened to 29 feet (8.8 m) and widened to 450 feet the approach channel in the Gulf, but the channel is subject to considerable shoaling and until the banks of the channel become stable, the project depth will be maintained by frequent dredging. The channel is well marked by lights and lighted buoys.

St. Andrew Bay Entrance Light, at the inner end of the west jetty is a flashing white light, 72 feet (21.9 m) high and visible 12 miles.

St. Andrew Bay Entrance Lighted Bell Buoy is 1.3 miles offshore, on the prolongation of the channel.

East Pass, lying southeastward of Hurricane Island, was the former entrance to St. Andrew Bay. Since the completion of the new channel, the lighted aids in East Pass have been discontinued. The old pass carries a depth of 20 feet (6.1 m), but is subject to shoaling and should be used only with local knowledge. The wreck of a tug lies about 600 yards east of the channel in about 7 feet (2.1 m) of water.

A small shallow pass leads west of Hurricane Island and in 1929 a new pass opened up through the island. The latter carries a depth of 5 feet (1.5 m) but is unmarked; it is subject to change by storms and should be used only with local knowledge.

Courtney Point Shoal is a shoal spit extending for 1 mile eastward of **Courtney Point**. Depths of 6 to 8 feet (1.8 to 2.4 m) are found near the outer part of the shoal. A light in 11 feet (3.3 m) marks the eastern edge of the shoal, but large vessels should give the light a good berth since depths of 23 to 25 feet (7.0 to 7.6 m) extend for ¼ mile southeastward.

Middle Ground is a large shoal area with a least depth of 11½ feet (3.5 m) lying in midchannel north of *Red-fish Point*. Large vessels should favor the point here, passing about 125 yards north of *Red-fish Point Light*.

Panama City is the county seat of Bay County and has been extended to include the towns of **St. Andrew, Millville,** and **Bay Harbor.** An

office of the United States Army engineers is located at the courthouse. One of the largest paper mills in the world is located at Bay Harbor. This is the principal industry although there is some commerce in fish, lumber, and naval stores. **Massalena Bayou,** at Panama City opposite **Red-fish Point,** is the location of many landings for fish boats and yachts. A weekly passenger and cargo boat from Mobile, Pensacola, Apalachicola, and Carrabelle docks just below the bridge here. The bridge is a wooden structure with a single lift span with a horizontal clearance of 32 feet and a vertical clearance of 8½ (2.6 m) feet at mean high water when closed. The entrance to the bayou is through a dredged channel marked on its western side by piles and by a range of two lights at night. A depth of 10 feet (3.0 m) can be carried through the dredged cut to the drawbridge, and 6 feet (1.8 m) can be carried through the bridge and into the yacht harbor above the bridge. **Watson Bayou** is used extensively for a yacht harbor and there are many boat landings here. There are shipyards and marine ways at Millville on Watson Bayou. Vessels must use care in approaching the head of the bayou as there are many piles and sunken logs to be found there. Depths of 6 to 10 feet (1.8 to 3.0 m) can be carried to the wharves at Millville.

Communication.—Panama City has a railroad communication with the interior of the State and bus communication to all points. A passenger and freight steamer makes weekly trips to Mobile, Pensacola, Apalachicola, and Carrabelle. Several lines of freight steamships have regular sailings to Gulf and Atlantic coast ports. There is an airport on the south shore of Goose Bayou, North Bay. Panama City has several good hotels. There is no commercial radio station but radio messages can be sent by telegraph via Pensacola or other radio stations.

Supplies.—Gasoline, fuel oil, and Diesel oil can be obtained at Panama City and Bay Harbor. The fresh water is said to be good for boiler purposes. Coal can be obtained in small quantities. A large supply of coal is kept on hand at Bay Harbor for the use of the paper mill but there are no facilities for loading sufficient quantities to be used for bunker coal. Provisions are available in large quantities. Ship chandlery and yacht supplies can be obtained in limited quantities.

Repairs.—Minor repairs to small vessels can be made at Massalena Bayou, Panama City, where there are marine ways of about 60 tons capacity. At Millville there are ways capable of hauling vessels up to 160 feet in length and a draft of 9 feet (2.7 m) forward and 12 feet (3.6 m) aft. Some machine repairs can also be made.

Wharves.—Bay Harbor is the principal loading port for large vessels. A depth of 24 feet (7.3 m) can be carried to the wharf here. Depths of 6 to 10 feet (1.8 to 3.0 m) can be carried to the wharves at Millville on Watson Bayou. A depth of 10 feet (3.0 m) can be carried to the wharf in Massalena Bayou below the bridge at Panama City.

Harbor master.—The harbor master assigns anchorages and berths to vessels and enforces the rules and regulations of the port. In accordance with State law he may charge 1 cent per ton upon vessels entering the port to discharge or load cargo, and one-half cent per ton for each vessel entering for bunker coal. The harbor master is stationed at Panama City.

Pilots.—Licensed pilots are stationed at Panama City. Pilotage is compulsory for foreign vessels. See extracts from the laws of Florida relating to pilotage on p. 8. Pilotage is advisable for all large vessels entering or leaving the port. Rates of pilotage are: For vessels drawing from 6 to 10 feet, $3 per foot; 10 to 14 feet, $4 per foot; 14 to 20 feet, $5 per foot; over 20 feet, $6 per foot. Since there is no radio at Panama City, pilots may be called by radio through Pensacola or Key West or by prearrangement. Pilots board vessels at the sea buoy off the dredged entrance cut.

A customs officer is stationed at Panama City. Customs officers board vessels at the anchorage midway between Red Fish Point and the beacon on Courtney Shoal. The customhouse landing is at Bay Harbor.

Quarantine.—The quarantine office is stationed at Panama City. Vessels subject to visitation are boarded at the anchorage midway between Red Fish Point and the beacon on Courtney Shoal.

Hospital.—The nearest marine hospital is at Mobile. There is a contract United States Public Health doctor and small private hospitals at Panama City.

Towboats may be had at Millville or Bay Harbor. These are small towboats used for towing barges and are too small to assist vessels in distress or to assist in docking a large vessel.

Anchorage.—Excellent anchorage can be found almost anywhere inside the bay where the depth is suitable. The usual anchorage for large vessels is off the wharves at Panama City to the northwestward of the Middle Ground in 6 or 7 fathoms (11.0 to 12.8 m). The quarantine and customs anchorage is about midway between Redfish Point and the beacon on Courtney Point Shoal.

Storm warnings (day and night) are displayed from the elevated municipal water tank at St. Andrew.

Tides.—The tides are chiefly diurnal; the average rise and fall is about 1.5 feet. Winds greatly affect the tide and frequently all traces of normal tidal action are obliterated. Long-continued southerly winds raise the water level in the bay and northerly winds lower it.

Currents.—A strong ebb current sets outward through the dredged cut and causes heavy tide rips if the wind is southerly and of moderate strength. Small vessels bound in or out, when there is a moderate southerly or westerly breeze, should endeavor to reach the entrance during flood current.

East Bay is an arm of St. Andrew Bay, extending in a general east-southeasterly direction for about 18 miles. It is from 3/8 mile to 2 1/4 miles wide, and forms part of the Intracoastal Waterway to Apalachicola. The shoal spits making off from the various points in the bay are marked by day beacons, and the dredged channel leading through the eastern part of the bay to the intracoastal canal at the mouth of **Wetappo Creek** is also marked by day beacons. **Dupont Bridge**, locally known as **East Bay Bridge**, crosses the bay at **Long Point**. The bridge has a center pier draw with a horizontal clearance of 90 feet on either side of the center pier, and a vertical clearance when closed of 14 feet (4.3 m) at mean high water. A white light is shown from the top of the bridge at the center of the draw span.

East Bay has depths of 45 to 50 feet (13.7 to 15.2 m) as far as Dupont Bridge; 15 feet (4.6 m) can be carried as far as Goose

Point and 10 feet (3.0 m) to beyond Farmdale. To the eastward of East Point there are numerous spots with 6 to 8 feet (1.8 to 2.4 m).

There are several small settlements on East Bay, none of which have any commercial importance. **Wetappo** is an abandoned post office and consists of a school and a few scattered houses, at the mouth of Sandy Creek. A depth of 3½ feet (1.0 m) can be taken through a narrow channel marked by stakes into the bayou where there is deeper water extending for approximately 3 miles to a highway bridge. **Allanton** consists of a post office, school, and a few scattered houses. **Farmdale** is a post office, school, and a few houses located on the western side of the entrance to Maddox Bayou. A depth of 4 feet (1.2 m) can be carried at mean low water through an entrance channel, marked by bush stakes, into the bayou where there is a small landing. **Bell Island** consists of a few summer cottages only. **Cook** on **Laird Bayou**, consists of a few scattered houses, some of which are unoccupied. **Callaway**, on **Callaway Bayou**, consists of a few houses only. **San Blas** consists of a few houses on the main highway. **Cromanton** is a post office with a church, school, and several houses. **Parker** is a post office with a few houses and store. **Pearl Bayou**, south of Dupont Bridge, and **Pitt Bayou** on the western side of Long Point afford good anchorage for small craft. **Parker Bayou**, on the eastern side of the settlement of Parker, is little used. **Martin Bayou** is obstructed at its entrance by a fixed wooden bridge having a horizontal clearance of 14½ feet and a vertical clearance of 6½ feet (2.0 m) at mean high water.

West Bay extends in a northwesterly direction from St. Andrews Bay, and is generally free from dangers except for several oyster bars with depths of 7 or 8 feet (21 or 2.4 m) over them. **Hathaway Bridge**, locally known as **West Bay Bridge**, crosses the bay at **Sulphur Point**. The bridge has a center pier draw with a horizontal clearance of 75 feet on either side of the center pier, and a vertical clearance of 12 feet (3.7 m) at mean high water. A white light is shown from the top of the bridge at the center of the draw span. The abandoned settlement of **Murfee**, now but one or two houses, is located on **Burnt Mill Creek** which empties into the northern part of West Bay. There is a depth of about 8 feet (2.4 m) in the entrance to the creek, but it shoals rapidly about ½ mile from the entrance. **West Bay Creek** empties into the head of West Bay. A depth of 5 feet (1.5 m) can be carried at low water to the lumber wharf on the south side of the entrance, thence about 2 feet (0.6 m) through a narrow winding channel, marked by poles, for about 1 mile, to the fixed highway bridge at the settlement of **West Bay**. This bridge has a horizontal clearance of 33 feet and a vertical clearance of 7½ feet (2.2 m) at mean high water. There is a post office, sawmill, general store, and gasoline station at West Bay.

Twelve feet (3.7 m) can be carried to within 2½ miles of the head of West Bay and 6 feet (1.8 m) to within half a mile of the shore.

North Bay extends in a northeasterly direction from St. Andrew Bay and has a channel depth of 12 feet (3.7 m) for 5 miles to North Bay Bridge and thence about 5 feet (1.5 m) for 4½ miles to **Bay Head**, a summer resort at the head of the bay. There are several oys-

ster bars near the middle of the bay, those below the bridge having depths of 5 to 9 feet (1.5 to 2.7 m), and those above the bridge 3 to 4 feet (0.9 to 1.2 m) over them. **North Bay Bridge,** which crosses the bay near Lynn Haven ,is a wooden highway bridge having a single lift draw with a horizontal clearance of 37 feet and a vertical clearance of 4½ feet (1.4 m) at mean high water when closed.

There are several bayous making off from North Bay which afford anchorage for small craft. There is an airport on the southern bank of **Goose Bayou.** **Lynn Haven** is a town on the south side of North Bay, about ½ mile back from the shore. There is a small launch basin, protected by a wooden bulkhead and connected by road to Lynn Haven, located ¼ mile west of the bridge on the south shore of the bay. A depth of about 3 feet (0.9 m) can be carried at mean low water into the basin. **Southport,** on **Fanning Bayou,** is a post office and railroad terminal. A depth of about 6 feet (1.8 m) can be carried at mean low water to the wharf on the west side of the town.

Grand Lagoon, extending for about 4½ miles northwestward from St. Andrew Bay, is of little importance and is seldom used. A fixed highway bridge crosses the lagoon about 1½ miles from the entrance. The bridge has a horizontal clearance between piers of 17 feet and a vertical clearance of 7½ feet (2.2 m) at mean high water. A depth of 6 feet (1.8 m) can be carried to within ½ mile of the bridge, thence 2 feet (0.6 m) for about 1 mile above the bridge.

DIRECTIONS—ST. ANDREW BAY

Courses and Distances for approaching St. Andrew Bay are given on page 60 and also under **Coastwise Courses** (position No. 11).

The following courses and distances are for the bay.

The Inland Rules are to be followed inside *St. Andrew Bay Entrance Lighted Bell Buoy.*

Courses and Distances

St. Andrew Bay

For reverse direction, read upward	Course (Reverse courses in *Italics*)		Distance
	True	Magnetic	
1. St. Andrew Bay Entrance Lighted Bell Buoy:	°	*Points*	*Nautical miles*
Direct	52	NE. ¼ E	2. 9
Reverse	*232*	*SW. ¼ W*	*2. 9*
Through dredged cut marked by lights at inshore end of each jetty and by lighted buoys.			
2. Midchannel position between Buoys 7 & 10:			
Direct (Massalena Bayou ahead)	70	NE. by E. ⅞ E	1. 85
Reverse (Massalena Bayou astern)	*250*	*SW. by W. ⅞ W*	*1. 85*
Heading for drawbridge over Massalena Bayou. This course leads well clear of the shoal water extending southeastward of *Courtney Point Shoal Light*,			

Courses and Distances—Continued

St. Andrew Bay—Continued

For reverse direction, read upward	Course (Reverse courses in *Italics*)		Distance
	True	Magnetic	
3. **Redfish Point Light,** distant 0.4 mi. *Town Point Light* in range:	°	′ *Points*	*Nautical miles*
Direct (Town Point ahead)	115	ESE. ⅛ E	1.0
Reverse (Town Point astern)	*295*	*WNW. ⅛ W*	*1.0*
Heading for Town Point (not the light). Passing 125 yards off *Redfish Point Light,* and avoiding the shoal water off the Middle Ground lying 300 yards northeastward of the light.			
4. **Redfish Point Light,** distant 0.5 mi. *Courtney Point Shoal Light* about on range:			
Direct (Palmetto Point ahead)	144	SE. ½ S	.5
Reverse (Palmetto Point astern)	*324*	*NW. ½ N*	*.5*
Heading for Palmetto Point and avoiding shoal water off the point southeastward of Redfish Point and also off *Town Point Light.*			
5. **Town Point Light** abeam (on above course), bearing 54° true (NE. ½ E. mag.), distant 300 yards:			
Direct (Military Point ahead)	104	E. ⅞ S	1.0
Reverse (Military Point astern)	*284*	*W. ⅞ N*	*1.0*
Heading for Military Point.			
6. **Bay Harbor Shoal Light** abeam (on above course), bearing 14° true (N. ⅞ E. mag.), distant 600 yards:			
Thence haul northward for the wharf at Bay Harbor.			

Directions, through East Bay to Wetappo Creek.—Day beacons mark the principal shoals protruding off the points through East Bay and courses passing outside these beacons lead through good water. Fifteen feet (4.6 m) can be carried as far as Goose Point and 10 feet (3.0 m) to beyond Farmdale, but there are spots with 6 to 8 feet (1.8 to 2.4 m) to the eastward of East Point.

Bn. 59.—Give a berth of 200 yards to avoid a 6-foot (1.8 m) spot outside the beacon.

Bn. 57.—Pass 150 yards to the eastward of.

Bn. 4.—Pass 200 yards west and south of. There is a spit, with 1 foot (0.3 m) of water over it, extending off the first point to the northwestward of Bn. No. 4. The course leads about 100 yards off this spit and there are several 5-foot (1.5 m) shoals lying about 100 yards southwestward of the course opposite the spit. The channel is deep but less than 200 yards wide here.

Bn. 55.—Pass 175 yards north of.

Bn. 2.—Pass 400 yards south of and 200 yards southeast of.

Bns. 53 to 1.—These pile beacons mark the east side and the south side of the channel leading into Wetappo Creek and the Inland Waterway to Apalachicola.

18. ST. ANDREW BAY TO PENSACOLA BAY

(Charts 184, 185, and 1265)

For 94 miles westward of St. Andrew Bay to Pensacola Bay the shore line is a gently curving sand beach, unbroken except at the entrance to Choctawhatchee Bay, 50 miles westward of St. Andrew Bay entrance. Except at the entrances to the bays the beach is steep-to and can be approached closely, and there are no outlying dangers. A slightly elevated wooded knoll, locally known as **Topsail Bluff**, stands 8 miles eastward of the entrance to Choctawhatchee Bay and can be seen for several miles, especially by vessels near the coast.

Choctawhatchee Bay is 25 miles long and averages 3 miles in width. It lies nearly parallel to the coast line, and is separated from the Gulf by land varying in width from one-fourth mile to about 4 miles. The depths of water in the bay decrease gradually from west to east, there being 18 to 25 feet (5.5 to 7.6 m) over the western two-thirds, except near the shores, and a depth of 9 feet (2.7 m) at the eastern limit of the bay. The bay and its tributaries have considerable traffic with Pensacola in lumber and naval stores. There is good highway connection to Pensacola and Panama City on both the north and south shores of Choctawhatchee Bay.

Choctawhatchee Bay Entrance (New Pass Channel), between Moreno Point and Santa Rosa Island, affords entrance from the Gulf into the western part of Choctawhatchee Bay. From close offshore it is easily identified by the tall fixed highway **bridge** crossing the channel just inside the east point of Santa Rosa Island. The vertical clearance at the highest part of the bridge is 38 feet (11.6 m) at mean low water, with a horizontal clearance of 75 feet. The entrance is marked by a lighted buoy and two channel (not range) lights.

Directions, Choctawhatchee Bay.—In 1935 there was 6 feet (1.8 m) on the bar just inside *Choctawhatchee Bay Entrance Lighted Buoy*. If entering without assistance, head about one-fourth mile east of the east point at the entrance and gradually veer to the westward passing close-by to the westward of *Choctawhatchee Channel Light 2* and through the center of the high span of the bridge. Generally the channel can be followed either by the breakers or by the color of the water, deeper where it is darker. The channel is subject to change.

From the bridge, head due north, 0° true (N. ½ W. mag.), for a distance of about one-third mile, heading 300 yards to the eastward of *Choctawhatchee Channel Light 1* and passing less than 200 yards off the western end of Moreno Point. Then veer to westward heading 150 yards to the eastward of the light and continue this course for one-half mile beyond the light which will lead into the deep water of the bay.

If going to the northern or eastern part of Choctawhatchee Bay, pass one-fourth mile or more outside of *Cobbs Point Light* to avoid the shoal off the west point at the entrance to **Jones Bayou**; thence use the chart as a guide to any part of the bay.

If going to Garnier Bayou, head half a mile south of **Black Point.** Fixed bridges, each with vertical clearance of 24 feet (7.3 m) at mean high water cross Garniers Bayou and Five Mile Bayou.

If going to Santa Rosa Sound steer 255° true (WSW. ¼ W.) to a position on the *Santa Rosa Sound Lighted Range* and about a third of a mile east of *Choctawhatchee Bay Beacon 1.* The reverse direction on this course should clear Cobbs Point by about 400 yards. See page 171 for Directions through Santa Rosa Sound.

East Pass, the former entrance to Choctawhatchee Bay, lies about 1¼ miles east of the present entrance to the bay. In 1935 this pass was nearly closed.

Choctawhatchee River, emptying into the eastern end of Choctawhatchee Bay has a depth at ordinary low water of 4½ feet (1.4 m) for 24 miles to the entrance to Holmes River which may be regarded as the head of navigation. The mouth of the river is through Cypress Top Outlet which has a controlling depth of 4 feet (1.2 m) and is marked at the outer end by a fixed white light. A launch makes tri-weekly trips between Santa Rosa Sound points and the Choctawhatchee River but proceeds only about 3 miles up the river.

Freeport is a post office and small town on **Fourmile Creek** which empties into **LaGrange Bayou.** It has communication by telegraph and improved State highway to all parts of the State. There is a controlling depth of 4½ feet (1.4 m) through LaGrange Bayou, [project depth 9 feet (2.7 m)] to Fourmile Creek which deepens to about 9 feet (2.7 m). Gasoline, fresh water, and provisions can be obtained here. A free ferry operates between Freeport and Port Washington at the southeast head of Choctawhatchee Bay.

A light marks the west side of the entrance to LaGrange Bayou.

Niceville is a small town and summer resort at the head of Boggy Bayou. The entrance to the bayou is marked by a fixed white light on the west side of the channel off Boggy Point. The bayou is deep and a draft of 8 feet (2.4 m) can be easily carried through the middle of the bayou to the wharves at Nicetown. Gasoline, fresh water, ice, and provisions can be obtained here, and there are facilities for making repairs to vessels up to about 65 feet long and about 9 feet draft. There is telephone, telegraph, and improved State highway connection with all parts of the State.

Valparaiso, on **Tom Bayou** which is a branch of Boggy Bayou, is a post office and summer resort. Gasoline, fresh water, provisions, and some yacht supplies can be obtained. There is a marine ways capable of hauling out boats up to 9 feet (2.7 m) in draft and 75 feet in length. Some machine repairs can also be made. A draft of 10 to 12 feet (3.0 to 3.7 m) can be taken to the warves here. **Storm warnings** (day only) are displayed in the public square.

There is triweekly boat service between Pensacola and Freeport, Nicetown, and Valparaiso.

Portland on **Alaqua Bayou, Santa Rosa** on **Hogtown Bayou, Bolton** on **Rocky Bayou, Destin** on Moreno Point, and **Garnier** on Garnier Bayou are post offices and small fishing villages. There is no regular boat service to these towns. A free ferry operates between Freeport and Port Washington at the head of Choctawhatchee Bay.

Santa Rosa Sound and its eastern continuation, known as **The Narrows,** together constitute a connecting waterway between Choctawhatchee Bay and Pensacola Bay. They lie parallel to the coast, just back of a narrow strip of beach known as Santa Rosa Island, and have a combined length of 33 miles. The width varies from

1¾ miles in the widest part of the sound to 250 yards in the narrowest part of **The Narrows.** The western part of the sound, including the entrance from Pensacola Bay, has a depth of 15 feet (4.6 m) or more in a narrow channel; the eastern half of the sound, The Narrows, and the approach from Choctawhatchee Bay have been dredged where necessary to give a least depth of 7½ feet (2.3 m) in the channel. The project dimensions for the channel through the sound are 100 feet wide by 9 feet (2.7 m) deep.

The channel is marked by beacons, lights, and lighted ranges, and by careful attention to the sailing directions and a sharp lookout for indications of shoals, a depth of about 7½ feet (2.3 m) could be carried through in 1935.

The deeper water through the sound is generally indicated by the color. The shoals are mostly white sand and show very light, almost white. Depths of less than 12 feet (3.7 m) show light green; the lighter the green, the shoaler the water. Depths of more than 12 feet (3.7 m) show quite dark green in contrast with the lighter green of the shoaler areas.

Two swing bridges cross Santa Rosa Sound; one just east of Fort Walton having a horizontal clearance of 80 feet and a vertical clearance above high water of 14 feet (4.3 m); and one near Pensacola, over the west end of the sound, having a horizontal clearance of 100 feet and a vertical clearance of 13 feet (4.0 m) above high water.

Fort Walton is a post office and summer resort. There is a hotel and general store here. Gasoline, fresh water, and provisions can be obtained. About one-half mile westward of the town is a slipways where small launches can be hauled out.

Storm wornings (day only) are displayed at Fort Walton.

Mary Esther and **Florrosa** are post offices and small summer resorts on the north shore of The Narrows.

There is tri-weekly boat service between these towns on Santa Rosa Sound and Pensacola and the towns on Choctawhatchee Bay.

Directions, Santa Rosa Sound.—The distance through this passage from the highway bridge at Fort Walton to *Deer Point Light* is 31 miles. In 1935 the controlling depth was 7½ feet (2.3 m).

Approach the dredged cut 1½ miles eastward of Fort Walton with *Santa Rosa Sound Lighted Range* ahead, steering 268° true (W. ½ S. mag.) and passing close-by to the northward of Choctawhatchee Bay Bns. 1 and 3. This range heads just a trifle to the south of the center of the highway bridge.

The range lights and Bn. 1 are on the point on the south shore just east of the bridge. Round this point at 50–60 yards. There is shoal ground to the northward.

After passing through the draw, pass between Bns. 2 and 3 and follow along the north shore at 50–75 yards off, till approaching Bn. 4.

Bn. 4.—Pass 100 yards or less to south of.

Hurricane Crossing Lighted Range.—Cross, on the range, from the north side to the south side of The Narrows, avoiding a 5-foot (1.5 m) spot to the northwest of the front range light. Course 235° true (SW. ½ W. mag.).

For about one-third mile west of the front range light (Hurricane Crossing), pass about 50 yards off the points along the south shore

and continue westward at 75–100 yards off the south shore, till approaching Bn. 6.

Bns. 6 and 8 mark a dredged cut. Pass 50 to 60 yards southwest of. Continue to within about 50 yards of the point west of the cut, then gradually haul over to the north shore, avoiding the shoal area off the north side of the point. Keep 75–100 yards off the north shore till half way to Bn. 10, and then increase the distance off-shore.

Bn. 10.—Pass 50–60 yards south of.

Bn. 5.—Pass 50 yards north of.

Bn. 7.—Pass 50 yards north of this beacon and then head southwestward to a position about 400 yards west of the front range light. Avoid a 5-foot (1.5 m) spot between the front light and Bn. 7.

Circle Crossing Lighted Range.—Follow this range from the position about 400 yards west of the front range light, till approaching Bn. 12, passing north of a spoil bank. Course 273° true (W. ⅛ S. mag.).

Bn. 12.—Pass 50 yards south of.

Bn. 9.—Pass 125 yards north of.

Bn. 14.—Pass 75–100 yards south of. Bn. 14 marks a 3-foot (0.9 m) shoal.

Bn. 11.—Pass 50 yards north of.

Bn. 13.—Round at 75 to 100 yards and gradually head to the southward of Bn. 16.

Bn. 16.—Round at about 150 yards.

There is deep water along the south shore from Bn. 16 to Upper Pritchard Long Point, except a 5-foot (1.5 m) shoal reaching 125 yards off the point one-fourth mile southwest of Bn. 16 (keeping north of the range Bn. 13—Bn. 16 will clear) and a 3-foot (0.9 m) shoal reaching 100 yards to the northwestward off Manatee Point. Keep about 150 yards off these points.

Upper Pritchard Long Point Light.—Round this light at 175–200 yards.

In the bight between the Pritchard points, the deep water is well north of the center line of the sound. Favor the north shore keeping 700–800 yards off.

Lower Pritchard Long Point Light.—Round at about 50 yards. The shoalest depth through the narrows is usually off this point.

Westward of the light, head northwestward into deeper water (18 to 20 feet; 5.5 to 6.1 m), and when about 500 yards off the north shore continue along shore at about this distance, heading first a little to the north and later (when about 1 mile distant) a little to the south of *Williams Creek Shoal Light 2.*

Williams Creek Shoal Bn. 1.—Pass 40 yards north of.

Williams Creek Shoal Light 2.—Pass 30 yards south of.

Williams Creek Shoal Bn. 2.—Pass 30 yards south of.

Williams Creek Shoal Light 4.—Pass 30 yards south of.

Williams Creek Shoal Bn. 3.—Pass 30 yards north of.

West of Bn. 3, keep ⅓ to ½ mile off the north shore, to the draw bridge east of Deer Point. At a point 5½ miles west of this beacon, shoal ground reaches one-half mile offshore.

After passing through the draw bridge, pass 200 yards south of *Deer Point Light* and steer west-northwestward into Pensacola Bay.

If continuing westward from Pensacola Bay through the Intracoastal Waterway, steer 266° true (W. 1/8 N. mag.) for 2.7 miles from the position south of *Deer Point Light* to *Pensacola Bay South Flats Buoy 2*, passing south of *North Flats Buoy 1* en route. From *South Flats Buoy 2* steer 257° true (WSW. 1/2 W. mag.) for 1.9 miles to a position on the Pensacola Bay Range about 300 yards south of the *Navy Yard Outer Bank Lighted Bell Buoy 19*. Then follow the Pensacola Bay ship channel to a position off the west end of Santa Rosa Island. The entrance to the Intracoastal Waterway is about 300 yards south of the *Caucus Cut Front Range Light*.

Directions, St. Andrew Bay to Pensacola Bay (for smaller vessels).—Directions for St. Andrew Bay are given on page 167 and for Pensocola Bay on page 179.

The coastline between St. Andrew Bay and Pensacola Bay is broken at but one point, viz, the entrance to Choctawhatchee Bay. Except at the entrances to the bays, deep water is found close in to the beach and depths of less than 3 fathoms (5.5 m) rarely over one-fourth mile off. For this reason the sea rolls in with undiminished strength, and breaks heavily on the shore when driven by southerly winds. Small craft bound westward from St. Andrew Bay should wait for favorable weather and should not put out until there are strong indications of light air or moderate northerly breezes for a period long enough to make the next port. The distance to the first port, New Pass, is 43 miles, but the distance to the nearest that a stranger may hope to enter successfully after the sea has risen is 41 miles farther, 84 miles from St. Andrew Bay.

From *St. Andrew Bay Entrance Lighted Bell Buoy*, a course 292° true (WNW. 3/8 W. mag.) for 42.5 miles will lead to *Choctawhatchee Bay Entrance Lighted Buoy;* or the coast can be followed, at a distance of about a mile, between the two buoys.

Directions for Choctawhatchee Bay are given on page 169 and for Santa Rosa Sound on page 171.

If continuing outside, a course 261° true (WSW. 7/8 W. mag.) for 41 miles leads from *Choctawhatchee Bay Entrance Lighted Buoy* to *Caucus Cut Entrance Lighted Whistle Buoy 1A* off Pensacola Bay entrance. Or the coast can be followed at a distance of about a mile until abreast the Coast Guard station 2 miles east of the entrance to Pensacola Bay. From there, a least depth of 10 feet (3.0 m) can be carried into the bay by following the shore of Santa Rosa Island. Cross East Bank at a distance of about one-third mile offshore and reduce the distance offshore to about 350 yards when rounding the west end of Santa Rosa Island. This will lead to *Fort McRee Range Turn Lighted Bell Buoy 14* off the west end of Santa Rosa Island. But if the sea is rough, it is safer to make *Caucus Cut Lighted Bell Buoy 2* and thence enter through the dredged Caucus Channel.

19. PENSACOLA BAY AND PENSACOLA

(Charts 413, 490, and 1265)

Pensacola Bay lies 106 miles west-northwestward from Cape San Blas, 80 miles westward from St. Andrew Bay entrance, 123 miles northeastward of South Pass, Mississippi River, and 40 miles east-

northeastward from Mobile Bay entrance. The bay is about 12½ miles long, 2½ miles wide, and easy of access either day or night. It is the approach to several towns and the city of Pensacola; to Escambia and East Bays, making northward and eastward, respectively, from its eastern end; and to Santa Rosa Sound. Pensacola Bay is one of the important harbors on the Gulf coast, having a considerable foreign and coastwise trade in cotton, chemicals, lumber, naval stores, and general merchandise; steamers also call here for bunker coal. It affords excellent shelter and anchorage, and in winter is frequently used by coasting vessels as a harbor of refuge.

The entrance to Pensacola Bay is three-fourths mile wide and partly obstructed by shoals extending 1½ miles seaward. **East Bank,** with 13 to 18 feet (4.0 to 5.5 m) over it, extends 1 mile southward of the western part of Santa Rosa Island. **Caucus Shoal,** with depths of 2 to 18 feet (0.6 to 5.5 m), extends 1½ miles from the point on the western side of the entrance. **Middle Ground** is between the two and has depths of 9 to 18 feet (2.7 to 5.5 m) over it. All the shoals are shown on the charts.

Caucus Channel, the entrance channel, has been dredged between Caucus Shoal and the Middle Ground. It is well marked by buoys, lighted buoys, and *Caucus Cut Lighted Range.* The channel is 500 feet wide and in 1935 had a controlling depth of 32 feet (9.8 m).

During favorable weather a draft of about 10 feet (3.0 m) can cross East Bank, about ⅓ mile offshore and continue into the bay, about the west end of Santa Rosa Island, about 300 yards offshore.

Inside the entrance a depth of 30 feet (9.1 m) can be taken up Pensacola Bay 7½ miles to the city of Pensacola, and about 18 feet (5.5 m) to the junction with Escambia and East Bays. The lower part of the bay is free from shoals, except close to the shores, and the depths range from 20 to 40 feet (6.1 to 12.2 m). Inside the 1-fathom (1.8 m) curve, small shoals, submerged piling, piles of rock ballast, and other debris are encountered.

Just above Pensacola the bay is crossed by a highway bridge; the vertical clearance, when closed, is 15 feet (4.6 m) above high water and the swing span has a horizontal clearance of 80 feet.

Prominent features.—Twenty-eight miles east of the entrance to Pensacola Bay there is the mast of a wreck, close in alongshore. Eight miles eastward of the entrance, the water tank at the old quarantine station shows over the tops of the trees. The buildings here are also prominent when they come into view. Six and a half miles west of the entrance there is a prominent uncompleted hotel.

The wreck of the battleship *Massachusetts* lies on the point of Caucus Shoal west of the entrance to Pensacola Bay and can be seen for a distance of several miles. There are a number of prominent objects in the vicinity of the Naval Air Station which can easily be identified from the chart. These consist of lights, radio towers, elevated tanks, stacks, etc. Pensacola Lighthouse, the weather observation tower at the extreme southeast point, and a tall brick chimney about midway between, are the more easily identified.

There are numerous prominent objects about the vicinity of Pensacola which can be identified from the chart. Of these, the outstanding are the coal elevators at the end of the Frisco Lines pier and the Muscogee Wharf, the San Carlos hotel (large square-shaped building, with a tall radio mast) near the center of town, and a

group of six tall black steel stacks, all in line, just north of Bayou Chico.

Pensacola Lighthouse (Lat. 30°20′.8; Long. 87°18′.5) is a conical brick tower, lower third white, upper two-thirds black, on the north side of the west end of the bay. The light is flashing white (flash 1.4 seconds, eclipse 18.6 seconds), 191 feet (58 m) above the water, and visible 20 miles.

A United States naval air station and a naval radio station, call letters NAS, are located on the north side of the bay on the point about 2 miles above the entrance.

The entrance to **Bayou Grande** is blocked by an extensive shoal area.

Bayou Chico empties into Pensacola Bay about 1 mile west of Pensacola. The entrance channel is marked by two lights along the north side; a can buoy marks the end of the **shoal area** extending southeastward from the entrance. Two drawbridges cross the bayou just inside the entrance, each having a controlling horizontal clearance of 80 feet through the draw. In 1935 a draft of 10 feet (3.0 m) could be carried through the entrance channel and for a distance of nearly a mile along the north shore above the bridges. There are several sawmills on the bayou but the shipyard has been discontinued. Care is necessary to avoid shoals, drift logs, and other floating debris.

Pensacola and its port facilities are described on page 177.

Into **Bayou Texar** a depth of 3 feet (0.9 m) is generally maintained.

Escambia Bay extends 9 miles northward from Pensacola Bay. A little over 5 miles above its mouth it is crossed by a railroad bridge with a draw opening 85 feet wide and with a vertical clearance of 7 feet (2.1 m) at low water. The depths in the bay shoal gradually from 15 feet (4.6 m) at the mouth to 7 feet (2.1 m) 2 miles above the bridge. A depth of 8 feet (2.4 m) can be carried to the bridge and 7 feet (2.1 m) to the entrance channel into the **Escambia** and **Simpson Rivers** and a depth of 4 feet (1.2 m) can be carried through a narrow winding channel into Simpson River. The entrance to **Mulatto Bayou** is blocked by the railroad trestle.

North of Devil Point there are shoals and submerged obstructions along the western shore and this shore should not be approached closer than half a mile. There are submerged timbers awash at very low water, about ⅞ mile northwestward of *Devil Point Light* in line with the west end of the bridge. Along the direct course from the bridge draw to the mouth of the Escambia River, there is a 5-foot (1.5 m) spot on the north side about half a mile above the draw and a piling, awash at low water, on the south side about ¾ mile above the draw; these can best be avoided by proceeding north beyond the bridge for half a mile or further. About the north end of Escambia Bay, snags, drift, and other debris will be encountered. **Mulat** and **Escambia** are small settlements on the east and west shores, respectively, of the bay, just above the bridge.

Escambia River empties into the bay through several mouths, the southern of which had a controlling depth of 5½ feet (1.7 m) in 1935. About 1½ miles inside the entrance there is a swing span highway bridge, with a horizontal clearance of 75 feet. There are depths of 7 feet (2.1 m) and 5 feet (1.5 m) for distances of 9 miles and 31 miles, respectively, above the mouth of the river, the latter being the head of navigation. This river is known as the **Conecuh**

River in Alabama, the State line being 56 miles above the mouth. There is some commerce in cypress logs.

East Bay is an eastward extension of Pensacola Bay, with which it is connected by a passage ¾ mile wide between shoals. It varies in depth from 8 to 12 feet (2.4 to 3.7 m), but there are several small shoals of less than 5 feet (1.5 m) scattered over the bay. The channel through the bay is well marked; directions are given on page 176.

There is a depth of 7 feet (2.1 m) into **East Bay River** but care is necessary to avoid spots with 5 to 6 feet (1.5 to 1.8 m). Depths decrease rapidly inside the entrance and only very small boats can go up the river.

Blackwater River empties into **Blackwater Bay**, the northern arm of East Bay. A channel 9 feet (2.7 m) deep and 100 feet wide has been dredged through Blackwater Bay and River to the town of Milton, 4 miles above the mouth. In February 1936 the controlling depth through this channel was 9 feet (2.7 m). The channel through Blackwater Bay is very narrow and vessels drawing close to the maximum draft must keep to the ranges.

There are numerous wrecks, submerged piling, and other obstructions close inshore along the Blackwater River and Wright and Marquis Basins are filled with such obstructions.

Milton (population 1,466 by 1930 census) has railroad and improved State highway connections to all parts of the State. A railroad bridge and a highway bridge, both with a draw-opening of about 80 feet, cross the river here, and there is a marine railway where small boats can be hauled out and repaired. **Bagdad** is a small town about 1½ miles down the river. Gasoline, fresh water, and provisions can be obtained at both Milton and Bagdad.

Storm warnings (day only) are displayed at Bagdad.

Directions, East Bay, Blackwater Bay and River.—The channel from Pensacola Bay to Milton is well marked by buoys, beacons, lights, and lighted ranges.

Garson Point Buoy 1 and Redfish Point Buoy 2.—There are depths of 12 feet (3.7 m) or more between these buoys, the deeper water being just north of buoy 2; 18 feet (5.5 m) can be carried this far.

White Point Buoy 3.—Pass well outside this buoy.

White Point Light.—Pass just to westward of and pick up *East Bay Channel Lighted Range* to the northward. If the range cannot be picked up, it may be advisable to pass ½ mile to ¾ mile eastward of the light and then round somewhat to the eastward until approaching Middle Beacon and bring the range lights on when north of the beacon. This course will avoid 5-foot (1.5 m) spots to either side of the range about half a mile north of the light.

East Bay Channel Lighted Range.—Follow lighted range ahead passing west of Middle Beacon and of Escribano Point Beacon.

Backwater Bay Channel Lighted Range.—Follow lighted range astern, being careful to stay in the narrow channel.

Bay Point Light.—Pass 100 yards west of the light and favor the west shore to avoid a shoal in midriver which can be easily seen.

Shield Point Light.—Pass to eastward.

Above Shield Point haul slowly over to the north side of the river and enter the narrow channel. About a mile north of Shield

Point, pass to the west of the island which here divides the channel, but keep close along the island to avoid shoals on the opposite side of the river. If going to Bagdad, take the next branch to the west which will lead to the wharves at Bagdad. If going to Milton, continue in the main channel, keeping about in midstream, to the wharves above the drawbridges.

Santa Rosa Sound is described on page 170.

Big Lagoon is a body of water about 5 miles long and from ¼ to 1 mile wide, extending westward from Pensacola Bay at the entrance. There is a channel 9 feet (2.7 m) deep through this lagoon connecting Pensacola and Perdido Bays. Two piles barely awash are about 800 yards west of Langley Point, in latitude 30°19′03″ N., longitude 87°22′05″ W.

Big Lagoon is separated from the Gulf by a narrow strip of sand beach so low in places that the sea washes over it during tropical storms.

Pensacola (population 31,579 by the 1930 census) is an important commercial city 7½ miles above the entrance of Pensacola Bay. It is a seaport terminus for the Louisville-Nashville Railroad and the St. Louis-San Francisco Railway both of which lines have facilities for handling coastwise and foreign trade. The principal articles of coastwise trade are petroleum products, chemicals, and naval stores, and of foreign trade are coal, lumber, naval stores, and chemicals.

From the deep water of the bay there are three approach channels, with a controlling depth of 30 feet (9.1 m), leading to the principal piers and wharfs at Pensacola. The most easterly of these leads to the Muscogee coaling wharf and is marked by a lighted range and by a lighted buoy at the entrance. From the most westerly, a depth of 26 feet (7.9 m) can be carried to the oil dock on the west side of town and about 18 feet (5.5 m) to the drydock yard just east of the oil dock. About 15 feet (4.6 m) can be carried to the remaining piers and wharfs.

An inner harbor channel with 30 feet (9.1 m) or more parallels the pierhead line from off the Frisco Lines' piers to off the L. & H. wharves at Tarragona St.

About 10 feet (3.0 m) can be carried into Bayou Chico.

The main slip at the naval air station has a general depth of about 25 feet (7.6 m) but in 1935 only about 19 feet (5.8 m) could be taken alongside.

Terminal Facilities.—There are 13 piers and wharfs at Pensacola having a total linear frontage of nearly 29,000 feet with depths alongside ranging from 10 to 30 feet (3.0 to 9.1 m). Six of these are used for loading lumber, general cargoes, and naval stores, two for coal, one for oil, and two for fishing vessels. With the exception of the two fishing wharves, they all have rail connections; four have transit sheds, and most cargo is handled directly from or to cars or sheds.

The seven principal piers and wharves are owned by the Louisville & Nashville Railroad Co. and the Frisco Lines. Both lines have some mechanical facilities for handling lumber and general cargo, and extensive facilities for handling coal. The Palafox Street Wharf, just west of the L. & N. R. R. Co. wharves, is owned and operated by the city. It is used chiefly for harbor tugs, coastwise vessels, and fishing smacks.

Pensacola has no storage warehouses at shipside, but there are five warehouses located a short distance back of the piers.

Anchorages.—Good anchorage can be found in all parts of the bay except southward of the naval station. The usual anchorage is off the city of Pensacola where the holding ground is good and vessels can ride out any gale. Vessels should not anchor within the cable areas crossing the entrance to the south and west of the Naval Air Station; these are shown on the chart.

Pilots and pilotage.—Pilotage is compulsory for vessels in foreign trade and for other vessels, except when having on board a pilot licensed by the United States Steamboat Inspection Service. For pleasure craft and Government-owned vessels (except Shipping Board steamers), the taking of a pilot is optional with the master of the vessel. Pilotage is also optional for vessels drawing 6 feet of water or less, if such vessels have a coastwise license. For further particulars see extracts from the laws of Florida relating to pilotage on page 8.

The pilotage charges are as follows:

	Per foot of draft.
Vessels with less than 6 feet draft	$2
6 feet and under 10 feet	3
10 feet and under 14 feet	4
14 feet and under 20 feet	5
20 feet and over	6

Approximately half rates apply for loading bunker coal or coming to drydock under competitive bids.

Pilots can always be had by making signals outside the bar or by radio or telegram. The pilots have a lookout station about 1 mile east of Pensacola Lighthouse and use a small tugboat to meet vessels outside of *Caucus Cut Entrance Lighted Whistle Buoy 1 A*. The entrance channels are well lighted and vessels are taken in at night.

Towboats can always be found at Pensacola for towing over the bar or up any of the bays.

The **harbor master** assigns anchorage and berths and enforces the rules and regulations of the port. Harbor master fees include a charge of $25 for moving in and out of berth and $10 for moving from dock to dock.

Quarantine.—Vessels subject to quarantine inspection are boarded in the stream off Pensacola. Fumigation is performed at Pensacola.

Customs and Immigration.—The offices of both the customs and immigration services are located in the Customhouse at Palafox and Government Streets.

Supplies.—An unlimited supply of fresh water, suitable for drinking or for boiler use, is available at all the piers and water can be delivered to vessels in the stream. There are oil-bunkering facilities with a capacity of 750 barrels per hour, and each of the railroad coaling tipples has a capacity of 600 tons per hour. Provisions and ship-chandlery supplies (in limited quantities) can be obtained.

Repairs.—There is a 6,000-ton floating drydock at Pensacola of the following general dimensions: 380 feet over keel blocks, 74 feet between wings, and 20 feet (6.1 m) of water over the blocks. There are facilities for making all kinds of repairs to hull and machinery of steel and wooden vessels. The largest marine railway has a capacity of 100 tons and can haul out vessels up to 85 feet long, and 9-feet

draft (7½ feet forward). There are limited wrecking and salvage facilities.

Storm warnings (day and night) are displayed from the American National Bank Building in Pensacola, where they can be seen from the harbor and also from a 250-foot tower at the Navy Yard. Day signals are also displayed on Santa Rosa Island at Pensacola Bay entrance.

Hospital.—A relief station and contract hospital of the United States Public Health Service is located at Pensacola. The nearest marine hospital is at Mobile.

Small Boat Facilities.—The principal berths for small boats are at the smaller wharves between the railroad piers, particularly between Baylen and Palafox Streets. There is good storm anchorage for depths up to 10 feet (3.0 m) in Bayou Chico and for depths up to 4 feet (1.2 m) in the bayou to the westward of the south end of the bay bridge. Gasoline is delivered by tank wagons on the wharves. There are good facilities for repairing and hauling out small boats.

Communications.—Pensacola is a seaport terminal of both the Louisville & Nashville Railroad Co. and the Frisco Lines. Two main State highways run to the eastward and one each to the north and to the west. There is coastwise steamer connection with New Orleans, Mobile, Panama City, and Apalachicola and small-boat communication with Santa Rosa Sound and Choctawhatchee Bay points. There are regular sailings to the Atlantic coast and to European, Mediterranean, and South American ports.

There is a United States Navy radio station at the Naval Air Station; the call letters are NAS. There are two United States Navy airports and one municipal airport.

A **meteorological table** for Pensacola is given in the Appendix.

The Port Series, volume No. 3 (Part 2) gives further detailed information regarding the port of Pensacola. See page 4.

A **Coast Guard Station** is located on the south side of Santa Rosa Island, 2½ miles eastward of the entrance to Pensacola Bay.

Tides.—Daily predictions of the times and heights of high and low water are given in the Tide Tables, Atlantic Ocean. Northerly winds sometimes lower the water surface 1½ feet and abnormal southerly winds raise it the same amount.

Currents.—The currents have considerable velocity on the bar at the entrance. In **Caucus Cut,** for 2 hours at the strongest of the ebb, the normal current has a velocity of 2 to 2½ knots, setting southwestward diagonally across the channel. The flood has less velocity and sets northeastward. Elsewhere the currents follow the general direction of the channel. The flood has greater velocity following a norther than at other times.

Winds.—Northers occur occasionally during the winter. They have little effect on the shipping at anchor in the harbor, except to lower the water.

Fog.—From January to April there is considerable hazy or misty weather; usually southerly winds bring it in and northerly winds clear it away.

DIRECTIONS, PENSACOLA BAY

Vessels approaching Pensacola Bay by day and not sure of their position can easily tell by the appearance of the land, when about 4

miles off, whether they are eastward or westward of the entrance. Eastward for a distance of 40 miles **Santa Rosa Island** presents a white sand beach and low, white sand hills with scattered clumps of trees and bushes; back of this, on the mainland, are thick woods. Westward of the entrance, for a distance of 40 miles, the shore is low and thickly wooded nearly to the water, showing no breaks and very few hillocks. The lead, too, will indicate whether a vessel is east or west of the entrance, the 10-fathom (18.3 m) curve approaching the coast very much more closely eastward than it does westward of the entrance. Depths of 10 fathoms (18.3 m) or less, 3 miles or more from the beach, indicate that a vessel is off the entrance or westward of it.

At night or in thick weather it is well for a vessel not sure of her position to keep in at least 12 fathoms (22 m) until the lighthouse is sighted or the position is otherwise determined.

Courses and Distances for approaching *Caucus Cut Entrance Lighted Whistle Buoy 1A* are given on page 60 and also under **Coastwise Courses** (Position No. 12).

The following Courses and Distances lead into Pensacola Bay from *Caucus Cut Entrance Lighted Whistle Buoy 1A:* The Inland Rules apply.

Courses and Distances

Pensacola Bay

For reverse direction, read upward Abbreviations: Ft., Fort; and Lt., Lighted	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. **Caucus Cut Entrance Lt. Whistle Buoy 1A:**			
Direct (Caucus Cut Lt. Range ahead).	341	NNW. ⅛ W	2. 6
Reverse (Caucus Cut Lt. Range astern)	*161*	*SSE. ⅛ E*	*2. 6*
Through dredged entrance channel, marked by buoys on either side.			
2. **Caucus Cut Lighted Bell Buoy:**			
Direct (Ft. Barrancas Lt. Range ahead).	11	N. ⅝ E	0. 8
Reverse (Ft. Barrancas Lt. Range astern).	*191*	*S. ⅝ W*	*0. 8*
3. **Ft. McRee Range Turn Lt. Bell Buoy 14:**			
Direct (Ft. McRee Cutoff Lt. Range astern).	59	NE. ⅞ E	0. 5
Reverse (Ft. McRee Cutoff Lt. Range ahead).	*239*	*SW. ⅞ W*	*0. 5*
4. **Intersection Ft. McRee Cutoff and Pensacola Ranges:**			
Direct (Pensacola Bay Lt. Range astern)	103	E. ¾ S	1. 5
Reverse (Pensacola Bay Lt. Range ahead)	*283*	*W. ¾ N*	*1. 5*
This course leads close along the north shore of Santa Rose Island; avoid getting south of the range.			
5. **Navy Yard Outer Bank Lt. Bell Buoy 19:**			
Direct (Heading for Fair Point Light).	53	NE. ⅜ E	2. 6
Reverse (Fair Point Light astern)	*233*	*SW. ⅜ W*	*2. 6*
Crossing Pensacola Bay.			

Courses and Distances—Continued

Pensacola Bay—Continued

For reverse direction, read upward Abbreviations: Ft., Fort; and Lt., Lighted	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
6. **Fair Point Lt.** bearing 53° true, distant 1.1 mile:	°	*Points*	*Nautical miles*
Direct (Heading Muscogee Wharf Elevator).	27	NNE	1.9
Reverse (Muscogee Wharf Elevator astern).	*207*	*SSW*	*1.9*
Passing between *Fair Point Lt. Bouy 1* and *Fair Point Shoal Buoy 16.*			
7. **Off Frisco Lines piers:** Proceed to piers or anchorage as desired.			

20. PERDIDO BAY

(Chart 1265)

Perdido Bay is an irregular shaped body of water of from 7 to 12 feet (2.1 to 3.7 m) depth, connected by **Bay La Launch** with **Wolf Bay,** a narrow tributary extending westward. Perdido Bay and **Perdido River,** entering the bay from northward, form part of the boundary between the States of Florida and Alabama. A fixed highway bridge crosses the bay at Cummings Point; it has 40 feet horizontal clearance and 13 feet (4.0 m) vertical clearance at mean low water. The Intracoastal Waterway between Pensacola Bay and Mobile Bay crosses the southern end of Perdido Bay; *Lights 59 and 6* along this inside route are located off the north point of **Ono Island** and off **Ross Point,** respectively.

Perdido Bay is connected with the Gulf by a narrow inlet 11½ miles westward of Pensacola Bay entrance and 28½ miles eastward of Mobile Bay entrance. At a distance of 1 mile from the shore the entrance is not easily distinguished, and there are no marks which a stranger would recognize. In 1935 there was a depth of about 7 feet (2.1 m) through this inlet and through Bayou St. John into Perdido Bay. This channel is narrow and subject to change and should only be attempted with local knowledge. Old River cannot be entered from this inlet or from Bayou St. John.

21. INTRACOASTAL WATERWAY, PENSACOLA BAY TO MOBILE BAY

(Charts 1265 and 1266)

This inside route provides safe passage through protected waters from Pensacola Bay to Mobile Bay. It extends through Big Lagoon, Perdido Bay, Bay La Launch, Wolf Bay, Portage Creek, Bon Secours River, and Bon Secours Bay. It is partly through natural waterways, which have been improved where necessary by dredging

and partly through connecting canals. The project dimensions are 9 feet (2.7 m) deep by 100 feet wide and in January 1936 there was a controlling depth of 9 feet (2.7 m) through the waterway with depths of 13 feet (4.0 m) into Big Lagoon at the east end and 10 feet (3.0 m) into Oyster Bay at the west end. Three pontoon swing bridges across the canals on highways leading to Pensacola Beach, Orange Beach, and Gulf Shores, respectively. These bridges have a minimum clearance of 94 feet.

The distance is 40 miles from the Pensacola Bay entrance to the waterway to *Mobile Channel Light 8* on the Mobile Bay Channel.

The approximate water distance between the cities of Pensacola and Mobile via this waterway is 72 miles.

Directions, Intracoastal Waterway, Pensacola Bay to Mobile Bay.—The eastern entrance to this section of the Intracoastal Waterway is through a dredged cut from Pensacola Bay into Big Lagoon, marked along the south side by a light at either end of the cut and by four intermediate day beacons. Pass 50–60 yards north of the beacons. Through Big Lagoon, favor the north shore as there are extensive shoals reaching off the south shore. Pass about 300 yards south of Trout Point on the north shore and continue about the same course to near the west end of the lagoon. In the western portion of the lagoon, 1.1 miles east of Light 13, there are two submerged pilings, generally marked by a small black buoy which should be passed to the northward.

Light 13.—Round 100–200 yards to north and west, keeping 300–400 yards offshore.

Bn. 2.—Pass 50–150 yards east of.

Bns. 15–33 (15, 27 and 29 lighted).—Pass 30–50 yards north of. For maximum draft, watch the water as the channel is narrow. There is shoal water near the channel between Bns. 31 and 33.

Bns. 33 to 35.—A canal section; canal crossed by a pontoon swing highway bridge near the eastern end.

Bns. 35 to 49 (41 and 49 lighted).—Pass 35–50 yards north of. There is shoal water on south side of channel just west of Bn. 37.

Light 4.—Pass 35–50 yards south of.

Bns. 51 to 59 (51, 57, and 59 lighted).—Pass 35–50 yards north of.

From Light 59 to Light 6, the channel passes through the entrance to Perdido Bay. Shoals extend to the south and west from Inerarity Point and to the north and east from Mill Point. Although there is a depth of 9 to 10 feet (2.7 to 3.0 m) between these beacons, the best water favors the shore opposite the shoals.

Light 6.—Pass 35 to 50 yards to southwest. Continue along north shore to next point to westward (about ⅓ mile) and then gradually round to southward. There is shoal ground on the south side of the channel opposite Light 6.

Light 8.—Round at about 50 yards and keep about 200 yards off Hatchet Point.

Light 61.—Round at 100 to 200 yards.

Light 10.—Round at 100 to 200 yards, keeping about 400 yards off Sapling Point.

Bns. 63 to 89 (63 lighted) mark the channel across the south end of Wolf Bay and into Portage Creek and the canal to Oyster Bay. Pass 35 to 50 yards north of these beacons. There is shoal ground just east of Bn. 79 on the south side of the channel.

Near the midway point of the canal there are two pontoon swing highway bridges.

Bns. 91 to 121 (91, 95, 105, and 119 lighted).—These beacons mark the route across the north end of Oyster Bay and out the Bon Secours River into Bon Secours Bay. Pass 30 to 50 yards north and east of (west of, from Bn. 113 to Bn. 121) these beacons, being careful to avoid shoal ground off Bns. 107 and 109.

Lights 12 and 14 mark the U turn in the Bon Secours River channel. Pass 50–60 yards south of these beacons, about midway between them and the black beacons on the opposite side of the channel.

Bns. 123 to 223 (123 and 223 lighted) mark a straight east and west channel across Bon Secours Bay into Mobile Bay. These beacons are spaced about 1,000 feet apart and should be passed about 50–60 yards to the northward. The westward course is 270° true (W. ½ S. mag.) and the eastward course is 90° true (E. ½ N. mag.). The distance is 8¼ miles.

From *Light 223* to *Mobile Light 8*.

Direct course, 281° true (W. ½ N. mag.).

Reverse course 101° true (E. ½ S. mag.).

Pass south of Light 8. Distance 6¼ miles.

For information regarding the Intracoastal Waterway from Mobile Bay to New Orleans see page 211.

22. MOBILE BAY AND MOBILE

(Chart 1266)

Mobile Bay lies 40 miles westward of Pensacola Bay entrance and 90 miles northeastward of the South Pass of the Mississippi River. It is the approach to the city of Mobile and to the Alabama and Tombigbee Rivers, the two most important streams in the State of Alabama. The lower part of the bay is a good anchorage and harbor of refuge and is easy of access either day or night when the sea is not breaking on the bar. The entrance to the bay has a width of 2¾ miles between Mobile Point on the east and the eastern extremity of Dauphin Island on the west, but it is largely filled with shoals extending 4 miles offshore.

Air photo compilations are available for the coastal area between Apalachee Bay and Mobile Bay; see page 2.

Main Ship Channel, with a depth of 36 feet (11.0 m), leads between **Southeast Shoal** and **Mobile Point** on the east, and **Sand Island Shoal** and **West Bank** on the west, up to the lower anchorage. Across the bar it has a depth of 21 feet (6.4 m) or more in a natural channel width of one-half mile, and a depth of 36 feet (11.0 m) in a dredged channel 450 feet wide. Inside the bar the depths in the channel increase to as much as 60 feet in places, with a least width of one-fourth mile between the shoals which rise abruptly from the deep water of the channel. The channel is marked by *Mobile Entrance Lighted Whistle Buoy*, by four lighted buoys and *Mobile Point Lighted Range* across the bar, by Sand Island Lighthouse and by additional buoys (lighted and unlighted) into Mobile Bay Channel.

From westward, small boats drawing up to 5 to 6 feet (1.5 to 1.8 m) can enter Mobile Bay through **Pelican Passage**. This channel passes

north of a spit off Pelican Island, then south of a spit off Dauphin Island just east of Pelican Island and then around a small spit off Fort Gaines but inside the larger Dauphin Island Spit. From the eastward only about 4 feet (1.2 m) can be taken across Southeast Shoal around Mobile Point. It is necessary to pass very close to shore and should only be attempted under most favorable weather conditions and with local knowledge. These channels shift frequently and are unmarked.

Sand Island Lighthouse (Lat. 30°11.2′; Long. 88°03.1′) is a black conical tower on the west side of the southern part of the Main Ship Channel. The light is occulting white (light 5 sec., eclipse 5 sec.), 131 feet (39.9 m) above the water and visible 18 miles. There is a radiobeacon at the lighthouse—see Light List or H. O. Publication No. 205.

Storm warnings (day only) are displayed at the lighthouse.

Middle Ground, a tongue-shaped shoal with a least depth of about 12 feet (3.7 m) extends into the channel from eastward at a point 1½ miles northward of Fort Morgan.

Anchorage.—The best anchorage in the lower bay for deep draft vessels is found northward and northwestward from **Fort Morgan** (on Mobile Point) and southward from the Middle Ground, where the depth ranges from 30 to 45 feet (9.1 to 13.8 m) and the holding ground is excellent. This anchorage is secure, but during a norther a short heavy choppy sea is raised which may be uncomfortable for small vessels.

Mobile Bay Channel etxends from the lower anchorage to the mouth of the Mobile River. The project dimensions are for a channel 32 feet (9.8 m) deep by 300 feet wide. The channel is subject to shoaling, but the project depth is generally maintained, and in February 1936 the controlling depth was 32 feet (9.8 m). This channel is marked by lights (square houses painted red on pile foundations) along the eastern side at intervals of about 1¼ miles and by black spar buoys along the western side. The northern end of the channel is marked by *Mobile Channel Lighted Range* on the south end of Pinto Island.

There is practically a continuous spoil bank along either side of the channel, from *Middle Ground Lighted Buoy 16* to the mouth of the river. Through these spoil banks, there are the following several openings for passage to various points about Mobile Bay:

Just south of *Light 38*; to eastern shore points.
Opposite *Light 36*; to Dog River.
Just south of *Light 26*; eastward to Point Clear and westward to Dog River and Fowl River.
Opposite *Light 22*; to Pass Aux Herons.
Opposite *Light 12*; to Pass Aux Herons.
Just south of *Light 8*; the Intracoastal Waterway crosses the channel.

Boats bound eastward into the Intracoastal Waterway can leave the ship channel at the opening just south of Light 26 and shape a course across Bon Secours Bay into the waterway.

Prominent features.—The general appearance of the land is a guide to finding the entrance to Mobile Bay. For a distance of 40 miles eastward of the entrance, the shore, although low, is wodded and unbroken. For 50 miles westward of the entrance there is a chain of islands which, although wooded in places, are generally low and

bare. In approaching the entrance, the most conspicuous objects are the Sand Island Lighthouse and the radio towers and a tall water tank on Mobile Point.

From Mobile Bay, the main objects of prominence are the water tanks at Fairhope and at the northeast corner of the bay opposite the Blakeley River. A private white light is displayed from the top of the Fairhope tank.

Approaching Mobile, the water tower at the south end of town is easily identified. There are numerous tall buildings in Mobile close to the waterfront; of these the most prominent is the one with the skeleton mast from which the aero light is displayed.

Mobile and its port facilities are described on page 186.

Just inside Mobile Point (Rear) Light, there is a small wharf with about 12 feet (3.7 m) at the end. The old Fort Morgan wharf is in poor condition, only small boats drawing not over 3 feet (0.9 m) being able to land about halfway in along the dock. The old quarantine dock is more or less in ruins. The offshore area to the north and east is sometimes used for anchorage but several rock piles (old ballast) are reported in this locality; two such spots (8 feet 2.4 m and 11 feet 3.3 m) are shown on the chart.

Bon Secours Bay is a large indentation of Mobile Bay, extending 14 miles eastward from inside Mobile entrance. It has an average depth of 8 to 10 feet (2.4 to 3.0 m) and is the western entrance to the Intracoastal Waterway connecting Mobile and Pensacola Bays. This waterway crosses Oyster Bay into a canal cut and in 1935 had a controlling depth of 9 feet (2.7 m).

Bon Secours River empties into the bay at the eastern end; the river has a depth of about 5 feet (1.5 m) and mud bottom. The town of **Bon Secours** is located on the north bank of the river, about one-half mile inside the mouth. There is a post office and general store here, and gasoline, fresh water, and provisions can be obtained. A mail and passenger boat makes weekly trips to Mobile. A small marine ways capable of hauling out boats up to 5 feet draft is located on the bayou leading to **Oyster Bay**.

Weeks Bay has an average depth of 2 to 5 feet (0.6 to 1.5 m). A staked channel with a depth of about 5 feet (1.5 m) leads through the entrance and across the bay to **Fish River** (north mouth). About the same depth can be carried into Fish River (south mouth). Small boats can go to **Marlow** on Fish River (north mouth) and to **Magnolia Springs** on Fish River (south mouth). The village of **Bayside** is located on the east shore of the bay between the mouths of Fish River. Gasoline, fresh water, and provisions can be obtained here, and there is weekly boat service from here to Mobile. Pulpwood is cut on both rivers and carried to Mobile by barges.

Fairhope (population 1,549 by the 1930 census) is a small town on the east shore of Mobile Bay. It is a single-tax colony and the principal summer resort on the bay. There are highway connections and daily boat service to Mobile. There is a depth of 9 feet (2.7 m) at the end of the principal wharf. Provisions, fresh water, and some small-boat supplies can be obtained. Small boats up to about 70 feet long and 4 feet (1.2 m) draft can be hauled out and repaired. Gasoline, distillate, etc., can be obtained at a bulk-oil plant. A bright white light on a tall tank at Fairhope is visible from all points in Mobile Bay.

Point Clear, Battles Wharf, Montrose, and **Daphne** are summer resorts along the eastern shore of Mobile Bay. They all have highway connections and occasional boat service to Mobile. There are numerous boat landings along this shore but many are in ruins and constitute possible dangers to small-boat navigation. North of Fairhope there is only one serviceable landing, this being the one at Daphne. *Great Point Clear Light* marks the outer edge of the shoal area extending off this shore.

Dog River, emptying into the western side of Mobile Bay is used considerably by yachts and small boats. There is a depth of about 5 feet (1.5 m) leading southwestward through the spoil bank from Light 36 on the Mobile Channel and this depth can be taken through the entrance to the river and up the river for about 7 miles to a fixed railroad bridge. The south entrance point is marked by a light. There is a swing highway bridge just inside the entrance with a horizontal clearance of 60 feet and a vertical clearance of 10 feet at mean low water. There is an aerial cable crossing at the bridge; the towers are 100 feet (30.5 m) but the vertical clearance is not known. Small boats can secure gasoline, oil, and water just inside the bridge. There is a sawmill on the upper river and there is some commerce in logs and pulpwood.

Along shore to the northward of Dog River, and to a less extent to the southward, there are numerous small boat landings. Many of these are in ruins and constitute possible danger to small-boat navigation.

Fowl River is a shallow stream of little importance.

Mobile River Channel extends from the mouth of the river, where it joins the Mobile Bay Channel, for 4½ miles up the river to the highway bridge to the north of Mobile. The channel has a project depth of 32 feet (9.8 m) to the highway bridge, with a width of 500 feet to the State Docks about 1½ miles below the highway bridge and a width of 300 feet for the remaining distance to the bridge. In September 1935 the controlling depth in the channel was 32 feet (9.8 m). The wharves and piers of Mobile extend along the west bank of the channel and there are some similar facilities along the east bank. The highway bridge at the north end of the channel is a vertical lift type with 300 feet horizontal clearance and 135 feet (41.1 m) vertical clearance above high water.

Mobile (population 68,202 by the 1930 census) is one of the largest and most important cities on the Gulf of Mexico. It is served by five trunk-line railroads, two of which maintain terminals and general facilities for foreign and coastwise trade. The Alabama State Docks provide an ocean terminal with modern facilities.

The principal exports are naval stores, cotton, lumber, coal and oil (bunker), iron and steel products, and fertilizer, while the principal imports are chemicals, ores, bananas, and molasses. The coastwise trade consists mainly of petroleum products, lumber, iron and steel products, chemicals, and food products. There are inland waterway transportation facilities, handling iron and steel products, ore, sugar, and coal, and serving the Warrior, Tombigbee, and Alabama River system with connections with the Mississippi River.

Most of the piers and wharves extend along the west bank of the Mobile River and have depth of 17 to 30 feet (5.2 to 9.1 m) alongside. Fourteen feet (4.3 m) can be taken into the Industrial Canal at the

upper end of the harbor; the entrance is through Three Mile Creek, over which there are two railroad swing bridges with a minimum horizontal clearance of 56 feet and a vertical clearance of 5.7 feet at low water. Industrial sites are available along the canal. There is a depth of about 18 feet (5.5 m) into Chicksaw Creek, 4½ miles above the mouth of Mobile River; the railroad drawbridge at the mouth of the creek has a horizontal clearance of 82 feet.

The **Alabama State Dock Commission** has jurisdiction over Mobile Harbor as well as Mobile Bay and all tributary streams. It has supervision over pilotage, wharves, and shipping, and authority in all matters relating to the arrival, departure, loading, and discharging of all vessels. Most routine functions are administered through the harbormaster.

Terminal Facilities.—The Alabama State Docks constitute a modern port terminal, open to all users alike. The facilities include: (*a*) Three piers, each 1,600 feet long with fireproof shipside transit sheds; there is a total of 10,565 lineal feet of concrete wharves for vessels of 30-foot draft; (*b*) a shipside bonded cotton warehouse; (*c*) coal and bulk handling plants; (*d*) a terminal railroad connecting with all railroads entering Mobile; and (*e*) an industrial canal and basin with sites for private industries, reached via Three Mile Creek.

Exclusive of the State Docks, there are 15 wharves and piers located along the western shore of the Mobile River, on deep water and with rail and highway connections. There is berthing space in excess of 14,000 lineal feet and a floor space of 1 million square feet in covered warehouses and sheds. Most of these belong to the railroads and include a grain elevator and special fruit-handling facilities.

There is a municipal wharf, 1,500 feet long, centrally located on the water front; it is used by bay and river vessels, inland barges, and other craft.

Anchorages.—With the extensive berthing space available about Mobile, there is little need for anchoring in the harbor. Vessels may anchor abreast the city to the eastward of the dredged channel but suitable arrangement must be made to maintain position parallel to the channel and there cannot be more than one vessel abreast. The principal anchorage is in the lower bay and there is a quarantine anchorage opposite the quarantine station.

Pilots and Pilotage.—Pilotage is compulsory for vessels in foreign trade but not for vessels in coastwise trade having on board a licensed pilot. The rates of pilotage are as follows:

Draft	*Per foot of draft*
9 feet and less	$2.50
9 feet 1 inch to 10 feet 11 inches	3.00
11 feet to 12 feet	3.25
12 feet 1 inch to 14 feet	3.50
14 feet 1 inch to 20 feet	5.00
20 feet 1 inch and up	6.00

Pilotage rates are one-half on all vessels entering the port for the purpose of drydocking and repairing or for bunkering.

The pilot-boat *Alabamian* will be found cruising outside the bar or at anchor near the entrance buoy; it is equipped with wireless telephone and reports vessels through the Coast Guard. Vessels up to 31 feet (9.4 m) of draft are taken in or out at any time, day or night.

Tugboats and ocean-going tugs are available at Mobile.

The harbormaster assigns berths in the harbor and enforces the rules and regulations of the port. The pilots only handle ships between the sea and the dock; the harbormaster has charge of shifting between berths in the harbor. The harbormaster's fees for shifting are as follows:

Shifting or mooring vessel in harbor (less than 1,000 tons, $5)	$10
Shifting to or from Chickasaw Creek	15
Shifting to or from Twelve Mile Island	20

Quarantine.—The quarantine station is on Sand Island at the entrance to Mobile River. Vessels subject to quarantine inspection are boarded at anchor or under way in the quarantine anchorage off the station.

Customs and Immigration.—The offices of both the customs and immigration services are located in the Customhouse at St. Joseph and St. Louis Streets.

Both the United States Coast Guard and the United States Steamboat Inspection and Navigation Service have administrative offices in Mobile.

Supplies.—Full stock of deck and engineer's supplies are carried in Mobile. Almost chemically pure water is piped to the principal wharves and piers. Three oil companies provide oil bunkering facilities with capacities up to 1,000 barrels per hour and all the State Docks are piped for fuel oil with a loading capacity of 1,000 to 1,500 barrels per hour. The State coal handling plant has a bunkering capacity of 600 tons per hour. There is floating equipment available for delivering bunker coal and bunker fuel oil to ships anywhere in the harbor.

Repairs.—There are excellent facilities at Mobile for practically any class of repair work to the hull or machinery of steel or wooden vessels. There are five floating drydocks, the two largest with capacities for lifting 12,000 and 10,000 tons and handling vessels up to 550 feet long by 24 feet draft and 480 feet long and 20½ feet draft, respectively. There is a marine railway with a lifting capacity of 2,500 tons and capable of hauling vessels up to 290 feet long and 10 feet draft (6 feet forward). There are also several smaller marine ways for handling smaller vessels.

Salvage Facilities.—Sea-going salvage tugs are available which are equipped for heavy work and able to go anywhere. Barges, derricks, pumps, diving outfits, etc., are available for practically any type of work.

Storm warnings (day only) are displayed at the First National Bank Building in Mobile, at Fort Morgan, and at Sand Island Lighthouse; also at Gulf Shores from June 15 to November 15.

The Marine Hospital (United States Public Health Service) is located at St. Anthony and Bayou Streets, about three-fourths mile from the water front. There are three additional hospitals in Mobile.

Small Boat Facilities.—The principal basin for yachts and small boats is along the north side of the Arlington dock to the south of Sand Island. There are several small wharves opposite the north end of Pinto Island used by fishing boats and other small craft. There are several small yards available for hauling out and repairing smaller boats.

Communications.—Mobile is served by five trunk-line railroads and improved highways lead to Pensacola and New Orleans and to interior points. There is regular steamer communication with New Orleans, Pensacola, and Tampa, and occasional connection with other points on the Gulf coast. There are also regular sailings to Atlantic and Pacific coast ports, to the West Indies and South America and to numerous world ports. Inland boats and barges serve the river ports in the interior of the State and also connect with New Orleans and occasionally with Texas ports. The Tropical Radio Telegraph Co. has stations at Mobile (WNN) and at Fort Morgan (WIO) which handle general commercial radio business. Mobile is on an air line between Atlanta and New Orleans and there is a municipal airport.

Port Regulations.—The following local rules and regulations have been proscribed (1927) for the port of Mobile by the State Docks Commission.

RULE 1.—Masters of vessels entering the port of Mobile must, on arriving in the river, rig in the jib-booms and other outriggers, cockbill their yards, and take their anchors in on deck when not in use. When permission is given by the chief wharfinger or deputy to allow a vessel to keep the jib-boom and other outriggers out, the vessel having such permission will be held responsible for all damage done to other vessels.

RULE 2.—The arrival of all vessels in the port of Mobile shall be immediately reported either by the master or ship's agent to the chief wharfinger's office.

RULE 3.—The *chief wharfinger* is charged with the duty of selecting and changing anchorages for ships, with the movements of vessels into and out of slips or berths, and with all other ship movements that affect a fair joint use of the facilities of the port, and his instructions will be obeyed accordingly.

RULE 4.—All vessels mooring in the river either to receive or to discharge cargo or ballast, must be moored on a line parallel to the channel of the river. If more than one vessel is so moored in the same vicinity, they must be moored on the same line. All such vessels must be moored at both ends with anchors sufficiently heavy to hold them on the line as specified above.

RULE 5.—Lighters, barges, timber, rafts, or similar floating objects placed alongside vessels, wharves, piling or dolphins must be placed so as not to unnecessarily obstruct navigable water and must be made fast securely at both ends to prevent swinging with the tides, and must display conspicuously, suitable lights at night.

RULE 6—No vessel in the channel shall be allowed to make fast a line ashore, except in emergency and then only for the shortest possible time.

RULE 7.—No vessel will be allowed to receive or discharge cargo while anchored in the river below Cochrane Bridge without permission from the chief wharfinger.

RULE 8.—Masters requiring anchor berths for the purpose of laying up their vessels will apply to the chief wharfinger who will designate a berth where the vessel can be anchored.

RULE 9.—When vessels are ready to proceed down the channel and they find themselves blocked by other vessels to the extent that they cannot get under way the officer in charge must report the same to the chief wharfinger at once.

RULE 10.—The maximum rate of speed of vessels through the water from Chickasaw Creek to the mouth of Mobile River shall be as follows: All vessels of 500 tons gross and under (except launches), 6 miles per hour, and all vessels over 500 tons gross, 4 miles per hour.

RULE 11.—When requested, the chief wharfinger will inform masters of vessels as to the maximum draft to which vessel can be safely loaded for passage through the channel.

RULE 12.—Vessels lying in slips at drydocks must not project out into the river beyond the harbor line. Vessels lying in slips other than at drydocks must not project out into the river beyond the harbor line unless the slip is shorter than the vessel, in which case the vessel must occupy the entire length of the slip.

RULE 13.—Vessels, barges, and boats must not be berthed more than two abreast at marginal wharves, on ends of piers, or alongside piling placed on the harbor line.

RULE 14.—The officer in charge of a vessel lying alongside a marginal wharf or at the end of a pier must have the anchors up into the hawse pipes. When impossible to heave anchors up into hawse pipes they must be taken up on deck.

RULE 15.—When the master of a vessel lying in the inner harbor of Mobile desires to shift his vessel, he shall apply to the chief wharfinger for permission to shift such vessel and for the services of a deputy wharfinger or pilot licensed and employed by the Alabama State Docks Commission to assist him in making the change. However, should the master desire to shift his vessel without the assistance of a deputy wharfinger or pilot licensed and employed by the Alabama State Docks Commission, the chief wharfinger is empowered to grant permission to the master or some other duly licensed navigating officer selected by the master, to make such shift, provided the chief wharfinger is of the opinion that such master or navigating officer has sufficient knowledge of the local conditions in the inner harbor to enable him to safely make such shift without endangering other shipping.

Under no circumstances will a vessel shift or change its anchorage or mooring without the assistance of a deputy wharfinger or pilot licensed and employed by the State Docks Commission unless the chief wharfinger has authorized such movement to be made by the master or some other duly licensed navigating officer.

RULE 16.—The Inner Harbor of Mobile comprises that portion of Mobile Bay lying north of an East and West line drawn through Beacon 40, and that part of all tributary streams flowing into such harbor in which the tide ebbs and flows.

RULE 17, SECTION 1.—No manufacturing or repair plant, no steamship, oil tanker, barge, or any other vessel shall, within the waters of the harbor of Mobile subject to the jurisdiction of the State Docks Commission, cast, discharge, or suffer to flow into and upon the waters of such harbor any oil or oily mixtures having an oil content greater than .05 of 1 per cent, or any other oily mixtures of a character that would cause an oil film on the surface of the water that would be visible to the naked eye in daylight in clear water.

SEC. 2.—No vessel or craft of any description carrying fuel oil, crude oil, or diesel oil in bulk as cargo or as fuel for boilers or engines, shall pump bilges containing any oil or oily mixtures of the character described in section 1 hereof, into the waters of Mobile harbor within the jurisdiction of the Commission.

SEC. 3.—The Pilot boarding any vessel entering Mobile Bay shall immediately serve the Master of such vessel a printed copy of these regulations; and all seagoing vessels, other than war vessels, carrying crude oil, fuel oil or diesel oil in bulk as cargo, or as fuel for boilers or engines, shall be boarded immediately, or as soon thereafter as practicable, upon arrival at wharf or anchorage within the harbor of Mobile, by a Representative of the State Docks Commission, who shall serve the Master (unless this has already been done by Pilot bringing ship in) and Chief Engineer of such vessel with a printed copy of these regulations, and shall with wire and lead seal bearing the impression SDC (wire to be not heavier than 22 gage), seal all valves and suctions of such vessels.

SEC. 4.—All vessels before loading or discharging crude oil, fuel oil or diesel oil as cargo or bunkers, will see that all hose through which such oil is to flow, is in good condition, and that connections are oil tight; also cause all scuppers to be closed with wooden plugs packed with burlap, burlap and cement, or similar material, in such manner as to prevent any oil, in case of accident, flowing into Mobile harbor. Masters and Chief Engineers of such vessels will be held jointly responsible and accountable for compliance with this regulation.

SEC. 5.—Where, in the process of drydocking a vessel, it is necessary to remove from the bunkers mixtures containing more than .05 of 1 per cent of oil content, a special provision shall be made for a place outside of the waters of Mobile harbor into which such material is to be pumped. The method provided for preventing the above oily mixture from getting into the waters of Mobile harbor shall, before being employed, be approved by the State Docks Commission.

SEC. 6.—Ships bringing oil cargoes into the port and pumping the same from their holds into tanks must submit to the State Docks Commission for approval the means adopted by them for preventing discharge of oil into the waters of the harbor of Mobile.

The **Port Series**, volume No. 3 (Part 1) gives further detailed information regarding the port of Mobile. See page 4.

Fogs.—There is considerable fog during the early spring months with southerly breezes; northerly breezes clear it away.

Winds.—The prevailing winds are southerly and southeasterly in spring, southerly in summer, northerly in fall, and northerly and easterly in winter. The strongest winds are southerly in summer and northerly in winter. Severe northers occur occasionally during the winter; they lower the water in the bay so as to interfere with the deeper-draft vessels bound through the dredged channel. During heavy southerly gales it is not always safe for vessels of over 25 feet (7.6 m) draft to attempt to cross the bar.

Tides.—The tides are chiefly diurnal and the rise and fall is small, averaging about 1 foot at the entrance and 1½ feet at Mobile. During the winter months northers may depress the water surface as much as 1.6 feet below mean low water, while hurricanes have been known to raise the level about 11.6 feet.

Currents.—The currents vary with the force and direction of the wind and are sometimes apparently suspended or reversed by heavy gales. The main body of the flood enters the bay through the Main Ship Channel with a normal velocity of about 2 knots, diminishing to about one-half knot in the bay channel. The ebb ordinarily has about the same velocity in a southerly direction and with a strong southerly breeze the sea on the bar is dangerous for small craft. With strong winds the maximum current velocities may be 3½ knots on the outer bar, 2½ knots in the bay channel and nearly 2 knots in the river channel. At the outer bar, the flood tide has a tendency to set toward Sand Island while the ebb sets diagonally toward the shoal on the east side of the Main Ship Channel.

DIRECTIONS, MOBILE BAY

Courses and Distances for approaching *Mobile Entrance Lighted Whistle Buoy* are given on page 61; and also under **Coastwise Courses** (Position No. 13).

The following Courses and Distances lead from *Mobile Entrance Lighted Whistle Buoy* into the bay. Inland Rules apply as far as Choctaw Point on the Mobile River.

Courses and Distances

Mobile Bay Entrance

For reverse direction, read upward	Course (Reverse courses in *italics*)		Distance
	True	Magnetic	
1. Mobile Bay Entrance Lighted Whistle Buoy:	°	*Points*	*Nautical miles*
Direct (Mobile Point Lighted Range ahead).	20½	N. by E. ⅜ E	2. 5
Reverse (Mobile Point Lighted Range astern).	*200½*	*S. by W. ⅜ W*	*2. 5*
Six buoys (three on either side) mark the dredged channel across the bar. The two buoys at either end of the dredged channel are lighted.			
2. Sand Island Lighthouse bearing 312° true, distant ½ mile:			
Direct	7	N. ⅛ E	3. 6
Reverse	*187*	*S. ⅛ W*	*3. 6*
Passing *Dixie Island Lighted Buoy 10* on the east side of the channel and *West Bank Lighted Buoy 13* on the west side of the channel. Also passing 0.7 mile westward of *Mobile Point Rear Range Light* at Fort Morgan on Mobile Point.			
3. Middle Ground Shoal Lighted Buoy 14, bearing 60° true distant 1/10 mile. Position is 1 mile 325° true from *Mobile Point Rear Range Light:*			
Direct	339	NNW. ⅜ W	0. 7
Reverse	*159*	*SSE. ⅜ E*	*0. 7*
4. Middle Ground Lighted Buoy 16, 1/10 mile to the west of.			
Thence be guided by chart 1266 through Mobile Bay Channel and Mobile River Channel to Mobile. Pass 50 to 75 yards westward of the lights along Mobile Bay Channel; the upper end of this channel is marked by *Mobile Channel Lighted Range.* Mobile (State Docks) is 27.5 miles above Position 4.			

RIVERS ABOVE MOBILE

Mobile and Tensaw Rivers are crooked streams with many ramifications, flowing in a general southerly direction from the junction of the Alabama and Tombigbee Rivers, 37 miles above the head of Mobile Bay, and emptying into the head of the bay through several mouths. Mobile River, the deeper and more important of the two streams, empties into the northwest corner of Mobile Bay at the city of Mobile. It has a depth 32 feet (9.8 m) to **Chickasaw Creek,** 4½ miles above the mouth, and 14 feet (4.3 m) to its head. The deepest draft navigating Mobile River above Chickasaw Creek is 9 feet (2.7 m). There are no towns of importance on the river. A draft of 8 feet (2.4 m) can be taken into the Tensaw River directly from the bay, but by a roundabout route, leading up Mobile

River, down Spanish River, and then up the Tensaw River. Stockton is the principal landing on the Tensaw River. Vessels navigating the Tensaw River are of 6 feet (1.8 m) or less draft. Pilot Rules for the Western Rivers are to be followed above Choctaw Point on the Mobile River.

Above the Mobile River there is a depth of 8½ feet (2.6 m) through a canalized channel following the **Tombigbee, Warrior,** and **Black Warrior** Rivers to the junction of the **Mulberry** and **Locust Forks** of the Black Warrior River, 357 miles above Mobile, and continuing up Mulberry Fork for 31 miles to **Sanders Ferry** and up Locust Fork for 13 miles to **Nichols Shoals.** There are 17 locks on the river, with limiting dimensions of 282 feet length, 51½ feet width and 8½ feet (2.6 m) depth. Numerous drawbridges cross the river, the limiting horizontal clearance being 87 feet. Freshets usually occur in the river from January to June.

Barge lines, towboats, and river craft contribute to a rather heavy river traffic; the principal river ports are **Jackson, Demopolis, Eutaw, Tuscaloosa, Cordova,** and **Birmingport** the latter being connected by rail terminal facilities with **Birmingham.** The major articles of river traffic are coal, iron and steel products, lumber and stone.

Alabama River is formed by the junction of the **Coosa** and **Tallapoosa** Rivers, and is navigable throughout its length to a point 327 miles above Mobile. At ordinary low-river stages there is a depth of 4 feet to **Selma** and 3½ feet (1.0 m) to **Montgomery,** 226 and 301 miles respectively above Mobile, and at higher river stages the available draft is proportionally greater. A depth of 3 feet (0.9 m) can be carried at low water to the head of the river and to **Wetumpka** on Coosa River, 10 miles above its mouth. This is the head of low-water navigation. Several drawbridges with a minimum horizontal clearance of 86 feet cross the river. Freshets usually occur in the river from January to May.

There is but limited navigation on the Tombigbee River above Demopolis. For about 4 months each year, navigation is safe at mean and high-river stages as far as Columbus, 130 miles above Demopolis, for river steamers drawing not over 5 feet (1.5 m). At low water, the controlling depth is but 1 foot (0.3 m).

23. MISSISSIPPI SOUND, LAKE BORGNE, AND LAKE PONTCHARTRAIN

(Charts 1266, 1267, 1268, and 1269)

Mississippi Sound extends 70 miles west of Mobile Bay between a chain of long and narrow, low sand islands and the mainland and affords a sheltered route for the Intracoastal Waterway from Mobile Bay to New Orleans. The depths are generally shoal, but there are natural depths up to 10 feet (3.0 m) through the sound and this route is invariably used by vessels of lighter draft than 9 feet (2.7 m) bound to New Orleans or the Mississippi River, in preference to the outside route to the mouth of the Mississippi and thence up the river. The eastern end of the sound is separated from Mobile Bay by an extensive oyster reef, 1 mile wide, across which there are two channels, viz, Pass aux Herons and Grants Pass. The sound

may also be entered from the Gulf by Petit Bois, Horn Island Dog Keys, and Ship Island Passes, and Cat Island Channel.

Courses and Distances through Mississippi Sound are given under Intracoastal Waterway, see page 212.

The **Intracoastal Waterway** extends through Mississippi Sound, Grand Island Pass, Lake Borgne, the Rigolets, and Lake Pontchartrain to New Orleans. The route through Mississippi Sound is via Pass Marianne. At the eastern end of the Sound, a channel has been dredged, 10 feet (3.0 m) deep by 300 feet wide, through Pass aux Herons, connecting the Sound with Mobile Bay. At the western end of the Sound, there is a dredged channel, 9 feet (2.7 m) deep by 100 feet wide, through the flats in Lake Borgne connecting Grand Island Pass with the Rigolets and at the western entrance to the Rigolets, another channel, 9 feet (2.7 m) deep by 100 feet wide, has been dredged through the Middle Ground to connect the Rigolets with Lake Pontchartrain. Except through these dredged channels, this waterway utilizes natural depths. The controlling depth of the waterway is the 9-foot depths through the dredged channels.

The Intracoastal Waterway is more fully described on page 211.

Pass aux Herons connects the southwestern corner of Mobile Bay with the eastern end of Mississippi Sound. It is a dredged channel about 4 miles long; the project dimensions are 300 feet wide by 10 feet (3.0 m) deep. It is subject to some shoaling near its ends; in 1935 the controlling depth was 10 feet (3.0 m). Tidal currents run through the pass with considerable velocity. The channel is marked on the north side by lights and beacons, about 75 yards from the axis and by black can buoys on the south side. The bottom, in the channel at the Mississippi Sound end, is soft but hard at the eastern end.

Grants Pass, one-fourth mile north of Pass aux Herons is a former toll pass; it is marked on the north side by single-pile beacons. There is still 6 to 7 feet (1.8 to 2.1 m) available through the pass, although it is no longer maintained.

Dauphin Island is a small fishing village and post office on the north shore of Dauphin Island. A draft of about 4 feet (1.2 m) can be carried close to shore, but it is necessary to land in small boats. Provisions, in very limited quantities, are available.

From **Cedar Point** there is a good road connecting with Mobile; local fish products are landed here and hauled to Mobile by truck. There are depths of 5 to 6 feet (1.5 to 1.8 m) close in and 2 to 3 feet (0.6 to 0.9 m) to the landing. Gasoline, oil, water, and provisions are available for small boats in limited quantity. To approach, leave Pass aux Herons at Light 6, heading ½ mile west of the point till ½ mile from shore and thence to a position off the point. Stakes sometimes mark the channel.

Coden is a small fishing village and resort town on the north shore of Mississippi Sound, northeast of Isle aux Herbes. The water front is exposed and most boats go to Bayou Labatre.

Bayou Labatre (population 964 by 1930 census) is a small fishing town about 1½ miles above the mouth of Bayou Labatre which empties into the northeast corner of Mississippi Sound. The entrance to the bayou is marked by *Bayou Labatre Light 2* on the east side of the entrance to the dredged channel across the bar and by *Bayou Labatre Lighted Range;* the channel has a depth of 6 feet (1.8 m). There is a railroad to Mobile and highway connection to

both Mobile and Pascagoula. The principal industry is shrimp and oyster fishing; a large fleet of fishing boats operate out of the town and there are several large canneries. Petroleum fuels, water, ice, and small boat supplies are available; some coal is also available for small tugs. There are numerous stores, an ice plant, and two hotels.

Petit Bois Pass, an entrance from the Gulf, between Dauphin and Petit Bois Islands, is seldom used except by fishing vessels of not more than 7 to 8 feet (2.1 to 2.4 m) draft. The channel is unmarked and changes frequently but can generally be followed by the deep green water during calm weather and by breakers during rough weather.

Dog Keys Pass, lying about midway between Horn Island and Ship Island, is good for a draft of at least 12 feet (3.7 m) and is marked by buoys. It is used by small local craft, and has been used by three-masted schooners when it was not desirable to go to Horn Island Pass or Ship Island Pass.

HORN ISLAND PASS AND PASCAGOULA

(Chart 1267)

Horn Island Pass, the approach to the city of Pascagoula, leads between Petit Bois Island and Horn Island. A channel 21 feet (6.4 m) deep has been dredged through the pass but in 1935 the controlling depth was 19 feet (5.8 m). The entrance is marked by *Horn Island Pass Bar Whistle Buoy* and by *Horn Island Pass Lighted Buoy 1*; the unlighted buoys marking the channel are shifted from time to time to conform to changes in the channel. Vessels drawing more than 15 feet (4.6 m) should take a pilot.

Horn Island Lighthouse (Lat. 30°13′.9; Long. 88°29′.2) is a white wooden dwelling on black piles, 47 feet (14.3 m) above the water and visible 12 miles. The light is flashing white.

Pascagoula River Approach is a dredged channel leading from the deeper water of Mississippi Sound into the Pascagoula River. The project dimensions are 150 feet wide by 17 feet (5.2 m) deep; the channel is subject to shoaling but in January 1936 the controlling depth was 17 feet (5.2 m). The channel is well marked by lights and a lighted range and other aids.

Pascagoula River and its tributary **Dog River** are navigable for a draft of 17 feet (5.2 m) for 9 miles above Pascagoula to a large paper mill near Moss Point. In 1929 there was a controlling depth of 7 feet (2.1 m) in the Pascagoula River as far as **Dead Lake,** 28 miles above the mouth of the Dog River and 3 feet (0.9 m) for an additional 44 miles above Dead Lake to the junction of the **Leaf** and **Chickasawhay** Rivers. Pascagoula River and tributaries are important chiefly as waterways for logs, timber, and forest products.

The river is crossed at Pascagoula by a railroad bridge and a highway bridge, each having swing spans with horizontal clearances of 82 feet and vertical clearances of about 9 feet (2.7 m) above mean low water. Similar bridges cross the river at Moss Point. There are 2 lights and 2 lighted ranges about 3 miles above Pascagoula.

Prominent features.—About a mile to the eastward of the mouth of the Pascagoula River there is a tall elevated water tank, quite

prominent from offshore. There is a tall stack at Pascagoula and a tall elevated water tank at Moss Point which can also be seen from many points offshore.

Pascagoula (population 4,339 by the 1930 census) is a lumber shipping port on the north shore of Mississippi Sound, at the mouth of the Pascagoula River, 9 miles north-northwestward of Horn Island Pass. By water route, it is 68 miles west of Mobile and 48 miles east of Gulfport. It has both rail and highway connections with Mobile, New Orleans, and intermediate points. Provisions, gasoline, water, and some coal and ship supplies can be obtained. The city and wharves are along the east bank of the river. The municipal wharf just below the bridges is the only one available for the handling of general cargo; in 1935 it was being used principally by Government vessels. Water is piped to this wharf and there is a depth of 20 feet (6.1 m) alongside. There are marine ways with a lifting capacity of about 300 tons and capable of handling vessels up to 135 feet long and 8 to 9 feet (2.4 to 2.7 m) draft and repairs to hull and machinery of vessels up to this size can be made.

Moss Point is located on the Dog River about 2 miles above its junction with the Pascagoula River and about 7 miles above the town of Pascagoula. The lumber traffic of the port of Pascagoula originates at the mills at or near Moss Point. A depth of 17 feet (5.2 m) can be taken to the lumber docks but in 1935 practically all shipments were made by barge to Mobile, Gulfport, and New Orleans. Provisions, gasoline, water, and some coal can be obtained.

Pilots meet vessels by previous arrangements; the keeper at Horn Island Lighthouse will generally give notice of approaching vessels. Pilotage is compulsory for all foreign vessels and for United States vessels of over 250 tons unless having a licensed pilot aboard. There is a uniform pilotage charge of $4 per foot of actual draft in either direction except that vessels entering from Mississippi Sound are charged but $2 per foot.

There are no **towboats** stationed at Pascagoula.

Anchorage for vessels of over 15 feet (4.6 m) draft while loading is found on the north side of the eastern end of Horn Island; this anchorage is fairly well protected. Vessels of less draft go to the anchorage south of Light A or to Pascagoula if there is sufficient depth in the approach channel. Smaller vessels anchor in the river abreast of Pascagoula and larger vessels can anchor here if necessary. The **harbormaster** has control of vessels at the anchorages.

Quarantine.—Vessels subject to inspection are boarded at the quarantine anchorage off Comynie Bayou just inside the mouth of the river.

Hospitals.—The nearest Public Health Service marine hospital is at Mobile and there are relief stations at Biloxi and at Gulfport. The Jackson County Hospital at Pascagoula is used, when necessary, by the Public Health Service.

Customs officers are stationed at Pascagoula.

Storm warnings (both day and night) are diplayed near the municipal wharf.

Tides and Currents.—The tides are chiefly diurnal. The mean rise and fall at Horn Island Pass and at the mouth of the river is about 1¾ feet. In the pass, the ebb current generally sets southeastward,

and the flood northward and westward, across the shoals. In the dredged cut across the bar, the ebb and flood follow the directions of the cut. Winds greatly affect the velocity and direction of the currents, as well as the rise and fall of the tides.

Winds.—Northers occur occasionally during the winter months. They do not greatly affect vessels at the anchorages if provided with good ground tackle, except that they may prevent vessels at the Horn Island anchorage from loading for short periods.

The **Port Series,** volume No. 19, gives further detailed information regarding the port of Pascagoula. See page 4.

Directions—Courses and Distances for approaching *Horn Island Pass Bar Whistle Buoy* are given on page 61, and also under **Coastwise Courses** (Position No. 14).

The following Courses and Distances lead from *Horn Island Pass Bar Whistle Buoy* to Pascagoula. The Inland Rules apply north of a line from *Mobile Entrance Lighted Whistle Buoy* to *Ship Island Lighthouse.*

Courses and Distances

Horn Island Pass to Pascagoula

For reverse directions, read upward	Course (Reverse course in *italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. Horn Island Pass Bar Whistle Buoy:			
Direct	38	NNE. ⅞ E	1. 2
Reverse	*218*	*SSW. ⅞ W*	*1. 2*
2. Horn Island Pass Lighted Buoy 1:			
Direct and *Reverse*	------	Various	3. 2
Numerous buoys mark either side of the channel past the west end of Petit Bois Island and to the east and north of the shoal area extending more than a mile off the east end of Horn Island.			
3. Horn Island Range South Buoy:			
Direct	34	NNE. ½ E	1. 5
Reverse	*214*	*SSW. ½ W*	*1. 5*
4. Horn Island Range North Buoy:			
Direct	359	N. ⅝ W	2. 0
Reverse	*179*	*S. ⅝ E*	*2. 0*
The Intracoastal Waterway route passes about ⅓ mile south of this buoy.			
5. Pascagoula River Entrance Light A, to the westward of:			
Direct (Pascagoula River Lighted Range ahead).	320	NW	4. 2
Reverse (Pascagoula River Lighted Range astern).	*140*	*SE*	*4. 2*
Passing *Pascagoula River Entrance Light B* and intermediate buoys along east side of channel.			
6. Pascagoula River Entrance Light C:			
Thence about bend to northward marked by *Entrance Lights D and E* and into the river channel. The first bridge is 1.8 miles above Light C.			

SHIP ISLAND PASS AND GULFPORT

(Chart 1267)

Ship Island Pass lies immediately westward of Ship Island, 47 miles westward of Sand Island Lighthouse and 11 miles northward of the northernmost of the Chandeleur Islands. It is the approach to Ship Island Harbor and the towns of Biloxi, Gulfport, Pass Christian, Bay St. Louis, and several smaller places. A straight channel, controlling depth 27 feet (8.2 m) in 1935, has been dredged across the bar, about one-half mile west of the old channel which has been abandoned. The new channel is marked by buoys (some lighted) and by *Gulfport Channel Entrance Lighted Range*. *Ship Island Pass Lighted Bell Buoy 1* marks the west side of the entrance. The inbound course along the axis of the range is 2½° true (N. ¼ W. mag.).

Ship Island Harbor, northward of Ship Island, is one of the best natural harbors on the Gulf coast, and is easy of access for a draft of 20 feet (6.1 m) or less at all times, and for a draft of 25 feet (7.6 m) when the sea is smooth. The depths in the harbor range from 20 to 30 feet (6.1 to 9.1 m), soft bottom.

Gulfport Channel leads from Ship Island Harbor to Gulfport Harbor; the project dimensions are 220 feet wide by 26 feet (7.9 m) deep. In February 1936 the controlling depth in the channel was 24 feet (7.3 m). The bottom is very soft ooze. The channel is well marked by lights and buoys. *Gulfport Channel Outer Lighted Range* on Ship Island marks the outer end of the channel and a private lighted range (*Gulfport Range*) in Gulfport marks the inner end. The marks and lights for the latter range are on a high pole near the outer end of the pier and on the south end of the grain elevator at Gulfport. This range leads along the axis of the dredged channel on a 324° true (NW. ¼ N. mag.) course, but usually cannot be identified until past Beacon 8.

Gulfport Harbor is an artificially constructed rectangular anchorage basin between two moles about a quarter of a mile apart and extending three-quarters of a mile offshore. The project depth is 26 feet (7.9 m) and this is usually maintained. The bottom is soft ooze. At the entrance to the harbor, a fixed green light marks the outer end of the breakwater on the west side of the channel.

Gulfport (population 12,547 by the 1930 census) is a seaport terminus of the Illinois Central Railroad and a lumber shipping port on the north shore of Mississippi Sound, 11¼ miles northwestward of Ship Island Lighthouse. It is about midway by rail and highway between Mobile and New Orleans.

The terminal facilities at Gulfport are located on the two moles enclosing the harbor and include special facilities for handling lumber, asphalt, creosote, and sulphur. On the east mole, the Gulf and Ship Island Railroad Co., subsidiary of the Illinois Central System, has extensive trackage to several transit sheds and a coal tipple with a capacity of 75 to 125 tons per hour. Along the outer end of the mole there is 2,900 feet of berthing space for large vessels while along the inner end there is 600 feet available for smaller vessels.

On the west mole, the Gulfport Port Commission is constructing a large modern terminal to consist of a concrete dock 1,790 feet long, a structural steel warehouse 122 feet by 220 feet, and a refrigeration plant, all served by railroad and highway. There is a municipal wharf at the northwest corner of the basin available for small boats and used principally by those engaged in the fish and shrimp trade. There are also storage warehouse facilities available in the port.

There are numerous stores in Gulfport; ordinary ship-chandlery supplies and provisions of all kinds are available. Fresh water suitable for drinking or for boiler use is piped direct to the docks. There are both coal and oil bunkering facilities, but the latter were not being used in 1935. Gulfport has irregular steamer connections with practically all Gulf ports and less frequent connections with other ports.

Small Boat Facilities.—Berths for smaller vessels are provided at the north end of the harbor at the inner end of the railroad pier. Gasoline and distillate and general supplies and provisions can be obtained. There is a marine ways capable of hauling boats up to 70 feet long and about 6 feet (1.8 m) draft; but only minor repairs can be made.

Biloxi (population 14,850 by the 1930 census) is a resort city on the north shore of Mississippi Sound, 40 miles west of Mobile Bay and 11 miles east of Gulfport. It is on the railroad and State highway running close along the north shore of the sound between Mobile and New Orleans. A channel 150 feet wide and 10 feet (3.0 m) deep has been dredged through the shoal area west of **Deer Island** to the wharves at Biloxi and on into **Back Bay**. In 1935 the controlling depth through this channel was 10 feet (3.0 m). About 5 to 6 feet (1.7 to 1.8 m.) can be carried to the harbor through Biloxi Bay east of Deer Island. The principal industry is commercial fishing, in which several hundred boats are engaged and there are numerous large shrimp and oyster canneries along the eastern length of the water front and in Back Bay. There is a public wharf on the south shore and another in Back Bay, both with a depth of about 8 feet (2.4 m) alongside. Fresh water and provisions and a fairly complete line of deck and engine supplies for smaller vessels are available. Gasoline and other petroleum fuels can be delivered by truck. There are numerous marine ways and repair facilities for boats up to 90 feet long and about 8 feet (2.4 m) draft.

Storm warnings (day and night) are displayed from a tower near the yacht club.

There are no regular **pilots** for the harbor.

There are several **prominent features** along the Biloxi water front. The Coast Guard hangar and air station mark the extreme eastern point. About half a mile west of the point of Deer Island there is a large prominent hotel with a water tank on top. To the east of the hotel, there is a white tower and to the west is *Biloxi Light*, 61 feet (18.6 m) above the water and visible 13 miles.

Vessels can anchor off the water front, north of Deer Island, or in Back Bay where there is excellent anchorage for smaller craft in 5 to 15 feet (1.5 to 4.6 m) soft bottom and good protection from all directions.

Biloxi Bay is a shallow body of water to the eastward and northward of Biloxi. It can be entered either through the dredged channel or by passing to the eastward of Deer Island about midway between the island and the mainland. About 5 to 6 feet (1.5 to 1.8 m) can be carried through the bay to the dredged channel leading to the wharves. Two drawbridges (one highway and one railroad), with a minimum horizontal clearance of 75 feet, cross the bay abreast of **Ocean Springs**, a small resort on the north shore. About 4 feet (1.2 m) can be carried to the boat landings here.

Directions to Biloxi.—Approach *Biloxi Channel Light 2* from any direction between NW. by W. and E. by N. or bring Biloxi Lighthouse to bear about 2° true (N. 3/8 W. mag.) and steer for it until picking up *Biloxi Channel Light 2*. Pass close by to westward of the latter light and follow marked channel north for about 1½ miles and then eastward parallel to and about 250 yards off the wharves. The marked channel continues to Biloxi Bay and thence through the drawbridges into Back Bay.

Pass Christian and **Bay St. Louis** are summer resorts on the east and west sides, respectively, of St. Louis Bay on the north shore of Mississippi Sound. They are on the railroad and main highway between Mobile and New Orleans. There is some commercial fishing at both places. Gasoline, fresh water, and provisions can be obtained.

At **Pass Christian**, a depth of about 7 feet (2.1 m) can be carried through a dredged channel, marked by lights, leading past the ends of the wharves. There are depths of 4 to 12 feet (1.2 to 3.7 m) at the wharves and 8 to 12 feet (2.4 to 3.7 m) in the anchorage off the wharves. Boats up to 70 feet in length and 5 feet (1.5 m) draft can be hauled and repaired at the cannery wharf, and to the west of this wharf there is a landing and basin.

At **Bay St. Louis** a depth of 6 feet (1.8 m) can be taken to within one-fourth mile of the shore at the town and to the cannery wharf south of the bridges, but the depth to the other wharves is under 4 feet (1.2 m). A depth of about 6 feet (1.8 m) can be taken to the cannery dock north of the bridges.

St. Louis Bay is an indentation in the north shore of Mississippi Sound, 11 miles west of Gulfport. The depths in the bay vary from 4 to 7 feet (1.2 to 2.1 m) and decrease gradually toward the shore. The bottom is soft. A railroad drawbridge and a highway drawbridge (minimum horizontal clearance 76 feet) cross the mouth of the bay. There are tall water tanks at either side of the entrance and a large hotel with a conspicuous tower at the head of the bay to the west of Grassy Point.

Wolf River and **Jordan River** empty into St. Louis Bay, the former into the northeast corner and the latter into the west side. Both have dredged approaches, 100 feet wide by 7 feet (2.1 m) deep, marked by beacons. These channels have shoaled, and in 1935 the controlling depths were 5 feet (1.5 m) in the approach to both rivers, and this depth can be taken up both rivers for about 10 miles. The former sawmills at **Kiln** on the Jordan River have been dismantled.

De Lisle is a small village on **Bayou De Lisle** at the mouth of Wolf River just inside bridge. There is a boat yard here providing fresh water storage for smaller craft. Boats up to 60 feet long and 4 to 5 feet (1.2 to 1.5 m) draft can be hauled and minor repairs made. The bridge has a horizontal clearance of 70 feet.

Cat Island is wooded nearly its whole length east and west. The eastern shore of the island, extending in a south-southwesterly direction for 3½ miles from **Great Sand Hill**, terminates in a low, narrow sand spit. **Cat Island Lighthouse** is near the western point of the island.

Isle au Pitre, on the south side of Cat Island Channel, is low and marshy, with scattered clumps of bushes.

Cat Island Channel and its extension, **South Pass**, form the most westerly connection between the Gulf of Mexico and Mississippi Sound, and lie between Cat Island, Miss., and Isle au Pitre, La. It is a buoyed passage 14 feet (4.3 m) deep, but the depth in the western part of the sound, to which it leads, is only 7 to 8 feet (2.1 to 2.4 m). This passage is little used, except by small local craft and an occasional larger vessel entering the eastern end for anchorage. The current has an ordinary maximum velocity of about 1.6 knots in Cat Island Channel.

Pass Marianne is the main passage through the shoals extending across the western end of Mississippi Sound, southward of the town of Pass Christian. The pass has a controlling depth of about 9 feet (2.7 m) and is marked by buoys and three lights. *Cat Island Shoal Light*, about 2¼ miles north of the west end of Cat Island, marks the south side of the approach from the eastward and *Merrill Coquille Light* on the northernmost point of Merrill Coquille Reef marks the south side of the approach from the westward. *Merrill Shell Bank Light* and several black can buoys mark the passage about the south end of **Tail of the Square Handkerchief** shoal; the light is 42 feet (12.8 m) high and can be seen 12 miles. There is also a lighted buoy marking the south side of a shoal 2 miles northeastward of Merrill Shell Bank Light.

Prominent features.—On a clear day, vessels from eastward bound for Ship Island Pass usually sight first a water tank, 100 feet (30.5 m) high, at the old quarantine station on Ship Island. At night they will first sight *Ship Island Lighthouse* or *Gulfport Channel Outer Rear Range Light*. Vessels from southward may sight Chandeleur Lighthouse first. At the western extremity of Ship Island there is a semicircular brick fort with sodded parapet, which is a conspicuous landmark. Near the northeastern end of Cat Island there is a high white sand bluff, which can be seen at some distance on a clear day.

Approaching Gulfport, the grain elevator is the rear range for the channel and there are several other prominent marks which can be recognized from the chart, principally two tall brick stacks with two elevated tanks close-by. Two hotels on the east side of the town are conspicuous.

Ship Island Lighthouse (Lat. 30°12′.7; Long. 88°57′.9) is a white pyramidal tower on the westerly end of the island. The light is occulting red (light 5 sec. eclipse 5 sec.), 73 feet (22.2 m) above the water, and visible 9 miles.

Chandeleur Lighthouse (Lat. 30°02.9; Long. 88°52′.3) at the northerly end of the Chandeleur Islands, is a pyramidal skeleton structure, painted black and brown. The light is flashing white (flash 0.5 second, eclipse 9.5 seconds), 99 feet (30.2 m) above the water, and visible 16 miles.

Gulfport Channel Outer Rear Range Light, on the south shore of Ship Island, about a mile from the west end is a skeleton tower 67 feet (20.4 m) above the water.

Anchorage.—Large vessels can anchor outside the bar anywhere westward of a line between Chandeleur and Ship Island Lighthouses and have rather smooth water in any weather. An especially good anchorage in stormy weather is west of Chandeleur Lighthouse in 4 to 5 fathoms (7.3 to 9.1 m). Just south of the bar, the holding ground is good and there is but little sea. Inside the bar, good anchorage and holding ground can be found almost anywhere north of Ship Island that the depth is suitable.

Pilotage is compulsory for all vessels in foreign trade and for coastwise vessels if over 250 tons unless having a licensed pilot aboard. There is a uniform pilotage charge of $4 per foot of actual draft in either direction. Pilots maintain a lookout at Ship Island Lighthouse and meet vessels outside the bar in a small power boat. Ships are taken in or out either day or night.

No **towboats** are stationed at Gulfport; ships usually come in and go out under their own steam.

The **Harbormaster** at Gulfport has control of anchoring and berthing all vessels at Ship Island and at Gulfport. The fees for boarding docking, and shifting are $5 each.

Ship's Lights.—The Gulfport Port Commission has ruled that all vessels alongside the Gulfport piers or in the harbor anchorage must have their cargo lights dimmed or matted to the southward, in order to avoid hampering the navigation of vessels using the dredged channel between Gulfport and Ship Island.

Quarantine.—Vessels subject to visitation by the health officer are boarded at Gulfport Harbor. The quarantine station on Ship Island has been abandoned.

Hospitals.—There are Public Health Service relief stations at Gulfport and at Biloxi, and marine hospitals at Mobile and New Orleans. There is a private hospital at Gulfport and a municipal hospital at Biloxi.

Customs and Immigration officers are stationed at Gulfport and at Biloxi.

Storm-warning signals (day and night) are displayed on the railroad pier at Gulfport, near the yacht club at Biloxi, on the cannery wharf at Pass Christian, and on St. Stanislaus College grounds at Bay St. Louis. Day signals are also displayed at Ship Island Lighthouse.

Tides.—The tides are chiefly diurnal. The average rise and fall is about 1¾ feet but the tides are greatly affected by the winds. Northeast to south winds raise the level of the water and southwest to north winds lower the level. A continued norther makes a current on Ship Island bar of as much as 4 knots.

The **Port Series,** volume No. 19, gives further detailed information regarding the port of Gulfport. See page 4.

Directions.—Courses and Distances for approaching Ship Island Pass are given on page 61, and also under **Coastwise Courses** (position No. 15.) The Inland Rules apply north of a line from *Mobile Entrance Lighted Whistle Buoy* to *Ship Island Lighthouse.* The following Courses and Distances lead from off Ship Island Pass Channel to Gulfport.

Courses and Distances

Ship Island Pass to Gulfport

For reverse directions, read upward	Course (Reverse courses in *italics*) True	Course (Reverse courses in *italics*) Magnetic	Distance
1. **Ship Island Lighthouse** bearing 29° true, distant 2.3 miles. On *Gulfport Channel Entrance Lighted Range*, ¾ mile south of *Ship Island Pass Lighted Bell Buoy 1:*	°	*Points*	*Nautical miles*
Direct (Gulfport Channel Entrance Lighted Range ahead).	2	N. ¼ W	3. 25
Reverse (Gulfport Channel Entrance Lighted Range astern).	*182*	*S. ¼ E*	*3. 25*
The channel across the bar is marked by 6 buoys, 3 on either side. The buoys at either end on the west side are lighted. There are additional buoys (some lighted) inside the bar.			
The course passes 350 yards to the westward of *Ship Island West Point Light.*			
2. **Gulfport Channel Entrance Front Light;** at the intersection of *Gulfport Channel Entrance Range;* and *Gulfport Channel Outer Range:*			
Direct [1]	324	NW. ¼ N	8. 8
Reverse [1]	*144*	*SE. ¼ S*	*8. 8*
There are numerous lights and buoys along the east side of the channel and several buoys along the west side. The Intracoastal Waterway route crosses Gulfport Channel at Light 4.			
3. **Gulfport Harbor Breakwater Light;** to east of light on above range.			
Thence into the harbor.			

[1] At the south end, the channel is marked by *Gulfport Channel Outer Range* and at the north end it is marked by *Gulfport Range.*

LAKE BORGNE

(Chart 1268)

Lake Borgne is a westward extension of Mississippi Sound, from which it is partly separated by three islands and outlying shoals. Between the islands and shoals there are several navigable passages. The lake is about 23 miles in length, 5 to 10 miles in width, and 7 to 9 feet (2.1 to 2.7 m) in depth, but 8 feet (2.4 m) is about the greatest draft entering. The shores of the lake are low and marshy, and are but sparsely populated. The lake is of importance chiefly as a connecting link for inside navigation from Mississippi Sound to Lake Pontchartrain and the Mississippi River. The lake is tidal, but the tides are small and are greatly modified by the winds. The tidal currents through Grand Island Pass have considerable velocity at times.

Vessels coming from eastward generally enter Lake Borgne through **Grand Island Pass,** which leads northward of **Grand** and **Grassy Islands** and close to the northerly shore of the lake; it is a deep channel, marked by *Lake Borgne Lighthouse* and *St. Joseph*

Island Light on the north side of the pass and a black can buoy on the south side of the pass near Grassy Island. There is a fog bell at Lake Borgne Lighthouse. The red nun buoy south of St. Joseph Island Light marks an obstruction 8 yards north of the buoy.

There is a dredged channel 9 feet (2.7 m) deep and marked by lights and buoys across the flats from Grand Island Pass to mouth of the Rigolets.

Lake Borgne Lighthouse, on the north side of the pass, is a white tower surmounting a dwelling on brown pile foundation. The light is fixed white, 44 feet (13.4 m) above the water, and visible 11 miles. There is a bell fog signal.

Pearl River empties into Lake Borgne from northward through two mouths, known as East Pearl River and West Pearl River.

East Pearl River, the principal mouth, is 3 miles westward of Lake Borgne Lighthouse; there is a dredged channel through the entrance with a controlling depth of 6 feet (1.8 m) in 1935. This channel is marked by buoys and by a beacon at either end, the southern one lighted. It is reported that a depth of 8 feet (2.4 m) can be taken to **Logtown,** 12 miles up the river. There is a large sawmill at **Bogalusa** on the upper river. A railroad drawbridge, with 85 feet horizontal clearance, crosses the river about 1 mile above its mouth. **English Lookout** (formerly known as **Dunbar**) is a small settlement and railroad station on Pearl River Island, 1½ miles above the railroad bridge. There is a small dredged basin here, off the south side of the river; only boats drawing less than 3 feet (0.9 m) can enter. Gasoline, oil, and some provisions can be obtained and on the river there is a marine ways capable of hauling out boats up to 50 feet in length and 5 feet (1.5 m) draft.

West Pearl River, the secondary mouth of the Pearl River, empties through West Mouth into the easterly end of The Rigolets, 1 mile west of the railroad bridge at the east end. It connects with East Pearl River by means of **East Mouth, North Pass, Little Lake,** and **Little Lake Pass.** In 1935 there was a controlling depth of about 7 feet (2.1 m) in the channel through the northerly end of Little Lake; the south side of this channel is marked by a series of black can buoys. A draft of about 4 feet (1.2 m) can be carried from Pearl River through the western end of Little Lake and East Pass to The Rigolets. The passage through the shoals in Little Lake is generally marked by stakes.

The Rigolets is a deep passage, 7½ miles long and one-fourth mile wide, connecting Lakes Borgne and Pontchartrain. The entrance is 8½ miles west of Lake Borgne Lighthouse at Grand Island Pass. The shores of The Rigolets are low and marshy. Two drawbridges cross The Rigolets. The first, a railroad bridge just westward of the Lake Borgne entrance, has a horizontal clearance of 154 feet and a vertical clearance of 15 feet (4.6 m) above mean low water. The second is a highway bridge about 1 mile from Lake Pontchartrain with corresponding clearances of 150 feet and 11 feet (3.4 m) respectively. At the western end of The Rigolets, each shore end of a submarine cable is marked by a flashing red light.

Rigolets is a small settlement and railroad station on **Rabbit Island.** Gasoline, oil, and some provisions can be obtained here. A draft of 7 feet (2.1 m) can be carried to the landing on **Little Rigolets** by enter-

ing from eastward. In 1935 there was less than 3 feet (0.9 m) through the western entrance to Little Rigolets.

Just inside the western entrance to The Rigolets, on the south side at the highway bridge, there is an old circular brick fort (Fort Pike) with sodded top which is quite conspicuous. The airway light close by is a prominent mark. To the south of the old fort there is a small-boat basin; boats up to 30 feet long and 3 feet (0.9 m) draft can be hauled and gasoline, oil, and water secured in limited quantities from nearby service stations.

Currents, The Rigolets.—Tidal currents are very irregular and greatly influenced by winds. They set with great velocity through The Rigolets at times, and especially through the draws of the bridges. Velocities of 2½ knots off *West Rigolets Light* and 3¾ knots at the L. & N. R. R. bridge have been observed. At the L. & N. R. R. bridge westerly currents set west-southwestward on to the fender on the southwesterly side of the draw, and easterly currents set east by north on to the fender on the northeasterly side. The ordinary maximum velocity is 0.6 knot. The bridge should not be approached closely until the draw is opened, and then only with caution.

Chef Menteur Pass is another connecting passage between Lake Borgne and Lake Pontchartrain, its entrance from Lake Borgne being 12 miles southwestward of The Rigolets. It is 6 miles long and of considerable depth, but with shallow water off the entrances. It is used considerably by small towboats and by small pleasure craft and fishing boats from New Orleans. Two drawbridges cross this pass, a railroad bridge and a highway bridge, both with horizontal clearances of 97 feet. These bridges are 2 and 2½ miles, respectively, from the Lake Borgne entrance. The south entrance is direct from *Alligator Point Light*. The north entrance is close along the southeast shore of Lake Pontchartrain from the western end of The Rigolets.

Bayou du Pre and **Lake Borgne Canal,** also known locally as **Violet Canal,** connect the west end of Lake Borgne with the Mississippi River at the village of **Violet,** about 10 miles below Canal Street, New Orleans. It is a toll canal, operated by the Violet Canal Co., and is good for a draft of about 4½ feet (1.4 m) at high water. Its approach in Lake Borgne is marked by a flashing red light. From Lake Borgne to the river, the distance is 6 miles. The canal has one lock at the river end, 275 feet long and 40 feet wide. Immediately east of the lock, there is a railroad and a highway drawbridge. Since the opening of the New Orleans Inner-Harbor Navigational Canal, connecting the Mississippi River with Lake Pontchartrain, the traffic through Lake Borgne Canal has greatly diminished.

Directions, Mississippi Sound to Lake Borgne Canal and Chef Menteur Pass.—From a position 1.1 miles 229° true from *Lake Borgne Lighthouse* (1 mile west of the light on the Intracoastal Waterway courses), a course 229° true (SW. ⅛ W. mag.) for 15.8 miles, with Lake Borgne Lighthouse astern, leads to *Alligator Point Light*. To enter Chef Menteur Pass proceed northwestward, passing about a mile southwestward of Alligator Point and on into the pass. To *Bayou du Pre Light*, off the entrance to the Lake Borgne Canal, the course is 250° true (SW. by W. ⅝ W. mag.) for 6.7 miles.

LAKE PONTCHARTRAIN

(Chart 1269)

Lake Pontchartrain is a fresh-water lake, roughly elliptical in shape 36 miles long, 22 miles wide at the widest part, and 10 to 16 feet (3.0 to 4.8 m) deep, lying 4 miles northward of the Mississippi River at New Orleans. At the eastern end it is connected with Lake Borgne. At its western end it is connected with Lake Maurepas, through a narrow passage called Pass Manchac. It has considerable commerce with New Orleans; the principal items being sand and gravel, shell, stone, lumber, and foodstuffs.

A shoal fills the eastern part of the lake, through which the North Shore Channel connects the lake with the deep water of the Rigolets. This is a dredged channel 100 feet wide by 9 feet (2.7 m) deep. Each of the two cuts of this channel is marked by a lighted range and by numerous buoys along the west and south sides of the cuts. The North Shore Channel is part of the Intracoastal Waterway from Mobile Bay to the Inner-Harbor Navigation Canal at New Orleans, the controlling depth of which is 9 feet (2.7 m).

The periodic **tide** is negligible but the variation in the water level due to winds may have an extreme range of 3½ to 4 feet. It is claimed that the surface of the lake is lowered at least 2 feet during the winter when northwest winds prevail.

A railroad bridge crosses the neck of the eastern extremity of the lake 4½ miles west of the Rigolets. It has two draws with double, clear openings of 106 feet at distances of 1 mile from either shore. There is a highway bridge immediately east of the railroad bridge with bascule draws opposite the draws of the railroad bridge; the horizontal clearance of the north draw is 150 feet and of the south draw 106 feet. The highway bridge has a vertical clearance of 13 feet (4.0 m) above mean low water while the clearance of the railroad bridge is but 5 feet (1.5 m).

The city limits of New Orleans extend from Lake Pontchartrain to the Mississippi River, but the business part of the city and the greater part of the residential section are on or close to the river bank. The pleasure resorts and the suburbs are on the lake shore.

A concrete sea wall has been built along the south shore of the lake from the Inner Harbor Navigational Canal, westward to the New Basin Canal, a distance of about 4 miles. Two drainage canals and Bayou St. John open through this sea wall, the latter near the center point.

The **Inner Harbor Navigation Canal**, also known as the **Industrial Canal**, is described on pages 212 and 228.

Shushan Airport is located on a large tract of reclaimed land just east of the Inner Harbor Navigation Canal. There are excellent facilities for servicing aircraft day and night, and there is a seaplane base on the eastern lake shore. The tower of the Administration Building is prominent, and there is an aero beacon.

Bayou St. John, also known as **Old Canal**, is a small boat haven extending southward into New Orleans for 3 miles from its entrance on Lake Pontchartrain. To enter, pass close-by to eastward of *Bayou St. John Light*, head straight in for sea wall, and then follow along sea wall, passing about 30 feet off the east point at the entrance. A

depth of 3 to 4 feet (0.9 to 1.2 m) is generally maintained across the bar, although there were but 1½ feet (0.4 m) at low water in March 1935. Inside the canal the depth is about 5 feet (1.5 m). Several drawbridges cross the canal; the minimum horizontal clearance is 45 feet. The third bridge, 2½ miles inside the entrance, is only opened on advance notice and is seldom operated. Just above the first bridge there are flood locks 400 feet long with 40 feet clear opening, which are only operated during certain high-water stages of Lake Pontchartrain.

Spanish Fort, a pleasure resort at the mouth of Bayou St. John, is connected with New Orleans by electric railway.

New Basin Canal extends south and southeastward into New Orleans for 5½ miles, to S. Rampart Street less than a mile from the Mississippi River. The approach to the canal in Lake Pontchartrain is protected by jetties, with the west jetty projecting diagonally across the mouth, forming a breakwater. A depth of 7 to 8 feet (2.1 to 2.4 m) can be carried into and to the head of the canal. Thirteen drawbridges cross the canal, all but one of which have a horizontal clearance of 50 feet. The Liberty Street Bridge, less than 1,000 feet from the head of the canal, has a horizontal clearance of 40 feet. There are flood locks just above the second bridge, about one-half mile inside the entrance; they are only operated during certain high-water stages of Lake Pontchartrain. The locks are 400 feet long, with a clear opening of 52 feet.

The canal is extensively used by tugs and barges and by pleasure boats. Passenger boats from Madisonville, Mandeville, and other towns on Lake Pontchartrain have landings a short distance inside the entrance. There is a toll charge of 20 cents per ton on commercial craft but no fee for small boats.

The general vicinity about the entrance to the canal is a pleasure resort known as **West End.** Gasoline, water, and provisions can be secured here and there is electric railway connection with New Orleans. There is a repair yard on the canal with several marine ways, capable of hauling heavy craft up to 110 feet long and 8 to 9 feet (2.4 to 2.7 m) draft.

The Southern Yacht Club is located on the west side of the entrance to the canal. There is a long pier to the clubhouse and a yacht basin immediately behind the clubhouse, with an entrance through a small drawbridge from the canal.

Storm warnings (day only) are displayed at the Southern Yacht Club.

The entrance to the canal is marked by *New Canal Lighthouse* on the east point and by a light on the west jetty. To enter, pass close-to southeastward of the end of the west jetty and favor the west jetty.

New Canal Lighthouse is 52 feet (15.8 m) above the water and visible 12 miles. There is a bell fog signal.

Directions, Intracoastal Waterway from Mobile Bay to New Orleans, are given on page 212.

Directions—To Chefuncte River and intermediate points from the north draw at the east end of Lake Pontchartrain.—Steer 287° true (W. by N. mag.) for 8¾ miles until Ragged Point is abeam and not closer than ¾ mile, and then steer 304° true (NW. by W. ½ W. mag.) for 11¾ miles until on *Chefuncte River Range.* Then see directions on page 209.

For Mandeville follow the directions given above to Ragged Point and then steer 321° true (NW. mag.) until abreast the town.

For Bayou Lacombe, steer 292° true (WNW. ½ W. mag.) until opposite the entrance; see page 208.

For Bayou Bonfouca, steer 295° true (WNW. ¼ W. mag.) until directions on page 208 can be followed.

From the north draw to points in Lake Maurepas.—Steer 279° true (W. ¼ N. mag.) for 25 miles. Keep *South Channel Light* (red) well on the starboard bow (all other lights are north of it); round this light, leaving it 125 feet to eastward, and head for *Pass Manchac Light*. Then follow Directions on page 210.

From the entrance to the Inner Harbor Navigation Canal, New Orleans, the following courses and distances lead to the approaches to points on Lake Pontchartrain; from the approaches the directions given after the descriptions of the rivers, bayous, etc., can be followed:

Bayou Bonfouca, 40° true, (NE. by N. mag.), 13.9 miles to nun buoy 2 at south end of dredged channel.

Bayou Lacombe, 19° true (N. by E. ¼ E. mag.), 13.5 miles.

Mandeville, 356° true (N. ⅞ W. mag.), 18.2 miles to *Mandeville Light.*

Chefuncte River 340° true (NNW. ¼ W. mag.), 21 miles to position on *Chefuncte River Lighted Range* three-fourths mile south of front light.

Pass Manchac, 315° true (NW. ½ W. mag.), 20 miles to *South Channel Light.*

Bayou Bonfouca empties into the north side of Lake Pontchartrain, 3 miles northwestward of the north draw in the railroad bridge which spans the eastern end of the lake. A 10-foot (3.0 m) channel has been dredged through the bar to deep water in the lake; it is subject to shoaling and was redredged in 1935. This channel is marked by red nun buoys along the east side and by *Bayou Bonfouca Light* on the west side at the entrance to the bayou. This channel is narrow and caution should be observed to stay in it. Inside the bayou, the depths vary from 10 to 16 feet (3.0 to 4.9 m) to the town of Slidell about 6 miles above the mouth. There is some commerce in lumber and piling and to the shipyard about 1½ miles below the town. A highway drawbridge crosses the bayou at Slidell.

Slidell (population 2,807 by the 1930 census), is on the main highway and railroad to New Orleans. There is a well equipped shipyard here with several marine ways and a commercial graving dock, 325 feet long by 60 feet wide with 14 feet (4.3 m) over the sill at low water. There are ample facilities for constructing or repairing steel or wooden vessels up to the capacity of the graving dock. Tugs, barges, diving equipment, etc., are available for towing or for heavy salvage work. Gasoline, fresh water, provisions and some boat supplies are available. Ship supplies including coal can be secured through the shipyard.

Storm warnings (day only) are displayed at the shipyard.

To enter Bayou Bonfouca, follow along to the westward of the line of red buoys and pass 50 feet eastward of the light. On this course, the south draw of the railroad bridge should be nearly astern.

Bayou Lacombe empties into Lake Pontchartrain 4½ miles westward of Bayou Bonfouca and nearly 7 miles west-northwestward of

the north draw of the railroad bridge. The controlling depth on the bar at the mouth is about 3 feet (0.9 m), hard sand bottom. *Bayou Lacombe Light* marks the west side of the entrance. With a favorable tide about 4 feet (1.2 m) can be carried about 7½ miles up the bayou to the sawmills which were not operating in 1935. A drawbridge crosses the bayou at Lacombe about 5 miles above its mouth. There is a State fish hatchery just above Lacombe.

Favor the east side, when entering Bayou Lacombe.

In 1935, a project was adopted for a channel 60 feet wide by 8 feet (2.4 m) deep in Bayou Lacombe but no work has been done (March 1936) on this project.

Mandeville (population 1,069 by the 1930 census) is a summer resort and commercial fishing town on the north shore of Lake Pontchartrain, 15 miles westward of the bridges crossing the lake and 20 miles north of New Orleans. There are train and bus connections to New Orleans and a daily boat during the summer season. Many of the numerous boat landings along the north shore of the lake are in ruins. There is a protected landing in the small yacht basin at the mouth of **Bayou Castine.** To enter, pass about 50 yards east of *Mandeville Light* and head a little east of the wharf; the entrance is generally staked. In February 1935 only about 4 feet (1.2 m) could be taken into the basin, but a depth of 6 to 8 feet (1.8 to 2.4 m) is frequently maintained. Gasoline, fresh water, and provisions can be obtained at Mandeville. There is an airway beacon on the east point at the entrance to the yacht basin.

Chefuncte River empties into the most northerly part of Lake Pontchartrain, about 5 miles west of Mandeville. In 1935, the least depth in the dredged channel across the bar was 7 feet (2.1 m); 10 feet (3.0 m) could be carried up Chefuncte River to Madisonville and up Chefuncte River and its tributary, Bogue Falia River, for a distance of 13 miles, to within 1 mile of **Covington.** A depth of 3 feet (0.6 m) can be carried to Covington, which is the head of navigation. **Bogue Falia River** empties into Chefuncte River about 9 miles above the mouth of the latter.

The entrance to the Chefuncte River is marked by *Chefuncte River Lighted Range* and by two red beacons. **Chefuncte River Lighthouse,** the rear light, is 49 feet (14.9 m) above the water and can be seen 11 miles; there is a bell fog signal. To enter steer 18° true (N. by E. ⅛ E. mag.) with the lights in range ahead, passing about 100 yards west of the beacons. When close to the rear light, head for the center of the narrow entrance to the river and continue midchannel courses up the river. A highway drawbridge crosses the river at Madisonville; the horizontal clearance is 60 feet and the vertical clearance 9 feet (2.7 m) at mean low water.

Madisonville (population 831 by the 1930 census) has bus connections and seasonal boat service to New Orleans. There are public landings at either side of the bridge and gasoline, fresh water, and provisions can be obtained. The shipyard on the south side of the town has marine ways capable of hauling heavy craft up to 150 feet in length and 8 to 9 feet (2.4 to 2.7 m) draft. Barges up to 250 feet in length can be hauled. There are facilities for building or repairing craft up to the above dimensions. Marine supplies can be secured from New Orleans. Tugs, barges, and salvage equipment are available.

Tangipahoa River is a very narrow but comparatively deep stream flowing into Lake Pontchartrain 6 miles southwestward of Chefuncte River Lighthouse. There is a controlling depth of about 2 feet (0.6 m) across the bar at the mouth and about 6.5 feet (2.0 m) in the river for a distance of about 7½ miles above the mouth. *Tangipahoa River Light*, about a mile off the river mouth, marks the northeast side of the approach channel.

Pass Manchac and **Lake Maurepas** are described under a separate heading below.

LAKE MAUREPAS

(Chart 1269)

Lake Maurepas, lying west of Lake Pontchartrain, is 11½ miles long in a northeast and southwest direction, from 4 to 8 miles wide, and about 10 feet (3.0 m) deep. The shores of the lake are low and thickly wooded and there are no cities or towns along them. The lake is of little commercial importance except as the approach to the Tickfaw and Amite Rivers, both of which have considerable trade to New Orleans passing through the lake.

Pass Manchac is a passage 5½ miles long by 150 to 200 yards wide connecting Lake Pontchartrain with Lake Maurepas. The pass has good depths, but the approaches in both lakes are across long bars on which the channel depths are 7 feet (2.1 m). From Lake Pontchartrain there are two approach channels, East Channel and South Channel, the east side of the entrance to each being marked by a light. Both channels lead to *Pass Manchac Light* on the north point at the entrance to the pass. There is a bell fog signal at Pass Manchac Light. Both channels are good for about 7 feet (2.1 m). The approach channel at the west end leads along the north shore and is also good for about 7 feet (2.1 m); there is an extensive shoal to the southward of this channel. Two drawbridges, 220 feet apart, span the west end of the pass. The draws are 58 feet wide.

To enter Lake Maurepas from Lake Pontchartrain, pass 125 feet west of *South Channel Light* and head for Pass Manchac Light. Haul around the point at a distance of 150 to 200 yards and steer midchannel courses through the pass to the bridges and then follow the north shore at a distance of 200 to 300 yards for 1½ miles in order to avoid the middle ground in the entrance to the lake.

To go to Tickfaw River, steer 310° true (NW. by W. mag.) for 3 miles until the light opens well clear of the east side of the entrance, and then steer about north for it. Give the east side of the entrance a berth of 100 yards.

To go to Amite River, steer 270° true (W. ½ S. mag.) for 6 miles, keeping the light a little on the port bow. Leave the entrance beacons and the light to the southward and take a midchannel course into the river.

Tickfaw River flows into the northerly end of Lake Maurepas over a bar having a least channel depth of 6 feet (1.8 m). The tributaries of this river, **Natalbany** and **Blood Rivers**, join it 1½ and 7 miles, respectively, above its mouth. **Ponchatoula River** is a tributary of Natalbany River, 3½ miles above its junction with the Tickfaw. All of these streams are navigable for any draft that can be taken across the outer bar and for distances above their respective mouths as

follows: Tickfaw, 15 miles; Natalbany, 9 miles to Springfield; Blood, 4 miles; and Ponchatoula, 4 miles. A white light on a white pile marks the west side of the mouth of Tickfaw River at the shore of the lake.

To enter Tickfaw River, steer northward for the light, giving the east side of the entrance a berth of 100 yards.

Amite River empties into Lake Maurepas 8 miles westward of Pass Manchac. A depth of 6 feet (1.8 m) can be taken across the bar at the entrance and for a distance of about 32 miles above the mouth to its junction with **Bayou Manchac** which is navigable for 5 feet (1.5 m) for a distance of 7 miles to the town of **Hope Villa.** The entrance to Amite River is marked by two single-pile beacons and by *Amite River Light.*

To enter Amite River, pass northward of the two entrance beacons with the light nearly ahead, and when past the second beacon, head for the entrance to the river, passing well to the eastward of the light.

24. INTRACOASTAL WATERWAY, MOBILE BAY TO NEW ORLEANS

(Charts 1266, 1267, 1268, and 1269)

Information regarding other sections of the Intracoastal Waterway is given in the following pages:

Pensacola Bay to Mobile Bay, page 181.
New Orleans to Port Arthur, page 258.
Port Arthur to Corpus Christi, page 285.

The Intracoastal Waterway extends through Mississippi Sound, Grand Island Pass, Lake Borgne, the Rigolets, and Lake Pontchartrain to New Orleans. The route through Mississippi Sound is via Pass Marianne. At the eastern end of the Sound, a channel has been dredged, 10 feet (3.0 m) deep by 300 feet wide, through Pass aux Herons connecting the Sound with Mobile Bay. At the western end of the Sound, there is a dredged channel, 9 feet (2.7 m) deep by 100 feet wide, through the flats in Lake Borgne connecting Grand Island Pass with the Rigolets and at the western entrance to the Rigolets, another channel, 9 feet (2.7 m) deep by 100 feet wide, has been dredged through the Middle Ground to connect the Rigolets with Lake Pontchartrain. Except through these dredged channels, this waterway utilizes natural depths. The major portion of the waterway follows open water and is subject to weather conditions.

The controlling depth of the waterway is the 9-foot depths through the dredged channels.

The distance from *Mobile Channel Light 8* to *Industrial Canal Light* is about 110 miles. New Canal is 4 miles farther to the westward of the Inner Harbor Navigation Canal.

Four bridges cross the waterway, viz, one at the eastern end of the Rigolets, one at the western end of the Rigolets, and two across the eastern end of Lake Pontchartrain. The clearances of these bridges are as follows:

Railroad swing bridge at the eastern end of the Rigolets:
Horizontal clearance 154 feet.
Vertical clearance 11 feet (3.4 m) (when closed).

Highway swing bridge at the western end of the Rigolets:
Horizontal clearance 150 feet.
Vertical clearance 11 feet (3.4 m) above high water (when closed).
Highway bascule bridge across the eastern end of Lake Pontchartrain:
Horizontal clearance 150 feet.
Vertical clearance 13 feet (4.0 m) above high water (when closed).
Railroad swing bridge across the eastern end of Lake Pontchartrain, close westward of the above highway bridge:
Horizontal clearance 106 feet.
Vertical clearance 5 feet (1.5 m) above high water (when closed).

Pamphlets giving current information regarding the waterway are prepared periodically by the United States Engineer, Staples-Powell Building, Mobile, Ala.

The Inner Harbor Navigation Canal (see pages 228 and 229) at New Orleans connects Lake Pontchartrain with the Mississippi River. The distance through the canal from the light to the river is about 5 miles. The channel has depths in excess of 9 feet (2.7 m) and a width of 150 feet or greater. This waterway is owned by the State of Louisiana, and canal and lockage fees are charged for the use of it. A lock near the Mississippi River end has an inside length of 640 feet, inside width of 75 feet, and a depth of 31.5 feet (9.7 m) over the sills. Five drawbridges with openings of ample width cross the canal.

Directions.—The following Courses and Distances lead from *Mobile Channel Light 8* to the *Industrial Canal Light* at New Orleans.

Descriptive matter for points along this route is given on the following pages:

Pass aux Herons, page 194.
Pass Marianne, page 201.
Lake Borgne, page 203.
Lake Pontchartrain, page 206.
Inner Harbor Navigation Canal, pages 213 and 228.

For information regarding the Intracoastal Waterway westward of New Orleans, see pages 258 and 285.

Courses and Distances

Mobile Bay to New Orleans

For reverse direction, read upward	Course (Reverse courses in *italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. Mobile Bay Channel Light 8:			
Direct	260	WSW. ⅝ W	4.75
Reverse	*80*	*ENE. ⅝ E*	*4.75*
Pass south of Light 8.			
2. Pass aux Herons Channel Light 2:			
Direct	247	SW by W. ½ W	3.75
Reverse	*67*	*NE. by E. ½ E*	3.75
Through dredged cut, marked by beacons and lights along north side and by black can buoys along south side.			
3. Pass aux Herons Channel Light 8:			
Direct	264	W. by S	13.0
Reverse	*84*	*E. by N*	*13.0*
Passing 2½ miles south of *Isle aux Herbes Light.*			

Courses and Distances—Continued

Mobile Bay to New Orleans—Continued

For reverse direction, read upward	Course (Reverse courses in *italics*)		Distance
	True	Magnetic	
4. Grand Batture Id. Shoal Lighted Channel Buoy:	°	*Points*	*Nautical miles*
Direct	272	W. ¼ S	9.25
Reverse	*92*	*E. ¼ N*	9.25
NOTE.—A course 302° true (NW. by W. ⅝ W. mag.) for 4.6 miles leads to *Pascagoula River Entrance Light A*. See page 197 for Directions to Pascagoula.			
The Intracoastal Waterway passes south of Round Island. For courses and distances north of Round Island, see page 215.			
5. Round Island South Channel Buoy. Round Island South Spit Light in range with **Round Island Light** and distant 0.6 mile:			
Direct	330	NW. ⅞ N	2.3
Reverse	*150*	*SE. ⅞ S*	*2.3*
Passing ¼ mile northeast of Buoy C1.			
NOTE.—From position 5, a course 68° true (NE. by E. ⅝ E. mag.) for 5.6 miles leads to *Pascagoula River Entrance Light A*. For Directions to Pascagoula, see page 197.			
6. Round Island South Channel, Buoy 3. Position 300 yards north northeastward of buoy and 2½ miles 258° true from **Round Island Light:**			
Direct	273	W. ⅛ S	7.0
Reverse	*93*	*E. ⅛ N*	*7.0*
7. Bell Fontaine Lighted Buoy. Position ¼ mile south of:			
Direct	269	W. ⅝ S	13.25
Reverse	*89*	*E. ⅝ N*	*13.25*
The Intracoastal Waterway passes south of Round Island. For courses and distances north of Round Island, see page 215.			
8. Gulfport Channel Light 4:			
Direct	260	WSW. ⅝ W	10.0
Reverse	*80*	*ENE. ⅝ E*	*10.0*
Passing south of *Cat Island Shoal Light* and *Pass Marianne Buoy 2*.			
NOTE.—For Directions to Gulfport, see page 202.			
9. Pass Marianne Lighted Buoy 2A, position ¼ mile south of:			
Direct	249	SW. by W. ⅝ W	1.5
Reverse	*69*	*NE. by E. ⅝ E*	*1.5*
10. Pass Marianne Buoy 9, position close by to the northward:			
Follow buoys through Pass Marianne	var	var	2.5
Passing south of *Merrill Shell Bank Light*.			

Courses and Distances—Continued

Mobile Bay to New Orleans—Continued

For reverse direction, read upward	Course (Reverse courses in *italics*) True	Course (Reverse courses in *italics*) Magnetic	Distance
11. **Merrill Coquille Light,** bearing 160° true, distant 0.8 mile:	°	*Points*	*Nautical miles*
Direct	243	SW. by W. ⅛ W	10
Reverse	*63*	*NE. by E. ⅛ E*	*10*
Passing 450 yards south of *St. Joseph Island Light and Buoy.*			
12. **Lake Borgne Light** bearing 342° true and distant ½ mile:			
Direct	257	WSW. ¼ W	3.7
Reverse	*77*	*ENE. ¼ E*	*3.7*
Passing north of *Grassy Island Buoy 1.*			
13. **Lake Borgne Light 1:**			
Direct	262	WSW. ¾ W	3.3
Reverse	*82*	*ENE. ¾ E*	*3.3*
Through dredged cut, marked by *Lake Borgne Lights 1–3–5 and 7* along south side and red nun buoys along north side.			
14. **Lake Borgne Light 7:**			
Direct	289	WNW. ⅞ W	2.2
Reverse	*109*	*ESE. ⅞ E*	*2.2*
Passing through eastern entrance to Rigolets.			
15. **Draw, L. & N. R. R. bridge.** Through Rigolets.	Mid	channel	7
Passing through highway drawbridge and to the north of *West Rigolets Light* at West entrance to Rigolets.			
16. **Rigolets Entrance Buoy 2,** off point at western entrance to Rigolets.			
Direct (Lighted Range ahead)	322	NW. ⅛ N	1.5
Reverse (Lighted Range astern)	*142*	*SE. ⅛ S*	*1.5*
Through North Shore Channel (dredged cut), marked by black spar buoys along southwest side.			
17. **North Shore Channel Buoy 29:**			
Direct (Lighted range astern)	270	W. ½ S	1.5
Reverse (Lighted range ahead)	*90*	*E. ½ N*	*1.5*
Through North Shore Channel (dredged cut), marked by black spar buoys along south side of cut.			
18. **Draws, highway and R. R. bridges:**			
Direct	286	W. ⅞ N	1.75
Reverse	*106*	*E. ⅞ S*	*1.75*
19. **Industrial Canal Light:**			
Direct	227	SW. ⅜ S	14.25
Reverse	*47*	*NE. ⅜ N*	*14.25*
Passing north and west of light.			
From the light, it is 5¼ miles through the canal to the Mississippi River. There are 5 drawbridges across the canal and locks near the southern end. See pages 217 and 228 for further information.			
The entrance to New Canal (see page 207) is 4 miles to the westward from the Inner Harbor Navigation Canal,			

Courses and Distances—Continued

Mobile Bay to New Orleans—Continued

For reverse direction, read upward	Course (Reverse courses in *italics*) True	Course (Reverse courses in *italics*) Magnetic	D istanc
19. **Industrial Canal Light**—Continued. or from the bridge draws (position 18), a course 233° true (SW. ¼ W. mag.) for 17.8 miles will lead to it.			
PASSING NORTH OF ROUND ISLAND. ROUTE GOOD FOR 5 TO 6 FEET (1.5 TO 1.8 M.)			
Position A below is the same as position No. 4 above and position E below is the same as position No. 7 above.			
A. **Grand Batture Id. Shoal Lighted Channel Buoy:**	°	*Points*	*Nautica miles*
Direct	302	NW. by W. ⅝ W.	4. 6
Reverse	*122*	*SE. by E. ⅝ E.*	*4. 6*
B. **Pascagoula River Entrance Light A:**			
Direct	320	NW	2. 1
Reverse	*140*	*SE*	*2. 1*
Following Pascagoula River Entrance Channel.			
C. **Pascagoula River Entrance Channel Light B:**			
Direct	279	W. ⅜ N	5. 0
Reverse	*99*	*S. ⅜ E*	*5. 0*
Passing 1 mile north of Round Island and about 300 yards north of *Round Island North Spit Buoy 1.*			
D. **Round Island Spit Light,** position south of:			
Direct	253	WSW	7. 5
Reverse	*173*	*ENE*	*7. 5*
E. **Bell Fontaine Lighted Buoy;** position ¼ mile south of.			

25. CHANDELEUR AND BRETON SOUNDS

(Charts 1270 and 1272)

Chandeleur and Breton Sounds lie southward of Mississippi Sound and northward of the Mississippi River Delta—Chandeleur Sound to northward and Breton Sound to southward—with no clearly defined line of demarcation between them. **Chandeleur Islands** form the eastern boundary of Chandeleur Sound. They are a narrow, crescent-shaped chain of low islands, beginning 10 miles southward of Ship Island and extending in a general south by west direction for a distance of 23 miles. Southwestward from these islands are **Errol Island,** at a distance of 2 miles, and **Breton Island,** 8½ miles beyond Errol Island. These mark the eastern limit of Breton Sound. Vessels of less than 10 feet (3.0 m) draft bound from Mississippi Sound to Mississippi River can pass through these sounds and have smoother water than by passing eastward of the islands.

Chandeleur Lighthouse (Lat. 30°02.′9; Long. 88°52.′3) at the northerly end of the Chandeleur Islands, is a pyramidal, skeleton structure, painted black and brown. The light is flashing white (light

0.5 second, eclipse 9.5 seconds), 99 feet (30 m) above the water, and visible 16 miles.

North, Freemason, Old Harbor, and **New Harbor Islands** are located on the eastern side of Chandeleur Sound. There are no houses on these islands and they are frequented only by fishermen and trappers. Several unmarked channels good for a draft of 8 feet (2.4 m) or more, lie between them. Good protected anchorage for small boats in stormy weather can be found in **Shoalwater Bay, Smack Channel,** and in some of the other passages.

The western shore of both sounds is a network of marshy islands separated by shallow bayous and bays. The land is all low and is submerged on extremely high tides, in some places nearly to the banks of the Mississippi River. Several shallow canals lead from the southern part of Breton Sound to the river bank, but only one of them, Ostrica Canal, leads into the river. These canals are used by the large fleet of oyster boats operating in the sound to deliver their catch to canneries and packing houses on the river bank, or to highways for truck transportation to New Orleans.

A depth of about 4 feet (1.2 m) can be carried from Chandeleur Sound to Lake Borgne through **Bayou La Loutre** by entering the bayou through **Lake Eloi** and **Bayou Eloi** and passing into Lake Borgne through **Bayou St. Malo.** There is a highway along the upper portion of Bayou La Loutre. Shallow draft boats can ascend **Bayou Terre aux Boeufs** to **Delacroix,** a small settlement about 8 miles south of Lake Borgne. A highway extends from Delacroix to Poydras on the Mississippi River and thence to New Orleans.

The marsh lands about **Black Bay** are used extensively for hunting.

The western side of the sounds is marked by three lights, one off **Door Point,** one at east end of the shoal off **Mitchell Key** and one off **Point Chico.** Door Point Beacon, 1½ miles east of Door Point Light, should be left to the eastward when proceeding from Chandeleur Sound to Mississippi Sound by way of **Oyster Bay** and **Grand Pass.** This route is used by the fishermen who bring in their catch from Louisiana waters. A checking station is maintained in Oyster Bay by the Conservation Commission of the State of Louisiana to check the catch taken from Louisiana waters to Mississippi. Grand Pass connects Oyster Bay with Mississippi Sound; it is marked by *Grand Pass Oyster Bay Light.*

Ostrica Canal is a privately-owned canal leading into the Mississippi River at the village of **Ostrica,** 21½ miles above the Head of the Passes. At high water a draft of 3 to 4 feet (0.9 to 1.2 m) can be taken from Breton Sound, through **Quarantine Bay, Bayou Tortillon,** and this canal, to the river, but on account of numerous oyster bars in these waters, local knowledge is essential. The canal has one lock in the levee of the river which will accommodate a vessel 60 feet long, 18 feet wide, and 4 feet (1.2 m) draft at low water. Toll charges for the canal range from $3 to $6 (approximately).

Ostrica is a small settlement opposite Buras.

Directions.—The following **Courses and Distances** lead from northwestward of *Chandeleur Lighthouse* to South Pass. The route is good for a depth of 9 to 10 feet (2.7 to 3.0 m) and the distance is 75 miles. The Inland Rules apply as far as *Pass a Loutre Lighted Whistle Buoy 2,* thence the International Rules to *South Pass Lighted Whistle Buoy.*

Courses and Distances

Chandeleur and Breton Sounds

For reverse direction, read upward	Course (Reverse courses in *italics*)		Distance
	True	Magnetic	
1. **Spit Buoy 3**—Chandeleur Lighthouse bearing 146° true (SE. ½ S.), distant 2.2 miles:	°	*Points*	*Nautical miles*
Direct	206	S. by W. ¾ W	20. 2
Reverse	*26*	*N. by E. ¾ E*	*20. 2*
Passing 2.4 miles to the westward of Pt. Neptune.			
2. **Harbor Keys Buoy**—vertical striped:			
Direct	193	S. ⅝ W	23. 6
Reverse	*13*	*N. ⅝ E*	*23. 6*
Passing 1½ miles eastward of the north end of Breton Island.			
3. **Position 6½ miles south (180° true) of the north end of Breton Island:**			
Direct	135	SE. ½ E	13. 5
Reverse	*315*	*NW. ½ W*	*13. 5*
4. **Pass a Loutre Beacon** (unused light tower) bearing 230° true (SW. ⅛ S. mag.) distant 4 miles:			
Direct	156	SSE. ⅝ E	4. 5
Reverse	*336*	*NNW. ⅝ W*	*4. 5*
5. **Pass a Loutre Lighted Whistle Buoy 2:**			
Direct	217	SSW. ¾ W	14
Reverse	*37*	*NNE. ¾ E*	*14*
Keeping clear of shoal area off Southeast Pass.			
6. **South Pass Lighted Whistle Buoy.**			

26. MISSISSIPPI RIVER

(Charts 1269, 1271, and 1272)

GENERAL

The **Mississippi River** empties into the north central part of the Gulf of Mexico through several mouths or passes, which form what is known as the delta of the Mississippi. The delta is, roughly, of a bird-foot form, having four toe-like extensions (the passes), which consist of narrow-banked deposits of sand and clay brought down by the river current. Between the passes are bays of considerable extent, which are being slowly filled by wave and tidal action from the Gulf, carrying in the bar sands, and by sedimentation from river overflow from above. The upper half of **Garden Island Bay** has been filled in this manner and is now a marsh. The delta is being built seaward at an estimated average rate of about 300 feet a year.

The passes begin to diverge at a point called **Head of the Passes** 12 and 17 miles above the mouths of South and Southwest Passes, respectively. The angle of greatest divergence is about 127°. The perimeter of the delta between the most widely divergent passes is about 35 miles.

Air photo compilations are available for the coastal area between Mississippi Sound and the Mississippi River. (See page 2.)

The improved ship channels into the Mississippi River are through South Pass and Southwest Pass. The following minor passes can only be used by small boats.

Main Pass has a depth of about 4 feet (1.2 m) over the bar at the Gulf entrance and about 5 feet (1.5 m) over the sill at the river entrance which is at Cubits Gap, about 3 miles above the Head of the Passes. In 1935 the passage over the sill was along the west shore, between the shore and an old barge sunk on the sill. The Gulf entrance to Main Pass is marked by *Cubits Gap-Main Pass Light. Cubits Gap Light* is just south of the Mississippi River entrance. This pass is used considerably by fishing vessels operating in Chandeleur and Breton Sounds.

Pass a Loutre divides at 4½ miles below Head of the Passes and flows onward in two streams, the northern one still bearing the same name, while the southern is called **Southeast Pass.** Pass a Loutre divides again when nearly to the Gulf and discharges through two mouths, of which the southern this time is called Pass a Loutre and the northern, **North Pass.** Southeast Pass also branches when near the Gulf, and its northern branch is named **Northeast Pass.** These passes are deep from the Head of the Passes to within a short distance of the Gulf, but the mouths of all of them are obstructed by bars. In 1935, it was reported that 6 feet (1.8 m) could be taken into North Pass and about 3 feet (0.9 m) into Southeast Pass. These passes are used occasionally by small local craft but should not be attempted by strangers.

Pass a Loutre Beacon is a black and white spirally banded tower (unused lighthouse) on the north side of the pass and 2 miles inside the entrance; it is 76 feet high (23.2 m).

Northeast Pass Beacon is the grayish white tower of an unused lighthouse; it is about half a mile north of the pass and 2 miles west of the entrance to the pass.

The marsh lands south of Main Pass are used extensively for hunting and there are oyster camps about **Redfish Bay.**

Landmarks.—The discolored water discharged from the Mississippi River is one of the first intimations to mariners approaching the passes of the proximity of land. This, however, cannot be depended upon to indicate distance, for with high-river stages and northerly winds discolored water will be met in some directions 60 miles or more from land, and the water will at times appear broken from 15 to 20 miles from the passes. The land near the entrances to the passes is low marsh covered with tall, coarse grass and weeds.

Approaching either South Pass or Southwest Pass, the lighthouses are the most prominent and easily recognized marks. To the east of each light there is an elevated water tank which is the next object recognized. The smoke from steamers in the passes is also a guide.

The wreck of a steamer lies 2½ miles 344° true from *Southwest Pass East Jetty End Light.* As it is north of the shoal area off the West Jetty, its masts should not be taken for a ship in the pass.

Mud lumps, unstable mounds of earth of considerable extent, forced up by pressure underneath to a height of 2 to 8 feet (0.6 to 2.4 m) above the surface of the water, are frequently found within about a mile of the mouth of each pass and are said to be most numerous on the right side of each channel. They generally rise in a few weeks' time and then gradually wear away, though sometimes they subside even more quickly than they rise.

A speed trial course has been established about 4 miles east of Southwest Pass. The course is marked by four white can buoys, 1 mile apart, and by shore ranges at the ends of a measured nautical mile. The course bears 40° true (NE. by E. mag.). The shore ranges are opposite the two center buoys.

Fogs.—From December to June fog may be encountered anywhere from 60 miles off the passes to the city of New Orleans. Southerly and easterly winds bring it in, and northerly and westerly winds clear it away.

Currents, Gulf of Mexico (see also p. 42).—The currents are variable in direction and velocity, depending at some seasons of the year upon the direction and velocity of the wind and, near the entrance to the passes, upon the stage of the river.

During February, March, and April the current runs to the southeastward with considerable strength, especially near the Tortugas, and it will be directly against a vessel most of the way on the course from there to the Mississippi River. During the rest of the year a countercurrent sets a little to the northward for the first 50 miles west of Tortugas. Then for 150 miles the main current runs to the southward and southeastward. For the next 100 miles there is an area of little movement, and for the last 125 miles, before reaching the mouth of the river, it runs strong to the east-northeastward.

During a light southerly wind a northeasterly set of 2¼ knots has been observed 13 miles southeast of South Pass entrance, and at the same time there was an easterly set of one-half knot at the lighted whistle buoy off the entrance.

At Southwest Pass lighted buoy the current is due chiefly to the discharge of the river. Its direction is southwesterly, and the velocity varies from 0 to 4 knots, the average being 1.7 knots.

Tides and currents, Mississippi River.—In the passes there is generally but one high and one low water in 24 hours, the extreme range being less than 1½ feet. At New Orleans the tide is not noticeable. The current due to the tide is not strong at any point, and for purposes of navigation it is rarely taken into account. **High river stages,** usually occurring from April to July, decrease the effect of the tide. The average date of high river stage occurs in April and of low river stage in October. At New Orleans the extreme difference between high and low stages of the river is 21 feet; the mean difference is about 14 feet. The following table gives the velocity of the current in the river for the different months of the year:

Mean cross-sectional velocity

Month	Section midway between The Jump, Grand Pass, and Fort St. Philip	Section at steamboat wharf, New Orleans	Month	Section midway between The Jump, Grand Pass, and Fort St. Philip	Section at steamboat wharf, New Orleans
	Knots	*Knots*		*Knots*	*Knots*
January	3.2	2.9	August	1.2	1.1
February	6.5	5.8	September	.8	.8
March	4.7	4.2	October	1.2	1.1
April	3.7	3.2	November	1.9	1.8
May	3.4	2.9	December	2.0	1.8
June	3.1	2.8			
July	2.2	2.0	Mean	2.8	2.6

The greatest velocity in a given section is generally about one and one-third times the cross-sectional velocity. The velocities in the narrower portions of the passes are probably a little greater than those at the steamboat wharf at New Orleans.

At several places in the lower part of the river, countercurrents or eddies, are often found near the banks, which, if taken advantage of, can greatly assist vessels bound up the river.

At South Pass the river current frequently has an easterly set. At Southwest Pass it sets straight out from between the jetties, thence spreading out fan-shaped, with slightly greater velocity to westward.

SOUTH PASS

(Chart 1272)

South Pass, is one of the two important commercial entrances to the Mississippi River from the Gulf of Mexico. It lies 425 miles northwestward of Dry Tortugas and 90 miles southwestward of Mobile Bay entrance. It has been improved by the construction of jetties on both sides of the entrance and by dredging, so that there is a usual depth of 30 feet (9.1 m) or more throughout the length of the pass from the Gulf to the Head of the Passes, a distance of about 12 miles. The width of the pass varies from 600 to 850 feet; the width in the clear between the jetties at their ends is about 670 feet. Immediately outside the entrance the depths are subject to considerable change, due to the large amounts of sediment brought down by the strong river currents; but at a distance of 1¼ miles out from the end of the jetties the depths are more dependable, and 10 fathoms (18.3 m) can be found in any easterly or southerly direction.

In March 1936 there was a controlling depth of 32 feet (9.8 m) on the entrance range at the south entrance to the pass.

Lying between one-quarter and one-half mile off the end of the jetties on the west side of the channel is a dangerous shoal, marked by *West Bank Lighted Bell Buoy 1*, with depths of 7 to 17 feet (2.1 to 5.2 m) on it. Except for changes during and after high river stages, the position of and depths on this shoal are rather constant. This shoal, coupled with the strong currents coming out from the river, makes the navigation of South Pass difficult for strangers without the aid of a pilot. A bend in the channel near the Head of the Passes also adds to the difficulty of navigating South Pass.

The approach to the entrance is marked by *South Pass Lighted Whistle Buoy* (vertical striped) 1½ miles southeastward of the end of the jetties and by *West Bank Lighted Bell Buoy 1* marking the shoal ground to the southwestward.

Two lighted ranges, *South Pass West Jetty Range* and *South Pass Range*, mark respectively the channel approaching and the channel through the entrance between the jetties, and *South Pass East Jetty Light* is located near the outer end of the east jetty. There is **an air diaphone fog signal** and a **radiobeacon** at *South Pass West Jetty Front Light* and these signals have been synchronized for **distance findings**, see page 27; also see Light List and H. O. Publication No. 205. At South Pass East Jetty Light there is a fog bell; it is operated every night from November 1 to April 30 and at all other times during foggy weather.

At Port Eads, 2 miles inside the entrance, there is a United States Navy Radio Direction Finder Station; call letter NBX.

South Pass (Rear) Lighthouse (Lat. 29°00′.9; Long. 89°10′.0), on the west bank 2¼ miles above the end of the jetties, is a white skeleton structure enclosing a cylindrical stairway. The light is flashing white (flash 1.5 seconds, eclipse 3.5 seconds), 108 feet (33 m) above the water, visible 16 miles.

The **Pilots Station** is a small settlement on the west bank about one-half mile above the end of the jetties. Rates for bar pilotage are given on page 229.

Port Eads, situated 2¼ miles above the end of the jetties on the east bank, is a post office and headquarters for the construction force employed in the maintenance of the pass.

At the north end, the entrance into the pass from the Mississippi River is marked by *Head of Passes West Jetty Light* and *Head of Passes East Jetty Light*, on the west and east points respectively at the entrance, and by *Cypress Lighted Range* marking the entrance channel. There is an electric siren fog signal at the West Jetty Light. There was a controlling depth of 35 feet (10.7 m) through the north entrance to the pass in June 1935.

The following **Rules and Regulations for the Navigation of South Pass, Mississippi River,** have been prescribed for the protection of the pass and the works for its improvement.

1. Vessels descending South Pass may enter the pass at full speed, but, after passing Depot Bend Light shall reduce their speed so as not to exceed 12 miles per hour over the ground or from point to point, without regard to the velocity of the current or run of the tide. The limiting speed for ascending vessels, similarly measured, shall be 10 miles per hour.

2. Steamers, with or without tows, passing Port Eads, or any dredge or other floating plant working in or anchored in the Pass, shall reduce their speed to not more than 5 miles per hour over the ground if ascending, or 8 miles per hour if descending. In all other respects navigation shall conform to the War Department rules and regulations governing the display of signals on, and the operation of, all craft and accessories working on wrecks, engaged in dredging, surveying, or other work of improvement, and the use and navigation of the waters in the vicinity, in the Great Lakes and their connecting and tributary waters as far east as Montreal, the Red River of the North, and the rivers whose waters flow into the Gulf of Mexico, and their tributaries.

3. Vessels anchoring in the Pass shall take positions near the *eastern* bank, above a point marked by a post, painted white, which is about one-half mile above South Pass Lighthouse; and below a point 1 mile below the Head of the Passes Lighthouse; and vessels so anchoring shall put out such extra moorings as may be necessary to prevent their being blown athwart the channel and thus endangering the navigation of the Pass.

4. No vessel, except a towboat without tow, shall enter the channel between jetties from the sea until after any descending vessel which has been approached within 1 mile of the outer end of the jetties shall have passed to sea; and likewise, no vessel descending the river shall enter the channel at the head of the Pass until after an ascending vessel which has reached the Franks Crossing Light on right bank below Depot Bend, shall have passed through the entrance at the head of the Pass; also, no such vessel ascending the Pass shall pass Franks Crossing Light until after a descending vessel which has entered the channel into the head of the Pass has passed Depot Bend Light.

5. No vessel having a speed less than 9 knots shall enter South Pass from the Gulf when the stage of the Mississippi River exceeds a 15-foot reading on the Carrollton gage at New Orleans. Such vessels shall use the Southwest Pass. This regulation shall not apply when the Southwest Pass is not clear for safe navigation.

6. Ashes, oil, or other refuse matter shall not be thrown, dumped, or discharged in the Pass, nor in the Gulf of Mexico within a distance of 5 miles from the sea ends of the jetties.

7. Seagoing sailing vessels shall not sail down the Pass after dark, or up the Pass farther than the anchorages designated in paragraph 3.

8. After dark no tow shall consist of more than one vessel of any kind, whether steamer, sailing vessel, barge, or other craft, and during daylight no tow shall consist of more than two vessels of any kind, whether steamers, sailing vessels, barges, or other craft. Tows may be in any formation except that when towing on hawsers, the hawsers shall not be more than 50 fathoms in length. Tows will not be permitted to change formation once they have entered the Pass. When rough weather is to be anticipated in the Gulf of Mexico, down-bound tows will be made up on hawsers in the river before entering the Pass. When coming to anchor at the authorized anchorages, tows will use caution to avoid blocking the Pass for approaching vessels.

9. These regulations shall take effect June 1, 1931, and shall supersede those prescribed August 8, 1929, and subsequent amendments thereof.

Directions for South Pass are given on page 235

SOUTHWEST PASS

(Chart 1272)

Southwest Pass, the westernmost of the passes of the Mississippi River, is 19 miles west-southwestward of South Pass entrance and 280 miles eastward of Galveston entrance. It has been improved by the construction of jetties on both sides at the entrance and by dredging, and a least depth of 35 feet (10.7 m) is generally maintained from the Gulf throughout the length of the pass, a distance of 17 miles. The width of the pass varies between 1,200 and 2,800 feet, averaging 2,000 feet; the width in the clear between the ends of the jetties is 1,400 feet. Dredging is done as necessary to maintain the project depth.

Near the end of the jetties the depths are somewhat changeable, but at all times there seems to be deep water in the Gulf from nearly every direction up to within three-fourths mile of the entrance.

In March 1936 there was a controlling depth of 39 feet (11.9 m) through Southwest Pass; in February 1936 the controlling depth on range at the head of Southwest Pass (Head of the Passes) was 34 feet (10.4 m).

A shoal with depths of 13 to 16 feet (4.0 to 4.9 m) extends along the west side of the approach channel for about a mile beyond the end of the west jetty. As at South Pass, the position of and depths on this shoal are rather constant except for changes during and after high river stages in the spring.

The approach to Southwest Pass is marked by *Southwest Pass Entrance Lighted Whistle Buoy*, 1¼ miles southward from the ends of the jetties. From this buoy, to abreast of *Southwest Pass East Jetty End Light*, the channel is marked by a lighted range (*Southwest Pass Entrance West Jetty Range*) and two lighted buoys, one on either side of the channel. Thence for a short distance the channel between the ends of the jetties is marked by a second lighted range (*Southwest Pass Inner Range*), succeeding the first range. The end of the first dike (A) near the end of the east jetty is marked by a light which is near the second channel range. A series of dikes has been constructed channelward from along the inner bulkhead of the east jetty.

The fog signal at *Southwest Pass East Jetty End Light*, which is at the end of the east jetty, is an electric siren. A fog bell at *South-*

west Pass Inner Range Front Light (second range) is operated every night from November 1 to April 30 and at all times during foggy weather. A **radiobeacon** and **air diaphone fog signal** are operated at *Southwest Pass East Jetty Fog Signal Station*, which is located 400 yards inside the end of the east jetty. The radiobeacon and the fog signal have been synchronized for **distance finding**, see page 27. Also see Light List and H. O. publication No. 205.

Southwest Pass Lighthouse (Lat. 28°58′.3; Long. 89°23′.5), on the northwest side of the pass 4½ miles inside the entrance, is a brown skeleton structure enclosing a cylindrical stairway. The light is occulting white (light 10 sec., eclipse 10 sec.), 124 feet (38.0 m) above the water and visible 17 miles; it is the brightest light at the passes of the Mississippi River.

Burrwood is a post office and the headquarters for the construction force employed upon the improvement of the pass; it is located on the southeast bank, 5 miles above the end of the jetties. Gasoline and provisions in limited quantities can be obtained here.

At the north end of the pass, *Southwest Pass Head Lighted Range* marks the entrance into the pass from the Mississippi River. There was a controlling depth of 34 feet (10.4 m) through the north entrance to the pass in February 1936.

The following **Rules and Regulations for the Navigation of Southwest Pass, Mississippi River,** have been prescribed for the protection of the pass and the works for its improvement.

1. Vessels navigating Southwest Pass or any part thereof shall reduce their speed so as not to exceed *12* miles per hour over the ground or from point to point, without regard to the velocity of the current or run of the tide.

2. Steamers, with or without tows, passing within 500 feet of the wharves at Burrwood, or of any dredge or other floating plant working in or anchored in the Pass, shall reduce their speed to not more than 5 miles per hour over the ground if ascending, or 8 miles per hour if descending. In all other respects navigation shall conform to the War Department rules and regulations governing the display of signals on, and the operation of, all craft and accessories working on wrecks, engaged in dredging, surveying, or other work of improvement, and the use and navigation of the waters in the vicinity, in the Great Lakes and their connecting and tributary waters as far east as Montreal, the Red River of the North, and the rivers whose waters flow into the Gulf of Mexico, and their tributaries.

3. Vessels anchoring in the Pass shall take position near the *eastern* bank, either above a point marked by a post, painted white, on the bank about 1½ miles above Southwest Pass Lighthouse, or between the bar pilots' station about 1 mile above the lower ends of the jetties, and spur dike no. E–1 about 1½ miles above the bar pilots' station, each of these limits being marked by white posts surmounted with round black targets.

4. No vessel, except a towboat without tow, shall enter the channel between the jetties from the sea until after any descending vessel which has approached within 1 mile of the outer end of the jetties shall have passed to sea.

5. Ashes, oil, or other refuse matter shall not be thrown, dumped, or discharged in the Pass, nor in the Gulf of Mexico within a distance of 5 miles from the sea ends of the jetties.

6. Seagoing sailing vessels shall not sail down the Pass after dark, or up the Pass farther than the anchorages designated in paragraph three.

7. After dark no tow shall consist of more than two vessels of any kind, whether steamers, sailing vessels, barges, or other craft, and during daylight no tow shall consist of more than three vessels of any kind, whether steamers, sailing vessels, barges, or other craft. Tows may be in any formation except that when towing on hawsers, the hawsers shall not be more than 50 fathoms in length. Tows will not be permitted to change formation once they have entered the Pass. When rough weather is to be anticipated in the Gulf of Mexico, down-bound tows will be made up on hawsers

in the river before entering the Pass. When coming to anchor at the authorized anchorages, tows will use caution to avoid blocking the Pass for approaching vessels.

8. These regulations shall take effect June 1, 1931, and shall supersede those prescribed August 8, 1929, for this waterway.

Directions for Southwest Pass are given on page 236.

HEAD OF THE PASSES TO NEW ORLEANS

From the Head of the Passes to New Orleans, a distance of 81 miles, the river has a least width of 600 yards, and a clear unobstructed channel with depths of from 6 to 39 fathoms (11 to 71 m). Shallow water does not extend far from the shore at any point, and the banks may be approached quite closely. The land on both sides of the river is low, and generally marshy, and in the lower reaches mostly covered with coarse grass or willows.

Above **Bohemia** on the east side and The Jump on the west side, levees prevent overflow at high water. Below Bohemia there is a 10-mile break in the levee to provide passage for flood waters eastward into the Gulf. There are levees on either side of this break, extending from the river to the Gulf and preventing the flooding of adjacent land. Below this break, the levee continues to **Fort St. Philip.**

The land back of the levees on the east side was formerly laid out in sugar and rice plantations but of late has been used for pasturage and market gardens. On the west side, back of the levees there are extensive orange groves. There is communication with New Orleans by means of river boats and by railroads and highways which extend down the west bank to Buras and down the east bank to Pointe a la Hache, 21½ and 37 miles, respectively, above the Head of the Passes.

Cubits Gap is an opening in the east bank 3 miles above the Head of the Passes, at which **Raphael, Main,** and **Octave Passes** meet and connect with the river. These passes are navigable for small craft but Main Pass is the only one having navigable connection with the Gulf, there being about 4 feet (1.2 m) across the bar at the entrance to this pass. A sill of willow brush, weighted down by rocks, has been laid across the entrances to these passes; it can be crossed at certain places with a draft of 5 feet (1.5 m) but local knowledge is necessary.

At **Cubits Gap Lighthouse,** on the southeast side of the gap, **a flashing white light of 2,000,000 candlepower** is shown from an 80-foot tower during fog or low visibility. The regular light is not shown when this flashing white light is in operation.

The Jump is the name of an opening in the west bank, 9 miles above the Head of the Passes, where Grand Pass and several smaller passes connect with the river. There is a sill across the entrance at a depth of about 5 feet (1.5 m) and a depth of about 4 feet (1.2 m) can be carried through the pass into the Gulf.

Pilottown, Venice, and **Boothville** are post offices and small settlements 2, 10, and 14 miles, respectively, above Head of the Passes. Gasoline, oil, and provisions in limited quantities can be obtained at these towns, and there is boat communication with New Orleans twice a week.

At **Olga,** across the river from Boothville, there is a small machine shop and boatyard with marine ways capable of hauling boats up to

about 90 feet long and 5-foot (1.5 m) draft. From behind the levee, a canal leads to **Grand Bay**, where there are numerous oyster camps.

The Ostrica Canal (described on page 216) has its Mississippi River entrance at **Ostrica**, a small settlement opposite Buras.

Buras (population 750 by the 1930 census) is the largest town on the river south of New Orleans. There are several stores where provisions and some supplies can be obtained. Gasoline, distillate, fuel oil, etc., are available. As at most river towns, the only water is rain or distilled river water, the well water being brakish. There is a machine shop and on the canal behind the levee there are two marine ways capable of hauling boats up to about 50 feet long and 3- to 4-foot draft. Numerous fishing boats operate in the waters to the westward of the Mississippi River, bringing their catch to the fish canneries at Buras. The only passage through the levee is at Empire (Doullut Canal). There is highway, railroad, and telephone communication with New Orleans and also boat service on the river.

Empire is a small settlement 3½ miles north of Buras and on the same side of the river. The Doullut Canal is located here. There is a store and marine ways capable of hauling boats up to 60 feet long and 3-foot draft.

Doullut Canal at Empire is a State owned canal leading from the Mississippi River to Adams Bay. In conjunction with the Ostrica Canal, it offers a water route for about 3-foot draft (0.9 m) across the Mississippi Delta between Barataria Bay and Breton Sound. The canal has one lock in the levee of the river which will accommodate a vessel 60 feet long, 18 feet wide, and 4 feet deep. There are no toll charges for use of this canal and lock.

The canal has a high-water depth of about 3 feet (0.9 m) and this draft can be carried to the Gulf or to Barataria Bay. The route to the Gulf is across **Adams Bay**, which is usually marked by stakes, and thence through **Mevers Canal** and **Grand Bayou**. Somewhat less draft can be carried by way of **Bayou Cook** and **Bastain Bay**. To reach Barataria Bay, Grand Bayou is followed to the northward to its junction with the Port Sulphur Canal, which connects with Lake Grande Ecaille, and thence with Barataria Bay.

Port Sulphur (Grande Port) is a post office and small town about 11 miles above Buras on the west bank of the river. There is a privately owned canal (**Port Sulphur Canal**) extending from the river to **Lake Washington** and **Lake Grande Ecaille**, a distance of about 8 miles. There are connections for 3-foot (0.9 m) draft vessels through these lakes into Barataria Bay and adjacent waters, but no connection into the Mississippi River.

There are docking facilities at Port Sulphur for ocean-going vessels. The wharf has a face 120 feet along the river, with dolphins and mooring clusters providing berthing space of about 800 feet. The depths are 30 feet (9.1 m) or more. The wharf is equipped with surphur-handling machinery.

Several other canals, with depths of about 3 feet (0.9 m), lead from behind the levees to the waters beyond on either side. **Socola Canal at Socola** leads to **Bayou Vacherie** and Grand Bayou and thence either to the Gulf or to Barataria Bay, as noted above. **Wilkinson Canal at Myrtle Grove** leads to Barataria Bay. On the east side of the river, similar canals lead eastward from Pointe a la Hache. These canals

lead to the canneries and to the highway on either side of the river but do not connect with the river.

Poine a la Hache (population 515 by the 1930 census), 40 miles below New Orleans, is the second largest town on the river. It is the county seat of Palquemines County which embraces most of the lower Mississippi River. Gasoline, provisions, and some supplies can be obtained. There are fish canneries and a ferry to the opposite side of the river. See above paragraph regarding canals.

The Lake Borgne Canal connecting the Mississippi River with Lake Borgne is described on page 203. The Harvey Canal, at Harvey opposite New Orleans, connects the Mississippi River with an extensive network of inland waterways west of New Orleans. It is described on page 259.

NEW ORLEANS

New Orleans (population 458,762 by the 1930 census), the largest city on the Gulf Coast, is one of the largest ports of the United States. It is located on both banks of the Mississippi River, 93 and 98 miles, respectively, above the entrances to South and Southwest Passes. It is a natural gateway to and from the vast central and southern portions of the United States and particularly to the entire Mississippi Valley with which it is connected by numerous inland water routes. There are main route rail connections to all parts of the United States. Both the foreign and coastwise trade are extensive. The chief imports are petroleum products, sugar and molasses, bananas, sisal and burlap, bauxite, nitrate of soda, and mahogany, and the chief exports are grain and flour, cotton, lumber, and petroleum products.

The city proper is on the north bank of the river, on a strip of land between the river and Lake Pontchartrain. The river and the lake are connected by the Inner Harbor Navigation Canal along the east side of the city. There are industrial developments and some port facilities on this canal.

Abreast of New Orleans, on the opposite bank of the river, are **Algiers** (which is a part of New Orleans), **Gretna**, and **Westwego**, all of which are connected with New Orleans by ferries. At Algiers there are several shipyards and a **United States Naval station**.

Chalmette, about 5 miles below Canal Street, on the same side of the river, has extensive terminal and cargo handling facilities.

The **New Basin Canal, Bayou St. John (Old Canal), Shushan Airport, and** other features along the Lake Pontchartrain shore of New Orleans are described on pages 206 and 207.

The harbor extends for nearly 15 miles along the Mississippi River, from Westwego and **Southport** on the northwest to Chalmette, 5 miles below Canal Street. Practically all wharves parallel the river bank and for 10 miles along the east bank of the river there is a practically continuous quay. The greater portion of the wharf area is covered by transit sheds. The wharves and sheds are equipped with modern handling devices suitable for the various commodities entering the port and practically all have rail connections. Depths at the wharves range from 15 to 40 feet (4.6 to 12.2 m) at mean low water, most of the wharves having 30 feet (9.1 m) or more alongside.

The Board of Commissioners of the Port of New Orleans, a State agency generally known as the **Dock Board**, has full control of the port except for matters pertaining to levees or the municipal belt line

railroad. About two-thirds of the improved wharf frontage of the port is owned by the State of Louisiana and operated by the Dock Board. The office of the Superintendent of Docks is on Canal Street near the river.

No bridges cross the Mississippi River between New Orleans and the sea. At Nine Mile Point, about 9 miles above Canal Street, the New Orleans Public Belt Line Railroad and Highway Bridge crosses the river. The principal navigation channel is near the west bank of the river and has a clear width between piers of 750 feet and vertical clearance of 135 feet (41.1 m) above high water.

Terminal Facilities.—Of the 10 miles of wharves, over 7 miles are covered by steel sheds and provided with every necessary facility for the quick handling of cargo. Floating derricks, locomotive cranes, and practically any other handling equipment are available as needed.

Three wharves are equipped with a total of 14 special banana unloaders each with a capacity of 2,500 bunches per hour. These banana unloaders with other mechanical installations afford immediate dispatch in refrigerator cars.

The public grain elevator has a storage capacity of 2,622,000 bushels and is considered one of the most modern grain terminals in the United States. Grain is handled to and from cars, barges, or ocean vessels by means of pneumatic conveyors, loading-out spouts, shipping bins, galleries, trippers, and marine legs. The wharf can accommodate five vessels. A modern sacking plant is operated in conjunction with the grain elevator.

The public coal and bulk commodity handling plant is equipped with three loading and two unloading towers and with numerous movable belt conveyors.

The public cotton warehouse has a storage capacity of 461,856 high-density bales. It is elaborately equipped with modern mechanical devices for loading or unloading cars, barges, or steamboats. In addition, there are three private concerns providing ship-side cotton warehouses at publicly operated wharves.

There is a vegetable oil pumping plant on the wharf of the public cotton warehouse for transferring such oils as coconut, palm kernel, olive, linseed, etc., from ships to tank cars.

Exclusive of wharf space, there are over 3,250,000 square feet of covered warehouse space designated for the storage of coffee, sugar, and general merchandise.

Several wharves are equipped with portable sectional conveyors for the handling and stacking of such commodities as coffee, rice, sugar, cement, etc., (in bags) coils of wire, boxes, and miscellaneous packages. At two wharves there are special package freight conveyors for unloading river craft. There are also special conveyors for handling molasses and alcohol in barrels, cottonseed products, and mahogany logs. The sugar refinery at Chalmette has a well equipped telpher system for receiving, storing, and delivering raw sugar.

There are two cold storage plants, both privately operated.

The terminal for the inland barge lines to the Mississippi and Warrior (Ala.) rivers is located on the Inner Harbor Navigation Canal just above the locks.

All port facilities are served by paved roadways and also by belt line rail connections to the trunk-line railroads entering New Orleans.

The Inner Harbor Navigation Canal, also known as the **Industrial Canal,** provides a deep water connection between the Mississippi River and Lake Pontchartrain, an approximate distance of 4½ miles. Locks are located half a mile inside the Mississippi River entrance; the inside dimensions are 640 feet long, 75 feet wide, and 31½ feet (9.6 m) over the sills at low water in the Mississippi River. Inside the locks, the depths to Lake Ponchartrain are 30 feet (9.1 m) below the Gulf, to Florida Walk, 25 feet (7.6 m) to the L. & N. R. R. bridge and thence 20 feet (6.1 m) to Lake Pontchartrain. A minimum depth of 9 feet (2.7 m) is maintained in the approach channel from Lake Pontchartrain. The approach channel has depths up to 15 feet (4.6 m) at times. There is a turning basin 1,000 feet square, about one-half mile inside the locks. One bascule bridge with a 75-foot opening crosses the canal just south of the locks, and there are four bascule bridges with 94-foot openings between the locks and the lake.

The Mississippi River entrance to the canal is marked by lights on either side of the entrance and by *Inner Harbor Navigation Canal Lighted Range.* The Lake Ponchartrain entrance is marked by *Industrial Canal Light* and by black can buoys along the east side.

The canal provides an additional 10 miles of waterfront to the port of New Orleans with practically constant water level, affording additional port facilities and sites for industrial development.

Near the lake entrance to the canal there is a repair yard, used mostly by tugs and barges, capable of hauling boats up to 60 feet long by 6 feet (1.8 m) draft and barges up to 100 feet long and 2 feet draft.

Extracts from the Tariff Regulations governing the Inner Harbor Navigation Canal are given on page 232.

The following rules and regulations are prescribed for the Canal:

Canal superintendent.—The canal superintendent is directly in charge of the operation of the canal. No vessel shall enter, depart, or shift in the canal without permission from the superintendent. The office of the superintendent is on the canal at the Mississippi River entrance.

Hours of operation.—Canal and lock to turning basin, 6 a. m. to 10 p. m. daily; canal, turning basin through to lake, 9 a. m. to 5 p. m. daily.

Navigation.—In the navigation of the canal, "Western River Rules" shall govern. When vessels are approaching a bridge at the same time, the vessel proceeding toward the river shall have the right-of-way.

Tows are restricted to a width of 90 feet in the canal and 72½ feet in the lock.

Aids to navigation.—On the levee, on the east or downstream side of the canal, there is a flashing red light and on the west side a flashing green light, both of 2-second duration. A range of white lights marks the entrance channel.

Signals.—On the west bank of the canal at the river entrance, there is a mast with yardarms for signaling. In the day, a white ball means to enter and a white cone not to enter. At night, a white light means to enter and a red light not to enter. The signal for the lock or bridges is four 5-second blasts of the whistle with 5-second intervals. Bridge operator will signal by swinging flag or lantern. Swinging flag or lantern in circles means "cannot open immediately"; raising flag or lantern up and down means "will open immediately."

Obstruction.—No vessel shall so moor or anchor as to cause any interference to navigation.

Responsibility of vessel.—In lock, the canal pilot (furnished by board) will be in responsible charge of the vessel.

In canal, the master of the vessel is in responsible charge. The canal pilot will act only in an advisory capacity. Vessels shall be liable for any damage to structures or equipment while in the canal.

Preparing vessels for transit and precautions to be observed.—Vessels must be fully manned; hawsers, lines, fenders, capstans, etc., must be ready for handling ship and both anchors ready for letting go. She must ride practically on even keel with no equipment or cargo protruding beyond her sides.

Before entering the lock vessels must make fast to the approach and take on canal pilot.

All vessels in tow must have sufficient men on deck to handle lines and fenders.

General disposal of refuse or waste matter.—Vessels are not allowed to discharge overboard any waste matter whatsoever, except water used in cooking or in cleaning tableware and discharge from water-closet chutes.

Explosives and inflammable cargo.—Vessels carrying dynamite, gunpowder, or other explosives will not be permitted to pass through the lock.

Anchorage.—Between the Head of the Passes and the city of New Orleans, vessels can anchor anywhere along the sides of the river, where the depth of the water and character of the bottom are favorable. In the vicinity of New Orleans the best anchorage is on the southwest side of the river, between Chalmette and Algiers. This anchorage is designated by the Dock Board for vessels awaiting assignment to berth, awaiting pilot, etc. The upper limit of this anchorage is indicated by a large sign opposite the American Sugar Refining Co. Vessels are to be anchored within 800 feet of the right bank (Algiers Bank) of the river.

Within the port limits, vessels may anchor or berth only as directed by the Superintendent of Docks, who is the representative of the Dock Board.

For anchorage below the Head of the Passes, in South Pass or Southwest Pass, see those respective headings.

Pilots.—There are two classes of pilots, the associated Branch Pilots for the bar and the Crescent River Pilots for the river. The bar pilots will generally be found outside the entrances to South and Southwest Passes or they can be signaled for from the lighted buoys outside the entrance to the passes. They use motor boats for boarding outside the bar and take vessels up to Pilottown, 2 miles above the Head of the Passes. The river pilots take vessels from Pilottown up the river to New Orleans.

At the bar, pilotage is compulsory for vessels in foreign trade and also for vessels in domestic trade except those under 100 tons lawfully engaged in the coasting trade and coastwise vessels having on board a pilot licensed by the United States Steamboat Inspection Service.

Pilotage on the river is also compulsory with the above exceptions and also with the exception of sailing vessels and barges in tow of river or harbor towboats.

Bar pilotage, inbound or outbound, is at the rate of $3.50 per foot of draft if drawing 10 feet or less and $4 per foot of draft if drawing over 10 feet. Only one pilotage (the deeper draft) is charged vessels entering for bunker coal, to avoid storms, to receive orders, or for repairs.

River pilotage, either direction, is at the rate of $2 per foot, with 10 feet minimum. The fee for stopping at quarantine is $5, and the harbor shifting fee is $15.

River pilotage from New Orleans to Baton Rouge is handled by licensed river pilots. Rates are $2 per foot of draft, each way, with

minimum draft of 10 feet, $5 for each day the ship is in port, and $10 for harbor shifting.

Towboats, ranging up to 2,000 horsepower, can always be had at New Orleans for either harbor of gulf towing. Steamships usually proceed to New Orleans under their own power, but all sailing vessels entering the passes use towboats. Charges for shifting berths range from $30 to $175, depending on the distance. Rates are based on ships of 2,500–5,000 gross tonnage, there being an additional charge for larger vessels and a reduction of $5 for smaller vessels. There is an additional charge of $25 for landing vessels "head down" stream and an additional charge of $10 per tug when service is not completed between 6 a. m. and 6 p. m. Two tugs must be employed on all towing to and from drydocks and should be employed on all ships towed around Algiers Point when the traffic lights are in operation.

Harbor Traffic Control.—There are two river traffic control lights along the river in the vicinity of Algiers Point. One is located on the north end of the Barracks Street Wharf on the left bank of the Mississippi River in New Orleans and the other is located on the crown of the levee on the right bank of the Mississippi River near the Southern Pacific Railroad wharf in the town of Gretna. These traffic lights are operated so as to control and regulate passage of river traffic through the port of New Orleans during such time as the Carrollton gage reads 12 feet on a rising stage of the Mississippi River and until the Carrollton gage reaches 15 feet on a falling stage. The rules and regulations for the operation of these lights are given below.

1. *Whenever the Carrollton gage reads twelve (12) feet* on a rising stage of the Mississippi River and until the gage reaches fifteen (15) feet on a falling stage, the movement of vessels on the Mississippi River in the vicinity of Algiers Point shall be governed by red and green traffic signal lights in the vicinity of Barracks Street and Gretna.

2. *Signals.*—(*a*) A green light revolving through sixty (60) degrees once every 5 seconds so as to sweep the entire width of the river, displayed ahead of a vessel in the direction of travel indicates that Algiers Point is clear.

(*b*) A red light revolving through sixty (60) degrees once every 5 seconds so as to sweep the entire width of the river, displayed ahead of a vessel in the direction of travel indicates that Algiers Point is not clear.

(*c*) Absence of lights, or lack of visibility thereof, will be considered a danger signal.

3. *Ascending vessels.*—(*a*) An ascending vessel shall not proceed farther up the river than the Pauline Street Wharf either when a red light or no lights are being displayed from the Barracks Street tower.

(*b*) Whenever an ascending vessel reaches Pauline Street Wharf and cannot see any signal, the pilot of the vessel shall use his own judgment about getting the vessel clear of a possible descending vessel.

4. *Descending vessels.*—(*a*) A descending vessel reaching the vicinity of Southport shall not endeavor to pass through the harbor during thick weather.

(*b*) Whenever a descending vessel reaches Napoleon Avenue and either a red light or no lights are being displayed from the Gretna tower the vessel shall immediately slow down and be placed in position to round to if the signal remains against the vessel.

5. Whenever Algiers Point is considered unsafe for navigation, the tower lights will be extinguished. If under such conditions a vessel signals the towerman a short, long, and short (— ——— —) blast, a red light will be displayed for two minutes and then extinguished to confirm the accuracy of the danger signal.

6. Any descending vessel destined to a wharf between Napoleon Avenue and Erato Street Wharf shall signal the Gretna towerman three (3) long and one (1) short (——— ——— ———) blast to indicate that he is bound to a wharf between these points.

7. The pilot of any vessel scheduled to leave any wharf above Barracks Street signal tower, bound downstream around Algiers Point, shall communicate with the Barracks Street towerman by telephone to determine whether the channel at Algiers Point is clear before leaving.

8. The term "vessel" shall include all ships, whether under their own power or in tow, and all barges in tow, but is not intended to apply to tugs or towboats without tows or to small river craft of any description operating under their own power.

9. The District Engineer, U. S. Engineer Department at Large, in charge of the locality, shall, sufficiently in advance, issue notices in the press or otherwise, warning navigation interests when it is expected that the Mississippi River will reach 12 feet on the Carrollton gage on a rising stage.

Port charges.—About two-thirds of the improved water front at the port is operated by the Dock Board. The following excerpt from the Rules and Regulations of this Board gives the principal port charges. A copy of these rules and regulations can be secured on application to the Board.

Harbor fee.—This charge applies to all vessels engaged in foreign or coastwise trade arriving in the port limits, with the following *exceptions:* (*a*) Vessels calling at the port for the sole purpose of receiving bunker fuel and/or ship supplies or changing pilot. (*b*) Vessels passing through the port and remaining less than 12 hours and not receiving or discharging cargo. (*c*) Government vessels not engaged in commerce. (*d*) Pleasure craft.

Vessels under 100 gross tons	$2.50
Vessels of 100 gross tons and under 500 gross tons	5.00
Vessels of 500 gross tons and over in ballast or with green fruit or with cargo in transit only	10.00
Vessels of 500 gross tons or over with general cargo	15.00

The foregoing charges cover the duties of harbor masters and port wardens.

Dockage-Wharfage is a charge against vessels for the use of the public wharves or mooring facilities based upon the gross tonnage of the vessel. A vessel shall be allowed, for the purpose of assembling cargo prior to her arrival, the use of such wharf and shed as may be assigned her for a maximum period of 10 days without incurring any dockage-wharfage charges until her arrival. On the arrival of said vessel before the expiration of said 10 days the following dockage-wharfage charges shall be levied, to wit:

3 cents per gross ton per day for the first and second days.
2 cents per gross ton for the third day.
1 cent per gross ton per day for the fourth, fifth, and sixth days.
No charge for the seventh to the sixteenth days.
1 cent per gross ton per day for the seventeenth to twenty-first days.

Vessels using the wharves beyond the twenty-first day shall be assessed dockage-wharfage at the same rate as set forth above, commencing at 3 cents per gross ton per day for the twenty-second and twenty-third days, etc.

Vessels moored outside of vessels lying at the wharves for the sole purpose of transferring cargo to or from such vessels lying at the wharves will be exempted from dockage-wharfage charges. Vessels when so moored for any other purpose, whether in whole or in part, will be subject to the same charges as though moored to the wharf.

Special rates for dockage-wharfage may be granted: (*a*) Vessels handling passengers exclusively; (*b*) Vessels fitting out for grain; (*c*) Vessels undergoing repairs; (*d*) Vessels receiving supplies; (*e*) Vessels fumigating. Special rates are also provided for vessels undergoing repairs or lying up at special mooring facilities.

Vessels are exempt from the regular dockage-wharfage charges when handling grain (or other commodities) at the Public Grain Elevator and Sacking Plant or when handling coal (or other bulk commodities) at the Public Coal and Bulk Commodity Handling Plant.

Other rules and rates affecting dockage-wharfage are given in the Rules and Regulations of the Board of Commissioners.

Sheddage, a charge against vessels for the use of covered wharves based on the gross tonnage of the vessel, is in addition to dockage-wharfage, and shall run concurrently therewith. Free time for assembling cargo is granted under the same conditions as for dockage-wharfage. Sheddage charges are: 3 cents per

gross ton of the vessel for a period of 16 days or less; 1½ cents per gross ton of the vessel for the period from the seventeenth to the twenty-first day inclusive or less. Beyond the twenty-first day these charges shall be again assessed at the same rate.

Vessels not making use of the sheds, moored outside of vessels lying at the wharves and transferring cargo to or from such vessels lying at the wharves will be exempted from sheddage charges. All vessels so moored and making use of the sheds will be assessed the regular sheddage charges.

Wharf tollage is a charge against vessels based on tons of cargo received or discharged while lying at public wharves or mooring facilities. The rate of wharf tollage shall be 15 cents per ton of 2,000 pounds with the following exception, viz: 10 cents per ton of 2,000 pounds shall be charged for bananas and coconuts.

The following cargoes will be exempted from the payment of wharf tollage: (*a*) Liquid cargoes received or discharged through pipes passing under the wharves and discharged into or pumped from storage plants located beyond the board's property line. (*b*) Coal or other bulk commodities passing through the Public Coal and Bulk Commodity Handling Plant to or from a vessel moored at the wharf. (*c*) Grain or other commodities passing through the Public Grain Elevator or Sacking Plant to or from a vessel moored at the wharf. (*d*) Ships stores and fuel intended for vessel's own consumption and use.

All commodities delivered to or received from vessels by other water craft when said vessels are occupying berths at the wharves or are moored outside of other vessels occupying berths at the wharves shall be subject to wharf tollage. Cargo discharged upon public wharves from vessels and transshipped to other vessels shall not be subject to the payment of a second wharf tollage, provided said cargo does not leave the public wharves.

Free time of from 48 to 96 hours is allowed on certain import cargoes before incurring demurrage charges. Coffee discharged at the Poydras and Girod Street sheds is allowed 20 consecutive days' free time; mild coffee discharged at other wharves is allowed 5 days' free time. Demurrage charges are 10 cents per ton of 2,000 pounds per day.

Special rates are made for inland water craft and for harbor excursion boats.

Tugs, barges, and special craft regularly using the harbor can secure annual licenses exempting dockage-wharfage and sheddage charges.

The following are extracts from the tariff regulations, governing the **Inner Harbor Navigation Canal**, effective July 1, 1935.

The public wharves on the canal are open to commerce on the same terms as those on the river front.

Canal and lockage fees.—For a one-way trip within a 2-day period (*a*) Not passing through locks, 2½ cents per gross ton, with $2.50 minimum. (*b*) Passing through locks, 5 cents per gross ton, with $5 minimum. Vessels of 500 gross tons and over, engaged on certain inland waters, will be charged on the basis of cargo carried, the fee being 5 cents per ton with a minimum of $25.

Anchorage and moorage charges.—When moored for more than 2 days either to a private or a public wharf, the charges range from $7.50 (over 5,000 gross tons) to $1 (under 100 gross tons) per day.

Vessels exempt from canal and lockage fees.—(*a*) If paying tollage or wharfage at any location of the Dock Board inside the canal. (*b*) If handling a cargo at private wharves or on exclusive business to private wharves—if covered by lease. (*c*) Towboats handling cargo carrying craft exempt from fees. (*d*) Craft owned by the city, State, or United States—under certain conditions. (*e*) If rendering assistance in working cargo or making repairs on other vessels. (*f*) If entering the canal for the sole purpose of delivering bunker fuel or ship supplies.

Quarantine.—The quarantine station is on the southwest bank of the river about 1 mile above Chalmette Slip. Vessels come to anchor in front of the station where they are boarded by United States quarantine officers. The anchorage site is 4,000 feet long and the upper end is indicated by a quarantine anchorage sign. The station is open for 24-hour service.

Fees for boarding vessels are $5 for 500 tons or less; $10 for vessels of 500 to 5,000 tons; $15 for vessels of more than 5,000 tons.

Federal Offices.—The customhouse is centrally located on Canal Street, less than one-quarter mile from the river; the following Federal Government offices are located in it; Custom Service; Lighthouse Service (Eighth District); Navigation and Steamboat Inspection Service; Coast and Geodetic Survey Field Station; Branch Hydrographic Office.

The customs district of New Orleans includes the cities of New Orleans, Baton Rouge, and Morgan City, all of which are in the state of Louisiana.

The United States Engineers, New Orleans District, have offices in the Union Building on Gravier Street.

The United States Immigration Station is located on the southwest side of the river, just above the quarantine station.

At the **Coast and Geodetic Survey Field Station,** Room 314 Customhouse, complete files of charts, coast pilots, tide tables, and other publications relating to navigation may be consulted and other information affecting navigation obtained without charge.

At the **United States Branch Hydrographic Office,** in the customhouse, bulletins are posted giving information of value to mariners, who are also enabled to avail themselves of publications pertaining to navigation and to correct their charts from standards. No charge is made for this service. Mariners unable to get the noon time signal by radio can obtain chronometer comparisons at this office, either in person or by telephone.

Supplies.—There is an unlimited supply of purified river water at all piers and wharves. This water is excellent for drinking purposes but contains a small amount of sulphate which causes some scale when used in stationary boilers.

There are six companies furnishing fuel oil either directly from piers or by pumping from oil barges. The bunkering capacity ranges from 1,000 to 3,500 barrels per hour and the price is 15 cents below the New York posted price.

The public coal handling plant has a storage capacity of 25,000 tons and a normal loading capacity of 400 tons per hour. Two private plants have loading capacities of 250 and 350 tons per hour respectively. There is a floating plant at Algiers, opposite Canal Street where vessels can be serviced while loading or discharging cargo and there are also colliers and barges equipped to bunker vessels anywhere within the port.

Ship chandlery stores of all kinds are obtainable and provisions are plentiful at reasonable prices.

Repairs.—There are five commercial floating dry docks in New Orleans, all located in Algiers, on the southwest side of the river. Of these, the Todd Engineering Dry Dock & Repair Co. has the two larger, the Johnson Iron Works has two and the Algiers Iron Works Dry Dock Company has one. The largest of these has a capacity of 10,000 tons, is 525 feet long, 84 feet wide at the entrance and can take vessels drawing up to 22 feet (6.7 m).

Marine repair plants are operated in connection with the above dry docks, the larger plants having well equipped shops and all other facilities necessary for complete marine repairs to either wood or steel vessels. There are also other marine repair plants with facilities for handling repairs above the water line.

There are several privately-owned floating derricks, the largest of which has a lifting capacity of 125 tons. There is a commercial graving dock at Slidell, on Bayou Bonfouca, with the following dimensions: Length 325 feet; width 60 feet; depth over sill 14 feet (4.3 m). The only marine ways at New Orleans are for small boats.

Salvage Facilities.—There is available at the port, practically any equipment (tugs, floating derricks, dredges, barges, pumps, diving equipment, etc.) required for heavy salvage work either at sea or in the harbor.

Storm warnings (day and night) are displayed at the foot of Canal Street, at Todds Drydocks, and at Pilottown, just above the Head of the Passes. Day signals are shown at Burrwood (Southwest Pass), at Port Eads (South Pass) and at West End on Lake Pontchartrain at the entrance to New Basin Canal.

Winds.—For prevailing winds, see meteorological tables in the appendix.

Hospitals.—There is a United States Marine Hospital as well as numerous public and private hospitals at New Orleans.

Communications.—New Orleans is the terminus of numerous trunk-line railroads to all parts of the United States. Improved highways lead either direction along the Gulf Coast and to the interior.

There are nearly 50 steamship companies operating on regular schedule out of New Orleans. Coastwise service includes all Gulf ports and numerous Atlantic Coast ports, particularly New York and Boston. Two companies give intercoastal service to the Pacific Coast. Foreign service includes all world ports, particularly West Indian, South American, and European.

Inland barge lines operate on the Mississippi River and its tributaries as far as Minneapolis and St. Paul on the Mississippi River and Chicago on the Illinois River, Kansas City on the Missouri River, and Pittsburgh on the Ohio River. There is also barge-line service to Mobile and to Birmingport (the port for Birmingham, Ala.) on the Warrior River in Alabama. The barge-line terminals are on the Inner Harbor Navigation Canal, just above the locks. There are inside freight routes out of New Orleans eastward to Mobile, Pensacola, Panama City, and Apalachicola and westward to New Iberia, Port Arthur, Galveston, and Houston. Small steamers handle passengers and freight to the several small towns on the lower Mississippi River—Buras, Boothville, Venice, Pilottown, Burrwood, and Port Eads.

There are two municipal and two commercial airports, all with facilities for servicing aircraft both day and night. Sushan airport on Lake Pontchartrain has a seaplane base. Air-line routes connect with New York via Atlanta and Washington, with Jacksonville and Miami via Atlanta, with Houston via Baton Rouge and with Chicago.

The Tropical Radio Telegraph Co. operates a general radio service to points in Mexico, Central and South America, and to ships.

Small Boat Facilities.—The principal berthing space for small boats on the river is at the entrance to the Inner Harbor Navigation Canal, just outside of the locks. Most small boat facilities are on the canals, inside the locks from the river; the principal resorts are New Basin Canal on the east side of the river and Harvey Canal on the west side of the river where fuel, provisions, and repair

facilities are available. Similar facilities are also available on the Inner Harbor Navigation Canal.

The **Port Series**, volume No. 5, gives further detailed information regarding the port of New Orleans.

DIRECTIONS, MISSISSIPPI RIVER

Approaching the mouth of the Mississippi River from Florida Straits deep-draft vessels usually set a course direct to the passes from a position about 10 or 12 miles southwestward of *Dry Tortugas Lighthouse*, on Loggerhead Key. Low-powered vessels of moderate draft sometimes, particularly during the winter months, pass northward from Florida Strait through Rebecca Channel, to the westward of *Rebecca Shoal Lighthouse*, and for 200 miles set a course 10° to 20° northward of the course to the passes of the river, and then change course for the passes; this keeps them out of the strongest part of the Gulf current.

Going to Straits of Florida, a course is usually set for a point 10 or 12 miles southwestward of Dry Tortugas.

In either direction the lead is of but little value for determining the ship's position, and observations should be relied upon. The currents vary considerably, and with the closest navigation a vessel bound for South Pass frequently makes a landfall at Pass a Loutre or Southwest Pass.

Approaching South Pass a vessel uncertain of her position can set a course so as to pick up the 20-fathom (37 m) curve from 5 to 20 miles northeastward of *South Pass Lighted Whistle Bnoy* and then follow the curve southwestward until the buoy is located. During thick weather vessels frequently ground northeastward of South Pass and northward of Southwest Pass, due to infrequent sounding. Due consideration should be given to possible occurrence of mud lumps.

However, vessels approaching South Pass or Southwest Pass should be fairly certain of their position in any weather by using radiocompass bearings in conjunction with soundings. There is a radiobeacon at the entrance to each pass and a radio direction-finder station in South Pass. The radiobeacons are synchronized with fog signals for distance finding, see page 27; also see Light Lists and H. O. publication No. 205.

In foggy or thick weather Southwest Pass is more accessible and more easily navigated than South Pass, because the channel is better marked, has greater width, and is nearly straight, and because a vessel is not set off the course to the same extent by the currents at the entrance.

South Pass.—Depths in the channel at the entrance to South Pass are subject to frequent change; strangers and all vessels of more than about 15 feet (4.6 m) draft are advised to take a pilot. The current has considerable velocity, which tends to carry a vessel upon the shoal that lies straight out from the ends of the jetties on the west side of the channel.

The principal navigational aids through the pass are described on page 220.

Courses and Distances for approaching *South Pass Lighted Whistle Buoy* are given on page 61 and also under **Coastwise Courses** (Posi-

tion No. 18). Pilot Rules for Western Rivers apply inside South Pass Entrance Lighted Whistle Buoy.

Stand in for *South Pass Lighted Whistle Buoy* and bring the *South Pass West Jetty Range lights* on the bearing 297° true (WNW. ⅛ W. mag.). Steer this range, passing to the eastward of *West Bank Lighted Bell Buoy 1* and about 200 feet to the westward of the end of the east jetty marked by *South Pass East Jetty Light*. The current will strike the vessel on the starboard bow, and as the end of the east jetty is approached the vessel should be headed to meet it, and by the time she is abreast the end of the east jetty she should be heading fair between the jetties. The *South Pass Range* (lighted) bearing 315° true, marks the western edge of deep water along the entrance channel and between the ends of the jetties.

When in the pass, the banks are a sufficient guide, care being taken to keep about midway between them, favoring the west bank for the last 3 miles before reaching Head of the Passes West Jetty Light. There are several lights on the east and west banks and a lighted range for entering the pass at its head; see page 61.

Southwest Pass.—Vessels bound to Southwest Pass sometimes fall westward of the Mississippi River Delta, but this can be quickly ascertained by watching the lead, as the water shoals much more gradually along this part of the coast than off the Delta.

Depths in Southwest Pass entrance are subject to some change, but the current, so far as is known, can be depended upon to set nearly straight out from between the jetties.

The principal navigational aids through the pass are described on page 222.

Courses and Distances for approaching *Southwest Pass Entrance Lighted Whistle Buoy* are given on page 61, and also under **Coastwise Courses** (Position No. 20). Pilot Rules for Western Rivers apply inside Southwest Pass Entrance Lighted Whistle Buoy.

From *Southwest Pass Entrance Lighted Whistle Buoy*, steer 0° true (N. ½ W. mag.), on the *Southwest Pass Entrance West Jetty Range*, for about 1⅜ miles to the westward of *Channel Lighted Bell Buoy 2* and to the eastward of *Channel Lighted Buoy 1*. When in the entrance and on *Southwest Pass Inner Range* bearing 23° true, head up between the jetties, slightly favoring the west jetty. Spur dykes have recently been constructed channelward from the east jetty.

When in the pass, the banks are a sufficient guide, care being taken to keep about midway between them. There are lights on the east and west banks and there is a lighted range for entering the pass at its head; see page 61.

Directions, New Orleans to Pilottown.—The following magnetic courses are given in points:

1. Southport to Westwego	S. by E. ¼ E.
2. Westwego to Amesville	E. by S. ½ S.
3. Amesville to Gretna	ENE.
4. Gretna to Gouldsboro	NNE.
5. Gouldsboro to Algiers Point	N. ½ W.
6. Algiers Point to Industrial Canal	E. by S.
7. Industrial Canal to Chalmette Point	SE. by E. ½ E.
8. Chalmette Point to Ninemile Point	E. ½ N.
9. Ninemile Point to Lake Borgne Canal	SE. by S.
10. Lake Borgne Canal to Twelvemile Point	S.
11. Twelvemile Point to Kennelwood	W. ½ N.

12.	Kennelwood to English Turn	WNW.
13.	English Turn to Scarsdale	S. by W. ¼ W.
14.	Scarsdale to Concession	SW. by S.
15.	Concession to Promised Land	S. by W.
16.	Promised Land to McCall Flats	SSW.
17.	McCall Flats to Jesuits Bend	S.
18.	Jesuits Bend to Belair	SE. ½ E.
19.	Belair to Turtle Point	SE. by S.
20.	Turtle Point to Poverty Point	S by E
21.	Poverty Point to Deer Range	SE. by E. ½ E.
22.	Deer Range to Point Celeste	E. ½ S.
23.	Point Celeste to Point La Hache	SE. by E.
24.	Point La Hache to Socola	SE.
25.	Socola to Point Michel	E. by S.
26.	Point Michel to Nestor Canal	SE. ½ S.
27.	Nestor Canal to Homeplace	SE. ¾ E.
28.	Homeplace to Harris Bayou	E. ¼ S.
29.	Harris Bayou to Bayou La Moque	SE. by S.
30.	Bayou La Moque to Tropical Bend	S. ¼ E.
31.	Tropical Bend to Alberta	SE. by E.
32.	Alberta to Old Quarantine	E. by S.
33.	Old Quarantine to Bayou Grand Laird	ESE.
34.	Bayou Grand Laird to Fort St. Philip	NE. ½ N.
35.	Fort St. Philip to New Canal	ESE.
36.	New Canal to The Jump	SE. ¼ S.
37.	The Jump to Wilder Flats	SE. ½ E.
38.	Wilder Flats to Pilottown	SE. ½ S.

MISSISSIPPI RIVER ABOVE NEW ORLEANS

A Federal improvement project provides for a channel 35 feet (10.7 m) deep at low water and 300 feet wide between Baton Rouge and New Orleans, a distance of 115 nautical miles; this channel is generally maintained.

The city of **Baton Rouge** has recently installed a modern terminal, including a reinforced concrete wharf 504 feet long. Attached to the main wharf is a large floating dock, to and from which freight is transferred by means of escalators. A triple-track car barge, 300 feet long with capacity for 16 cars, serves for interchange of all freight destined to either the east or west bank of the river.

Channel depths and other information regarding the Mississippi River and its tributaries above Baton Rouge are given on page 55.

Briefly, the following channel depths are available:

Mississippi River.—

To Cairo.—Project depth 9 feet (2.7 m). Generally available.

To Grafton.—Project depth 9 feet (2.7 m). A channel depth of 8 to 9 feet is frequently available and a depth of 6 feet (1.8 m) can generally be depended upon although during periods of very low water the controlling depth may be as little as 5 feet (1.5 m).

To Minneapolis and St. Paul.—Above Grafton, a 9-foot (2.7 m) project has been adopted but in 1934 a controlling depth of about 6 feet (1.8 m) was available.

The controlling bridge clearances below Grafton are 200 feet horizontal clearance through the swing bridge at Alton, Illinois, and 44 feet (13.4 m) vertical clearance at extreme high water under the Merchants Bridge at St. Louis, Missouri.

Ohio River.—

To Pittsburgh.—A 9-foot (2.7 m) channel has been completed to Pittsburgh, which is 851 nautical miles above the mouth of the Ohio River.

Illinois Waterway System.—

To CHICAGO.—A 9-foot (2.7 m) channel has been completed, connecting the Mississippi River at Grafton with Lake Michigan at Chicago. The total distance is 284 nautical miles. Locks 28 and 68 miles, respectively, above Grafton, have limiting dimensions of 300 feet long by 73 feet wide. The limiting bridge clearances are 118 horizontal and 44 feet (13.4 m) vertical at extreme high water, which is about 60 feet at ordinary river stages.

Missouri River.—

To KANSAS CITY.—A 6-foot (1.8 m) channel is available up the Missouri River as far as Kansas City. The mouth of the river is 13 nautical miles above St. Louis and Kansas City is 337 nautical miles above the river mouth.

Distances along Mississippi River.—The following are a few of the more important towns along the river and their approximate distance in nautical miles above New Orleans which is 93 and 98 miles, respectively, above the entrances to South and Southwest Passes:

Donaldsonville, La	68	Memphis, Tenn	651
Plaquemine, La	98	Cairo, Ill	848
Baton Rouge, La	115	St. Louis, Mo	1,002
Natchez, Miss	230	Missouri River (mouth)	1,015
Vicksburg, Miss	324	Grafton, Ill	1,036
Greenville, Miss	429	St. Paul, Minn.	1,573

Inland Waterway Commerce.—On the Mississippi River and its navigable tributaries, the old time river packetboat has been superseded by powerful towboats which push strings of barges loaded with 6,000 tons or more of freight. The numerous commodities transported on the inland channels include cotton, grain, sugar, coal, ore, oil, gasoline, steel products, cement, sand, gravel, and others too numerous to mention, which are shipped at a relatively low cost.

Adequate terminals have been constructed at New Orleans, Helena, Memphis, Cairo, St. Louis, Peoria, and other localities along the lakes to Gulf Waterway, and plans are being prepared for terminals in other cities.

Chicago to New York.—Vessels can go from Chicago to the Atlantic Ocean by way of Lake Michigan, Lake Huron, St. Claire River, Lake St. Claire, Detroit River, Lake Erie, Erie Canal, and Hudson River. The limiting dimensions of the locks in the Erie Canal are 300 feet long, 44½ feet wide with 12 feet (3.7 m) over the sills. The controlling clearance under fixed bridges is about 14½ feet (4.4 m). In 1933, the controlling depth was about 10 feet (3.0 m).

27. COAST FROM MISSISSIPPI RIVER TO SABINE PASS

From the delta of the Mississippi River to Sabine Pass, a distance of 250 miles, the coast has a general westerly trend, with several deep indentations or bays nearly separated from the Gulf by chains of long narrow islands. It is characterized by a fringe of low sandy beaches backed for many miles by vast stretches of marshy ground.

The off-lying water is shoal for long distances from the beach and, except for the first 50 miles west of Southwest Pass, the 10-fathom (18 m) curve is 20 to 35 miles offshore. Numerous shallow areas, irregular in outline, situated well out of sight of land, are serious menaces to the navigation of vessels of even moderate draft.

With the exception of Barataria Pass, the numerous shallow passes to the eastward of Atchafalaya Bay are dangerous to enter except during good weather. The channels change frequently with storms and local knowledge is generally necessary.

An extensive network of bayous and canals, with depths of 2 to 9 feet (0.6 to 2.7 m), covers the country for about 50 to 75 miles back from the coast. The Doullut Canal at Empire, about midway between New Orleans and Southwest Pass, is the only canal entering the Mississippi River from the westward below New Orleans. The Louisiana and Texas Intracoastal Waterway follows two routes between the Mississippi River and Morgan City; the southern route, the Harvey Canal, enters the river at Harvey opposite New Orleans and the northern route enters the river at Plaquemine, 98 miles above New Orleans. Many other canals extend to the Mississippi River levees but do not enter the river. This network of canals extends from the Mississippi River westward to Sabine Pass, and is used extensively by fishing boats, barges, shallow draft steamers, and pleasure boats.

The low swampy coastal country is but sparsely settled and is frequented principally by fishermen and muskrat trappers. The bottom in the canals and bayous is soft deep mud through which it is frequently possible to navigate with a draft one foot in excess of the depth.

Between Atchafalaya Bay and the Vermilion River, there are several salt mounds (islands) from which commercial salt is produced. There has been considerable oil exploration along the coast, particularly eastward of the Atchafalaya Bay and westward of the Mermentau River and there is some oil production in these areas.

The above canals and bayous are described in detail on page 258. Those waterways that touch the coast are described in the immediately following pages.

Air photo compilations are available for the coastal area westward from the Mississippi River as far as Caillou Bay. See page 2.

Current.—Inside the 100-fathom curve from Southwest Pass to Sabine Pass there is a westerly current which has an average velocity of about ¼ knot.

SOUTHWEST PASS TO ATCHAFALAYA BAY

(Charts 196, 197, and 198)

From Southwest Pass to Barataria Pass, at the entrance to Barataria Bay, the shore line is broken by numerous small and unimportant passes and shallow bays, little frequented except by small boats and canoes, and never approached by seagoing vessels.

Bayou Scofield, 7 miles eastward of Bastian Bay, provides an entrance from the Gulf to the lakes and bayous to the southward of Buras. In 1934 there was a depth of about 3 feet (0.9 m) through the entrance but scarcely half that depth could be carried to Buras. There is the wreck of a schooner just south of the entrance.

Bastian Bay, 26 miles northwestward of Southwest Pass, is 2½ miles long and 1½ miles wide, and 1 to 2 feet (0.3 to 0.6 m) deep. The bay is separated from the Gulf by **Bastian Island. Bastian Pass,** east of the island, is not navigable. The pass west of the island is

the main entrance to Bastian Bay, and is also the entrance to **Grand Bayou.** In 1934, the approach from the Gulf was from the westward and through the western pass; there was about 3½ feet (1.1 m) across the bar outside the entrance. *Bastian Bay Light* is on the west side of the passage leading into Bastian Bay and on the east side of the entrance to Grand Bayou.

Grand Bayou empties into the western pass at the entrance to Bastian Bay. *Bastian Bay Light* marks the east side of the entrance. This bayou is used considerably by local fishing boats. On a favorable tide about 3 feet (0.9 m) can be carried through Grand Bayou and **Mevers Canal** and across **Adams Bay** to the **Doullut Canal** connecting with the Mississippi River at **Empire**; distance 9 miles. About the same depth can be carried to the canals north of Empire leading to the river levee and to the New Orleans-Buras Highway. This depth can also be carried to Barataria Bay via the Port Sulphur Canal and **Lake Grande Ecaille.**

Bayou Cook, emptying into the northern end of Bastian Bay, leads to Adams Bay. *Bayou Cook Light* is on the east side of the entrance to the bayou. *Bayou Courant Light* is on the west side of the entrance into Adams Bay. Doullut Canal (described on page —) connects Adams Bay with the Mississippi River. The shallow depths across the southern portion of Bastian Bay limit this route to about 2 feet (0.6 m) on a favorable tide.

Chaland Pass is a shallow unfrequented pass 3 miles west of Bastian Bay.

Quatre Bayou Pass, 5½ miles east of Barataria Lighthouse, is the entrance to **Bay Ronquille** and **Cat Bay.** The west side of the pass is marked by *Quatre Bayou Pass Light.* This pass and the Bastian Bay pass to Grand Bayou are the only passes east of Barataria Bay used extensively by local fishermen. Bay Ronquille is separated from Cat Bay by a group of islands, through which there is a pass known as **Four Bayous Cutoff.** At the north end of this pass, on the west side of the entrance to Cat Bay, is *Four Bayous Cutoff Light.* In 1934 there was a depth of 7 feet (2.1 m) across the bar and deeper water immediately inside the pass, but Bay Ronquille and Cat Bay are shallow. On a favorable tide, a depth of about 3 feet (0.9 m) can be carried to Barataria Bay through Four Bayous Cutoff and Cat Bay. This same depth can also be carried across Bay Ronquille to Lake Grande Ecaille and to the Port Sulphur Canal, which connects with the Doullut Canal into the Mississippi River and other canals leading to the river levee and to the highway to New Orleans.

To enter Quatre Bayou Pass, approach from a southwest direction and favor the west bank. To go to Barataria Bay, take the first cut-off to the westward, about three-eighths mile above *Quatre Bayou Pass Light* and, after leaving this cut-off, follow the southwest shore of Bay Ronquille for 1 mile to Four Bayous Cutoff. Go through this cut-off into Cat Bay, leaving the light and some small reefs to westward. The passage from Cat Bay into Barataria Bay is about 1 mile northwestward of *Four Bayous Cutoff Light.*

Barataria Bay (chart 196) is a large, marsh-fringed, shallow lake, separated from the Gulf by a low, narrow sand island known as **Grand Terre Island.** The bay has general depths of 4 to 6 feet (1.2 to 1.8 m) and is frequented chiefly by fishermen and oystermen, who take their catch to New Orleans in launches of 3 to 4 feet draft, going by way

of one of the various inside routes. With the exception of fishing camps, Grand Isle and Manila Village are the only settlements on the bay.

Barataria Pass, also known as **Grand Pass**, is the main entrance to Barataria Bay. It is marked on the easterly side by *Barataria Bay Lighthouse*, on the corner of **Fort Livingston**. Barataria Pass Buoy (black and white vertical striped) lies 2.5 miles 147° true from the lighthouse. The only other objects which can be made out at a distance are some tall trees at Grand Isle to the westward of the pass. In 1934 there was a straight, deep channel leading out of the pass to the southeastward. This channel was 700 yards wide, and there was a controlling depth of 8 to 9 feet (2.4 to 2.7 m) on the bar, 2 miles off Barataria Bay Lighthouse. Hard sand bars with from 2 to 5 feet (0.6 to 1.5 m) over them extend for about a mile offshore on either side of the channel. The bar off the entrance channel only breaks during bad storms. Two beacons mark submerged wreckage northwestward of the lighthouse. Inside the bar, depths up to 12 feet (3.6 m) extend northward as far as **Independence Island**.

Strangers should not attempt to enter Barataria Bay without a pilot, as the bar shifts frequently and, with the exception of the lighthouse, there are no aids which would be of any assistance.

Barataria Bay Lighthouse (Lat. 20°16′.4; Long. 89°56′.6) is a white skeleton structure; the light is fixed white, 77 feet (23.5 m) above the water and visible 12 miles.

Currents in Barataria Pass have a mean velocity at strength of about 2 knots.

Bayou Regault, on the north side of Grand Isle, is the approach to the town of Grand Isle, 4 miles west of Barataria Pass. *Bayou Regault Light* marks the east side of the entrance at the northeast end. A depth of about 4 feet (1.2 m) can be carried nearly 2 miles to the westward into the bayou.

There are no landings at the town of **Grand Isle**, but on the south side of the channel about one-fourth mile inside the entrance, there are several wharves and a general store where gasoline and some supplies can be purchased. There is a shrimp factory on the opposite side of the bayou. An improved highway connects with Bayou Lafourche and with No. 90 Highway to New Orleans. There is daily mail service by highway.

Manila Village is on the north side of the entrance to Grand Bayou, near the northwest end of Barataria Bay. There is a store and a post office. The mail is brought by boat from Grand Isle. There is a small boat yard at Manila Village.

It should be noted that there are two **Grand Bayous** in the vicinity of Barataria Bay, one to the westward of Bastian Bay and the other off the northwest side of Barataria Bay.

Bay des Ilettes, Orlando Bay, Bay Tambour, and **Caminada Bay** are on the westerly side of Barataria Bay and partly separated from it by low marshy islands. They are shallow bodies of water of from 2 to 4 feet (0.6 to 1.2 m) depth and of the same characteristics as Barataria Bay. These bays afford approaches to the Southwestern Louisiana Canal, which connects Barataria Bay with Bayou Lafourche and Timbalier Bay.

The main route from Barataria Bay to the Southwestern Louisiana Canal is through **Bayou Fifi, Bay des Ilettes, Bayou Andre,** or Orlando

Bay and Caminada Bay. There is also a route across Bay Tambour, through a cut to the north end of Bay des Ilettes and across **Champagne Bay** to the north of Shell Island. A shell reef extends south of Shell Island. These bays are shallow and boats drawing over 2½ feet (0.8 m) must wait for high water. There are no marked channels and strangers are advised to get some local fisherman at Grand Isle to act as pilot. Through the canal, there are depths of 3 to 4 feet (0.9 to 1.2 m).

Caminada Pass, about 7 miles southwestward of Barataria Bay Lighthouse, connects Caminada Bay with the Gulf. The entrance channel shifts with every storm and the pass is but little used. In 1934 a depth of about 5 feet (1.5 m) could be carried into the pass to a point one-half mile above the highway bridge but only 2 to 3 feet (0.6 to 0.9 m) could be taken into Caminada Bay. The bridge is just inside the eastern point and has a vertical clearance of 16 feet (4.9 m) above mean high water; it is a fixed span.

Inside routes from Barataria Bay.—The channel northward through Barataria Bay has a controlling depth of 5 feet (1.5 m). It leads between **Queen Bess Island** and **Independence Island** and close to the westward of *Shell Island Light.*

The main route north is through **Bayou St. Denis** and connecting waterways to the Intracoastal Waterway at the village of Barataria on Bayou Barataria. The entrance to the bayou is marked by *Bayou St. Denis Entrance Lights 2 and 4.* Four miles above the inner light the route branches to the northeast into **Bayou Cutler,** the west side of this entrance being marked by *Bayou Cutler Entrance Light.* Thence **Dupree Cut, Bayou Dupont,** and Big Barataria Bayou lead to the Intracoastal Waterway at the junction of the latter bayou and Bayou Villars. This route has a controlling depth of 5 feet (1.5 m) through the upper portion of Barataria Bay.

Previously used routes northward through **Grand Bayou, Little Lake, Lake Villere, Harvey Cut-Off,** and **Bayou Rigolettes** are now little used, shoaling having occurred in the latter bayou. The south entrance to Grand Bayou is marked by *Grand Bayou Light* at Manila Village on the east side of the entrance. Both Grand Bayou and Bayou St. Denis lead into Little Lake with a depth of about 3 feet (0.9 m). This depth can also be carried across the lake.

Wilkinson Canal enters Barataria Bay about 1½ miles eastward of Bayou St. Denis. This canal is 11 miles long and leads to **Myrtle Grove** on the Mississippi River, but does not enter the river. This canal has a depth of about 3 feet (0.9 m).

To the eastward, a depth of 3 feet (0.9 m) can be carried into the Mississippi River through the Doullut Canal at Empire. The route follows Lake Grande Escaille, Port Sulphur Canal, Grand Bayou, Mevers Canal, and Adams Bay to Doullut Canal. The Port Sulphur Canal leads to Port Sulphur (Grandeport) on the Mississippi River but does not enter the river. Other similar canals north of Port Sulphur can be reached via Grand Bayou.

Routes to the westward, to the Southwest Louisiana Canal have previously been described. See Bay des Ilettes, etc., above.

From Barataria Bay westward to Atchafalaya Bay, there is a succession of shallow passes leading to the bays inside. The islands separating the bays from the Gulf, as well as the entrance channels between the islands, are undergoing continual changes. During rel-

atively recent years, the easterly end of Timbalier Island has been washed away for about 3 miles, Grand Pass Timbalier has moved about a mile to the westward and a new channel has broken through 2 miles west of Grand Pass Timbalier. There are few aids to navigation in this area and local knowledge is generally necessary to navigate the passes as well as most of the inside waters.

Pass Fourchon was formerly the easterly of two entrances to Bayou Lafourche from the Gulf. It is now closed.

Belle Pass was formerly the westerly and is now the only direct entrance into Bayou Lafourche from the Gulf of Mexico. It is used considerably by small fishing boats drawing 2 to 4 feet (0.6 to 1.2 m). A favorable tide is necessary for the latter draft.

Bayou Lafourche was formerly an outlet of the Mississippi River at Donaldsonville, 68 miles above New Orleans, but for purposes of flood prevention it is now separated from that stream by a dam without locks at Donaldsonville. From Donaldsonville, it extends in a southeasterly direction for 93 miles and empties into the Gulf of Mexico at Belle Pass, 19 miles southwestward of Barataria Bay Lighthouse.

The bayou varies in width from 75 to 150 feet Inside the entrance there is 6 feet (1.8 m) to Leeville and thence about 8 feet (2.4 m) to Larose. Between Larose and Lockport, Bayou Lafourche forms part of the Intracoastal Waterway. This section of the bayou has depths of 9 feet (2.7 m) or more. Above Lockport to Thibodaux there is about 5 feet (1.5 m) and nearly 5 feet (1.5 m) for 16 miles above Thibodaux. For 14 miles south of Donaldsonville, the bayou is shallow and not used for navigation.

The Intracoastal Waterway furnishes a traffic outlet eastward to New Orleans and westward as far as Galveston. Through the Southwestern Louisiana Canal and other connections listed below, there are outlets to Barataria Bay to the eastward and to Timbalier Bay and Terrebonne Bay to the westward. A highway extends along each side of the bayou southward as far as the town of Golden Meadow and on the west side as far as Leeville where it crosses the bayou and continues to Grand Isle. The highway bridge has a swing span with 51 feet horizontal clearance and 10 feet (3.0 m) vertical clearance at mean high water. The channel is through the western opening.

On the lower bayou there is considerable commerce in towing oil barges to New Orleans from the oil fields in the vicinity of Leeville.

In 1935 a Federal project was adopted for the further improvement of the bayou. This provided for a channel 60 feet by 6 feet (1.8 m) from Napoleonville to Lockport and a channel of same dimensions from Larose to the Gulf of Mexico via a jettied entrance through either Pass Fourchon or Belle Pass.

Raccoon Pass was formerly a shallow pass into Timbalier Bay, 20½ miles southwestward of Barataria Bay Lighthouse; the pass is now closed.

Southwestern Louisiana Canal is a toll canal connecting Barataria Bay with Timbalier Bay, and affords a protected inside passage for small boats. The canal crosses Bayou Lafourche at Leeville 12½ miles above its mouth, and that part lying east of the bayou is known as **East Louisiana Canal** and the part west of the bayou as **West Louisiana Canal**. The canal is about 10 miles long and 3 to 4 feet (0.9 to 1.2 m)

deep with shoaler depths at both the eastern and western approaches. With a favorable tide, about 3½ feet (1.1 m) can be carried through Caminada Bay, the eastern approach, and about 3 feet (0.9 m) across **Little Lake,** the approach at the western end. **Deep Bayou** and **Bayou Blue** connect Little Lake with Lake Raccourci. These approaches are sometimes staked but are generally difficult for a stranger. A fixed highway bridge crosses the eastern end of the West Louisiana Canal making it necessary to enter the canal from Bayou Lafourche through a short cut-off. The toll charges are 30 cents per net ton for the East Louisiana Canal and 16 cents per net ton on the West Louisiana Canal. The toll collectors are at Leeville at the Bayou Lafourche end of each canal.

Bayou Grey, 3 miles south of Leeville, with a connecting channel through **Bayou Blue,** offers the deepest and most generally used route from Bayou Lafourche to Lake Raccourci and Timbalier Bay. On a favorable tide 4 feet (1.2 m) can be carried through a locally marked channel. **Bayou Blue** also connects with Little Lake. Bayou Grey is a toll channel, the toll collector's house being at the junction with Bayou Lafourche. There is a cable barrier which is only lowered upon the payment of toll charges.

Seven miles south of Leeville there is a recently dredged cut good for about 5 feet (1.5 m), leading westward to Timbalier Bay and connecting with a marked channel across Timbalier and Terrebonne Bays to Cat Island Pass. (See page 245.)

Timbalier Bay and **Terrebonne Bay** (charts 197 and 198) are large shoal-water bays separated from the Gulf by a chain of low sand islands. The average depths in these bays range from 4 to 7 feet (1.2 to 2.1 m). Several passes having depths of 6 to 13 feet (1.8 to 4.0 m) lead from the Gulf to these bays. There is no post office or settlement of any importance on these bays, but they are frequented by large numbers of fishing and oyster boats, which carry their catches through the inside passages to New Orleans or Houma.

Grand Pass Timbalier, known also as **Timbalier Pass,** 50 miles westward from Southwest Pass and 40 miles east-northeastward from Ship Shoal Lighthouse has been filling up and is but little used. In 1934 the channel was narrow and winding and difficult to navigate; the greatest depth which could be carried across the outer bar was 5½ feet (1.7 m) and 4½ feet (1.4 m) across the inner bar into the bay. *Timbalier Lighthouse*, on the west side of the channel, is the only aid for entering. A wrecked lighthouse of steel framework lies 800 yards east-northeast of Timbalier Light. Part of it projects 10 feet above water. In 1934, the entrance channel ran in a northerly direction between the light and the wrecked tower, favoring the latter.

Two miles westward from Grand Pass Timbalier, there is a wider and straighter channel which is more generally used to enter Timbalier Bay. The new pass has a depth of 6 feet (1.8 m) on the outer bar and a depth of 4 feet (1.2 m) on the inner bar. The channel branches at the inner end, the western branch being considered the safer and is the more generally used. Local reports are that this pass is working westward.

Timbalier Lighthouse (Lat. 29°03′.0; Long. 90°21′.6) is a fixed red light shown from a white square tower, on a wooden dwelling on piles. The light is 56 feet (1.7 m) high and visible 13 miles.

Caillou Pass, 9 miles westward of Timbalier Lighthouse, has a depth of 5 feet (1.5 m) in the channel over the bar and good anchorage inside in 10 feet (3.0 m) of water. This pass is continually changing with storm and tide; the lead should be used when entering.

Cat Island Pass, 11 miles westward of Timbalier Lighthouse, connects the deepest part of Terrebonne Bay with the Gulf and is the principal entrance into the bay. The pass is marked by several buoys, three of which are lighted; four have white and two have green reflector tops. In 1934 there was 13 feet (4.0 m) across the outer bar and a large anchorage area inside the bar, with depths of 12 to 21 feet (3.7 to 6.4 m). Further in, the depth gradually shoals to the general bay depths of 7 feet (2.1 m) and less.

Recently oil has been found in several localities about Terrebonne and Timbalier Bays. The Texas Co. is the principal operator and has marked numerous channels connecting its oil wells in the locality with their loading base inside Cat Island Pass which is a grounded tanker secured by piling. The Texas Co. has also marked channels leading from Cat Island Pass to Bayou Terrebonne and Bayou Lafourche. The channel markers consist of lighted beacons, day beacons, can buoys made from oil drums and simple stakes; they are moved as the channel shifts or as the navigational requirements of the company are changed.

Lake Barre lies northward of Terrebonne Bay and westward of Lake Felicity. The general depths are 4 to 6 feet (1.2 to 1.8 m). Westward, Seabreeze Pass leads into Bayou Terrebonne and to Lake Lagraisse at the northwest end of Terrebonne Bay; southward, **Pass Barre** and also a dredged channel lead into Terrebonne Bay and from the northeast corner of the bay there is a connecting passage into Lake Felicity.

Old Lady Lake (local name) is a shoal body of water with depths of 3 to 4 feet (0.9 to 1.2 m) lying between Lake Raccourci and Lake Barre and southward of Lake Felicity. There are numerous passages connecting it with these lakes and with Timbalier Bay. The lake has a depth of 3 to 4 feet (0.9 to 1.2 m) but the passes have a controlling depth of 1 to 2 feet (0.3 to 0.6 m).

Lake Felicity, with depths of 5 to 6 feet (1.5 to 1.8 m), lies between Lake Barre and Lake Raccourci to the northward of Timbalier and Terrebonne Bays and connected therewith by many bayous and passes. Most of the bayous to the east and north of Lake Felicity are used as oyster bedding grounds and contain numerous oyster reefs. The water in the bayous shoals rapidly whenever the bayous widen and the channels are difficult to follow without local knowledge. An inside route between Bayou Terrebonne and Bayou Lafourche passes through Lake Felicity.

Lake Raccourci is a shoal body of water lying northward of Timbalier Bay. The general depths are 4 to 5 feet (1.2 to 1.5 m). The area around **Philo Brice Islands** and **Jacko Camp Bay** contains many oyster bedding grounds and fish traps. The oyster beds are marked by iron or brush stakes. On the eastern side of the lake, Deep Bayou and Bayou Blue lead into Little Lake and from the northwest corner of the lake, **Grand Pass Felicity** leads into Lake Felicity.

Wine Island Pass is about 4½ miles westward of Cat Island Pass and 24 miles east-northeastward of Ship Shoal Lighthouse. The pass has depths of about 9 feet (2.7 m) on the bar and 8 feet (2.4 m)

at the anchorage inside. The channel lies close to Isles Derniere. When any sea is running, the breakers clearly show the outlines of the channel.

Bayou Terrebonne is navigable for a draft of about 5 feet (1.5 m) to the town of Houma 33 miles above its southern mouth. For the lower 4 miles of its course the bayou flows through a long narrow delta separating Lake Barre and Terrebonne Bay, from each of which there are several entrances to the Bayou. **Seabreeze Pass**, connecting Lake Barre and **Lake Lagraisse**, crosses the northern end of the delta and provides the main entrance into the bayou from both Lake Barre and Terrebonne Bay. From Terrebonne Bay, the main entrance to Bayou Terrebonne, good for about 5 feet (1.5 m), is through Lake Lagraisse and the western portion of Seabreeze Pass. The bayou can also be entered from the bay via Pass Barre, Lake Barre, and the eastern portion of Seabreeze Pass; at the entrance to the latter pass, there is a controlling depth of about 4½ feet (1.4 m). For 2 miles below Seabreeze Pass, the bayou is shallow and not navigable. Across this section, Bayou Jose and an inlet opposite from Lake Jean Pierre provides another connection between Lake Barre and Terrebonne Bay but with a controlling depth of but 2½ to 3 feet (0.8 to 0.9 m). At its southern end, Bayou Terrebonne empties into Pass Barre.

Seabreeze Light at the northwest point of the intersection of Seabreeze Pass and Bayou Terrebonne, marks the entrances to the bayou from Lake Lagraisse and from Lake Barre. On a favorable tide, a depth of about 5 feet (1.5 m) can be carried into Bayou Terrebonne from Terrebonne Bay by way of Lake Lagraisse and about 4½ feet (1.4 m) from Lake Barre; *Lake Barre Pass Light* marks the approach from Lake Barre. For 3 miles above the entrance, there are controlling depths of 5 feet (1.5 m) and thence 6½ feet (2.0 m) or more to Houma.

Bayou Terrebonne is crossed by the Intracoastal Waterway just east of Houma and is joined by Bayou Petit Caillou about 4 miles below Houma. At **Bourg**, 8 miles below Houma, a section of the old Company Canal furnishes a cut-off, between the bayou and the waterway, good for about 5 feet (1.5 m). Several other canals enter Bayou Terrebonne and are used considerably by small boats.

The banks of Bayou Terrebonne are thickly settled throughout its upper half and there are frequent settlements where gasoline, oil, and provisions can be obtained. A State highway extends south along the east bank of the bayou for 6 miles below **Montegut**. Near the end of the road, The Texas Co. has a repair yard and construction camp for their oil operations in Terrebonne and Timbalier Bays; there are marine ways for hauling heavy craft up to about 5 feet (1.5 m) draft. Bayou Terrebonne is crossed by a number of drawbridges with ample openings. Small boats can be hauled and minor repairs made at several points along the bayou. There are general stores at Bourg and at Montegut, a large sugar mill at Montegut, and a road extends from Montegut to Bayou Petit Caillou.

Bayou Petit Caillou empties into **Troiscent Piquette Bay** on the west side of Terrebonne Bay, 5 miles north of Wine Island Pass. A beacon marks the south side of the passage between Terrebonne and Troiscent Piquette Bays. Off the mouth of the bayou, the entrance channel passes north of four small islets, where the controlling depth is 3.0

feet (0.9 m). The bayou is 29 miles long to its junction with Bayou Terrebonne 4 miles south of Houma. There are 3- and 4-foot (0.9 and 1.2 m) shoals south of **Cocodrie**, 6 miles above the mouth and a controlling depth of 5 feet (1.5 m) above that point. Several canals enter the bayou, **Bush Canal** leading to Bayou Terrebonne, and **Boudreaux** (toll) and **Robinson** Canals connecting with **Bayou Grand Caillou**. Two miles above Cocodrie there is a connecting route to Bayou Terrebonne through **Wine Lake** and Lake Lagraisse; it is good for but about 3 feet (0.9 m) on a favorable tide.

The lower portion of this bayou is used considerably by local oystermen and fishermen. A highway extends south along the west shore to Cocodrie. At Boudreaux Canal 15 miles above the mouth, there is a shrimp and oyster cannery and a large store where boat supplies can be secured. There are several small marine ways along the bayou.

Channels and Routes, Timbalier and Terrebonne Bays.—From inside Cat Island Pass, a marked channel extends 4 miles northeasterly across the central portion of Terrebonne Bay to *The Texas Company Light 1*, thence northerly for about 2 miles to *Light 2*, and thence again northeasterly for about 1 mile to *Light 4* at the south entrance to Pass Barre, which connects with Lake Barre. A depth of about 7 feet (2.1 m) can be carried to Lake Barre.

Another marked channel (by the Texas Co.) from inside Cat Island Pass extends eastward to the north of **Caillou Island**, to the south of **Bush Island**, and thence across Timbalier Bay to a dredged cut connecting the eastern side of this bay with Bayou Lafourche; the cut joins the bayou 7 miles below Leeville. This channel is good for about 5 feet (1.5 m).

A beacon marks the east side of the southern entrance to Lake Lagraisse, about 2½ miles west-northwesterly from *The Texas Company Light 2*. This is the main route to Bayou Terrebonne mentioned on page —. A depth of about 5 feet can be carried into the bayou on a favorable tide.

From south of *The Texas Company Light 1*, a marked channel extends eastward into Timbalier Bay and thence northeastward into Lake Raccourci, passing about ⅓ mile above the north end of Northwest Island, and thence continuing eastward to the southwest entrance to Bayou Blue leading to Bayou Lafourche. On a favorable tide a depth of about 5 feet (1.5 m) can be carried into Lake Raccourci and about 4 feet (1.2 m) into Bayou Blue.

From Lake Raccourci there is a route through Bayou Grand Felicity, across Lake Felicity and thence through a connecting passage at the southwest corner of the lake to Lake Barre and to Bayou Terrebonne. On a favorable tide about 5 feet (1.5 m) can be carried into Lake Barre and 4½ feet (1.4 m) into Bayou Terrebonne. Beacons mark both ends of Bayou Grand Felicity as well as the connecting passage between Lake Felicity and Lake Barre.

Bayou Lafourche can be reached from lower Timbalier Bay, either by passing about the north end of Northwest Island or through the recently dredged cut on the east side of the bay.

A depth of 5 feet (1.5 m) can be carried from Timbalier Bay to Terrebonne Bay through the passage north of Timbalier Island and Caillou Island.

The main passage from Terrebonne Bay to Lake Pelto is south of Point Mast Island; it has a depth of 7 feet (2.1 m) or more. There is also a marked passage through **Bayou La Poule**. The entrance to Bayou Petit Caillou has been described on page 246.

Houma, at the head of Bayou Terrebonne, is the largest town in this vicinity; it is described on page 261.

Lake Pelto, with general depths of 5 to 7 feet (1.5 to 2.1 m), lies west of Terrebonne Bay and north of the **Isles Dernieres**. Depths of 5 feet (1.5 m) can be carried eastward into Terrebonne Bay and westward through **Caillou Boca** to Caillou Bay.

Whiskey Pass, through the Isles Dernieres, is the only entrance to Lake Pelto from the Gulf; the controlling depths are 4 to 5 feet (1.2 to 1.5 m) at the north end of the pass.

Caillou Bay is a large bight with general depths of 5 feet (1.5 m) lying north and east of **Raccoon Point** at the western end of the Isles Dernieres. There is an anchorage site in 8 feet (2.4 m) close inside of Raccoon Point, but with only about 7 feet in the approach.

Western Pass (local name), 3 miles east of Raccoon Point, is shallow changeable and difficult to follow. It is not used even by local fishermen.

A protected inside route is afforded small craft of 4 to 5 feet (1.2 to 1.5 m) draft from Timbalier and Terrebonne Bays westward through Lake Pelto and Caillou Boca to Caillou Bay.

From Terrebonne Bay to Atchafalaya Bay there is an extensive network of lakes, bayous, and canals. This area is sparsely populated but there is considerable navigation by local fishermen and trappers. The principal entrances from the Gulf are described below.

Bayou Grand Caillou empties into the Gulf about 7 miles north of Raccoon Point. *Grand Caillou Light* is ⅓ mile west of the entrance. There are depths of 5 to 6 feet (1.5 to 1.8 m) off the entrance and a controlling depth of 5 feet (1.5 m) to beyond **Dulac**, about 20 miles above the mouth. **Bayou Dulac** connects with Bayou Petit Caillou. A draft of about 3 feet (0.9 m) can be taken to the Intracoastal Waterway by way of the **Ashland Canal** and **Bayou Lecarpe**. The bayou connects with a network of navigable lakes and canals and is used by local boats. A highway extends south along the east bank to below Dulac.

In 1935 a Federal project was adopted providing for a channel 40 feet wide by 5 feet (1.5 m) deep from the Intracoastal Waterway at Houma through Bayou Lecarpe, Bayou Pelton, and Bayou Grand Caillou to Bayou Dulac, a distance of about 14 miles.

Grand Bayou de Large, leading to Caillou Lake, empties into the Gulf half a mile west of *Grand Caillou Light*. There are depths of 6 to 7 feet (1.8 to 2.1 m) off the Gulf entrance and 3½ to 4 feet (1.0 to 1.2 m) across **Caillou Lake** to Grand Pass connecting with **Bayou de Large** and with **Lake Mechant**. Small boats of 2 to 3 feet (0.6 to 0.9 m) draft can proceed 13 miles up Bayou de Large to **Theriot**. A highway extends south along the east side of the bayou to below Theriot.

There is a connecting passage into Bayou Grand Caillou from Caillou Lake with a controlling depth of 2.5 to 3.0 feet (0.8 to 0.9 m).

Between Grand Bayou de Large and Oyster Bayou there are a number of shallow entrances leading to a network of shallow inside waters. A draft of 4 to 5 feet (1.2 to 1.5 m) can be carried through

the larger entrances to anchorage immediately inside, but generally navigation of these inside waters is confined to drafts of 2 to 3 feet (0.6 to 0.9 m).

Oyster Bayou, 13 miles northwestward of Raccoon Point, connects the Gulf with **Four League Bay,** an arm of Atchafalaya Bay. It affords a protected route for small craft of 3 to 4 feet (0.9 to 1.2 m) draft going to Atchafalaya Bay from Caillou Bay or the waters to the eastward. There are a number of oyster reefs through the bayou which are generally marked by a pipe.

Oyster Bayou Lighthouse is a white house on pile foundation on the east side of the entrance. The light is 47 feet (14.3 m) above the water and visible 8 miles.

The route across the south end of **Four League Bay** is marked by *Oyster Bayou Inner End Light* off Oyster Bayou and *Mosquito Point Light* off Mosquito Point and by a line of closely spaced beacons. Boats follow close along the east side of the beacons and maintain a channel slightly deeper than the general bay depths. *Halters Island Point Light* marks the entrance to Four League Bay from Atchafalaya Bay. **Blue Hammock Bayou** on the east side of Four League Bay is another entrance to the network of shallow inside waters in this vicinity. Shallow draft boats (2 to 3 feet on a favorable tide) can reach the Intracoastal Waterway by way of **Lost Lake, Bayou de Cade, Lake de Cade, and Minor Canal.** Blue Hammock Bayou also connects with Lake Mechant.

Ship Shoal, lying about 10 miles southward of Raccoon Point, is about 25 miles long in a general east and west direction, 1 to 3 miles wide, and has depths ranging from 5 to 18 feet (1.5 to 5.5 m); for 6½ miles of its length it has a depth of less than 12 feet (3.7 m). In stormy weather it may be distinguished at some little distance by a choppy or breaking sea. In calm weather its position is not indicated by natural phenomena, and it can best be avoided by use of the lead. Heavy rips have been reported about 15 miles southwest of Ship Shoal.

To mark the best water inside of Ship Shoal, two midchannel buoys have been established respectively 2 miles northward and 10 miles westward of Ship Shoal Light.

Ship Shoal Lighthouse (Lat. 28°54′9″; Long. 91°04′2″), standing in 14 feet (4.3 m) of water, lies 86 miles 271° true (W. ⅜ S. mag.) from *Southwest Pass Entrance Lighted Whistle Buoy.* It is a brown skeleton structure, inclosing a stair cylinder and cylindrical dwelling. The light is flashing white (flash 1 second, eclipse 9 seconds), 105 feet (32.1 m) above the water and visible 16 miles. *Ship Shoal Lighted Whistle Buoy 2* "Ship" lies about 18 miles 177° true (S. by E. ¾ E. mag.) from Ship Shoal Light. It is moored in the 10-fathom (18.2 m) curve.

ATCHAFALAYA BAY AND RIVER

(Chart 199)

Atchafalaya Bay is a large indentation in the coast of Louisiana 112 miles westward of Southwest Pass, Mississippi River, and 37 miles northwestward of Ship Shoal Lighthouse. It is about 28 miles long in nearly an east and west direction, and averages 7 miles wide. It is full of shoals and oyster reefs, and has general depths of 3 to 9

feet (0.9 to 2.7 m). The bay is partially separated from the Gulf by a fringe of reefs, the eastern end of which is known as **Point au Fer Shell Reef,** and the approach for 25 miles is shallow, with depths of 25 feet (7.6 m) or less. Atchafalaya Bay is the approach to Atchafalaya River and Morgan City. The usual draft of vessels navigating the bay is 3 to 5 feet (0.9 to 1.5 m). The Atchafalaya Bay Ship Channel (project 20 feet (6.1 m) deep by 200 feet wide) has shoaled to a controlling depth of 6½ to 7 feet (2.0 to 2.1 m) and there is about the same depth through the old Morgan Channel.

Prominent features.—In approaching Atchafalaya Bay, Atchafalaya Channel Beacon 1, a black pyramidal structure on piles, is the most prominent object and the first to be seen when coming from the southward or westward. Channel Beacon 3 and *Point au Fer Reef Lighthouse* are about the only other objects which can be easily recognized by a stranger as the coast eastward and westward is low and marshy. **Belle Isle,** on the north shore of the bay, northward of the lighthouse, is 130 feet (40 m) high and is a conspicuous object from some distance offshore.

Point au Fer Reef Lighthouse (Lat. 29° 22′.3; Long. 91°23′.0) is a white wooden house on pile foundation on Eugene Island on the westerly side of the dredged channel. The light is fixed white, 54 feet (16.5 m) above the water, and visible 13 miles.

Southwest Reef Unused Lighthouse, 6½ miles west of Point au Fer Reef Lighthouse, is a black square pyramidal tower, connected to a square house on piles with a pyramidal tower on the roof. This is a prominent object for small vessels approaching close inshore from westward.

Atchafalaya Bay Ship Channel is a straight cut extending from the Gulf northeastward through Point au Fer Shell Reef to the mouth of the Atchafalaya River. It was formerly dredged to the project dimensions of 20 feet (6.1 m) deep by 200 feet wide but these dimensions have not been maintained; in 1935, the controlling depth was 6 feet (1.8 m) in the vicinity of Beacon 3. The channel is marked by lights and beacons on the northwesterly side, Point au Fer Reef Lighthouse marking the cut through Point au Fer Shell Reef. The southeasterly side of the channel is occasionally marked by brush stakes. The former spoil bank along the northwest side of the channel has washed away. There are strong tidal currents in the channel through Point au Fer Reef, especially during northerly winds and extreme low tides.

A Cutoff Channel, marked on the northerly side by pile beacons, leads from the mouth of Atchafalaya River westward through the bay to the entrance to East Cote Blanche Bay, and to a channel leading to the Gulf at Southwest Reef unused lighthouse. This channel has been nearly abandoned and some of the beacons are gone. It is good for a draft of 6 feet (1.8 m). Along the north side of this channel, there is a long line of closely spaced iron piling filled with concrete. These piling are 1 to 2 feet (0.3 to 0.6 m) below mean low water and are particularly to be avoided when navigating in this locality.

Atchafalaya River empties into the northeastern corner of Atchafalaya Bay from northward. It is the outlet of an extensive system of lakes and bayous in southern Louisiana which, in part, afford inside

passages to the Mississippi and New Orleans and to other parts of the State.

From Atchafalaya Bay to Morgan City, a distance of 15 miles, the river has a crooked channel 300 to 600 yards wide and 35 to 125 feet (10.7 to 38.0 m) deep, the deepest water generally being found in midstream. Two bridges cross the river at Morgan City, a railroad drawbridge with a swing span 113 feet wide and a fixed highway bridge with a vertical clearance of 50 feet (15.2 m) at mean high water.

Bayou Boeuf, joining the Atchafalaya River from the eastward at Morgan City, is a section of the Intracoastal Waterway which follows the river for 2½ miles south of Morgan City, where it continues westward through Little Wax Bayou. The Intracoastal Waterway is described on pages 258 to 269.

Bayous Chene, Shaffer, Penchant, and **Black** are described on page 262.

The alternate route of the Intracoastal Waterway extending from Morgan City to Plaquemine on the Mississippi River is described on page 262.

Bayou Grossetete is described on page 263.

Bayou Teche, Six Mile Lake, and **Grand Lake** are described on pages 264 to 265.

Morgan City (population 5,985 by the 1930 census) is on the east bank of the Atchafalaya River at its junction with Bayou Boeuf, a section of the Intracoastal Waterway. The portion of the river immediately north of the town is locally known as **Berwick Bay.** There are railway and highway connections to all points east and west. Numerous inside waterways radiate from the town, east, north, and west along the Intracoastal Waterway, north to Bayou Teche and to Six Mile Lake and Grand Lake, and south to the Gulf Coast, together with several other adjacent bayous. The town is the center for considerable local commerce in fishing, shell dredging, trapping, lumbering, and growing of sugarcane.

On account of the depths and currents in the river, vessels generally go alongside. There are several landings for river boats with ample depths alongside. Gasoline and fuel oil, fresh water, provisions, and some boat supplies can be obtained. There is a shipyard, with machine shop, capable of hauling and repairing vessels up to 200 tons [length about 75 feet and draft about 8 feet (2.4 m)].

There are no regular **pilots** or towboats for the harbor. The nearest marine hospital is at New Orleans, but there is a private hospital at New Iberia.

Storm warnings (day and night) are displayed near the water front between the bridges.

Berwick is a small town opposite Morgan City and connected with it by the highway bridge. There are several fish canneries and a small repair yard which can haul and repair boats up to about 70 feet long and 5 feet (1.5 m) draft.

Fog is most frequent during January, February, and March. Southerly winds bring it in and northerly winds clear it away.

Tides, currents, and freshets.—The level of the water surface and the velocity of the current depend to a considerable extent upon the force and direction of the wind. At the entrance to the bay the mean range of tide is 1.2 feet; at Morgan City normal tide action is

not perceptible. Northerly winds lower the water surface at Morgan City as much as 1 foot, and southeasterly winds raise it 1½ to 2 feet.

Freshets occur frequently during May and June, at which times the river overflows its banks and the current has considerable velocity, making it difficult to keep in the channel. During ordinary stages of the river the current has a velocity of about one-half knot. When there are freshets in the rivers the water in Atchafalaya Bay is quite fresh and that in the Cote Blanche Bays is nearly so. The discolored water coming out of the mouth of the river will be encountered well offshore, the distance depending much upon the direction of the wind.

Directions, Atchafalaya Bay and River.—Vessels approaching the bay from eastward or westward should keep in about 3 to 4 fathoms (5.5 to 7.3 m) of water until a 38° true (NNE. ¾ E. mag.) course will bring Atchafalaya Channel Beacon 1 and *Point au Fer Reef Lighthouse* ahead when sighted. This course will then lead along the axis of the dredged channel. Strangers should select anchorage as far inshore as the draft will permit, and obtain local assistance.

Pass southeast of the lights and beacons and when up to Light 7 haul eastward to the south of Beacon 13 and north of Light 2. When three quarters of a mile past Light 2, haul northward into the mouth of the river and steer midchannel courses to Morgan City. There are a number of lights marking the river channel.

Little Wax Bayou, leaving the Atchafalaya River 2½ miles below Morgan City, empties into **Wax Lake** and thence through Wax Lake Pass into the Gulf. The northern end of the bayou has been straightened by dredged cuts and forms the extension westward of the Intracoastal Waterway from the Atchafalya River. **Big Wax Bayou**, a branch of Little Wax Bayou, empties into the Gulf at the entrance to **Wax Lake Pass**. These bayous form an inside route to the western part of Atchafalaya Bay with a controlling depth of 6 feet (1.8 m) off the entrance to Wax Lake Pass.

The former inside route westward from Morgan City extended through these bayous, thence along the north shore of Atchafalaya Bay and through East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay to Schooner Bayou and White Lake. A depth of about 4 feet (1.2 m) can be carried over this route, the limiting depth being through the entrance to Schooner Bayou from Vermilion Bay. About 5 feet (1.5 m) can be carried through Schooner Bayou, White, and Grand Lakes to the Mermentau River. This route is described on page 267.

ATCHAFALAYA BAY TO SABINE PASS

(Charts 199, 1277, 1278, and 1279)

East Cote Blanche, West Cote Blanche, and **Vermilion Bays** (charts 199 and 1277) are the names applied to three parts of a large body of water which extends west-northwestward from the northwestern side of Atchafalaya Bay and is separated from the Gulf by **Marsh Island.** The bays have a combined length of about 32 miles, with varying width of 5 to 15 miles, and average depth of 5 to 9 feet (1.5 to 2.7 m). With the exception of Cote Blanche Island, Weeks Island, and Avery Island the shores of these bays and Marsh Island are low and marshy.

The bays are of little commercial importance, and there are no settlements directly on their shores.

Vessels going from Atchafalaya Bay to East Cote Blanche Bay generally use **Morrison Cutoff,** between **Point Chevreuil** on the east and **Rabbit Island** on the west. Under favorable conditions a draft of 5 feet (1.5 m) or possibly less, can be taken through the cut-off into East Cote Blanche Bay and thence through West Cote Blanche Bay to Vermillion Bay, but local knowledge is required. About 1 mile north of Point Chevreuil, cross East Cote Blanche Bay to a point about 2 miles southeast of the northeast point of **Marsh Island**; thence round the latter point at about 1 mile and continue about a mile off the north shore of Marsh Island. Between Marsh Island and **Dead Cypress Point,** it is reported that 3 to 5 feet (0.9 to 1.5 m) can be taken south of **Sally Island** and possibly 5 feet (1.5 m), passing about 1 mile northeast of the island and about 1 mile off Dead Cypress Point, where there was formerly a pole. Across Vermilion Bay to **Redfish Point,** the water is relatively deep.

The Jaws, at the northeast corner of West Cote Blanche Bay, is a short channel with a least depth of about 6 feet (1.8 m) connecting the bay with the Intracoastal Waterway. The entrance from the bay is marked by *Jaws Entrance Light.* Three-quarters of a mile north of the light, the channel turns sharply to the east and follows along the south bank for about a mile, entering the waterway at Beacon 3. The other connecting passages to the waterway are shallow.

Cote Blanche Island, on the northerly side of West Cote Blanche Bay, is about 70 feet (21 m) high and on the bay side presents a reddish-yellow steep bluff.

Weeks Island (sometimes known as **Grande Cote Island**), is near **Weeks Bay,** a northeasterly extension of Vermilion Bay. It is 204 feet (62 m) high and, together with an elevated water tank and a tower of a mine building on the summit, forms a prominent landmark from the bays. The Intercoastal Waterway passes close along the west side of the island. There are extensive salt mines on the island with railroad and highway connections with **Baldwin** on the Teche. The post office name is **Weeks.** There is a general store and a garage where gasoline can be secured.

Bayou Carlin, at the northeast corner of Weeks Bay and 1 mile north of Weeks Island, affords a passage from Vermilion Bay into the Intracoastal Waterway for drafts up to about 5 feet (1.5 m). The channel passes just west of the point on the east side of the entrance; a small clubhouse stands near the point. **Weeks Bayou,** branching to southward just inside the point, is somewhat shoaler.

Avery Island, about 4 miles north of the head of Vermilion Bay, is another prominent landmark from the bays. It is approximately 200 feet (61 m) high and there is an elevated tank and a shaft house with tower on the summit. It is the location of a salt mine and a railroad and highway extend to New Iberia. A depth of about 5 feet (1.5 m) can be taken from the Intracoastal Waterway up **Bayou Petite Anse** for 5 miles to the highway bridge just north of the island. There is a general store and a garage where gasoline can be obtained but both are at some distance from the bayou. Above Bayou Petite Anse, small boats of 3 to 4 feet draft (0.9 to 1.2 m) can ascend Bayou Carlin for about 5 miles to **Delcambre.**

Only shallow-draft boats can enter the Intracoastal Waterway from Vermilion Bay through either **Bayou Petite Anse** or **Avery Canal.** The deeper water is through Avery Canal with a depth of about 3 feet (0.9 m).

Vermilion River, flowing from northward, enters the western extension of Vermilion Bay. The river entrance, marked by a fixed white light, has a depth of but 3 feet (0.9 m) on a favorable tide. A mile and a half above the entrance, the Intracoastal Waterway follows the river for a short distance and there is a dredged canal 5 feet (1.5 m) deep to Schooner Bayou. This dredged canal furnishes a connection between Grand and White Lakes and the Intracoastal Waterway. The river has a depth of 11 feet (3.3 m) as far as Abbeville, 21 miles above the Intracoastal Waterway, 5 feet to **Milton,** and 3 feet to **Pinhook Bridge,** about 2 miles below Lafayette. Abbeville is described on page 266.

Schooner Bayou, emptying into the extreme western extension of Vermilion Bay, forms part of the former inside route to Mermentau River through White and Grand Lakes and connecting passages. This route has a controlling depth of about 5 feet (1.5 m). The approach to the bayou is marked by fixed white lights off Redfish Point and at the entrance to the bayou. The entrance channel is no longer maintained and in 1934 there was a depth of but 4 feet (1.2 m), on a favorable tide, just off the entrance to the bayou. To enter, pass about half a mile north of Redfish Point and follow ½ to ⅓ mile off the south shore. Pass close by to the southward of the light off the entrance to the bayou.

Four miles inside Schooner Bayou, there is a tidal lock to prevent salt water from flowing through the canal into White Lake. The lock is 300 feet long, 36 feet wide, and 8 feet (2.4 m) deep.

The inside route through White and Grand Lakes is described on page 267.

Shell Keys extending about 4½ miles off **South Point,** the southernmost point of Marsh Island, reach about 2 feet above high water in places and on a clear day may be seen from aloft at a considerable distance.

Southwest Pass, (Chart 1277) entrance to Vermilion Bay from the Gulf, has a controlling depth of 6 to 7 feet (1.8 to 2.1 m) and leads between the western end of Marsh Island and the mainland. This pass, if it can be found, is not difficult to enter with a draft of 6 feet (1.8 m), but it is advisable to have local assistance.

Directions, Southwest Pass, Vermilion Bay.—These directions are good for a draft of about 6 feet (1.8 m).

Examine chart No. 1277 before approaching the pass.

Approaching from eastward keep about 3 miles offshore and from westward about 2 miles offshore until **Lighthouse Point** bears 40° true (NE. by N. mag.). This point has a sand beach and there is a small dome-shaped rock lying just off of it. Head for the point with the west point at the north entrance about in range. When about a mile offshore, veer to the westward heading for the opposite (western) point at the entrance and bringing a small island on the oyster reef in range ahead. An iron stake marks the 3-foot (0.9 m) shoal on the west side of the channel. When off the west point at the entrance, turn east so as to pass south of a pile marking the turn and follow

the chart through the pass, favoring the east side which is soft mud. The center shoal is usually marked by small stakes.

Trinity Shoal lies about 25 miles southward of Southwest Pass, Vermilion Bay, and 60 miles 285° true (W. ¾ N. mag.) from Ship Shoal Lighthouse. It is about 20 miles long in a west-southwesterly and east-northeasterly direction and has depths of 11 to 18 feet (3.4 to 5.5 m). It is fairly steep-to on its southwestern side, the 10-fathom (18 m) curve being distant only about 5 miles and the 5-fathom (9 m) curve only about 1 mile. In calm weather Trinity Shoal can be discerned by a difference in color of the water; in stormy weather it is indicated by a choppy sea. Owing to its greater depth the sea does not break so heavily on Trinity Shoal as on Ship Shoal.

Trinity Shoal is marked off the south end of its southwesterly part by *Trinity Shoal Lighted Whistle Bouy 4* (Lat. 29°05′; Long. 92°16′) moored in 11½ fathoms (21 m) of water.

Mermentau River empties into the Gulf of Mexico from northeastward about 86 miles westward of Atchafalaya Bay entrance and 90 miles eastward of Bolivar Point Lighthouse. It is formed by the junction of **Bayou Nezpique** and **Bayou des Cannes**, and in its course to the Gulf has four enlargements known as **Lake Arthur**, **Grand Lake**, **Upper Mud Lake**, and **Lower Mud Lake**. The Intracoastal Waterway crosses the river just north of Grand Lake. North of this waterway, the river is navigable for a distance of 32 miles to its head, the controlling depth being 9 feet (2.7 m) in Lake Arthur through which the channel is marked. From the head of the Mermentau River, Bayou Nezpique is navigable for 20 miles and Bayou des Cannes for 7½ miles, the depth in the former being 9 feet (2.7 m) and in the latter 5 feet (1.5 m). **Bayou Plaquemine Brule (Medlenka River)** empties into Bayou des Cannes about 1 mile above the Mermentau River from which a depth of about 6 feet (1.8 m) can be carried for 17 miles to near **Crowley**, an important town between Jennings and Lafayette. The same depth can be carried by **Bayou Queue de Tortue** to **Riceville**, a distance of 12 miles.

From the Intracoastal Waterway to the Gulf, the controlling depth in the Mermentau River is 3 feet (0.9 m), this depth being found off the Gulf entrance, through Lower Mud Lake and through the lower portion of Grand Lake. The bar off the mouth of the river is subject to change, and the river entrance is used but very little.

Grand Chanier is a small settlement and post office on the east bank of the river between Lower and Upper Mud Lakes. There is a highway to Lake Charles and weekly boat service for freight and passengers to Lake Arthur. Water and gasoline and provisions in small quantities can be secured.

Mermentau River is connected with Schooner Bayou by an inside route with a controlling depth of about 5 feet (1.5 m) through Grand and White Lakes and connecting passages. This route is described on page 267.

Calcasieu Pass (chart 591), the outlet of Calcasieu Lake and River, lies about 98 miles westward of Atchafalaya Bay entrance and about 78 miles eastward of Galveston entrance. It is obstructed by a shifting bar, which has been improved by the construction of two jetties extending southward from the mouth of the pass. The depth in the channel over the bar is 8 feet (2.4 m).

Inside the entrance the pass for a distance of 5½ miles has an average width of 600 feet and a depth of 12 feet (3.7 m) or more and is an excellent anchorage for vessels which can cross the bar.

The recently published new chart no. 592 covers Calcasieu Pass and Calcasieu Lake.

Cameron is a small fishing village with post office on the eastern shore of Calcasieu Pass about 2½ miles above its entrance. There are several shrimp packing houses. Gasoline, oil, water, and provisions are available in limited quantities for small boats. An automobile ferry is maintained by the State for the highway extending through Cameron from Lake Charles to Grand Chenier.

The vessels entering Calcasieu Pass from the Gulf are practically limited to small fishing vessels. There is very little traffic, and there are no regular pilots stationed here. Fishermen from Cameron can give information relative to the pass.

Calcasieu Range Rear Lighthouse (Lat. 29°46.′8; Long. 93°20.′7) is a black pyramidal tower on pile foundation in the marsh on the west bank of the river. The light is fixed white, 53 feet (16.2 m) above the water, and visible 12 miles.

The front range is a white slatted pyramidal structure, on pile foundation, standing in 5 feet (1.5 m) of water near the west bank of the river; the light is fixed red. With the rear light it forms a range leading close to the westward of the east jetty on a bearing 355° true (N. by W. ⅛ W. mag.).

Calcasieu Lake (chart 591), at the head of Calcasieu Pass, 6 miles from the Gulf, is 15 miles long, 3 to 5 miles wide and 5 to 7 feet (1.5 to 2.1 m) deep. The controlling depth off the entrances at either end of the lake is about 5 feet (1.5 m), but the bottom is soft and a slightly greater draft can generally drag through. The channel across the lake is marked by a row of piles along the west side. An old revetment about 1½ miles long and partly submerged extends along the southern end of the lake; the old entrance channel at the south end of the lake passed along the south side of this revetment, but is no longer used.

Grand Lake is a summer resort on the northeast side of Calcasieu Lake. There are a number of boat landings here with depths of 2 to 4 feet (0.6 to 1.2 m). **Hackberry** on the northwest side of the lake is an oil drilling center. Both towns have highway connections with Lake Charles.

Directions, Calcasieu Pass, Lake and River.—These directions are for light-draft vessels entering from Calcasieu Pass to Calcasieu River. From the black and white vertical striped buoy "Calcasieu" off the entrance, steer 355° true (N. by W. ⅛ W. mag.), with *Calcasieu Range* lights ahead, for ¾ of a mile. Approaching the outer end of the east jetty, bear somewhat to the westward so as to pass fair between the jetties (150 to 175 yards to the west of the east jetty). The range passes too close to the east jetty and at the inner end of the jetty passes across tidal flats. Inside the entrance, pass to the east of the front range light and follow midchannel courses to an anchorage or to the wharves at Cameron.

If going to Calcasieu Lake, continue midchannel courses to **St. John Island,** 2 miles above Cameron. The passage to the east of the island is the channel into the lake. Favor the southeast point at the entrance and steer so as to pass close off the point on the north side

about ½ mile distant. There are oyster reefs on either side about half way along this course. Beyond the second point, head to the northward, keeping about 50 yards off the west bank (St. John Island). There is a large oyster reef on the east side of the channel about 400 yards north of this point. Strangers should sound when passing the oyster reefs in this passage.

On entering the lake, pass west of the old revetment and head NNE. mag., following along the southeast side of the row of piles marking the channel for 4½ miles. Off Long Point this channel joins the old marked channel northward through the center of the lake. There is a row of piles along the west side of this channel to the north end of the lake.

The entrance to the **Calcasieu River,** emptying into the north end of Calcasieu Lake, is to the east and north of the island in the mouth of the river. The line of piles marking the channel across the lake leads directly to the deep water into this entrance and stakes generally mark the entrance immediately east of the island. Pass midway between the island and the north shore and continue westward (not north into Turner Bay) for about ⅝ mile and then northward through Mud Lake, the enlargement at the mouth of the river. The deep water is to the east of the center and is generally marked by stakes. A beacon at the north end of the lake, marks the west side of the channel and the north side of a cut, with a depth of 7 feet (2.1 m), leading to the Lake Charles Canal. About 400 yards north of the beacon, there is another connection to the canal with a depth of 12 feet (3.7 m).

Follow midchannel courses up the Calcasieu River. Three lights mark the west side of the channel across **Moss Lake.** Five miles above Moss Lake, the channel passes through Rose-Bluff Cut-off and continues through a cut across the south end of Coon Island; beyond Coon Island and at the port docks, it takes the east forks. Lake Charles is about 10 miles above Moss Lake.

The Calcasieu River is further described in connection with the Intracoastal Waterway and the Lake Charles Canal on pages 268 and 278.

Lake Charles is described on page 279.

Sabine Bank is a succession of detached shoal spots, about 38 miles in length east and west, lying off Sabine Pass and parallel to the coast at a distance averaging 17 miles. The depths on the bank range from 16 to 30 feet (4.9 to 9.1 m), but they are undoubtedly subject to change. The bank is marked by *Sabine Bank Lighthouse* near the middle and by *Sabine Bank East End Lighted Whistle Buoy 1* at its easterly extremity. In a heavy sea the outlines of the shoals are denoted by breakers.

There are several passages between the shoal spots. The one generally used by vessels approaching from southeastward lies 3 miles eastward of Sabine Bank Lighthouse and is 1¾ miles wide between the 30-foot (9.2 m) curve, and is locally known as **the Hole in the Wall.** This passage is marked by buoys and is good for a depth of 32 feet (9.8 m) at mean low water, but this may be reduced by as much as 3 feet during northers. Directions for this pass are given on page 282.

Sabine Bank Lighthouse (Lat. 29°28′.4; Long. 93°43′.4) is a red conical tower on cylindrical pier standing in 18 feet (5.5 m) of water,

11½ miles 152° true (SE. ⅞ S. mag.) from Sabine Pass entrance. The light is flashing white, 72 feet (22 m) above the water, and visible 14 miles.

To the southward of Sabine Bank, and about 6 miles inside of the 10-fathom (18 m) curve, the bottom is somewhat irregular and broken, and several spots with depths of 35 feet (10.6 m) or less are found with surrounding depths 10 to 20 feet (3 to 6 m) greater. A 26-foot (7.9 m) spot lies 12.2 miles 143° true from Sabine Bank Lighthouse. This is the least depth found on a ridge extending out from Sabine Bank. There are two shoal spots of 31 feet (9.5 m) each about 1,000 yards 106° true and 1,800 yards 287° true, respectively, from the 26-foot shoal with deeper water between the three shoals. A 31- foot (9.4 m) spot lies about 7.3 miles 105° true from the 26-foot spot. These shoals lie in the direct track of vessels making the passage through Sabine Bank from the southeastward. Northward of Sabine Bank the general depths are from 36 to 40 feet (11 to 12.2 m).

28. INTRACOASTAL WATERWAY, NEW ORLEANS TO PORT ARTHUR

For information pertaining to the Intracoastal Waterway eastward of New Orleans see page 211, and westward of Port Arthur see page 285.

In southern Louisiana west of the Mississippi River there is an extensive network of shallow inland waters, which lie within the region of alluvial deposit by the river and consist of vast stretches of marsh, containing numerous areas of cypress swamps varying in size from small patches to tracts several miles in extent, and also many lakes, some up to 30 miles in length. These inland waters are intersected by navigable waterways, termed bayous, having a general north and south direction, with a well-defined current toward the Gulf of Mexico after a heavy rainfall, but for the greater part of the time with only a very sluggish current, which may often be reversed by a change in direction of the wind. The highest land is found immediately adjacent to the bayous in the form of natural levees; as a rule, the larger the bayou the higher its levee. In the western part of the section narrow "islands" or "ridges" rise to heights of 4 to 8 feet (1.2 to 2.4 m) above the surrounding marsh; some of these ridges are 6 to 7 miles in length. The extraordinary high "islands" ranging in elevation from 70 to 200 feet (21.3 to 61.0 m), near the central part of the Louisiana coast, have been described on page 2.

The depth of water in the bayous is nearly always sufficient for navigation by river craft and not infrequently is as great as 20 to 30 feet (6 to 9 m) for miles in succession. The lakes, on the contrary, are generally shallow, having depths of possibly 4 to 10 feet (1.2 to 3.0 m), with soft mud or ooze bottom. The shores are marshy, being a few inches above the surface of the lakes at low water and subject to overflow during high water. The land high enough to admit of cultivation, as well as that which lies within the limits of some project of artificial drainage, is extremely fertile and intensively cultivated; sugar, rice, and vegetables being the principal crops. The waters of the lower portion of this section in the vicinity of the

Gulf abound with oysters, shrimp, and fish. For the most part the towns and villages are located on the high ground along the bayous, but small settlements are to be found in other advantageous locations.

There is a large traffic on these waterways in fish, oysters, logs, lumber, rice, sugarcane, fertilizer, vegetables, and general merchandise. The Intracoastal Waterway forms a connecting link between these bayous and affords an outlet for their products to the markets in New Orleans and other cities.

There is now a continuous inside route of 9 feet (2.7 m) controlling depth between New Orleans and Port Arthur. Between the Mississippi River and Morgan City (Atchafalaya River), there are two routes; one is known as the lower route via the Harvey Canal near New Orleans and the other is the alternate route via the Plaquemine Waterway.

The route via the Harvey Canal to Morgan City and thence to Port Arthur has a controlling depth of 9 feet (2.7 m) and a general bottom width of channel of 100 feet. There are no fixed bridges. The limiting horizontal clearance for drawbridges is 68 feet. The lock at Harvey is 425 feet long by 75 feet wide and the Vermilion lock is 1,182 feet long by 56 feet wide. This route is marked by beacons and sign boards, indicating directions at bayou intersections, names of cross bayous, approach to locks, bridges, etc. Mile posts (statute miles) are placed at 5-mile intervals, mile 0 being at Harvey lock.

The Plaquemine route also has a controlling depth of 9 feet (2.7 m) and a general bottom width of 100 feet. There is one fixed highway bridge crossing the Atchafalaya River at Morgan City having a vertical clearance of 50 feet (15.2 m). The limiting horizontal clearance for drawbridges is 108 feet. The Plaquemine lock is 260 feet long by 55 feet wide.

The entire waterway is under the control of the Federal Government and is free of tolls.

Regular freight service is maintained between New Orleans and Barataria Bay and Bayou Teche and to the westward as far as Port Arthur and Houston.

Pilots for the eastern part of this section may be had at Harvey, La. For other sections they may be found at the larger towns and settlements.

Small-scale maps giving the general location and other information regarding the Intracoastal Waterway may be obtained from the United States Engineer Office, First New Orleans District, 604 Union Building, New Orleans, La. The price is 25 cents each. A pamphlet giving the status of the waterway as far as the Sabine River may also be obtained here. A pamphlet giving the status of that section of the waterway in Texas may be obtained from the United States Engineer Office, Trust Co. Building, Galveston, Texas.

NEW ORLEANS TO LOCKPORT

The Harvey Canal route of the Intracoastal Waterway commences at **Harvey**, on the southwest bank of the Mississippi River opposite New Orleans with which it has regular ferry connections. The entrance is through **Harvey Canal No. 1** extending southward for 5 miles to **Bayou Barataria**. The Harvey lock at the Mississippi River end

of the canal is 425 feet long, 75 feet wide and 12 feet (3.7 m) deep at low water. A railroad and a highway bridge cross the canal just inside of the lock. Both are bascule type with a horizontal clearance of 75 feet and a vertical clearance of 11 feet (3.4 m). Just south of the locks, there are a number of wharves and good facilities for securing motor fuels and fresh water. Provisions and supplies can be secured at Harvey or from New Orleans. About a mile inside the lock and on the west bank of the canal, there is a shipyard, capable of hauling and repairing vessels of 200 tons or under up to 140 feet long and 6 foot (1.8 m) draft.

South of Harvey Canal No. 1, the waterway follows **Bayou Barataria** for 9 miles and its branch **Bayou Villars** for about 1 mile into a 13-mile land cut leading to **Harvey Canal No. 2.** This cut passes about the south side of **Lake Salvador** and joins Harvey Canal No. 2, 5 miles from Larose on Bayou Lafourche. From Larose to Lockport, the waterway follows Bayou Lafourche.

Bayou Barataria is not navigable above its junction with Harvey Canal No. 1 where it is obstructed by a pumping station. Southward, a depth of 9 feet (2.7 m) can be carried to Bayou Villars and 5 feet (1.5 m) thence through **Little Bayou Barataria** and **Bayou Dupont** into **Dupre Cut** leading to **Barataria Bay.** See page 240, for Barataria Bay. At **Lafitte,** 14 miles below the Harvey Canal, the bayou divides and forms **Bayou Rigolettes** and Bayou Dupont. **Bayou Rigolettes** was a former route to Barataria Bay but is now shallow. Two miles below Lafitte, Dupre Cut branches to the southward from Bayou Dupont. Beyond this point, Bayou Dupont is shallow.

Supplies can be secured and small boats (up to about 50 feet) hauled and repaired at **Crown Point,** 5 miles below Harvey Canal, at **Barataria** at the junction of Bayou Barataria and Bayou Villars and also at **Lafitte.** There is a shrimp cannery, an ice factory, and a large general store at Lafitte and gasoline can be secured here. An improved highway extends from Harvey to Lafitte. There are post offices at Barataria and Lafitte.

Lake Salvador has depths of 5 to 7 feet (1.5 to 2.1 m). A depth of about 5 feet (1.5 m) can be carried into the lake from either Bayou Villars or Harvey Canal No. 2, or from **Bayou Segnette,** the former **Company Canal** from **Westwego** on the Mississippi River. This same depth can be carried from the lake into **Bayou Des Allemands** and thence across **Lake Des Allemands** and up **Bayou Chevreuil** and **Grand Bayou.** This area is given over to the growth of sugarcane. The lake entrances are marked by lights.

Four miles west of Bayou Villars, the Intracoastal Waterway crosses **Bayou Pero** connecting Lake Salvador and **Little Lake.**

Depth and connecting routes from **Bayou Lafourche** have been described on page 243. The banks of the bayou are thickly settled throughout the greater part of its length. **Golden Meadow,** 16 miles below Larose, is the principal fishing settlement. There are several shrimp canneries and ice houses here, also numerous stores and a hotel. Gasoline and water can be secured at the landings. **Larose, Lockport,** and **Thibodaux,** 19 miles above Lockport, are principally agricultural towns; provisions and some supplies including gasoline and water can be secured. The usual fishing boats can be hauled and minor repairs made at Golden Meadow and at several ways along the bayou. The principal repair yard is at Lockport where most craft navi-

gating the waterway can be hauled and repaired. Lockport has railroad connection to New Orleans. There are numerous drawbridges of ample clearance across the bayou.

Directions.—Coming from the Mississippi River, pass through the lock and drawbridges at Harvey and continue through the canal for 5 miles. At the south end of the canal, turn westward into Bayou Barataria and follow mid-channel courses through this bayou for 9 miles. There are several cut-offs to straighten the channel; these are easily recognized. A highway swing bridge with 75 feet horizontal clearance and 10 feet (3.0 m) vertical clearance crosses the bayou between Crown Point and Barataria and there is an automobile ferry (cable) at Barataria.

At Barataria village, turn westward into Bayou Villars and a short distance beyond turn south into a 13-mile land cut. At the end of this land cut, turn south into Harvey Canal No. 2. All these turns are marked by beacons. Five miles further, at **Larose**, the waterway turns north into Bayou Lafourche for 10 miles and at **Lockport** turns west into an improved section of the old Company Canal. These turns are also marked by beacons.

Two highway pontoon bridges cross the Intracoastal Waterway at Larose, one just before entering Bayou Lafourche and another immediately after entering. A third bridge of this type crosses Bayou Lafourche between Larose and Lockport. The minimum horizontal clearance is 75 feet. There is a highway swing bridge across the bayou at Lockport with a horizontal clearance of 88 feet and a vertical clearance of 20 feet (6.1 m) above high water.

LOCKPORT TO HOUMA

From Lockport to Houma, the Intracoastal Waterway follows through canal cuts for the entire distance of 12 miles. For 6 miles beyond Lockport, the waterway is an improved section of the old Company Canal. Beyond this point, it turns northwestward into a new cut, the turn being marked by beacons. The old Company Canal continues for about 1 mile to **Bourg** on Bayou Terrebonne; it is good for about 5 feet (1.5 m). The waterway crosses Bayou Terrebonne just east of Houma. On the north side of the bayou there is a bascule highway bridge crossing the waterway and on the south side a highway pontoon bridge. There is also a highway pontoon bridge crossing the waterway at Lockport just west of Bayou Lafourche. All these bridges have a horizontal clearance of 75 feet.

Directions.—No further directions are necessary than the above.

Bayou Terrebonne has been described on page 246.

Houma (population 6,531 by the 1930 census) is the center for the fishing industry about the bayous, lakes, and bays adjacent to Bayou Terrebonne; it is also an agricultural center. It is on the main State highway between New Orleans and Lake Charles and a railroad runs to Schriever on the main line of the Southern Pacific Railroad. There are numerous stores, shrimp and oyster canneries, a sugar mill, an ice and cold storage plant, and several hotels. Provisions and general supplies are available. Motor fuels, oil, and water can be secured in town and there is a marine service station on the Intracoastal Waterway just beyond the railroad bridge on the west side of the town.

HOUMA TO MORGAN CITY

Westward from Houma, the Intracoastal Waterway follows canal cuts for 17½ miles into Lake Wallace, thence through Lake Wallace 3½ miles, **Cocodrie Bayou** 2 miles, **Black Bayou** 1½ miles, **Bayou Chene** 2 miles, and **Bayou Boeuf** 7½ miles to Morgan City.

Directions.—The waterway crosses Bayou Terrebonne just southeast of Houma. The two bridges at this crossing have been described. One mile beyond Bayou Terrebonne, a railroad bridge crosses the waterway with 91 feet horizontal clearance. This bridge is generally open. Just west of this bridge, **Bayou Black** branches to the northward and **Bayou Lacarpe** (see p. 248) leads off the southward. One mile west of the railroad bridge, there is a pontoon highway bridge with 75 feet horizontal clearance. Six miles west of the railroad bridge, the **Minor Canal** leads to the southward. (See p. 249.) Ten and a half (10½) miles farther, the canal cut leads into Lake Wallace.

Through **Lake Wallace**, the channel is marked by lights and beacons along the north side. The lights are flashing red on red triangular structures 25 feet high and the beacons are spaced approximately 1,000 feet apart. The turns into and out of the lake as well as at the successive bayou junctions to the westward are all marked by beacons. From Lake Wallace, the waterway leads through short sections of Bayous Cocodrie (2 miles), Black (1½ miles), Chene (2 miles), and Boeuf (7½ miles) to Morgan City.

On Bayou Chene, just east of Bayou Boeuf, the center pier of an old highway bridge is still in place; there is a horizontal clearance of 70 feet. A highway swing bridge with a horizontal clearance of 68 feet crosses the Bayou Boeuf, just east of Bayou Shaffer about one mile east of Morgan City.

Morgan City and the Atchafalaya River below Morgan City are described on page 251.

Bayou Chene connects the Atchafalaya River at Sweetbay Lake; the southern end of the channel follows short sections of first **Bayou Penchant** and then **Bayou Shaffer** before reaching the river. The upper end of Bayou Shaffer leaves the Intracoastal Waterway about 1 mile east of Morgan City. Both of these routes have depths in excess of 9 feet (2.7 m). Bayou Penchant provides a passage for shallow draft boats from Bayou Chene into **Lake Decade.**

Bayou Black was formerly the route of the Intracoastal Waterway westward from Houma. It is little used at present, but a draft of about 5 feet (1.5 m) can be taken through. There are a number of swing bridges with a minimum horizontal clearance of 35 feet.

MORGAN CITY TO PLAQUEMINE

An alternate route of the Intracoastal Waterway, with an available depth of 9 feet (2.7 m) and bottom width of 100 feet extends northward from Morgan City to the Mississippi River at Plaquemine, a distance of 56 miles. This route follows the Atchafalaya River 2 miles, Flat Lake 3 miles, Bayou Long 7 miles, Belle River 8 miles, Bayou Godelle 5 miles, Bay Natchez 5 miles, Grand River 17 miles, and Bayou Plaquemine 9 miles. The channel through Flat Lake is between timber dykes and marked by three lights. There is little

current through this waterway during the dry season, but during high water in the spring the current often attains a velocity of from 2 to 3 knots.

The Government lock at Plaquemine, on the Mississippi River 98 miles above New Orleans, connects this route with the Mississippi River. The lock has an available length of 260 feet, width 55 feet and a low-water depth over the sills of 10 feet (3.0 m).

Supples of all kinds can be secured at **Plaquemine.** Gasoline and provisions can be obtained at Indian Village and at Martins Store, 6 and 9 miles, respectively, below Plaquemine. There are facilities for making repairs to hull and machinery of vessels at Martins Store and at Plaquemine. No supplies or repairs can be obtained between Martins Store and Plaquemine along this route.

Bayou Grossetete, emptying into **Bayou Plaquemine** 6½ miles below the lock, has a controlling depth of 6 feet (1.8 m) for a distance of 24 miles above its mouth and 4½ feet (1.4 m) for 2 miles farther to the head of navigation. It is used principally by barges carrying cane and by log rafts.

Directions.—From Morgan City, head northward through that part of Atchafalaya River known as **Berwick Bay.** Pass to the westward of **Rabbit Island,** the small island at the entrance to **Flat Lake.** A light marks the northwest point of Rabbit Island. Beyond the light, head for the passage between the two pile and brush dykes to the northward; a light marks the south end of the western dyke. The passage between the dykes bears to the northeastward, approaching the east side of the lake. There is a light near shore, beyond the end of the dykes. Keep south of this light, passing about the north end of the eastern dyke and bearing southeastward into **Bayou Long.**

Follow **Bayou Long** for 2¼ miles to the junction with **Bayou Milhomme.** Take the left hand (northern) branch and continue for one-half mile to the junction with **Little Bayou Sorrel.** Take the right-hand branch here and continue for 3¾ miles to **Belle River. Bayou Magazille** branches to eastward here and Belle River to westward. Follow Belle River for 3½ miles to an island in the river. Pass to eastward of this island and continue for 4½ miles to the junction of **Old River** (entering from westward) and **Bayou Godelle** (entering from northward). Follow Bayou Godelle for 5 miles to Bay Nachez.

The channel through the widest part of **Bay Nachez** is marked on the easterly side by piles. There are two islands in the bay; the first about midway and the second near the northerly end. Pass to eastward of the first island and to northward of the second, keeping always to westward of the row of piles. About 1 mile beyond the first island, **Lake Nachez Pass** branches to northward forming a long point in the river covered with willows. Take the west branch and follow the **Lower Grand River. Bayou Postillon** branches to southward here. Take the north branch, which is Lower Grand River.

Pass to westward of the island in Lower Grand River, 1 mile above Bay Nachez, and to eastward of the island about 1 mile further on. **Bayou Pigeon** branches to westward about 2½ miles above the second island. Take the north branch and pass to westward of two small islands 1 mile farther on. About 7 miles above these two is-

lands, **Bayou Sorrel** branches to westward. Continue in Lower Grand River (northerly branch) for 4 miles to the junction of **Upper Grand River** from westward, and Bayou Plaquemine from northward. Martin's Store is on the east bank of the river at this junction.

Follow Bayou Plaquemine for 2½ miles to its junction with Bayou Grossetete, opposite Indian Village. Follow Bayou Plaquemine to eastward to the town of Plaquemine. There are two drawbridges at Plaquemine before reaching the lock.

THE TECHE AND ADJACENT WATERWAYS

Bayou Teche is a waterway of southern Louisiana having its source in St. Landry Parish and flowing southeastward, parallel to and 35 miles westward of the Mississippi River, for 110 miles, to the point where it joins the lower Atchafalaya River about 10 miles above Morgan City. It is navigable for a depth of 7½ feet (2.3 m) to New Iberia, 5½ feet (1.7 m) to **Breaux Bridge** and 6 feet (1.8 m) to **Arnaudville** 103 miles above Morgan City and within 17 miles of the head of the bayou. The Teche is crossed by numerous pontoon and swing bridges with a minimum horizontal clearance of 56½ feet to New Iberia and of somewhat less but ample width above that point. Keystone Lock, 160 feet long and 36 feet wide, is 63 miles above the mouth of the Teche and about 73 miles above Morgan City.

The main State highway between New Orleans and Lake Charles follows close along the west side of Bayou Teche, passing through the principal towns on the bayou. There is regular boat service between New Orleans and points on the Teche as far as New Iberia. The principal commerce consists of rice, sugar, logs, and shell. Provisions and some supplies can be obtained at the larger towns, viz, **Patterson, Franklin, Jeanerette,** and **New Iberia.** The shipyard at **Garden City** can haul and repair heavy craft up to 115 feet long and 6 feet (1.8 m) draft. Small boats can be hauled and limited repairs made at Patterson and New Iberia. There is a commercial airport at Patterson.

Directions.—The Atchafalaya River leads to westward 1½ miles above Morgan City. The passages to the east and west of Drew Island lead into Flat Lake (the Plaquemine route of the Intracoastal Waterway) and Sixmile Lake respectively. Nine miles above Morgan City, Bayou Teche leads westward from the Atchafalaya River, the river continuing about 2 miles farther into Sixmile Lake. There are shoals through the entrance and for about 2 miles up the Teche which are usually marked by piles. Farther up the bayou no directions are necessary other than to follow the center of the bayou and be careful to avoid old piling, which are quite numerous.

Hanson Canal leads from Bayou Teche at Garden City into **Bayou Portage** which connects with the Intracoastal Waterway along **Bayou Bartholomew** about 1½ miles east of **The Jaws.** From the Intracoastal Waterway, the entrance to Bayou Portage is the northerly of two passages entering the waterway just east of Beacon 3. A depth of about 5 feet (1.5 m) can be taken through this route. The lock, just inside the canal is 937 feet long. Three fixed bridges cross

the lock; the controlling horizontal clearance is 26½ feet, and vertical clearance is 9 feet (2.7 m) at low water.

Sixmile Lake and **Grand Lake**, with depths of 5 to 7 feet (1.5 to 2.1 m) are connected with Bayou Teche by the Atchafalaya River and with the Plaquemine route of the Intracoastal Waterway by **Little Pigeon Bayou** and **Big Pigeon Bayou**. There is a short route from Morgan City into Sixmile Lake to the westward of **Drew Island**. There are lights at the Atchafalaya River entrance, on Stout Point opposite the north end of Drew Island; at the south end of **Bayou Boutte**; on the east side of **Cypress Island**; on Windy Point to the north of Bayou Boutte; and on **Pigeon Point** between Big Bayou Pigeon and Little Bayou Pigeon. These waterways are used considerably by local boats of 3 to 4 feet (0.9 to 1.2 m) draft.

MORGAN CITY TO VERMILION RIVER

(Charts 199 and 1277)

About 2½ miles south of Morgan City, the Intracoastal Waterway leads westward into **Little Wax Bayou**. The entrance is marked by a lighted beacon. The course of the bayou has been straightened by several short cut-offs. The waterway follows the bayou for 3 miles, to a 14-mile land cut passing north of Wax Lake and leading into **Bayou Bartholomew**. From Bayou Bartholomew, the waterway contines westward through land cuts passing just north of **Cote Blanche Island**, around Weeks Bay and the north side of Vermilion Bay to the Vermilion River, crossing en route several passages connecting with the coastal bays. These passages are successively, **The Jaws**, **Bayous Weeks** and **Carlin**, and **Avery Canal** and **Bayou Petite Anse**, distant 21, 35, and 41 miles, respectively, from the Atchafalaya River. They, together with Weeks and Avery Islands, have already been described on page 253.

Directions.—The route of the Intracoastal Waterway across all intersecting streams is well marked and the above paragraph covers all necessary directions. A single track railroad swing bridge, with a horizontal clearance of 75 feet, crosses the waterway at **North Bend Plantation**, 12 miles west of the Atchafalaya River. Highway cable ferries cross the waterway at the following points: (*a*) just west of the railroad bridge; (*b*) about due north of Cote Blanche; and (*c*) just west of the conspicuous stack at **Cypremont**, about 3½ miles west of Cote Blanche. Such bridges as are constructed to replace these ferries will have 75 feet horizontal clearance.

Depths into and up the **Vermilion River** have been given on page 254. The principal river traffic consists of sulphur tows.

Intracoastal City is a small settlement on the north bank of the Vermilion River just west of the point where the Intracoastal Waterway joins the river from the eastward. There are several small basins for the storage of small boats and marine ways capable of hauling boats up to about 40 feet long and 4 feet (1.2 m) draft. Gasoline, oil, and water (in very limited quantities) are available. Provisions can be secured from Abbeville, 16 miles distant by highway.

Abbeville (population 4,356 by 1930 census) is 21 miles up the Vermilion River from the Intracoastal Waterway. There are numerous stores for securing provisions and some supplies, a machine shop, and a marine service station where gasoline, oil, and water can be secured. Boats up to about 50 feet long and 4½ feet (1.4 m) draft can be hauled and some repairs made. There is an improved highway and a railroad to New Iberia and a highway to Lafayette.

VERMILION RIVER TO MERMENTAU RIVER

Between these rivers, the Intracoastal Waterway follows a land cut running in a general northwesterly direction for 37½ miles. The waterway enters the Mermentau River about half a mile above Grand Lake and about 14 miles below the town of Lake Arthur.

The Vermilion Lock is located about 2 miles west of Vermilion River. This lock has an available length of 1,182 feet, width of 56 feet, and 12 feet (3.7 m) depth over sill. This lock is only operated as necessary to prevent the water beyond the locks becoming brackish.

The waterway follows the Vermilion river for 1½ miles and the Mermentau river for 1 mile; on each river, the junction points of the river and the Intracoastal Waterway are marked by beacons.

Three cable ferries cross the waterway at 6½, 8½, and 10½ miles, respectively, west of Vermilion Lock. There is a gasoline service station near the first ferry.

Directions.—No directions are necessary other than the above.

Depths into and up the **Mermentau River** have been given on page 255.

The channel in the Mermentau River to the north of the Intracoastal Waterway is marked by numerous aids. Below Lake Arthur there are several local buoys, marking the west side of the channel. One mile above the western junction with the Intracoastal Waterway, there is a cutoff on the north side of the river marked by four beacons. Across the lower portion of Lake Arthur, a long straight channel is marked by beacons along the east side and by ranges at either end. Just north of this range, the channel passes through the constriction a little more than halfway up the lake. Across the upper portion of the lake, the channel is marked by several successive ranges. The controlling depth in the river is 9 feet (2.7 m) across Lake Arthur.

Lake Arthur (population 1,602 by 1930 census), located on the northwest side of Lake Arthur and 13 miles above the Intracoastal Waterway, has an improved highway to Jennings and Lake Charles and railroad connection to Lake Charles. There are several small stores. Provisions and supplies can be secured in Jennings or Lake Charles if not available locally. A depth of about 6 feet (1.8 m) can be taken to the boat landings. There is a boat yard, with machine shop, capable of hauling and repairing boats up to about 60 feet long and 4 feet (1.2 m) draft. Gasoline, oil, and excellent water are available.

At **Mermentau**, on the upper river 16 miles above Lake Arthur, there is a boat yard capable of hauling and repairing any heavy craft which can enter the river.

Inside Route through White and Grand Lakes.—Just west of the Vermilion River, two canals lead from the Intracoastal Waterway to **Schooner Bayou.** The first leaves the waterway half a mile west of the river and joins Schooner Bayou about half a mile inside its mouth, both junctions being east of the locks in the respective waterways. The second canal (North Fork Canal) leaves the waterway about 4 miles west of Vermilion Lock and joins Schooner Bayou about half a mile west of Schooner Bayou Lock. These canals are about 5 feet (1.5 m) deep and provide traffic connections between the Intracoastal Waterway and points on White and Grand Lakes and connecting waterways. A depth of about 5 feet (1.5 m) can be carried through this route from Schooner Bayou to the junction of the Mermentau River and the Intracoastal Waterway.

Schooner Bayou has been described on page 254.

Schooner Bayou Canal leads from Schooner Bayou into White Lake.

White Lake is 12 miles long, 6 miles wide, and has depths of 5 feet (1.5 m) or more and mud bottom. Each entrance from the lake, into the canal at either end, is marked by a beacon and a light, both on the north side of the channel. The course across the lake is about W. ½ N. (mag.), passing about half a mile off the point in the middle of the north shore of the lake; the channel is not marked.

Approach the east entrance with the line of the Schooner Bayou Canal in range ahead. The channel is narrow and the spoil bank on the south side is marked by stakes.

At the west end of the lake, pass about 100 yards south of the light and 10–15 yards south of the beacon just off the canal entrance.

Turtle Lake is nearly round, with a diameter of about ¾ mile. The lake is shallow but there is a narrow 5 foot (1.5 m) channel across it, marked at each end by a beacon on the northeast side. This channel leads directly from about 100 yards south of one beacon to 100 yards south of the other beacon, with a spoil bank along the south side. A long earth dyke reaches off the south side of the east entrance; the channel is but 5–10 yards off this dyke.

Alligator Lake is about the same size and depth as Turtle Lake. A narrow 5-foot (1.5 m) channel has been dredged across the southern part of the lake and is marked by a beacon at either end, the channel passing about 100 yards south of the beacons. At the east end of the lake, the channel from the canal into the lake turns sharply to westward. The shoalest depths along this route are through Alligator Lake.

Collicon Lake is 3 miles long, 1 mile wide and from 2 to 3 feet (0.6 to 0.9 m) deep. A narrow 5-foot (1.5 m) channel has been dredged across the lake and is marked by a beacon on the north side at either end. Stakes are set across the lake 10–15 yards southwest of the channel. On the west side of the lake an earth dyke extends along the north side of the channel; keep close to this dyke, within 5–10 yards.

Grand Lake is from 5 to 7 feet (1.5 to 2.1 m) deep but the entrances are subject to shoaling. At the southeast end of the lake, the entrance to the canal to Collicon Lake leads close (5–10 yards) along

the south side of an earth dyke. There is a beacon just north of the outer end of the dyke and a light about 100 yards beyond the beacon. There are lights on Grassy Point and on the easterly point at the entrance to the Mermentau River. From the Collicon Lake canal entrance, steer about NW. by W. (mag.), passing about half a mile off the first point to the northward and about the same distance off Umbrella Point, the second point to northward. From Umbrella Point, steer about NW. (mag.) so as to pass about ¼ mile east of Grassy Point and when beyond this point haul to westward and pass well off the easterly point at the entrance to the Mermentau River, which is marked by a light. About half a mile up the Mermentau River, the Intracoastal Waterway leads eastward and a mile farther leads to the westward. The river channel is deep.

MERMENTAU RIVER TO CALCASIEU RIVER

Westward of the Mermentau River, the Intracoastal Waterway follows a land cut in a westerly direction, passing north of **Lake Misere** and southwest of **Sweet Lake**, thence northwesterly to **Black Bayou** and through Black Bayou to Calcasieu River, a distance of about 33 miles. The Black Bayou channel has been straightened by numerous cut-offs. The junctions of the waterway with the Mermentau and Calcasieu rivers, as well as with connecting channels into Lake Misere and Sweet Lake, are marked by beacons. The waterway follows the Calcasieu River northward and westward around Devils Elbow for about 2 miles into the Lake Charles Canal, which branches to the southwestward 1 mile below Moss Lake.

There is a highway cable ferry 6½ miles east of the Calcasieu River and 1 mile east of the river a power ferry has replaced a previous highway bridge. When replaced, the bridge will have a 75-foot horizontal clearance.

Directions.—None are necessary other than the above.

The western end of this portion of the Intracoastal Waterway is shown on the recently published new chart No. 592.

The Calcasieu River and the port of Lake Charles are described on pages 278–279.

CALCASIEU RIVER TO SABINE RIVER

(Chart 592)

This section of the Intracoastal Waterway follows the **Lake Charles Canal**, a land cut leaving the Calcasieu River a mile below Moss Lake and joining the Sabine River about 3 miles below the port of Orange, Tex., a distance of about 22 miles. For 2½ miles this cut runs in a southwesterly direction and thence due west to the Sabine River. At the end of the land cut, the route passes to the southward of two islands and then turns south into the Sabine River. Two cable ferries cross the canal, 2¼ and 11½ miles, respectively, west of the Calcasieu River.

Directions.—No directions are necessary other than the above.

This section of the Intracoastal Waterway is shown on the recently published new chart No. 592.

SABINE RIVER TO PORT ARTHUR

(Charts 533 and 517)

This section of the Intracoastal Waterway follows the deep-water channels of the Sabine River, the Sabine-Neches Canal and the Port Arthur Ship Canal to Port Arthur. These waterways are described under **Sabine Pass and Tributary Waters**, page 269.

From the Lake Charles Canal, the waterway follows the Sabine River for 6 miles and the Sabine-Neches Canal for 14½ miles to the north end of the Port Arthur Ship Canal opposite the entrance to Taylor Bayou, where a land cut branches westward toward Galveston. The city of Port Arthur is 3 miles above Taylor Bayou.

Distances along the Intracoastal Waterway between the Mississippi River and the Sabine River are given below:

	Miles
PLAQUEMINE ROUTE:	
Canal Street, New Orleans	0
Plaquemine, La	98
Morgan City, Atchafalaya River	154
HARVEY CANAL ROUTE:	
Canal Street, New Orleans	0
Harvey Lock, Harvey, La	3
Barataria	17
Larose	34
Lockport	45
Houma	59
Lake Wallace	75
Morgan City, Atchafalaya River	92
The Jaws (Beacon 3)	116
Weeks Island	128
Bayou Petit Anse	135
Vermilion River	147
Vermilion Lock	150
Mermentau River	185
Lake Misere	194
Sweet Lake	203
Calcasieu River	218
Sabine River	241

For information regard the Intracoastal Waterway westward of Port Arthur, see page 285.

29. SABINE PASS AND TRIBUTARY WATERS INCLUDING PORT ARTHUR, BEAUMONT, AND LAKE CHARLES

(Charts Nos. 517, 533, and 592)

Sabine Pass (Chart 517), lying about 243 miles westward of Southwest Pass, Mississippi River, and 50 miles east-northeastward of Galveston entrance, is the approach from the Gulf of Mexico to Sabine Lake, Sabine and Neches Rivers, and the cities of Port Arthur, Lake Charles, Orange, and Beaumont. Sabine Pass, Lake, and River together form the boundary between the States of Louisiana and Texas for a distance of 275 miles northward from the Gulf.

The entrance is obstructed by a bar, which has been improved by the construction of two nearly parallel jetties, extending about 3½ miles in a southerly direction from shore and having a clear width

between them of 1,700 feet. Sabine Pass and connecting channels constitute an extensive deep-waterway system leading inland as far as Beaumont, Tex., and Lake Charles, La. The general depths between the jetties, outside of the channel, are 8 to 16 feet (2.4 to 4.9 m). The improved channel has a depth of 35 feet (10.7 m) across the bar and between the jetties, 32 feet (9.8 m) to and up the Neches River to Beaumont, and 30 feet (9.1 m) to Orange and Lake Charles.

The channel through the pass is marked by three lighted ranges and by numerous other aids. *Sabine Pass Outer Range* marks the approach channel to the entrance between the jetties. Two miles off the end of the jetties, *Sabine Pass Lighted Whistle Buoy 1* marks the west side of this channel and, 1 mile off the jetties, *Sabine Pass Lighted Bell Buoy 2* marks the east side of the channel. The channel between the jetties is marked by *Sabine Pass Jetty Channel Range* and the first reach inside the jetties is marked by the *Inner Range*.

Prominent features.—The most prominent object when approaching Sabine Pass by day is the pilot station on the west jetty. It is a white building on a steel skeleton foundation and can be seen for a considerable distance. The east jetty light and the entrance range lights are also rather prominent. Other conspicuous objects are the Sabine Pass Lighthouse, the Coast Guard station below the village of Sabine, the oil tanks west of Sabine Pass, and a 400-foot stack at Port Arthur.

Sabine Pass East Jetty Light, on the south end of the jetty, is flashing white light with red sector, on a red, square, skeleton structure on piles on a concrete block, 50 feet (15.2 m) high, and visible for 10 miles. The red sector shows eastward of 349° true. The fog signal is maintained from November 1 to April 30, and is a bell rung continuously 1 stroke every 20 seconds.

Sabine Pass Lighthouse (Lat. 29°43′.0; Long. 93°51′.0) is a black and white horizontally banded octagonal tower on the east side of the pass, 4½ miles 342° true (NNW. ¼ W. mag.) from the end of the jetties. The light is fixed white, varied by a white flash 84 feet (25.6 m) above the water, and visible 15 miles. There is a radiobeacon at the lighthouse; see Light List and H. O. publication No. 205.

Inside the jetties the pass extends in a northwesterly direction for about 6 miles to Sabine Lake, and has a least width of over one-fourth mile; but numerous shoals contract the navigable channel to a least width of about 300 feet. The bottom outside of the channel for the most part is soft, and vessels can touch upon it without injury; but there are occasional patches of oyster bars, dangerous to vessels striking them. There is an extensive oyster bar on the east side of the channel, opposite the village of Sabine, and a smaller one, on the same side, opposite the village of Sabine Pass.

The pass affords excellent anchorage for small vessels and is used as a harbor of refuge by small coasting vessels during the winter months.

Above Sabine Pass there is an extensive system of deep waterways leading inland as far as Beaumont, Tex., and Lake Charles, La. The project dimensions for the improvement of these waterways are given in the following table; the present (1935) existing

dimensions are shown in parentheses. The mileage from the Sabine Jetties entrance is also shown.

Channel Dimensions

Section of waterway	Mileage above jetty entrance	Depth	Width
	Nautical miles	*Feet*	*Feet*
Sabine Pass—outer bar		36 (35)	600 (450).
Sabine Pass—jetty entrance	0 - 4	36–34 (35)	600–400 (300).
Sabine Pass	4 - 8	34 (32)	400 (300).
Port Arthur Canal	8 -14	34 (31)	300 (200).
Entrance to Port Arthur Turning Basin	14	34 (32)	250–540
Port Arthur East Turning Basin		34 (32)	420 x 1,800.
Port Arthur West Turning Basin		34 (32)	325 x 1,700.
Port Arthur West Turning Basin to Taylors Bayou Turning Basin.		34 (32)	125.
Taylors Bayou Turning Basin	15¼	34 (32)	150–1,000 (2,900 long).
Sabine-Neches Canal from Port Arthur Canal to Neches River.	14 -24½	34 (32)	250 (200).
Neches River—including cut-offs, to Beaumont Turning Basin.	24½–43	34 (32)	250 (200).
Beaumont Turning Basin	43	32 (32)	500 x 1,500.
Beaumont Turning Basin Extension		32 (31)	350 x 2,000.
Sabine-Neches Canal from Neches to Sabine River	24½–28½	30 (31)	125 (125).
Sabine River—mouth to Orange Municipal slip	28½–34½	30 (31)	125 (125).
Sabine River—Municipal slip to Orange Turning Basin	34½–36½	25 (25)	150 (150).
Orange Turning Basin	36½	25 (25)	500 x 1,500.
Lake Charles Canal	34 -56	30 (30)	125 (125).
Calcasieu River	56 -67	30 (30)	
Lake Charles Turning Basin	68	30 (30)	

Sabine is a village and post office on the west shore of the pass, about 5 miles above the outer end of the jetties. The former shipping facilities at this place have been discontinued. The southerly of the two old slips is used as a small boat harbor.

Sabine Pass, a small village and post office on the west shore of the pass about 1½ miles above Sabine, is of some commercial importance as a crude petroleum shipping point.

Sabine Lake is about 15 miles long and has an average depth of about 6 feet (1.8 m). At the southern end where it empties into Sabine Pass there is an unimproved bar with a depth of 4 feet (1.2 m). The Lake can also be entered from the Sabine-Neches Canal or through East Pass at the mouth of the Sabine River. Opposite Light 7 there is an opening in the spoil bank with a depth of 4 to 6 feet (1.2 to 1.8 m). The depth through East Pass is about 3 feet (0.9 m). The lake is of little commercial importance.

Johnson Bayou, in the extreme southwestern part of Louisiana, empties into the southeastern part of Sabine Lake, directly east of Port Arthur. The bayou has been improved by dredging, and is now navigable for a draft of 6 feet (1.8 m) for about 4½ miles to the settlement of **Johnson Bayou, La.** A highway now connects the settlement with Sulphur and the bayou is little used.

Port Arthur Ship Canal extends from Sabine Pass to the entrance to Taylor Bayou, a distance of 6 miles. It is 31 feet (9.5 m) deep and has a bottom width of 250 feet. The canal is separated from the western shore of Sabine Lake by a narrow strip of land. The entrance to the canal is marked by a flashing red light on the north side of the channel and there is a flashing white light on the west side of the pass about 500 yards south of the entrance. Three flash-

ing white lights on the southwest side of the channel about 800 yards apart mark the bend in the channel opposite Keith Lake which is separated from the canal by a dam.

Port Arthur (population 50,902 by the 1930 census) is an important oil shipping point. Its principal industrial development is on **Taylor Bayou,** along the southwestern outskirts of the city and is sometimes known as West Port Arthur. Two railway systems connect the city with Beaumont and improved highways extend to Beaumont and to Galveston. A depth of 31 feet (9.5 m) can be carried from Port Arthur to the Gulf.

Port Arthur has a considerable trade, both foreign and domestic, in crude petroleum and its refined products. There is also some commerce in wheat, lumber, iron and steel products, and general merchandise.

Terminal Facilities.—Immediately inside of Taylor Bayou, there are two adjoining turning basins, the easterly 420 by 1,800 feet long and the westerly 325 by 1,700 feet long. The extensive facilities of the Texas Oil Co., with 3,000 feet of docking space, extend along the east side of the easterly basin. At the upper end of the basin are the general cargo facilities of the Port Arthur Canal & Dock Co. There are extensive warehouses and sheds and a total docking space of 6,500 feet in two slips. There is a grain elevator with a capacity of 550,000 bushels and a large cotton wharf. Along the north side of the western basin there is a lumber wharf 1,765 feet long with a small coal pier at the eastern end.

About a mile farther up the bayou, there is a third turning basin 2,900 feet long by 1,000 feet wide at the outer end and 150 feet wide at the upper end. The extensive oil-handling facilities of the Gulf Refining Co., with 3,000 feet of docking space, are located along the northeast side of this basin.

All the above facilities have both rail and highway connections. They are all privately owned and the oil terminals are generally used only for company business.

Dockage.—Vessels tied up at the wharves of the Port Arthur Canal & Dock Co. or made fast to a vessel so berthed, are charged dockage at the rate of 1 cent per gross ton per day or fraction thereof when not receiving or discharging any cargo.

Towboats and ocean-going tugs are available at Port Arthur.

Supplies and Repairs.—Provisions and general supplies can be obtained at the numerous stores in Port Arthur. Only a very limited supply of marine hardware is available. The oil companies carry their own stock of supplies and equipment.

Fresh water of good quality can be secured alongside the wharves or can be delivered in barges. Both oil companies have oil bunkering facilities with a loading rate of 4,000 to 5,000 barrels per hour. Only a small quantity of coal is kept on hand but larger quantities can be secured by previous arrangements.

There are no marine ways or major marine repair plants at Port Arthur. A machine shop, a welding shop, and a foundry are available.

Radio.—The radio station WPA of the Radiomarine Corporation handles a general commercial business.

Storm Warnings.—Day and night signals are displayed on a steel tower just east of the bridge crossing the canal at Port Arthur, and day signals are displayed at the Coast Guard Station in Sabine Pass.

Hospitals.—There is a United States Public Health Service Relief Station at Port Arthur and also one private hospital.

Small Boats Facilities.—Small boats can secure gasoline, oil, water, etc., just below the town on the Sabine-Neches Canal. Boats up to 40 feet long and 4 feet (1.2 m) draft can be hauled and minor repairs made at the small ways along this section of the canal. There is a mooring basin on the west side of the canal just above the highway bridge.

Pilotage, Anchorage, Quarantine, and other general information for points on the Sabine waterways, are given at the end of this section.

The **Port Series,** volume No. 14, gives further detailed information regarding the port of Port Arthur. See page 4.

Taylor Bayou has a navigable depth of about 4 feet (1.2 m) for about 30 miles above the upper turning basin at West Port Arthur. There is some traffic on the bayou towing barges loaded with oil and rice. Two draw-bridges across the bayou immediately above the turning basin, the first a railroad and the second a highway bridge with horizontal clearances of 40 and 69 feet, respectively.

The Sabine-Neches Canal is a continuation of the Port Arthur Ship Canal above the mouth of Taylor Bayou. It parallels the shore of Sabine Lake back of a narrow strip of land to the mouth of the Neches River; beyond the Neches River it crosses a narrow neck of land through a half-mile cut and continues across the upper end of Sabine Lake to the mouth of the Sabine River. As far as the Neches River it has a depth of 32 feet (9.8 m) and a bottom width of 200 feet; beyond the Neches River it is 30 feet (9.1 m) deep and 125 feet wide on the bottom.

A bascule highway bridge crosses the canal at Port Arthur. This bridge has a clear horizontal opening of 200 feet and a vertical clearance of 20 feet (6.1 m) at high water. Five miles above the bridge there is an abandoned guard lock. The ship channel passes to the east of the lock. *Sabine-Neches Canal Light 1* marks the point where the canal enters the Neches River from the south. That part of the canal crossing the upper end of Sabine Lake is marked on its north side by four lights spaced somewhat less than a mile apart.

During high-river stages on the Neches River, usually from January to the last of April, a vessel may encounter an athwartship current crossing the Neches River along the canal route, which may prove dangerous if not guarded against.

The following are **extracts from the regulations** prescribed by the Secretary of War for the navigation of Port Arthur Ship Canal, the Sabine-Neches Canal, Taylor Bayou, and the turning basin at Port Arthur.

Navigation of canals, basins, and bayou.—Pilots and vessels, while in the canals, basins, and bayou, will be subject to all the rules and regulations of the United States relating to pilots and vessels on western rivers.

No boat of 10 tons gross tonnage or over, while in the canals or bayou, shall be raced with or crowded alongside of another boat, or moved at a greater rate of speed than 7 miles per hour, without regard to the velocity of the current or run of the tide.

In the basins, boats of 10 tons gross tonnage or over shall reduce their rate of speed to 4 miles per hour.

Boats, in navigating these canals, basins, or bayou, shall ordinarily keep to that side of the midchannel which lies on the starboard side of such vessel, and when meeting other boats will alter their course to starboard, so that each may pass on the port side of the other.

Boats with tows or rafts, or any boat moving at a slow rate of speed, must permit boats moving in same direction and at a greater rate of speed to pass, and shall in no case attempt to cross the bow or crowd upon the course of the passing boat.

Sailing vessels and barges.—Sailing vessels of 100 gross tonnage or over shall not be permitted to sail up or down these canals, basins, or bayou. Not more than two (2) such vessels shall be towed through these canals, basins, or bayou by a towboat at the same time, and one of these shall be towed alongside the towboat and the other on a hawser not exceeding 500 feet long.

This rule shall also apply to the towing of barges of 100 tons gross tonnage or over through these canals, basins, or bayou, except that as many as four (4) such barges may be towed at one time through these canals, basins, and bayou when towed in the following described manner: Barge first behind towboat to be towed by a bridle line not exceeding 50 feet long, leading from opposite sides of bow of barge to towboat, and the following barges, not exceeding three, to be tied close up so that not more than 6 feet will intervene between any two barges.

All logs, sawed or hewn timber rafted into or through these canals shall be securely tied together by iron dogs and chains, each piece of the raft having at least one fastening and no part of the raft to exceed a width of 40 feet.

Anyone desiring to raft logs, hewn or square timber through these canals must first file written request and secure written permit from the United States Engineer Office at Port Arthur, Texas, for so doing.

Right-of-way.—United States dredges or other United States boats, and such contract dredges as may be employed from time to time by the United States in these canals, basins, and bayou, while they are at work therein shall have exclusive right-of-way over all vessels navigating such waters. All vessels in passing these dredges must exercise due caution by slowing down before reaching them and going by at a rate of speed less than 4 miles per hour.

Mooring boats, barges, etc.—No boats, barges, rafts, or other floating craft shall be anchored or tied up in these canals, basins, and bayou in such places or in such manner as to prevent or obstruct the passage of other boats, barges, rafts, or other floating craft.

No boats, barges, rafts, or other floating craft shall be anchored or tied up to the banks of these canals, basins, and bayou, or on the batture adjacent to same where they are liable to be carried into the canals, etc., by high tides, storms, floods, or otherwise for a greater period of time than 72 hours, unless such boats, etc., are engaged in receiving or discharging cargo.

Written requests for permission to moor boats, barges, rafts, or other floating craft in the basins or batture adjacent thereto for a period not to exceed 30 days may be granted by the engineer officer in charge or by his authorized representative, and boats, etc., so using the basin or batture must be securely moored by bow and stern lines to the places assigned to such boats, etc., and be promptly removed on due written notice being given. Owners of craft thus afforded mooring space must assume all risks of damage.

Refuse in the canals, basins, and bayou.—No ashes, cinders, slag, waste oil, refuse, or obstructive matter of any kind shall be dumped, cast out, or unloaded in these canals, basins, and bayou from or out of any ship, barge, or other floating craft, or from the shore, wharf, manufacturing establishment, or mill of any kind, nor shall such be deposited on the banks of these canals, etc., or in or on the banks of any tributary stream where the same shall be liable to be washed into these canals, etc., either by ordinary or high tides or by storms or floods.

Certain statistical information is required regarding ship and cargo passing through the canal or any portion of it. This information is to be furnished the United States Engineer Office at Port Arthur, Tex.

NECHES RIVER AND BEAUMONT

Neches River, emptying into Sabine Lake from the northwestward has an improved channel, 32 feet (9.8 m) deep for 18½ miles to

Beaumont. This channel has a bottom width of 200 feet, both in the open river and through the cuts. During high-river stages, usually from January to the last of April, the depths are several feet greater. During such periods of high water, a vessel may encounter an athwartship current in crossing the Neches River along the canal route, which may prove dangerous if not guarded against. The turning basin at Beaumont is 500 feet wide and 1,500 feet long. The improved section of the river is well marked by lights and buoys.

Three drawbridges (described under Beaumont) cross the river at Beaumont above the improved channel. The highway bridge at Port Arthur is the only bridge between Beaumont and the Gulf.

There is an overhead wire crossing near Mansfield Ferry with a vertical clearance of 192 feet (58.5 m) above mean low water.

There are numerous pipe lines and cables crossing the river below Beaumont; these are indicated by warning signs on the river banks.

Above Beaumont, a depth of perhaps 10 feet (3.0 m) can be carried for about 30 miles up the Neches River, but for several years past (1935) there has been no commerce on this section of the river and there are probably many snags.

Port Neches, on the Neches River 6 miles above Sabine Lake, is an important oil refining center. There are two oil handling terminals with a total berthing space for five ships. One terminal has a transit shed (312 feet by 96 feet) with rail connections for handling general cargo. Considerable petroleum products, asphalt and roofing material are shipped from here. It has railroad communication and an improved highway to Port Arthur and Beaumont.

Beaumont (population 57,732 by the 1930 census), on the Neches River 18½ miles above Sabine Lake and 43 miles from the Gulf, is the largest city in eastern Texas. There are numerous railroads and improved highways radiating from the city and connecting with all parts of the country. A number of steamship companies maintain more or less regular freight service out of Beaumont to both coastwise and foreign ports and the petroleum industry owns or charters and operates a large fleet of tankers to distribute their products to all parts of the world.

The principal commerce is in petroleum and petroleum products. Other commodities of commerce include lumber, rice, cotton, flour, and iron and steel products.

A depth of 31 feet (9.5 m) can be carried to the port of Beaumont from the Gulf. The only bridge below Beaumont is the highway bridge at Port Arthur. There are two railroad drawbridges opposite the city and above the improved channel, and a highway drawbridge about 1½ miles further up the river. The railroad bridges have horizontal clearances of 96 feet and 103 feet respectively and the highway bridge has a horizontal clearance of 90 feet. The minimum vertical clearance is 11 feet (3.4 m) above high water at the first railroad bridge.

Terminal Facilities.—The principal terminal development is the municipal wharves and warehouses on the south side of the city, on the protruding point just north of the turning basin. Practically all the general shipping of the port is handled at this terminal. The wharves extend along both sides of the point and have a total berthing space of 2,900 feet. There are 8 transit sheds with a total floor

space of over 154,000 square feet. There are highway connections to the wharves, and railroad tracks extend along the face of the wharves and behind the transit sheds. There is some mechanical equipment for handling cargo. The Superintendent of Docks has an office at the terminal; the office of the Port Director is in Beaumont.

There are ten extensive petroleum handling terminals along the Neches River below Beaumont; the larger ones are the Magnolia Petroleum Corporation plant 1 mile below the turning basin with a wharf frontage of 1,531 feet and the Yount Lee Oil Co. plant 5 miles below Beaumont with 2,000 feet berthing space.

Towboats and seagoing tugs are available at Beaumont.

Supplies and Repairs.—There are numerous stores in Beaumont for securing provisions and general supplies. Some ship chandlery supplies are available.

Fresh water of good quality can be secured alongside the municipal wharves and also at most of the wharves along the river. Bunker oil can be secured at four of the oil terminals along the river; the maximum rate is 7,000 barrels per hour. There are no coal bunkering facilities.

The Pennsylvania Shipyards, Inc., located on the west side of the river above the railroad bridges, has a marine railway with a lifting power of 2,500 tons capable of handling vessels up to 345 feet long and 17 feet (5.2 m) draft. This yard is equipped to handle practically any repair work on wood or steel vessels; its equipment includes a derrick barge of 100-ton capacity.

The Beaumont Iron Works is a well-equipped plant capable of handling any kind of foundry or machine work.

Radio.—The Magnolia Radio Co. handle a general commercial business. The call letters are WOD.

Small Boat Facilities.—There are small boat landings in the bend below the turning basin and along the river above the railroad bidges. A boat yard at the mouth of **Brakes Bayou** has three marine ways and can handle vessels up to 130 feet long and 10 feet (3.0 m) draft. Gasoline, oil, and water can be secured along the water front.

Hospitals.—The nearest facility of the United States Public Health Service is the relief station at Port Arthur. There are two local hospitals.

Pilotage, Anchorage, Quarantine and other general information for points on the Sabine waterways are given at the end of this section.

The **Port Series,** volume No. 14, gives further detailed information regarding the port of Beaumont. (See p. 4.)

Pine Island Bayou, emptying into the Neches River about 9 miles above Beaumont has a navigable depth of about 8 feet (2.4 m) for a distance of about 10 miles to the pumping plant of the Neches Water Co. Transporting fuel oil to this plant is about the only commerce on the bayou.

SABINE RIVER AND ORANGE

Sabine River, emptying into Sabine Lake from northward, has an improved channel with a depth of 30 feet (9.1 m) and a bottom width of 125 feet from the Sabine-Neches Canal for 6 miles to the Orange municipal slip, 1½ miles below Orange and thence a depth

of 25 feet (7.6 m) to the turning basin at Orange. A draft of perhaps 10 feet (3.0 m) can be carried for 10 to 15 miles above Orange, but for several years past (1935) there has been no commerce and there are probably snags in the upper river. A highway bridge with a 125-foot swing span crosses the river just above the town and at Echo, about 12 miles above Orange, there is a railroad drawbridge with 96 feet horizontal clearance. The river below Orange is well marked by lights and buoys.

Cow Bayou, emptying into Sabine River 4 miles above Sabine Lake, is a crooked stream navigable for a draft of 4½ feet (1.3 m) for 22 miles. A highway drawbridge crosses the bayou 10 miles above the mouth. There are oil fields a few miles above the bridge.

Orange (population 7,913 by the 1930 census) is a city of some commercial importance, 8 miles above Sabine Lake and 36 miles from the Gulf. Its principal commerce is in lumber and its products. A depth of 30 feet (9.1 m) can be carried from the Gulf to the municipal wharf and a depth of 25 feet (7.6 m) for 2 miles further up the river to the turning basin which is 500 feet wide by 1,500 feet long. The highway bridge at Port Arthur is the only bridge between Orange and the Gulf. The city is located on the main coast highway between Lake Charles and Beaumont and on two trunk railway systems. The large saw mills formerly operating on the river below the city are now (1935) closed.

A municipal terminal is located on a slip 2 miles below the city. There is a wharf 1,504 feet long and two transit sheds with a total floor area of 72,000 square feet. The wharf has railway and highway connections. The harbor master has an office on the wharf.

Along the river front of the city, there are several smaller wharves, some used for handling lumber and others for river and harbor craft.

Towboats are available at Orange.

Supplies and Repairs.—Provisions and some marine hardware are available. Fresh water of good quality can be secured either at the municipal wharf or along the river front in town. There are no fuel bunkering facilities.

Small boats can secure gasoline, oil, water, and provisions at wharves in Orange.

There are two marine repair yards at Orange with facilities for building, hauling, and repairing moderate sized vessels. The larger yard can haul vessels of 1,800 tons up to 235 feet long and 15 feet (4.6 m) draft aft but the forward draft is restricted by the pitch of the ways (three-fourths inch to 1 foot).

Storm Warnings.—Day storm warning signals are displayed on the waterfront.

Hospitals.—The nearest facility of the United States Public Health Service is a relief station at Port Arthur. There is a local hospital.

Pilotage, Anchorage, Quarantine, and other general information for points on the Sabine Waterways are given at the end of this section.

The **Port Series,** volume No. 14, gives further detailed information regarding the port of Orange. (See p. 4.)

LAKE CHARLES CANAL, CALCASIEU RIVER, AND LAKE CHARLES

Lake Charles Canal (chart 592).—This canal is a link in the series of deep waterways connecting the city of Lake Charles with the Gulf of Mexico at Sabine Pass. The route has a controlling depth

of 30 feet (9.1 m) and leads through Sabine Pass, Port Arthur Ship Canal, Sabine-Neches Canal, Sabine River, Lake Charles Canal, and Calcasieu River to the Port of Lake Charles on the Calcasieu River immediately adjacent to the city of Lake Charles on Lake Charles. There are several sharp turns along this waterway and several places where it would be dangerous to pass another large vessel. The recently published new chart No. 592 covers that section of this waterway between the Sabine River and Lake Charles.

This canal leaves the Sabine River, 3 miles south of Orange, extends due eastward for 19½ miles and northeastward for 2½ miles and joins the Calcasieu River about 1 mile south of Moss Lake. The controlling dimensions of the canal are 30 feet (9.1 m) deep with a bottom width of 125 feet. Two highway cable ferries cross the canal; one 2 miles from the eastern end, just north of where the canal turns westward and the other about half way along the canal. They are operated by a cable which is lowered to the bottom on the approach of a vessel. A long blast should be given in ample time for the ferryman to clear the cable and to prevent serious accident.

Calcasieu River extends northeastward from the north end of Calcasieu Lake. The entrance from the lake into the river has been described on page 257.

Three miles above the mouth of the river, the Intracoastal Waterway leads to the eastward and 2 miles further, at the west end of Devils Elbow, the Lake Charles Canal (route of the Intracoastal Waterway) leads to the westward. Both river entrances are marked.

The ship canal follows the river (and a cut-off) from the Lake Charles Canal to the Port of Lake Charles, a distance of 10½ miles. Several spar buoys have been placed in the river by private concerns, but as they are not colored, local knowledge is necessary in using them. Across **Moss Lake**, about a mile above the canal, the western side of the channel is marked by three lights. Five miles above Moss Lake, the channel follows the north fork through **Rose Bluff Cut-off** and continues on the same course through a cut across the south end of **Coon Island** (in the north bend of the river above Prien Lake); it then takes the eastern (right) fork for about 1½ miles further to the port docks. There is deep water along mid-channel courses through the river with a controlling depth of 30 feet (9.1 m) in Rose Bluff Cut-off. Unlike most rivers, the deeper water often favors the points rather than the bends. There are no bridges crossing the river below the port docks. There is little current in the river except during freshets.

The port docks are on the east side of the river, on a point formed by cutting through a narrow neck of land across a bend of the river. The bend extends about a mile to the northwestward and forms a complete loop for vessels to head down stream. A large alkali works is located on a dredged channel leading off the northwest side of this bend. A draft of 30 feet (9.1 m) can be carried around the bend and to the wharf of the alkali works. The project provides for a turning basin at the municipal docks 2,000 feet by 500 feet.

About a mile above the port docks, the river widens into **Lake Charles.** This section of the river is crossed by a highway bascule bridge with a horizontal clearance of 100 feet and a vertical clear-

ance (closed) of 11 feet (3.4 m) above high water. The lake is roughly circular, about a mile and quarter in diameter. The city of Lake Charles is located on the western shore.

Above the lake Caleasieu River has a controlling depth of 23 feet (7.0 m) for about 5 miles through that section of the river immediately north and west of the city, and it is reported that this depth can be taken about 15 miles up the river. A depth of 7 feet (2.1 m) can be carried to **Jones Bluff**, the head of navigation, 23 miles above Lake Charles. The deep water channel through the lake is 100–125 yards off the west shore for a distance of half a mile, into the northern extension of the river. This channel across the lake is sometimes marked by private concerns. Two railroad drawbridges cross the river just above the lake and another, 7 miles further upstream. The minimum horizontal clearance is 93 feet.

Lake Charles (population 15,791 by the 1930 census) is the only major port in western Louisiana. It is on the main state highway running westward from New Orleans and is served by three trunk line railroads. There are frequent steamship sailings to coastwise and foreign ports. Extensive oil discoveries in the vicinity have greatly increased the importance of the city. The principal exports are rice, lumber, cotton, packing house products, and oil. The principal imports are fertilizer materials, cement, and iron and steel products. The public terminals are owned by the Lake Charles Harbor and Terminal District and operated by a board of Commissioners, which is an agency of the State of Louisiana. The office of the port director is close by the wharves.

Westlake on the west bank of the Calcasieu River just north of Lake Charles is a sawmill town of some importance. There is highway connection with the city of Lake Charles.

Terminal Facilities.—The public terminals are on a point on the east side of the Calcasieu River about a mile and a half west of the city of Lake Charles. There are two wharves, each 1,600 feet long, one on either side of the point. The transit sheds on the wharves have nearly 500,000 square feet of covered area and are equipped with modern fire-fighting apparatus. Double railroad tracks extend along both the front and the rear of the transit sheds. In the space between the wharves there are several privately owned warehouses and a high-density cotton compress.

At **Rose Bluff**, 5 miles below the public wharves, there are several privately owned oil-loading wharves and a similar terminal 5 miles further down the river. There is a large alkali works on the river bend northwest of the public wharves.

Pilotage.—Pilotage is compulsory for vessels in foreign trade but not compulsory for vessels in coastwise trade if having on board a pilot licensed by the United States Steamboat Inspection Service.

Bar pilotage, inward or outward, from sea to Orange, Tex., is as follows:

	Per foot draft
6,000 gross tons and under	$5.00
6,000 to 7,000 gross tons	5.25
7,000 to 8,000 gross tons	5.50
8,000 to 9,000 gross tons	5.75
9,000 gross tons and over	6.00

To the above rates must be added river pilotage rate from Orange, Tex., to Lake Charles, of $1.50 per draft foot, regardless of size of vessel, with a minimum rate of $60 for round trip.

Due to passing from Texas into Louisiana it is necessary to have two pilots, one taking the vessel through the Sabine River and the other on to Lake Charles.

Ships generally go alongside the wharves although they can be moored along the river bank if necessary. There is scarcely room for anchoring in the river.

Smaller tugs are available locally and sea-going tugs can be secured at Beaumont or Port Arthur.

Supplies and Repairs.—Fresh water, suitable for boiler use, is piped to the public wharves. Provisions and general supplies are available but very little in the line of marine hardware. There are no fuel bunkering facilities. Gasoline, oil, and water can be secured at several boat landings on Lake Charles. The water in Calcasieu River and Lake Charles is suitable for boiler purposes.

The only repair facilities are for light-draft vessels. There are marine ways on the lower river just south of Moss Lake, where vessels up to 130 feet long and 7 feet (2.1 m) draft can be hauled and repaired. Larger vessels are taken to Orange and Beaumont. There are machine shops, a small foundry, and a welding shop in Lake Charles.

Quarantine, Customs, etc.—The boarding station for quarantine and immigration inspection is at Sabine, Tex. The quarantine station is at Sabine. The Immigration Office and the nearest United States Public Health Service Relief Station are at Port Arthur. The Customs Office is located in the Post Office building in Lake Charles.

There is a local **hospital**.

Small boat Facilities.—There are numerous boat landings along the lake shore at Lake Charles to which a depth of 6 to 7 feet (1.8 to 2.1 m) can be taken. The landings along the south shore of the river between the docks and the lake have somewhat greater depths and better protection. Gasoline, oil, and water can be secured at several of these landings. For repairs see **Supplies and Repairs** above.

The **Port Facilities** described below apply generally to the ports on the **Sabine Waterways**.

Anchorage.—Vessels provided with good ground tackle can ride out any gale by anchoring about 7 miles westward of the jetties as close inshore as their draft will permit. The **shoal** west of the jetties is rapidly building out, and vessels should approach this area with caution. The bottom is soft mud and ooze. In some places during southerly gales the surface has the appearance of being covered with oil. Small craft should find anchorage inside the jetties or in the pass. In the pass there are three anchorages. The quarantine anchorage southward of the lighthouse has a depth of 32 feet (9.7 m). An anchorage alongside the west bank abreast of the northern end of the village of Sabine and an anchorage alongside the west bank for about a mile below the entrance to the Port Arthur Ship Canal have depths sufficient for any vessel that can enter the pass, but both have limited swinging room.

There are no anchorages at Beaumont, Orange, or Lake Charles. Anchorage is permitted in the Neches, Sabine, or Calcasieu Rivers

only in an emergency. Vessels may be tied up to the banks of the rivers for limited periods if permission is obtained from the United States Engineer Department.

Pilotage.—Pilotage is compulsory for vessels in foreign trade. It is also compulsory for vessels in coastwise trade as required under the laws for the State of Texas as given on page 8. It is not compulsory for coastwise vessels when having on board a pilot licensed by the United States Steamboat Inspection Service.

The Sabine Pilots have a station on the west breakwater at Sabine Pass. A pilot boat is usually on watch near the end of the jetties or will come out to a vessel making signal.

The rates of pilotage are as follows:

	Per foot of draft
FROM SEA TO PORT ARTHUR:	
Any tonnage	$4.00
FROM SEA TO BEAUMONT OR ORANGE:	
6,000 gross tonnage and under	5.00
6,000 to 7,000 gross tonnage	5.25
7,000 to 8,000 gross tonnage	5.50
8,000 to 9,000 gross tonnage	5.75
9,000 gross tonnage and over	6.00
SHIFTING CHARGES:	
With steam	20.00
Without steam	25.00

The Lake Charles Pilots take ships from the Sabine River to Lake Charles. The rate for this river pilotage is $1.50 per foot of draft, regardless of size of vessel, with a minimum rate of $60 for the round trip.

Towage.—Towboats are frequently employed by the larger and deeper draft vessels.

There are three principal companies which furnish towboats and seagoing tugs in the Sabine area. Two of these operate out of Port Arthur and one out of Beaumont. Smaller tugs are available at Orange.

The following rates are quoted as typical:

FROM SEA TO—	*Light*	*Loaded*
Port Arthur	$120	$140
Beaumont	275	300
Orange	275	300
Lake Charles	365	400

Salvage Facilities.—The towboat companies have tugs, barges, derricks, pumps and miscellaneous equipment for the performance of wrecking and salvage operations.

Port Charges.—There is a dockage charge of 1 cent per gross registered ton for vessels tied up at the wharves of the Port Arthur Canal & Dock Co. or at the municipal wharf at Orange when not engaged in receiving or discharging any cargo. There are no dockage charges at the municipal terminal at Beaumont.

Quarantine.—The Quarantine station is located on the west side of Sabine Pass just above Sabine. Vessels subject to visitation are boarded off Sabine. See also information relative to quarantine on page 9.

Immigration.—The Immigration Office is located in the Federal Building at Port Arthur. Vessels are boarded at Sabine in Sabine Pass.

Customs.—The Sabine District customhouse is located in the Federal Building at Port Arthur. There is a customs office in the Federal Building at Beaumont; this office handles the business of the port of Orange. There is also a customs office in the Post Office Building at Lake Charles.

Hospitals.—The nearest marine hospital is at Galveston. There is a United States Public Health Service Relief Station at Port Arthur and there are private hospitals at Port Arthur, Beaumont, Orange, and Lake Charles.

Storm Warnings.—Storm warning signals (day only) are displayed at the Coast Guard station in Sabine Pass and on the water front at Orange. Both day and night signals are displayed from the signal tower at the east end of the highway bridge at Port Arthur.

Tides and currents.—The mean range of tide is 1.4 feet at the entrance of Sabine Pass. Tidal action is felt at Beaumont and Orange. Winds from any easterly or southerly quarter raise the surface of the water by as much as 3 feet at Sabine and 1½ feet at Port Arthur. Northerly winds lower the surface by nearly the same amounts.

The currents off the entrance are dependent upon the direction and velocity of the wind. Following continued northerly, northeasterly, or easterly winds a southwesterly to westerly current will be found off the entrance, sometimes with a velocity of as much as 2 knots and frequently of 1 knot. Following southerly or southwesterly winds, the currents will be in the opposite direction but with less velocity. A velocity of 2½ knots has been observed in Sabine Pass.

DIRECTIONS, SABINE PASS

Approaching from eastward, deep-draft vessels should avoid Ship Shoal, Trinity Shoal, and the extensive area of broken ground between them. Sabine Bank (described on p. 257) parallels the east at a distance averaging 17 miles and should be avoided. The *Lighted Whistle* buoys off Ship Shoal, Trinity Shoal, and the easterly end of Sabine Bank are useful and dependable marks. Deep-draft vessels approaching from eastward usually lay their courses for *Sabine Bank East End Lighted Whistle Buoy 1* or *Sabine Pass Approach Lighted Bell Buoy 6*. Comparatively few vessels from Dry Tortugas or points north of Dry Tortugas approach Sabine Pass through the buoyed channel in the bank 3 miles east of *Sabine Bank Lighthouse*, and with the 26-foot (7.9 m) shoal 12 miles 143° true from Sabine Bank Lighthouse, it is probable that this approach never will be popular. Mariners would prefer this approach (were it not for the fact that it is a difficult one), since it keeps them in deeper water with less bottom suction considerably longer than when approaching northward of the bank. Consequently many vessels that approach Sabine Pass to the northward of the bank depart by way of the passage through the bank.

Vessels coming from Dry Tortugas to Sabine Pass should hold up to the north in order to make their landfall course approximately parallel to the 10-fathom (18 m) curve, and incidentally to a line connecting *Ship Shoal Lighted Whistle Buoy 2* and *Trinity Shoal Lighted Whistle Buoy 4*. If Ship Shoal buoy is missed they can

continue on approximately the same course, and using the 10-fathom (18 m) curve as a guide, invariably pick up Trinity Shoal buoy. As the run from the latter to the Sabine Bank East End buoy or Sabine Pass Approach Lighted Bell Buoy 6 is comparatively short, there is little chance of missing them. There is a 7-fathom (12.8 m) spot, 45 miles northwestward of Ship Shoal Lighted Whistle Buoy: it is 3½ miles outside the 10-fathom (18.2 m) curve and 1 mile outside the course between the two lighted whistle buoys.

This approach is superior for deep-draft vessels to that of setting the course direct from Dry Tortugas to Sabine Bank Lighthouse. By the latter method the land fall must be made in the vicinity of several dangerous **shoals** and in a locality where the bottom is more or less uneven and where soundings taken do not assist materially in fixing a position.

After passing *Sabine Bank East End Lighted Whistle Buoy 1*, vessels should haul to northward to avoid a shoal with a least depth of 18 feet (5.5 m) over it, lying 8 miles 296° true from the buoy. Then set course for *Sabine Pass Lighted Whistle Buoy 1*.

Courses and Distances for approaching *Sabine Pass Lighted Whistle Buoy 1* are given on page 61, and also under **Coastwise Courses** (Position No. 24).

The following Courses and Distances are from the entrance buoy. Inland Rules are to be followed northward of *Sabine Pass Lighted Whistle Buoy 1*, in Sabine Pass and all tributary waters.

Courses and Distances

Sabine Pass

For reverse direction, read upward	Course (Reverse courses in *italics*)		Distance
	True	Magnetic	
1. Sabine Pass Lighted Whistle Buoy 1; close by to eastward of buoy:			
Direct (Sabine Pass Outer Lighted Range ahead)	° 336	*Points* NNW. ⅞ W	*Nautical miles* 2.0
Reverse (Sabine Pass Outer Lighted Range astern).	*156*	*SSE. ⅞ E*	*2.0*
Heading between the jetties and passing to the westward of *Sabine Pass Lighted Bell Buoy 2.* There is a bell buoy on the east side of the channel 400 yards south of the *East Jetty Light.*			
2. Sabine Pass East Jetty Light bearing 72° true, distant 230 yards:			
Direct (Sabine Pass Jetty Channel	347	N. by W. ⅞ W	2.7
Reverse Lighted Range ahead or *astern).*	*167*	*S. by E. ⅞ E*	*2.7*
Passing between the jetties.			
3. Sabine Pass Channel Lighted Buoy 5:			
Direct (Inner Lighted Range ahead)	325	NW. ⅛ N	3.2
Reverse (Inner Lighted Range astern)	*145*	*SE. ⅛ S*	*3.2*
Passing 0.4 mile westward of Sabine Pass Lighthouse. There are oyster bars close along east side of channel in the vicinity of *Sabine Pass Channel Light 2.*			

Courses and Distances—Continued

Sabine Pass—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
4. **Inner Range Front Light.** Position 250 yards southeastward of:	----	Various courses	2. 3
Pass to the eastward of this light and follow marked channel to entrance of Port Arthur Canal. Channel follows along west bank. *Port Arthur Canal Light 2* is on the point on the north side of the entrance.			
5. ***Port Arthur Canal Light 2:***			
Above this point, see descriptions of Port Arthur Canal, Sabine-Neches Canal, Neches River, Lake Charles Canal and Calcasieu River and be guided by charts Nos. 517, 533, and 592.	----	----	----

Light-draft vessels coming from eastward can also follow along the coast, giving it a berth of about 2 miles, or keeping in 3 fathoms (5.5 m) until the lighted whistling buoy off the entrance is sighted.

Approaching from southwestward, deep-draft vessels make the land at Galveston entrance, taking care to pass northward of Heald Bank, and then set a course for a position 1 to 2 miles outside the lighted whistle buoy off Sabine Pass. The bottom is fairly regular, and there are no known dangers within 15 miles of the coast.

Light-draft vessels when eastward of Galveston entrance can follow the coast at a distance of 1 to 2 miles, increasing that distance to 5 miles as Sabine Pass is approached, and when the entrance buoy is sighted it may be approached, keeping it on the port bow.

In entering the pass strangers of deep draft should take a pilot. For vessels of moderate draft, chart 517 and the buoys are sufficient guides, if followed carefully.

The shoalest water in the entrance channel will generally be found about three-fourths mile outside the end of the jetties.

30. COAST, SABINE PASS TO GALVESTON

High Island, about 23½ miles eastward of Bolivar Point Lighthouse, is a mound about 1 mile in diameter and 40 feet (12.2 m) high. This is the highest land on the coast between Sabine Pass and Galveston and is a landmark for vessels making, or standing along, the coast. There are numerous oil derricks on the mound and about 1½ miles to the northward, there are two 132-foot (40 m) towers for a transmission line crossing the Intracoastal Waterway.

Heald Bank, lying 34 miles eastward of Galveston, is nearly 5 miles long in a northeast and southwest direction, and has depths of 25 to 35 feet (7.6 to 10.7 m) over it, while depths of 50 to 60 feet (15 to 18 m) are found as close as 1½ to 2 miles to the southeastward.

In a heavy sea Heald Bank should be avoided by all vessels, including those of moderate draft, which could pass over it in smooth water.

The **currents** at Heald Bank are due largely to the winds. In calm weather or with light breezes little current is experienced. Wind velocities of 25 to 40 miles produce currents of about 0.5 to 1 knot, setting in a direction approximately fair with the wind. From observations made during the first 6 months of the year 1915 the greatest velocity of the current was 1.1 knots. From this series of observations, the average drift was one-fourth knot, setting in a southwestward direction.

Heald Bank Lightship (Lat. 29°05′.0; Long. 94°13′.8) is moored in 7 fathoms (12.8 m) of water off the southwestern end of the bank. The vessel has a red hull with "HEALD" on each side, and two masts with red circular gratings at each masthead. The light is occulting white, 50 feet above the water and visible 12 miles. There is a small riding light on the forestay. The fog signal is a steam diaphragm horn; if the horn is disabled, a bell is struck by hand. A **radiobeacon** is operated; it has been synchronized with the diaphragm horn fog signal for **distance finding**: see Light List or H. O. publication No. 205. When the lightship is withdrawn for repairs, from about July 15 to October 15, the station is marked by a lighted whistle buoy.

The code flag signals and radio call for the station are WSU. Radio messages of importance in the maintenance of aids to navigation or on other urgent matters will be received during the first 15 minutes of each hour from 8 a. m. to 8:15 p. m. standard time.

Storm warnings are displayed at the lightship.

Bolivar Point Unused Lighthouse is a white and black, horizontally banded, conical tower, on the point at the northerly side of the entrance to Galveston Bay, about 5 miles westward of the entrance to the channel between the jetties.

A wreck awash at high tide is one-half mile off the Gulf Coast of Bolivar Peninsula, 7 miles north-northeastward from Galveston North Jetty Light, in 13 feet of water. It is reported that several fishing vessels have been wrecked by this obstruction. The area about three-fourths mile wide extending northward from Galveston North Jetty and along the beach is strewn with wreckage.

31. INTRACOASTAL WATERWAY, PORT ARTHUR TO CORPUS CHRISTI

Information regarding other sections of the Intracoastal Waterway is given on the following pages:

Pensacola Bay to Mobile Bay, page 181
Mobile Bay to New Orleans, page 211.
New Orleans to Port Arthur, page 258.

A River and Harbor project has been adopted which provides for a channel 9 feet (2.7 m) deep at mean low water and 100 feet wide from Port Arthur to Corpus Christi. The project also provides for the construction of locks on each side of the Brazos and Colorado Rivers.

A great portion of the projected waterway is through land cuts. The first section, from the Port Arthur Canal at Port Arthur to

Port Bolivar on Galveston Bay is practically all a land cut. To the south of Galveston, land cuts pass inland of the chain of shallow bays and lagoons which lie behind the succession of long narrow islands and peninsulas extending along the Gulf Coast. Natural depths will be utilized across the central deeper portion of Matagorda Bay and also across Aransas Bay to Port Aransas and there will be a dredged channel across San Antonio Bay. Existing ship channels of greater depth are utilized from Port Bolivar to the west end of the Galveston Channel and also from Port Aransas to Corpus Christi.

In 1935, the section of the Intracoastal Waterway between Port Arthur and Galveston had been completed to project dimensions and the section between Galveston and Freeport had also been completed to project dimensions to a point 14½ miles west of Galveston, ending in a land cut north of West Bay. No construction work had been done to the westward of this point.

There was previously an inland waterway from Galveston to Corpus Christi with controlling dimensions of 5 feet (1.5 m) deep by 40 feet wide. This waterway is to be replaced by the new Intracoastal Waterway and is no longer being maintained. In 1935, this previous route was closed between Freeport and Matagorda Bay but a depth of 3 feet (0.9 m) could be carried from Galveston to Freeport and the same depth from Matagorda Bay to Corpus Christi. The present (1935) condition of this route is given on the following pages:

Galveston to Brazos River, page 38.
Galveston and Brazos River Canal, page 309.
Directions, Galveston to Freeport, page 310.
Brazos River to Matagorda Bay, page 314.
Matagorda Bay, page 315.
Matagorda Bay to Aransas Pass, page 319.

Pamphlets giving the current status of the above inside waterways are prepared periodically by the United States Engineer Office, Trust Company Building, Galveston, Tex.

PORT ARTHUR TO GALVESTON

From the junction of the Sabine-Neches Canal and the Port Arthur Canal at the mouth of Taylor Bayou, the Intracoastal Waterway follows a land cut for about 52½ miles to Galveston Bay. This cut approaches within about 3 miles of the coast, passes about 1½ miles north of High Island and continues southwestward along the north side of Bolivar Peninsula. The project dimensions are 9 feet (2.7 m) deep by 100 feet bottom width.

The entrance from the Port Arthur Canal is marked by beacons and the *Sabine Galveston Waterway Light* marks the entrance from Galveston Bay on the northeast side of Bolivar Point. Seventeen miles east of the Galveston Bay entrance, the canal passes across the head of East Bay. The north side of the channel across the open water is marked by a light at either end and by two intermediate beacons. There is a spoil bank along the south side.

The waterway is crossed by three bridges, viz, one bascule highway bridge just west of the Port Arthur Canal entrance and railway and highway swing bridges just north of High Island. All

have a horizontal clearance of 100 feet and a vertical clearance of 12 feet (3.7 m) above mean low water when closed.

Just west of the High Island bridges, a transmission line crosses the canal. The towers are 132 feet (40 m) high and the vertical clearance is 110 feet (33.5 m).

Directions.—No directions, other than the above, are necessary as far as the *Sabine Galveston Waterway Light* north of Point Bolivar where the waterway enters the deep water of Galveston Bay. From this light, pass west of the *Port Bolivar Range Lights* and follow the Port Bolivar Channel to *Bolivar Roads Buoy 4*, and thence across Bolivar Roads to *Pelican Spit Shoal Lighted Buoy*, passing south of *Bolivar Roads Lighted Buoy 2*. From the Pelican Spit buoy, follow the Galveston Channel south to Galveston.

The 9-foot channel branches west from the Port Arthur Ship Canal about 3 miles below Port Arthur. The distance through the land out to deep water in Galveston Bay is about 52 miles and from this point to Galveston is about an additional 5 miles.

High Island is a small town and oil producing center on the hill by that name about a mile north of the coast and 26 miles east of Galveston Bay. It is the only settlement near the Intracoastal Waterway between the Port Arthur Canal and Galveston Bay. The railroad between Beaumont and Galveston and the highway between Port Arthur and Galveston pass through High Island, both crossing the Intracoastal Waterway about 1½ miles to the northward.

GALVESTON TO FREEPORT

Westward from Galveston, the new Intracoastal Waterway has been completed for 14½ miles to the Galveston-Brazoris County line. 11 miles beyond the drawbridge of the Galveston Causeway. From the drawbridge, the new channel leads across to the north shore of West Bay for 4½ miles and thence follows a land cut along the north shore of the bay for 6½ miles to the present (1935) dead end. This section has been completed to the project dimensions of 9 feet (2.7 m) deep by 100 feet wide.

Westward of the Galveston Channel, this new channel is marked along the north side by beacons spaced about 1,000 feet apart and also by several red lights. There are three red lights between the Galveston Channel and the causeway, one between the bridge and the land cut north of West Bay and one just east of the entrance into the land cut. Just west of the causeway bridge, *Galveston-Freeport Waterway Light 5* marks the south side of the channel near the point where the former 5 feet (1.5 m) by 40 feet inside route leads southwestward through West Bay. This junction point is marked by a beacon just eastward of the light. The beacon is on the west side of the old route which continues a short distance to the southward to the old Beacon 1.

The total distance from Galveston to Freeport by this route will be about 38 miles.

The drawbridge of the Galveston Causeway has a horizontal clearance of 100 feet and a vertical clearance of 12 feet (3.6 m) above low water when closed. There is an overhead wire crossing with 100 feet (31.0 m) vertical clearance.

FREEPORT TO CORPUS CHRISTI

No construction work has yet (1935) been done on this section of the waterway.

From Freeport Harbor westward for a distance of 56 miles, the waterway will be through a dredged land cut following in general the north shores of the Cedar Lakes and Matagorda Bay. It will then cross the western end of Matagorda Bay, a distance of 12 miles which will require no dredging. From Matagorda Bay the waterway will follow a land cut along the north shore of Espiritu Santo Bay for about 14 miles and thence a dredged channel across San Antonio Bay a distance of about 10 miles. From San Antonio Bay, a dredged cut will lead along the north shores of Mesquite and Aransas Bays to deep water in Aransas Bay, a distance of about 14 miles. Thence the waterway will follow Aransas Bay and Lydia Ann Islands Channel to Port Aransas, a distance of about 15 miles, and the Corpus Christi Channel to Corpus Christi, an additional distance of about 18 miles.

The total distance over this route from Freeport to Corpus Christi will be about 139 miles.

32. GALVESTON BAY AND TRIBUTARIES INCLUDING GALVESTON AND HOUSTON

(Charts 1282, 520, 588, 589, and 590)

Galveston Bay (Chart 1282) is a large, irregularly shaped, shallow body of water on the coast of Texas about 285 miles westward from Southwest Pass, Mississippi River, and 755 miles westward from Key West, Fla. The bay is about 30 miles long in a general north-northeast and south-southwest direction, about 17 miles wide at its widest part, and has general depths of 7 to 9 feet (2.1 to 2.7 m). It is nearly separated into two parts about midway of its length by a chain of small islets and shoals known as **Redfish Bar**, through which a channel 32 feet (9.8 m) in depth has been dredged near its western end. That part of the bay northward of Redfish Bar is generally designated as the "Upper Bay", the part southward as "Lower Bay." The northeastern end of the upper bay is known as **Trinity Bay**.

Galveston Bay is the approach to East and West Bays, Houston Ship Channel, and the cities of Galveston, Texas City, and Houston, as well as to numerous smaller towns and bayous. Galveston Bay and tributaries form one of the most important ports commercially in the United States, having an extensive foreign and coastwise trade in crude petroleum and its refined products, cotton and cottonseed products, grain, sulphur, ores and iron and steel products, sugar, tropical fruit, and general merchandise.

Galveston Entrance, the approach to Galveston Bay, lies between two converging jetties about 4 miles long and 1¼ miles apart at the outer end. The jetties extend from **Bolivar Peninsular** on the north and **Galveston Island** on the south, respectively, to deep water in the Gulf. There is a dredged channel between the jetties, crossing the old inner bar north of Fort Point and the outer bar at the jetty entrance. The project dimensions of the channel are 36 feet (11.0 m) deep over the outer bar and 34 feet (10.4 m) deep over the inner bar, with a

width of 800 feet. In February 1936 the controlling depth over the outer bar was 34 feet (10.4 m) for a width of 800 feet and 34 feet (10.4 m) over the inner bar for a width of 800 feet.

Galveston Bar Lighted Whistle Buoy, 2 miles off the end of the jetties, marks the entrance to the channel. Thence into Bolivar Roads the south side of the channel is marked by five lighted buoys (four with bell) and there are three lighted bell buoys along the north side of the channel. There is also a light near the end of each jetty. Inside the jetties the channel passes first close by the north jetty and then crosses to the south side.

Fort Crockett Aviation Beacon.—This beacon is located about 8 miles west of Galveston entrance and about ½ mile from the seacoast, in latitude 29°16′08″ N. and longitude 94°50′14″ W.

Galveston Jetty Light (Lat. 29°19′.7; Long. 94°41′.5) near the outer end of the south jetty, is a cream colored cylindrical brick structure with black pilasters. The light alternately flashes white and red (white flash 0.5 sec., eclipse 4.5 sec.; red flash 0.5 sec., eclipse 4.5 sec.). The light is 91 feet (27.7 m) high and visible 15 miles. There is an air diaphone fog signal and a radiobeacon station; see Light List and H. O. publication No. 205.

Galveston North Jetty Light is located at the end of the north jetty.

Galveston Direction-Finder Station, located just inside the junction of the Galveston sea wall and the south jetty, is operated by the United States Navy. Call letters are NKB; see Light List and Hydrographic Office publication No. 205.

Prominent features.—Approaching the entrance to Galveston Harbor on a clear day, among the first objects sighted will be the grain elevator 240 feet (73 m) high on the Galveston Channel at 28th Street, the Buccaneer Hotel near the sea wall, and *Galveston Jetty Light* on the south jetty. Bolivar Point Unused Lighthouse, 116 feet (35 m) high and a clubhouse on the north jetty show conspicuously on closer approach and are easily identified. Vessels approaching from eastward near the coast will first sight High Island and those approaching from southwestward will probably first sight the hotel near the sea wall.

Galveston Harbor is the name generally applied to the larger deep water area between the jetties and extending westward between Bolivar Peninsula on the north and Pelican Island and Galveston Island on the south. On the south and west it connects with the ship channels to Galveston, Texas City, and Houston.

Bolivar Roads, the western portion of the harbor, affords good anchorage in 30 to 50 feet (9.1 to 15.2 m) at all seasons except during hurricanes, when refuge is taken at Houston. During winter months it furnishes good refuge for coasting vessels.

A small yacht basin has been dredged behind the sand point protruding north of the south jetty. The entrance is on a southerly course, leading just east of the small pier along the jetty to the eastward of the seawall. When close to the jetty continue close along it to the eastward through a narrow entrance between the jetty and the sand spit opposite. There was a controlling depth of about 5 feet (1.5 m) in 1935, but caution is necessary. Gasoline can be secured at the boat landings.

Galveston Channel extends from a point in Galveston Harbor off **Fort Point** to and along the wharf front at Galveston, and has a length

of about 4 miles and width of 1,200 feet. The project provides for a channel 34 feet (10.4 m) deep and 1,200 feet wide from the entrance to Forty-third Street, thence 32 feet (9.8 m) deep and 1,200 feet wide to Fifty-first Street; and for its extension when the interests of navigation and commerce require it, with a width of 1,000 feet and depth of 32 feet (9.8 m) to Fifty-seventh Street. In February 1936 the controlling depth was 33 feet (10.1 m) for a width of 700 feet.

The entrance into the channel from Bolivar Roads is marked on the west side by *Second Turn Light* and *Pelican Spit Shoal Lighted Buoy* and on the east side by *Fort Point Lighted Buoy* and a bell buoy.

Pelican Island (Pelican Spit) an artificial island with a dike along the southern side, projects Galveston Channel from northers. There are some harbor facilities on Pelican Island.

Regulations governing the use of Galveston Channel are prescribed by the Secretary of War as follows:

1. The speed of all vessels of over a net tonnage of 100 tons or of greater draft than 6 feet moving in Galveston Channel bounded by Pelican Island dike, the city of Galveston wharf front, the Second Turn Beacon (red), and the western limits of the excavated area, shall be reduced to and shall not exceed a rate of 4 miles per hour through the water when within 300 feet of the wharves or Pelican Island dike, and elsewhere in said channel the speed shall not exceed a rate of 6 miles per hour through the water.
2. All vessels are forbidden to drop anchor, weights, or other ground tackle within 200 feet of the water main and electric cables crossing Galveston Channel from pier 14, Galveston, to Pelican Island.

Galveston (population 52,938 by the 1930 census) occupies the eastern end of Galveston Island, covering the entire width of the island southwestward to the city limits. The wharves are built along Galveston Channel on the north side of the city. The south side of the city fronts upon the Gulf of Mexico and is protected by a concrete seawall 17 feet (5.2 m) high.

Galveston is primarily a port and practically all of its commercial activities are closely related to the business of the port. The short route to the sea together with a deep easily navigated channel and excellent port facilities enable cargo to be handled most expeditiously.

Both the foreign and domestic commerce of the port are extensive. The principal exports are cotton and cottonseed products, grain, flour, rice, sulphur, and metals. The principal imports are bananas, raw sugar, bagging, and creosote. The coastwise trade includes the above articles together with petroleum products, iron and steel products, wool and mohair, lumber, and general merchandise.

There is regular steamship service to several Atlantic and Gulf coast ports and to the principal world ports. Five trunk line railroads enter the port and improved highways extend to Houston and Port Arthur. The railroad to Beaumont and the highway to Port Arthur have ferry connections across Bolivar Roads to Bolivar Peninsula.

Galveston is also a large seashore resort, the principal such resort in the southwest. There is also considerable commercial fishing.

Galveston is connected with the mainland by **Galveston causeway**, a concrete and earth viaduct 1¾ miles long, crossing the northern end of West Bay. On the causeway, there are double tracks used by

the steam railroads entering Galveston, an electric line and a roadway for vehicles and pedestrians. The draw, about midway of the length of the causeway, has a lift opening 100 feet wide and a vertical clearance (when closed) of 9 feet (2.7 m) above high water. The overhead wire crossing has a vertical clearance of 100 feet (31 m).

Terminal Facilities.—All shipping terminal facilities are located on the city waterfront along the south side of Galveston channel and are privately owned.

The major portion of these facilities is owned and operated by the Galveston Wharf Company whose properties extend along the central portion of the city waterfront for a distance of 2 miles. These properties include 32 piers and wharves with a total berthing space of about 31,000 feet. Immediately to the westward are located the three piers of the Southern Pacific Terminal Co. with a total berthing space of about 6,000 feet. Two long piers with oil handling plants are located to the eastward of the Galveston Wharf Co.'s properties. Depths up to 30 feet (9.1 m) can be carried to all the above terminals.

Practically all piers and wharves have transit sheds, there being 30 waterfront warehouses with a total storage space of about 3,000,000 square feet. All have both rail and highway connections and nearly all have shipside tracks. There is a total storage capacity of nearly 10,000,000 square feet available at the port; more than half is for the storage of cotton.

The port facilities have been especially developed for the efficient handling of cotton, grain, sulphur, and bananas, as well as general merchandise. There are numerous cotton warehouses with compresses, all located near or on the water front. The storage capacity is 1,680,000 bales, untiered. There is a concrete, electrically operated grain elevator with a capacity of 6,000,000 bushels and with a sacking plant in connection. There are two other grain elevators with capacities of 500,000 and 1,000,000 bushels, respectively; one of these has pneumatic, electrically operated, unloading equipment with a capacity of 6,000 to 15,000 bushels per hour. On Pier 19 there are three electrically operated banana conveyors and on piers 35 and 36 there are special facilities for handling sulphur.

The properties of the terminal companies are administered directly by the respective companies.

A Captain of the Port, designated from the Coast Guard Service, exercises jurisdiction over all matters covering the movement and mooring of vessels and enforces the provisions of the anchorage regulations for the port.

Dockage.—At the railroad piers no dockage charges are made except when vessels occupy berths while being fitted for loading grain. At the other piers there are dockage charges.

Lighters are not used in Galveston but one car float operates between Galveston and Bolivar Peninsula as part of the through transportation facilities of the Gulf, Colorado & Sante Fe Railway.

Supplies and Repairs.—Provisions and supplies including ship chandlery are available.

An ample supply of fresh water is available at all piers. It is good for boiler use and for drinking.

There are five companies furnishing fuel oil either directly from piers or by pumping from oilbarges. The maximum capacity is

about 3,000 barrels per hour. Bunker coal can be secured at Pier 34 at the rate of about 200 tons per hours. There are also barges available for bunkering alongside.

On Pelican Island, **Todd Drydocks** have two drydocks, each with a rated lifting capacity of 10,000 tons for vessels up to 520 feet long and 22 feet (6.7 m) draft. These drydocks can haul vessels up to 12,000 tons and 550 feet long. There is also a marine railway with tonnage capacity of 1,200 tons and capable of hauling vessels up to 250 feet long and 18 feet (5.5 m) draft. A derrick boat of 60-ton capacity is also available. This yard has complete shops for all types of marine repairs to steel and wooden vessels.

The port of Galveston is well equipped with numerous marine repairs shops and foundries capable of making repairs to the hull or machinery of steel or wooden vessels.

Salvage Facilities.—Tugs, lighters, pumps, derricks, driving equipment, etc., are available for wrecking and salvage operations.

Radio.—The Radiomarine Corporation operates a radio station doing a general commercial business. The call letters are WGV.

Airways.—There is airway communication to Houston, Waco, and Fort Worth. There is a municipal airport, with facilities for servicing aircraft day and night. The Fort Crockett airdrome (United States Army) is located 3 miles southwest of the city. There are servicing facilities for Government aircraft day and night.

Storm Warnings.—Day and night signals are displayed on a steel tower at the Galveston Quarantine Station on the west side of the entrance to Galveston Channel.

Small-Boat Facilities.—The slip between piers Nos. 15 and 16 (foot of 16th St.) is used as a small-boat basin. Deliveries of gasoline, oil, and provisions can be secured here; fresh water is piped to the piers and there are a number of berths under sheds.

At the foot of 9th Street there is a boat yard with marine ways which can haul vessels up to 110 feet long and 9 to 10 feet (2.7 to 3.0 m) draft.

The small yacht basin in Galveston Harbor has been described on page 289, and Offatts Bayou is described on page 308.

Hospitals.—The United States Marine Hospital is located at 4400 Avenue N. There are several other hospitals in Galveston.

Customs and Immigration.—The Customhouse is located at 25th Street and Avenue F and the Immigration office at 18th Street and Avenue B.

A United States Branch Hydrographic Office is located at Room 301, Customhouse. Bulletins are posted here giving information of value to mariners who are also enabled to avail themselves of publications pertaining to navigation and to correct their charts from standards. No charge is made for this service.

A meteorological table for Galveston is given on page 382.

For information regarding **Pilotage, Anchorage, Quarantine,** etc., see pages 302 to 305.

The **Port Series,** volume No. 6 (Part 1), gives further detailed information regarding the port of Galveston; see page 4.

Port Bolivar Channel connects Galveston Harbor with a turning basin at the wharves of Port Bolivar. The project provides for a channel 30 feet (9.1 m) deep and 200 feet wide from deep water in

Galveston Harbor to a turning basin 1,600 feet long, with an average width of about 750 feet and 30 feet (9.1 m) deep in front of the wharves. In September 1935, the controlling depth in the channel was 21 feet (6.4 m) for a width of 200 feet and in the basin 13 feet (4.0 m) for a width of 500 feet. The channel is marked by *Port Bolivar Lighted Range* and by buoys.

Port Bolivar, at the southwestern extremity of Bolivar Peninsula and 3½ miles north of Galveston, is the terminus of a line of the Gulf, Colorado & Santa Fe Railway from Beaumont and the interior of the State. Car ferry service is maintained to Galveston but the former port facilities at this place have been discontinued.

Texas City Channel extends from deep water in Galveston Harbor through the lower end of Galveston Bay to an artificial harbor off the wharves at Texas City. The project provides for a channel 34 feet (10.4 m) deep by 300 feet wide and for a dredged harbor 3,200 feet long, 800 feet wide and 34 feet (10.4 m) deep. In February 1936, the controlling dimensions of the channel were a depth of 32 feet (9.8 m) for a width of 150 feet. Along the face of the wharves and in the slips there were depths of 30 feet (9.1 m) or more.

The channel is protected on its northerly side for about 4½ miles out from the mainland by a double dike (a pile dike with a rubble mound dike along the south side); the dike is about 900 feet north of the channel at the eastern end and about 2,300 feet at the western end. The harbor is further protected by a large spoil bank extending along the eastern side and connected with the mainland by a narrow strip of land at the south end.

The entrance to the channel (Cut A) is marked by several buoys (some lighted) along the south side and by a lighted range. Cut B has a lighted range at either end. There are also several beacons along the channel.

Texas City, on the west side of lower Galveston Bay, about 7 miles northwestward from Galveston, is a port of considerable commercial importance, having an extensive foreign and coastwise trade in petroleum products, cotton, iron and steel products and general merchandise. The facilities for handling cargo are very good. There are connections with the railroads entering Galveston and with the state highway between Galveston and Houston. Most steamships to Galveston or Houston will call at Texas City for cargo.

There is a small boat channel with a depth of about 6 feet (1.8 m) leading northwestward from just inside the front range light to the inshore end of the channel dike where there is a landing and a small basin used by fishing and pleasure boats.

Terminal Facilities.—These consist of four piers with three 200-foot slips between them. There are two general cargo piers, one 1,200 feet long by 1,000 feet wide and another 900 feet long by 500 feet wide. These piers have transit sheds with a total floor space of about 600,000 square feet and immediately behind the piers there are storage warehouses with a total floor space of about 350,000 square feet. A high density cotton compress, a grain elevator (capacity 500,000 bushel), and an ore handling plant are operated in connection with these piers. There are rail connections to the piers and to ship side.

To the south of the cargo piers, there is a long open oil pier with bunkering facilities and berthing space for several vessels. This oil

pier and the adjoining cargo pier have oil connections to the extensive oil handling plants in the vicinity.

North of the cargo piers is the plant of the Texas Sugar Refining Co. with a wharf and warehouse along the north side of the north slip.

The Texas City Terminal Railway Co. own and operate all the port facilities at Texas City except the sugar refinery and the oil pier; this company owns but does not operate the oil pier.

The **Customs Service** have an office at Texas City.

For information regarding **Pilotage, Anchorage, Quarantine,** etc. see pages 302 to 305.

The **Port Series,** volume No. 6 (Part 3) gives further detailed information regarding the port of Texas City; see page —.

East Bay is a large shallow bay making eastward about 16 miles from the southern end of Galveston Bay and lying northwestward of Bolivar Peninsula. It is partially separated from Galveston Bay by a chain of low sand islands and shoals, known as **Hanna Reef.** The depths in the bay range from 2 to 7 feet (0.6 to 2.1 m), with a depth of 4¼ feet (1.3 m) in a dredged channel through Hanna Reef. At Rollover, on the south side of the head of the bay, a depth of 2 feet (0.6 m) can be taken into the Intracoastal Waterway. The Intracoastal Waterway does not traverse the waters of East Bay; it follows a land cut along the length of Bolivar Peninsula, entering Galveston Bay just northward of Port Bolivar.

East Bay Bayou empties into the northeast end of East Bay. The Intracoastal Waterway follows the general course of the bayou from near its mouth to its junction with Mud Bayou.

Oyster Bayou empties into the northeast end of East Bay just to the westward of East Bay Bayou. It is a shallow stream with practically no commerce.

Robinson Bayou has a depth of only 1 foot (0.3 m) on the bar at the entrance, and is little used except by hunters.

Double Bayou enters upper Galveston Bay on the east side, about 26 miles by the usually traveled channels northward of Galveston. Its main commerce is in mud shell. The entrance channel is marked by two lights along the south side of the channel; the project depth is 6 feet (1.8 m) but in June 1935 the controlling depth was but 3 feet (1.8 m). One-half mile above its mouth, the bayou divides into east and west branches, navigable for distances of 12 and 8 miles, respectively. **Glen, Eagle,** and **Double Bayou** are three villages on the west branch one-half mile, 3 miles, and 7 miles, respectively, from Galveston Bay. Ferries cross the bayou at the two latter settlements and a county bridge crosses the bayou at Jacksons store on the east branch.

Anahuac is a village at the northeastern end of **Trinity Bay,** opposite the mouth of the Trinity River. There is a shallow channel, marked by three lights, across the shoals from deep water in the bay, past Anahuac, into the mouth of Browns Pass, Trinity River. A highway connects with Goose Creek and Houston.

Turtle Bay is separated from Trinity Bay by an earth dam. The entrance to Turtle Bay is through the mouth of Browns Pass. A lock, in poor condition and without gates, is at the entrance of the pass into Turtle Bay. The water of the bay is fresh. In 1935 there

was but 1½ feet (0.5 m) in the channel across Turtle Bay to Turtle Bayou.

Trinity River, emptying into the northeastern end of Trinity Bay, is one of the largest rivers in the State of Texas. The entrance to the river is through Anahuac channel and Browns Pass. In 1935 the controlling depth through Anahuac channel was less than 1 foot (0.3 m), but there were depths of 2 to 3 feet (0.6 to 0.9 m) close by. From inside the mouth, a depth of about 6 feet (1.8 m) can be carried to **Liberty**, a distance of about 36 miles. There is some traffic on the river in clam and oyster shells.

Between Trinity River and **Umbrella Point**, there is a submerged pile. It is 1½ miles off the northern shore and 4½ miles northeastward of Umbrella Point; it is submerged at high water.

Cedar Bayou is a crooked stream of considerable depth, flowing in a southern direction and emptying into the northwestern corner of Galveston Bay 2½ miles northwest of Cedar Point and 25 miles above Galveston. There is considerable commerce in crude oil and shell, handled in barges. A channel, 11 feet (3.3 m) deep by 100 feet wide in 1935 and protected by submerged jetties at the entrance to the bayou, has been dredged across the flats from the Houston Ship Channel to the first bend above the mouth of the bayou. A depth of about 5½ feet (1.7 m) can be carried 9½ miles farther up the bayou. Cedar Bayou is a small town and postoffice 8 miles above the mouth.

The entrance channel across the flats is marked by a light on the north side at either end and a light on the south side at the bend in the channel. To the eastward of the bend in the channel, there is a row of beacons along the south side and a spoil bank on the north side.

Goose Creek empties into **Black Duck Bay** at the north end of **Hog Island**, 1½ miles above Morgan Point. It is connected with Houston Ship Channel by a dredged channel along the northwest side of Hog Island. A depth of 6 to 7 feet (1.8 to 2.1 m) can be carried through this channel and for about 1 mile up Goose Creek and a depth of 3 to 4 feet (0.9 to 1.2 m) can be carried 4 to 5 miles farther. A large oil field is located east of the creek. Traffic on the creek consists of crude oil and shell handled in barges. Several fixed bridges cross the bayou, the first about 2 miles above the mouth.

The town of **Goose Creek** (population 5,208 by the 1930 census) is located on the north shore of Tabbs Bay, just east of the creek. It is the center of the oil industry in the vicinity. There are highway and railroad connections to Houston.

Morgan Point is located on the northwest end of Galveston Bay, at the entrance to San Jacinto River and on the western side of the Houston Ship Channel. There is a maritime reporting station and a towboat station at the north end of the cut close to the westward of the channel. A highway ferry operates between Morgan Point and the south end of Hog Island, connecting the highway from Goose Creek with the highway down the west side of Galveston Bay. The town of **Laport** is 2 miles southwest of Morgan Point. Both Morgan Point and Laport have railroad communication.

Barbour Bayou, extending about 1¼ miles westward along the north side of Morgan Point, has a depth of about 20 feet (6.1 m) through the entrance and about 30 feet (9.1 m) in the basin at the head. It

provides excellent shelter for vessels up to 150 feet or larger and is particularly used for barges and tugs.

From Morgan Point southward to **Red Bluff** there are hotels and summer homes with numerous boat landings along the shore.

The yacht basin of the Houston Yacht Club is located 1½ miles north of Red Bluff. The club maintains a lighted range leading to the basin.

A wrecked barge awash at low water lies 1½ miles off Red Bluff.

Clear Creek empties into upper Galveston Bay on the west side, about 20 miles northwestward from Galveston. About 2 miles above its mouth it broadens into a shallow body of water 2½ miles long known as **Clear Lake.** The project dimensions for the channel as far as the first bridge are 60 feet wide by 6 feet (1.8 m) deep. In 1935 the entrance channel into the creek had a depth of 3 to 4 feet (0.9 to 1.4 m). *Seabrook Light* marks the north side of the offshore entrance to the channel, and there are locally maintained markers along the north side of the channel, the inshore one marking the point where the channel turns south into Clear Creek. **Seabrook,** at the entrance to the creek, is headquarters for party boats, fishing boats, and pleasure boats. Gasoline, oil, and water and some provisions can be secured.

A highway bridge and a railroad bridge cross the creek about 1 mile above the mouth. Both are drawbridges, the minimum horizontal clearance being 40 feet. Just beyond the bridges there are boat yards with ways capable of hauling boats up to about 90 feet in length and 6 feet (1.8 m) draft. Limited repairs can be made.

The lake is shallow, and there is practically no traffic above the lake.

Dickinson Bayou empties into lower Galveston Bay on the west side, about 13 miles northwestward of Galveston. A channel has been dredged across the bar at the mouth of the bayou; in June 1933 it was 2 feet (0.6 m) deep. Inside the bayou, there are depths of 6–10 feet (1.8 to 3.0 m) for several miles. **Dickinson** is a small settlement about 7 miles above the mouth. Just inside the mouth there is a highway and a railroad bridge. The highway bridge is fixed with a horizontal clearance of 40 feet and a vertical clearance of 14½ feet (4.4 m) above high water.

The entrance channel from off Shell Island, between April Fool Point and Miller Point, is marked by several beacons on the south side.

Moses Lake is a shallow unimportant lagoon, south of the mouth of Dickinson Bayou.

HOUSTON SHIP CHANNEL

(Charts 1282, 588, 589, and 590)

Houston Ship Channel extends from Galveston Harbor, across Galveston Bay and through parts of San Jacinto River and Buffalo Bayou to the city of Houston, a distance of 44 miles. The project provides for a channel 34 feet (10.4 m) deep through its entire length and with a width of 400 feet across Galveston Bay, 300 feet through Morgan Cut to above the bend at Baytown and thence 250 feet to Norsworthy and 200 feet thence to the turning basin which

has a width of about 1,000 feet. Certain widening at bends is also provided.

In February 1936 there was a controlling depth of 30.5 feet (9.3 m) between Bolivar Roads and Morgan Point, with a controlling depth of 32 feet (9.8 m) elsewhere in the channel. In the turning basin, the controlling depth was 25 feet (7.6 m). Ordinarily the depth in the basin is about 32 feet (9.8 m).

The entrance to the channel is at the northwest end of Bolivar Roads, between Port Bolivar and Texas City channels and is marked by *Galveston Bay Channel Entrance Lighted Range* (indicated Houston Channel Range on the chart) and by *Galveston Bay Channel Lighted Buoys 2 and 6* along the northeast side of the channel. Across the bay the channel is marked by numerous lights and buoys in pairs (one on either side of the channel).

South of Red Fish Bar, there are spoil banks on either side of the channel as far as Buoy 6. North of Red Fish Bar there is no spoil bank along the west side of the channel; along the east side there is practically a continuous spoil bank with two gaps for entering the northwest portions of the bay. One gap is about 200 feet south of Beacon 14 and the other north of Beacon 22; both have a depth of about 5 feet (1.5 m). Part of the spoil material shows above water and forms a dike protection to the channel. For several miles south of Morgan Point, this dike is relatively high and continuous.

North of Morgan Point to Lynchburg, a distance of 8 miles, the ship channel is marked by numerous lighted ranges (Cuts A to X, inclusive). Along this section there is a lighted range at both ends of each reach. Above Lynchburg there are lights on the outside of the curves which have signs mounted on them, giving the distance that the structure is located from the center of the channel.

Buffalo Bayou above the turning basin has a depth of about 7 feet (2.1 m) for about 6 miles to Main Street, Houston, where there is a landing. This channel is used considerably by barges and vessels traversing the Intracoastal Waterway. There is a boat yard on the bayou, less than a mile above the turning basin, with facilities for hauling and repairing harbor craft up to about 75 feet long and 9 feet (2.7 m) draft. There is a project for deepening the bayou to 10 feet (3.0 m), if and when commerce demands it.

Ferries and Bridges.—Three ferries cross the Houston Ship Channel, one at Morgan Point, one at Lynchburg and one at Pasadena. All are self-propelled and operate without cables.

There are no bridges across the Houston Ship Channel, but there are 12 bridges across the upper light draft channel through Buffalo Bayou between the turning basin and Main Street. The first eight bridges are draw or lift spans with least width of 80 feet. The upper four bridges are fixed with clearances above mean low water of 42, 45, 38.8, and 54.2 feet. As bridge tenders are not maintained at all draw bridges, proper notice of at least 12 hours must be given of desire to pass with any craft requiring more than 30 feet vertical clearance.

Overhead Wire and Cable Crossings.—There are two overhead electric power line crossings, one at Baytown 196 feet (60 m) high, and the other at power plant one mile above Pasadena 199 feet (61 m).

Pipeline crossings under the river are indicated by warning signs on the river bank. Oil and gas pipe lines cross the channel at the following locations: 1 mile below Baytown, ½ mile above Baytown, at Lynchburg and ½ mile below Shell slip. All pipe lines are 43 to 45 feet below water surface. At Sinco, there is a concrete tunnel for pipe lines; it is placed 58 feet below the channel.

Layby Moorings.—Suitable anchor chain moorings, secured to deadmen on shore, have been provided by the Port Commission on the west side of Morgan Cut at intervals of about 300 feet, to which vessels delayed by accident or fog may be made fast while lying against the clay bank of channel.

The numerous oil terminal facilities along the Houston Ship Channel between Morgan Point and Houston are described under Houston-Terminals.

San Jacinto River, branching northward at **Lynchburg,** 8 miles above Morgan Point, has a navigable depth of 5 to 6 feet (1.5 to 1.8 m) for about 11 miles above Lynchburg to the fixed highway bridge on the Beaumont-Houston highway. The vertical clearance at the bridge is 26 feet at low water and 4 feet at high-river stage. **Highlands** and **Sheldon,** 4½ and 10½ miles, respectively, above Lynchburg are post offices. There is some traffic in shell and building sand.

There are marine ways at Lynchburg with a lifting capacity of 1,000 tons and capable of handling vessels up to 180 feet long and 13 feet (4.0 m) draft. Woodwork repairs can be made but there is no machine shop. Small boats can secure gasoline near the ferry across the Houston Ship Channel.

San Jacinto Battlefield, a Texas state park, is on the south side of the channel, 9 miles above Morgan Point. It is the site of the battle that won independence for the Republic of Texas. There are landings here for small craft and vessels should slow down to prevent wave wash and damage to boats.

Greens Bayou, entering Buffalo Bayou from the northward at a point 6 miles above Lynchburg, is navigable for a draft of 8 to 10 feet (2.4 to 3.0 m) for a distance of about 5 miles, at which point it is crossed by three fixed bridges, each having about 26 feet (7.9 m) headroom at mean low water. A draft of 4 to 5 feet (1.2 to 1.5 m) extends up another 5 miles. The bayou has some traffic in timber and shell.

On **Cottonpatch Bayou** and **Sims Bayou,** there are marine ways capable of hauling barges and harbor craft up to about 150 feet in length and 8 to 10 feet (2.4 to 3.0 m) draft.

Harrisburg (industrial section City of Houston) about 2 miles below turning basin, has a light draft channel (Harrisburg Bend) around Brady Island, on which are located landings for pleasure craft, sand and shell unloading rigs, small marine ways, boat repair yards, machine shops, material yards, etc. A marine service station is located just inside the west entrance to this channel. There are depths of 8 to 12 feet (2.4 to 3.6 m) in the west end of the channel, but only about 5 feet (1.5 m) can be taken through the east end.

Brays Bayou, branching off the western entrance to Harrisburg Bend is a center for laying up and repairing pleasure craft. There are storage yards, repair yards and ways capable of hauling boats up to 90 feet long and 6 to 8 feet (1.8 to 2.4 m) draft. Gasoline, oil, water, and provisions can be obtained.

Houston (population 292,352 by the 1930 census), the largest city in the state of Texas and the second largest port on the Gulf is located 22 miles above the head of Galveston Bay and 44 miles above Galveston Entrance with which it has deep-water connection through Houston Ship Channel. It is the principal distributing point for southeastern Texas and one of the main distributing points for the southwestern part of the United States.

Numerous trunk line railroads and improved highways radiate from the city to all parts of the state and connect with all parts of the United States. There is regular steamboat service to the principal Gulf and Atlantic Coast ports as well as to most of the important world ports.

Houston has an extensive foreign and domestic commerce. The principal exports are petroleum products, cotton and cottonseed products, scrap iron, chemicals, rice, and flour. The principal imports are crude oil, iron and steel products, sugar, bagging material, molasses, and general merchandise.

The turning basin at the head of the ship channel is on the southeast side of the town. The commercial terminals are on and just below the turning basin and many industrial plants extend along either side of the channel for several miles below the turning basin. Between Morgan Point and Houston, there are numerous oil terminals along the ship channel.

The control of the municipally owned wharves as well as the belt line railroad serving all port facilities is vested in a board of Port Commissioners. The Director of the Port (Civil Court Bldg., Houston) has the active management of the port.

The Superintendent of Wharves is in charge of the Public Terminals and vessels are moved, shifted and assigned to berths under his direction.

Terminal Facilities.—The public terminals surround the turning basin and are operated by the Port Commission of Houston. There are 13 wharves with berthing space for 18 vessels and total storage space in transit sheds and warehouses of 1,260,000 square feet. Most of the wharves handle general merchandise and several are equipped with mechanical conveyors, escalators, cranes, etc. Three wharves are devoted principally to handling cotton (two with cotton compresses) and two handle principally cottonseed products.

There is a grain elevator behind one of the wharves with a capacity of 3,500,000 bushels and equipped with two automatic box car unloaders and six power shovels. Grain berths are available at two wharves.

One wharf is devoted to the handling of bulk commodities (iron, lumber, etc.) and is equipped with locomotive cranes.

All the wharves have pipe line connections for oil bunkering and one wharf is an oil terminal.

The following additional terminal facilities are located below the municipal terminals:

Long Reach.—This is a straight section of channel just below the turning basin, and on south side are located the terminals of the Terminal Compress and Warehouse Co., Ship Channel Compress Co., and the Houston Compress Co., where large volumes of cotton and general cargo are handled. Ten ship berths are available.

Armour Fertilizer and Tex-Cuban.—Located at lower end of turning basin, with one wharf equipped to handle bulk phosphate rock, sulphur, etc., for fertilizer manufacture, and crude molasses through pipe line to Tex-Cuban Molasses Co. tanks. A pipe line to molasses tanks also extends from Public Wharf No. 1.

Manchester, City Terminals, are located 4 miles below the turning basin. There are general cargo facilities and grain loading facilities for the American Maid Flour Mills in rear of wharf. Just above are barge wharves of Lone Star Cement Co., Magnolia Petroleum Co., Deepwater Refining Co., and Texas Chemical Co. These wharves have depths of 10 to 25 feet alongside.

Manchester Terminal Corporation is located 5 miles below the turning basin on the south side of the channel. There are berths for four vessels where cotton and general cargo is handled. This plant is just inside the city limits of Houston.

Clinton is opposite the Manchester Terminal Corporation. Here are the general cargo terminals of the Southern Pacific Steamship Co. (Morgan Line) with slip and berths for four vessels, and the warehouse and terminal of the Carnegie Steel Co. with one ship berth and under-cover slip for barges, equipped with overhead traveler cranes.

The following oil terminals are located along the Houston Ship Channel between Morgan Point and Houston:

Baytown (population 5,194 by 1930 census), 4 miles above Morgan Point, is the location of the Humble Oil Refineries and is the shipping port for their products. They have berths for four large vessels at 32 feet depth. A Deputy Customs Collector is stationed here to facilitate entrances and clearances.

Lynchburg, at the junction of Buffalo Bayou and San Jacinto River, 8 miles above Morgan Point, is the location of the Gulf Pipe Line Co. terminal with one ship berth for handling oil.

Shell, 11½ miles above Morgan Point, is the location of Shell Petroleum Corporation refinery with slip and berths for three vessels.

Norsworthy, 16 miles above Morgan Point, is location of the American Petroleum Co. oil terminal with one ship berth.

Pasadena (population 1,647 by 1930 census), 17 miles above Morgan Point, is location of Crown-Central refinery with one ship berth. Pasadena Ferry is just above wharf.

Galena, 17½ miles above Morgan Point, is location of Texas Corporation refinery with slip and berths for three vessels. The General American Tank Storage and Terminal Co. adjoin the Texas Corporation plant and use the west side of slip for berthing their vessels.

Sinco, 18½ miles above Morgan Point, is location of refinery and terminals of the Sinclair Refining Co. This plant has three ship berths. Directly opposite are terminals of Gulf Refining Co. and Coastal Oil and Transport Co. with one ship berth each.

General harbor regulations.—The following are extracts from the local regulations for the port:

Forbiden anchorage.—It shall be unlawful for any vessel or barge to anchor in the turning basin or channel.

Speed limit.—No steam vessel shall exceed a speed limit of 8 knots in any part of the harbor; and provided further, that upon approaching another vessel or barge under way, moored, anchored, or fastened to a wharf, or under

repair or construction, said vessel shall slow down to the slowest speed at which her steerageway may be maintained; and provided further, that no steam vessel may pass any dock or wharf at a greater speed than 5 knots.

Restriction of towage.—The director of the port shall be authorized to stipulate the number of barges or the tonnage or the size of rafts which shall be allowed to be towed through said port by any certain power boat or towboat, and that, except in the case of seagoing barges or vessels, it shall be unlawful for a towboat to tow a barge or barges while lashed to the side of the same, and that in all towing, except in the case of seagoing barges and vessels, the barge or barges shall be in a single line astern of the towboat or boat towing same.

Vessels to be properly moored.—No barge or vessel shall be moored or fastened to a dock in such a manner that one end shall be free to swing athwart stream.

Lights on moored vessels.—All vessels or barges shall display lights from sunset to sunrise while lying at any wharf or dock, steam vessels to conform to navigation rules applying when moored or anchored in the channel, and barges to display white lights visible all around the horizon located at least 8 feet above the water line on their outside or channel corners; provided, that said regulation shall not apply to pleasure craft and other small vessels and barges which may be located in the said channels or other small waterways which are not a part of the Houston Ship Channel proper.

Vessels at docks not to interfere with navigation.—The director of the port shall be authorized to state the total number and nature of vessels which may be docked at the same time at any certain dock with the authority to stipulate the manner in which they shall be placed, with a view to the protection of navigation and the maintaining of the thoroughfares free of obstruction.

Discharging of oils, etc., into channel.—It shall be unlawful for any person, persons, firm, or corporation to deposit, place, or discharge into the Houston Ship Channel, between Main Street viaduct and Morgan Point, or into Buffalo Bayou or White Oak Bayou or the tributaries of either within or without the limits of the city of Houston, either directly or through private or public sewers, any sanitary sewage, butcher's offal, garbage, dead animals, gaseous liquid, or solid matter, oil, gasoline, residuum of gas, calcium carbide, trade waste, tar or refuse, or other matter which is capable of producing floating matter or scum on the surface of the water, sediment in the bottom of the channel, or the odors and gases of putrefaction.

Supplies and Repairs.—There is an ample supply of fresh water at all piers; it is good for both boiler use and for drinking. Provisions and general supplies of practically any kind can be secured at Houston.

Vessels can secure bunker oil through pipe lines on the public wharves at the turning basin and Houston compress wharves while loading or discharging cargo or at the wharves of the various oil companies on Houston Ship Channel. There are about 12 companies furnishing fuel oil in or near Houston and several have oil barges for bunkering. The only coal bunkering facilities are deliveries from local dealers.

The nearest drydocks are at Galveston. The marine railways at the port are used for the repair of barges, small tugs, etc., up to 600 gross tons. These are located on Cottonpatch Bayou, Sims Bayou, Harrisburg Bend, Brays Bayou, and Buffalo Bayou and have been described. There are ways at Lynchburg capable of hauling vessels up to 1,000 tons.

There are good machine shops, foundries, welding plants, etc., in Houston capable of handling most repairs to hull or machinery above the water line.

Salvage Facilities.—There are no firms in Houston which make an exclusive business of wrecking and salvage but harbor tugs, derricks, and barges are available when required. Divers and other

equipment can be secured on short notice from Galveston or Beaumont.

Airways.—There is airway communication to Galveston, Fort Worth, and New Orleans. There is a municipal and a commercial airport, both with facilities for servicing aircraft day or night.

Small Boat Facilities.—The principal small boat facilities are on Harrisburg Bend and Brays Bayou; the latter is used particularly by pleasure boats. There is a landing at Main Street, Houston, at the head of Buffalo Bayou where gasoline, supplies, and provisions can be obtained.

Hospitals.—There is a United States Public Health Service Relief Station in the Medical Arts Building, Houston, and a Marine Hospital in Galveston. There are several public and private hospitals in Houston.

Customs and Immigration.—A deputy collector of customs has an office in the old Federal Building and a suboffice on Wharf No. 3 at the turning basin. The immigration office is in the Federal Building on San Jacinto Street. The customs service also has a suboffice at Baytown.

The **Port Series,** volume No. 6 (Part 2) gives further detailed information regarding the port of Houston; see page 4.

The following **port information** applies more or less generally to Galveston, Texas City, and Houston.

Anchorage.—Vessels outside of the bar, if prevented from entering by a norther, can anchor in about 5 fathoms (9 m), with Bolivar Point Unused Lighthouse bearing about northwest. The holding ground is good, and there is but little sea.

The best anchorage for large vessels is in Bolivar Roads, between Bolivar Point and Pelican Island. The depths range from 3 to 8 fathoms (5.5 to 14.5 m), and the bottom is good holding ground.

The quarantine anchorage is northeastward of Fort Point.

Anchorage grounds for Galveston Bay, Port Bolivar, and Texas City have been prescribed by the War Department. The limits and the regulations are as follows:

THE ANCHORAGE GROUNDS

Vessels may anchor only in the anchorage basin known as Bolivar Roads, lying between Bolivar Point on the north and Galveston Island, Pelican Spit, and Pelican Island on the south, west of a line ranging from the north end of the United States concrete sea wall at Fort Jacinto to the east end of the United States concrete sea wall in front of Fort Travis (Bolivar Point), and east of a line ranging from the triangulation beacon "M" on the east end of Pelican Island to the Port Bolivar front range light near the north edge of Port Bolivar turning basin, and only in those portions of said anchorage lying outside of the Galveston Channel, the Texas City Channel, and the Port Bolivar Channel and turning basin.

THE RULES AND REGULATIONS

1. Except as provided in paragraphs 8 and 9 of these regulations and in cases of great emergency, no vessel shall anchor in the channels or turning basin, or in the outer harbor between the jetties; nor be made fast to the exterior end of any pier, or vessel lying at the exterior end of any pier, or along any bulkhead in such manner as to obstruct the passage of any vessel to or from adjacent wharf property, or impede the movement of any vessel entering or leaving the slips.

2. Vessels anchoring under circumstances of great emergency elsewhere than as specified in the description above of "The anchorage grounds", must, if

anchored in a channel, turning basin, or in the outer harbor between the jetties, be placed as near the edge of the channel as possible, and so as not to interfere with the free navigation thereof, nor obstruct the approach to any pier. They shall move from such position as soon as the emergency ceases, or when so ordered by the captain of the port.

3. All vessels shall lie at anchor with as short a cable as conditions will permit, and in no case shall the length of cable exceed 990 feet.

4. A vessel upon being notified by the captain of the port to shift its position must get under way at once, or signal for a tug, and must change position as directed with reasonable promptness.

5. When the maritime or commercial interests of the United States so require, the captain of the port is hereby empowered to shift the position of any vessel anchored on the anchorage grounds or outside thereof; or any vessel moored or anchored so as to impede or obstruct vessel movements in any channel or obstruct or interfere with range lights; or of any vessel which, lying at the exterior end of a pier or alongside an open bulkhead, obstructs the passage of vessels to or from adjacent wharf property or impedes the movement of vessels entering or leaving adjacent slips.

6. Vesseds in collision in the channel or turning basin, or in the outer harbor between the jetties, must, if still afloat in a condition making anchorage necessary, be immediately removed to the prescribed anchorage in Bolivar Roads, or, if in such condition that beaching is necessary, they shall be temporarily beached on the north side of Pelican Island, southwest of Bolivar Point, and properly secured against movement therefrom.

7. In no case following accidents of fire or collision will a vessel be allowed to remain either anchored or grounded in the channels or turning basin, or beached at any place where it endangers other vessels, while settlement is pending with the underwriters.

8. Permits to anchor in channels may be granted by the district engineer, engineer department at large, in charge of the locality to wrecking plants locally engaged in recovering sunken property.

9. In special cases the captain of the port may grant permission to small craft, barges, etc., awaiting repairs by the facilities on Pelican Spit, to lie at anchor, securely moored at both bow and stern and showing proper lights, within a line parallel to the pile and brush dike and not over 200 feet therefrom, in the shallow water on north side of Galveston Channel.

10. Nothing in the foregoing rules and regulations 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, etc.

On account of the amount of traffic **Galveston Channel** can be used only for temporary anchorage by steamers preparing to haul into berths at the wharves or after leaving the wharves before going to sea.

In **Galveston Bay** small craft can anchor anywhere outside of the dredged channels where the depth is sufficient. The water in the bay may be lowered as much as 3 feet (0.9 m.) by a norther, and vessels should make due allowance for it when selecting anchorage during the winter months.

Vessels are prohibited from anchoring in the **Houston Ship Channel** or turning basin except in cases of great emergency, and under such circumstances shall be placed as near the edge of the channel or turning basin as possible, so as not to interfere with free navigation nor obstruct the approach to any pier. The regulations for the Houston Ship Channel are given under that heading. Lay-by moorings to the north of Morgan Point are also described.

Pilotage is compulsory for foreign vessels, for American vessels in foreign trade and for certain classes of coastwise vessels; in regard to the latter see extracts of State of Texas Pilot Regulations on page 8. Pilotage is not compulsory for coastwise vessels having

on board a pilot licensed by the United States Steamboat Inspection Service.

The pilot boat will be found cruising outside the bar or anchored near the end of the jetties. Pilots for both Galveston and Houston use the same boat. The signal for a pilot to Galveston or Texas City is four long blasts of the whistle; for a Houston pilot, the signal is two long and three short blasts of the whistle. Ships are taken in day or night.

The rates of pilotage inward and outward for Galveston and Texas City are:

	Per foot draft
Not over 500 net registered tons	$3.00
500 to 1,000 net registered tons	3.50
1,000 to 1,500 net registered tons	3.75
Over 1,500 net registered tons	4.00

The rates of pilotage for Houston are:

	Per foot draft
All foreign vessels to and from sea	$5.50
All vessels to and from roads	2.50
Coastwise vessels from sea to the various terminals on the channel and vice versa	3.25–4.00

There is no additional charge for docking or undocking. The charge for shifting ships in harbor is $20; for shifting between Galveston and Texas City, the charge is $25.

Quarantine.—The national quarantine station is located at the northeast end of Pelican Island, at the entrance to Galveston Channel. Vessels are boarded by the doctor at the quarantine anchorage in Bolivar Roads. Additional information relative to quarantine is given on page 9.

Towboats and seagoing tugs are available in Galveston. Towboats are also stationed at Morgan Point and at Houston. With a fair wind, sailing vessels under the direction of a pilot, usually come in to Bolivar Roads without the aid of a pilot. Towboats are frequently used into Houston but their use is not obligatory. Typical charges for assisting steamers are; Bolivar Roads to Texas City, $80; Bolivar Roads to Houston, $285; Morgan Point to Houston, $200. Docking charges are $40 to $65 and shifting charges are $55 to $75.

Storm warnings are displayed at the Quarantine Station, Galveston (day and night), Texas City Company's elevator, Seabrook, Shore Acres (Houston Yacht Club) and Laporte.

The United States Coast Guard have a base at the old Immigration Station on Pelican Island, less than a mile to the westward of the Quarantine Station.

Tides and Currents.—Near the time when the moon's declination is greatest north or south there is but one high and one low tide daily. When the moon is near the equator however, there are two high and two low waters daily. Predictions of the times and heights of the tide at Galveston for every day in the year are given in the Tide Tables, Atlantic Ocean. Both the times and heights of the tide are considerably affected by the winds. It is not an uncommon occurrence for the wind to blow from the east and southeast for a number of days, banking the water up in this part of the Gulf and filling the bays to from 2 to 4 feet above mean low tide. The wind then suddenly changes to the north and blows steadily and

with considerable violence for several days, blowing the water out of the bay and reducing the level of the Gulf and the bay to 2 or 3 feet below mean low water.

The currents are also frequently modified by the winds. Easterly or southeasterly winds may cause a continuous flood current between the jetties at the entrance for a period of a day or more, and westerly or northwesterly winds sometimes set up a continuously outgoing current for a similar period.

When the moon is near its maximum north or south declination, the tidal current is diurnal, one flood and one ebb occurring each day. At such times, the usual velocity between the jetties at strength of flood or ebb is about 3 knots. For 5 or 6 days after the moon crosses the equator, the current is semidiurnal, two floods and two ebbs occurring each day. During this period the average velocity between the jetties at strength of flood or ebb is about 2 knots. The tidal currents also have considerable velocity on the bar at the entrance, along the wharves, and in the dredged cuts in the bay and tributaries.

Winds.—The prevailing winds are northerly from November to March, throughout which time "northers" occur frequently. These gales, although occasionally blowing with a velocity of over 40 miles, are not dangerous to vessels anywhere close to the coast, as they blow offshore and the sea is not heavy; the Weather Bureau warning of their approach gives vessels ample time for preparation. From April to October the prevailing winds are southerly, and hurricanes occur occasionally; these are dangerous to shipping near the coast because the wind is onshore. Hurricanes of marked violence at Galveston have occurred as follows: September 1875, September 1877, September 1900, and August 1915. During the hurricane of August 1915 the wind attained a velocity of over 100 miles per hour.

DIRECTIONS, GALVESTON BAY

Approaching from northeastward, vessels should make High Island and then follow alongshore, taking care to be far enough off to clear the end of the jetty. The bottom is fairly regular and there are no known dangers within 15 miles of the coast.

Approaching from southwestward, keep in 5 to 6 fathoms (9 to 11 m) in winter and deeper water in summer, because of the prevailing southerly winds and swell. For prominent features visible upon approaching Galveston Entrance see page 289. The bottom is regular and there are no known dangers.

During the winter months when northers are frequent it is well for westbound vessels to keep a little northward of the 295° course from Dry Tortugas to Heald Bank Light Ship, but go southward of the light ship in passing. In either direction verify the ship's position as often as possible, because no sailing directions can be given which will suffice for all of the varying conditions of current encountered. For 300 miles before reaching Heald Bank westbound vessels frequently overrun, especially during the winter months, and eastbound vessels overrun for the last 300 miles before reaching the Tortugas. Depend upon the lead westbound, but upon observations eastbound.

The following hints regarding **Currents** apply to the general conditions which may be looked for, and are based mainly on reports received by the United States Hydrographic Office.

During February, March, and April the current runs southeastward with varying strength, and will be directly against a vessel most of the way on the 295° course until within about 100 miles of Heald Bank, when it sets southwestward with considerable strength.

During May, June, and July the current runs southward and southeastward for 200 miles west of the Tortugas. Then for 200 miles it often sets slightly northward. For the next 150 miles the current runs northeastward and eastward, and when approaching Heald Bank it sets southwestward.

During August, September, and October (the hurricane season) the current is very irregular and uncertain. For the first 200 miles west of the Totugas it runs southward and southeastward with varying velocities, depending much upon the direction and force of the wind in the Atlantic and the Gulf. For the second 200 miles it sets north-northwestward and northward, often with greater velocity than during the preceding 3 months. For the next 150 miles the current runs northeastward and eastward. When approaching Heald Bank, it frequently sets southwestward.

During November, December, and January, the season when northers occur most frequently, the current runs southward and southeastward for the first 200 miles west of the Tortugas. For the next 200 miles it runs northwestward and northward, and is said to be strong enough to offset the southerly set of the first 200 miles. For the next 150 miles the current may have a slight northeasterly set; but ordinarily it is not so noticeable as at other seasons. When approaching Heald Bank, it sets southwestward with considerable strength.

Entering Galveston Harbor, since the channel is changeable, it is advisable for strangers of deep draft to take a pilot. For vessels of moderate draft the chart and buoys are sufficient guides if followed carefully.

Courses and Distances for approaching *Galveston Bar Lighted Whistle Buoy* are given on page 62, and also under **Coastwise Courses** (Position No. 25).

Galveston Entrance, Galveston Harbor, Bolivar Roads, and Galveston Channel, together with the principal aids and prominent features in the vicinity have been described on pages 288 and 289.

Galveston (at the large grain elevator) is 9½ miles from the entrance buoy.

Texas City is 13½ miles from the entrance buoy.

Houston is 50 miles from the entrance buoy and 44 miles from Fort Point at Galveston. The following Course and Distances are for the Houston Ship Channel from near *Bolivar Roads Lighted Buoy 4* (1 mile northwest of Fort Point) to Morgan Point.

Houston Ship Channel is described on page 296.

The Inland Rules apply inside *Galveston Bar Lighted Whistle Buoy.*

Courses and Distances

Houston Ship Channel

For reverse direction, read upward	Course (Reverse courses in *Italics*)		Distance
	True	Magnetic	
1. **Bolivar Roads Lighted Buoy 4** bearing 353° true and distant 200 yards. This position is at the intersection of the two lighted ranges, Houston Ship Channel and Bolivar Point Channel:			
Direct (Houston Lighted Channel Range [1] ahead)	° 317	*Points* NW. ⅝ W	*Nautical miles* 1.6
Reverse (Houston Lighted Channel Range [1] astern)	*137*	*SE. ⅝ E*	*1.6*
Passing southwest of *Galveston Bay Channel Lighted Buoy 2.*			
2. **Galveston Bay Channel Lighted Buoy 6** bearing 351° true, distant 250 yards; position 375 yards from front light:			
Direct	336	NNW. ⅞ W	8.2
Reverse	*156*	*SSE. ⅞ E*	*8.2*
3. **Galveston Bay Light 12:**			
Direct	330	NW. ⅝ N	1.1
Reverse	*150*	*SE. ⅝ S*	*1.1*
Passing through Red Fish Bar.			
4. **Red Fish Bar Cut Light:**			
Direct	326	NW. ¼ N	7.2
Reverse	*146*	*SE. ¼ S*	*7.2*
Passing through Red Fish Bar.			
5. **Galveston Bay Light 22:**			
Direct	342	NNW. ⅜ W	4.7
Reverse	*162*	*SSE. ⅜ E*	*4.7*
6. **Morgan Point:**			
Galveston Entrance is shown on Chart 520.			
Galveston Bay is shown on Chart 1282.			
Houston Ship Channel is shown on charts 588, 589, and 590, described on page 296.			

[1] Listed as Galveston Bay Channel Entrance Range in Light List.

33. COAST, GALVESTON TO THE RIO GRANDE

(Charts 1282 to 1288)

From Galveston entrance to the entrance to Matagorda Bay at Pass Cavallo, a distance of 107 miles, the coast trends in a general southwest by west direction. From Pass Cavallo it curves gently to the southward for 100 miles to latitude 27° N., where its trend is north and south, true; thence it curves gently a little east of south for 64 miles to the mouth of the Rio Grande. Throughout the whole distance the coast encloses a chain of shallow bays or lagoons, some of them of considerable size, separated from the Gulf by long, narrow islands and peninsulas, which are generally low and sandy,

with but few natural distinguishing marks. A few of the bays and lagoons may be entered from the Gulf through small passes partly obstructed by bars with little depths on them, except the ones which have been improved by the construction of jetties and by dredging.

Except in the vicinity of the passes, the coast has fairly uniform depths with but few outlying dangers, and can be approached to within about 2½ miles by a vessel of any draft. The only reported dangers are found for about 20 miles southwestward of the entrance to the Brazos River and consist of occasional ridges of soft mud having as little as 4 fathoms (7 m) over them, with general surrounding depths of 5 to 5½ fathoms (9 to 10 m).

Air Photo Compilations are available for the coastal area between West Bay and Corpus Christi; see page 2.

Currents.—The tidal and permanent currents along the entire western coast of the Gulf of Mexico are, as a rule, very weak, the principal currents of interest to navigators being due to the winds. Moderately strong currents set with the wind along the coast, their strength and set depending on the direction, strength, and duration of the wind. Wind velocities of 20 to 40 miles produce currents of about 0.5 to 0.9 knot, setting in a direction approximately fair with the wind, modified by the shore line. The currents seldom exceed 1 knot.

GALVESTON BAY TO BRAZOS RIVER

(Charts 1282 and 1283)

West Bay is a shallow body of water extending 16 miles southwestward from the southwestern part of Galveston Bay, between Galveston Island and the mainland. It is of no commercial importance, except as forming a link in the original 5 feet (1.5 m) by 40 feet inland waterway. A depth of about 5 feet (1.5 m) can still be carried through this route from the Causeway to the Mud Island channel but there is only about 3 feet (0.9 m) across the shoal area leading into the latter channel. This waterway is no longer maintained and will eventually be replaced by the new 9 feet (2.7 m) by 100 feet Intracoastal Waterway. This route was originally marked by numerous beacons, mostly on the south side. Some of these are gone and some are in poor condition but there are still (1935) a sufficient number in place to follow the channel.

Offatts Bayou extends from off the south side of West Bay to the southwest limits of Galveston. The entrance channel leaves the Intracoastal Waterway about one-fourth mile west of the causeway and leads close around the west end of West Bay Point. Inside, the channel follows along the north shore to the enlarged basin at the head of the bayou. The entrance channel, as well as the channel through the bayou is usually marked by local boatmen. In 1935 there was about 4 feet (1.2 m) through the entrance channel and about 9 to 10 feet (2.7 to 3.0 m) through the bayou channel. The basin has been dredged (for filling purposes) to depths of 22 to 30 feet (6.7 to 9.1 m). A fill for Sixty-first Street, Galveston, forms the upper limit of the basin; it is about 2½ miles above the mouth of the bayou.

The bayou is frequented by small pleasure and fishing boats out of Galveston. At the head of the bayou, there are small ways capa-

ble of hauling boats up to 20 to 30 feet in length and 2 to 3 feet (0.6 to 0.9 m) draft. Gasoline, oil, and water can be obtained at some of the landings.

Green Lake, Karankawa Lake, and **Halls Lake** are shallow unimportant bodies of water on the northern side of West Bay.

Chocolate Bay and **Chocolate Bayou** form a tributary of West Bay on the north side at its southwestern end. In 1933 a depth of 2 to 3 feet (0.6 to 0.9 m) could be carried across the bay into the bayou where the depths are greater. There are usually temporary markers for the bay channel. Several drawbridges cross the bayou at Liverpool, a small settlement 7 miles up the bayou. There is very little commerce.

San Luis Pass leads from the Gulf to the southwestern end of West Bay. It is obstructed by a bar across which there was, in 1935 an unmarked channel one-fourth mile wide and 9 feet (2.7 m) deep. The entrance leads in a westerly direction, passing between the shoals extending southward from Galveston Island and eastward from San Luis Island. Inside there are equal or greater depths to the north end of San Luis Island and thence in a north-northeasterly direction for about a mile farther. A depth of 7 feet (2.1 m) can be carried from San Luis Pass through **Cold Pass** (south of **Titlum Tatlum Island**) and a short distance into Oyster Bay. Off the northeast side of San Luis Island, there are depths up to 25 feet (7.6 m). This deeper area offers protected anchorage but the bottom is hard sand. The best anchorage can be found in Cold Pass, off the east side of Mud and Titlum Tatlum islands. Fishermen acquainted with the pass can sometimes be found to pilot vessels in.

The Galveston and Brazos River Canal leaves West Bay near the north end of **Mud Island,** following a dredged cut across the north end of the island and across the south side of Bastrop Bay to **Christmas Point** at the north end of Oyster Bay. The channel follows along the south side of Christmas Point for about three-fourths mile and then crosses Oyster Bay to **Rattlesnake Point,** thence across Drum Bay to a cut leading to Oyster Creek which it follows for about 1¼ miles to another cut leading to the Brazos River.

The project dimensions for this waterway were 5 feet (1.5 m) deep by 40 feet wide but the channel is no longer maintained. In 1935 there was a controlling depth of about 3 feet (0.9 m) across the shoal area leading into the Mud Island cut from West Bay.

Bastrop Bayou empties into **Bastrop Bay** lying northwest of Mud Island. The bay and the mouth of the bayou are obstructed by shoals. A channel with a depth of 2 to 3 feet (0.6 to 0.9 m) leaves the main channel just east of Christmas Point and extends across the bay to the mouth of the bayou. Along the east and north side of this channel, there is a spoil bank and numerous iron pipes of a temporary nature. Austin Bayou enters Bastrop Bayou about 10½ miles above its mouth. Shallow draft boats can ascend Bastrop Bayou for about 15 miles and Austin Bayou for about 9 miles.

Hoskins Mound is an oil and sulphur field about 3 miles northwest of Bastrop Bay. There is a white concrete stack here which is prominent from off shore. Steamers approaching the coast should not confuse this mound with Bryan Mound 3 miles southwest of Freeport where there are three stacks and an elevated tank.

Oyster Bay and Drum Bay are shallow bodies of water extending southwestward of Bastrop Bay. They are traversed by the Galveston and Brazos River Canal. Along the greater portion of the canal, there are spoil banks along either side, particularly southward from about one mile north of Rattlesnake Point.

Oyster Creek is a tortuous stream of no importance emptying into the Galveston and Brazos Canal about 2½ miles northeastward of Brazos River Lighthouse, from which point it forms a part of the canal for a distance of about 1¼ miles.

Inside Routes.—The new Intracoastal Waterway has been completed westward from Galveston Channel for 14½ miles, to the Galveston-Brazoris County line, 11 miles beyond the drawbridge of the Galveston Causeway. From the drawbridge, the new channel leads across to the north shore of West Bay for 4½ miles and then follows a land cut along the north shore of the bay for 6½ miles to the present (1935) dead end.

This section of the new waterway has been completed to the project dimensions of 9 feet (2.7 m) deep by 100 feet wide. Along the north side, the channel is marked by beacons spaced about 1,000 feet apart and also by several red lights; there are three red lights between the Galveston Channel and the causeway bridge, and one between the bridge and the land cut north of West Bay and one just east of the entrance into the land cut. Just west of the causeway bridge, *Galveston-Freeport Waterway Light 5*, fixed white, marks the south side of the channel near the point where the former 5 feet (1.5 m) by 40 feet inside route leads southwestward through West Bay.

This waterway will eventually be completed to Corpus Christi, Tex., and will replace the original 5 feet (1.5 m) by 40 feet inland waterway. Sections of this original route are still available with a controlling depth of about 3 feet (0.9 m) but the project is no longer being maintained.

The Galveston drawbridge has a horizontal clearance of 100 feet and a vertical clearance of 12 feet (3.6 m) above low water when closed. There is an overhead wire crossing with 100 feet (30 m) vertical clearance.

Directions for old inland waterway, Galveston to Freeport.—This route follows the new Intracoastal Waterway westward from Galveston to beyond the Causeway drawbridge. There are beacons along the north side of the channel spaced about 1,000 feet apart; also three red lights along the north side between Galveston and the bridge.

About 1,000 feet beyond the drawbridge, the new channel forks to the westward, toward the north shore of West Bay; a masonry pillar 6 feet in height (the remains of one of the piers of the former county causeway) lies off the north side, about 200 yards westward of the turn. *Galveston-Freeport Waterway Light 5*, fixed white, is opposite this masonry pillar, marking the south side of the new channel; a beacon just east of the light marks the junction of the old and new routes.

To follow the old route, pass eastward of the latter beacon and continue toward old Beacon 1, 540 yards 205° true from the draw; here the old route turns southwestward, through the center portion of West Bay. Old Beacon 1 marks the southeast side of this turn.

On account of the very shallow depths along the old inland waterway, this route is not considered available for use by strangers.

Throughout the entire route, many of the old beacons are either gone or in poor repair, and in many cases only the stub of an old pile remains in place. However, in 1935, there were generally sufficient marks in place to follow the old channel.

About midway between the Causeway and Deer Islands there is a stub pile marking a bend in the channel to the southward.

West of West Bay this route follows the Galveston and Brazos River Canal described on page 309.

Off Mud Island cut, only the inshore beacon is still standing. It is necessary to feel one's way into this cut by sounding, although stakes are sometimes in place. Only about 3 feet (0.9 m) could be carried across this shoal area in 1935.

Across **Bastrop Bay** there are spoil banks on either side of the channel.

Along **Christmas Point,** caution is necessary. In 1935, the deeper water passed close to the east end of the point, between the point and a shoal area a short distance off shore. Stakes and beacons indicated the channel along the south shore of the point before turning south across Oyster Bay.

Toward the south end of **Oyster Bay,** the spoil banks are well defined on either side and continue so to the cut at the south end of Drum Bay. No directions are necessary through this section to the Brazos River. The channel joins the Brazos River just southeast of Brazos River Lighthouse, less than a mile inside the Brazos River entrance.

A small highway ferry crosses the canal just north of the Brazos River.

Freeport lies about 3 miles up the Brazos River. Follow midchannel courses.

The distance from Galveston to the Brazos River by this route is 36½ miles.

BRAZOS RIVER AND FREEPORT

(Charts 525 and 1283)

Brazos River Entrance lies 40 miles southwestward of Galveston Entrance. The river has been improved by constructing jetties on either side at the entrance and dredging a channel from deep water in the Gulf to a turning basin just below the town of Freeport which lies 4 miles inside the entrance. The project provides for a channel 32 feet (9.8 m) deep and 300 feet wide from deep water in the Gulf of Mexico to the jetty entrance; thence 32 feet (9.8 m) deep and 200 feet wide (necessary additional width at Quintana Bend) to a turning basin 700 feet by 700 feet at Brazosport 1½ miles inside the entrance; thence 32 feet (9.8 m) deep and an average width of 375 feet to a turning basin, 600 feet square, 1 mile below Freeport. In February 1936 the controlling dimensions of the channel through the entrance were 26.5 feet (8.1 m) for a width of 300 feet; the controlling depths above the entrance were, 28 feet (8.5 m) to Brazosport turning basin, 32 feet (9.8 m) in the Brazosport turning basin and 22 feet (6.7 m) for some distance above this turning basin.

Above the upper turning basin, a depth of about 10 to 12 feet (3.0 to 3.6 m) can be carried to Freeport and Velasco.

A combined railroad and highway drawbridge crosses the river at Freeport. The horizontal clearance is 122 feet and the vertical clearance 14 feet (4.3 m) at low water.

The **Brazos River** channel has been dammed about 7 miles above the jetties and the river now flows into the Gulf of Mexico through a diversion channel with its mouth about 4 miles southwest of the jettied entrance. Below the dam, the old river channel is now a tidal estuary and the harbor improvements are protected against flood conditions in the river.

Prominent Features.—The stacks, tank and rising smoke at the sulphur mines at **Bryan Mound,** 4 miles westward of the entrance are the first objects sighted in clear weather. There are three tall stacks and an elevated tank. The elevated sulphur conveyor at Brazosport and Brazos River Lighthouse are seen on closer approach.

Vessels approaching the entrance should not mistake Hoskins Mound, 6 miles northwest of San Luis Pass for Bryan Mound. There is but one stack at Hoskins Mound.

Brazos River Lighthouse (Lat. 28°56′.7; Long. 95°18′.5) near the mouth of the river, is a pyramidal skeleton structure painted brown with black lantern. The light is flashing white, 98 feet (30 m) above the water and visible 16 miles.

The entrance is marked by *Brazos River Entrance Lighted Bell Buoy* in 32 feet (9.8 m) 2½ miles off the end of the jetty. There are several buoys marking either side of the channel for a mile off the jetties and *Brazos River Lighted Buoy 6* lies just off the outer end of the north jetty. A court 295° true (WSW. ½ W. mag.) for 2¼ miles leads from the entrance buoy to entrance between the jetties.

Freeport (population 3,162 by the 1930 census) is the center for the sulphur industry at Bryan Mound. Both railroad and improved highway extend to Angleton and to Houston and there are numerous stores, a commercial hotel and a hospital operated by the Freeport Sulphur Co.

Brazosport, 2 miles below Freeport, is the site of the terminal facilities of the sulphur industry. The inside waterway crosses the Brazos River at Brazosport, joining the river from the northward just southeast of Brazos River Lighthouse and branching to the southward about one-fourth mile east of the sulphur dock.

Velasco is a small town on the north side of the river, just above the bridge.

Terminal Facilities.—At Brazosport there is a dock on the south side of the basin with an elevated sulphur conveyor for the loading of crude sulphur from the mines at Bryan Mound directly into steamers from railroad cars; the berthing space is about 700 feet. There are also two small oil docks. A depth of 26½ feet (8.1 m) can be taken to the sulphur dock, which has rail connections. Neither the sulphur dock nor the oil dock are open to the public.

On the north side of the river, nearly opposite the sulphur wharf, there is a wooden steamship wharf and shed 450 feet long, owned by the railroad company. There was formerly railroad connection to this wharf but in 1934 the trestle, carrying the tracks just west of the wharf, was destroyed and has not (in 1935) been replaced.

Anchorage may be found anywhere in the river that the depth is suitable, but there is not much swinging room for large vessels.

Pilotage is compulsory for all vessels in foreign trade and for coastwise vessels unless having on board a pilot licensed by the United States Steamboat Inspection Service. The rate is $4 per foot of draft, inward or outward. Pilots meet vessels by previous arrangement, using small power boats. No ships are brought in at night.

Quarantine inspection is made by local doctor after boat comes alongside.

Customs inspectors come from Houston but maintain an office in town.

Supplies and Repairs.—Provisions and limited supplies (no ship chandlery) can be secured at Freeport stores or from Houston. Fuel oil and coal can be secured from the Freeport Sulphur Co. in emergency but not as a commercial practice. The town water is good for drinking but is specially treated for boiler use.

There are no facilities for ship repairs.

Storm warnings (day and night) are displayed at the Velasco Coast Guard Station, about 1 mile inside the entrance on the north side.

Small boats.—There is an excellent yacht basin at Freeport accommodating boats up to about 50 feet long in individual slips. Provisions and some supplies are available in town, and gasoline, oil, and water can be secured at the slips. There are several other boat landings along the river.

Just below the yacht basin there is a small marine ways with a machine shop. Boats up to about 40 feet long and 3 to 4 feet (0.9 to 1.2 m) draft can be hauled.

Tides and Currents.—The mean range of tide at the mouth of the river is 1.9 feet.

The current off the entrance generally sets to the westward, with a counter current near the beach, which is largely influenced by the direction of the wind. The bar is very rough with an easterly breeze.

Directions, Brazos River Entrance.—Bring Brazos River Lighthouse to bear 302° true (N. W. by W. ⅞ W.) and head for it. *Brazos River Entrance Lighted Bell Buoy* lies 2½ miles off the end of the jetties. A course 295° true (WSW. ½ W. mag.) for 2¼ miles leads from the entrance buoy to the entrance between the jetties. Care should be taken to avoid the submerged end of the north jetty which extends some 200 yards beyond the visible portion and is marked by the lighted buoy.

Courses and Distances for approaching Brazos River Entrance from Galveston or Corpus Christi are given under **Coastwise Courses** (Position No. 27). Inland Rules are to be followed inside *Brazos River Entrance Lighted Bell Buoy* and in the river.

Diversion Channel and upper river.—At the present time there are no locks in the diversion dam and the only entrance to the upper river is directly into the Diversion Channel from the Gulf or through the inside waterway extending between the Brazos River and Matagorda Bay. The Diversion Channel constantly changes its course through the bar at its mouth but with local knowledge a depth of about 3 feet (0.9 m) can generally be carried from the Gulf into the canal. In June 1935, both the east and west entrance from the Diversion Channel to the inside waterway were blocked by silt and log jams and there were no immediate plans for opening them. Previously,

about 3 to 4 feet (0.9 to 1.2 m) could be carried into the Diversion Channel from the Brazos River and about 2 feet (0.6 m) from Matagorda Bay.

A highway drawbridge crosses the Diversion Channel about 1½ miles south of the dam. The horizontal clearance is 100 feet and the vertical clearance 10 feet (3.0) at high water.

The **Brazos River** extends about 820 miles above the dam and during high-river stages light draft vessels have ascended the river as far as **Old Washington,** 221 miles above the mouth. In 1929, at ordinary river stages, a depth of about 6 feet (1.8 m) could be carried to **Bolivar Landing,** 41 miles above the mouth. However, there is practically no commerce on the river, and snags, etc., are likely to be encountered.

A railway and a highway drawbridge cross the river at **Brazoria,** 23 miles above the mouth of the river, and a highway bridge crosses at **Columbia,** 30 miles above the mouth of the river. The minimum clearances are 85 feet horizontal and 34 feet (10.4 m) vertical at low water (about nothing at high water).

BRAZOS RIVER TO MATAGORDA BAY

(Chart 1283)

San Bernard River flows into the Gulf of Mexico about 9 miles southwestward from the mouth of the Brazos River. Its mouth is obstructed by a shifting bar on which the depth varies from 1½ feet (0.4 m) to 4 feet (1.2 m). Inside the bar it is said to have a depth of 8 feet (2.4 m) for about 40 miles. There are some small settlements along the river but no towns of importance. A number of drawbridges cross the river; the minimum horizontal clearance is 32 feet. The narrows, about 3 miles above the mouth, are difficult to navigate without local knowledge.

Cedar Lakes are shallow bodies of water having a total length of about 5 miles, lying ½ mile westward of San Bernard River and connected therewith by **Longs Bayou.**

Inland Waterway.—The original 5 feet (1.5 m) by 40 feet inland waterway left the Brazos River just east of the sulphur dock and extended for about 25 miles to the head of Matagorda Bay, through the upper end of which there was a dredged channel to the deeper water of the bay.

In June 1935 this route was blocked by silt and log booms on either side of the Brazos River Diversion Channel where the waterway crossed this channel. There were no immediate plans for removing these obstructions.

This route follows a canal from the Brazos River to the San Bernard River, crossing the Diversion Channel en route. It follows the San Bernard River upstream for about half a mile to Longs Bayou which leads to Cedar Lakes. Across Cedar Lakes the channel was formerly well marked and most of these marks are still in place. A canal connects Cedar Lakes and Caney Creek, thence the route follows Caney Creek for nearly 2 miles, to a short canal connecting with the head of Matagorda Bay. The section of the waterway through Matagorda Bay is described on page 319.

The controlling depth along this route in 1935 was about 2 feet (0.6 m) through Cedar Lakes.

The four following highway drawbridges cross the canal sections of this route; the controlling horizontal clearance is 55 feet.

Quintana Bridge; ¼ mile west Brazos River.
Bryan Bridge; 2.0 miles east Diversion Channel.
Longs Bayou Bridge; 0.2 mile west San Bernard River.
Caney Creek Bridge; 0.1 mile east of Caney Creek.

The distance from Brazos River to Matagorda Bay is 23½ miles.

MATAGORDA BAY

(Charts 1283 and 1284)

Pass Cavallo is an entrance from the Gulf to the southwestern corner of Matagorda Bay, 108 miles southwestward from Galveston entrance. It is 1¼ miles wide between Matagorda Peninsula on the east and Matagorda Island on the west, and is of some commercial importance.

The entrance is obstructed by a bar subject to frequent change in both location and depth, and the bar buoy cannot be depended upon to indicate the best water. The depths over the bar vary from 5 to 10 feet (1.5 to 3.0 m). With a swell or sea outside, there is practically a continuous line of breakers over the bar.

In 1935, the best water was along the east shore of Matagorda Island, a half mile or less off shore. The controlling depth was 8 feet (2.4 m) on the bar southeast of Matagorda Lighthouse. This entrance channel continues along the east shore of Matagorda Island, passing to the eastward of the beacons about half a mile off Saluria (McHenry) and Big Bayous and thence off the Port O'Connor jetties into the deeper water of the bay. About ¾ mile north of the jetties, the piles of an old pier are to be avoided.

Pelican Island and generally shoal areas lie along the east side of the pass. In 1935, there was a passage with a depth of 9 feet (2.7 m) or more through these shoals in a northeasterly direction, from off Saluria (McHenry) Bayou to about a half mile inside the north shore of Matagorda Peninsula. This channel is particularly subject to change. The ruins of West Shoal Lighthouse were just visible along the south side of this passage and should be avoided. The ruins of old East Shoal Lighthouse lie about 1,300 yards to the north-northeastward; they are submerged and are charted as a sunken rock.

Prominent features.—Matagorda Lighthouse, the old Coast Guard Station about 1¼ miles northeast of the lighthouse and the new Coast Guard Station at the entrance to Saluria (McHenry) Bayou are the only objects of prominence in the vicinity of the pass. Thirty-five miles northeastward of the pass, the twin stacks and the buildings at Gulf show prominent from off shore. At about 13 and 24 miles, respectively, southwestward of the light, there is a prominent wreck close in along shore, and a tank, about a mile inshore and about 35 feet high, which show prominently from the Gulf.

Matagorda Lighthouse (Lat. 28°20.'2; Long. 96°25.'5) is a black conical tower. The light is flashing white, 85 feet (26 m) above the water and visible 15 miles.

With northerly winds or smooth sea, good anchorage may be had outside the bar in 4 to 6 fathoms (7 to 11 m), with the lighthouse bearing about W. ½ S. (mag.). Inside the bar, the deeper area toward the head of the pass is available for anchorage. In 1935 there were depths here in excess of 30 feet (9.1 m). During northers, anchorage in the pass is dangerous on account of strong currents. There are no licensed pilots. Vessels desiring to enter, usually signal the Coast Guard station, whereupon the keeper of the station places two poles with blue flags on the range marking the best water; at night white lights take the place of the flags, the higher light being the rear one. When desired, the keeper of the station will come out, if practicable to enter, and pilot a vessel in over the bar.

Matagorda Bay is an irregularly shaped body of water, 45 miles long in a general northeasterly and southwesterly direction, from 1 to 10 miles wide, and separated from the Gulf by **Matagorda Peninsula. Dog Island Reef,** about 20 miles from the northeastern end of the bay, divides the bay into two parts, with somewhat dissimilar characteristics. Eastward of the reef the bay is a shallow lagoon, with a greatest depth of 5 feet (1.5 m), soft mud or silt bottom, and shows indications of being filled up rapidly. The Colorado River empties into this part of the bay. Westward of Dog Island Reef, the depths range from 5 to 13 feet (1.5 to 4.0 m), averaging 10 to 12 feet (3.0 to 3.7 m) over the greater part. Middle Channel, through Dog Island Reef connects the two parts of the bay; it had a controlling depth of 3 feet (0.9 m) at the western end in 1935. This channel is marked, on the south side by *Matagorda Middle Channel Lights.*

The original 5 feet (1.5 m) by 40 feet inland waterway extends through the entire length of Matagorda Bay. This is described on page 319. In 1935, the depths through the eastern end of the bay were barely 3 feet (0.9 m) and off the mouth of the Colorado River the depths were barely 2 feet (0.6 m).

During flood conditions on the Colorado River, silt and driftwood accummulate in the bay off the mouth of the river. Following flood conditions in June 1935, there was barely 2 feet (0.6 m) between the *Colorado River Entrance Light*, at the mouth of the river, and Middle Channel through Dog Island Reef.

Colorado River empties into Matagorda Bay about 1½ miles northeastward of Dog Island Reef. Originally there were several mouths to the river. At present, the river discharges through the east mouth which has been improved by dredging and constructing earth and driftwood dikes along either bank. The dikes and dredged channel have been extended out across Matagorda Bay to within nearly ½ mile of the north shore of the Matagorda Peninsula where *Colorado River Entrance Light* marks the entrance to the river from the inland waterway.

A county dredge is employed more or less continuously on this channel. It is attempted to maintain a 4-foot (1.2 m) channel from the Bay to Matagorda but constant shoaling occurs and frequently the depth is 3 feet (0.9 m) or less.

Opposite the mouth of the river, a cut has been made through Matagorda Peninsula to the Gulf. A bar, with practically no water over it, obstructs passage to the Gulf through this cut.

Matagorda (population 805 by the 1930 census) is a small town and postoffice 3 miles above the mouth of the Colorado River. It is headquarters for a small fleet of fishermen and oystermen who use a number of small landings along the river bank. A depth of 3 to 4 feet (0.9 to 1.2 m) can be carried to these landings. A railroad and an improved highway extend to Bay City. Gasoline, fresh water, and provisions can be obtained, and there are facilities for hauling out small vessels.

Storm warning signals (day and night) are displayed at Matagorda.

At ordinary river stages, a depth of about 2 feet (0.6 m) can be taken up the Colorado River above Matagorda to **Bay City**.

Gulf is a small town 4½ miles eastward of Matagorda. There are extensive sulphur mines north of the town which are connected by railroad and highway with Matagorda and the interior of the State. In 1935, the mines were not being operated. The twin stacks and the buildings at the mine are prominent from off shore.

Caney Creek empties into the extreme northeastern part of Matagorda Bay, through a canal one-half mile long. It meanders through a fertile country but is of little commercial importance.

A depth of 3 to 4 feet (0.9 to 1.2 m) can be carried up the creek to a county bridge about 25 miles above Matagorda Bay. **Gainesmore** and **Cedar Lane** are small settlements and post offices.

Live Oak Bay and **Bayou**, tributary to the eastern part of Matagorda Bay, are shallow and of no importance.

Trespalacios Bay on the north side of the western portion of Matagorda Bay is the approach to Palacios and to the small town of Collegeport. Lights off **Oliver Point** and off **Wells Point** mark the entrance into the bay. A depth of 5 to 6 feet (1.5 to 1.8 m) can be taken into the bay, passing close outside of either light (the area between is shoal), and about 4 feet (1.2 m) into the small dredged slip on the south shore at Palacios.

Trespalacios River empties into the northern extremity of Trespalacios Bay. It has a depth of about 2 feet (0.6 m) at the entrance and depths of 6 to 10 feet (1.8 to 3.0 m) for 10 to 15 miles above the mouth. There is a fixed highway bridge crossing the river about 3½ miles above Collegeport; the horizontal clearance is 100 feet and the vertical clearance 6½ feet (2.0 m).

Palacios (population 1,318 by the 1930 census) is a fishing and farming community on the west side of Trespalacios Bay about 5 miles above the entrance. It is on the improved highway between **Bay City** and Port Lavaca and has railroad connection to Bay City. A small boat slip has been dredged to boat landings at the shrimp and oyster canneries on the south shore of the town, and there is a slip for pleasure boats on the north side of the town. Fresh water, gasoline, and provisions and some small boat supplies can be secured. There is a marine railway near the canneries capable of hauling the larger fishing vessels (up to about 60 feet long and 4 feet (1.2 m) draft) and there is a machine shop in town.

Storm warning signals (day and night) are displayed from a steel tower near the public pier in front of the town.

Camp Hulen (Army Post) is on the western side of the town. There is a pier on Trespalacios Bay and an auxiliary landing field for aircraft. An elevated water tank at the post and a similar tank in town show prominently from the bay.

Caranahua Bay, 6 miles west of Trespalacios Bay is a shallow unimportant body of water navigated only by a few small boats. There are depths of 3 feet (0.9 m) in the entrance to the bay, with somewhat greater depths inside. A fixed highway bridge crosses the bay 5 miles above the entrance; horizontal clearance is 18 feet and vertical clearance 13 feet (4.0 m).

Halfmoon Reef extends about 3 miles off **Palacios Point**, the southwest point of the tongue of land extending between the eastern and the northern portions of Matagorda Bay. This is a shell reef, 100 to 500 yards wide and with about 1 foot of water on it at low tide for the greater portion of its length. *Halfmoon Reef Light* is located near the outer end of the reef and there is a beacon at the extreme outer end. *Palacios Point Light* is at the inshore end; it marks the inshore side of **Palacios Channel** across the inner end of the reef.

Palacios Channel has a depth of 4 to 5 feet (1.2 to 1.5 m).

Halfmoon Reef Light is a white tower of a dwelling on piles; it is 35 feet (10.7 m) above the water and visible 9 miles.

Lavaca Bay, an arm of Matagorda Bay at its northwestern corner had a controlling depth of 7 feet (2.1 m) in 1935 through the dredged channels across **Sand Point** and **Gallinipper Reefs** to the town of Port Lavaca on the western shore. These channels are marked by lights at either end of both cuts. A highway causeway crosses the upper end of the bay from Noble Point to Cox Point directly opposite. A horizontal span has a 35-foot opening with about 8 feet (2.4 m) clearance at high water. About the head of the bay there are a number of reefs.

Keller Bay, an arm on the east shore of Lavaca Bay, is of little commercial importance. A depth of 3 to 4 feet (0.9 to 1.2 m) can be carried to **Olivia**, a small farming community on the east side at the head of the bay.

Lavaca River, emptying into Lavaca Bay near its head, is obstructed by a bar at the mouth, on which there is a depth of 2½ feet (0.8 m). Above the mouth it has a depth of 5 feet (1.5 m) for 10 miles, at which point it is joined by the Navidad River. **Vanderbilt** is a town near the junction of the two streams. A railroad drawbridge crosses the river at Vanderbilt. **Navidad River** is navigable above its junction with the Lavaca for about 3 miles to the town of **Red Bluff**.

Garcitas Creek, emptying into the head of Lavaca Bay, is navigable for small boats only, and is of no commercial importance.

Port Lavaca (population 1,367 by the 1930 census) is a fishing and farming community and the county seat of Calhoun County. It is on an improved highway between Bay City and Corpus Christi, and both an improved highway and a railroad connect with Victoria. There are numerous stores, two hotels, and a machine shop.

Several small boat basins are maintained along the water front at Port Lavaca by the local fishing (shrimp and oysters) companies. There are depths of about 6 feet (1.8 m) into these basins. Gasoline, oil, and provisions and some small boat supplies can be secured. The local water is rather brakish but cistern water can usually be secured for drinking. There are marine ways capable of hauling boats up to 45 feet long and about 5 feet (1.5 m) draft and some repairs can be made.

Storm warnings (day and night) are displayed on a steel tower on the south side of the town.

A fixed white light is displayed from the top of a prominent elevated tank in the center of the town.

Storm Anchorages.—The usual storm anchorages for small boats about Matagorda Bay are the following.

Chocolate Bay; depths of 3 feet (0.9 m).

Lavaca Bay; on the east side, to the north of the causeway; depths 4 to 5 feet (1.2 to 1.5 m).

Lavaca River; depths of about 2½ feet (0.8 m) across bar.

Caranahua Bay; depths of 3 feet (0.6) across bar.

Trespalacios Bay, off Palacios; depths 4 to 5 feet (1.2 to 1.5 m).

Tides.—The average rise and fall of the tide in Matagorda Bay is about half a foot.

Inland Waterway.—The original 5 feet (1.5 m) by 40 feet inland waterway enters the east end of Matagorda Bay through a short canal connecting with Caney Creek. In 1935, there were still a sufficient number of markers in place to indicate the channel to beyond Dressing Point, although some toward the west end were only stubs. Between Beacons 9 and 17, the best water is northward of the channel and about an old wreck, bare 1½ feet at low water. West of Dressing Point, the deeper water lies along the south shore of the bay. *Colorado River Entrance Light* marks the entrance into the Colorado River from the waterway. From this light, the channel leads northwestward to Middle Channel through Dog Island Reef which is marked by *Matagorda Middle Channel Lights* on the south side of the channel.

Westward of the Reef, the depths are greater and there is no marked channel. A course 242° true (SW. ¾ W. mag.) for 23½ miles leads to Barroom Cut into Barroom Bay whence the inland waterway continues westward from Matagorda Bay. This course follows close to shoal depths along the south shore of the bay and to shoal ground southeastward of the jetty entrance, both of which should be avoided.

In 1935, the depths through the eastern end of the bay were barely 3 feet (0.9 m) and off the mouth of the Colorado River there was barely 2 feet (0.6 m) from the entrance light to the Middle Channel.

The total distance across Matagorda Bay is 44 miles.

MATAGORDA BAY TO ARANSAS PASS

(Charts 1284 and 1285)

Espiritu Santo, San Antonio, Mesquite, and **Aransas Bays** are the names applied to a series of shallow bodies of water, extending southwesterly along the coast for a distance of 50 miles from Pass Cavallo to Aransas Pass, and separated from the Gulf by **Matagorda** and **St. Joseph Islands.** They are filled with islands, reefs, and shoals, and are of little commercial importance, except as forming a link in the inland waterway described on page 322.

Espiritu Bay has depths up to 8 feet (2.4 m). A beacon marks a shoal in the central part of the bay. There are depths of 5 feet (1.5 m) north of the beacon and 8 feet (2.4 m) south of it. The bay can be entered from Matagorda Bay either through **Barroom Cut, Big Bayou** or **Saluria (McHenry) Bayou.**

Barroom Cut is the route of the original 5 feet (1.5 m) by 40 feet inland waterway and has a depth of 4 to 5 feet (1.2 to 1.5 m). Jetties extend about one-fourth mile off the east end of Barroom Cut and *Port O'Connor Lights 1 and 3*, at either end of the south jetty, mark the approach to the jetty entrance. A depth of about 3 feet (0.9 m) can be taken through Big Bayou. At the eastern entrance to Saluria (McHenry) Bayou, there is a depth of but 2 to 3 feet (0.6 to 0.9 m) but inside on into Espiritu Bay there are depths of 5 feet (1.5 m) or more. Saluria (McHenry) Bayou is used as an anchorage by local fishermen.

Port O'Connor is a small settlement with post office and telephone at the southwestern end of Matagorda Bay, about half a mile north of Barroom Bay. A highway leads to Seadrift and Port Lavaca. There are several small fish docks on Barroom Bay just inside the jettied entrance from Matagorda Bay. A depth of barely 3 feet (0.9 m) could be taken to these docks in 1935. The approach from the waterway is from westward and is usually staked. Gasoline, oil, and water (brackish) can be secured in limited quantities by truck delivery to the fish house docks. There are facilities for hauling out small boats up to about 35 feet long. Along the Matagorda Bay shore, the piles of an old pier are to be avoided, three-fourths mile north of the entrance between the jetties.

Storm warning signals (day only) are displayed.

San Antonio Bay has depths up to 5 to 6 feet (1.5 to 1.8 m). It is separated from Espiritu Bay by the **First Chain of Islands**, through which there is an old dredged cut, marked by beacons, having a depth of about 4 feet (1.2 m) in 1935. There are numerous reefs (some bare at low water) about the bay and particularly about the upper end of the bay. These reefs make navigation difficult and local information essential.

Seadrift (population 413 by the 1930 census), a small fishing and farming community on the northeast shore, is the largest settlement on the bay. Highways extend to both Victoria and Port Lavaca and a railroad connects with Victoria. There is a railroad trestle extending into the bay and providing facility for the unloading of mud shell from barges.

The channel leading to the wharves is usually staked for 1 to 2 miles into the bay. In 1935 there was a depth of about 4 feet (1.2 m) in this channel but the bottom is soft mud and tows of somewhat greater draft enter at times. Gasoline, oil, and water and some provisions can be obtained. There are marine ways capable of hauling boats up to about 55 feet long and 4½ feet (1.4 m) draft and there is a machine shop.

Storm warning signals (day only) are displayed at Seadrift.

Long Mott, to the north of Seadrift and **Austwell** on **Hynes Bay** are other small villages about the head of San Antonio Bay. A depth of 2 to 3 feet (0.6 to 0.9 m) can be taken to these towns.

Guadalupe River empties into the northern end of San Antonio Bay; a depth of about 2 feet (0.6 m) can be carried from the bay into the north fork of the river. Snags and driftwood make navigation almost impossible but there are navigable depths as far as the San Antonio River, about 10 miles above the mouth.

Mesquite Bay lies between the **Second and Third Chain of Islands**, and is of no commercial importance except for its fish and oysters.

A large hunting club is located on Matagorda Island opposite the southeast corner of the bay. There is a small landing with 3½ feet (1.0 m) alongside and an elevated tank about 35 feet high which shows prominently from the Gulf.

Cedar Bayou, separating Matagorda Island from St. Joseph Island leads in a southerly direction from the southeast corner of Mesquite Bay to the Gulf. In 1935 a bar closed the outer end and there was about 2 feet (0.6 m) at the inner entrance.

Aransas Bay is 15 miles in length, 3 to 4 miles in width, and with depths in the middle and near the southern end ranging from 8 to 12 feet (2.4 to 3.7 m). Near the northern end, where it joins Mesquite Bay, it is very shallow. South of Mud Island at the south end of the bay, there is good anchorage in 5 to 6 feet (1.5 to 1.8 m), mud bottom. The whole of Aransas Bay is an extensive shrimping ground.

The old dredged channel of the original 5 feet (1.5 m) by 40 feet inland waterway extends from San Antonio Bay, through Mesquite Bay to deep water in Aransas Bay. In 1935 there was a controlling depth of about 3 feet (0.9 m), and there was a sufficient number of the old beacons in place to indicate the channel. A causeway for the highway between Port Lavaca and Corpus Christi crosses the connecting channel to Copano Bay at the northwest corner of Aransas Bay. There is a bascule span 42 feet (12.8 m) wide with a vertical clearance of 11 feet (3.4 m) above high water when closed.

The **periodic tide** throughout the bay is too small to be of any practical importance.

Ninemile Point Light marks a shoal extending off the west side of the bay about 15 miles northeast of Rockport.

Three submerged pipes are located about 1.6 miles north of *Ninemile Point Light* and about 0.6 mile offshore. These pipes are on a small shoal with a least depth of 3 feet (0.9 m) at mean low water and surrounded with depths of 6½ to 10 feet. The pipes are slightly submerged at mean low water.

Rockport (population 1,140 by the 1930 census) is a commercial fishing and resort town on the west shore of Aransas Bay. It is on the highway between Port Lavaca and Corpus Christi and has railroad communication with the interior. There are numerous stores and one year-round hotel.

A railroad trestle extends into the bay, and a small harbor is formed by a rock fill under the trestle and a breakwater extending southward parallel to the shore from this fill to *Rockport Breakwater Light*. The entrance is to the southward of this light on the south end of the breakwater. In 1935 about 6 feet (1.8 m) could be taken to the wharves and about 3 feet (0.9) into the slip paralleling the south side of the railroad trestle.

A mosque-like tower on the north side of the town shows prominently from Aransas Bay.

Gasoline, oil, water, and provisions and some boat supplies can be secured. There is a boatyard with ways capable of hauling boats up about 80 feet long and about 5 feet (1.5 m) draft, and there is a machine shop in town.

Storm warnings (day only) are displayed near the water front.

About a mile south of the town there is a small shipyard with ways capable of hauling vessels up to about 75 feet long and 6 feet (0.9 m) draft. There is a machine shop and a fuel-oil handling plant at the yard, but in 1935 no stock was kept at the latter.

St. Charles Bay is an arm of Aransas Bay extending northward. There is considerable hunting and sport fishing, but commercial fishing is not allowed, and there are no communities on the bay. There is 2 to 3 feet (0.6 to 0.9 m) through the entrance and somewhat greater depths with numerous reefs inside.

Copano Bay is a northwesterly extension of Aransas Bay. Extreme caution is required when navigating the bay on account of the numerous unmarked reefs extending across the bay. There are depths up to 8 feet (2.4 m) in the bay and 6 to 7 feet (1.8 to 2.1 m) in the narrow sloughs or channels between the reefs. The bay is principally a center for hunting and sport fishing. No commercial fishing (except oysters) is allowed. A highway causeway crosses the entrance to the bay; the bascule span has a horizontal clearance of 42 feet and a vertical clearance (when closed) of 11 feet (3.4 m).

Aransas River, emptying into the northwestern end of Copano Bay, can only be entered by small open boats.

Bayside is a small resort town on the northwestern shore of Copano Bay; depths of 3 to 4 feet (0.9 to 1.2 m) can be carried to a small landing. There is highway communication with the interior of the State and a large hotel which shows prominently from out in the bay.

Mission Bay, on the north shore of Copano Bay, is of no commercial importance; only small skiffs can enter the bay.

Storm anchorages.—Boats drawing up to 3 to 4 feet (0.9 to 1.2 m) can find good protection in the small bight at the northeast corner of Port Bay (Puerto Bay) and those of slightly greater draft can find good protection in the extreme northeast corner of Copano Bay. There is soft mud bottom at each place.

Lydia Ann Islands Channel, along the northwest side of Harbor Island, connects the south end of Aransas Bay with Aransas Pass. The entrance from Aransas Bay is between Murray Shoal and shoals extending off the north end of Harbor Island; beacons along Murray Shoal mark the east side of the channel. There are depths of about 8 feet (2.4 m) through the north entrance with depths of 13 feet (4.0 m) or more to Aransas Pass at the south end. A wreck with 8 feet (2.4 m) of water over it lies outside the red and black beacon southeast of Aransas Lighthouse.

Inland Waterway.—The original 5 feet (1.5 m) by 40 feet inland waterway between Matagorda Bay and Aransas Pass follows a series of shallow bays extending along the coast immediately behind Matagorda and St. Joseph Islands. In 1935 the controlling depth was about 3 feet (0.9 m) through the shoaler portions of the waterway and there were still a sufficient number of markers in place to indicate the channel. Remarks regarding markers relate to such as were in place in 1935.

The entrance is through Barroom Bay Cut into Barroom Bay at the northeast corner of Espiritu Santo Bay. There are jetties on either side of the cut extending about one-fourth mile eastward into Matagorda Bay, and *Port O'Connor Lights 1 and 3*, on the south jetty, mark the approach to the entrance between the jetties.

The wharves at Port O'Connor are on the north shore of Barroom Bay immediately inside the jetties but the approach to the wharves is by a small channel, generally staked, about one-fourth mile to the westward; there is shoal ground directly between the waterway and the wharves.

Inside the jetties, the channel follows along to the northward of the line of Beacons 1 to 9, through Barroom Bay and south of Blackberry Island. From Beacon 9, a course 231° true (SW. ¼ S. mag.) for 11 miles leads to South Pass, the cut through the **First Chain of Islands.** This course passes one-fourth to one-half mile south of Blackberry and Dewberry Islands and half a mile northwest of *Dewberry Island Shoal Beacon 2*, 1¼ miles south of the southwest end of Dewberry Island. Deeper water can be carried across Espiritu Santo Bay by passing about one-half mile southeast of this beacon but the course north of the beacon carries 4 to 5 feet (1.2 to 1.5 m) while this inside route has a general controlling depth of but 3 feet (0.9 m).

South Pass, a dredged cut through the **First Chain of Islands,** connects Espiritu Santo Bay and San Antonio Bay. There is an old beacon (No. 1) on the south side at the east end of the cut and another (No. 4) on the north side at the west end of the cut and a spoil bank extends along the south side.

From South Pass, a course 241° true (SW. ⅝ W. mag.) for 5 miles leads to **Panther Reef Cut.** A beacon (No. 3) marks the south side of the west end of the cut.

Westward of Panther Reef, a course 237° true (SW. ¼ mag.) for 5.6 miles leads to the first (No. 1) of three beacons (Nos. 1, 3, and 5) marking the south side of the channel around the south end of the **Second Chain of Islands.** At Beacon 1, the channel turns 25° to the left (southward) and at Beacon 5 turns right (westward) 23°. Only the stub of Beacon 5 remains in place.

The channel across **Ayres Bay,** between the Second Chain of Islands and **Ayres Reef** is one straight reach; it is marked by one beacon (No. 7) on the south side.

Ayres Dugout is the passage through Ayres Reef, on the northeast side of Mesquite Bay. There is deeper water through the cut, but barely 3 feet (0.9 m) through the approach from either direction. At the east end of Ayres Dugout there is a beacon on either side of the channel (No. 1 and 2) and at the west end there is a beacon (No. 3) on the south side of the channel and also a smaller beacon, a short distance to the eastward. The smaller beacon stands on the spoil bank on the south side of the channel and was formerly the front beacon of the range marking the channel through **Belden Cut** immediately to the westward. Through Ayres Dugout, the deeper water is close to the fill along the south side of the channel; on the north side of the channel, there are the remains (barely showing at low water) of four beacons formerly marking two short ranges through the cut.

Belden Dugout is a dredged cut, of one straight reach extending across the north side of Mesquite Bay from Ayres Reef to the **Third Chain of Islands.** The course is 248° true (SW. by W. ⅛ W. mag.) for 2.2 miles. There is a beacon (No. 1) near the midway point marking the south side of the channel.

About 1/4 mile to the eastward of the Third Chain of Islands, there is a beacon (No. 1) on the south side of the cut. The beacons (Nos. 2 and 3) on either side of the cut through the islands are gone, but the passage is marked by the small range beacons which are still showing to the northwestward of **Cedar Point**, the prominent point immediately north of **Cedar Reef**. This range leads to a beacon (No. 1) on the south side of the channel at the east end of Cedar Dugout, about 1/4 mile west of the Third Chain of Islands.

Cedar Dugout leads along the southeast side of Cedar Point. There is a beacon on the south side of the channel at either end of the cut; No. 1 is at the east end and No. 3 at the west end. Cedar Point is thickly wooded.

The channel across Mud Bay, to the southeastward of **Cape Carlos**, between Cedar Dugout and Cape Carlos Dugout is marked by one beacon (No. 1) on the east side. The court is 210° true (S. by W. 7/8 W. mag.) for 1.2 miles to Beacon 3 at the east end of Cape Carlos Dugout.

Cape Carlos Dugout extends for 1.1 miles in the direction 232° true (SW. 1/4 S. mag.) through the reef south of Cape Carlos. Pass close to south bank between Beacons 1 and 2. Only the stub of Beacon 3 remains in place. There was formerly a range to the westward marking the course through Cape Carlos Dugout but in 1935, only the rear beacon was in place.

At Beacon 5, on the south side at the west end of Cape Carlos Dugout, the channel turns south to the cut through Poverty Reef. Beacon 1 marks the east side of this reach and Beacon 3, on the south side at the center portion of the reef, marks a turn to the westward in the channel.

Between Poverty Reef and Long Reef, one beacon (No. 1) marks the south side of the channel. A course 246° true (SW. by W. mag.) for 1.4 miles leads from Beacon 3 to Beacon 1 and a course 234° true (SW mag.) for 1.1 miles leads to Beacon 1 at the east end of the cut through Long Reef.

Through Long Reef, two beacons (Nos. 1 and 3) mark the south side of the channel. This is the last reef before entering the deeper water of Aransas Bay.

Across Aransas Bay, a course 219° true (SSW. 5/8 W. mag.) for 4.4 miles leads to a position one-fourth mile southeast of *Nine Mile Point Light* and from this position a course 202° true (S. by W. 1/8 W. mag.) for 5.9 leads to *Mud Island Shoal Beacon* at the north end of Lydia Ann Islands Channel. Rockport is 1 1/2 miles west of *Nine Mile Point Light.*

Lydia Ann Islands Channel connects Aransas Bay with Aransas Pass. It leads between Harbor Island on the west and Murray Shoal, Lydia Ann Islands, and the south end of St. Joseph Island on the east. Several beacons mark the east side of the channel past Murray Shoal and Lydia Ann Islands. It is 5.3 miles from Mud Island Shoal Beacon to Aransas Pass opposite Port Aransas.

From Aransas Pass to Corpus Christi, the Corpus Christi Channel is followed, see page 327.

The distance from Matagorda Bay to Aransas Pass by this route is 53 miles. From Aransas Pass to Corpus Christi the distance is 18 miles.

ARANSAS PASS AND CORPUS CHRISTI BAY INCLUDING CORPUS CHRISTI

(Chart 1286)

Aransas Pass lies 154 miles southwestward of Galveston entrance, 113 miles northward of the mouth of the Rio Grande, and is the principal approach from the Gulf of Mexico to Aransas and Corpus Christi Bays and their numerous tributaries. It lies between **St. Joseph Island** on the north and **Mustang Island** on the south. Directly opposite the inner end of the pass is **Harbor Island,** which separates Aransas Bay from Corpus Christi Bay.

The entrance to Aransas Pass is obstructed by a bar, and has been improved by dredging and by the construction of two jetties extending about a mile into the Gulf. The improvement project provides for a channel 37 feet (11.3 m) deep by 700 feet wide to a point opposite the outer end of the south jetty, thence decreasing to 35 feet (10.7 m) by 600 feet wide to Cline Point (the inner basin), thence 35 feet (10.7 m) deep and 400 feet wide (decreasing to 300 feet) to a point opposite the western end of the basin dredged by the Humble Oil and Refining Co. at its docks on Harbor Island and with widening opposite the northwest corner of Mustang Island. In February 1936, the controlling depths in the entrance channel were; 31 feet (9.4 m) deep on the center line, 29 feet (8.8 m) along the north side and 31 feet (9.4 m) along the south side.

There is one straight channel through the entrance from the Gulf to the inner basin at Harbor Island. This channel is marked by *Harbor Island Range Lights* and there are several buoys (some lighted) and lights along either side of the channel. The entrance from the Gulf is marked by *Aransas Pass Lighted Whistle Buoy* nearly five miles off the jetties and by *Aransas Pass Lighted Bell Buoy* on the north side of the outer end of the dredged channel. The submerged outer end of the north jetty is marked by *Aransas Pass Lighted Buoy 2.* The Harbor entrance range is 301° true (WNW. ⅛ W. mag.). A wreck which bares 5 feet at low water lies on the south side of the channel inside of the jetties.

Prominent features.—In approaching Aransas Pass in daytime, the first object sighted is a water tank 145 feet (44 m) high located on Harbor Island opposite the inner end of the pass. The lighthouse and the buildings at Port Aransas will be sighted as the pass is approached. The 78-foot tower of the Turtle Cove Channel Rear Range Light, toward the south end of St. Joseph Island, also shows prominently in the daytime. Twenty-two miles northeastward of the entrance, an elevated tank, a mile inshore and about 35 feet high, shows prominently from the Gulf.

Aransas Pass Lighthouse (Lat. 27°51′.9; Long. 97°03′.4) is an octagonal red-brick tower on the east side of Harbor Island about a mile north of the inner end of the pass. The light is occulting white, it is 65 feet (19.8 m) above the water and visible 13 miles. There is a radiobeacon station at the light; see Light List and H. O. publication No. 205.

Harbor Island Basin lies to the eastward of the oil piers on Harbor Island, in the triangular area between Harbor, St. Joseph and Mustang Islands. The project dimensions are 650 feet by 3,000 feet but these dimensions are not maintained. In 1935, there was a con-

trolling depth of 30 feet (9.1 m) over an area 650 feet wide by 1,000 feet long over the route taken by ships.

Port Aransas (population 416 by the 1930 census) is a small commercial fishing and resort town on the north end of Mustang Island at the inner end of Aransas Pass. An automobile ferry runs to Harbor Island connecting with the highway to the town of Aransas Pass and to interior points. Across Harbor Island to Aransas Pass, the railroad causeway is used as a highway. Port Aransas has telephone and telegraph connections and a railroad extends from the town of Aransas Pass to the wharves at Harbor Island.

A channel 12 feet (3.7 m) deep by 100 feet wide connects the ship channel with a turning basin 200 feet square off the ferry slip. About 6 feet (1.8 m) can be taken alongside the public boat landing. Gasoline, oil, water, and provisions can be secured in limited quanities. There is a small marine ways capable of hauling small boats not over 30 feet long and some minor repairs can be made.

Storm warnings (day only) are displayed on a steel tower near the waterfront.

There is a **Coast Guard Station** at Port Aransas.

Harbor Island.—The Humble Oil and Refining Company has a large oil-handling plant on the east end of Harbor Island, at the head of Aransas Pass. A turning basin has been dredged for nearly 2,000 feet along the north side of the ship channel and there are three open piers with berthing space for three large vessels. There is also a railroad wharf about 1,000 feet long with a transit shed but this was little used in 1935. Both terminals have rail connections. The terminal railroad runs to the town of Aransas Pass, on the mainland about 5½ miles distant, connecting there with the Southern Pacific system.

There are marine ways on Harbor Island capable of hauling boats up to about 75 feet long and about 6 feet (1.8 m) draft.

Corpus Christi Bayou, to the westward of Harbor Island, connects Aransas Bay with Corpus Christi Bay. The southern portion of the bayou has been improved by dredging and is known as **Morris and Cummings Cut.** The entrance from Aransas Bay is marked by a beacon on the south side of the channel, and has a controlling depth of 4 to 5 feet (1.2 to 1.5 m). Inside the entrance, the bay is deep but crooked and somewhat difficult to follow.

Toward the south end of Morris and Cummings Cut, there is also a controlling depth of 4 to 5 feet (1.2 to 1.5 m).

The causeway (combined highway and railroad), between Harbor Island and the town of Aransas Pass, crosses Corpus Christi Bayou near its midway point. The draw has a horizontal clearance of 24 feet and there is an overhead transmission line crossing having a vertical clearance of 60 feet.

Aransas Pass Canal is a privately dredged canal extending across Harbor Island. The canal parallels the causeway (combined highway and railroad) and connects the town of Aransas Pass with Aransas Pass. The controlling depth was 4 to 5 feet (1.2 to 1.5 m) in 1935. About 1½ miles west of the town, the canal crosses Corpus Christi Bayou thus affording connection with Aransas Bay to the north and Corpus Christi Bay to the south.

The town of Aransas Pass (population 2,482 by the 1930 census) is situated on the mainland about 1½ miles to the westward of

Corpus Christi Bayou and 6 miles northwestward of Aransas Pass. A canal, crossing the west end of the Aransas Pass Canal, extends along the east side of the town just inside the shore of Redfish Bay. The depths are greater than in the Aransas Pass Canal. The canals offer good protection and there is a small boat basin near the west end of the Aransas Pass Canal. A large fishing (mostly shrimp) fleet operate out of the town and there are several shrimp canneries along the canals.

The town has both highway and railroad connections to all parts of the State. Gasoline, oil, and provisions and some boat supplies are available. Other boat supplies can be secured at Corpus Christi. There are marine ways capable of hauling boats up to about 50 feet long and about 5 feet (1.5 m) draft and there is a machine shop in town.

Redfish Bay is a shallow bay of no importance extending along the mainland north of Corpus Christi Bay.

Corpus Christi Bay is a large body of water, roughly elliptical in shape, lying to the westward of Mustang Island and connected with Aransas Pass by the passage known as Turtle Cove. The bay is about 15 miles long in an east and west direction and 11 miles wide at its widest part. About the eastern end of the bay the depths are 8 to 11 feet (2.4 to 3.3 m) and most of the rest of the bay has depths of 12 to 13 feet (3.7 to 4.0 m).

Corpus Christi Channel extends from Aransas Pass to Corpus Christi on the west side of Corpus Christi Bay. For about 4 miles, at the eastern end, it extends through **Turtle Cove** between Harbor Island on the north and Mustang Island on the south; thence across Corpus Christi Bay to Corpus Christi. It is straight except for one 15° bend at about its midway point just south of Ingleside Cove. The project provides for a channel, 32 feet (9.7 m) deep by 200 feet wide and these dimensions are generally maintained. In February 1936, the controlling depth in the approach channel and maneuvering basin was 27 feet (8.2 m). The project also provides for 3 widened places for passing but these are little used and are no longer marked.

The reach through Turtle Cove is marked by *Turtle Cove Channel Range* (lighted). For the entire length of the channel, there are fixed white lights along the south side at approximate intervals of 1¼ miles (the most westerly at the breakwater), and on the opposite side of the channel there are several fixed red lights opposite certain white lights. There are also beacons 500 yards apart between Aransas Pass and Corpus Christi. At the west end of the channel, *Corpus Christi Channel Range* (lighted) marks the entrance through the breakwater and *Corpus Christi Harbor Range* (lighted) marks the entrance through the highway and railroad draw into the turning basin (1,000 by 3,000 feet). The bascule draw has a horizontal clearance of 92 feet; there is a vertical clearance of 10 feet (3.0 m) when the bridge is closed.

To allow entrance into the channel from the bay, the spoils banks are located on alternate sides of the channel. For 4½ miles westward of Lights 8 and 15, the spoil bank extends along the north side of the channel. Farther to the westward and also to the eastward, the spoil bank is placed along the south side of the channel. Just west of Light 7 there is a cut through the spoil bank along the south side of the channel; it has a depth of 5 to 6 feet (1.5 to 1.8 m).

Port Ingleside is a privately owned oil terminal of the Humble Oil and Refining Company on the north shore of the Corpus Christi Bay about 2 miles east of Ingleside Cove. The oil piers are about 1,000 feet north of the ship channel. At Ingleside about 3½ miles to the northward, there is a large oil refinery.

Ingleside Cove in the northeast corner of Corpus Christi Bay, 9 miles east of Corpus Christi, is a good anchorage for small boats in depths of 9–10 feet (2.7 to 3.0 m). The approach is from westward, north of **Long Reef** extending 2½ miles off **Ingleside Point**. **Donnel Reef** extends for a half mile off the north point of the cove. The small boat anchorage is south of Donnel Reef and east of a third reef, about half a mile off shore, extending northward from the south shore of the cove.

Ingleside-on-the-Bay is a small fishing and resort settlement on the east shore of Ingleside Cove.

Shamrock Cove, on the east side of Corpus Christi Bay, affords good anchorage for small boats in depths of 7 to 8 feet (2.1 to 2.4 m) soft mud bottom.

Portland is a small resort settlement on the north shore of Corpus Christi Bay, about 5 miles northeast of Corpus Christi.

Nueces Bay is a tributary of Corpus Christi Bay, partially separated from it by sand spits and a railway bridge and a highway bridge. The bridges have drawspans, off Rincon Point, with openings 32 feet wide. Nueces Bay has depths of only 1 to 2 feet (0.3 to 0.6 m) and is of but little importance. **Nueces River**, emptying into the western part of Nueces Bay, is navigable for open boats for a distance of 9 miles to a dam. The river is of no commercial importance.

Corpus Christi (population 27,741 by the 1930 census), on the western side of Corpus Christi Bay, is the most important city commercially on the coast of Texas southwestward of Galveston. The city is served by three railroad systems, and improved highways connect with all parts of the State. There is regular coastwise steamship service to several Gulf ports (principally New Orleans and Houston) and to a number of ports on both the Atlantic and Pacific coasts, and about 30 companies offer scheduled sailings to Europe and the Far East.

The principal commerce is in petroleum and petroleum products, and cotton and cottonseed products. Other commodities of commerce include metals (lead and zinc), crude sulphur, iron, and steel products and food products.

The harbor consists of two inland basins connected by an industrial canal along the north side of the city. The principal basin is close to the bay and is entered through a dredged cut crossed by a combined railroad and highway drawbridge having a horizontal clearance of 92 feet and a vertical clearance of 10 feet (3.0 m) above low water when closed. This basin is 3,000 feet long and 1,000 feet wide with a project depth of 30 feet (9.1 m). The second basin, at **Avery Point**, is about 1.3 miles west of the first one; it is about 1,200 feet long by 800 feet wide with a project depth of 30 feet (9.1 m). Both basins and the connecting channel (project depth also 30 feet (9.1 m)) are well protected by levees built up by the dredged material. In February 1936, the controlling depth in the Corpus Christi turning basin was 28 feet (8.5 m), in the Avery Point turning basin 26 feet (7.9 m), and in the industrial canal 22 feet (6.7 m).

All the water-front facilities at the main basin are publicly owned.

A **Director of the port,** acting for the harbor commissioners, has charge of the management of the port, and a **harbor master** at the wharves has charge of assigning berths. Copies of harbor regulations are available for strangers.

Terminal Facilities.—Along the south side of the main basin there is a continuous wharf with about 3,000 feet berthing space and eight transit shed units with a total of over 416,000 square feet of storage space. There are rail connections to the rear of all transit sheds and shipside tracks along an 800-foot section of the wharf. Immediately south of the transit sheds are warehouses for cotton and general cargo with approximately 1,250,000 square feet of storage space.

Along the east end of this basin there is a 500-foot wharf continuous with a 300-foot ore dock. There is another transit shed unit on the wharf with tracks along both the rear and front of the shed. The ore dock has a storage bin of 8,000 tons capacity and mechanical conveyor with a capacity of 300 tons per hour.

At the west end of the basin there is an oil dock for loading bunker oil.

The Southern Alkali Plant is located on the south side of the western basin. There are berths for two ships on either side of the loading dock.

Anchorages.—Deep-draft vessels can anchor in the Gulf near the jetties wherever the draft is suitable. Inside Aransas Pass, the only available anchorage is in the turning basin east of Harbor Island and north of the channel. The space here is restricted and subject to shoaling, and caution is accordingly necessary. The holding ground is good but is unprotected from north and east winds. Lighter draft vessels, up to about 12 feet (3.7 m), can anchor in Lydia Ann Islands Channel north of this turning basin. Lighter draft vessels can also anchor in Corpus Christi Bay in depths up to 13 feet (4.0 m) and behind the breakwater off Corpus Christi in depths up to 7 feet (2.1 m). Under certain conditions, ships are anchored to short scope, in the turning basins.

Pilotage.—With the exceptions noted under the extract from the laws of Texas on page 8, pilotage is compulsory for foreign vessels and for vessels in foreign trade and also for coastwise vessels unless having on board a pilot licensed by the United States Steamboat Inspection Service. The pilots maintain a lookout at Port Aransas and meet vessels (usually by appointment) near the bell buoy in a motor pilot boat.

The rates for pilotage are as follows:

	Per foot of draft
Corpus Christi, in or out:	
Coastwise or American ships in foreign trade under 2,000 tons	$4.00
All others	5.00
Port Ingleside or Harbor Island, in or out:	
Foreign or coastwise	4.00

Towboats.—Several towboats are usually available; they are generally stationed at Harbor Island.

Quarantine.—At Harbor Island and Port Ingleside, ships subject to inspection are boarded alongside the dock, while at Corpus Christi they are boarded while anchored in the turning basin.

Customs and Immigration.—Both services maintain offices in the Federal Building in Corpus Christi. Ship inspections are made at quarantine inspection or at dock.

Supplies.—Fresh water suitable for drinking and for boiler use is available at all the docks. Bunker oil can be secured either at Harbor Island, Port Ingleside, or Corpus Christi Harbor. There are no coal-bunkering facilities. General supplies and provisions are available at numerous stores, and more unusual items can generally be secured quickly from Galveston or Houston.

Repairs.—Several machine shops and a small foundry are the only repair facilities in the port. The nearest drydocks are at Galveston.

Storm Warnings Signals (day and night) are displayed from a steel tower on the south side of the entrance to the turning basin at Corpus Christi. Day signals are also displayed at Port Aransas, Aransas Pass (town), and at Flour Bluff on the south side of the bay.

Marine Hospital.—The nearest marine hospital is at Galveston. There are a United States Public Health Service Relief Station and several private hospitals at Corpus Christi.

Small boat facilities.—The entire waterfront at Corpus Christi is protected by a breakwater nearly 2 miles long. Depths over the area behind the breakwater, range from 4 to 7 feet (1.2 to 2.1 m), except for the ship channel crossing the north end. The entrance is either through the ship channel at the north end or through a small boat channel at the south end. The latter is marked by *Corpus Christi Light*, on the north side of the channel about one-half mile off the opening in the breakwater.

Immediately inside the south entrance, there is a municipal pier principally used by the local fishing fleet. Depths of 4 to 5 feet (1.2 to 1.5 m) can be taken alongside.

Opposite the center of the city there is a pleasure pier with several boat slips along the north side at the outer end. These slips have depths of 6 to 7 feet (1.8 to 2.1 m); they have to be vacated with wind shifting to north or northwest.

The best anchorage area for small boats is behind the north end of the breakwater in depths of 6 to 7 feet (1.8 to 2.1 m).

Gasoline, oil, water, and provisions can be obtained. There are machine shops, etc., for handling most repairs to smaller vessels. There are marine ways capable of hauling boats up to about 40 feet long and 3 feet (0.9 m) draft; also private ways which are at times available and which can haul boats up to about 80 feet long and 5 feet (1.5 m) draft.

The **Port Series**, volume No. 6 (Part 3) gives further detailed information regarding the port of Corpus Christi; see page 4.

Winds from any easterly direction make a rough bar and raise the water inside as much as 2 feet above normal; winds from any westerly direction have an opposite tendency. A sudden shift of the wind from south to north makes an especially rough bar for a short time.

A **meteorological table** for Corpus Christi is given in the appendix.

Tides.—At Port Aransas the range of the tide from lower low water to higher high water averages about 1½ feet. In Corpus Christi and Redfish Bays, the periodic tide is too small to be of any practical importance.

The **Currents** in the pass have an average velocity, at strength of flood or ebb, of about 1½ knots, and are greatly influenced by the winds. Just inside the end of the jetties, the current sets close to the north jetty.

Directions.—Courses and Distances for approaching *Aransas Pass Lighted Whistle Buoy* are given on page 62, and also under **Coastwise Courses** (Position 29).

The following courses and distances are from the entrance buoy. Inland Rules apply inside this buoy.

Courses and Distances

Aransas Pass to Corpus Christi

For reverse direction, read upwards	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
1. **Aransas Pass Lighted Whistle Buoy;** position to the southward of.	°	*Points*	*Nautical miles*
Direct	301	WNW	4. 6
Reverse	*121*	*ESE*	*4. 6*
Passing to southward of *Aransas Pass Lighted Bell Buoy.*			
This course follows the *Harbor Island Lighted Range.*			
2. **Aransas Pass Lighted Buoy 2;** position to the southward of.			
Direct (Harbor Island Lighted Range ahead).	301	WNW	1. 6
Reverse (Harbor Island Lighted Range astern).	*121*	*ESE*	*1. 6*
Passing through Jetty Entrance. Several lights and lighted buoys on either hand. See Chart No. 1286 or Light List.			
3. **Turtle Cove Channel Front Light** bearing 78° true, distant 400 yards; position at intersection of *Harbor Island Range* and *Turtle Cove Channel Range.*			
Direct (Turtle Cove Channel Lighted Range ahead).	258	WSW. ⅛ W	9. 8
Reverse (Turtle Cove Channel Lighted Range astern).	*78*	*ENE. ⅛ E*	*9. 8*
Both sides of the channel are marked by lights and beacons.			
4. **Lights Nos. 8 and 15;** mid-channel position.			
Direct (No range)	269	W. ⅞ S	8. 1
Reverse (No range)	*89*	*E. ⅞ N*	*8. 1*
Both sides of the channel are marked by lights and beacons.			
Corpus Christi Channel Lighted Range is picked up toward the west end of this course.			
5. **Corpus Christi Breakwater Light.**			
The *Corpus Christi Channel Lighted Range* (269° true) marks the entrance through the breakwater and the *Corpus Christi Harbor Lighted Range* (301° true) marks the entrance into the easterly basin. A bascule bridge spans the latter entrance.			

ARANSAS PASS TO THE RIO GRANDE

(Charts 1286, 1287, and 1288)

Corpus Christi Pass, 17 miles southwestward of Aransas Pass, separates Mustang Island and **Padre Island.** In 1935, it was closed at the Gulf entrance and nearly closed at the inside entrance at the southeast corner of Corpus Christi Bay. At times it affords a shallow entrance from the Gulf for small craft.

Laguna Madre is a shallow body of water, scarcely more than a few inches deep in places, extending southward from Corpus Christi Bay for a distance of 100 miles, and separated from the Gulf by only a low and barren storm-swept strip of sand beach, known as Padre Island. A few small streams are tributary to it, but neither they nor the laguna are of any commercial importance.

Brazos Santiago is a narrow pass from the gulf to the lower end of Laguna Madre, at the south end of Padre Island and between that island and **Brazos Island.** It lies 236 miles south-southwestward of Galveston entrance, 106 miles southward of Aransas Pass, and 7 miles northward of the mouth of the Rio Grande, and is of importance as the approach to Port Isabel and the newly developed port of Brownsville.

The pass has been improved by constructing jetties extending nearly a mile into the Gulf and by dredging a channel through it from deep water in the Gulf. The dredged channel then extends southwestward across the southern part of Laguna Madre from the pass to **Long Island** and thence through Long Island to a turning basin on the southwest side of the town of Port Isabel. The project provides for a channel 25 feet (7.6 m) deep and 300 feet wide through the pass, thence decreasing to 100 feet wide to a turning basin 600 feet by 700 feet at Port Isabel. In 1935 the controlling depth was 25 feet (7.6 m) for a width of 100 feet.

Prominent features.—In approaching Brazos Santiago on a clear day the old unused lighthouse, a white conical brick tower at Point Isabel, is the first object sighted, followed soon by Brazos Santiago Lighthouse and the Coast Guard station inside the entrance on the north side. A few miles northward of the entrance a succession of large sand hills 20 to 25 feet (6.1 to 7.6 m) high, known as **The Tanks,** are distinctive marks for this stretch of the coast.

Directly off the entrance the bottom is soft and affords fair anchorage with good holding ground; farther north and south the bottom is harder.

Brazos Santiago (Padre Island) Lighthouse (Lat. 26°04′.3; Long. 97° 10.′0) is a white hexagonal house on a brown skeleton foundation. The light is fixd white, 60 feet (18.3 m) above the water, and visible 12 miles.

The entrance to Brazos-Santiago pass is marked by *Brazos-Santiago Entrance Lighted Whistle Buoy*, located about 1½ miles directly off the entrance between the jetties.

The channel through the pass is marked by *Brazos-Santiago Entrance Lighted Range*, the bearing of which is 269° true (W. ⅞ S. mag.). The northern side of the channel across Laguna Madre

is marked by lighted beacons about 1 mile apart and by numerous intermediate beacons.

Port Isabel (Point Isabel) (population 1,177 by the 1930 census) is a small commercial fishing and resort town 2½ miles westward of Brazos Santiago pass. There are both railroad and improved highway connections to Brownsville and to Rio Grande Valley points in general. There are several small stores and two small hotels. Gasoline, oil, water, provisions, and some boat supplies are available for small craft. Water is rather unpalatable but acceptable for boiler use. There are marine ways capable of hauling boats up to about 40 feet long and 4 feet (1.2 m) draft, and some machine repairs can be made.

Terminal Facilities.—There is a transit shed (200 feet by 100 feet) with rail connections along the west side of the turning basin at Port Isabel. Shipments consist of citrus fruit, early vegetables (particularly onions), and cotton, while the receipts are general commodities.

Boca Chica, at the south end of Brazos Island and 4 miles southward of Brazos Santiago, is an entrance from the Gulf to Laguna Madre. It has a depth of 1½ to 3 feet (0.5 to 0.9 m) at the entrance but only a few inches inside, and is seldom used.

Del Mar (Boca Chica Beach) on Brazos Island is a bathing and fishing resort.

The Rio Grande, which for about 1,000 miles of its length forms the boundary between the United States and Mexico, empties into the Gulf 7 miles southward of Brazos Santiago Pass.

By international agreement, the river is not used for navigational purposes; special permission is necessary for any boat to enter the river. No survey of the river has been made recently but it is reported that about 4 feet (1.2 m) can be carried across the bar off the entrance to the river; inside the channel is changeable and not dependable. Brownsville is 55 miles from the mouth via the river but only 20 miles by airline. **Matamoros** is opposite Brownsville on the Mexican side of the river.

Brownsville Ship Channel.—This project provides for the extension of the ship channel for 12½ miles southwestward from Long Island to a turning basin 1,000 feet by 1,300 feet on the northeast side of the city of Brownsville. The channel is to be 100 feet wide and the whole project 25 feet (7.6 m) deep. It is expected that this project will be completed by about June 1936.

Terminal Facilities.—When the above ship channel is completed, it is expected to have certain facilities available at the turning basin. Two or more wharves with transit sheds will be constructed along the north side of the basin. Each of the wharves will be 400 feet long and the transit sheds 400 feet by 120 feet. Tracks will extend along the face of the wharves as well as behind the transit sheds and an excellent highway will connect the port with the town of Brownsville. Industrial sites are available along the ship canal.

Brownsville (population 22,021 by the 1930 census) is the fast-growing metropolis of the Rio Grande Valley, a rich agricultural section extending along the north side of the Rio Grande for approximately 100 miles above its mouth. In addition to the agricultural

development of the valley, Brownsville is both a summer and a winter resort and a port of entry into Mexico. Less than 100 miles west of the city a considerable area of new oil fields is being developed.

Three trunk-line railroads connect the city with both United States and Mexican points and excellent highways extend throughout the valley area as well as to the northern and northwestern part of Texas.

Airways.—The Pan American airport, about 5 miles east of the city, has airport facilities of every kind including customs, immigration, and health officers of both the United States and the Mexican Governments. There are about 200 employees at the airport. There are daily scheduled planes north to Dallas and Fort Worth and south to Mexico City, where connections are made for Central and South American points.

Anchorages.—The only available anchorage site is outside the jetties in the Gulf of Mexico. After entering the pass, ships have to proceed to the wharves.

Pilotage.—Pilotage is compulsory to the same extent as for Aransas Pass and Galveston. The pilots meet vessels in a motor launch by previous arrangement; they intend to establish a lookout station on Padre Island. The rates of pilotage for Port Isabel are as follows:

	Per foot of draft
For foreign vessels	$4.00
Coastwise vessels	2.50

Pilotage rates for Brownsville have not yet been established.

Quarantine, Customs, Immigration.—All these services maintain offices in the Federal Building.

Hospitals.—The nearest marine hospital is at Galveston and the nearest United States Public Health Service Relief Station is at Corpus Christi. There is a private hospital in Brownsville.

Supplies and Repairs.—Provisions and general supplies can be secured at the numerous stores in Brownsville. There are as yet no facilities for ship repairs.

Meteorological table for Brownsville is given in the appendix.

Directions.—There is no inside route southward from Aransas Pass to Brazos Santiago. From *Aransas Pass Lighted Bell Buoy*, a course 183° true (S. ½ E. mag.) for 106 miles leads to **Brazos Santiago Entrance Lighted Whistle Buoy.** Or small boats can follow the coast southward at a distance of about 1 mile to Brazos Santiago Pass.

Courses and Distances for deep-draft vessels approaching Brazos Santiago Pass are given on page 62, and also under **Coastwise Courses** (Position No. 30). The following courses and distances are for entering from the entrance buoy. The Inland Rules apply inside *Brazos Santiago Entrance Lighted Whistle Buoy.*

Courses and Distances

Brazos Santiago

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
1. **Brazos-Santiago Entrance Lighted Whistle Buoy.** Buoy is close to Brazos Santiago Entrance Lighted Range:			
Direct (Brazos Santiago Entrance Lighted Range ahead).	° 269	*Points* W. ⅞ S	*Nautical miles* 2.6
Reverse (Brazos Santiago Entrance Lighted Range Astern).	*89*	*E. ⅞ N*	*2.6*
Passing through jetty entrance. The outer end of the jetties are submerged.			
2. **Brazos Santiago Entrance Front Light:**			
Direct	236	SW. ⅛ W	1.9
Reverse	*56*	*NE. ⅛ E*	*1.9*
Brazos Santiago Light 12 and numerous beacons along north side of channel.			
3. **Brazos Santiago Light 24:**			
Entering cut through Long Island.			
Channel to Port Isabel branches to northward. The basin is about 1.3 miles above Light 24.			
Channel to Brownsville (under construction in 1935) continues straight ahead.			

34. INSIDE ROUTES, KEY WEST TO THE RIO GRANDE

KEY WEST TO SAN CARLOS BAY

The various routes available for smaller vessels between Key West and San Carlos Bay are described and directions given on page 92. The route via Hawk Channel and Florida Bay is the most protected route and greatly reduces the distances between protected anchorages although considerably increasing the total distance. The total distance via this route is 181 miles from Key West Harbor to *Caloosa Lighted Bell Buoy* off San Carlos Bay and the limiting draft across Florida Bay is about 6 feet (1.8 m).

The route via Northwest Channel to Northwest Cape is 60 miles and an additional 90 miles to *Caloosa Lighted Bell Buoy.* The limiting depth for the courses and distances given to the northward of Northwest Cape is 7 to 8 feet (2.1 to 2.4 m) but this can be increased by keeping a somewhat greater distance off the coast.

There are two passages affording protected routes behind Cape Romano for smaller vessels.

Caxambas Pass.—See page 88 for Description and Directions. The distance through this passage from *Coon Key Light* to the western entrance to the pass is 6 miles and in 1935 the controlling depth was 3 feet (0.9 m) at low water. The tidal range is about 2 feet.

Big Marco Pass and River.—See page 89 for Description and page 90 for Directions. The distance from *Coon Key Light* to the western

entrance to the pass is about 11 miles, and in 1935 the controlling depth was 2½ feet (0.8 m) at low water. The tidal range is about 1.7 feet.

Big Marco Pass to Gordon Pass.—A shallow inside passage extends from Big Marco Pass to Gordon Pass with a dead end extension to Naples. The southern entrance is north of Beacon 4 in Big Marco Pass, whence the passage extends northward through creeks and small dredged cuts. A low-water depth of about 4 feet (1.2 m) can be carried as far as Little Marco Pass but barely 2 feet (0.6 m) from there to Gordon Pass. The passage is not marked and is quite difficult to follow and should only be attempted with local information. The outside route is generally used between Big Marco Pass and Gordon Pass.

Gordon Pass to San Carlos Bay.—There is no inside passage from Gordon Pass to San Carlos Bay. Boats must pass outside along this section of the coast.

INSIDE ROUTE ACROSS SOUTH FLORIDA

The entrance to this route is through the southern portion of the Caloosahatchee River to Fort Myer. Description and Directions for this portion of the Caloosahatchee River are given on pages 98 and 100.

This route above Fort Myers is described and directions given on pages 103 to 108. The route follows the Caloosahatchee River and connecting canal to Lake Okeechobee, thence the St. Lucie Canal and St. Lucie River to the Intracoastal Waterway along the east coast of Florida.

The present (1935) controlling depth is 3.5 feet (1.0 m). The project depth is 6 feet (1.8 m) and construction work is in progress toward the completion of the project.

The distance from Fort Myers to Stuart by this route is 108 miles.

SAN CARLOS BAY TO TAMPA BAY

North of San Carlos Bay, an inside route is available through **Pine Island Sound** to Charlotte Harbor. Description and Directions for this route are given on pages 108 and 109. The controlling depth is about 6 feet (1.8 m) at low water and about an additional foot at high water. The distance from *Caloosa Lighted Bell Buoy* to Charlotte Harbor Entrance is 33 miles via Jug Creek Shoal cut at the north end of the sound.

From Charlotte Harbor to Venice Inlet, 30 miles south of Tampa Bay, there is no inside route and the entrance to the first inside route of importance is through Big Sarasota Pass, 11 miles north of Venice Inlet and 38 miles north of Boca Grande entrance.

When proceeding northward, the swash channel, about the outside of the north point at Charlotte Harbor Entrance, can under favorable weather conditions be used by boats drawing less than 5 to 6 feet. This channel follows close about the southern end of Gasparilla Island; it has a controlling depth of about 6 feet (1.8 m) but should be used by strangers only when the sea is smooth and the shoals can be seen.

North of Charlotte Harbor Entrance the coast can be followed at a distance of 1 to 2 miles to Venice Inlet or to Big Sarasota Pass. Off Gasparilla Pass, shoals extend nearly a mile offshore.

The inside route from Venice Inlet to Sarasota Bay is seldom used as the channel is narrow, unmarked, and difficult to follow. In 1935 it was reported that sections of this channel had shoaled to a depth of about 2½ feet (0.8 m). Local information is necessary for the use of this channel. In 1935 Venice Inlet had a controlling depth of about 2½ feet (0.8 m) and a course of about 108° true (ESE. ⅝ E.) led through the entrance channel. Local information can be secured at Venice or Nokomis or sometimes just inside the entrance.

From Big Sarasota Pass to Tampa Bay, an inside route is available. Description and Directions for this route are given on pages 118 and 119. The controlling depth through Big Sarasota Pass was about 6 feet in 1935. The project depth for the channel through Sarasota Bay to Tampa Bay is 7 feet (2.1 m) but there is often less water (4 to 5 feet in 1935) over a shifting bar just inside Longboat Inlet. The distance from *Big Sarasota Pass Light* at the south end of the route to *Sarasota Pass Light 1* at the north end of the route is 20 miles.

Directions for Tampa Bay are given on page 131.

TAMPA BAY TO APALACHEE BAY AND ST. GEORGE SOUND

Between Tampa Bay and Anclote Anchorage there is an inside route through Boca Ciega Bay, The Narrows, Clearwater Harbor, and St. Joseph Sound. Descriptions and Directions for this route are given on pages 133 and 139. The controlling depth through The Narrows and St. Joseph Sound was about 3 feet (2.4 m) in 1935. The distance from *Point Pinellas Light* to a position in Anclove Anchorage opposite *Anclote Keys Lighthouse* is 40 miles.

If passing outside at Tampa Bay, steer 352° true (N. by W. mag.) for 4.3 miles from *Sarasota Pass Light 1*, heading for the wharf at the old quarantine station. When one-half mile off the wharf follow the Tampa Bay ship channel about the north end of Egmont Key into the Gulf. See Directions for Tampa Bay, page 131.

Coastwise courses from Tampa Bay to Apalachee Bay and to East Pass, St. George Sound are given on page 63. If desiring to enter Cedar Keys, a course 355.5° true (N. ¾ W. mag.) for 87 miles leads direct to *Cedar Keys Main Entrance Light 1*. Directions for Cedar Keys are given on page 144.

There is no inside route between Anclote Anchorage and Apalachee Bay, but shelter, supplies, and provisions are available at Cedar Keys; see page 143.

Directions between Anclote Anchorage and *North Entrance Light 2*, north of Anclote Keys, are given on page 137.

From *North Entrance Light 2*, a course 344° true (N. by W. ⅝ W.) for 10.5 miles leads to a position one-fourth mile west of *St. Martins Outer Shoal Beacon 22*, on the outer edge of St. Martins Reef and from this position a course 349° true (N. by W. ¼ W.) for 39.5 miles leads to *Cedar Keys Main Entrance Light 1*. Directions for Cedar Keys are given on page 144.

From Cedar Keys a depth of about 5 feet (1.5 m) can be taken out the Northwest Channel. From *North Bank Light*, at the outside entrance to Northwest Channel, a course 308° true (NW. 7/8 W.) for 70 miles leads to *Ochlockonee Shoal Sea Buoy* on the west side of Apalachee Bay or a course 294° true (WNW. 1/8 W.) for 89 miles leads to *East Pass Lighted Buoy 1* off the entrance to East Pass, St. George Sound.

APALACHEE BAY TO PENSACOLA BAY

Between Apalachee Bay and St. George Sound there is an inside route via Ochlockonee Bay, Ochlockonee River, Crooked River, and Carrabelle River. Description and Directions for this route are given on pages 150 and 151. The controlling depth through Crooked River is 3 feet (0.9 m) and the distance from *Ochlockonee Shoal Sea Buoy* to Carrabelle at the mouth of the Carrabelle River is 51 miles (13 miles to the mouth of Ochlockonee Bay and 38 miles through the inside passages).

To enter Ochlockonee Bay from *Ochlockonee Shoal Sea Buoy*, steer 358° true (N. 1/2 W. mag.) for 5 miles and then 278° true (W. 1/2 N. mag.) for 6 miles passing about the north side of Ochlockonee Shoal to a position off the entrance to the bay. Bring the south side of Ochlockonee Point to bear 287° true (WNW. 3/4 W. mag.) and steer for it. This last course will lead very close to shoals on each side and may have to be modified somewhat to avoid them. Go slowly and sound continuously until past the point. Directions for Ochlockonee Bay are given on page 150, and for the remainder of the route to Carrabelle on page 151.

Directions between Carrabelle and East Pass are given on page 158.

From East Pass to Apalachicola, there is an inside passage through St. George Sound and Apalachicola Bay with a controlling depth of 7 feet (2.1 m); the distance from the entrance buoy to Apalachicola is 24 miles. East Pass is described on page 152, and Directions for the pass given on page 158. Directions for St. George Sound to Apalachicola are given on page 158.

Between Apalachicola Bay and St. Andrews Bay there is an inside route via the Apalachicola River, Jackson River, Lake Wimico, Wetappo Creek, and East Bay to St. Andrews Bay. Description and Directions for that section of this route east of East Bay are given on page 160, and for East Bay on page 165, and page 168. The distance from Apalachicola to Panama City via this passage is 53 miles and the controlling depth in 1935 was 5 feet (1.5 m). There is a project for improving this route to a controlling depth of 9 feet (2.7 m) and work on this project was commenced in 1935.

Between St. Andrews Bay and Choctawhatchee Bay there is no inside route. A project has been adopted for a 9-foot (2.7 m) waterway between these bays but no work has yet (1935) been undertaken. Accordingly, it is necessary to go outside when proceeding westward from St. Andrews Bay.

Directions for St. Andrews Bay are given on page 167, and Directions from St. Andrews Bay to Choctawhatchee Bay and to Pensacola Bay are given on page 173.

Between Choctawhatchee Bay and Pensacola Bay, The Narrows and Santa Rosa Sound afford an inside passage with a controlling depth

of about 7½ feet (2.3 m). The distance from Choctawhatchee Bay Entrance Lighted Buoy to the entrance to the Intracoastal Waterway westward from Pensacola Bay is 44.5 miles. Description and Directions for Choctawhatchee Bay Entrance (New Pass Channel) are given on page 169. Santa Rosa Sound is described on page 170 and Directions given on page 171.

PENSACOLA BAY TO CORPUS CHRISTI

The Intracoastal Waterway with a controlling depth of 9 feet (2.7 m) has been completed to a point beyond Galveston and there is an approved project for continuing this waterway to Corpus Christi. Sections of this Intracoastal Waterway are described and directions given on the following pages:

Pensacola Bay to Mobile Bay, page 181.
Mobile Bay to New Orleans, page 211.
New Orleans to Port Arthur, page 258.
Port Arthur to Corpus Christi, page 285.

The present condition of the previous 5 feet by 40 feet inside waterway between Galveston and Corpus Christi is given on the following pages:

Galveston to Brazos River, page 208.
Brazos River to Matagorda Bay, page 314.
Matagorda Bay, page 315.
Matagorda Bay to Aransas Pass, page 319.

35. APPENDIX

COAST PILOTS OF THE COAST AND GEODETIC SURVEY

	Price
U. S. Coast Pilot, Atlantic Coast, Section A, from St. Croix River to Cape Cod	$0.75
U. S. Coast Pilot, Atlantic Coast, Section B, from Cape Cod to Sandy Hook, including Long Island Sound	.75
U. S. Coast Pilot, Atlantic Coast, Section C, Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays	.75
U. S. Coast Pilot, Atlantic Coast, Section D, Cape Henry to Key West	.75
U. S. Coast Pilot, Gulf Coast, from Key West to the Rio Grande	.75
U. S. Coast Pilot, West Indies, Puerto Rico, and Virgin Islands	.75
Inside Route Pilot, New York to Key West	.50
U. S. Coast Pilot, Pacific Coast, California, Oregon, and Washington	.75
U. S. Coast Pilot, Alaska, Part I, from Dixon Entrance to Yakutat Bay	.75
U. S. Coast Pilot, Alaska, Part II, Yakutat Bay to Arctic Ocean	.75
U. S. Coast Pilot, Hawaiian Islands	.50
U. S. Coast Pilot, Philippine Islands, Part I, Luzon, Mindoro, and Visayas	.75
U. S. Coast Pilot, Philippine Islands, Part II, Palawan, Mindanao, and Sulu Archipelago	.75
Distances Between United States Ports	.10

FIELD STATIONS

Boston, Mass., room 808, Customhouse.
New York, N. Y., rooms 741–742 Customhouse.
New Orleans, La., room 314, Customhouse.
San Francisco, Calif., room 510, Customhouse.
Seattle, Wash., room 601, Federal Office Building.
Manila, P. I., Intendencia Building.

At these stations complete files of the United States Coast and Geodetic Survey Charts, Coast Pilots, Tide Tablets, Current Tables, and other publications relating to navigation may be consulted and information affecting navigation obtained without charge. Light Lists, Buoy Lists, and Notices to Mariners are kept for sale or for free distribution to mariners. The field stations are also sales agencies for the Coast and Geodetic Survey publications. A chart catalogue, giving lists of Charts, Coast Pilots, Tide Tables, and agencies of the Coast and Geodetic Survey, can be obtained from any of the field stations or will be sent, free of charge, on application to the Coast and Geodetic Survey, Washington, D. C. Frequent changes occur in the agencies, and the list of agencies is published in the first notice each month of the Notice to Mariners.

NAVIGATIONAL AIDS AND THE USE OF CHARTS

The **Coast and Geodetic Survey** is charged with the survey of the coasts, harbors, and tidal estuaries of the United States and its insular possessions and issues the following publications relating to these waters as guides to navigation: Charts, Coast Pilots, Tide Tables, Current Tables, a catalog of these publications, and Notices to Mariners, the last-named published weekly by the Bureau of Lighthouses and Coast and Geodetic Survey.

Charts bear three dates, which should be understood by persons using them: (1) The date (month and year) of the edition, *printed* on the late charts below

the border in a central position; (2) the date of the latest correction to the chart plates, *printed* in the lower left-hand corner below the border; (3) the date of issue, *stamped below* the border and just to the left of the subtitle. Charts show all necessary corrections as to lights, beacons, buoys, and dangers, which have been received to the *date of issue*, being hand corrected since the latest date printed in the lower left-hand corner. All small but important corrections occurring subsequent to the *date of issue* of the chart are published in Notices to Mariners and should be applied by hand to the chart immediately after the receipt of the notices. The date of the edition of the chart remains unchanged until an extensive correction is made on the plate from which the chart is printed. The date is then changed and the issue is known as a new edition. When a correction, not of sufficient importance to require a new edition, is made to a chart plate, the year, month, and day are noted in the lower left-hand corner. All the notes on a chart should be read carefully, as in some cases they relate to the aids to navigation or to dangers that cannot be clearly charted. The charts are various in character, according to the objects which they are designed to subserve. The most important distinctions are the following:

1. Sailing charts, mostly on a scale of approximately 1:1,200,000, which exhibit the approaches to a large extent of coast, give the offshore soundings, and enable the navigator to identify his position as he approaches from the open sea.
2. General charts of the coast, on scales of 1:400,000 and 1:200,000, intended especially for coastwise navigation.
3. Coast charts, on a scale of 1:80,000, by means of which the navigator is enabled to avail himself of the channels for entering the larger bays and harbors.
4. Harbor charts, on larger scales, intended to meet the needs of local navigation.

Note.—General charts of the Philippine Islands are on scales 1:1,600,000, 1:800,000, and 1:400,000; coast charts are on scales 1:100,000 and 1:200,000.

Coast pilots, relating to waters of the United States, Puerto Rico, Virgin Islands, Alaska, Hawaiian Islands, and the Philippine Islands, contain descriptions of the coasts, harbors, dangers, and directions for coasting and entering harbors. At intervals of about one year supplements are issued, containing the more important corrections since the publication of the volume. The supplements are printed on one side of the paper only, so that they may be cut and pasted in the appropriate places in the volume. Supplements and other corrections for any volume can be furnished, free of charge, on application to the Coast and Geodetic Survey, Washington, D. C., or any of its field stations, provided the volume itself has not been superseded by a subsequent edition.

Tide tables.—The Coast and Geodetic Survey Tide Tables are issued annually in advance of the year for which they are made and contain the predicted times and heights of the tide for each day in the year at the principal ports of the world. A table of tidal differences is given by means of which the tides at about 3,900 intermediate ports may be obtained. These tables are published in two volumes under the titles: Tide Tables, Atlantic Ocean, and Tide Tables, Pacific Ocean and Indian Ocean.

Current tables are also issued annually in advance. They include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb for a number of harbors, together with differences for obtaining predictions for numerous other places, as well as other useful information on currents. The current tables appear in two volumes, one for the Atlantic coast of the United States and the other for the Pacific coast of the United States.

Agencies for the sale of the Charts, Coast Pilots, Tide Tables, and Current Tables of the Coast and Geodetic Survey are established in many ports of the United States and in some foreign ports. The charts and publications can also be purchased in the office of the Coast and Geodetic Survey, Washington, D. C., or any of the field stations. If ordered by mail, prepayment is obligatory. Remittances should be made by postal money order or express order, payable to the Coast and Geodetic Survey. Postage stamps, checks, and drafts cannot be accepted. The sending of money in an unregistered letter is unsafe. Only catalogue numbers of charts need be mentioned. The catalogue of charts and other publications of the survey can be obtained free of charge on application at any of the sale agencies or to the Coast and Geodetic Survey, Washington, D. C. A

list of the sales agencies of the Coast and Geodetic Survey is published quarterly in the Notice to Mariners.

Other publications.—Lists of Lights, including buoys and other daymarks of the United States, its insular possessions, and the Great Lakes, are published by the Bureau of Lighthouses and may be purchased from its sales agencies or from the Superintendent of Documents, Washington, D. C. Notice to Mariners, relating to the same waters, is published weekly by the Bureau of Lighthouses and Coast and Geodetic Survey; this publication can be obtained free of charge on application to the superintendents of lighthouses of the various districts. The Corps of Engineers, United States Army, in cooperation with the Bureau of Operations, United States Shipping Board, publish the Port Series in 24 volumes and Port and Terminal Charges at United States Ports. These volumes contain much useful information concerning port conditions which is of interest to the navigator. They may be purchased from the Superintendent of Documents, Washington, D. C.

PUBLICATIONS

The following résumé of the United States Government publications of navigational value is included for the ready reference of the mariner:

The Catalog of United States Coast and Geodetic Survey Nautical Charts, Coast Pilots, Tide Tables, Current Tables, Tidal Current Charts, and Aeronautical Charts is distributed free by the United States Coast and Geodetic Survey and its authorized agents.

The List of Publications of the Department of Commerce lists the publications of the United States Coast and Geodetic Survey and may be secured free on application from the offices of the Department of Commerce and its field agencies, or from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Certain libraries have been designated by the Congress of the United States to receive prints, as issued, of all publications printed by the Government for public distribution. These publications may be consulted by anyone during business hours.

NAUTICAL CHARTS

Coasts of the United States, Territories, and Possessions:
- Issued by the United States Coast and Geodetic Survey.
- For sale by the United States Coast and Geodetic Survey, Washington, D. C., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

Mississippi River from the Head of Passes to Cairo:
- Issued and for sale by the Mississippi River Commission, Vicksburg, Mississippi.

Illinois Waterway System:
- Issued and for sale by the United States Engineers, Chicago, Illinois.

Ohio River:
- Issued and for sale by the United States Engineers, Cincinnati, Ohio.

Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River, St. Regis to Cornwell, Canada:
- Issued and for sale by the United States Lake Survey, Detroit, Michigan.

New York State Canal System:
- Issued and for sale by the Superintendent of Public Works, Albany, New York.

Foreign countries:
- Issued by the Hydrographic Office, United States Navy Department.
- For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.

COAST PILOTS

Coasts of the United States, Territories, and Possessions:
- Published by the United States Coast and Geodetic Survey.
- For sale by the United States Coast and Geodetic Survey, Washington, D. C., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

Foreign countries:
Published by the Hydrographic Office, United States Navy Department.
For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.

TIDE TABLES

Atlantic Ocean, and Pacific and Indian Oceans—Two volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

CURRENT TABLES

Atlantic Coast, North America, and Pacific Coast, North America, and Philippine Islands—Two volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

TIDAL CURRENT CHARTS

Boston Harbor, New York Harbor, San Francisco Bay—Three volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

NOTICE TO MARINERS

Issued by the United States Department of Commerce and by the Hydrographic Office, United States Navy Department.
Notices to Mariners are published weekly and may be secured free of charge from the United States Lighthouse Service and from the Hydrographic Office.

LIGHT LISTS

United States, Territories, and Possessions:
Published by the United States Lighthouse Service.
For sale by the Superintendent of Documents, Washington, D. C., and by authorized sales agents in the various ports.
Philippine Islands:
Published by the Department of Agriculture and Commerce, Navigation Division, Manila, Philippine Islands.
Copies of the List of Lights, Buoys, Beacons and Daymarks of the Philippine Islands may be secured free on application to the Director, Bureau of Commerce and Industry, Manila, P. I.
A limited number of Philippine Notice to Mariners and List of Lights, etc., are available for free distribution at the Coast and Geodetic Survey field stations at Seattle, Wash., San Francisco, Calif., and Honolulu, T. H.
Foreign Countries:
Published by the Hydrographic Office, United States Navy Department.
For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.

RADIO

Charts of Radiobeacon System, Atlantic and Gulf Coasts, Pacific Coast, and Great Lakes:
Free on application to the various superintendents of lighthouses.

Circular No. 1, Radio, Distribution of Weather Information, Forecasts, and Warnings by Radio for the Benefit of Marine, Aviation, and Commercial Interests:
Free on application to the Weather Bureau, United States Department of Agriculture, Washington, D. C.

List of Stations Performing Special Services:
Published and for sale by the Bureau of the International Telecommunication Union, Berne, Switzerland.

List of Coast Stations and Ship Stations:
Published and for sale by the Bureau of the International Telecommunication Union, Berne, Switzerland.

Radio Aids to Navigation (H. O. Publ. No. 205):
Published by the Hydrographic Office, United States Navy Department.
For sale by the Hydrographic Office, Washington, D. C.

Radiobeacons and Radiobeacon Navigation:
Published by the United States Lighthouse Service.
For sale by the Superintendent of Documents, Washington, D. C.

List of Radiobeacons:
See Light Lists published by the United States Lighthouse Service.

MISCELLANEOUS

American Practical Navigator (Bowditch):
Published by the Hydrographic Office, United States Navy Department.
For sale by the Superintendent of Documents, Washington, D. C.

Annual Report of the Chief of Engineers, United States Army:
Part 1.—Report upon river and harbor improvement work, including flood-control operations.
Part 2.—Commercial Statistics, Water-borne Commerce of the United States.
These volumes may be consulted at the libraries which are public depositories.

General Rules and Regulations Prescribed by the Board of Supervising Inspectors—four volumes:
Published by and issued free on application to the Bureau of Navigation and Steamboat Inspection, United States Department of Commerce, Washington, D. C.

Laws Governing Steamboat Inspection:
Published by and free on application to the Bureau of Navigation and Steamboat Inspection, United States Department of Commerce, Washington, D. C.

List of Bridges Over the Navigable Waters of the United States:
Published by the United States Engineers. (1934 edition now in press.)
For sale by the Superintendent of Documents, Washington, D. C.

Navigation Laws of the United States:
Published by the Bureau of Navigation and Steamboat Inspection, United States Department of Commerce.
For sale by the Superintendent of Documents, Washington, D. C.

Pilot Rules for Certain Inland Waters of Atlantic and Pacific Coasts and Coast of Gulf of Mexico:
Published by and free on application to the Bureau of Navigation and Steamboat Inspection, United States Department of Commerce, Washington, D. C.

Pilot Rules for Rivers whose Waters Flow into the Gulf of Mexico and Their Tributaries and Red River of North:
Published by and free on application to the Bureau of Navigation and Steamboat Inspection, United States Department of Commerce, Washington, D. C.

Pilot Rules for Great Lakes and Their Connecting and Tributary Waters:
Published by and free on application to the Bureau of Navigation and Steamboat Inspection, United States Department of Commerce, Washington, D. C.

Port and Terminal Charges at United States Ports:
Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Shipping Board.
For sale by the Superintendent of Documents, Washington, D. C.

Port Series—of the United States—23 volumes:
Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Shipping Board.
For sale by the Superintendent of Documents, Washington, D. C.

Rules and Regulations; The Navigable Waters of the United States:
Prepared by the United States Engineers.
Regulations for Lighting Bridges:
Published by and free on application to the United States Lighthouse Service, Washington, D. C.
Shipping Charges at United States and Foreign Ports; Consular Services and Charges:
Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Shipping Board.
For sale by the Superintendent of Documents, Washington, D. C.
The American Ephemeris and Nautical Almanac:
Published by the United States Naval Observatory.
For sale by the Superintendent of Documents, Washington, D. C.

REMARKS ON THE USE OF CHARTS

Accuracy of charts.—The value of a chart depends upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become. In these respects the source from which the information has been compiled is a good guide. This applies particularly to the charts of the Alaska Peninsula, Aleutian Islands, Arctic Ocean, and part of Bering Sea, and the Philippine Islands. The early Russian and Spanish surveys were not made with great accuracy, and until they are replaced by later surveys these charts must be used with caution.

With respect to these regions, the fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail. A wide berth should, therefore, be given to every rocky shore or patch, and this rule should invariably be followed, viz, that instead of considering a coast to be clear unless it is shown to be foul the contrary should be assumed.

With respect to a well-surveyed coast, only a fractional part of the soundings obtained are shown on the chart, a sufficient number being selected to clearly indicate the contour of the bottom. When the bottom is uneven the soundings will be found grouped closely together, and when the slopes are gradual fewer soundings are given. Each sounding represents an actual measure of depth and location at the time the survey was made. Shores and shoals where sand and mud prevail, and especially bar harbors and the entrances of bays and rivers exposed to strong tidal currents and a heavy sea, are subject to continual change of a greater or less extent, and important ones may have taken place since the date of the last survey. In localities which are noted for frequent and radical changes, such as the entrance to a number of estuaries on the Atlantic, Gulf, and Pacific coasts, notes are printed on the charts calling attention to the fact.

It should also be remembered that in coral regions and where rocks abound it is always possible that a survey with lead and line, however detailed, may have failed to find every small obstruction. For these reasons, when navigating such waters, the customary sailing lines and channels should be followed and those areas avoided where the irregular and sudden changes in depth indicate conditions which are associated with pinnacle rocks or coral heads.

Dredged channels.—These are generally shown upon the chart by two broken lines to represent the side limits of the improvement together with the depth and date. The depth is the controlling depth through the channel on the date charted and does not mean that this depth obtains over the full width of the channel, nor that the depth has not subsequently changed due to either shoaling or dredging. These changes are often of frequent occurrence; therefore, when vessels' drafts approximate the charted depth of a dredged channel local information as to conditions should be obtained before entering.

Danger curves.—The depth curves will be found useful in giving greater prominence to outlying dangers. It is a good plan to trace out with a colored pencil the curve next greater than the draft of the vessel using the chart and regard this as a "danger curve", which is not to be crossed without precaution. Isolated soundings shoaler than surrounding depths should be avoided, as there is always the possibility that the shoalest spot may not have been found.

Caution in using small-scale charts.—It is obvious that dangers to navigation cannot be shown with the same amount of detail on small-scale charts as on those of larger scale; therefore in approaching the land or dangerous banks

regard should be had to the scale of the chart, and the largest scale chart available should be used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. For the same reason bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

Distortion of printed charts.—The majority of Coast and Geodetic Survey charts are now printed by lithography on dry paper and have little, if any, distortion. A lithographed chart may be distinguished from a plate-printed chart by the feel of the surface, the former being smooth, while the latter is rough. Lithographed charts also are usually tinted in colors, while the others are in black and white.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact position, especially when in exposed positions. It is safer, when possible, to navigate by bearings or angles to fixed objects on shore and by the use of soundings.

Lighted buoys and other unwatched lights cannot be implicitly relied on; the light may be altogether extinguished or, if flashing or occulting, the apparatus may get out of order.

Lights.—The distances given in the light lists, Coast Pilots, and on the charts for the visibility of lights are computed for a height of 15 feet (4.6 m) for the observer's eye. The table of distances of visibility due to height, published in the light list, affords a means of ascertaining the effect of a greater or less height of the eye. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range of visibility. Again, refraction may often cause a light to be seen farther than under ordinary circumstances. As the range of visibility increases with the elevation of the observer, it is often possible to obtain a bearing before the light is sighted from the bridge by sighting the light from aloft, noting a star in range with it, and then obtaining a bearing of the star with compass or pelorus.

The actual power of a light should be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen. The power of a light can be estimated by its candlepower as given in the light lists and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Light sectors.—Where lights have various colored sectors it should be borne in mind that the bearings of the edges of the sectors as given in the light lists and Coast Pilots are in degrees true, reading clockwise from 0° at N. as observed from a vessel.

In some conditions of the atmosphere white lights may have a reddish hue; the mariner, therefore, should not trust solely to color where there are sectors, but should verify the position by taking a bearing on the light. On either side of the line of demarcation between white and red there is always a small sector of uncertain color, as the edges of a sector cannot be cut off sharply.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the wind, large areas of silence have been found in different direction and at different distances from the origin of the sound signal, even in clear weather. Therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal may require some time before it is in readiness to act. A fog often creeps imperceptibly toward the land and is not observed by those at a lighthouse until it is upon them, whereas a vessel may have been in it for many hours while approaching the land. In such a case no signal may be sounded. When sound travels against the wind it may be thrown upward; in such a case a man aloft might hear it when it is inaudible on deck. The conditions for hearing a signal will vary at the same station within short intervals of time. Mariners must not, therefore, judge their distance from a fog signal by the force of the sound and must not assume that a signal is not sounding because they do not hear it. Taken together, these facts should induce the utmost caution when nearing the land or danger in fog. The lead or an echo-sounding instrument are often the

only safe guide and should be faithfully used. The establishment of radiobeacons and radio direction-finder stations combined with the use of radio direction-finder apparatus aboard ship have greatly facilitated the fixing of position in fog.

In regions where the shores are high and rocky the echo of the whistle frequently gives warning of too close an approach to shore. In narrow passages it is often possible to keep in mid-channel by directing course so that the echoes from both shores are heard at approximately the same time.

An echo may sometimes be heard from the boarded side of a beacon (echo board) or from a flat surface of any structure. A megaphone is said to be helpful for detecting sound and for determining the direction to the source.

Submarine signals, installed on many lightships and buoys, have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus can determine the approximate bearing of the signal, and when the sound signals (air or submarine) are synchronized with the radiobeacon the distance from the lightship may be determined. See page 20. These signals can be heard also on vessels not equipped with receiving apparatus by observers below the water line, but a bearing of the signal cannot then be readily determined.

Tides.—A knowledge of the tide, or vertical rise and fall of the water, is of great and direct importance whenever the depth at low water approximates or is less than the draft of the vessel and wherever docks are constructed so as to be entered and left near the time of high water. But under all conditions such knowledge may be of indirect use, as it often enables the mariner to estimate in advance whether at a given time and place the current will be running flood or ebb.

Plane of reference for soundings on charts.—For the Atlantic coast of the United States and Puerto Rico the plane of reference for soundings is the mean of all low waters; for the Pacific coast of the United States and Alaska, with the one exception noted below, and for the Hawaiian and Philippine Islands, it is the mean of the lower low waters. For the Atlantic coast of the Canal Zone, Panama, the plane of reference for soundings is mean low water, and for the Pacific coast of the same it is low-water springs. For foreign charts many different planes of reference are in use, but that most frequently adopted is low-water springs.

It should be remembered that whatever plane of reference is used for a chart there may be times when the tide falls below it. When the plane is mean low water or mean lower low water, there will generally be as many low waters or lower low waters below those planes as above them; also the wind may at times cause the water to fall below the plane of reference.

Tidal currents.—In navigating where the tidal range is considerable, special caution is necessary. It should be remembered that along the coast there are indrafts into all bays and bights, although the general set of the current is parallel to the shore; and that the effect of a crosscurrent is greater on a vessel running slowly than when at full speed. The turn of the tidal current offshore is seldom coincident with the time of high and low water on the shore.

At the entrance to most harbors without important tributaries or branches, the current turns at, or soon after, the time of high and low water within. The diurnal inequality in the velocity of current will be proportionately but half as great as in the height of the tides. Hence, although the heights of the tide may be such as to cause the surface of the water to vary but little in level for 10 or 12 hours, the ebb and flow will be much more regular in occurrence. A swift current often occurs in narrow openings between two bodies of water because the water at a given instant may be at different levels. Along most shores not seriously affected by bays, tidal rivers, etc., the current usually turns soon after high and low waters.

The swiftest current in straight portions of tidal rivers is usually in the mid-channel, but in curved portions the strongest current is toward the outer edge of the curve. Counter currents and eddies may occur near the shore of straits, especially in bights and near points.

Tide rips and swirls occur in places where strong currents occur, caused by a change in the direction of the current, and especially over shoals or in places where the bottom is uneven. Such places should be avoided if exposed also to a heavy sea, especially with the wind opposing the current. When these conditions are the worst the water is broken into heavy choppy seas from all directions, which board the vessel, and also make it difficult to keep control, owing to the plunging effects of the propeller and rudder.

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The current tables published by the Coast and Geodetic Survey give the predicted times of slack water and other current data for a number of places on the Pacific and Atlantic coasts of North America.

Current arrows on charts show only the usual or mean direction of a tidal stream or current. It must not be assumed that the direction of the current will not vary from that indicated by the arrow. In the same manner the velocity of the current constantly varies with circumstances, and the rate given on the chart is a mean value, corresponding to an average range of tide. At some stations but few observations have been made.

Fixing position.—The most accurate method available to the navigator for fixing a position relative to the shore is by plotting with a protractor sextant angles between well-defined objects on the chart. This method, based on the "*three-point problem*" of geometry, should be in general use.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by this method. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might, under such circumstances, put the ship ashore. For its successful employment it is necessary, first, that the objects be well chosen, and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn. On the other hand, distant objects should be used for direction because less affected by a small error or change of position. The three-arm protractor consists of a graduated circle with one fixed and two movable radial arms. The zero of the graduation is at the fixed arm, and by turning the movable arms each one can be set at any desired angle with reference to the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges in case of a metal instrument, or the radial lines in the case of a transparent or celluloid instrument, pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole. The tracing-paper protractor, consisting of a graduated circle printed on tracing paper, can be used as a substitute for the brass or celluloid instrument. The paper protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through the three objects, it will be indeterminate, as it will plot all around the circle. An approach to this condition, which is called a "revolver", must be avoided. In case of doubt, select from the chart three objects nearly in a straight line or with the middle object nearest the observer. Near objects are better than distant ones, and, in general, up to 90°, the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer, the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation. A single angle and a range give, in general, an excellent fix, easily obtained and plotted.

The compass.—It is not intended that the use of the compass to fix the position should be given up. There are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. Where accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal or of additions to a chart, as fresh soundings or new buildings. In such cases, angles should be taken to several objects, the more the better; but five objects are a good number, as the four angles thus

obtained usually establish a position free of any doubt. When only two objects are visible, a sextant angle can be used to advantage with the compass bearings and a better fix obtained than by two bearings alone.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing", the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam when the position is obtained. By taking the bearing at two points and four points on the bow a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval allowing for current. Taking afterward the beam bearing gives, with slight additional trouble, the distance of the object when abeam. Such beam bearings and distances, with the times, should be continually recorded as fresh departures, the importance of which will be appreciated in case of being suddenly shut in by fog. A graphic solution of the problem for any two bearings of the same object is frequently used. The two bearings are drawn on the chart, and the course is then drawn by means of the parallel rulers, so that the distance as measured from the chart between the lines is equal to the distance made good by the vessel between the times of taking the bearings.

Danger angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten.

Range finders.—Vessels equipped with range-finding apparatus have a ready means for determining the distance from an object and, combined with a bearing, can fix their position at any time when objects are visible.

Soundings.—In thick weather, when near or approaching the land or danger, soundings should be taken continually and at regular intervals, and with the character of the bottom systematically recorded. By marking the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship and then moving the paper over the chart parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined.

Echo sounding.—This modern method of obtaining soundings is coming into use extensively. Its advantages lie in the fact that rapid and almost instantaneous soundings can be had while the vessel is running at full speed, and the navigator thereby knows at all times the depth of water under his keel. The method of determining the ship's position as described in the preceding paragraph is eminently applicable when echo soundings are obtained. Two types of instruments have been brought out. In one type, the returning echo is flashed on a revolving plate and the depth read by an adjacent scale, while with the other type the depths are recorded on a graph.

By means of echo soundings, a vessel can follow a safe depth curve with ease, and dangerous points and capes can be rounded in thick weather with utmost safety.

Echo sounding has been developed to such an extent that it is now used by the surveying vessels of the Coast and Geodetic Survey and has practically replaced the use of the pressure tube.

Use of sounding tubes.—Although of undoubted value as a navigational instrument, the sounding tube is subject to certain defects which, operating singly or in combinations, may give results so misleading as to seriously endanger the vessel, whose safety is entirely dependent upon an accurate knowledge of the depths. There are various types of tubes in common use which are too well known to require a detailed description here. They are all based on the principle that the column of air in the tube will be compressed in proportion to the depth to which the tube is lowered in the water. The principle is sound theoretically, but in practice there are several sources of mechanical errors which affect the result in proportion to the depth of water determined. The most important sources of errors are as follows:

(*a*) *Inherent:* Those which occur as a result of permanent defects in the tube, such as the variation of the bore from a true cylinder, variation in the thickness of the cap, etc.

(*b*) *External:* Those which occur as a result of the conditions under which the sounding was taken, variations of temperature or barometric pressure from the normal, etc.

(*c*) *Accidental:* Those which affect a single sounding, due to the failure of the tube to register properly, leakage of air, loss of water from leaky valve, errors due to the presence of salt in the tube, etc.

Before undertaking the sounding necessary to make any particular landfall the vessel should be stopped for an up-and-down cast of the lead in order to test the accuracy under the prevailing conditions of the tubes which are to be used. For this purpose it is not necessary to get bottom; simply run out 60 to 80 fathoms of wire and then see how closely the tubes register that amount. A number of tubes can be sent down at one time, and it is then possible to select one or two which register most nearly correct. The accidental errors are probably the most serious of the three types, both because they are apt to be larger in amount and because it is impossible to foresee when they will occur. It should be kept in mind that tubes which have been working properly for a number of soundings may suddenly develop errors, and for this reason the mariner must beware of overconfidence in the tubes.

Sumner's method.—Among astronomic methods of fixing a ship's position the great utility of Sumner's method or one of its many modifications should be well understood, and this method should be in constant use. The Sumner line—that is, the line drawn through the two positions obtained by working the chronometer observation for longitude with two assumed latitudes, or by drawing through the position obtained with one latitude a line at right angles to the bearing of the body as obtained from the azimuth tables—gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. If directed toward the coast, it marks the bearing of a definite point; if parallel with the coast, the distance of the latter is shown. Thus the direction of the line may often be usefully taken as a course. A sounding at the same time with the observation may often give an approximate position on the line. A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The Sumner lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterward or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day, and in combination with the sun gives an excellent fix.

Position line by means of tables.—The Sumner line of position furnished ready to lay down on the chart may be derived from the tables of "Simultaneous Hour Angle and Azimuth of Celestial Bodies", published by the Hydrographic Office as Publication No. 203. By means of these tables all calculations are avoided, but they are not recommended for use within an hour of the meridian, when the Marc St. Hilaire Method of Ex-Meridian Tables should be substituted.

Position line by Marc St. Hilaire or calculated altitude method.—By this method the altitude of the celestial body is calculated for the assumed position, and the difference between the observed and calculated altitudes is laid off toward or away from the assumed position, according to sign, along the azimuth of the observed body. The line of position is then drawn through the new point in a direction normal to the azimuth of the celestial body. This method has certain advantages, the principle one being that the solution is strong even when the body is near the meridian. Full description of this method will be found in any epitome of navigation.

Radio direction finder bearings and positions are especially valuable at night and during fog or thick weather when other observations are not obtainable. For practical navigating purposes radio waves may be regarded as traveling in a straight line from the sending station to the receiving station. Instruments for determining the bearing of this line are now available. The observations may be divided into two general classes: First, where the bearing of the ship's radio call is determined by one, two, or more radio stations on shore and the resulting bearing or position is reported to the vessel (see p. 31); secondly, where the bearing of one or more known radio stations is determined on the vessel itself and plotted as a line of position or as cross bearings. Experiments show that these bearings can be determined with a probable error of less than 2°, and the accuracy of the resulting position is largely dependent on the skill and care of the observer. It must be remembered, however, that these lines are parts of great circles, and if plotted as straight lines on a Mercator chart a

considerable error may result when the ship and shore station are a long distance apart. The bearings may be corrected for this distortion as explained on page 22.

Radio bearings may be combined with position lines obtained from astronomic observations and used in ways very similar to the well-known Sumner line when avoiding dangerous shoals or when making the coast.

Radiobeacons.—The United States Lighthouse Service now maintains and operates radiobeacons at a large number of lighthouses and lightships. In fog or thick weather these radiobeacons send distinctive signals and ships equipped with radio direction finders may readily obtain bearings on these beacons. For a detailed description, see page 27.

Radiobeacon stations that are equipped for distance finding, transmit a special radio signal and sound a corresponding air or submarine signal at the same period of time. The reception of the sound signal by a vessel will be delayed depending upon the distance the sound has to travel, whereas the radio signal will be received practically instantaneously.

Synchronization of sound and radio signals.—When the sound signal travels through water, the number of seconds intervening between the reception of the radio signal and sound signal divided by 1.25 gives the distance of the vessel in miles from the station. Where the sound signal travels through air the distance in miles is obtained by dividing the number of seconds by 5 (or more exactly 5.5).

For details as to the signal characteristics see the Light Lists published by the United States Lighthouse Service.

Change in variation of the compass.—The gradual change in the variation must not be forgotten in laying down positions by bearings on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are replotted for every new edition if the error is appreciable. Means for determining the amount of this error are provided by printing the date of constructing the compass and the annual change in variation near its edge.

The change in the magnetic variation in passing along parts of the coast of the United States is so rapid as to materially affect the course of a vessel unless given constant attention. This is particularly the case in New England and parts of Alaska, where the lines of equal magnetic variation are close together and show rapid changes in magnetic variation from place to place, as indicated by the large differences in variation given on neighboring compass roses.

A table giving the magnetic variation for 1936 and the annual increase or decrease at certain points within the area covered by this volume is given on page 37 under "General information."

Local magnetic disturbance.—The term "local magnetic disturbance" or "local attraction" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places. Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflection of the compass is due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centers near together. The law which has hitherto been found to hold good as regards local magnetic disturbance is that north of the magnetic equator the north end of the compass needle is attracted toward any center of disturbance; south of the magnetic equator it is repelled. It is very desirable that whenever an area of local magnetic disturbance is noted the position should be fixed and the facts reported as far as they can be ascertained.

USE OF OIL FOR MODIFYING THE EFFECT OF BREAKING WAVES

Many experiences of late years have shown that the utility of oil for this purpose is undoubted and the application simple. The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil skillfully applied may prevent much damage, both to

ships (especially of the smaller classes) and to the boats, by modifying the action of breaking seas. The principal facts as to the use of oil are as follows:

1. On free waves—that is, waves in deep water—the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances, but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else is obtainable; but all animal and vegetable oils, and generally waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, either when running or lying-to or in wearing.

6. No experiences are related of its use when hoisting a boat at sea or in a seaway, but it is highly probable that much time would be saved and injury to the boat avoided by its use on such occasions.

7. In cold water the oil, being thickened by the lower temperature and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to facilitate leakage of the oil. The oil is also frequently distributed from canvas bags or oakum inserted in the closet bowls. The positions of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—for example, from the cathead—and allowed to tow in the water. With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter. Lying-to, the weather bow, and another position farther aft seem the best places from which to hang the bags, using sufficient line to permit them to draw to windward while the ship drifts.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances, the effect cannot be so much trusted. On a bar with the ebb tide running it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck it is recommended to pour oil overboard to windward of her before going alongside. The effect in this must greatly depend upon the set of the current and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat and the bag readily hauled on board for refilling if necessary.

INSTRUCTIONS TO MARINERS IN CASE OF SHIPWRECK

General information.—Coast Guard (lifesaving) stations and houses of refuge are located upon the Atlantic and Pacific seaboards of the United States, the Gulf of Mexico, and the Lake coasts.

The stations are manned throughout the year by crews of experienced surfmen.

All lifesaving stations are fully supplied with boats, wreck guns, beach apparatus, restoratives, and clothing provided by the Blue Anchor Society, women's national association for the shipwrecked requiring it, etc.

Houses of refuge are supplied with boats and restoratives but not manned by full crews; an officer in charge, and at places, one or two additional men reside in each, who are required to make extended excursions along the coast after every storm, with a view of ascertaining if any shipwreck has occurred and finding and succoring any persons that may have been cast ashore.

Houses of refuge are located exclusively upon the east coast of Florida, where the requirements of relief are different from those of other portions of the seaboard.

The lifesaving stations are provided with the International Code of Signals, and other means of visual signaling, and vessels can, by opening communica-

tion, be reported; or obtain the latitude or longitude of the station, where determined; or information as to the weather probabilities in most cases; or, where facilities for the transmission of messages by telephone or telegraph are available, request for a tug or Coast Guard cutter will be received and promptly forwarded.

All services are performed by the lifesaving crews without other compensation than their pay from the Government.

Destitute seafarers are provided with food and lodging at the nearest station by the Government as long as necessarily detained by the circumstances of shipwreck, and, if needed, with clothing provided by the Blue Anchor Society.

The station crews patrol the beach from 2 to 4 miles each side of their stations between sunset and sunrise, and if the weather is foggy the patrol is continued through the day. A continuous lookout is also maintained at every station night and day.

Each patrolman carries warning signals. Upon discovering a vessel standing into danger he ignites one of these, which emits a brilliant red flame of about 2 minutes' duration, to warn her off, or, should the vessel be ashore, to let her crew know that they are discovered and assistance is at hand.

If the vessel is not discovered by the patrol immediately after striking, rockets, flare-up lights, or other recognized signals of distress should be used. If the weather be foggy, some recognized sound signal should be made to attract attention, as the patrolman may be some distance away at the other end of his beat.

Masters are particularly cautioned, if they should be driven ashore anywhere in the neighborhood of the stations, to remain on board until assistance arrives, and under no circumstances should they attempt to land through the surf in their own boats until the last hope of assistance from the shore has vanished. Often when comparatively smooth at sea a dangerous surf is running which is not perceptible 400 yards offshore, and the surf when viewed from a vessel never appears as dangerous as it is. Many lives have been lost unnecessarily by the crews of stranded vessels being thus deceived and attempting to land in the ship's boats.

The difficulties of rescue by operations from the shore are greatly increased in cases where the anchors are let go *after entering the breakers*, as is frequently done, and the chances of saving life correspondingly lessened.

Rescue with the lifeboat or surfboat.—The patrolman after discovering your vessel ashore and burning a warning signal, hastens to his station or the telephone for assistance. If the use of a boat is practicable, either the large lifeboat is launched from its ways in the station and proceeds to the wreck by water, or the lighter surfboat is hauled overland to a point opposite the wreck and launched, as circumstances may require.

Upon the boat reaching your vessel the directions and orders of the officer in charge (who always commands and steers the boat) should be implicitly obeyed. Any headlong rushing and crowding should be prevented, and the captain of the vessel should remain on board, to preserve order, until every other person has left.

Women, children, helpless persons, and passengers should be passed into the boat first.

Goods or baggage will positively not be taken into the boat until all are landed. If any be passed in against the remonstrance of the officer in charge, he is fully authorized to throw the same overboard.

Rescue with the breeches buoy or life car.—Should it be inexpedient to use either the lifeboat or surfboat, recourse will be had to the wreck gun and beach apparatus for the rescue by the breeches buoy or the life car.

A shot with a small line attached will be fired across your vessel. Get hold of the line as soon as possible and haul on board until you get a tailblock with a whip or endless line rove through it. The tailblock should be hauled on board as quickly as possible to prevent the whip drifting off with the set or fouling with wreckage, etc. Therefore if you have been driven into the rigging, where but one or two men can work to advantage, cut the shot line, and run it through some available block, such as the throat or peak-halyards block, or any block which will afford a clear lead, or even between the ratlines, that as many as possible may assist in hauling.

Attached to the tailblock will be a tally board with the following directions in English on one side and French on the other:

"Make the tail of the block fast to the lower mast, well up. If the masts are gone, then to the best place you can find. *Cast off shot line, see that the rope in the block runs free,* and show signal to the shore."

The above instruction being complied with, the result will be shown in figure 1.

As soon as your signal is seen a 3-inch hawser will be bent onto the whip and hauled off to your ship by the lifesaving crew.

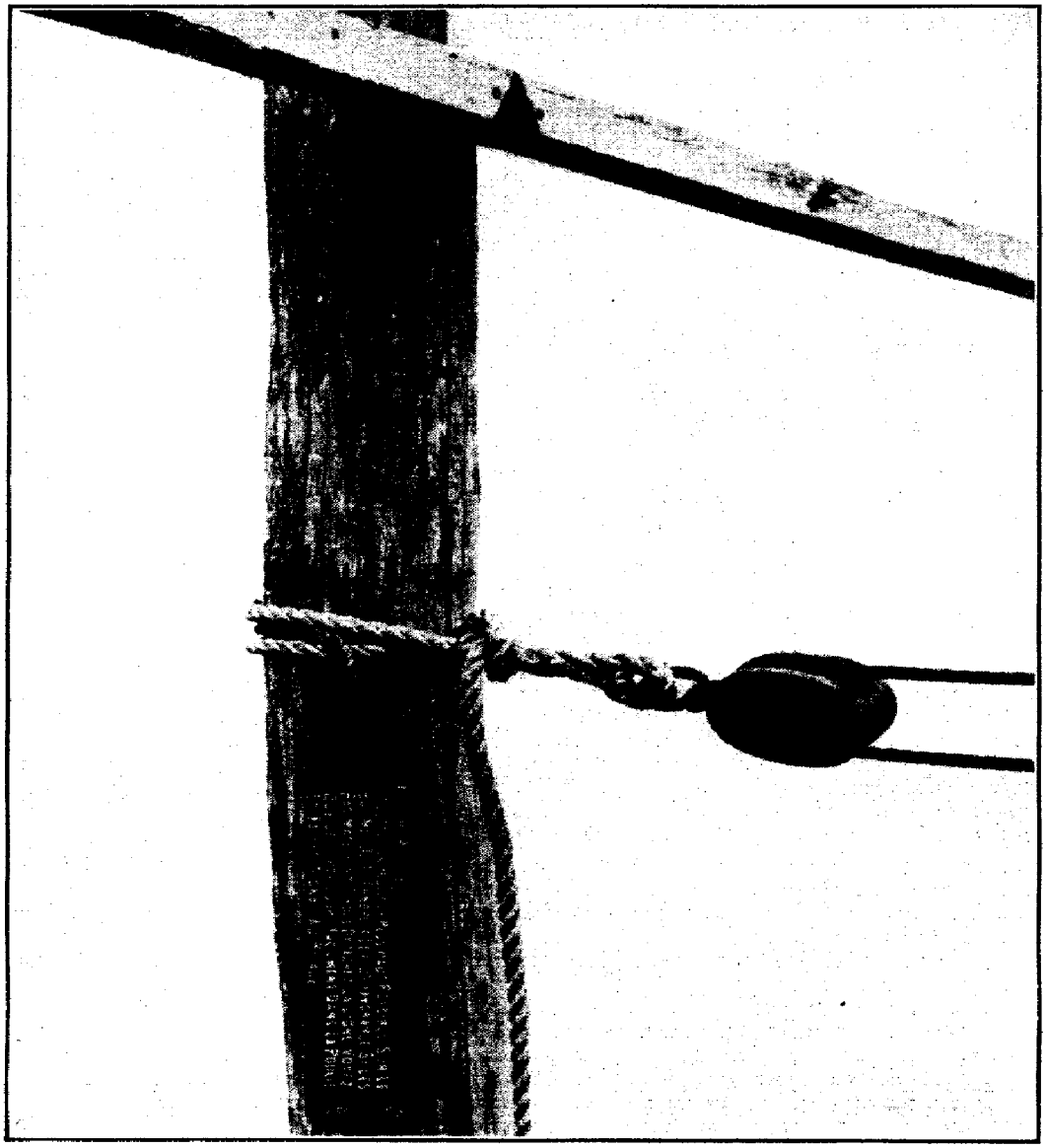

FIGURE 1.

If circumstances permit, you can assist the lifesaving crew by manning that part of the whip to which the hawser is bent and hauling with them.

When the end of the hawser is got on board, a tally board will be found attached, bearing the following directions in English on one side and French on the other:

"Make this hawser fast about 2 feet above the tailblock, see all clear and that the rope in the block runs free, and show signal to the shore."

These instructions being obeyed, the result will be shown in figure 2.

Take particular care that there are no turns of the whip line around the hawser. To prevent this, take the end of the hawser up between the parts of the whip before making it fast.

When the hawser is made fast, the whip cast off from the hawser, and your signal seen by the lifesaving crew, they will haul the hawser taut and by means of the whip will haul off to your vessel a breeches buoy suspended from a traveler block, or a life car, from rings running on the hawser.

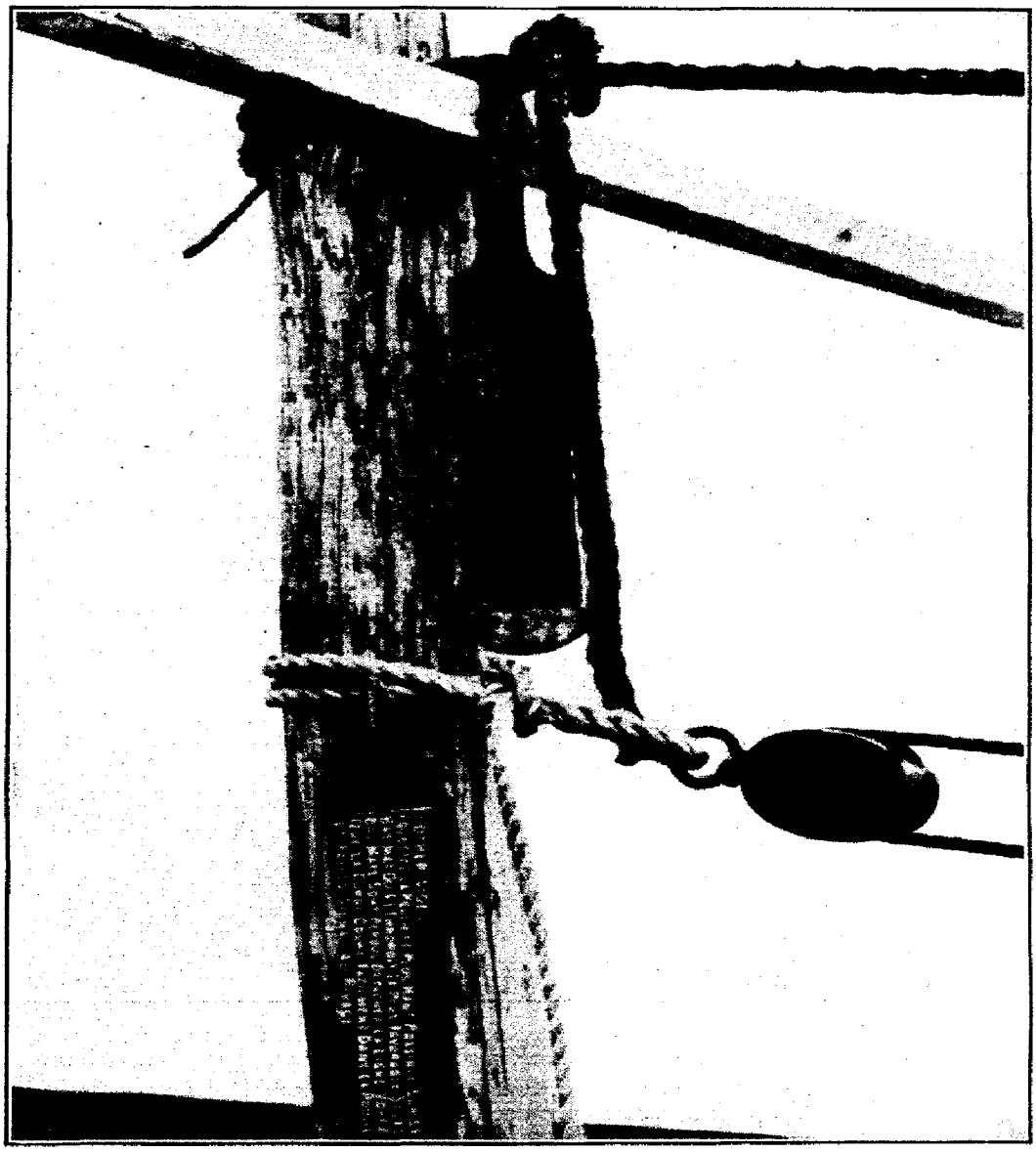

FIGURE 2.

Figure 3, below, represents the apparatus rigged, with the breeches buoy hauled off to the ship.

If the breeches buoy be sent, let one man immediately get into it, thrusting his legs through the breeches. If the life car, remove the hatch, place as many persons therein as it will hold (four to six) and secure the hatch on the outside by the hatch bar and hook, signal as before, and the buoy or car will be hauled ashore. This will be repeated until all are landed. On the last trip of the life car the hatch must be secured by the inside hatch bar.

In many instances two men can be landed in the breeches buoy at the same time by each putting a leg through a leg of the breeches and holding onto the lifts of the buoy.

Children when brought ashore by the buoy, should be in the arms of older persons or securely lashed to the buoy. Women and children should be landed first.

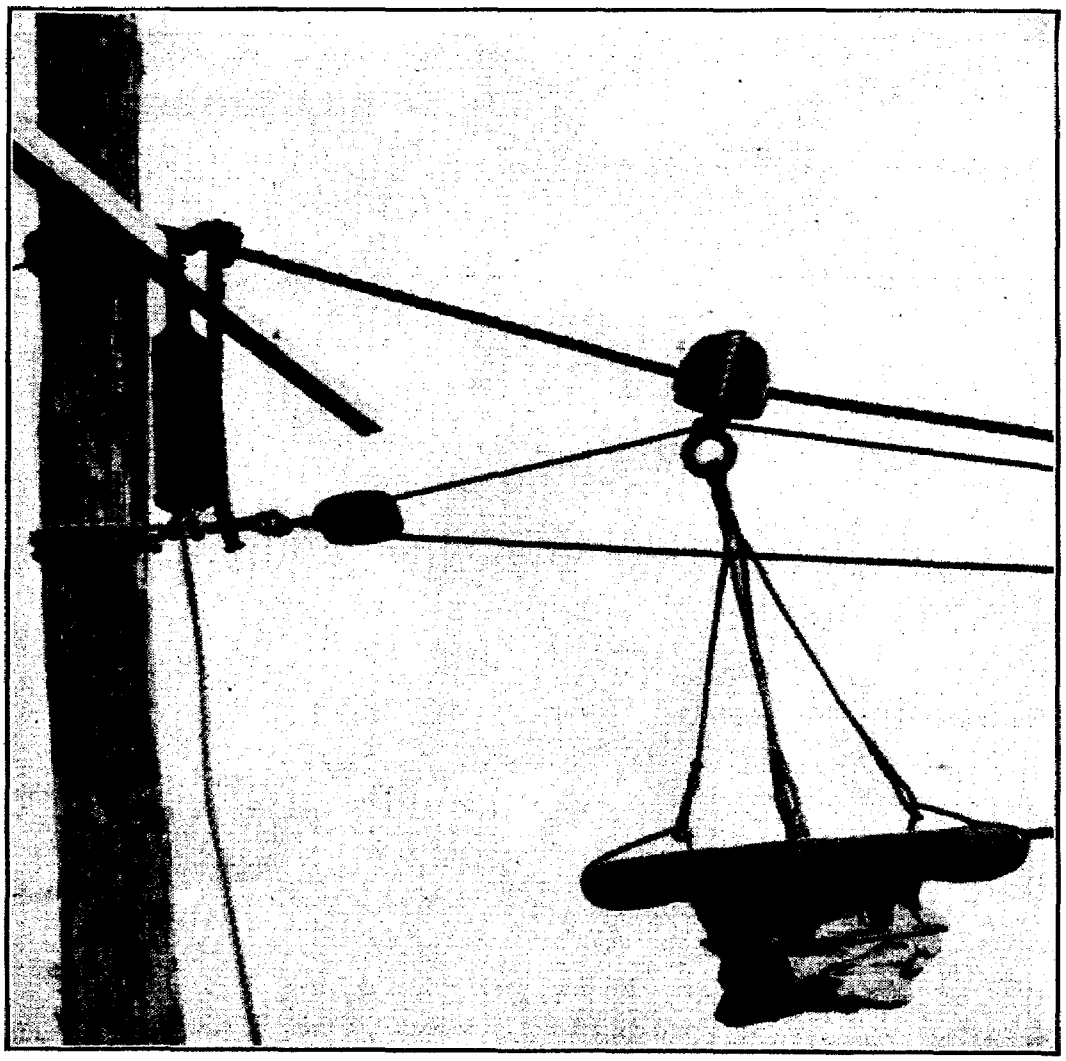

FIGURE 3.

In signaling as directed in the foregoing instructions, if in the daytime, let one man separate himself from the rest and swing his hat, a handkerchief, or his hand; if at night, the showing of a light and concealing it once or twice will be understood; and like signals will be made from the shore. (See also "Wreck Signals", below.)

Circumstances may arise, owing to the strength of the current or set or the danger of the wreck breaking up immediately, when it would be impossible to send off the hawser. In such a case a breeches buoy or life car will be hauled off instead by the whip or sent off to you by the shot line, and you will be hauled ashore through the surf.

If your vessel is stranded during the night and discovered by the patrolman—which you will know by his burning a brilliant red light—keep a sharp lookout for signs of the arrival of the lifesaving crew abreast of your vessel.

Some time may intervene between the burning of the light and their arrival, as the patrolman may have to return to his station, perhaps 3 or 4 miles distant, and the lifesaving crew draw the apparatus or surfboat through the sand or over bad roads to where your vessel is stranded.

Lights on the beach will indicate their arrival, and the sound of cannon firing from the shore may be taken as evidence that a line has been fired across your vessel. Therefore upon hearing the cannon, make strict search aloft, fore, and aft, for the shot line, for it is almost certain to be there. Though the movement of the lifesaving crew may not be perceptible to you, owing to the darkness, your vessel will be a good mark for the men experienced in the use of the wreck gun, and the first shot seldom fails.

Important.—Remain by the wreck until assistance arrives from the shore, or as long as possible. If driven aloft, the inshore mast is the safest.

If not discovered immediately by the patrol, burn rockets, flare-up, or other lights, or if the weather be foggy, fire guns or make other sound signals.

Make the shot line fast on deck or to the rigging to prevent its being washed into the sea and possibly fouling the gear.

Take particular care that there are no turns of the whip line around the hawser before making the hawser fast.

Send the women, children, helpless persons, and passengers ashore first.

Make yourself thoroughly familiar with these instructions, and remember that on your coolness and strict attention to them will greatly depend the chances of success in bringing you and your people safely to land.

Wreck signals.—The following signals, approved by the International Marine Conference convened at Washington in October 1889, have been adopted by the Coast Guard Service and will be used and recognized by the officers and employees as occasion may require:

"Upon the discovery of a wreck by night, the lifesaving force will burn a red pyrotechnic light or a red rocket to signify, '*You are seen; assistance will be given as soon as possible.*'

"A red flag waved on shore by day, or a red light, red rocket, or red roman candle displayed by night, will signify, '*Haul away.*'

"A white flag waved on shore by day, or a white light slowly swung back and forth, or a white rocket, or white roman candle fired by night, will signify, '*Slack away.*'

"Two flags, a white and red, waved at the same time on shore by day, or two lights, a white and a red, slowly swung at the same time, or a blue pyrotechnic light burned by night, will signify, '*Do not attempt to land in your own boats; it is impossible.*'

"A man on shore beckoning by day, or two torches burning near together by night, will signify, '*This is the best place to land.*'

"Any of these signals may be answered from the vessel as follows: In the daytime, waving a flag, a handerchief, a hat, or even the hand; at night, by firing a rocket, a blue light, or a gun, or by showing a light over the ship's gunwale for a short time, and then concealing it."

BOUNDARY LINES OF THE HIGH SEAS

The following lines dividing the high seas from rivers, harbors, and inland waters described in this volume are hereby designated and defined pursuant to section 2 of the act of Congress of February 19, 1895. Waters inshore of the lines here laid down are "inland waters", and upon them the inland rules and pilot rules made in pursuance thereof apply. Upon the high seas, viz, waters outside of the lines here laid down, the international rules apply. The following lines were made effective June 1, 1935:

INLAND WATERS ON THE ATLANTIC, GULF, AND PACIFIC COASTS OF THE UNITED STATES

General rule.—At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not prescribed herein, Inland Rules of the Road shall apply inshore of a line approximately parallel with the general trend of the shore, drawn through the outermost buoy or other aid to navigation of any system of aids.

Pilot Rules for Western Rivers shall apply in rivers flowing into the Gulf of Mexico except as hereinafter stated.

Modifications of general rule.—Lines of demarcation have been established for the following specific areas of inland waters on the Atlantic and Gulf

coasts of the United States where the Inland Rules of the Road are to be followed; and inland waters of the United States bordering on the Gulf of Mexico where the Inland Rules of the Road or Pilot Rules for Western Rivers are to be followed:

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, to Miami Lighted Whistle Buoy; thence to Fowey Rocks Lighthouse; thence to Pacific Reef Lighthouse; thence to Carysfort Reef Lighthouse; thence to Molasses Reef Lighthouse; thence to Alligator Reef Lighthouse; thence to Tennessee Reef Lighthouse; thence to Sombrero Key Lighthouse; thence to American Shoal Lighthouse; thence to Key West Entrance Lighted Whistle Buoy; thence to Sand Key Lighthouse; thence to Cosgrove Shoal Lighthouse; thence to westernmost extremity of Marquesas Keys.

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.

San Carlos Bay and tributaries.—A line drawn from Estero Pass Light to Caloosa Lighted Bell Buoy 2; thence to Sanibel Island Lighthouse.

Pilot Rules for Western Rivers are to be followed to Caloosahatchee River northward of a line drawn from the westernmost extremity of the shore line at Punta Rasa to Sword Point.

Charlotte Harbor and tributaries.—Eastward of Charlotte Harbor Entrance Lighted Bell Buoy off Boca Grande.

Pilot Rules for Western Rivers are to be followed in Peace and Miakka Rivers north of Mangrove Point Light.

Tampa Bay and tributaries.—A line drawn from the southernmost extremity of Long Key to Tampa Bay Lighted Whistle Buoy; thence to Southwest Channel Lighted Bell Buoy; thence to a spire on the northeast side of Anna Marie Key, bearing approximately 109°.

Pilot Rules for Western Rivers are to be followed in Manatee River inside Manatee River Entrance Buoy 2; and in Hillsboro River north of Pratt Street Bridge.

Carrabelle River and Apalachicola River, Fla.—Pilot Rules for Western Rivers are to be followed in Carrabelle River inside Carrabelle River Entrance Light 2; and in Apalachicola River northward of Outer Light at the east side of entrance to the dredged channel leading into the river.

Sounds, lakes, and harbors on the coasts of Alabama, Mississippi, and Louisiana from Mobile Bay, Ala., to Barataria Bay, La., including the Delta of the Mississippi River.—Starting from a point which is located 1 mile, 90° true, from Mobile Point Lighthouse, a line drawn to Mobile Entrance Lighted Whistle Buoy; thence to Ship Island Lighthouse; thence to Chandeleur Lighthouse. A line drawn from the southwesternmost extremity of Errol Island to Pass a Loutre Lighted Whistle Buoy 2.

Pilot Rules for Western Rivers are to be followed in Mobile River above Choctaw Point; and also in Mississippi River inside South Pass Entrance Lighted Whistle Buoy and Southwest Pass Entrance Lighted Whistle Buoy.

Sabine Pass, Tex.—Inland Rules are to be followed northward of Sabine Pass Lighted Whistle Buoy, in Sabine Pass and all tributary waters.

Galveston Harbor.—A line drawn from Galveston North Jetty Light to Galveston Bar Lighted Whistle Buoy; thence to Galveston (S.) Jetty Lighthouse.

Brazos River, Tex.—Inland Rules are to be followed in the river and in the entrance inside of Brazos River Entrance Lighted Bell Buoy.

INTERNATIONAL RULES TO PREVENT COLLISIONS OF VESSELS

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following regulations for preventing collisions at sea shall be followed by all public and private vessels of the United States upon the high seas in all waters connected therewith navigable by seagoing vessels.

PRELIMINARY

In the following rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The words "steam vessel" shall include any vessel propelled by machinery.

A vessel is "under way", within the meaning of these rules, when she is not at anchor, or made fast to the shore, or aground.

RULES CONCERNING LIGHTS, AND SO FORTH

The word "visible" in these rules when applied to lights shall mean visible on a dark night with a clear atmosphere.

Article 1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

Art. 2. A steam vessel when under way shall carry—(*a*) On or in front of the foremast, or if a vessel without a foremast, then in the forepart of the vessel, at a height above the hull of not less than twenty feet, and if the breadth of the vessel exceeds twenty feet, then at a height above the hull not less than such breadth, so, however, that the light need not be carried at a greater height above the hull than forty feet, a bright white light, so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

(*e*) A steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least fifteen feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

Art. 3. A steam vessel when towing another vessel shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than six feet apart, and when towing more than one vessel shall carry an additional bright white light six feet above or below such lights, if the length of the tow measuring from the stern of the towing vessel to the stern of the last vessel towed exceeds six hundred feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in article two (*a*), exceptng the additional light, which may be carried at a height of not less than fourteen feet above the hull.

Such steam vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

Art. 4. (*a*) A vessel which from any accident is not under command shall carry at the same height as the white light mentioned in article two (*a*), where they can best be seen, and if a steam vessel, in lieu of that light two red lights, in a vertical line one over the other, not less than six feet apart, and of such a character as to be visible all around the horizon at a distance of at least two miles; and shall by day carry in a vertical line, one over the other, not less than six feet apart, where they can best be seen, two black balls or shapes, each two feet in diameter.

(*b*) A vessel employed in laying or in picking up a telegraph cable shall carry in the same position as the white light mentioned in article two (*a*), and if a steam vessel in lieu of that light three lights in a vertical line, one over the other, not less than six feet apart. 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 around the horizon at a distance of at least two miles.

By day, she shall carry in a vertical line, one over the other, not less than six feet apart, where they can best be seen, three shapes not less than two 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.

(*c*) The vessels referred to in this article, when not making way through the water, shall not carry the side lights, but when making way shall carry them.

(*d*) The lights and shapes required to be shown by this article are to be taken by other vessels as signals that the vessel showing them is not under command and cannot therefore get out of the way.

These signals are not signals of vessels in distress and requiring assistance. Such signals are contained in article thirty-one.

Art. 5. A sailing vessel under way and any vessel being towed shall carry the same lights as are prescribed by article two for a steam vessel under way with the exception of the white lights mentioned therein, which they shall never carry.

Art. 6. Whenever, as in the case of small vessels under way during bad weather, the green and red side lights cannot be fixed, these lights shall be kept at hand, lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such a manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

Art. 7. Steam vessels of less than forty, and vessels under oars or sails of less than twenty, tons gross tonnage, respectively, and rowing boats, when under way, shall not be required to carry the lights mentioned in article two (*a*), (*b*), and (*c*), but if they do not carry them they shall be provided with the following lights:

First. Steam vessels of less than forty tons shall carry—

(*a*) In the fore part of the vessel or on or in front of the funnel, where it can best be seen, and at a height above the gunwhale of not less than nine feet, a bright white light constructed and fixed as prescribed in article two (*a*), and of such a character as to be visible at a distance of at least two miles.

(*b*) Green and red side lights constructed and fixed as prescribed in article two (*b*) and (*c*), and of such a character as to be visible at a distance of at least one mile or a combined lantern showing a green light and a red light from right ahead to two points abaft the beam on their respective sides. Such lanterns shall be carried not less than three feet below the white light.

Second. Small steamboats, such as are carried by seagoing vessels, may carry the white light at a less height than nine feet above the gunwhale, but it shall be carried above the combined lantern mentioned in subdivision one (*b*).

Third. Vessels under oars or sails of less than twenty tons shall have ready at hand a lantern with a green glass on one side and a red glass on the other, which, on the approach of or to other vessels, shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

Fourth. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision.

The vessels referred to in this article shall not be obliged to carry the lights prescribed by article four (*a*) and article eleven, last paragraph.

Art. 8. Pilot vessels when engaged on their station on pilotage duty shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side lights lighted ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading, but the green light shall not be shown on the port side nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at

hand, ready for use, a lantern with green glass on the one side and red glass on the other, to be used as prescribed above.

Pilot vessels when not engaged on their station on pilotage duty shall carry lights similar to those of other vessels of their tonnage.

A steam pilot vessel, when engaged on her station on pilotage duty and in waters of the United States, and not at anchor, shall, in addition to the lights required for all pilot boats, carry at a distance of eight feet below her white masthead light a red light, visible all around the horizon and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles, and also the colored side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and in waters of the United States, and at anchor, she shall carry in addition to the lights required for all pilot boats the red light above mentioned, but not the colored side lights. When not engaged on her station on pilotage duty, she shall carry the same lights as other steam vessels.

Art. 9. Fishing vessels and fishing boats, when under way and when not required by this article to carry or show the lights hereinafter specified, shall carry or show the lights prescribed for vessels of their tonnage under way.

(*a*) Open boats, by which is to be understood boats not protected from the entry of sea water by means of a continuous deck, when engaged in any fishing at night, with outlying tackle extending not more than one hundred and fifty feet horizontally from the boat into the seaway, shall carry one all-around white light.

Open boats, when fishing at night, with outlying tackle extending more than one hundred and fifty feet horizontally from the boat into the seaway, shall carry one all-around white light, and in addition, on approaching or being approached by other vessels, shall show a second white light at least three feet below the first light and at a horizontal distance of at least five feet away from it in the direction in which the outlying tackle is attached.

(*b*) Vessels and boats, except open boats as defined in subdivision (*a*), when fishing with drift nets, shall, so long as the nets are wholly or partly in the water, carry two white lights where they can best be seen. Such lights shall be placed so that the vertical distance between them shall be not less than 6 feet and not more than 15 feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than 5 feet and not more than 10 feet. The lower of these two lights shall be in the direction of the nets, and both of them shall be of such a character as to show all around the horizon, and to be visible at a distance of not less than 3 miles.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of these two lights. Should they, however, not carry it, they shall show in the same position (in the direction of the net or gear) a white light, visible at a distance of not less than 1 sea mile, on the approach of or to other vessels.

(*c*) Vessels and boats, except open boats as defined in subdivision (*a*), when line fishing with their lines out and attached to or hauling their lines, and when not at anchor or stationary within the meaning of subdivision (*h*), shall carry the same lights as vessels fishing with drift nets. When shooting lines, or fishing with towing lines, they shall carry the lights prescribed for a steam or sailing vessel under way, respectively.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea, sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of these two lights. Should they, however, not carry it, they shall show in the same position (in the direction of the lines) a white light visible at a distance of not less than 1 sea mile on the approach of or to other vessels.

(*d*) Vessels when engaged in trawling, by which is meant the dragging of an apparatus along the bottom of the sea—

First. If steam vessels, shall carry in the same position as the white light mentioned, in article 2 (*a*) a tricolored lantern so constructed and fixed as to show a white light from right ahead to two points on each bow, and a green light and a red light over an arc of the horizon from two points on each bow to two points abaft the beam on the starboard and port sides, respectively; and not less than 6 nor more than 12 feet below the tricolored lantern a white light in a lantern, so constructed as to show a clear, uniform, and unbroken light all around the horizon.

Second. If sailing vessels, shall carry a white light in a lantern, so constructed as to show a clear, uniform, and unbroken light all around the horizon, and shall also, on the approach of or to other vessels, show where it can best be seen a white flare-up or torch in sufficient time to prevent collision.

All lights mentioned in subdivision (*d*) first and second shall be visible at a distance of at least 2 miles.

(*e*) Oyster dredgers and other vessels fishing with dredge nets shall carry and show the same lights as trawlers.

(*f*) Fishing vessels and fishing boats may at any time use a flare-up light in addition to the lights which they are by this article required to carry and show, and they may also use working lights.

(*g*) Every fishing vessel and every fishing boat under 150 feet in length, when at anchor, shall exhibit a white light visible all around the horizon at a distance of at least 1 mile.

Every fishing vessel of 150 feet in length or upward, when at anchor, shall exhibit a white light visible all around the horizon at a distance of at least 1 mile, and shall exhibit a second light as provided for vessels of such length by article 11.

Should any such vessel, whether under 150 feet in length or of 150 feet in length or upward, be attached to a net or other fishing gear, she shall on the approach of other vessels show an additional white light at least 3 feet below the anchor light, and at a horizontal distance of at least 5 feet away from it in the direction of the net or gear.

(*h*) If a vessel or boat when fishing become stationary in consequence of her gear setting fast to a rock or other obstruction, she shall in day time haul down the day signal required by subdivision (*k*); at night show the light or lights prescribed for a vessel at anchor; and during fog, mist, falling snow, or heavy rainstorms make the signal prescribed for a vessel at anchor. (See subdivision (*d*) and the last paragraph of article 15.)

(*i*) In fog, mist, falling snow, or heavy rainstorms drift-net vessels attached to their nets, and vessels when trawling, dredging, or fishing with any kind of drag net, and vessels line fishing with their lines out, shall, if of 20 tons gross tonnage or upward, respectively, at intervals of not more than 1 minute make a blast; if steam vessels, with the whistle or siren, and if sailing vessels, with the foghorn, each blast to be followed by ringing the bell. Fishing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals; but if they do not, they shall make some other efficient sound signal at intervals of not more than 1 minute.

(*k*) All vessels or boats fishing with nets or lines or trawls, when under way, shall in daytime indicate their occupation to an approaching vessel by displaying a basket or other efficient signal where it can best be seen. If vessels or boats at anchor have their gear out, they shall, on the approach of other vesesls, show the same signal on the side on which those vessels can pass.

The vessels required by this article to carry or show the lights hereinbefore specified shall not be obliged to carry the lights prescribed by article 4 (*a*) and the last paragraph of article 11.

Art. 10. A vessel which is being overtaken by another shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

The white light required to be shown by this article may be fixed and carried in a lantern, but in such case the lantern shall be so constructed, fitted, and screened that it shall throw an unbroken light over an arc of the horizon of twelve points of the compass, namely, for six points from right aft on each side of the vessel, so as to be visible at a distance of at least 1 mile. Such light shall be carried as nearly as practicable on the same level as the side lights.

Art. 11. A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upwards in length when at anchor shall carry in the forward part of the vessel, at a height of not less than 20 and not exceeding 40 feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall not be less than 15 feet lower than the forward light, another such light.

The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

A vessel aground in or near a fairway shall carry the above light or lights and the two red lights prescribed by article 4 (*a*).

Art. 12. Every vessel may, if necessary in order to attract attention in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that cannot be mistaken for a distress signal.

Art. 13. Nothing in these rules shall interfere with the operation of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective governments and duly registered and published.

Art. 14. A steam vessel proceeding under sail only, but having her funnel up, shall carry in daytime, forward, where it can best be seen, one black ball or shape 2 feet in diameter.

SOUND-SIGNALS FOR FOG, AND SO FORTH

Art. 15. All signals prescribed by this article for vessels under way shall be given.

First. By "steam vessels", on the whistle or siren.

Second. By "sailing vessel" and "vessels towed", on the foghorn.

The words "prolonged blast" used in this article shall mean a blast of from four to six seconds' duration.

A steam vessel shall be provided with an efficient whistle or siren sounded by steam or by some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient foghorn, to be sounded by mechanical means, and also with an efficient bell. In all cases where the rules require a bell to be used a drum may be substituted on board Turkish vessels, or a gong where such articles are used on board small seagoing vessels. A sailing vessel of twenty tons gross tonnage or upward shall be provided with a similar foghorn and bell.

In a fog, mist, falling snow, or heavy rainstorms, whether by day or night, the signals described in this article shall be used as follows, namely:

(*a*) A steam vessel having way upon her shall sound, at intervals of not more than two minutes, a prolonged blast.

(*b*) A steam vessel under way, but stopped, and having no way upon her, shall sound, at intervals of not more than two minutes, two prolonged blasts, with an interval of about one second between.

(*c*) A sailing vessel under way shall sound at intervals of not more than one minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession; and when with the wind abaft the beam, three blasts in succession.

(*d*) A vessel when at anchor shall, at intervals of not more than one minute, ring the bell rapidly for about five seconds.

(*e*) A vessel when towing, a vessel employed in laying or in picking up a telegraph cable, and a vessel under way, which is unable to get out of the way of an approaching vessel through being not under command, or unable to maneuver as required by the rules, shall, instead of the signals prescribed in subdivisions (*a*) and (*c*) of this article, at intervals of not more than two minutes, sound three blasts in succession, namely: One prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any other.

Sailing vessels and boats of less than twenty tons gross tonnage shall not be obliged to give the above-mentioned signals; but if they do not, they shall make some other efficient sound signal at intervals of not more than one minute.

SPEED OF SHIPS TO BE MODERATE IN FOG, AND SO FORTH

Art. 16. Every vessel shall, in a fog, mist, falling snow, or heavy rainstorms, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel, the position of which is not ascertained, shall so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

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STEERING AND SAILING RULES—PRELIMINARY—RISK OF COLLISION

Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

Art. 17. When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other, as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

Art. 18. When two steam vessels are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other.

This article only applies to cases where vessels are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two vessels which must, if both keep on their respective courses, pass clear of each other.

The only cases to which it does apply are when each of the two vessels is end on, or nearly end on, to the other; in other words, to cases in which, by day, each vessel sees the masts of the other in a line, or nearly in a line, with her own; and by night, to cases in which each vessel is in such a position as to see both the side lights of the other.

It does not apply by day to cases in which a vessel sees another ahead crossing her own course; or by night, to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

Art. 19. When two steam vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other.

Art. 20. When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

Art. 21. Where, by any of these rules, one of two vessels is to keep out of the way, the other shall keep her course and speed.

Note.—When, in consequence of thick weather or other causes, such vessel finds herself so close that collision cannot be avoided by the action of the giving-way vessel alone, she also shall take such action as will best aid to avert collision. [See articles twenty-seven and twenty-nine.]

Art. 22. Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

Art. 23. Every steam vessel which is directed by these rules to keep out of the way of another vessel, shall, on approaching her, if necessary, slacken her speed or stop or reverse.

Art. 24. Notwithstanding anything contained in these rules every vessel, overtaking any other, shall keep out of the way of the overtaken vessel.

Every vessel coming up with another vessel from any direction more than two points abaft her beam—that is, in such a position, with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's side lights—shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel cannot always know with certainty whether she is forward of or abaft this direction from the other vessel she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

Art. 25. In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or midchannel which lies on the starboard side of such vessel.

Art. 26. Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats.

Art. 27. In obeying and construing these rules due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

SOUND SIGNALS FOR VESSELS IN SIGHT OF ONE ANOTHER

Art. 28. The words "short blast" used in this article shall mean a blast of about one second's duration.

When vessels are in sight of one another, a steam vessel under way, in taking any course authorized or required by these rules, shall indicate that course by the following signals on her whistle or siren, namely:

One short blast to mean, "I am directing my course to starboard."

Two short blasts to mean, "I am directing my course to port."

Three short blasts to mean, "My engines are going at full speed astern."

NO VESSEL UNDER ANY CIRCUMSTANCES TO NEGLECT PROPER PRECAUTIONS

Art. 29. Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

RESERVATION OF RULES FOR HARBORS AND INLAND NAVIGATION

Art. 30. Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbor, river, or inland waters.

DISTRESS SIGNALS

Art. 31. When a vessel is in distress and requires assistance from other vessels or from the shore the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime: First. A Gun or other explosive signal fired at intervals of about a minute.

Second. The international code signal of distress indicated by N C.

Third. The distance signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball.

Fourth. A continuous sounding with any fog-signal apparatus.

At night: First. A gun or other explosive signal fired at intervals of about a minute.

Second. Flames on the vessel (as from a burning tar barrel, oil barrel, and so forth).

Third. Rockets or shells throwing stars of any color or description, fired one at a time, at short intervals.

Fourth. A continuous sounding with any fog-signal apparatus.

INLAND RULES TO PREVENT COLLISION OF VESSELS

AN ACT To adopt regulations for preventing collisions upon certain harbors, rivers, and inland waters of the United States

Whereas the provisions of chapter eight hundred and two of the laws of eighteen hundred and ninety, and the amendments therto, adopting regulations for preventing collisions at sea, apply to all waters of the United States connected with the high seas navigable by seagoing vessels, except so far as the navigation of any harbor, river, or inland waters is regulated by special rules duly made by local authority; and

Whereas it is desirable that the regulations relating to the navigation of all harbors, rivers, and inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal and the Red River of the North and rivers emptying into the Gulf of Mexico and their tributaries, shall be stated in one act: Therefore

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following regulations for preventing collision shall be followed by all vessels navigating all harbors, rivers, and inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal and the Red River of the North and rivers emptying into the Gulf of Mexico and their tributaries, and are hereby declared special rules duly made by local authority:

PRELIMINARY

In the following rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The words "steam vessel" shall include any vessel propelled by machinery.

A vessel is "under way", within the meaning of these rules, when she is not at anchor, or made fast to the shore, or aground.

RULES CONCERNING LIGHTS, AND SO FORTH

The word "visible" in these rules, when applied to lights, shall mean visible on a dark night with a clear atmosphere.

Article 1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

Art. 2.[1] A steam vessel when under way shall carry—(*a*) On or in front of the foremast, or, if a vessel without a foremast, then in the fore part of the vessel, a bright white light so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red side lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

(*e*) A seagoing steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least fifteen feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

(*f*) All steam vessels (except seagoing vessels and ferryboats), shall carry in addition to green and red lights required by article two (*b*), (*c*), and screens as required by article two (*d*), a central range of two white lights; the after light being carried at an elevation at least fifteen feet above the light at the head of the vessel. The headlight shall be so constructed as to show an unbroken light through twenty points of the compass, namely, from right ahead to two points abaft the beam on either side of the vessel, and the after light so as to show all around the horizon.

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[1] Article 2 is amended by act of Congress approved June 9, 1910, effective on and after July 9, 1910, in rules for lights required to be carried by every vessel propelled by machinery and not more than 65 feet in length, except tugboats and towboats propelled by steam. (See p. 375.)

Art. 3. A steam vessel when towing another vessel shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than three feet apart, and when towing more than one vessel shall carry an additional bright white light three feet above or below such lights, if the length of the tow measuring from the stern of the towing vessel to the stern of the last vessel towed exceeds six hundred feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in article two (*a*) or the after range light mentioned in article two (*f*).

Such steam vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

Art. 5. A sailing vessel under way and any vessel being towed, except barges, canal boats, scows, and other vessels of nondescript type, when in tow of steam vessels, shall carry the same lights as are prescribed by article two for a steam vessel under way, with the exception of the white lights mentioned therein, which they shall never carry.

Art. 6. Whenever, as in the case of vessels of less than ten gross tons under way during bad weather, the green and red side lights cannot be fixed, these lights shall be kept at hand, lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

Art. 7. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision.

Art. 8. Pilot vessels when engaged on their station on pilotage duty shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side lights lighted ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading, but the green light shall not be shown on the port side nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside of a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand, ready for use, a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

Pilot vessels, when not engaged on their stations on pilotage duty, shall carry lights similar to those of other vessels of their tonnage.

A steam pilot vessel when engaged on her station on pilotage duty and in waters of the United States, and not at anchor, shall in addition to the lights required for all pilot boats, carry at a distance of eight feet below her white masthead light a red light visible all around the horizon and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles, and also the colored side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and in waters of the United States, and at anchor, she shall carry, in addition to the lights required for all pilot boats, the red light above mentioned, but not the colored side lights.

When not engaged on her station on pilotage duty, she shall carry the same lights as other steam vessels.

Art. 9. (*a*) Fishing vessels of less than ten gross tons, when under way and when not having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side lights; but every such vessels shall, in lieu thereof, have ready at hand a lantern with a green glass on one side and a red glass on the other side, and on approaching to or being approached by another vessel such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

(*b*) All fishing vessels and fishing boats of ten gross tons or upward, when under way and when not having their nets, trawls, dredges, or lines in the water, shall carry and show the same lights as other vessels under way.

(*c*) All vessels, when trawling, dredging, or fishing with any kind of drag nets or lines, shall exhibit, from some part of the vessel where they can be best seen, two lights. One of these lights shall be red and the other shall be white. The red light shall be above the white light and shall be at a vertical distance from it of not less than six feet and not more than twelve feet; and the horizontal distance between them, if any, shall not be more than ten feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all around the horizon, the white light a distance of not less than three miles and a red light of not less than two miles.

(*d*) Rafts or other water craft not herein provided for, navigating by hand power, horsepower, or by the current of the river, shall carry one or more good white lights, which shall be placed in such manner as shall be prescribed by the Board of Supervising Inspectors of Steam Vessels.

Art. 10. A vessel which is being overtaken by another, except a steam vessel with an after range light showing all around the horizon, shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

Art. 11. A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upward in length when at anchor shall carry in the forward part of the vessel, at a height of not less than 20 and not exceeding 40 feet above the hull, 1 such light, and at or near the stern of the vessel, and at such a height that it shall be not less than 15 feet lower than the forward light, another such light. The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

Art. 12. Every vessel may, if necessary, in order to attract attention, in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that cannot be mistaken for a distress signal.

Art. 13. Nothing in these rules shall interfere with the operation of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective governments, and duly registered and published.

Art. 14. A steam vessel proceeding under sail only, but having her funnel up, may carry in daytime, forward, where it can best be seen, one black ball or shape 2 feet in diameter.

SOUND SIGNALS FOR FOG, AND SO FORTH

Art. 15. All signals prescribed by this article for vessels under way shall be given:

1. By "steam vessels" on the whistle or siren.
2. By "sailing vessels" and "vessels towed" on the foghorn.

The words "prolonged blast" used in this article shall mean a blast of from 4 to 6 seconds' duration.

A steam vessel shall be provided with an efficient whistle or siren, sounded by steam or by some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient foghorn; also with an efficient bell. A sailing vessel of 20 tons gross tonnage or upward shall be provided with a similar foghorn and bell.

In fog, mist, falling snow, or heavy rainstorms, whether by day or night, the signals described in this article shall be used as follows, namely:

(*a*) A steam vessel under way shall sound, at intervals of not more than 1 minute a prolonged blast.

(*b*) A sailing vessel under way shall sound, at intervals of not more than 1 minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession, and when with the wind abaft the beam, three blasts in succession.

(*c*) A vessel when at anchor shall, at intervals of not more than 1 minute, ring the bell rapidly for about 5 seconds.

(*d*) A steam vessel when towing shall, instead of the signals prescribed in subdivision (*a*) of this article, at intervals of not more than 1 minute, sound

three blasts in succession, namely, one prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any other.

(*e*) All rafts or other water craft not herein provided for, navigating by hand power, horsepower, or by the current of the river, shall sound a blast of the foghorn, or equivalent signal, at intervals of not more than 1 minute.

SPEED OF SHIPS TO BE MODERATE IN FOG, AND SO FORTH

Art. 16. Every vessel shall, in a fog, mist, falling snow, or heavy rainstorm, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel the position of which is not ascertained shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

STEERING AND SAILING RULES—PRELIMINARY—RISK OF COLLISION

Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

Art. 17. When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

Art. 18. Rule I. When steam vessels are approaching each other head and head, that is, end on, or nearly so, it shall be the duty of each to pass on the port side of the other; and either vessel shall give, as a signal of her intention, one short and distinct blast of her whistle, which the other vessel shall answer promptly by a similar blast of her whistle, and thereupon such vessels shall pass on the port side of each other. But if the courses of such vessels are so far on the starboard of each other as not to be considered as meeting head and head, either vessel shall immediately give two short and distinct blasts of her whistle, which the other vessel shall answer promptly by two similar blasts of her whistle, and they shall pass on the starboard side of each other.

The foregoing only applies to cases where vessels are meeting end on or nearly end on, in such a manner as to involve risk of collision; in other words, to cases in which, by day, each vessel sees the masts of the other in a line or nearly in a line with her own, and by night to cases in which each vessel is in such a position as to see both the side lights of the other.

It does not apply by day to cases in which a vessel sees another ahead crossing her own course, or by night to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light or a green light without a red light is seen ahead, or where both green and red lights are seen anywhere but ahead.

Rule III. 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.

Rule V. Whenever a steam vessel is nearing a short bend or curve in the channel, where, from the height of the banks or other cause, a steam vessel approaching from the opposite direction cannot be seen for a distance of half a mile, such steam vessel, when she shall have arrived within a half mile of such curve or bend, shall give a signal by one long blast of the steam whistle, which signal shall be answered by a similar blast, given by any approaching steam vessel that may be within hearing. Should such signal be so answered by a steam vessel upon the farther side of such bend, then the usual signals

for meeting and passing shall immediately be given and answered; but, if the first alarm signal of such vessel be not answered, she is to consider the channel clear, and govern herself accordingly.

When steam vessels are moved from their docks or berths, and other boats are liable to pass from any direction toward them, they shall give the same signal as in the case of vessels meeting at a bend, but immediately after clearing the berths so as to be fully in sight they shall be governed by the steering and sailing rules.

Rule VIII. When steam vessels are running in the same direction, and the vessel which is astern shall desire to pass on the right or starboard hand of the vessel ahead, she shall give one short blast of the steam whistle, as a signal of such desire, and if the vessel ahead answers with one blast, she shall put her helm to port; or if she shall desire to pass on the left or port side of the vessel ahead, she shall give two short blasts of the steam whistle as a signal of such desire, and if the vessel ahead answers with two blasts, shall put her helm to starboard; or if the vessel ahead does not think it safe for the vessel astern to attempt to pass at that point, she shall immediately signify the same by giving several short and rapid blasts of the steam whistle, not less than four, and under no circumstances shall the vessel astern attempt to pass the vessel ahead until such time as they have reached a point where it can be safely done, when said vessel ahead shall signify her willingness by blowing the proper signals. The vessel ahead shall in no case attempt to cross the bow or crowd upon the course of the passing vessel.

Rule IX. The whistle signals provided in the rules under this article, for steam vessels meeting, passing, or overtaking, are never to be used except when steamers are in sight of each other, and the course and position of each can be determined in the daytime by a sight of the vessel itself, or by night by seeing its signal lights. In fog, mist, falling snow, or heavy rainstorms, when vessels cannot so see each other, fog signals only must be given.

Art. 19. When two steam vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other.

Art. 20. When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

Art. 21. Where, by any of these rules, one of the two vessels is to keep out of the way, the other shall keep her course and speed. See Articles 27 and 29.

Art. 22. Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

Art. 23. Every steam vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse.

Art. 24. Notwithstanding anything contained in these rules, every vessel, overtaking any other, shall keep out of the way of the overtaken vessel. Every vessel coming up with another vessel from any direction more than two points abaft her beam—that is, in such position with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's sidelights—shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel cannot always know with certainty whether she is forward or abaft this direction from the other vessel she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

Art. 25. In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or midchannel which lies on the starboard side of such vessel.

Art. 26. Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats.

Art. 27. In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger. See Art. 18.

SOUND SIGNALS FOR VESSELS IN SIGHT OF ONE ANOTHER

Art. 28. When vessels are in sight of one another, a steam vessel under way whose engines are going at full speed astern shall indicate that fact by three short blasts on the whistle.

NO VESSEL UNDER ANY CIRCUMSTANCES TO NEGLECT PROPER PRECAUTIONS

Art. 29. Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

Art. 30. The exhibition of any light on board of a vessel of war of the United States or a Coast Guard cutter may be suspended whenever, in the opinion of the Secretary of the Navy, the commander in chief of a squadron, or the commander of a vessel acting singly, the special character of the service may require it.

DISTRESS SIGNALS

Art. 31. When a vessel is in distress and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime: A continuous sounding with any fog-signal apparatus, or firing a gun.

At night: First, flames on the vessel as from a burning tar barrel, oil barrel, and so forth.

Second. A continuous sounding with any fog-signal apparatus, or firing a gun.

RULES FOR LIGHTS FOR CERTAIN CLASSES OF VESSELS

RULES FOR LIGHTS FOR CERTAIN CLASSES OF VESSELS NAVIGATING THE HARBORS, RIVERS, AND INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL, AND THE RED RIVER OF THE NORTH, AND RIVERS EMPTYING INTO THE GULF OF MEXICO, AND THEIR TRIBUTARIES[2]

The following rules for lights to be carried by ferryboats, rules for lights for barges and canal boats in tow of steam vessels, rules for lights for rafts and other water craft navigating by hand power, horsepower, or by the current of the river, rule relating to use of searchlight, rule prohibiting unnecessary sounding of the steam whistle, rule prohibiting the carrying of unauthorized lights on steam vessels, and rules relating to drawbridges over navigable water of the United States were adopted by the Board of Supervising Inspectors, Steamboat Inspection Service, and approved by the Secretary of Commerce.

These rules concerning lights shall be complied with in all weathers from sunset to sunrise.

RULES FOR LIGHTS TO BE CARRIED BY FERRYBOATS NAVIGATING THE HARBORS, RIVERS, AND INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL, AND THE RED RIVER OF THE NORTH, AND RIVERS EMPTYING INTO THE GULF OF MEXICO, AND THEIR TRIBUTARIES[2]

Ferryboats propelled by machinery and navigating the harbors, rivers, and other inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal, and the Red River of the North, and rivers emptying into the Gulf of Mexico, and their tributaries, shall carry the range lights and the colored side lights required by law to be carried on steam vessels navigating those waters, except that *double-end ferryboats* shall carry a central range of clear, bright, white lights, showing all around the horizon, placed at equal altitudes forward and aft, also on the starboard side a green light, and on the port side a red light, of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 2 miles, and so constructed as to show a uniform and un-

[2] See act of Congress approved June 9, 1910, effective on and after July 9, 1910, prescribing lights that shall be carried by certain classes of vessels of not more than 65 feet in length, amendatory to these rules, p. 375.

broken light over an arc of the horizon of 10 points of the compass, and so fixed as to throw the light from right ahead to 2 points abaft the beam on their respective sides.

The green and red lights shall be fitted with inboard screens projecting at least 3 feet forward from the lights, so as to prevent them from being seen across the bow.

Local inspectors in districts having ferryboats shall, whenever the safety of navigation may require, designate for each line of such boats a certain light, white or colored, which will show all around the horizon, to designate and distinguish such lines from each other, which lights shall be carried on a flagstaff amidships, 15 feet above the white range lights.

RULES FOR LIGHTS FOR BARGES AND CANAL BOATS IN TOW OF STEAM VESSELS AND FOR LIGHTS AND DAY SIGNALS FOR DREDGES, VESSELS WORKING ON WRECKS, ETC., NAVIGATING THE HARBORS, RIVERS, AND OTHER INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL, AND THE RED RIVER OF THE NORTH, AND RIVERS EMPTYING INTO THE GULF OF MEXICO, AND THEIR TRIBUTARIES

Lights for barges and canal boats in tow of steam vessels on certain inland waters on the seaboard, except the Hudson River and adjacent waters and Lake Champlain.—On the harbors, rivers, and other inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal, and the Red River of the North, and rivers emptying into the Gulf of Mexico, and their tributaries, and except on the waters of the Hudson River and its tributaries from Troy to the boundary lines of New York Harbor off Sandy Hook, as defined pursuant to section 2 of the act of Congress of February 19, 1895, the East River, and Long Island Sound (and the waters entering thereon, and to the Atlantic Ocean), to and including Narragansett Bay, R. I., and tributaries, and Lake Champlain, barges (except scows) and canal boats in tow of steam vessels shall carry lights as follows:

Barges and canal boats towing astern of steam vessels, when towing singly, or what is known as "tandem towing", shall each carry a green light on the starboard side and a red light on the port side, and a white light on the stern, except that the last vessel of such tow shall carry two white lights on her stern, athwartship, horizontal to each other, not less than 5 feet apart, and not less than 4 feet above the deck house, and so placed as to show all around the horizon.

When two or more boats are abreast, the colored lights shall be carried at the outer sides of the bows of the outside boats. Each of the outside boats in last tier of a hawser tow shall carry a white light on her stern.

The white light required to be carried on stern of a barge or canal boat carrying red and green side lights shall be carried in a lantern so constructed that it shall show an unbroken light over an arc of the horizon of 12 points of the compass, namely, for 6 points from right aft on each side of the vessel, and shall be of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 2 miles.

Barges or canal boats towing alongside a steam vessel shall, if the deck, deck houses, or cargo of the barge or canal boat be so high above water as to obscure the side lights of the towing steamer when being towed on the starboard side of the steamer, carry a green light upon the starboard side; and when towed on the port side of the steamer, a red light on the port side of the barge or canal boat; and if there is more than one barge or canal boat abreast, the colored lights shall be displayed from the outer side of the outside barges or canal boats.

The colored side lights referred to in these rules for barges and canal boats in tow shall be fitted with inboard screens, so as to prevent them from being seen across the bow, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least 2 miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of 10 points of the compass, and so fixed as to throw the light from right ahead to 2 points abaft the beam on either side. The minimum size of the glass globes shall not be less than 6 inches in diameter and 5 inches high in the clear.

Scows when being towed by steam vessels on the waters covered by the first paragraph of these rules shall carry a white light at each end of each scow, except that when such scows are massed in tiers, two or more abreast, each

of the outside scows shall carry a white light on its outer bow, and the outside scows in the last tier shall each carry, in addition, a white light on the outer part of the stern. The white light shall be carried not less than 8 feet above the surface of the water, and shall be so placed as to show an unbroken light all around the horizon, and shall be of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 5 miles.

RULES FOR LIGHTS AND DAY SIGNALS TO BE CARRIED BY VESSELS, DREDGES OF ALL TYPES, AND VESSELS WORKING ON WRECKS OR OTHER OBSTRUCTIONS TO NAVIGATION, OR MOORED FOR SUBMARINE OPERATION, OR MADE FAST TO A SUNKEN OBJECT WHICH MAY DRIFT WITH THE TIDE OR BE TOWED [3]

Rule for signals to be displayed by a towing vessel when towing a submerged or partly submerged object upon a hawser when no signals are displayed upon the object which is towed.—The vessel having the submerged object in tow shall display, by day, where they can best be seen, two shapes, one above the other, not less than 6 feet apart, the lower shape to be carried not less than 10 feet above the deck house. The shapes shall be in the form of a double frustum of a cone, base to base, not less than 2 feet in diameter at the center nor less than 8 inches at the ends of the cones, and to be not less than 4 feet lengthwise from end to end, the upper shape to be painted in alternate horizontal stripes of black and white, 8 inches in width, and the lower shape to be painted a solid bright red.

By night the towing vessel shall display the regular side lights, but in lieu of the regular white towing lights shall display four lights in a vertical position not less than 3 feet nor more than 6 feet apart, the upper and lower of such lights to be white, and the two middle lights to be red, all of such lights to be of the same character as is now prescribed for the regular towing lights.

Rule for steamers, derrick boats, lighters, or other types of vessels made fast alongside a wreck, or moored over a wreck which is on the bottom or partly submerged or which may be drifting.—Steamers, derrick boats, lighters, or other types of vessels made fast alongside a wreck, or moored over a wreck which is on the bottom or partly submerged, or which may be drifting, shall display by day two shapes of the same character and dimensions and displayed in the same manner as required by the foregoing rule, except that both the shapes shall be painted a solid bright red; but where more than one vessel is working under the above conditions, the shapes need be displayed only from one vessel on each side of the wreck from which it can best be seen from all directions.

By night this situation shall be indicated by the display of a white light from the bow and stern of each outside vessel or lighter not less than 6 feet above the deck, and in addition thereto there shall be displayed in a position where they may best be seen from all directions two red lights carried in a vertical line not less than 3 feet nor more than 6 feet apart, and not less than 15 feet above the deck.

Rule for dredges which are held in stationary position by moorings or spuds.—Dredges which are held in stationary position by moorings or spuds shall display by day two red balls not less than 2 feet in diameter and carried in a vertical line not less than 3 feet nor more than 6 feet apart, and at least 15 feet above the deck house and in such a position where they can best be seen from all directions. By night they shall display a white light at each corner, not less than 6 feet above the deck, and in addition thereto there shall be displayed in a position where they may best be seen from all directions two red lights carried in a vertical line not less than 3 feet nor more than 6 feet apart, and not less than 15 feet above the deck. When scows are moored alongside a dredge in the foregoing situation they shall display a white light on each outboard corner, not less than 6 feet above the deck.

Rule for self-propelling suction dredges under way with their suctions on the bottom.—Self-propelling suction dredges under way with their suction on the bottom shall display by day the same signals as are used to designate any steamer not under control; that is to say, two black balls not less than 2 feet in diameter and carried not less than 15 feet above the deck house, and where they may best be seen from all directions.

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[3] Adopted by executive committee of Board of Supervising Inspectors on July 22, 1914, and approved by Secretary of Commerce on July 28, 1914. Adopted by Board of Supervising Inspectors on Jan. 20, 1915, and approved by the Secretary of Commerce on Apr. 12, 1915.

By night they shall carry, in addition to the regular running lights, two red lights of the same character as the masthead light, in the same vertical plane and underneath the masthead light, the red lights to be not less than 3 feet nor more than 6 feet apart and the upper red light to be not less than 4 feet and not more than 6 feet below the white masthead light, and on or near the stern two red lights in the same vertical plane not less than 4 feet nor more than 6 feet apart, to show through 4 points of the compass; that is, from right astern to 2 points on each quarter.

Rule for vessels which are moored or anchored and engaged in laying pipe or operating on submarine construction or excavation.—Vessels which are moored or anchored, and engaged in laying pipe or operating on submarine construction or excavation shall display by day, not less than 15 feet above the deck, where they can best be seen from all directions, two balls not less than 2 feet in diameter, in a vertical line not less than 3 feet and not more than 6 feet apart, the upper ball to be painted in alternate black and white vertical stripes 6 inches wide, and the lower ball to be painted a solid bright red. By night they shall display three red lights, carried in a vertical line not less than 3 feet nor more than 6 feet apart and not less than 15 feet above the deck, and in such position as may best be seen from all directions.

All the lights required by these special rules for dredges, wrecking boats, lighters, etc., shall be of such size and character as to be visible on a dark night with a clear atmosphere for a distance of at least 2 miles.

Rule for vessels which are moored or at anchor.—Vessels of more than 300 gross tons, propelled by machinery, when moored or anchored in a fairway or channel where traffic is liable to congestion or confusion, shall display between sunrise and sunset, on the forward part of the vessel where it can best be observed from other vessels, one black ball or shape not less than 2 feet in diameter.

Rule for lights to be displayed on pipe lines.—Pipe lines attached to dredges, and either floating or supported on trestles, shall display by night one row of white lights not less than 8 feet nor more than 12 feet above the water, about equally spaced and in such number as to mark distinctly the entire length and course of the line, the intervals between lights where the line crosses navigable channels to be not more than 30 feet. There shall also be displayed on the shore or discharge end of the line two red lights, 3 feet apart, in a vertical line with the lower light at least 8 feet above the water, and if the line is to be opened at night for the passage of vessels, a similar arrangement of lights shall be displayed on each side of the opening. The lights shall be of the same size and character as specified in rule 5 above.

Rule for passing signals.—Vessels intending to pass dredges or other types of floating plant working in navigable channels, when within a reasonable distance therefrom and not in any case over a mile, shall indicate such intention by blowing the passing signal prescribed in the local pilot rules for vessels under way, which shall be answered in the usual manner from said plant if the channel is clear and the approaching vessel may pass on the course indicated; otherwise the floating plant shall sound the alarm or danger signal and the approaching vessel shall slow down or stop and await further signal from the plant.

When the pipe line from a dredge crosses the channel in such a way that an approaching vessel, owing to excessive draft or for other reasons, cannot pass around the pipe line or dredge, a signal shall be given from the vessel by sounding four blasts of the whistle, which shall be answered by a like signal from the dredge. The pipe line shall then be opened for the passage of the vessel as soon as practicable; when the line is open, ready for passage, the dredge shall so indicate by sounding the usual passing signal, and the approaching vessel shall promptly pass the dredge.

Rule for speed of vessels passing floating plant working in channels.—Steamers with or without tows, passing floating plant working in channels, shall reduce their speed sufficiently to insure the safety of both said plant and themselves, and when passing within 200 feet of said plant their speed shall not exceed 5 miles per hour. While passing over lines of said plant, propelling machinery shall be stopped.

Rule for light-draft vessels passing floating plant.—Vessels whose draft permits shall keep outside of the buoys marking the ends of mooring lines of floating plant working in channels.

Rule for aids to navigation marking floating-plant moorings.—Breast, stern, and bow anchors of floating plant working in navigable channels shall be

marked by barrel or other suitable buoys. By night approaching vessels shall be shown the location of adjacent buoys by throwing a suitable beam of light from said plant on the buoys until the approaching vessel has passed, or the buoys may be lighted by red lights, visible in all directions, of the same size and character as specified in rule 5 above: *Provided*, That the foregoing provisions of this paragraph shall not apply to floating plant working in the following waters of New York Harbor and adjacent waters; namely, the East River, the North River (Battery to Spuyten Duyvil), and the Harlem River.

Rule for obstruction of channel by floating plant.—Channels shall not be unnecessarily obstructed by any dredge or other floating plant. While vessels are passing such plant, all lines running therefrom across the channel on the passing side, which may interfere with or obstruct navigation, shall be slacked to the bottom of the channel.

Rule for protection of marks placed for the guidance of floating plant.—Vessels shall not run over anchor buoys, or buoys, stakes, or other marks placed for the guidance of floating plant working in channels; and shall not anchor on the ranges of buoys, stakes, or other marks placed for the guidance of such plant.

NOTE—If it is necessary to prohibit or limit the anchorage or movement of vessels within certain areas in order to facilitate the work of improvement, application should be made through official channels for establishment by the Secretary of War of special or temporary regulations for this purpose.

Rule for clearing of channels.—When special or temporary regulations have not been prescribed and action under these rules and regulations will not afford clear passage, floating plant in narrow channels shall, upon notice, move out of the way of vessels a sufficient distance to allow them a clear passage. Vessels desiring passage shall, however, give the master of the floating plant ample notice in advance of the time they expect to pass.

Rule relating to the use of searchlights.—Any master or pilot of any steam vessel who shall flash or cause to be flashed the rays of the searchlight into the pilot house of a passing vessel shall be deemed guilty of misconduct and shall be liable to have his license suspended or revoked.

Rule prohibiting unnecessary sounding of the steam whistle.—The Board of Supervising Inspectors, at their annual meeting of January 1907 adopted the following rule:

Unnecessary sounding of the steam whistle is prohibited within any harbor limits of the United States. Whenever any licensed officer in charge of any steamer authorizes or permits such unnecessary whistling, upon conviction thereof before any board of inspectors having jurisdiction, such officer shall be suspended from acting under his license as the inspectors trying the case may deem proper.

Rule prohibiting the carrying of unauthorized lights on steam vessels.—Any master or pilot of any steam vessel who shall authorize or permit the carrying of any light, electric or otherwise, not required by law, on the outside structure of the cabin or hull of the vessel that in any way will interfere with distinguishing the signal lights shall, upon conviction thereof before any board of inspectors having jurisdiction, be deemed guilty of misconduct and shall be liable to have his license suspended or revoked.

REGULATIONS OF MOTOR BOATS

AN ACT To amend laws for preventing collisions of vessels and to regulate equipment of certain motor boats on the navigable waters of the United States

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the words "motor boat", where used in this act, shall include every vessel propelled by machinery and not more than sixty-five feet in length, except tugboats and towboats propelled by steam. The length shall be measured from end to end over the deck, excluding sheer: *Provided*, That the engine, boiler, or other operating machinery shall be subject to inspection by the local inspectors of steam vessels, and to their approval of the design thereof, on all said motor boats which are more than forty feet in length and which are propelled by machinery driven by steam.

SEC. 2. That motor boats subject to the provisions of this Act shall be divided into classes as follows:

Class 1. Less than twenty-six feet in length.

Class 2. Twenty-six feet or over and less than forty feet in length.

Class 3. Forty feet or over and not more than sixty-five feet in length.

SEC. 3. That every motor boat, in all weathers, from sunset to sunrise, shall carry the following lights, and during such time no other lights which may be mistaken for those prescribed shall be exhibited:

(*a*) Every motor boat of class 1 shall carry the following lights:

First. A white light aft to show all around the horizon.

Second. A combined lantern in the fore part of the vessel and lower than the white light aft showing green to the starboard and red to port, so fixed as to throw the light from right ahead to two points abaft the beam on their respective sides.

(*b*) Every motor boat of classes 2 and 3 shall carry the following lights:

First. A bright white light in the fore part of the vessel as near the stem as practicable, so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side. The glass or lens shall be of not less than the following dimensions:

Class 2. Nineteen square inches.

Class 3. Thirty-one square inches.

Second. A white light aft to show all around the horizon.

Third. On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side. On the port side a red light so constructed as to show an unbroken light over an arc on the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side. The glasses or lenses in the said sidelights shall be of not less than the following dimensions on motor boats of—

Class 2. Sixteen square inches.

Class 3. Twenty-five square inches.

On and after July 1, 1911, all glasses or lenses prescribed by paragraph (b) of section 3 shall be fresnel or fluted. The said lights shall be fitted with inboard screens of sufficient height and so set as to prevent these lights from being seen across the bow and shall be of not less than the following dimensions on motor boats of—

Class 2. Eighteen inches long.

Class 3. Twenty-four inches long: *Provided*, That motor boats as defined in this Act, when propelled by sail and machinery or under sail alone, shall carry the colored lights suitably screened, but not the white lights prescribed by this section.

SEC. 4 (*a*) Every motor boat under the provisions of this Act shall be provided with a whistle or other sound-producing mechanical appliance capable of producing a blast of two seconds or more in duration, and in the case of such boats so provided a blast of at least two seconds shall be deemed a prolonged blast within the meaning of the law.

(*b*) Every motor boat of class 2 or 3 shall carry an efficient foghorn.

(*c*) Every motor boat of class 2 or 3 shall be provided with an efficient bell, which shall be not less than eight inches across the mouth, on board of vessels of class 3.

SEC. 5. That every motor boat subject to any of the provisions of this Act, and also all vessels propelled by machinery other than by steam, more than sixty-five feet in length, shall carry either life preservers or life belts or buoyant cushions, or ring buoys, or other device, to be prescribed by the Secretary of Commerce, sufficient to sustain afloat every person on board, and so placed as to be readily accessible. All motor boats carrying passengers for hire shall carry one life preserver of the sort prescribed by the regulations of the Board of Supervising Inspectors for every passenger carried, and no such boat while so carrying passengers for hire shall be operated or navigated except in charge of a person duly licensed for such service by the local board of inspectors. No examination shall be required as the condition of obtaining such license, and any such license shall be revoked or suspended by the local board of inspectors for misconduct, gross negligence, recklessness in navigation, intemperance, or violation of law on the part of the holder, and if revoked, the person holding such license shall be incapable of obtaining another such license for one year from the date of revocation: *Provided*, That motor boats shall not be required to carry licensed officers except as required in this Act.

SEC. 6. That every motor boat and also every vessel propelled by machinery other than by steam, more than sixty-five feet in length, shall carry ready for

immediate use the means of promptly and effectually extinguishing burning gasoline.

SEC. 7. That a fine not exceeding $100 may be imposed for any violation of this Act. The motor boat shall be liable for the said penalty and may be seized and proceeded against, by way of libel, in the district court of the United States for any district within which such vessel may be found.

SEC. 8. That the Secretary of Commerce shall make such regulations as may be necessary to secure the proper execution of this Act by collectors of customs and other officers of the Government. And the Secretary of the Department of Commerce may, upon application therefor, remit or mitigate any fine, penalty, or forfeiture relating to motor boats except for failure to observe the provisions of section 6 of this Act.

SEC. 9. That all laws and parts of laws only insofar as they are in conflict herewith are hereby repealed: *Provided*, That nothing in this Act shall be deemed to alter or amend acts of Congress embodying or revising international rules for preventing collisions at sea.

SEC. 10. That this Act shall take effect on and after thirty days after its approval.

Approved June 9, 1910.

Numbering motor boats.—Every undocumented vessel operated in whole or in part by machinery, owned in the United States and found on the navigable waters thereof, except public vessels, and vessels not exceeding 16 feet in length measured from end to end over the deck, excluding sheer, temporarily equipped with detachable motors, shall be numbered. Such numbers shall be not less in size than 3 inches and painted or attached to each bow of the vessel in such manner and color as to be distinctly visible and legible.

The said numbers, on application of the owner or master, shall be awarded by the collector of customs of the district in which the vessel is owned and a record thereof kept in the customhouse of the district in which the owner or managing owner resides. No numbers not so awarded shall be carried on the bows of such vessel.

METEOROLOGICAL TABLE, KEY WEST, FLA.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean max.	Air temperature: Mean: Mean min.	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0-10	Precipitation: Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Max. fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of hours from each direction: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Number of days with winds of 32 miles or over	Number of days dense fog
	Ins.	*Ins.*	*Ins.*	*Ins.*	°																								
January	30.10	30.50	29.71	0.79	69.5	74.4	65.2	9.2	90	41	49	80	4	1.96	8	3.97	10.4	46	14	33	23	17	6	2	1	4	0	0	*
February	30.07	30.47	29.60	.87	70.5	75.8	66.1	9.7	87	44	43	76	3	1.34	6	2.99	10.2	44	14	22	18	26	7	4	2	7	0	1	*
March	30.05	30.47	29.60	.87	72.6	77.9	68.1	9.8	89	48	41	73	3	1.39	5	4.52	11.0	46	16	13	19	32	8	4	1	7	0	*	0
April	30.02	30.37	29.63	.74	75.7	80.9	71.2	9.7	91	54	37	71	3	1.29	4	3.23	10.4	45	12	11	23	33	7	4	2	8	0	1	0
May	29.97	30.25	29.68	.57	79.1	84.1	74.4	9.7	93	63	30	72	5	3.54	8	5.83	9.9	43	8	6	23	33	10	6	4	10	0	*	0
June	29.99	30.26	29.62	.64	81.9	87.0	77.1	9.9	100	65	35	74	5	4.24	11	5.48	9.2	40	3	4	18	48	11	7	2	7	0	0	0
July	30.03	30.24	29.77	.47	83.5	88.6	78.4	10.2	100	68	32	72	5	3.28	12	7.46	8.5	41	3	4	23	43	11	8	3	5	0	*	0
August	29.98	30.20	29.67	.53	83.5	88.9	78.3	10.6	100	68	32	72	5	4.51	14	8.32	8.6	40	3	8	29	34	11	6	3	6	0	1	0
September	29.94	30.17	28.83	1.34	82.2	87.5	77.3	10.2	97	69	28	75	5	6.70	16	11.95	9.6	84	3	11	33	34	8	7	1	3	0	1	0
October	29.94	30.28	28.47	1.81	79.1	83.3	74.6	8.7	92	59	33	76	5	6.00	13	13.54	10.4	76	11	27	29	16	6	4	2	5	0	*	0
November	30.09	30.46	29.65	.80	74.3	78.4	70.2	8.2	91	51	40	76	4	2.19	7	8.86	10.8	41	15	39	27	11	1	2	1	4	0	*	0
December	30.08	30.52	29.63	.89	70.3	75.0	66.3	8.7	88	44	44	78	4	1.67	7	3.93	10.2	44	16	33	20	17	6	3	1	4	0	*	*
Mean	30.02				76.8	81.8	72.3	9.6				75	4				9.9		11	13	25	30	8	5	2	6	0		
Total														38.11	112													4	*

* Mean less than 1.

METEOROLOGICAL TABLE, TAMPA, FLA.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean max.	Air temperature: Mean: Mean min.	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds, 0-10	Precipitation: Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Max. fell in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of hours from each direction: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Number of days with winds of 32 miles or over	Number of days dense fog
	Ins.	*Ins.*	*Ins.*	*Ins.*	°	°	°	°	°	°	°																		
January	30.12	30.56	29.44	1.12	60.4	69.9	52.3	17.6	83	23	50	73	5	2.69	7	3.58	7.9	37	16	25	13	7	11	8	8	12	0	(1)	4
February	30.10	30.59	29.48	1.11	61.9	71.4	53.7	17.7	86	22	64	71	5	2.56	7	4.06	8.3	46	12	19	10	7	14	13	12	13	0	(1)	3
March	30.07	30.51	29.52	.99	66.8	75.9	57.7	18.2	92	32	60	68	4	2.43	6	5.62	8.5	40	9	18	12	9	12	15	14	11	0	(1)	2
April	30.06	30.39	29.59	.80	70.9	80.4	62.0	18.4	91	38	53	66	4	2.01	5	4.25	8.3	37	7	18	18	9	11	15	13	9	0	(1)	1
May	29.99	30.33	29.64	.69	76.3	85.5	67.6	17.9	94	52	42	66	5	2.99	7	3.55	7.8	47	6	21	18	10	9	12	16	8	0	(1)	(1)
June	30.01	30.32	29.60	.72	80.2	88.6	71.9	16.7	98	59	39	71	6	7.25	14	7.81	7.3	39	4	20	21	9	11	12	17	6	0	(1)	(1)
July	30.04	30.29	29.80	.49	81.2	89.4	73.7	15.7	97	65	32	73	6	7.95	17	5.53	6.8	39	4	13	19	11	14	16	17	5	1	(1)	(1)
August	30.00	30.26	29.57	.69	81.5	89.6	73.8	15.8	97	66	31	73	6	0.18	17	5.04	6.7	44	6	20	21	11	12	11	12	6	1	(1)	(1)
September	29.97	30.24	29.46	.78	79.9	88.3	72.3	16.0	96	54	42	74	6	6.42	15	7.27	7.5	46	8	33	25	9	7	6	7	5	0	(1)	(1)
October	29.98	30.43	28.81	1.62	74.3	82.6	66.3	16.3	93	43	50	72	5	3.09	8	6.48	8.3	53	13	42	19	5	5	4	6	6	0	(1)	1
November	30.08	30.51	29.67	.84	66.9	75.9	58.2	17.7	88	32	56	69	4	1.72	5	4.18	8.0	32	21	31	18	4	6	4	6	10	0	(1)	2
December	30.12	30.64	29.64	1.00	61.1	70.9	53.3	17.6	86	19	67	73	5	2.07	7	3.93	7.7	41	16	24	14	7	11	6	8	14	0	(1)	3
Mean	30.04				71.8	80.7	63.6	17.1				71	5				7.8		10	23	18	8	11	10	11	9	0	(1)	
Total														49.36	115												2	1	16

[1] Mean less than 1.

METEOROLOGICAL TABLE, PENSACOLA, FLA.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level				Air temperature, in °F.							Average relative humidity	Average amount of clouds 0-10	Precipitation			Wind										Number of days with winds of 32 miles or over	Number of days dense fog
	Mean	Extremes			Mean				Extremes								Statute miles		Percentage of hours from each direction									
	For month	Highest	Lowest	Range	For month	Mean max.	Mean min.	Range	Highest	Lowest	Range			Average fall	Number of days 0.01 inch or more	Max. fall in 24 hours	Average hourly velocity	Highest velocity	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm		
	Ins.	*Ins.*	*Ins.*	*Ins.*	°	°	°	°	°	°	°																		
January	30.14	30.75	29.18	1.57	52.5	60.2	46.0	14.2	79	14	65	77	6	3.99	10	8.00	11.0	51	23	17	16	9	13	7	8	7	0	2	3
February	30.11	30.67	29.17	1.50	55.2	62.3	48.4	13.9	78	7	71	77	6	4.34	10	5.05	11.3	47	19	13	13	12	15	10	10	8	0	2	3
March	30.06	30.60	29.39	1.21	60.3	67.0	53.7	13.3	87	23	64	76	5	4.77	9	8.32	11.6	60	18	12	13	16	16	9	9	7	0	3	3
April	30.02	30.40	29.40	1.00	66.7	73.0	60.5	12.5	92	34	58	75	5	4.03	7	8.91	11.3	57	13	9	8	18	23	12	10	7	0	2	1
May	29.99	30.39	29.56	.83	73.9	79.7	67.3	12.4	94	44	50	75	4	3.37	7	5.63	10.7	59	12	9	10	13	25	15	10	6	0	1	(1)
June	29.99	30.25	29.62	.63	79.3	85.2	73.5	11.7	101	55	46	75	5	4.68	10	10.70	10.1	51	9	6	9	10	24	18	18	6	0	2	(1)
July	30.01	30.27	28.92	1.35	81.0	86.8	74.8	12.0	103	62	41	77	6	6.77	14	5.01	9.5	79	10	6	8	7	18	18	24	9	0	1	(1)
August	29.98	30.24	29.27	.97	80.9	86.9	74.5	12.4	99	62	37	77	5	8.02	14	9.60	9.2	71	12	9	12	8	19	15	17	8	0	1	(1)
September	29.99	30.25	28.51	1.74	78.0	84.7	71.8	12.9	102	49	53	75	5	5.33	9	8.56	10.1	88	13	21	19	11	16	8	8	4	0	1	(1)
October	30.03	30.54	28.76	1.78	69.9	77.0	62.5	14.5	95	35	60	71	4	4.20	7	17.07	10.7	91	16	21	22	14	13	4	5	5	0	1	(1)
November	30.11	30.59	29.60	.99	60.2	67.8	52.7	15.1	82	25	57	73	4	3.70	7	7.66	10.7	49	22	21	18	10	10	4	7	8	0	1	1
December	30.15	30.68	29.03	1.65	54.0	61.8	47.1	14.7	77	14	63	76	6	4.65	10	4.32	11.0	62	22	17	16	9	12	7	8	9	0	2	2
Mean	30.05				67.7	74.4	61.1	13.3				75	5				10.6		16	13	13	12	17	11	11	7	0		
Total														57.85	114													19	13

[1] Mean less than 1.

METEOROLOGICAL TABLE, NEW ORLEANS, LA.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level				Air temperature, in °F.							Average relative humidity	Average amount of clouds 0–10	Precipitation			Wind											Number of days with winds of 32 miles or over	Number of days dense fog
	Mean	Extremes			Mean				Extremes								Statute miles		Percentage of hours from each direction										
	For month	Highest	Lowest	Range	For month	Mean max.	Mean min.	Range	Highest	Lowest	Range			Average fall	Number of days 0.01 inch or more	Max. fall in 24 hours	Average hourly velocity	Highest velocity	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm		
	Ins.	*Ins.*	*Ins.*	*Ins.*	°	°	°	°	°	°	°																		
January	30.13	30.80	29.27	1.53	54.2	62.3	47.0	15.3	82	15	67	76	6	4.34	10	4.28	8.7	41	14	21	14	14	12	10	5	10	0	(1)	4
February	30.09	30.71	29.13	1.58	57.3	64.9	49.4	15.5	84	7	77	74	6	4.25	9	5.71	9.0	41	13	17	11	15	14	14	6	10	0	(1)	2
March	30.04	30.71	29.44	1.27	62.8	71.0	55.3	15.7	90	28	62	73	5	4.72	9	8.66	9.0	36	12	14	12	19	16	13	5	9	0	(1)	2
April	30.00	30.48	29.50	.98	68.8	76.7	61.3	15.4	90	38	52	71	5	5.24	7	14.01	8.7	38	8	11	8	25	20	14	6	8	0	(1)	1
May	29.97	30.38	29.62	.76	75.4	82.9	67.7	15.2	96	52	44	70	5	4.60	9	9.08	7.9	38	8	10	9	22	18	16	7	9	1	0	(1)
June	29.98	30.34	29.63	.71	80.6	88.0	73.7	14.3	102	58	44	71	5	5.88	13	5.48	7.1	40	5	8	9	22	17	19	12	7	1	(1)	(1)
July	30.00	30.29	29.41	.88	82.4	89.3	75.4	13.9	102	66	36	73	6	6.37	15	7.52	6.8	34	6	5	6	12	12	24	21	12	2	(1)	(1)
August	29.98	30.29	29.43	.86	82.2	89.3	75.5	13.8	100	63	37	74	6	5.80	14	8.90	6.7	47	7	12	9	13	13	18	14	11	3	(1)	(1)
September	29.98	30.31	28.11	2.20	79.2	86.1	72.8	13.3	99	54	45	73	5	5.03	10	10.75	7.6	66	8	22	17	21	12	8	5	5	2	(1)	(1)
October	30.03	30.55	29.21	1.34	71.0	78.2	63.9	14.3	94	40	54	71	4	3.30	7	7.79	8.1	43	10	23	19	20	10	6	5	6	1	0	1
November	30.10	30.68	29.62	1.06	61.6	69.7	54.4	15.3	89	29	60	73	5	3.14	7	4.39	8.4	34	13	22	15	16	10	7	7	9	1	(1)	2
December	30.13	30.71	29.55	1.16	55.6	63.1	48.1	15.0	84	19	65	75	6	4.79	10	4.83	8.7	38	11	22	12	13	12	11	8	11	0	(1)	3
Mean	30.04				69.3	76.8	62.0	14.8				73	5				8.1		11	16	10	18	14	14	8	8	1	(1)	
Total														57.46	120														1.5

[1] Mean less than 1.

METEOROLOGICAL TABLE, GALVESTON, TEX.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level				Air temperature, in °F.							Average relative humidity	Average amount of clouds, 0–10	Precipitation			Wind											
	Mean	Extremes			Mean				Extremes								Statute miles		Percentage of hours from each direction									
	For month	Highest	Lowest	Range	For month	Mean max.	Mean min.	Range	Highest	Lowest	Range			Average fall	Number of days 0.01 inch or more	Max. fall in 24 hours	Average hourly velocity	Highest velocity	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Number of days with winds of 32 miles or over	Number of days dense fog
	Ins.	*Ins.*	*Ins.*	*Ins.*	°	°	°	°	°	°	°																		
January	30.13	30.90	29.43	1.47	53.8	57.3	46.3	11.0	76	11	65	83	6	3.41	10	5.38	11.2	50	18	12	12	22	14	6	4	11	1	1	5
February	30.07	30.94	29.19	1.75	56.3	61.7	50.9	10.8	83	8	75	82	6	2.83	9	3.79	11.4	47	16	12	12	23	16	6	5	10	0	1	4
March	30.01	30.61	29.18	1.43	62.4	67.5	57.4	10.1	85	30	55	80	5	2.68	8	3.98	11.5	48	12	9	11	31	20	5	4	8	0	1	4
April	29.97	30.53	29.36	1.17	68.7	71.9	62.7	9.2	86	41	45	79	5	3.06	7	9.23	11.7	56	10	7	10	37	23	5	2	6	0	1	1
May	29.94	30.41	29.52	.89	74.8	80.0	71.0	9.0	93	52	41	78	4	3.42	6	6.13	11.1	47	7	6	7	41	27	5	3	4	0	1	(1)
June	29.95	30.27	29.50	.77	80.7	85.7	76.8	8.9	99	57	42	77	4	4.37	7	10.27	10.3	49	4	5	6	34	36	9	3	3	0	(1)	[1] 0
July	29.98	30.26	29.59	.67	83.4	87.8	78.6	9.2	101	66	35	75	4	3.71	9	14.35	9.4	53	4	3	4	24	40	17	5	3	0	(1)	[1] 0
August	29.96	30.25	28.63	1.62	83.0	87.9	78.5	9.4	100	67	33	74	4	4.28	9	9.05	9.1	71	5	5	7	24	36	13	5	4	1	(1)	[1] 0
September	29.98	30.31	28.55	1.76	80.1	84.7	75.3	9.4	96	54	42	74	4	5.57	9	10.00	9.9	65	11	15	14	30	18	4	3	5	0	(1)	[1] 0
October	30.03	30.57	29.39	1.18	72.7	77.6	67.7	9.9	91	41	50	74	4	4.36	7	14.10	10.2	49	16	17	15	24	13	4	4	7	0	(1)	[1] 0
November	30.09	30.68	29.38	1.30	63.3	68.5	58.0	10.5	85	26	59	77	5	3.33	8	5.63	10.8	43	18	15	14	22	14	5	3	9	0	1	[1] 1
December	30.12	30.83	29.52	1.31	56.4	61.7	50.8	10.9	80	18	62	80	6	3.75	10	4.50	11.1	43	19	12	12	18	14	6	6	13	0	1	3
Mean	30.02				69.6	74.4	64.5	9.9				78	5				10.6		12	10	10	28	22	7	4	7	0		
Total														44.77	99													7	18

[1] Mean less than 1.

METEOROLOGICAL TABLE, CORPUS CHRISTI, TEX.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level				Air temperature, in °F.							Average relative humidity	Average amount of clouds, 0–10	Precipitation			Wind											Number of days with winds of 32 miles or over	Number of days dense fog
	Mean	Extremes			Mean				Extremes								Statute miles		Percentage of hours from each direction										
	For month	Highest	Lowest	Range	For month	Mean max.	Mean min.	Range	Highest	Lowest	Range			Average fall	Number of days 0.01 inch or more	Max. fall in 24 hours	Average hourly velocity	Highest velocity	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm		
	Ins.	*Ins.*	*Ins.*	*Ins.*	°	°	°	°	°	°	°																		
January	30.10	30.93	29.41	1.52	56.0	63.2	48.1	15.1	85	14	71	79	6	1.56	8	2.51	10.0	38	28	9	11	20	15	2	4	11	0	1	3
February	30.05	30.92	29.40	1.52	58.4	65.4	51.7	13.7	88	11	77	78	6	1.48	7	5.80	10.8	49	21	12	17	19	17	2	3	9	0	1	2
March	29.98	30.62	29.35	1.27	65.0	71.0	58.5	12.5	96	28	68	77	6	1.60	7	4.66	13.9	44	19	10	20	32	12	1	2	4	0	2	2
April	29.95	30.52	29.34	1.18	70.8	76.1	65.7	10.4	95	41	54	78	6	1.78	6	4.22	14.7	51	10	6	16	52	12	1	1	2	0	3	1
May	29.90	30.32	29.47	.85	76.2	80.7	71.4	9.3	97	44	53	78	6	3.22	6	6.60	14.5	64	6	7	18	51	14	1	1	2	0	2	0
June	29.91	30.23	29.39	.84	81.0	85.5	75.8	9.7	97	56	41	77	4	2.59	6	8.26	13.9	54	3	3	16	56	19	1	1	1	0	(1)	0
July	29.96	30.21	29.68	.53	82.7	87.6	76.9	10.7	99	65	34	76	4	1.53	5	4.35	12.8	38	2	2	12	49	31	2	1	1	0	(1)	0
August	29.93	30.23	29.07	1.16	82.5	88.0	77.1	10.9	102	65	37	76	4	2.27	5	5.13	11.9	72	2	2	19	43	31	1	1	1	0	(1)	0
September	29.95	30.34	28.65	1.69	79.7	85.8	74.5	11.3	100	53	47	76	4	4.49	9	7.96	11.1	58	14	12	26	30	14	1	1	2	0	1	0
October	30.00	30.58	29.51	1.07	73.2	79.8	67.1	12.7	93	41	52	75	4	2.47	7	4.17	10.5	46	22	12	22	26	12	1	1	4	0	0	1
November	30.07	30.69	29.32	1.37	64.3	71.3	58.2	13.1	91	29	62	76	5	1.99	7	4.61	10.6	49	26	12	12	23	13	2	3	9	0	1	2
December	30.12	30.74	29.55	1.19	58.0	64.6	50.7	13.9	88	20	68	77	6	1.45	8	2.50	10.4	39	33	10	9	14	12	1	4	17	0	1	3
Mean	29.99				70.6	76.6	64.6	11.9				77	5				12.1		16	8	17	35	17	1	2	4	0		
Total														26.43	81													12	14

[1] Mean less than 1.

METEOROLOGICAL TABLE, BROWNSVILLE, TEX.

Compiled by the United States Weather Bureau

Month	Barometer at 32° F. and mean sea level				Air temperature, in °F.							Average relative humidity	Average amount of clouds, 0-10	Precipitation			Wind											Number of days with winds of 32 miles or over	Number of days dense fog
	Mean	Extremes			Mean				Extremes								Statute miles		Percentage of hours from each direction										
	For month	Highest	Lowest	Range	For month	Mean max.	Mean min.	Range	Highest	Lowest	Range			Average fall	Number of days 0.01 inch or more	Max. fall in 24 hours	Average hourly velocity	Highest velocity	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm		
					°	°	°	°	°	°	°																		
January	30.08	30.69	29.64	1.05	59.8	69.4	50.3	19.1	90	18	72	76	6	1.50	7	2.79	8.6	32	25	8	7	16	28	1	2	13	0	(1)	4
February	30.02	30.60	29.58	1.02	62.6	72.5	53.5	19.0	94	12	82	76	6	1.21	5	3.27	9.3	33	15	8	9	25	30	2	1	10	0	(1)	4
March	29.96	30.54	29.44	1.10	68.2	77.5	59.4	18.1	102	30	72	74	6	1.26	5	2.73	10.1	35	14	9	12	25	32	1	1	6	0	(1)	2
April	29.90	30.43	29.43	1.00	73.7	82.9	65.6	17.3	100	37	63	75	5	1.43	4	5.00	10.0	32	7	8	13	37	31	1	1	2	0	(1)	1
May	29.87	30.26	29.52	.74	78.6	87.0	70.7	16.3	102	41	61	74	5	2.27	5	7.38	9.7	31	5	7	11	40	33	1	1	2	0	0	1
June	29.86	30.14	29.54	.60	82.4	90.9	74.1	16.8	103	56	47	75	4	2.87	6	4.56	8.3	24	4	4	12	42	34	1	1	1	1	0	(1)
July	29.92	30.13	29.60	.53	83.6	92.3	75.2	17.1	102	57	45	72	3	1.96	5	3.97	8.1	29	2	2	8	41	44	1	1	1	0	0	0
August	29.90	30.11	29.71	.40	83.9	93.2	75.1	18.1	104	63	41	70	3	2.55	5	7.82	7.6	26	3	5	8	41	38	1	1	2	1	0	0
September	29.91	30.19	29.60	.59	80.6	89.9	72.3	17.6	102	51	51	76	5	5.52	10	11.91	6.7	36	13	12	15	35	17	1	1	5	1	(1)	(1)
October	29.97	30.49	29.58	.91	74.9	84.7	65.7	19.0	99	38	61	75	5	3.29	7	6.34	7.1	36	19	14	15	22	20	1	1	8	0	(1)	(1)
November	30.04	30.53	29.58	.95	67.2	76.6	58.7	17.9	98	27	71	75	6	1.98	7	3.41	7.8	34	20	9	8	16	27	1	3	16	0	(1)	1
December	30.06	30.68	29.52	1.16	61.2	70.7	52.1	18.6	93	15	78	78	7	1.56	7	3.44	9.0	31	28	7	7	12	23	1	3	19	0	0	2
Mean	29.96				73.1	82.3	64.4	17.9				75	5				8.5		13	7	11	30	30	1	1	7	0	(1)	
Total														27.40	73														15

[1] Mean less than 1.

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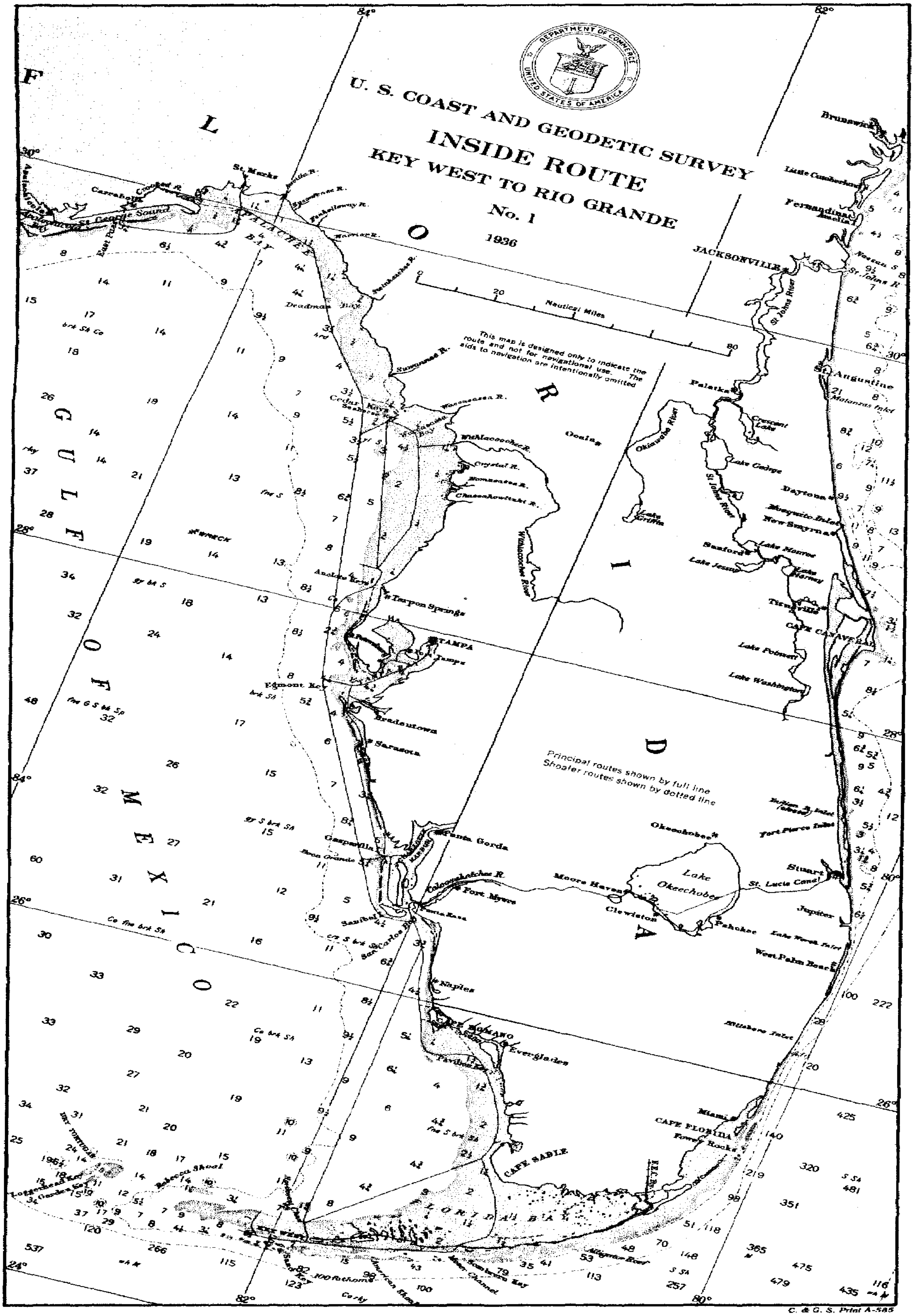

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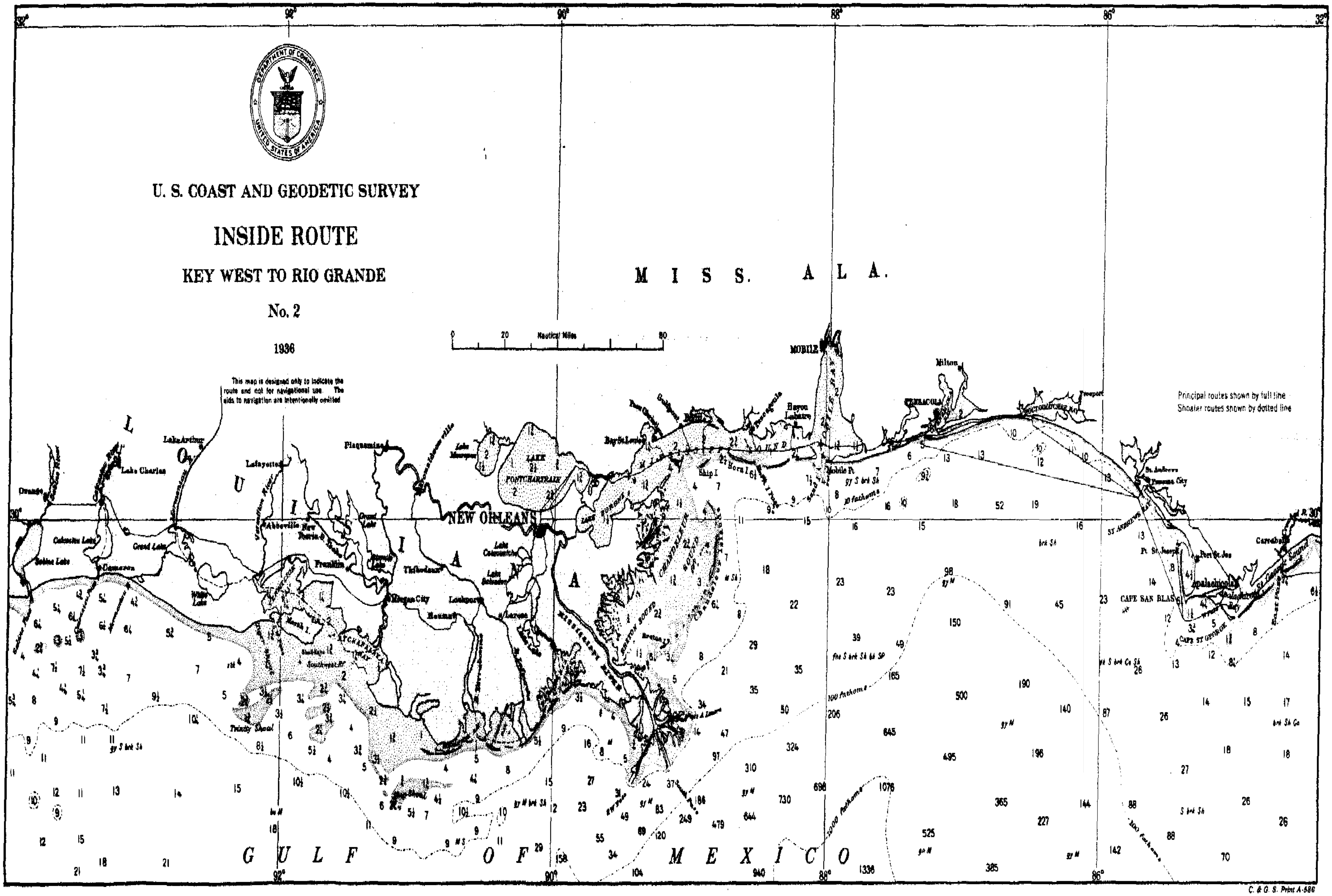
U. S. COAST AND GEODETIC SURVEY
INSIDE ROUTE
KEY WEST TO RIO GRANDE
No. 2
1936
This map is designed only to indicate the route and not for navigational use. The aids to navigation are intentionally omitted
Principal routes shown by full line
Shoaler routes shown by dotted line
Nautical Miles
MISS.
ALA.
LOUISIANA
GULF OF MEXICO
NEW ORLEANS
MOBILE
PENSACOLA
Milton
Freeport
Lake Charles
Lake Arthur
Lafayette
Plaquemine
Abbeville
Franklin
Thibodaux
Morgan City
Lockport
Houma
Larose
Cameron
Sabine Lake
Calcasieu Lake
Grand Lake
White Lake
Grand Lake
Lake Maurepas
LAKE PONTCHARTRAIN
Lake Salvador
Bay St. Louis
Ship I.
Horn I.
Mobile Pt.
Bayou Labatre
St. Andrews
Panama City
Pt. St. Joseph
Port St. Joe
Apalachicola
CAPE SAN BLAS
CAPE ST. GEORGE
Carrabelle
Trinity Shoal
Marsh I.
CHANDELEUR SOUND
BRETON SOUND
MISSISSIPPI RIVER
100 fathoms
1000 fathoms
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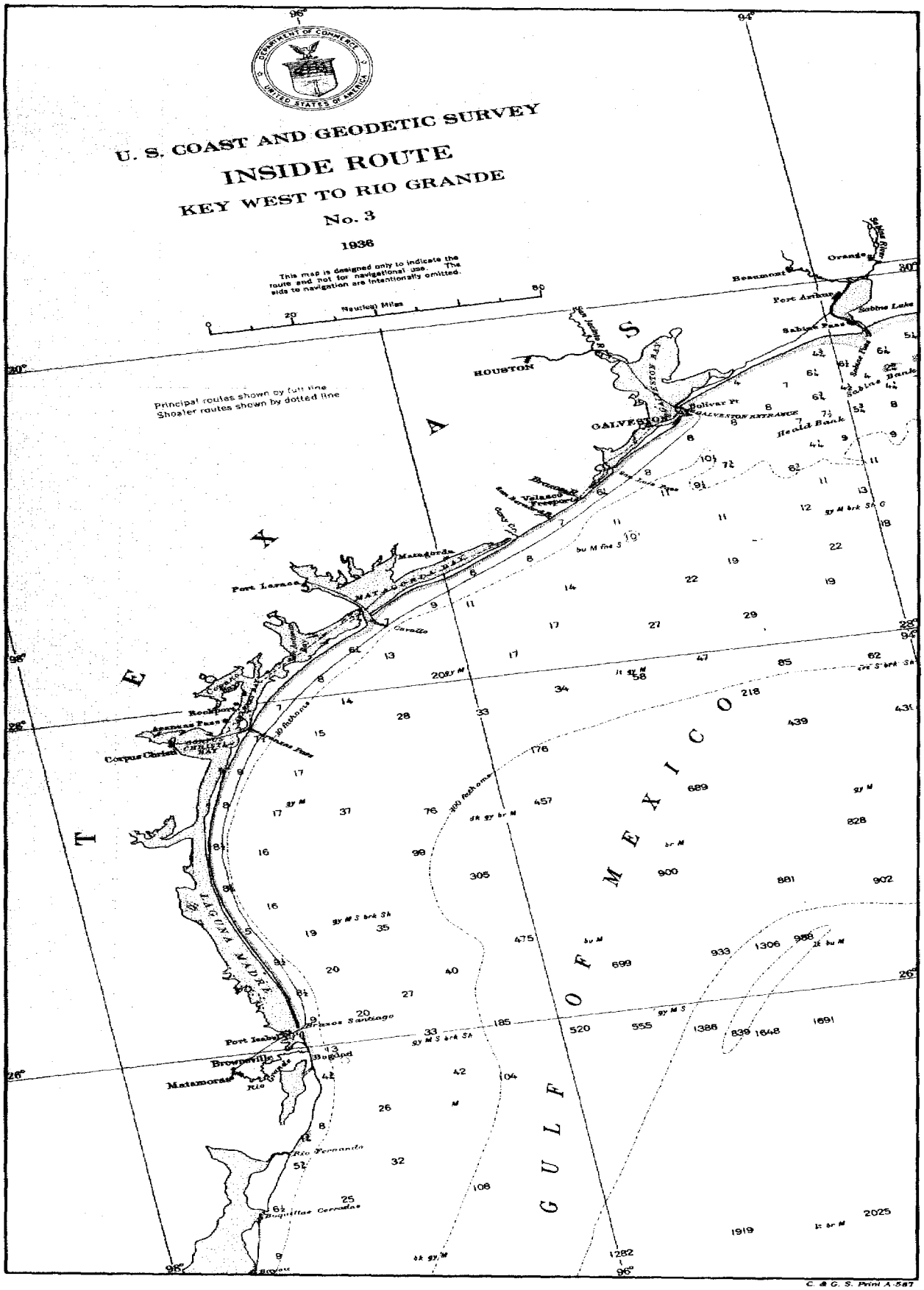
U. S. COAST AND GEODETIC SURVEY
INSIDE ROUTE
KEY WEST TO RIO GRANDE
No. 3
1936
This map is designed only to indicate the route and not for navigational use. The aids to navigation are intentionally omitted.
Nautical Miles
Principal routes shown by full line
Shoaler routes shown by dotted line
TEXAS
GULF OF MEXICO
HOUSTON
GALVESTON
Galveston Entrance
Bolivar Pt
Heald Bank
Sabine Bank
Sabine Lake
Port Arthur
Beaumont
Orange
Velasco
Freeport
Matagorda
Matagorda Bay
Port Lavaca
Cavallo
Rockport
Aransas Pass
Corpus Christi
Laguna Madre
Port Isabel
Brownsville
Matamoras
Rio Grande
Rio Fernando
Bagillas Cerradas
Bayou
Bagillas
Frenos Santiago
300 fathoms
200 fathoms
C. & G. S. Print A-587