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U. S. COAST AND GEODETIC SURVEY

E. LESTER JONES, DIRECTOR

UNITED STATES COAST PILOT

ATLANTIC COAST

SECTION A

ST. CROIX RIVER TO CAPE COD

SECOND EDITION

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INTRODUCTORY

DEPARTMENT OF COMMERCE,
UNITED STATES COAST AND GEODETIC SURVEY,
Washington, May 15, 1927.

This publication covers the coast from St. Croix River to Race Point, Cape Cod, including Cape Cod Bay. It is based mainly upon the work of the United States Coast and Geodetic Survey, including the results of a special examination in 1926.

The present edition (which is the second) has been prepared by Lieut. R. R. Lukens under the direction of Lieut. Commander J. H. Hawley, chief, coast pilot section.

Great courtesy has been shown by the Lighthouse Service, the United States Engineers, and local authorities in furnishing information for use in this publication. Special acknowledgement is due the local inspectors, Steamboat Inspection Service, Boston, Mass., for their assistance in laying out sailing directions for Boston Harbor.

The aids to navigation are corrected to May 6, 1927.

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

E. LESTER JONES, *Director.*

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NOTE

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 per cent to the distances given.

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

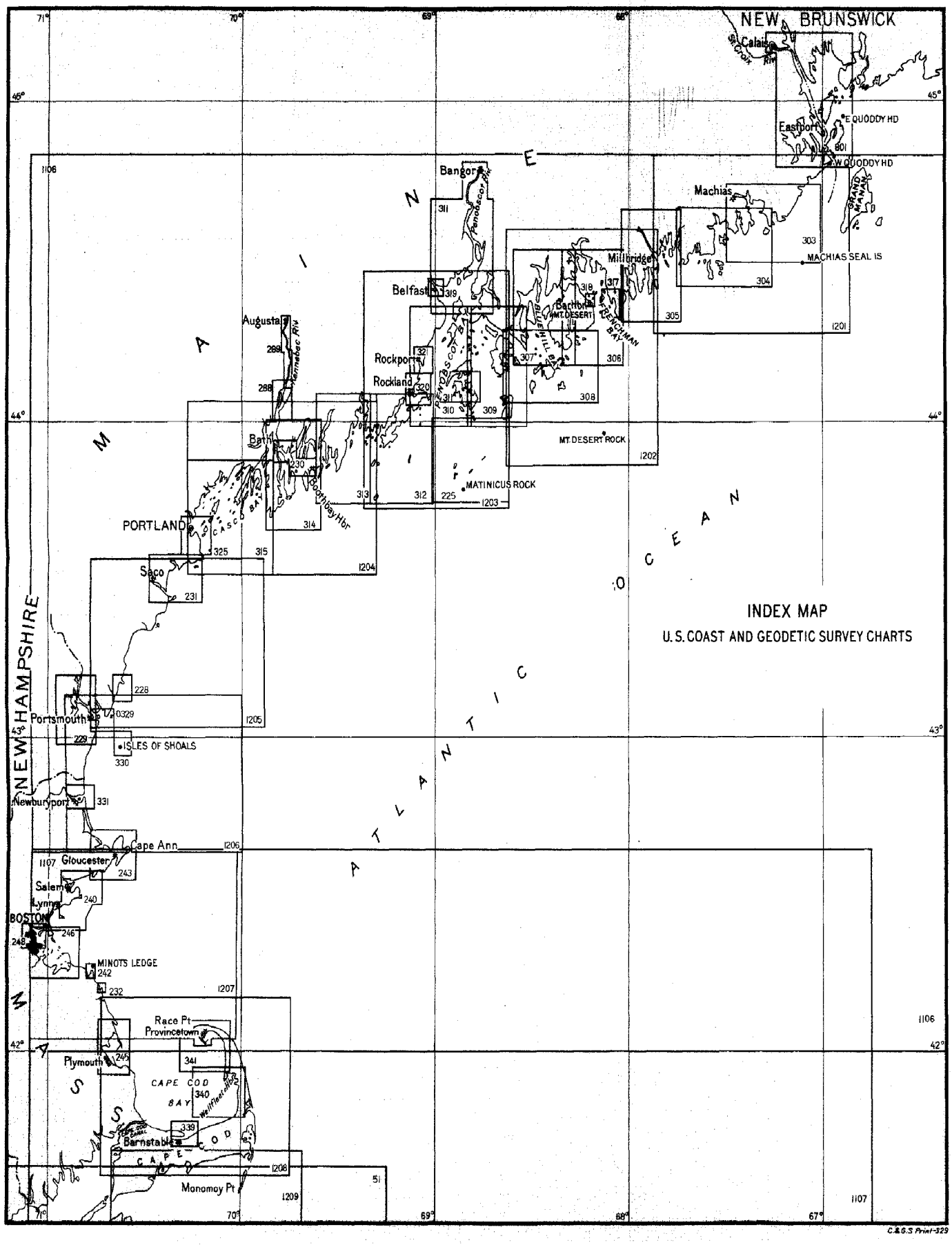
Except where otherwise stated, all depths are at *mean low water.*

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

Heights are given in feet with metric equivalent in parentheses.

Changes and other corrections affecting all coast-pilot volumes are included in the Notice to Mariners published weekly by the United States Department of Commerce. About one year after a Coast Pilot is published, and at approximately yearly intervals thereafter until a new edition is brought out, a supplement, giving the more important corrections and additions to its text since the date of its publication, is issued. The date of the latest supplement to each Coast Pilot, for which a supplement has been issued, is shown in the list of Coast Pilots published each week in the Notice to Mariners. Any supplement may be obtained, free of charge, upon application to the Coast and Geodetic Survey, Washington, D. C., or any of its field stations. Each supplement is complete in itself and cancels all previous supplements.

Do not use this Coast Pilot except with reference to the latest supplement that may have been published and Notices to Mariners issued after the date of the supplement.



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UNITED STATES COAST PILOT

ATLANTIC COAST—SECTION A—ST. CROIX RIVER TO CAPE COD

GENERAL INFORMATION

The information contained in this volume relates to the coast and inland waters from St. Croix River, forming the boundary between Maine and New Brunswick, to Race Point, Cape Cod, including Cape Cod Bay. It embraces all of the coast of Maine and New Hampshire and part of the coast of Massachusetts.

Character of the bottom.—The entire area within the limits of this volume is a region of ledges and bowlders. The ledges rise abruptly from deep water and the bowlders ordinarily lie singly or in clusters on an otherwise flat bottom, so that the navigator can not depend on the lead to avoid them. *As a measure of safety, vessels should avoid broken ground where abrupt changes in depth are indicated by the chart to depths less than 10 or 12 fathoms (18.3 to 21.9 m.); and in places dangers have been found where least depths of as much as 20 fathoms (37 m.) were the only indications found by the lead line survey. It is always safest, therefore, to select a sailing line from the chart which leads in the deepest water and well clear of broken ground.* There is little natural change in the shore or shoals, except in places in Cape Cod Bay, where the shores are generally sandy and sand shoals extend off from them in places. Bowlders also occur in places, however, in Cape Cod Bay.

Wire-drag surveys.—In all areas mentioned above as rocky or regions of bowlders the ordinary survey with the lead line can not be relied upon to locate all dangers. In such areas a wire-drag survey, in which a horizontal wire is suspended at a known depth below the surface and dragged across the area, is the only means of locating all dangers.

At the end of 1926 the areas examined by means of a wire drag were as follows:

Friar Roads to Shackford Head, Head Harbor Passage to sea, Western Passage and area to Navy Island, and all of Passamaquoddy Bay.

The sea approaches from West Quoddy Head to the entrance of Head Harbor Passage.

Winter Harbor and the main part of Frenchman Bay from just southward of Egg Rock Lighthouse to the entrance of the tributaries at the head.

Parts of Blue Hill Bay and Jericho Bays.

The main channels through Eggemoggin Reach, Deer Island Thorofare, and Merchant Row.

An irregular area southward of Great Wass and Head Harbor Islands.

Penobscot Bay from southward of Matinicus Island to the entrance of Penobscot River, including the main channels through Fox Island Thorofare.

Muscle Ridge and Twobush Channels and the channel westward from them to Mosquito and Metinic Islands.

Portland Harbor and approaches from Fort Gorges out to the general 18-fathom (33 m.) curve, the eastern limit being 3 miles eastward of Halfway Rock.

The main channel of Portsmouth Harbor and the broken ground off the entrance.

A section along the coast extending from about 5 miles south of Isles of Shoals to Cape Elizabeth and a short distance eastward of Isles of Shoals and Boon Island Ledge.

The broken ground along the coast from Cape Ann to the entrance of the Cape Cod Canal, out to a distance varying from 4½ to 7 miles from the shore.

The above limits are general, and are given more in detail under the description of the tributaries.

The coast from West Quoddy Head to Penobscot Bay is generally rocky and indented by numerous large bays and many excellent harbors. Numerous islands lie along the shore, among which are passages that are much used by vessels, usually of less than 12 feet (3.7 m.) draft, as they afford anchorage in a head wind, or in thick weather. The many bowlders, rocks, and ledges which lie along and off this coast require the closest attention of the navigator, as in many cases they rise abruptly from deep water and the lead does not generally give indication of their proximity until too late to avoid them. The navigator should also remember that the average rise of spring tide at Rockland is 11 feet (3.4 m.), at Millbridge 13 feet (4 m.). and at Eastport 21 feet (6.4 m.), and that a vessel may sometimes pass over places at high water on which she would bring up at low water.

Between Penobscot Bay and Cape Elizabeth the coast is rocky and very much broken by numerous bays and rivers, many of which are excellent harbors. In Muscongus and Casco Bays good channels lead between the islands, affording inside passages that are much used by the smaller class of vessels passing along the coast. Great caution is necessary when standing along this stretch of the coast in thick weather, on account of the numerous dangers which in some cases lie nearly 10 miles offshore.

Between Cape Elizabeth and Portsmouth there are fewer harbors and marked indentations. The shore is more thickly settled than farther eastward, several of the beaches being popular summer resorts. The outlying dangers are well marked and fewer in number.

Southward of Portsmouth the coast is low and generally a sandy beach, with a few outcropping ledges and outlying dangers, but the northern shore of Cape Ann is high and rocky.

Between Cape Ann and Plymouth entrance the coast is rocky, generally bold, with numerous islands, dry rocks, bowlders, and

sunken ledges lying near the shore, with deep channels between. The shores of **Cape Cod Bay** are generally sandy, with extensive sand shoals extending out well from the shore in many places. Bowlders also occur in places in Cape Cod Bay.

Harbors and ports.—The most important places, either commercially or as harbors of refuge are Calais; Eastport; Little River; Machias Bay; Narraguagas Bay; Winter Harbor; Bar Harbor; South West Harbor; Bass Harbor; Castine, Belfast, Camden, Rockport, and Rockland in Penobscot Bay; Bangor and Bucksport on Penobscot River; Tenants Harbor; Port Clyde; Boothbay; Bath and Augusta on Kennebec River; Portland; Portsmouth; Gloucester; Salem; Boston; Plymouth; and Provincetown. These and many other harbors are described under the different headings following:

Anchorages.—Between West Quoddy Head and Portland, anchorages are numerous, those most frequently used by coasting vessels being Little River, Starboard Cove, Englishman Bay, Narraguagus Bay, Winter Harbor, South West Harbor, Rockland Harbor, Port Clyde, Boothbay Harbor, and Portland Harbor. Southward of Portland the only anchorages available for large vessels are in the harbors of Portsmouth, Gloucester, Salem, Boston, Plymouth, and Provincetown. There are other harbors available for small vessels and motor boats, as mentioned under the description.

Prominent features.—The coast between West Quoddy Head and Little River presents no special features; westward of Little River the shore is broken by bays and islands, and continues to be so to Whitehead. Grand Manan Island has nearly perpendicular, dark, rocky faces about 200 feet (61 m.) high on its western side. Pigeon Hill on the western side of Pigeon Hill Bay, near the head, is 307 feet (94 m.) high. Schoodic Mountain, near the south end of Schoodic Peninsula, the eastern point at entrance to Frenchman Bay, is 437 feet (133 m.) high. Cadillac Mountain, the highest on Mount Desert Island, is 1,532 feet (467 m.) high and the most prominent landmark on this part of the coast; there are other mountains nearly as high near it. Isle au Haut is 556 feet (169 m.) high near its northern end and is on the eastern side of the entrance to East Penobscot Bay. The Camden Hills (Mount Megunticook, 1,320 feet (402 m.) are on the western side of Penobscot Bay, above the town of Camden. Monhegan Island, lying 9¼ miles from the mainland, is 160 feet (49 m.) high and a mark for all vessels bound into Penobscot Bay from westward. Seguin Island lies about 2¼ miles from the mainland off the mouth of the Kennebec River; the island is about 145 feet (44 m.) high and a mark for vessels bound into the river or standing along the coast.

Cape Elizabeth, the southern point at the entrance to Portland Harbor, is about 90 feet (27.4 m.) high and marked by a lighthouse. Agamenticus Mountain is 673 feet (205 m.) high and the most prominent landmark between Portland and Cape Ann. It is about 4½ miles inland and 9 miles northeastward of Portsmouth. The Isles of Shoals, lying about 5½ miles from the coast and southeastward of Portsmouth Harbor entrance, can be seen a long distance, the large

hotels being conspicuous marks. Boon Island Lighthouse is about 9 miles northeastward of the Isles of Shoals and about 6½ miles offshore. Cape Ann, at its northern end, is high, but its eastern end is comparatively low. The two light towers on Thatcher Island are the most conspicuous marks seen when approaching the cape.

The land southward of Cape Ann is comparatively low, well settled, and has numerous artificial marks. The prominent objects visible in approaching Cape Cod are described on page 297.

In the approaches to Boston, the high tower of the Boston Customhouse (see p. 251) is a predominating landmark.

System of buoyage.—In conformity with section 4678 of the Revised Statutes of the United States, the following order is observed in coloring and numbering buoys in United States waters, viz:

In approaching the channel, etc., from seaward, *red* buoys, with *even* numbers, will be found on the starboard side.

In approaching the channel, etc., from seaward, *black* buoys, with *odd* numbers, will be found on the port side.

Buoys painted with red and black horizontal stripes will be found on obstructions, with channel ways on either side of them, and may be left on either hand *in passing in.*

Buoys painted with white and black perpendicular stripes will be found in midchannel, and must be passed close-to to avoid danger.

All other distinguishing marks to buoys will be in addition to the foregoing and may be employed to mark particular spots.

Perches, with balls, cages, etc., will, when placed on buoys, be at turning points, the color and number indicating on what side they shall be passed.

Nun buoys, properly colored and numbered, are usually placed on the starboard side and can buoys on the port side of channels.

Day beacons (except such as are on the sides of channels, which will be colored like buoys) are constructed and distinguished with special reference to each locality, and particularly in regard to the background upon which they are projected.

Buoys maintained by the United States Army Engineers for dredging purposes are painted white with the top, for a distance of 2 feet, painted dark green.

Aids to navigation.—The lighthouses and other aids to navigation are the principal guides, and mark the approach and channels to the important ports. The buoyage accords with the system adopted in United States waters. The principal coast lights are described in the text of this volume. For a complete description of all lighted aids see the Light List, Atlantic and Gulf Coasts of the United States, published by the Lighthouse Service, which can be obtained from the Division of Publications, Department of Commerce, Washington, D. C., or from agents in various ports for the sum of 50 cents.

Lights, buoys, and day marks are described briefly in Buoy List, Maine and New Hampshire, and Buoy List, Massachusetts, which can be obtained in the same manner at a price of 20 cents per copy.

A list of Canadian lights and fog signals of the Atlantic coast can be obtained from the Department of Marine, Ottawa, Canada.

Bridge regulations.—Regulations for lighting 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 will be sent free of charge to any shipmaster, pilot, or bridge owner on application to the Division of Publications, Department of Commerce, Washington, D. C. The lighthouse superintendents have immediate authority over lighting of structures in their respective districts and are charged with the enforcement of the regulations.

Regulations for the operation of drawbridges are prescribed by the Secretary of War, and extracts from these regulations are given in the description of the waters affected under the heading "Bridge regulations."

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.

The following special **signals for surveying vessels** of the United States employed in hydrographic surveying have been prescribed:

A surveying vessel of the United States, under way or at anchor in a fairway and employed in hydrographic surveying, may carry where they can best be seen, but in any case well above the running lights prescribed by law for preventing collisions, three lights in a vertical line one over the other and not less than 6 feet apart. The highest and lowest of these lights shall be green, 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 2 miles. In the case of a small vessel the distance between the lights of such private code may be reduced to 3 feet if necessary.

By day such surveying vessel may carry in a vertical line, not less than 6 feet apart, where they can best be seen, three shapes of 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.

The wire drags, some of which are over 2 miles long, 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.

Supplies.—All kinds of supplies in unlimited quantities are obtainable at Boston and Portland. Coal, gasoline, water, and ordinary ship supplies are obtainable at Eastport, Rockland, Bangor, Bath, Portsmouth, Gloucester, Salem, Beverly, and Plymouth. Fuel oil can be obtained only at Boston and Portland. Coal in limited quantities, water, gasoline, and provisions are also usually obtainable at Calais, Winter Harbor, Bar Harbor, Camden, Belfast, Boothbay Harbor, Newburyport, and Rockport, Mass. Gasoline and provisions are obtainable at all of the towns and villages and on some of the off-lying islands, as mentioned under the descriptions.

Repairs.—Boston is the only port where repairs of any magnitude to large vessels can be made. Portland is well equipped for repairing the type of vessels engaged in the coasting trade, while schooners, towboats, and fishing vessels can be repaired in Gloucester, Rockland, and Camden. Small motor boats and yachts can be hauled out, and ordinary repairs to machinery can be made at several other places.

The details of the largest dry docks and marine railways are given in the following tables:

Largest dry docks and marine railways

Port	Type	Length	Depth on sill at high water	Capacity
		Feet	*Feet*	*Tons*
St. John, New Brunswick	Graving	1,150	42	--------
Camden	Railway	160	15	700
Rockland	do	175	13	600
Boothbay	do	175	13	500
Portland	do	270	19	--------
Portsmouth (U. S. Navy)	Graving	740	30	--------
Gloucester	Railway	100	16	200
Boston	Floating	480	24	10,000
Boston (U. S. Navy)	Graving	1,115	42	--------

PILOTS AND PILOTAGE

Pilots.—Pilotage is not compulsory for ports in the State of Maine. Fishermen and others competent to take vessels into the ports of the State can usually be found along the coast. There are licensed pilots for the port of Portland. (See "Pilots" under heading Portland Harbor.)

Pilotage is not compulsory for enrolled or registered vessels of the United States in the ports of New Hampshire, and only for other vessels when a pilot offers his services.

Pilotage is compulsory for ports in Massachusetts, except coastwise steam vessels not sailing under register, vessels regularly employed in the coasting trade, fishing vessels other than whalers, and

vessels of less than 7 feet (2.1 m.) draft. All other vessels are obliged to pay pilotage. (See also "Pilots," under different headings.) Pilots are always available at Gloucester, Boston, and Cape Cod Canal.

Towboats are available at Eastport, Rockland, Bangor, Bath, Portland, Portsmouth, Gloucester, and Boston. A towboat engaged in towing rock barges is sometimes available at Stonington. At a number of other places power fishing boats and launches can be secured for handling smaller vessels, such as 2 and 3 mast schooners engaged in the coasting trade.

Harbor masters are appointed for the principal ports, and they have charge of the anchorage and berthing of vessels in their respective harbors. The anchorage regulations for the port of Boston are given on page 260. The laws prohibit the dumping of ashes or other materials in the channels.

Navigation laws of the United States are published by the Bureau of Navigation, Department of Commerce, at intervals of four years, the present edition being that of 1923. A supplement is issued after every session of Congress. The volume and supplements can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., price $1 for the volume and 5 cents each for the supplements.

Rules of the road.—International and inland "Rules to prevent collisions of vessels," lines within which the inland rules apply, and "Regulation of motor boats" are published by the Bureau of Navigation, Department of Commerce, and are included in the appendix to this volume.

Pilot rules for certain inland waters of the Atlantic and Pacific coasts and of the coast of the Gulf of Mexico are published by the Steamboat Inspection Service in Form 804.

Copies of these pamphlets are furnished by the officers of the Steamboat Inspection Service, and can also be had from the Division of Publications, Department of Commerce, Washington, D. C.

QUARANTINE

Quarantine for all ports within the limits of this volume is enforced in accordance with the regulations of the United States Public Health Service. There are United States quarantine officers at Eastport, Portland, and Boston. Health officers of the State of New Hampshire have authority to make regulations respecting quarantine for ports in the State.

National quarantine regulations will be found at the stations of the service and at American consulates, and will be furnished to vessels upon application, either by officers of the service or by the bureau in Washington, D. C. Every vessel should be provided with the quarantine regulations.

At Portland the quarantine station is on House Island, while at Boston it is located on Gallup Island, in the outer harbor.

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."

Calais, Me., 281 Main Street.
Eastport, Me., 34 Boynton Street.
Machias, Me.
Boothbay Harbor, Me., 2 Commercial Street.
Bangor, Me., 217 State Street.
Rockland, Me., 400 Main Street.
Bath, Me., collector of customs in charge.
Portland, Me., Woodford Station. Out-patient office in customhouse.
Boston, Mass., Chelsea. Out-patient office in customhouse.
Provincetown, Mass., 234 Commercial Street.

WEATHER

Prevailing winds.—The prevailing winds are southwesterly during the summer and northerly during the winter. At all seasons the heaviest gales are generally from northeastward or eastward. (See also the meteorological tables in the appendix.)

Fogs are the dread of the navigator on this coast in summer and may occur at any season. They are liable to set in at any time, often with almost no warning. They are of frequent occurrence during June, July, and August, and the months of May and September are not free from them. Some portion of this period invariably has much thick weather, while other portions may be free from it. Fogs have been known to last three weeks, almost without intermission. At the heads of the bays and within the rivers it is often comparatively clear when thick outside. The fog of such interior waters usually clears throughout the middle of the day. Winds from east to southwest, by the way of south, are those which bring in fog; westerly and northerly winds clear it away.

Under this heading scarcely any rule can be made that is not subject to frequent exceptions, and those who have the most experience in the matter are the least apt to make predictions. It is usually the case, however, that a fall of the barometer below 30 inches during a fog will be followed by the lifting of the fog. If a wisp of mist is to be seen hanging over Mount Desert or over the Camden Hills, whether otherwise clear or not, the following day is usually foggy. When calm during the ebb tide, if the fog is seen in a bank offshore, provided it remains calm, the fog will come in with the following flood.

The following table shows the average number of hours per month, from a record of about six years, that the fog signals were operated, on account of fog and snow, at the stated light stations of the United States:

HOURS OF OPERATION OF FOG SIGNALS

	January	February	March	April	May	June	July	August	September	October	November	December	Total
West Quoddy Head	76	92	63	99	135	156	321	235	176	59	22	55	1, 489
St. Croix River	12	24	10	47	17	48	86	115	66	12	8	10	455
Little River	77	92	63	93	112	128	274	203	150	62	21	58	1, 333
Libby Islands	105	126	85	108	133	137	288	226	181	79	41	72	1, 581
Nash Island	71	89	56	89	118	95	211	199	136	61	24	47	1, 196
Petit Manan	74	101	64	89	113	109	248	173	144	55	26	58	1, 254
Mount Desert	101	112	64	105	136	143	257	200	158	56	29	49	1, 410
Egg Rock	121	133	99	125	127	122	236	172	166	74	40	85	1, 500
Blue Hill Bay	48	63	46	60	73	56	156	115	97	29	13	34	790
Saddleback Ledge	59	58	46	87	76	85	188	135	115	41	10	28	928
Matinicus Rock	115	115	110	131	165	166	302	220	192	94	29	79	1, 718
Whitehead	155	149	137	173	163	144	263	203	193	109	109	122	1, 920
Fort Point	33	23	22	48	51	37	116	86	75	29	19	27	566
Manana Island fog signal	76	91	78	103	104	95	163	122	122	56	38	49	1, 097
Perkins Island	47	44	30	47	33	35	72	55	58	37	21	25	504
Seguin	176	148	141	142	149	138	239	198	182	93	92	131	1, 829
Halfway Rock	76	80	53	78	63	53	104	94	96	48	32	52	829
Portland Lightship	57	75	49	78	56	62	88	79	99	46	37	57	783
Portland Head	73	87	56	78	63	59	122	83	98	48	40	55	862
Cape Neddick	82	83	65	79	69	60	91	69	97	59	45	65	864
Portsmouth Harbor	78	82	55	59	45	46	80	64	69	48	38	63	727
Isles of Shoals	69	66	48	65	47	43	62	60	71	45	33	41	650
Cape Ann	85	71	68	93	72	71	120	86	71	62	28	52	879
Bakers Island	100	71	85	65	65	49	100	87	67	73	30	59	851
Boston Lightship	88	74	81	77	61	65	90	76	70	66	36	65	849
The Graves	75	62	71	59	53	47	85	69	62	68	31	56	738
Boston	82	64	75	55	51	48	76	63	55	65	38	62	734
Plymouth (Gurnet)	62	63	66	65	62	51	66	54	43	41	25	30	628
Race Point	90	87	81	69	68	58	66	47	67	53	31	34	751
Cape Cod	92	83	91	78	94	78	96	68	77	72	34	29	892
Pollock Rip Lightship	88	102	84	70	118	116	212	145	126	73	37	44	1, 215
Great Round Shoal Lightship	105	109	90	92	99	124	181	111	94	70	33	50	1, 158
Nantucket Shoals Lightship	50	59	63	83	141	168	184	80	71	63	11	10	893

Ice.—The extent to which the harbors of Maine are closed to navigation by ice varies greatly in different years. During some winters most of the harbors are open, while in others the only harbors available for anchorages are Quoddy Roads, Eastport, Little River, Machias Bay (above Avery Rock Lighthouse), Mistake Harbor (not much used), Winter Harbor, and Boothbay Harbor. Portland Harbor generally has an open channel in winter, kept so by steamers and tugs. The mouths of the rivers are generally avoided for anchorage in winter and early spring on account of running ice. In the bays and harbors the ice formation is mostly local; beginning at the head, in sheltered places along the shore, it extends outward. During a calm or light winds from northward the local formations rapidly increase, while strong winds break them up and force them as drift ice onto the lee shore. The tidal currents do not prevent the formation of ice or influence its movement in strong winds except in the larger rivers.

In severe winters some of the harbors south of Cape Ann are closed to navigation by ice, and there is more or less drift ice in all the harbors, in Cape Cod Bay, and on Monomoy and Nantucket Shoals. In

the principal harbors steamers and tugs usually keep a channel open. See "Ice" under the different headings.

STORM WARNINGS

Storm warnings are displayed by the United States Weather Bureau 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 lanterns, one above the other, displayed 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 on the following islands in the Atlantic: Jamaica, Turks Island, Bermuda, Haiti, Curaçao, Porto Rico, Virgin Islands of the United States, St. Kitts, Dominica, Barbados, Trinidad, St. Lucia, St. Vincent, Grenada, Swan Island, and Cuba.

The following are the storm warning display stations within the limits covered by this volume:

MAINE:
- Eastport.
- Machiasport.
- Vinalhaven.
- Whitehead.
- Cranberry Island.
- Cross Island.
- Great Wass Island.
- Marshall Point Lighthouse.
- Boothbay Harbor.
- Portland.
- Isles of Shoals.

NEW HAMPSHIRE:
- Portsmouth.
- Portsmouth (Coast Guard station).
- Portsmouth (navy yard).

MASSACHUSETTS:
- Newburyport.
- Rockport

MASSACHUSETTS—Continued.
- Gloucester.
- Marblehead.
- Marblehead (Boston Yacht Club).
- Boston (post-office building).
- Charlestown (navy yard).
- South Boston (city Coast Guard station).
- City Point (Boston Yacht Club).
- Dorchester (Boston Yacht Club).
- Dorchester (Savin Hill Yacht Club).
- Hull
- Hull (Boston Yacht Club).
- Sandwich.
- Wellfleet.
- Provincetown.
- Race Point.
- Cape Cod Lighthouse.

RADIO SERVICE

The supervision of radio communication in the United States, including the Hawaiian Islands, is controlled by the Department of Commerce and the Federal Radio Commission. A list of the radio stations of the United States, including shore stations, merchant vessels, and Government vessels; Radio Communication Laws and Regulations of the United States; and Amateur Radio Stations of the United States are published by the department. Either of the first two publications can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., price, 15 cents each; the last one, 25 cents. Changes or additions to the stations and to the laws and regulations are published in bulletins issued monthly; price, 5 cents per copy or 25 cents per year.

The International List of Radio Stations of the World (edition in English) can be procured from the International Bureau of the Telegraphic Union (Radiotelegraphic Service), Berne, Switzerland. In addition to the information contained in the list of the United States stations published by the Bureau of Navigation, the international list shows geographical locations, normal ranges in nautical miles, radio systems, and rates. Supplements to the international list will be issued monthly and will contain new stations and tables of alterations. Inquiries as to the subscription prices of these lists should be made direct to the Berne bureau at the address given above. Remittances to Berne should be made by international postal money orders.

Time signals.—Radio time signals are sent daily from United States naval radio stations as follows: From the station at Arlington (call letters NAA) signals are sent out at noon and 10 p. m., standard seventy-fifth meridian time, on wave lengths of 2,677 and 4,409 meters, A. C. W. They are repeated automatically from the station at Annapolis (NSS) on a wave length of 17,130 meters, continuous wave, and from the station at Key West (NAR) on a wave length of 2,939 meters, tube. Lag constants have been determined for these stations, as follows: Arlington, 0.09 second; Annapolis, 0.09 second; and Key West, 0.28 second. Should the Arlington station not be working, time signals will be sent at noon daily, Sundays and holidays excepted, from the stations at New York, Norfolk, and Charleston.

The signals begin at 5 minutes before the hour and continue for 5 minutes. During this interval every tick of the clock is transmitted except the twenty-ninth second of each minute, the last 5 seconds of each of the first 4 minutes, and finally the last 10 seconds of the last minute. The time signal is the beginning of the dash after this long break. Hydrographic information, weather reports, and other information of benefit to shipping are sent out from these stations.

Radiocompass 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 radiocompass 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 14 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 radiocompass stations or radio beacons 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 radiocompass stations and radio beacons listed in the Coast Pilots, in the light and buoy lists published by the Lighthouse Service, or in the publication, Radio Aids to Navigation (H. O. No. 205), issued by the Hydrographic Office, United States Navy. The largest scale chart available should be used for this purpose.

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

The sign of the **correction,** when bearings are read clockwise from north, will be as follows: In **north latitude,** the plus sign is used when the ship is **east** of the compass station; the minus sign is used when the ship is **west** of the compass station; in **south latitude,** the minus sign is used when the ship is **east** of the compass station; the plus sign is used when the ship is **west** of the compass station. If the radio bearings are observed on the ship, the signs will be reversed. The corrected bearing is then the Mercator bearing from ship to the sending station, and to facilitate plotting 180° should be added to it and the result plotted from the sending station.

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

Example.—A ship in latitude 37° 20′ N., longitude 69° 20′ W., by dead reckoning receives a radio bearing of 64° from a radiocompass station located in latitude 35° 14′ N., longitude 75° 32′ W. Find the Mercator bearing of the ship from the station—

Radiocompass station latitude	35°	14′ N.,	long.	75°	32′ W.
Dead reckoning position of ship	37	20		69	20
Middle latitude	36	17	Diff.	372	

Entering table with difference of longitude = 360′, which is the nearest tabulated value to 372′, and opposite 36° middle latitude (the nearest tabulated value to 36° 17′) the correction 106′ is read. The ship being east of the station the correction is plus. The Mercator bearing will then be the radio bearing received plus the correction from the table, 64° 00′ + 106′ = 64° + 1° 46′ = 65° 46′.

For more accurate determinations the following formula should be used and on which the table of corrections is based:

Formula for the conversion of radio bearings into Mercator bearings.—The Mercator bearing is equal to the radio bearing received, plus or minus one-half the convergence of the meridians in minutes, which expressed as a formula is

$$M = R \pm \frac{D}{2} \sin\left(\frac{B+B'}{2}\right) \text{ in which}$$

M = Mercator bearing required.
R = radio bearing received from the radiocompass station.
D = difference in longitude, in minutes, between the radiocompass station and the ship's position by dead reckoning.
B = latitude of the radiocompass station.
B' = latitude of the ship's position by dead reckoning.

Example.—A ship in latitude 37° 20′ N., longitude 69° 20′ W., by dead reckoning receives a radio bearing of 64° from a radiocompass station located in latitude 35° 14′ N., longitude 75° 32′ W. Find the Mercator bearing of the ship from the station.

By the formula—

$R = 64°$
$D = 75° 32' - 69° 20' = 6° 12' = 372'$
$\frac{D}{2} = 186'$

$B = 37° 20'$
$B' = 35° 14'$
$B + B' = 72° 34'$
$\frac{B+B'}{2} = 36° 17'$

sine $36°17' = 0.59176$ (from the table of natural sines, below).

Substituting these values in the formula, and observing that since the ship is in north latitude and east of the radiocompass station the + sign is used (see p. 12 for determination of signs), we have—

$$M = 64° + 186' \times 0.59176 = 64° + 110' = 64° + 1° 50' = 65° 50'$$

Table of natural sines

Mid. L.	Sine	Mid. L.	Sine	Mid. L.	Sine	Mid. L.	Sine	Mid. L.	Sine	Mid. L.	Sine
0°	0.00000	11°	0.19081	22°	0.37461	33°	0.54464	44°	0.69466	55°	0.81915
1°	.01745	12°	.20791	23°	.39073	34°	.55919	45°	.70711	56°	.82904
2°	.03490	13°	.22495	24°	.40674	35°	.57358	46°	.71934	57°	.83867
3°	.05234	14°	.24192	25°	.42262	36°	.58779	47°	.73135	58°	.84805
4°	.06976	15°	.25882	26°	.43837	37°	.60182	48°	.74314	59°	.85717
5°	.08716	16°	.27564	27°	.45399	38°	.61566	49°	.75471	60°	.86603
6°	.10453	17°	.29237	28°	.46947	39°	.62932	50°	.76604	61°	.87462
7°	.12187	18°	.30902	29°	.48481	40°	.64279	51°	.77715	62°	.88295
8°	.13917	19°	.32557	30°	.50000	41°	.65606	52°	.78801	63°	.89101
9°	.15643	20°	.34202	31°	.51504	42°	.66913	53°	.79864	64°	.89879
10°	.17365	21°	.35837	32°	.52992	43°	.68200	54°	.80902	65°	.90631

Table of corrections, in minutes

[Difference of longitude in minutes]

Mid. L.	30′	60′	90′	120′	150′	180′	210′	240′	270′	300′	330′	360′	390′	420′	450′	480′	510′	540′	570′	600′
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	22	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

Radiobeacons (fog signals).—The following radiobeacons, operated by the United States Lighthouse Service, will be of use to vessels navigating within the approximate limits of this volume:

Portland Lightship:
- **Groups of 1 dash and 2 dots** ..... **60 seconds.**
- **Silent** ..... **120 seconds.**
- **Clear weather transmission: 5.30 to 6 and 11.30 to 12, both a. m. and p. m.**

Boston Lightship:
- **Groups of 1 dash and 1 dot** ..... **60 seconds.**
- **Silent** ..... **120 seconds.**
- **Clear weather transmission: 2.30 to 3 and 8.30 to 9, both a. m. and p. m.**

Nantucket Shoals Lightship (call letters WWAH):
- **Groups of 4 dashes** ..... **60 seconds.**
- **Silent** ..... **120 seconds.**
- **Clear weather transmission: Second 15 minutes of each hour, day and night.**

Fire Island Lightship (call letters WWAN):
- **Groups of 2 dashes** ..... **60 seconds.**
- **Silent** ..... **120 seconds.**
- **Clear weather transmission: 5.30 to 6 and 11.30 to 12, both a. m. and p. m.**

Ambrose Channel Lightship (call letters WWAT):

Single dashes	60 seconds.
Silent	120 seconds.

Clear weather transmission: 3.30 to 4 and 9.30 to 10, both a. m. and p. m.

NOTE.—Ships for which no call letters are given do not maintain radio communication.

These radio fog signals are intended for the use of vessels equipped with radiocompass. By use of this radiocompass (also termed radio direction finder) the bearing of the radio fog-signal station 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 without knowledge of the telegraph code. The radio direction-finding apparatus consists of a radio receiving set, similar in operation to those used for radio telegraph or telephone 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 caused 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 a magnetic compass. Those using radio direction finding on shipboard are cautioned to bear these errors in mind and to keep radiocompasses calibrated at all times. This may be done during clear weather by comparing the bearing obtained with the radiocompass with the bearing as given by other methods in general use. All radiocompasses are subject to what is called "night effect," an indeterminate error sometimes experienced near nightfall and sunrise.

The signals from the lightships have definite characteristics for identifying the stations, as have the flashing lights and sound fog signals, and bearings may be obtained with even greater facility than sight bearings on visible objects. *The radio fog signals are transmitted on a wave length of 1,000 meters, which is exclusively reserved for this purpose to avoid interference.*

With the exception of *Nantucket Shoals Lightship*, as noted below, the lightships transmit continuously during thick or foggy weather, and sound the signal daily in clear weather during certain periods as noted above (seventy-fifth meridian time).

On *Nantucket Shoals Lightship* (call letters WWAH) the operator stands watch in clear weather during the first 15 minutes of each hour (seventy-fifth meridian time) from 8 a. m. to 10.15 p. m. During fog the radiobeacon will be silent from 10 a. m. to 10.15 a. m. and 4 p. m. to 4.15 p. m. for listening in.

During thick or foggy weather *Nantucket Shoals Lightship* sounds radio fog signals and submarine signal at the same time. The submarine signal sounds 2 groups of blasts every 90 seconds, thus, six 1-second blasts, 3½ seconds apart, 12 seconds silence, six 1-second blasts, 3½ seconds apart, 31 seconds silence. In each repetition the first dash of the radio signal and the first blast of the submarine signal are sounded at the same time. The difference in time in seconds between the reception of the first dash of the radio signal and the first blast of the submarine signal multiplied by 1,600 will give the distance in yards of the observer from the lightship.

Vessels are requested to forward reports to the Commissioner of Lighthouses, Washington, D. C., or Superintendent of Lighthouses, Boston, Mass., as to the effectiveness of this signal.

Operators on *Fire Island* and *Ambrose Channel Lightships* maintain watch on 600-meter wave for the first 15 minutes of each hour from 8 a. m. to 9.15 p. m., local standard time, except when radiobeacon is in operation. Requests by radio for special transmission of signals for testing or calibrating should be made during such watch periods, using 600-meter wave.

A general description of this method of navigation and the instruments required is given in Lighthouse Service Publication, Radio Fog Signals and Their Use in Navigation, which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents. Bureau of Standards Scientific Paper, No. 428, The Radio Direction Finder and Its Application to Navigation, may be obtained from the same source for 15 cents.

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 can not accept any responsibility for the consequences of a bearing being inaccurate.

When three stations, so situated as to give intersecting bearings. can be used and the three simultaneous bearings cross with a small "triangle of error," considerable reliance can be placed in the position obtained.

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 generally unreliable. 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.

United States naval radiocompass stations will furnish radio bearings to mariners of all vessels equipped with radiotelegraph transmitters. While the use of these bearings should not lead a mariner to neglect other precautions, such as the use of the lead, etc., during a fog, these bearings will greatly reduce the dangers to navigation for mariners who are compelled for any reason to proceed during foggy or misty weather.

These radiocompass stations are provided, primarily, to assist the mariner in closing the land during fog or poor visibility, but they may also be used to obtain the positions of vessels at sea in radiocompass range, about 150 miles, when for any reason positions can not be obtained by other means. The maximum distance for which bearings from these stations are accurate is 150 miles. (See preceding pages for reduction of observed bearings to Mercator bearings.)

Radiocompass stations are divided into two classes: (*a*) Single stations, operating independently and furnishing a single bearing. (*b*) Harbor-entrance groups. All stations in harbor-entrance groups are connected to and controlled by the master station. All stations of the group take bearings simultaneously and these bearings are transmitted to the ship requesting them by the control station.

Where only one radiocompass station is available, the mariner may fix his position by two or more bearings, from the station with

the distance run between, or may use the bearings as a line of position, or as a danger bearing. Or the bearing may be crossed with a line of position obtained from an observation of an astronomical body to establish a fix.

Wave lengths.—All independent and group radiocompass stations keep watch on 375 kilocycles (800 meters). Only this wave should be used to call and work with these stations.

Hours of service.—During the first 10 minutes of each hour during clear weather radiocompass stations ordinarily will not be guarding this wave. Ships are requested to confine their requests to bearings during clear weather to the remaining 50 minutes of the hour, as far as is practicable. Should a station chance to hear a request for a bearing during the first 10 minutes of the hour, the required bearing will be given. During the remaining 50 minutes, and at all times during inclement weather, all radiocompass stations will be continuously guarding the 375-kilocycle (800-meter) wave.

Calling a radiocompass station.—To obtain a bearing from independent radiocompass stations, call the station from which the bearing is desired in the usual manner and request bearings by means of the conventional signal given hereafter. Simultaneous bearings from two or more compass stations can be obtained by making the call include the other compass stations desired. To obtain bearings from the harbor-entrance compass stations, carry out the procedure previously given. The compass-control station only will answer.

Conventional signals.—The following abbreviated signals will be used:

Signal	Meaning
QTE?	What is my true bearing?
QTE	Your true bearing from ——— radiocompass station was ——— degrees.

The following radiocompass stations will be of use for vessels navigating within the approximate limits of this volume. In plotting bearings furnished by these stations the *position of receiver* must be used. Vessels equipped with a radiocompass may also use these stations as radio beacons. For this purpose a station will transmit, upon request, its call letter for 45 seconds on 800-meter wave. When the bearing is taken on the vessel the *position of transmitter* must be used for plotting.

Name of station	Call letters	Position of receiver		Position of transmitter		Arc of calibration
		Latitude (N.)	Longitude (W.)	Latitude (N.)	Longitude (W.)	
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	*Degrees*
Bar Harbor, Me	NQC	44 18 48	68 11 40	44 18 51	68 11 48	70–235
Cape Elizabeth, Me	NAB	43 33 59	70 11 59	43 33 54	70 12 06	50–210
Gloucester (Thatchers Island), Mass[1]	NBE	42 38 10	70 34 45	42 38 10	70 34 45	322–243
Deer Island, Mass.[1]	NWM	42 21 16	70 57 29	42 21 16	70 57 29	15–150
Fourth Cliff, Mass.[1]	NBF	42 09 40	70 42 22	42 09 40	70 42 22	330–135
North Truro (Cape Cod), Mass	NAE	42 02 23	70 03 37	42 02 27	70 03 43	210–150
Surfside, Nantucket, Mass	NBS	41 14 39	70 05 53	41 14 40	70 05 55	345–275

[1] These stations ordinarily operate as a group, but are also available for independent bearings and for beacon service. The group call is NWM with Deer Island as the master and transmitting station.

NOTE.—The arc of calibration is a sector of the circle of which the compass coil at the radio station is the center; the bearings are from the station (clockwise). Compass bearings are reliable only when they fall within the calibrated arcs.

Procedure in detail.—(*a*) A ship calling the radiocompass station or compass control station should make the abbreviation "QTE?" ("What is my true bearing?"). This request will be answered by the radiocompass station or control station, and when ready to observe the radio bearing it will send the signal "K," indicating to the ship to commence "testing"; that is, repeating its distinguishing signal for a period of 50 seconds. The signal should be made slowly, with the dashes considerably prolonged.

(*b*) The testing should be made on 800 meters, upon the completion of which the ship should await reply from the radiocompass station.

(*c*) The radiocompass station or control station will then reply, repeating the abbreviation "QTE" ("Your true bearing from _____ was _____ degrees"), followed by the bearing in degrees given by a group of three figures 000 to 359, indicating the true bearing in degrees of the ship station from the radiocompass station, and then the time group, giving the time of observations in local standard time. In the case of more than one radiocompass connected by land line, only the station originally called will answer. This station will combine all the bearings taken by itself and associated stations into one message, which gives each bearing observed immediately after the name of the station making the observations. *All compass stations transmit on 800 meters.*

Danger from reciprocal bearings.—Attention is invited to the fact that when a single bearing is furnished there is a possibility of an error of approximately 180°, as the operator at the compass station can not always determine on which side of the station the vessel lies. Certain radiocompass stations, particularly those on islands or extended capes, are equipped to furnish two corrected true bearings for any observation. Such bearings when furnished vessels may differ by approximately 180° and whichever bearing is suitable should be used.

Caution.—Mariners receiving bearings which are evidently the approximate reciprocal of the correct bearing should never attempt to correct these bearings by applying a correction of 180°, as such correction would not include the corrrection necessary on account of deviation at the compass station. An error of as large as 30° may be introduced by mariners applying an arbitrary correction of 180° to such bearings. Vessels receiving bearings manifestly requiring an approximate 180° correction should request the other bearing from the radiocompass station if not previously furnished.

Bearings, except in the case of approximate reciprocal bearings, should be accurate within 2° of arc, provided the transmitting equipment on board vessels is tuned sharply to 800 meters. Operators should use sufficiently wide coupling to obtain low decrement. If radio transmitters are not tuned sharply, it is difficult to obtain bearings that are sufficiently accurate for navigational purposes.

When bearings from three or more compass stations are not over 2° of arc in error, but do not meet at a fixed point, the geometric center of the triangle formed by the bearings can generally be taken as the approximate position of the vessel. Mariners, until thoroughly familiar with the system, are advised to use radiocompass stations frequently, especially in clear weather, when positions of vessels can be accurately fixed in order to accustom operators to the

procedure and to acquaint themselves with the degree of accuracy and dependability of bearings furnished by the radiocompass stations.

Reports.—In order that the operation of shore radiocompass stations may be checked, mariners, obtaining bearings are requested to forward a brief report to the Director Naval Communications, Navy Department, Washington, D. C., containing the following particulars:

1. Name of ship.
2. Name of radiocompass station.
3. Date and local standard time at which radio bearing was taken.
4. Bearings given by radio station.
5. Estimated position of ship at above time and dates by methods other than radio.
6. The probable degree of accuracy of the estimated position.
7. Weather conditions at above time.
8. Remarks, if any.
9. Signature of master or responsible navigating officer.

There is no charge for bearings furnished by the United States naval radiocompass stations.

Radio telegraphic broadcasts of weather information, issued daily (Sundays and holidays included) by the United States Weather Bureau for the benefit of marine and aviation interests, are sent out in cooperation with Office of Communications, Navy Department, from naval radio stations on the North Atlantic coast.

Bulletins are broadcast from the Arlington (Va.) Naval Radio Station (call letters NAA), as follows:

Wave length, 2,677 meters.
0300 (GCT), time, navigational warnings.
0330 (GCT), weather.
1700 (GCT), time, weather.
1530 (GCT), weather, navigational warnings.

Bulletins are broadcast from the Boston Naval Radio Station (call letters NAD), as follows:

Wave length, 2,939 meters.
1600, 2200 (GCT), weather, navigational warnings.

Major bulletins.—These bulletins are broadcast from the Arlington (Va.) Naval Radio Station (call letters NAA) twice daily, as follows:

Morning bulletin at 10.30 a. m. (1030) (1530 GCT) on wave lengths of 2,677 and 4,409 meters (133 KC/s) A. C. W. tube.

Evening bulletin at 10.30 p. m. (2230) (0330 GCT) on wave lengths of 2,677 and 4,409 meters (133 KC/s) A. C. W. tube.

The bulletins are divided into two parts and invariably begin with the words "Weather Bureau bulletin." The first part consists of surface weather conditions based upon observations taken at 8 a. m. and 8 p. m. and upper-air data.

Weather reports from ships in the Atlantic Ocean, and during the hurricane season additional ship reports from the Gulf of Mexico and Caribbean Sea, follow the reports from land stations in the first part of the bulletin.

The second part of the bulletin consists of a summary of general atmospheric pressure distribution over land and sea, including the

location of "high" and of "low" areas and the barometer readings at their centers; wind and weather forecasts for Atlantic and Gulf of Mexico offshore areas; storm warnings for these areas; and flying weather forecasts for each of six aviation zones.

The weather reports contained in the bulletins and supplemented by others picked up from vessels can be used in the production of weather maps, which will be of much value to navigating officers; and charts prepared for this purpose, which show the reporting station and their key letters, will be forwarded upon application to the United States Weather Bureau.

Hurricane warnings when issued are repeated at 2-hour intervals for 24 hours.

Complete details relative to the above service, including method of decoding the major bulletins and a list of stations from which localized broadcasts are made, are published in Circular No. 13, issued by the United States Weather Bureau. Copies of this circular and a card descriptive of storm signals may be obtained without charge upon application to any United States Weather Bureau office on the Atlantic coast. A new edition of the Radio Weather Code for Vessel Weather Observers (W. B. 860) was published in 1925.

Free medical advice to seamen by radio.—The Seamen's Church Institute, of New York, announces that, through the cooperation of the Seamen's Church Institute with the United States Public Health Service, free medical advice for ships at sea is now available through the coastal radio stations operated on the Atlantic and Pacific coasts of the United States.

The marine hospitals and relief stations of the United States Public Health Service designated to furnish the service in question are as follows:

Atlantic coast:
- New York, N. Y., United States Marine Hospital No. 70. (Alternate.)
- Stapleton, N. Y., United States Marine Hospital No. 21.
- Key West, Fla., United States Marine Hospital No. 10.

Gulf coast: New Orleans, La., United States Marine Hospital No. 14.

While the Panama Canal was not included in the original scheme, several requests for medical service have been received here from ships at sea and have been given prompt attention.

Ships desiring medical advice can secure prompt service by sending radiograms through any radio station with which communication is established, such radiograms to be signed by the master addressed to the nearest marine hospital or relief station and briefly stating symptoms of the person afflicted. The advice given by the above-mentioned hospitals will be phrased in language (English) intelligible to a layman. This free medical service has been established primarily for the benefit of ships not carrying physicians. However, should occasion require, consultation may be held by radio by ships' physicians with the hospital staffs.

The United Fruit Co. announces that the free medical-radio service, which it inaugurated on August 1, 1922, from its hospitals in the various countries of Central America and from the passenger ships in its service, is now made available for ships at sea through an additional number of stations. The following is a list of radio stations of the United Fruit Co. and of the Tropical Radio Tele-

graph Co. through which this service may hereafter be obtained without charge, so far as these companies are concerned, by ships of all nationalities:

Radio station	Call letters	Radio station	Call letters
Boston, Mass	WBF	Tegucigalpa, Honduras	UG
Miami, Fla	WAX	Puerto Barrios, Guatemala	UF
New Orleans, La	WNU	Managua, Nicaragua	UL
Burrwood, La	WBW	Bluefields, Nicaragua	UQ
Fort Morgan, Ala	WIO	Cape Gracias, Nicaragua	UW
Mobile, Ala	WNN	Puerto Limon, Costa Rica	UX
Swan Island, Caribbean Sea	US	Almirante, Panama	UB
Santa Marta, Colombia	UJ		

Free medical radio service is also available through the Tela Railroad Co.'s radio station, call letters UC, Tela, Honduras, and through the Truxillo Railroad Co.'s radio station, call letters UA, Puerto Castilla, Honduras. Both of these stations may be reached through any station of the United Fruit Co. or of the Tropical Radio Telegraph Co. listed above.

The following information is taken from a circular issued by the United Fruit Co.:

Radiograms requesting medical advice should be signed by the captain of the ship and should state briefly but clearly the symptoms of the person afflicted. Such radiograms, if intended for a United Fruit Co. hospital, should be addressed "Unifruitco," followed by the name of the place where the hospital is located. United Fruit Co. hospitals giving this service are located at the following places and also may be reached through any of the above-mentioned radio stations: Santa Maria, Colombia; Puerto Limon, Costa Rica; Almirante, Panama; and Puerto Barrios, Guatemala.

This service may also be obtained at the hospital of the Tela Railroad Co., Tela, Honduras, and at the hospital of the Truxillo Railroad Co., Puerto Castilla, Honduras. Radiograms for these hospitals should be addressed "Telarailco" and "Trurailco," respectively.

All United Fruit Co. passenger steamships carry doctors and free medical advice may be secured by radio from any of them by a radiogram addressed "Ship's Doctor," followed by name of the steamship. This free medical service is established primarily for the benefit of ships not carrying doctors; however, should occasion require, ships' doctors may hold consultation by radio with the United Fruit Co. ships' doctors and hospital staffs.

The physicians and surgeons comprising the medical staff of the United Fruit Co. and its associated companies are thoroughly qualified, but in view of the fact that radio medical advice to ships at sea is given free and without an opportunity for a personal examination of the patients, no responsibility will be assumed by either the company and its associated companies or the physicians or surgeons giving the advice as to its accuracy, or for error or delay in the receipt or transmission of any message sent or received in connection therewith.

It is requested that when sending medical-advice radiograms, radio operators check them "(number of words) DH Medico." "DH Medico" radiograms will be given preference over all other radiograms, excepting SOS calls, throughout the radio service of the United Fruit Co. and Tropical Radio Telegraph Co.

UNITED STATES COAST GUARD STATIONS

Coast Guard stations are maintained at the places named in the table following. The stations are fully manned throughout the year

and are supplied with boats, wreck guns, beach apparatus, and all 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 314.

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.

LIST OF COAST GUARD STATIONS

Cape Cod to the St. Croix River

Official designation [1]	State	Name and locality
1	Maine	Quoddy Head, near West Quoddy Head Light.
2	do	Cross Island, Machias Bay.
4	do	Great Wass Island, off Jonesport.
5	do	Cranberry Island, off Mount Desert.
6	do	Whitehead, on southwest end of Whitehead Island.
7	do	Burnt Island, off mouth of St. George River.
8	do	Damiscove Island, Damiscove Harbor.
9	do	Kennebec River, on west side mouth of Kennebec River.
10	do	Cape Elizabeth, near the light.
11	do	Fletchers Neck, Biddeford Pool.
12	New Hampshire	Portsmouth Harbor, on Wood Island.
13	do	Wallis Sands.
14	do	Isles of Shoals, Appledore Island.
15	do	Rye Beach, north end.
16	do	Hampton Beach, 1½ miles north of Great Boars Head.
19	Massachusetts	Salisbury Beach, ⅜ mile south of State line.
20	do	Merrimac River, north end of Plum Island.
21	do	Plum Island, 2¼ miles from south end.
22	do	Straitsmouth, ½ mile west of Straitsmouth Light.
23	do	Gloucester, westerly side of Gloucester Harbor.
24	do	Nahant, on Nahant Neck.
25	do	City Point, floating station in Dorchester Bay.
26	do	Point Allerton, 1 mile west of Point Allerton.
27	do	North Scituate, 2½ miles south of Minot Ledge Light.
29	do	Brant Rock, on Green Harbor Point.
30	do	Gurnet, 4½ miles northeast of Plymouth.
31	do	Manomet Point, 6½ miles southeast of Plymouth.
32	do	Wood End, ⅛ mile east of Wood End Light.
33	do	Race Point, 1⅜ miles northeast of Race Point Light.

[1] For aviation purposes only.

MASSACHUSETTS HUMANE SOCIETY LIFE-SAVING STATIONS

The following life-saving stations, maintained by the Massachusetts Humane Society, are not manned, but depend on local residents

to render assistance with the equipment given under the column headed "Remarks":

Locality	Life-saving apparatus
Annisquam	Lifeboat.
Emerson Point, Cape Ann	Dory.
Brace Cove, Gloucester	Lifeboat, Hunt gun, and apparatus.
Marblehead	Power lifeboat, lifeboat, Hunt gun, and apparatus.
Deer Island, Boston Harbor	Lifeboat.
Boston Light	Hunt gun and apparatus.
Nantasket Beach (between Point Allerton and Strawberry Hill).	Large lifeboat and small boat.
Nantasket Beach, Surfside	Lifeboat and dory, Hunt gun, and apparatus.
The Glades, North Scituate	Lifeboat, Hunt gun, and apparatus.
Scituate Light	Lifeboat.
Scituate	Hunt gun and apparatus.
Bass Cove, Scituate	Large and small lifeboat.
Third Cliff	Lifeboat, Hunt gun, and apparatus.
Race Point Light	Hunt gun and apparatus.

VARIATION OF THE COMPASS

The magnetic variation for 1927 and annual increase at points mentioned are as follows:

Locality	Variation	Annual increase
	° ′	′
Eastport	20 50 W	4
Little River	20 15 W	4
Jonesport, Moosabec Reach	19 45 W	4
Petit Manan	19 15 W	4
Mount Desert Rock	18 40 W	4
Bar Harbor	19 00 W	4
Blue Hill	18 45 W	4
Stonington, Deer Island Thorofare	18 30 W	4
Matinicus Rock	18 00 W	4
Belfast	18 30 W	4
Monhegan	17 45 W	5
Kennebec River entrance	17 25 W	5
Cape Elizabeth	16 55 W	5
Cape Porpoise	16 25 W	5
Isles of Shoals	15 50 W	5
Gloucester	15 30 W	5
Salem	15 20 W	5
Boston Lightship	15 10 W	5
Cape Cod Canal	14 50 W	5
Cape Cod Lighthouse	15 25 W	5

TIDES AND CURRENTS

Tide Tables for the Atlantic Coast of the United States, including Canada and the West Indies, are published annually in advance by the United States Coast and Geodetic Survey. This volume fur-

nishes, at the nominal cost of 15 cents, full tidal data for the Atlantic and Gulf coasts of North America.

It contains a table of full daily predictions of the times and heights of high and low waters for certain standard or principal ports along the coast, 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 standard ports are extended so as to enable one to obtain the predictions for each day for a large number of other stations and with almost the same accuracy as though full predictions were given for all these points.

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.

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, landlocked harbors, or on tidal rivers the time of slack current may differ by two or three 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 for certain standard stations and a table of current differences and constants by means of which the daily predicted times of slack water 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.

The results of detailed tidal and current observations in Portsmouth and Boston Harbors are being compiled, and will be published under the following titles: "Tides and Currents in Portsmouth Harbor" and "Tides and Currents in Boston Harbor." Copies of these publications may be obtained from the Coast and Geodetic Survey Field Station, Boston, Mass., or from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a nominal cost.

INLAND WATERWAYS

The following data about the inland waterways are included for ready reference:

The inland waters extending eastward from New York include Long Island Sound, Narragansett Bay, Buzzards Bay, and Vineyard and Nantaucket Sounds. From the head of Buzzards Bay there is an available passage through Cape Cod Canal (see p. 299), from which the passage to the New England coast must be made mostly outside, although there are harbors at short intervals.

Long Island Sound has harbors at short intervals on both sides from its west end to Eaton Neck, and thence on its north side to and including Fishers Island Sound. From Watch Hill boats must go outside to the bays and sounds eastward, but Point Judith Harbor of Refuge is available, and shortens the distance between harbors.

On the south coast of Long Island there is at present no inside route between Jamaica Bay and the inland waters eastward. Boats must go outside from New York to East Rockaway Inlet, and the latter requires local knowledge, because of frequent changes. But from East Rockaway Inlet boats of 5-foot (1.5 m.) draft can be taken inside through Great South Bay, Moriches and Shinnecock Bays and Shinnecock Canal to Great Peconic Bay. Masted boats are limited to a height of less than 20 feet (6.1 m.) above the water by the fixed bridges over Shinnecock Canal, and otherwise all bridges have draw openings. This route is described in Atlantic Coast Pilot, Section B, under the heading "Inland waters, south coast of Long Island."

By the Hudson River and New York State Barge Canal, or Hudson River, Champlain Canal, and Richelieu River, boats can be taken through to the Great Lakes or St. Lawrence River, respectively. The dimensions of vessels that can be taken through to the Great Lakes or to Lake Champlain are, draft 10 feet (3.0 m.), length 300 feet, width 44.4 feet, and overhead clearance 15.5 feet (4.7 m.) above water level.

The controlling width is that of the Government lock in the dam across the Hudson River at Troy. The limiting depth occurs in the New York State Barge Canal, where the project depth of 12 feet (3.7 m.) has not yet been attained. In 1925 barges drawing 10½ feet (3.2 m.) successfully navigated the canal.

Chicago to New Orleans.—A draft of about 3 feet (0.9 m.) can be carried by the way of the Chicago River, 6 miles; Sanitary Canal, 28 miles; Illinois & Michigan Canal, 56 miles; Illinois River, 194 miles; and Mississippi River, 1,041 miles. The limiting dimensions are found in the Illinois and Michigan Canal, where boats are limited to a length of about 100 feet, width 16 feet and draft 3 feet (0.9 m.). There is a headroom of 11 feet (3.4 m.) under fixed bridges.

New York to Key West.—Vessels of 7-foot (2.1 m.) draft can pass inside from New York Bay to Delaware River through the Delaware & Raritan Canal. Masted vessels are limited to a height of 50 feet (15.2 m.) above canal level by a bridge without draw at New Brunswick, N. J.

Twelve feet (3.7 m.) can be carried from the Delaware River through the Chesapeake & Delaware Canal and Chesapeake Bay to Norfolk.

From Norfolk a draft of 8¾ feet (2.6 m.) can be carried through the Albemarle & Chesapeake Canal and the North Carolina Sounds to Beaufort, North Carolina.

From Beaufort to Winyah Bay there is no inside passage and vessels must pass outside for a distance 165 miles. Cape Fear River, halfway between them, is available as a harbor of refuge.

From Winyah Bay to Charleston a draft of 5 feet (1.5 m.) can be carried at *high water*.

From Charleston to the St. Johns River a draft of 6 feet (1.8 m.) can be carried.

From the St. Johns River to Miami a draft of 3 feet (0.9 m.) can be carried without difficulty.

From Miami to Key West a draft of 4 feet (1.2 m.) can be carried.

Route across Florida.—A draft of about 3 feet (0.9 m.) can be carried across Florida by either the St. Lucie or Palm Beach Canal to Lake Okeechobee, thence via the Caloosahatchee Canal and River to the Gulf Coast at San Carlos Bay.

Gulf of Mexico.—From Key West to New Orleans there are several detached stretches of inside waters, available for a draft of 4 to 5 feet (1.2 to 1.5 m.), and a partially sheltered route with frequent harbors for small craft along the entire coast.

From New Orleans westward through Louisiana there is a network of inside waters affording a through route, for drafts of 3 to 5 feet (0.9 to 1.5 m.), to Sabine Pass. From Sabine Pass to Galveston there is no inside route.

From Galveston southwestward to Corpus Christi there is an inside route for a draft of 4 feet (1.2 m.) by way of several extensive bays and dredged canals connecting them. Beyond Corpus Christi there is no inside route available.

Charts covering the routes along the Atlantic and Gulf coasts are published by the United States Coast and Geodetic Survey. Charts of the natural waters of the New York State Canal system and Great Lakes are published by the United Lake Survey Office, Detroit, Mich. The same office publishes a Bulletin, Survey of Northern and Northwestern Lakes, in which a detailed description of the waters of the Great Lakes and the New York Canal system are found. This volume is issued free to navigators and other chart purchasers. Application should be made to the United States Lake Survey Office, Old Customhouse, Detroit, Mich. The Superintendent of Public Works, Albany, N. Y., has issued a set of charts covering practically all parts of the canal system. There is a nominal fee for these charts.

A catalogue showing the charts of the route along the Atlantic and Gulf coasts can be obtained free of charge on application to the Coast and Geodetic Survey, Washington, D. C., or to any of its agents. A list of agents for the sale of charts and other publications of the Coast and Geodetic Survey is given in the catalogue and in the first notice each month of the Notice to Mariners, published weekly by the Bureau of Lighthouses and the 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, and 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.

Inside Route Pilot, coast of New Jersey.

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

Inside Route Pilot, New York to Key West.

United States Coast Pilot, Gulf Coast, Key West to the Rio Grande, covering the coast and inland waters of the Gulf of Mexico.

Inside Route Pilot, Key West to the Rio Grande.

TABLE OF DISTANCES

	Eastport, via East Quoddy Head	Bar Harbor	Rockland	Boothbay Harbor	Portland	Portsmouth	Newburyport	Gloucester	Boston
Cape Cod Canal...	256	191	157	131	118	81	72	51	50
Boston*.....	250	184	147	115	98	61	50	25	
Gloucester.....	229	164	126	94	77	40	29		
Newburyport.....	222	158	120	87	68	23			
Portsmouth.....	216	151	107	75	55				
Portland.....	184	120	75	40					
Boothbay Harbor..	161	89	42						
Rockland.....	128	60							
Bar Harbor.....	81								

All distances in nautical miles via shortest navigable routes.

*Distances are from Bird Island Anchorage.

Boston to

Cape Race.....	820
Halifax, Nova Scotia.....	380
St. John, N.B.....	286
Bangor, Me.....	189
Bath, Me.....	117
New York, via Cape Cod Canal.....	233
New York, via Nantucket Sound.....	294
New York, via Nantucket Lightship.....	311
Norfolk, Va.....	561
Baltimore, Md.....	684
Liverpool, England.....	2,928
San Francisco, Calif., via Panama Canal.....	5,445

34370°—27——3

DESCRIPTIONS AND SAILING DIRECTIONS

GULF OF MAINE

The great indentation of the coast between the British Province of Nova Scotia on the northeast and Massachusetts on the southwest, which includes the Bay of Fundy and Massachusetts Bay as subsidiary features, has received the general designation "Gulf of Maine." It is shown on charts 1000, 1106, and 1107.

On account of its changeable weather, frequent fogs, and strong tidal currents, this locality has a bad reputation among mariners. (For offshore current observations see p. 30.)

The bottom in the Gulf of Maine is irregular, and the depths are so variable that it is quite impossible to determine a vessel's position by soundings alone, but the navigator will find a frequent use of the lead of the greatest assistance in approaching both Georges and Brown Banks from southward and eastward, the bottom slope on that side being well defined.

The principal offshore dangers are Nantucket Shoals, Georges and Cultivator Shoals, both a part of Georges Bank; and Ammen Rock, a part of Cashe Ledge.

Brown Bank, with 14 to 50 fathoms (25.6 to 91 m.) over it, is about 40 miles south of Cape Sable, between latitude 42° 17′ and 42° 54′ N., and longitude 65° 12′ and 66° 28′ W. The bank is about 50 miles long in a west-northwest direction, and its greatest width is nearly 30 miles. The least known depth of 14 fathoms (25.6 m.) is near the westerly end of the bank.

Georges Bank is the extensive shoal with depths less than 50 fathoms (91 m.), lying off the coast of Massachusetts eastward of Nantucket Shoals. The northeastern point of this bank is in latitude 42° 05′ N. and longitude 66° 05′ W.; from this the eastern edge trends in a general southwesterly direction to latitude 40° 48′ N. and longitude 67° 00′ W.; the edge of the bank then takes a general westerly direction and joins the 50-fathom (91 m.) curve southward of Nantucket Shoals. The greatest width north and south is about 80 miles.

That part of the bank where depths of less than 20 fathoms (37 m.) will be found, including Georges and Cultivator Shoals, is an area 30 to 40 miles wide and about 75 miles long in a west-southwesterly direction, lying approximately between latitude 40° 45′ and 42° 00′ N. and longitude 67° 10′ and 68° 40′ W., and has several spots with 5 to 10 fathoms (9.1 to 18.3 m.) over them. Depths of less than 20 fathoms (37 m.), however, extend farther southwestward.

Georges Shoal is a dangerous shoal, with less than 10 fathoms (18.3 m.) over it, between latitude 41° 33′ and 41° 47′ N. and longitude 67° 38′ and 67° 53′ W. The least-known depth within these limits is 12 feet (3.7 m.); in heavy weather the sea breaks here in 10 fathoms (18.3 m.), and tide rips are found near the shoalest place, which extends about 9 miles in a north and south direction.

Cultivator Shoal is about 7 miles long in a north-northeast direction, with least found depths of 3 to 8 fathoms (5.5 to 14.6 m.). It lies between latitude 41° 32′ and 41° 39′ N. and longitude 68° 10′ and 68° 14′ W., and is about 19 miles westward of the shoalest part of Georges Shoal.

A detached shoal, with 5¼ fathoms (9.5 m.) over it, lies in latitude 41° 11′ N., longitude 68° 26′ W.; and another, with 5 fathoms (9.1 m.) over it, lies in latitude 41° 14′ N., longitude 68° 00′ W. Between these and Cultivator Shoal are several shoal spots with 8 and 10 fathoms (14.6 to 18.3 m.) over them.

Nantucket Shoals is the general name of the numerous different broken shoals which lie southeastward of Nantucket Island and make this one of the most dangerous parts of the coast of the United States for the navigator. These shoals extend 23 miles eastward and 39 miles southeastward from Nantucket Island, are shifting in their nature, and the depths vary from 3 and 4 feet (0.9 to 1.2 m.) on some to 4 and 5 fathoms (7.3 to 9.1 m.) on others, while sloughs with depths of 10 fathoms (18.3 m.) or more lead between those farthest offshore. The easterly edge of the shoals has depths of 4 and 4½ fathoms (7.3 to 8.2 m.) in places, and trends 166° true (S. mag.) from latitude 41° 18′ N., longitude 69° 29′ W., to latitude 40° 57′ N., longitude 69° 22′ W. **Asia Rip,** the southeasternmost danger, has a least depth of 6 fathoms (11 m.) in latitude 40° 48′ N., longitude 69° 22′ W. Deep-draft vessels should pass southward and eastward of Asia Rip, and eastward of the easterly edge of the shoals as defined above. For a distance of 15 miles eastward and southeastward and 17 miles southward from Nantucket Island, the shoals have depths less than 16 feet (4.9 m.), and this area should be avoided by all vessels. The tidal currents are strong, and variable in direction, forming extensive rips and broken water over the shoals.

Nantucket Shoals Lightship, the leading mark for vessels passing southward of Nantucket Shoals, is moored in 30 fathoms (55 m.) off the southern end of the shoals. This lightship sends out radio fog signals. (See p. 14).

Cashe Ledge, with depths less than 30 fathoms (55 m.), is about 6 miles long in a north-northeast direction. **Ammen Rock,** with 4¼ fathoms (7.6 m.) over it, is near the middle of the ledge in latitude 42° 53′ N., longitude 68° 55′ W. There is a whistling buoy on the east side. The sea breaks over this rock in heavy weather.

Monhegan Fall, locally known as **Jeffrey Bank,** has a least found depth of 46 fathoms (84 m.), and lies about 26 miles southward of Matinicus Rock Lighthouse. Less depths have been reported by fisherman.

Platt Bank has a least found depth of 29 fathoms (53 m.).

Banks with depths of 45 to 50 fathoms (82 to 91 m.) have been reported by fishermen about 10 miles northwestward, 10 miles northeastward, and 15 miles eastward of the shoalest part of Platt Bank.

Jeffrey Ledge makes northeastward from Cape Ann, and has a least found depth of 18 fathoms (33 m.) over it. The northeastern point of the ledge is 22 miles eastward of Boon Island Lighthouse. It is marked by a red whistling buoy (2 JL) located 13 miles southwestward from the northeast end of the ledge.

Stellwagen Bank lies northward of Cape Cod and off the entrance to Massachusetts Bay; the least found depth over it is from 9½ to 20 fathoms (17.4 to 37 m.), but fishermen have reported a depth of 7 fathoms (12.8 m.) at the north end.

Grand Manan Channel.—This channel leads along the coast of Maine, between it and Grand Manan Island, and is an approach from westward to Quoddy Roads and Passamaquoddy Bay, and the most direct passage for vessels bound up the Bay of Fundy from along the coast of Maine. The channel varies in width from 5½ miles abreast Campobello Island to 10 miles abreast Southwest Head, the southwestern point of Grand Manan Island. Its western approach is marked by Machias Seal Island Lighthouse, which also marks the westernmost of the rocks and ledges which lie southwestward of Grand Manan Island. With the exception of the dangers between Machias Seal Islands and Grand Manan Island, the channel is free and has a good depth of water. The tidal currents have a velocity of 2½ to 3 knots and follow the general direction of the channel. Off West Quoddy Head the currents set in and out of the roads, forming strong rips. Sailing vessels should not approach West Quoddy Head too closely with a light wind.

CURRENTS, GULF OF MAINE

Offshore.—The current over the region extending westward and northward of a line from Georges Bank to Lurcher Shoal is very nearly simultaneous. The flood current sets northward, the strength of the flood over the eastern portion of this region occurring about 2 hours after the current turns northward in Bay of Fundy entrance (about 3 hours after the time of Boston low water), and over the western portion about ½ hour later. The ebb current sets southward, the strength of the ebb over the eastern portion occurring about 2 hours after the current turns southward in Bay of Fundy entrance (about 3 hours after the time of Boston high water) and over the western portion about ½ hour later.

Slack water over the eastern portion occurs about 1 hour before the current turns southward and northward in Bay of Fundy entrance (about the time of high and low water at Boston), and over the western portion about ½ hour later.

Off Nova Scotia, outside the 50-fathom (91 m.) curve, the velocity at the time of strength is about 1½ knots; inside the 50-fathom (91 m.) curve the velocity is between 1½ and 2½ knots.

At the entrance of the Bay of Fundy, 5 miles southeastward of Gannet Rock, the strength of the flood current occurs about 3 hours after the current turns northward in the Bay of Fundy entrance (about 3 hours before high water at St. John, New Brunswick), has an average velocity of 2.7 knots, and sets 36° true (NE. by E. mag.).

The strength of the ebb occurs about 3 hours after the current turns southward in the Bay of Fundy entrance (about 3 hours before low water at St. John), has an average velocity of 3.9 knots, and sets 228° true (WSW. mag.).

Slack water before the flood occurs about the time of the corresponding slack at Bay of Fundy entrance (about ½ hour after low water at St. John). Slack water before the ebb occurs about ½ hour

before the corresponding slack at Bay of Fundy entrance (about the time of high water at St. John).

In the Bay of Fundy slack water before the flood occurs ½ hour after the current turns northward in Bay of Fundy entrance (about ¾ hour after low water at St. John). Slack water before the ebb occurs about ¼ hour after the current turns southward in Bay of Fundy entrance (about ¾ hour after high water at St. John). The velocity at strength is between 1½ and 2½ knots, the flood setting northeastward and the ebb southwestward.

In Grand Manan Channel the average velocity at strength is about 2½ knots, the flood setting northeastward and ebb southwestward, approximately parallel to the channel. Slack water before the flood occurs at about the time of low water at St. John, and slack water before the ebb about ½ hour after high water at St. John. The predicted times of slack water for every day in the year are given in the Atlantic Coast Current Tables.

Over Georges Bank the velocity at strength is about 2 knots.

Between Georges Bank and Brown Bank the velocity at strength is about 1½ knots, with a like velocity between Brown Bank and Cape Sable Bank.

Over Stellwagen Bank, and in the channel between it and Cape Cod, the flood current sets westward and the ebb northeastward to eastward. The flood current begins about ½ hour before the corresponding slack at Boston Harbor (about the time of low water at Boston), and the ebb current begins about ½ hour before the corresponding slack at Boston Harbor (about high water). The velocity at strength is about ¾ knot.

Alongshore.—On the coast of Maine eastward of Portland the flood sets eastward and has greater velocity than the ebb, which sets westward. In passing from one headland to another it is always necessary to make allowance for the current setting into or out of the bays or rivers, according to the stage of the tide; such allowance frequently amounts to as much as ½ point.

Eastward of Mount Desert the currents have a greater velocity than farther west, but are more regular in their ebb and flow, conforming more exactly to the rise and fall of the tides. **Along the coast between Mount Desert and Portland** the effect of the westerly (ebb) set is more marked as compared with the flood than is the case farther east.

With easterly or southeasterly winds the currents have more of a tendency on shore than at other times, but they are not affected much by northerly, westerly, or southerly winds.

No systematic current observations have been made along the coast of Maine, except at Portland lightship.

Portland Lightship.—The tidal current is weak, being on the average less than ¼ knot at time of strength. During October, November, and December there is a southerly set of about ½ knot. Southerly winds, however, tend to reverse this set. The greatest velocity observed was 1.6 knots westerly, accompanied by an easterly wind of 35 to 40 miles per hour.

Boston Lightship.—The tidal current is small, averaging about ¼ knot at time of strength. Strength of flood current occurs about

3 hours after the current turns westward at Deer Island light (about 2¾ hours before high water), and sets 265° true (W. ⅞ N. mag.). Strength of ebb occurs about 3 hours after the current turns eastward at Deer Island Light (about 2¾ hours before low water at Boston), and sets 85° true (E. ⅞ S. mag.).

Because of the weak character of the tidal currents the winds greatly influence the direction of the current. The greatest velocity observed during summer and autumn was less than 1 knot.

The currents along the eastern side of Cape Cod and across Monomoy and Nantucket Shoals are described in Atlantic Coast Pilot, Section B.

APPROACHING OR STANDING ALONG THE COAST OF MAINE EASTWARD OF PORTLAND

This section of the coast is a dangerous one for navigators on account of the strong tidal currents, frequent fog, and numerous offlying dangers. For information concerning currents see page 30. and for information concerning fog see page 8 and the meteorological tables in the appendix. The lead is of little assistance to locate the position, but should be in constant use to prevent too close an approach to dangers. See a discussion of the character of the bottom on page 28.

Wrecks.—An examination of the record of wrecks occurring on the coast of Maine eastward of Portland shows that wrecks have occurred on practically all of the offlying islands and rocks between Portland and Machias Bay, most of them in thick weather, either fog or snow. Many of the wrecks could have been prevented if frequent soundings had been taken.

During thick weather great caution is necessary when approaching the coast, especially eastward of Petit Manan, where the tidal currents have considerable velocity. If one of the offshore lighthouses has not been made and the position accurately determined before the fog shuts in, it is advisable to keep well outside until it clears. East of Seguin Island, except southward and eastward of Grand Manan Island, in clear weather the land will always be made before any of the outlying dangers are encountered, and by keeping 3 miles outside of the headlands and outlying islands vessels will clear all unmarked dangers.

Coming from the vicinity of Cape Sable.—Vessels bound to Machias or ports eastward of it should make Machias Seal Island Lighthouse and pass westward of it. If bound to Eastport or Calais, the route through Grand Manan Channel is preferable to passing eastward of Grand Manan, as in case of bad weather coming on an anchorage may be made either at Little River or in Machias Bay.

It is not advisable for a stranger to pass eastward of the Machias Seal Islands or between them and Grand Manan, where there are a number of ledges on which the sea breaks in heavy weather, including Bull Rock, an unmarked danger with 2 feet (0.6 m.) over it.

If bound to ports in Penobscot Bay, vessels should steer so as to make either Mount Desert Lighthouse or Matinicus Rock Lighthouse. In the former case, on a clear day, Cadillac Mountain, the highest part of Mount Desert Island, may be sighted before the lighthouse. When steering for Matinicus Rock Lighthouse, Isle au Haut, 556

feet (169 m.) high, on a clear day may be sighted about the same time as the rock.

Coming from the vicinity of Cape Cod or Cape Ann.—Vessels, both steamers and large tows, bound into Penobscot Bay, including those coming from Boston and Cape Cod Canal, and also those passing eastward of Cape Cod, usually make the gas and whistling buoy off Cape Ann and then shape the course for Manana Island gas and whistling buoy and enter through Twobush or Muscle Ridge Channels. In the winter and in bad weather the smaller class of vessels follow the coast, sighting the principal lighthouses, and making an anchorage on approach of bad weather. Vessels bound from Cape Cod or Cape Ann to points eastward of Penobscot Bay usually shape the course from Cape Ann to either Monhegan Island or Matinicus Rock Lighthouses.

On all the banks in or near the Gulf of Maine a number of fishing vessels may be found at anchor. They are sometimes very numerous in the South Channel, on the Georges Bank, and Jeffrey Ledge. In the summer a large fleet of mackerel fishermen will often be met near the coast between Mount Desert Rock and Cape Ann.

Standing along the coast.—In clear weather, vessels stand along the coast close enough to make the lighthouses and to recognize the principal landmarks on shore. In thick weather they aim to make the fog signals or the whistling or bell buoys; these buoys are placed close enough to one another and to the fog signals to be readily followed up by vessels if not set too much off their course by the tidal currents. When running in thick weather a vessel should verify her position as often as possible by the aids, and when approaching a fog signal or buoy should proceed slowly, using the lead, and if necessary stop until the looked-for aid is found and recognized before she continues for the next aid. There are three good harbors for which a stranger standing along the coast in their vicinity can make in thick weather and enter with ordinary precaution—Machias Bay, Winter Harbor, and Boothbay Harbor.

Vessels equipped with radio should make use of the radiocompass stations as listed on page 17. In addition to this list, the Canadian Government maintains radiocompass stations at Yarmouth and St. John, New Brunswick.

APPROACHING OR STANDING ALONG THE COAST BETWEEN PORTLAND AND CAPE COD

Approaching Massachusetts Bay from sea.—The approach to the coast of Massachusetts north of Cape Cod is through the Gulf of Maine, the body of water lying westward of a line drawn from Cape Cod to Cape Sable. Between these points, and forming the southeastern limit of the Gulf, lie Nantucket Shoals, Georges Bank, and Brown Bank, areas over which there is a depth of less than 50 fathoms (91 m.). Nantucket Shoals and Georges Bank, on account of their many shoal spots and the strong tidal currents setting over them, are a menace to navigators approaching the coast or standing from Canadian ports to New York.

As far as the navigator is concerned, Brown Bank need not be avoided; it may even assist, from soundings, to approximately locate a vessel's position.

The part of Georges Bank lying between latitude 41° 05′ N., and 42° 00′ N., and longitude 67° 17′ W. and 68° 35′ W. should be avoided; in heavy weather the sea breaks on the spots with 10 fathoms (18.3 m.) or less, and strong tide rips are encountered, the latter, however, not always indicating shoal water, For current information see page 31.

Vessels passing south of the dangerous part of Georges Bank should not shoal the water to less than 25 fathoms (46 m.). Approaching this part of the bank from eastward or southward, the water shoals gradually. Approaching from westward, the depths are irregular and the water shoals abruptly in places to 20 fathoms (37 m.) or less. On the north side of Georges Bank, between longitude 66° 00′ W. and 68° 00′ W., the 100-fathom and 50-fathom (91 and 46 m.) curves are but a few miles apart, and when approaching the dangerous part of the bank from northward 50 fathoms (91 m.) may be taken as a good depth to avoid the shoals.

The only known outlying danger in the Gulf of Maine to be avoided by vessels bound to ports in Massachusetts is **Ammen Rock,** with 4¼ fathoms (7.6 m.), in latitude 42° 53′ N. and longitude 68° 55′ W. It is a part of Cashe Ledge, which is about 6½ miles long in a north-northeast direction, with depths less than 30 fathoms (55 m.).

Vessels from ports in northern Europe or the British Provinces and bound to ports in the United States north of Cape Cod approach the coast passing between Cape Sable and Georges Bank, between latitude 42° 00′ N. and 43° 10′ N. If bound to Boston, they cross Brown Bank and shape the course for Boston Lightship. See page 269.

Vessels approaching the Gulf of Maine from southward sometimes endeavor to make the 50-fathom (91 m.) curve on the southern edge of Georges Bank, in latitude 40° 20′ N. and longitude 68° 50′ W., then stand 0° true (N. by E. ¼ E. mag.) on soundings of over 30 and less than 50 fathoms (55 and 91 m.) for about 50 miles, and then shape a 323° true (NNW. mag.) course, taking care to keep in a greater depth than 20 fathoms (37 m.) until the course is laid to sight Cape Cod Lighthouse. This lighthouse, Nauset Beach Lighthouse, the skeleton radio towers, and the Pilgrim Monument at Provincetown are the most prominent marks on Cape Cod.

The passage across Georges Bank between the easternmost of the Nantucket Shoals and the westernmost shoal spots of Georges Bank, about 30 miles wide, has been called **Great South Channel.**

Vessels coming from Cape Hatteras, Chesapeake Bay, Delaware Bay, or New York make Nantucket Shoals Lightship.

Vessels of less than 24 feet (7.3 m.) draft may, when coming from southward or alongshore, enter the Gulf of Maine through Vineyard and Nantucket Sounds. This route avoids Nantucket Shoals, and is the one followed by vessels in the coasting trade. Vessels of 22-foot (6.7 m.) draft or less can also enter through Cape Cod Canal. (See p. 299.)

Directions for all of the various routes from southward to the north end of Cape Cod are given in Atlantic Coast Pilot, section B, Cape Cod to Sandy Hook.

Standing along the coast between Portland and Cape Cod.—The lighthouses and other aids to navigation are sufficiently numerous to enable a stranger to run either at night or the daytime in clear weather. There are numerous anchorages where a vessel with good ground tackle can ride out any gale. (See p. 3.) Of these, Provincetown Harbor is the harbor of refuge most frequently used by vessels approaching Massachusetts Bay from seaward. The navigator, when crossing the banks and when approaching the coast, should not neglect to take soundings at frequent intervals, and vessels equipped with radio should make use of the radiocompass stations and obtain frequent fixes by radio bearings. (See p. 16.) Vessels equipped with radio direction finders can obtain bearings of the Boston and Portland Lightships both of which send out radio signals in thick weather. (See p. 14.)

Wrecks.—South of Portland the wrecks have occurred most frequently on the prominent headlands or the shoals off them, viz, Cape Elizabeth, Cape Ann, and the north side of Cape Cod, with less frequent wrecks on the less prominent headlands. Numerous wrecks have also occurred on the dangers in the approaches to Boston Harbor, more frequently on the south side, from Scituate to Point Allerton. Most of the wrecks have occurred during thick weather.

Between Portland and Boston the most dangerous points for coasting vessels are the dangers off Cape Elizabeth, Boon Island, Isles of Shoals, Cape Ann, and the dangers in the entrance of Boston Harbor. Vessels must depend upon making the fog signals or the whistling and bell buoys, and when approaching them should proceed slowly, using the lead, and if necessary stop until the looked-for aid is found and recognized before continuing for the next aid. The soundings in the vicinity of Cape Ann are very irregular and can not be depended upon to locate even approximately the vessel's position.

The numerous strandings on the north end of Cape Cod, between Cape Cod Lighthouse and Race Point Lighthouse, have usually occurred to vessels approaching Massachusetts Bay or Cape Cod Bay from southward or eastward in thick weather. Keeping in a greater depth than 20 fathoms (37 m.) will insure giving the eastern side of Cape Cod a berth of 2½ miles, and if this depth is followed will lead to Peaked Hill Bar gas, whistling, and submarine bell buoys, northward of the end of the cape.

The precautions to be taken in approaching Boston Harbor from Cape Cod or Cape Ann are given on page 269.

DIRECTIONS, CAPE COD TO EAST QUODDY HEAD

The following tables give the courses followed (each way) by the large vessels and the large tows between Cape Cod and Eastport, Me. Alternate courses are given, so that the navigator has the choice of several different routes.

North and east bound

From—	Distance in nautical miles	To—	Course True	Course Magnetic
1. Cape Cod Canal to Boston Lightship			°	*Points*
Black bell buoy No. 1	2¼	Canal Approach gas and bell buoy.	29	NE. ⅛ N.
Canal Approach gas and bell buoy.	21	Humarock Shoal gas and whistle buoy No. 4. Pass ¾ mile east of gas and bell buoy off Mary Ann Rocks.	348	N. ¼ E.
Humarock gas and whistle buoy No 4	14¼	Boston Lightship. If bound to Boston, see directions on p. 271.	321	NNW. ⅛ W.
1A. Cape Cod to Boston Lightship				
Peaked Hill Bar gas and whistle buoy.	31	Boston Lightship	296	NW. ⅜ W.
1B. Cape Cod Canal to Cape Ann				
Black bell buoy No. 1	2¼	Canal Approach gas and bell buoy.	29	NE. ⅛ N.
Canal Approach gas and bell buoy.	49	Cape Ann gas and whistle buoy.	357	N. by E.
1C. Cape Cod to Cape Ann				
Peaked Hill Bar gas and whistle buoy.	35½	Cape Ann gas and whistle buoy.	331	N. by W. ¼ W.
1D. Entrance Broad Sound North Channel to Cape Ann				
¼ mile east of Finn Ledge gas and bell buoy.	23½	Cape Ann gas and whistle buoy.	48	NE. by E. ⅝ E.
2. Boston Lightship to Cape Ann				
Boston Lightship	20¼	Cape Ann gas and whistle buoy.	31	NE. ⅛ E.
3. Cape Ann to Portland Lightship				
Cape Ann gas and whistle buoy.	56	Portland Lightship. If bound to Portland, see directions on p. 210.	19	NE. by N.
3A. Cape Ann to Portsmouth				
Cape Ann gas and whistle buoy. Pass 1¾ miles westward of Isles of Shoals Light.	27	Entrance Portsmouth Harbor. (See directions for Portsmouth Harbor on p. 222.)	342	N. ¼ W

North and east bound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
3B. Cape Ann to Matinicus Rock Direct				
Cape Ann gas and whistle buoy.	100	Matinicus Rock whistle buoy.	° 48	Points NE. by E. ¾ E.
3C. Cape Ann to Bantam Rock gas and whistle buoy				
Cape Ann gas and whistle buoy.	74½	½ mile south of Bantam Rock gas and whistle buoy.	31	NE. ¼ E.
3D. Portland Lightship to Bantam Rock gas and whistle buoy				
Portland Lightship	22½	½ mile south Bantam Rock gas and whistle buoy. If bound to Penobscot Bay, see directions on p. 151.	65	E. ¾ N.
4. Portland Lightship to East Quoddy Head				
Portland Lightship	57	Matinicus Rock whistle buoy.	77	E. ⅜ S.
Matinicus Rock whistle buoy. Pass 4½ miles off Great Duck Lighthouse.	72	½ mile south of Moose Peak whistle buoy.	55	ENE. ½ E.
½ mile south of Moose Peak whistle buoy.	18½	½ mile southeast of Little River whistle buoy.	50	ENE. ¼ E.
½ mile southeast Little River whistle buoy.	14	½ mile southeast of Sail Rock whistle buoy. (For directions to Lubec, see p. 63.)	46	NE. by E. ⅞ E.
½ mile southeast of Sail Rock whistle buoy.	1⅞	Owen Head abeam, distant ¾ mile.	31	NE. ⅝ E.
Owen Head abeam	5¼	Scott Head abeam	16	NE. ¾ N.
Scott Head abeam	2⅞	Head Harbor Lighthouse abeam, distant ½ mile. (For directions to Eastport see p. 62).	346	N. ½ E.

West and south bound

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
1. East Quoddy Head to Portland Lightship			°	Points
½ mile east of Head Harbor Light.	2⅞	¾ mile ESE. of Scott Head.	166	S. ½ W.
¾ mile ESE. of Scott Head.	5⅛	Owen Head abeam, distant ¾ mile.	196	SW. ¾ S.
¾ mile off Owen Head	1⅞	½ mile southeast of Sail Rock whistle buoy.	211	SW. ⅝ W.
½ mile southeast of Sail Rock whistle buoy.	14	½ mile southeast of Little River red whistle buoy.	226	SW. by W. ⅞ W.
½ mile southeast of Little River red whistle buoy.	18½	½ mile south of Moose Peak whistle buoy.	230	WSW. ¼ W.
½ mile south of Moose Peak whistle buoy.	72	Matinicus Rock whistle buoy.	235	WSW. ½ W.
Matinicus Rock whistle buoy.	57	Portland Lightship	257	W. ⅜ N.
2. Portland Lightship to Cape Ann				
Portland Lightship	56	Cape Ann gas and whistle buoy.	199	SW. by S.
2A. Portland Lightship to Portsmouth				
Portland Lightship	34½	York Ledge red whistle buoy. If bound to Portsmouth Harbor, see directions on p. 222.	218	SW. ¾ W.
2B. Matinicus Rock whistle buoy to Cape Ann				
Matinicus Rock whistle buoy.	100	Cape Ann gas and whistle buoy.	228	SW. by W. ¾ W.
3. Cape Ann to Boston Lightship				
Cape Ann gas and whistle buoy	20¼	Boston Lightship	211	SW. ⅛ W.
3A. Cape Ann to Entrance Broad Sound North Channel.				
Cape Ann gas and whistle buoy.	23½	¼ mile east of Finn Ledge gas and bell buoy.	228	SW. by W. ⅝ W.
3B. Cape Ann to Cape Cod Canal, direct.				
Cape Ann gas and whistle buoy.	49	Canal approach gas and bell buoy.	177	S. by W.
Canal approach gas and bell buoy.	2¼	Black bell buoy No. 1. For procedure in entering the canal see p. 303 under "Cape Cod Canal."	209	SW. ⅛ S.

West and south bound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
3C. Cape Ann to Cape Cod, direct				
Cape Ann gas and whistle buoy.	35½	Peaked Hill Bar gas and whistle buoy.	° 151	Points S. by E. ¼ E.
4. Boston Lightship to Cape Cod Canal				
Boston Lightship	14¼	Humarock Shoal gas and whistle buoy No. 4.	141	SSE. ⅛ E.
Humarock Shoal gas and whistle buoy No. 4.	21	Canal approach gas and bell buoy.	168	S. ¼ W.
Canal approach gas and bell buoy.	2¼	Black bell buoy No. 1. For procedure in entering the canal see page 303 under "Cape Cod Canal."	209	SW. ⅛ S.
4A. Boston Lightship to Cape Cod				
Boston Lightship	31	Peaked Hill Bar gas and whistle buoy.	116	SE. ⅜ E.

DIRECTIONS, INSIDE PASSAGES, WEST QUODDY HEAD TO PORTLAND

Small craft.—Small craft of 6-foot (1.8 m.) or less draft, running along this section of the coast in the daytime, in clear weather, can find a partially protected route throughout most of the distance from West Quoddy Head to Portland. The route is fringed with numerous dangers, and extreme caution and close attention to the charts are necessary.

The most frequently used route for boats of this class leads close along the coast from West Quoddy Head to Cross Island, through Cross Island Narrows, across the mouth of Machias Bay, through Foster Channel, Brothers Passage, Moosabec Reach, and Tabbott Narrows, across Petit Manan Bar close to the perpendicular striped buoy (navigable only with a smooth sea), through the buoyed channel northward of Schoodic Island, through Western Way, across Bass Harbor Bar, through Casco Passage, Deer Island Thorofare, Fox Islands Thorofare, Owlshead Bay, and Muscle Ridge Channel, and thence by the route used by vessels of 12-foot (3.7 m.) or less draft, described following.

Directions through Cross Island Narrows, Foster Channel, and Petit Manan Bar are given under their descriptions. Directions through most of the other passages are given following. Strangers in small craft can follow the directions given following for vessels of 12-foot (3.7 m.) or less draft if desired.

Vessels of 12 feet (3.7 m.) or less draft.—Vessels of this draft at low water and about 18-foot (5.5 m.) draft at high water, bound along the coast of Maine, generally use the thorofares and passages inside and between the islands. The most frequently used route leads southward of Cross and Libby Islands, through Moosabec Reach and Tabbott Narrows, southward of Petit Manan lighthouse and Schoodic Island, across Bass Harbor Bar, through Casco Passage, Deer Island Thorofare or Merchant Row, Fox Islands Thorofare, Muscle Ridge Channel, Davis Straits, Fisherman Island Passage (near Boothbay Harbor), and between Seguin and Pond Island. Vessels of this draft can then pass southward of the islands in Casco Bay or can find a more protected route inside the islands as described in the directions following; the most frequently used route in good weather is southward of the islands in Casco Bay.

This inside route is very narrow in places and leads close to many dangers, but the principal dangers for vessels of 12-foot (3.7 m.) draft are marked, and it can be used by vessels of that draft in the daytime and with clear weather, by a close attention to the charts and the following directions: A 13-foot (4 m.) shoal on the course between Hardwood Island and Fessenden Ledge at the west end of Moosabec Reach has been reported recently. Most of the route is used by local vessels up to 18-foot (5.5 m.) draft, but strangers in vessels of over 12-foot (3.7 m.) draft seldom use it. There are anchorages at frequent intervals, as mentioned under the descriptions of the bays and thorofares, and vessels caught in a fog anchor until the weather clears. Pilots for the route can be obtained at most of the cities and towns along it, and strangers often take pilots.

Vessels using this track and bound in the reverse direction—that is, from Portland toward West Quoddy Head—will find courses tabulated for that direction on page 47.

Directions, westbound

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
1. West Quoddy Head to Moosabec Reach (Charts 1201, 303, and 304)			°	*Points*
Sail Rock black whistle buoy.	14	Little River red whistle buoy.	226	SW. by W. ⅞ W.
Little River red whistle buoy.	4½	½ mile south of Double Shot Island.	233	WSW. ½ W.
½ mile south of Double Shot Island.	5	½ mile south of Libby Island Light.	243	W. ⅝ S.
½ mile south of Libby Island Light.	2⅞	Black bell buoy No. 3	271	WNW. ⅛ W.
Black bell buoy No. 3	1⅝	200 yards north of Pulpit Rocks (bare).	257	W. ⅝ N.
200 yards north of Pulpit Rocks.	3¼	¼ mile north of Mark Island (wooded).	249	W. ⅛ S.

Directions, westbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
2. Through Moosabec Reach to Petit Manan (Charts 304 and 305)			°	*Points*
¼ mile north of Mark Island.	1⅛	Red buoy No. 6	252	W. ⅛ N.
Red buoy No. 6	1	Black buoy No. 9	266	WNW. ⅝ W.
Black buoy No. 9	2⅝	¼ mile north of Pomp Island.	260	W. ⅞ N.
¼ mile north of Pomp Island.	1½	¼ mile west black buoy S11.	253	W. ¼ N.
¼ mile west of black buoy No. 11. (Heading for Nash Island Light.) Pass mid-channel through Tabbott Narrows.	2	Green Island on port beam.	224	SW. by W. ¾ W.
Green Island on port beam.	2	⅜ mile north of Nash Island Light.	235	WSW. ⅝ W.
⅜ mile north of Nash Island Light.	8½	Petit Manan black and white fairway bell buoy.	213	SW. ¾ W.
3. Petit Manan to Bass Harbor Bar via Western Way (Charts 305 and 306)				
Petit Manan bell buoy	7⅞	Schoodic Island whistle buoy.	256	W. ½ N.
Schoodic Island red whistle buoy.	8⅜	200 yards north of Lewis Rock black buoy No. 3A.	256	W. ½ N.
200 yards north of Lewis Rock black buoy No. 3A.	2	Bear Island Light on starboard beam.	259	W. ⅝ N.
Bear Island abeam. (Bring Bear Island Light astern.)	1⅜	Spurling Point fairway buoy (black and white can).	204	SW. ¼ S.
Spurling Point fairway buoy.	1⅛	Black spar No. 3 on starboard beam.	177	S. by W. ⅜ W.
Black spar No. 3 abeam.	1⅜	100 yards southeast of black bell buoy off the Nubble.	208	SW. ⅛ W.
100 yards southeast of black bell buoy off the Nubble. (Dredged cut across bar, 14 feet at mean low water.)	1¾	Bass Harbor Bar fairway buoy.	268	WNW. ½ W.

Directions, westbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
3A. Petit Manan to Bass Harbor Bar via direct route (Chart 1202)			°	Points
Petit Manan bell buoy	7¾	Schoodic Island whistle buoy. For directions Frenchman Bay, see page 91.	255	W. ⅜ N.
Schoodic Island red whistle buoy.	8⅜	Baker Island red whistle buoy.	229	WSW.
Baker Island red whistle buoy.	5⅛	100 yards southeast of black bell buoy off the Nubble.	266	WNW. ¾ W.
100 yards southeast of black bell buoy off the Nubble.	1¾	Bass Harbor Bar fairway buoy.	268	WNW. ½ W.
4. Bass Harbor Bar through Casco Passage (Chart 308)				
Bass Harbor Bar fairway buoy.	4⅞	Casco Passage fairway bell buoy.	254	W. ¼ N.
Casco Passage fairway bell buoy.	1¼	Close south of red spar buoy No. 2NR.	263	W. by N.
Close southward of red spar buoy No. 2NR.	½	200 yards north of black spar buoy No. 7.	271	WNW. ¼ W.
5. Casco Passage through Deer Island Thoroughfare (Charts 308 and 309)				
200 yards north of black spar No. 7.	1¼	Egg Island red bell buoy.	238	WSW. ¾ W.
Egg Island bell buoy	1⅝	Long Ledge red spar No. 2 close abeam.	256	W. ⅜ N.
Red spar No. 2 abeam	1⅝	Black spar No. 3 abeam	262	W. ⅞ N.
Black spar No. 3 abeam.	⅜	Haycock beacon on port beam.	236	WSW. ⅝ W.
Haycock beacon abeam. (Head for south end of Grog Island passing south of buoys S6 and S8.)	1⅜	Black spar No. 7 abeam	251	W. ⅛ S.
Black spar No. 7 abeam.	⅞	Summit of Camp Island on port beam.	236	WSW. ½ W.
Summit of Camp Island abeam. (North side of Bold Island astern).	1	Red spar No. 14	262	W. ⅞ N.
Red spar No. 14	½	Black spar No. 11	253	W.
Black spar No. 11. Pass north of black spars Nos. 13 and 15 and south of red spar No. 16.	1⅝	Deer Island Thorofare Light abeam, distant 300 yards.	242	W. ⅞ S.

Directions, westbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
5A. Casco Passage through Merchant Row (Charts 308 and 309)			°	Points
200 yards north of black spar No. 7.	6	⅜ mile W. by N. from Southern Mark Island (grassy).	223	SW. by W. ⅜ W.
⅜ mile W. by N. from Southern Mark Island. (Head for Ewe Island.)	2¼	400 yards south of Barter Island Ledges spindle.	264	W. by N.
400 yards south of Barter Island Ledge spindle. Pass south of red and black spar marking 14-foot spot.	2⅜	West end of Farrel on starboard beam.	276	NW. by W. ⅞ W.
West end Farrel Island abeam.	1	300 yards southwest of Deer Island Thorofare Light.	317	NNW. ¼ W.
5B. Casco Passage to Owls Head via Eggemoggin Reach				
100 yards south of red spar buoy No. 4.	2¾	300 yards southwest of Devil Head.	304	NW. ⅝ N.
300 yards southwest of Devil Head.	2	300 yards ENE. of Conary Ledge black buoy.	311	NNW. ¾ W.
300 yards ENE. of Conary Ledge Buoy.	1	100 yards southwest of red buoy No. 4B.	298	NW.
100 yards southwest of red buoy No. 4B. Head for wharf at Sargentville.	3⅛	300 yards ENE. of outer black buoy off North Deer Isle.	314	NNW. ½ W.
300 yards ENE. of outer black buoy off North Deer Isle.	1⅞	300 yards southwest of Byard Point.	295	NW. ⅛ W.
300 yards southwest of Byard Point.	2	400 yards northeast black buoy No. 11.	307	NW. ⅞ N.
400 yards northeast of black buoy No. 11. Head for Blake Point.	¾	400 yards NNE. of Pumpkin Id. Ledge black buoy.	258	W. ½ N.
400 yards NNE. of Pumpkin Id. Ledge black buoy.	1¼	Perpendicular striped bell buoy.	229	WSW.
Perpendicular striped bell buoy.	2½	½ mile southwest of Cape Rosier.	276	NW. by W. ⅞ W.
½ mile southwest of Cape Rosier.	3	½ mile northwest of Resolution Island.	216	SW. ⅞ W.
½ mile northwest of Resolution Island.	7⅝	¼ mile SSE. of McIntosh Ledge buoy. Buoy is on southwest part of ledge.	210	SW. ¼ W.
¼ mile SSE. of McIntosh Ledge buoy.	5¼	400 yards north of Monroe Island. If bound westward, see section 7 following.	222	SW. by W. ⅜ W.

Directions, westbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
6. Through Fox Island Thorofare to Owls Head (Charts 309, 310, and 311A)			°	*Points*
300 yards north of Deer Island Thorofare Light.	4½	100 yards south of Channel Rock red bell buoy No. 2.	264	W. by N.
100 yards south of Channel Rock bell buoy.	1	Goose Rocks Light 150 yards on starboard beam.	290	NW. ⅝ W.
Goose Rocks Light on starboard beam.	⅝	Fish Point Ledge red buoy No. 4 abeam.	269	WNW. ½ W.
Fish Point Ledge red buoy abeam.	⅝	Dobbin Rock red buoy No. 8.	223	SW. by W. ⅜ W.
Dobbin Rock red buoy No. 8.	⅜	250 yards SW. from Grindstone Ledge red buoy No. 10.	230	WSW.
250 yards SW. from grindstone Ledge red buoy.	½	Postoffice Ledge red and black spar buoy on starboard beam.	284	NW. by W. ¼ W.
Postoffice Ledge buoy abeam.	½	Calf Point (western side Young Cove).	289	NW. ¾ W.
Calf Point	⅝	Young Point beacon abeam.	256	W. ¼ N.
Young Point beacon abeam.	⅞	Sugar Loaves black spar buoy No. 5 on port beam.	222	SW. by W. ¼ W.
Sugar Loaves black spar No. 5 abeam.	1⅝	¼ miles southwest of Fiddler Ledge stone beacon.	231	WSW.
¼ miles southwest Fiddler Ledge stone beacon.	4¼	350 yards north of beacon on north end Monroe Island.	263	W. by N.
7. Owls Head to Davis Strait, Muscle Ridge Channel (Chart 312)				
350 yards north from north end Monroe Island.	¼	200 yards southeast of Dodge Point beacon.	225	SW. by W. ½ W.
200 yards southeast of Dodge Point beacon.	1⅛	Sheep Island Bar red nun buoy No. 2 close on port beam.	206	SW. ⅛ S.
Sheep Island Bar nun buoy No. 2.	1¾	150 yards east of Ash Island black bell buoy No. 11.	192	SSW. ⅝ W.
150 yards east of Ash Island bell buoy No. 11.	½	150 yards west of Upper Gangway Ledge red and black nun buoy.	211	SW. ¼ W.
150 yards west Upper Gangway Ledge red and black striped buoy. (Head for Whitehead Island Light.)	3¼	250 yards north of Lower Gangway Ledge red and black nun buoy.	216	SW. ⅝ W.

Directions, westbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
7. Owls Head to Davis Strait, Muscle Ridge Channel (Chart 312) —Continued			°	*Points*
250 yards north of Lower Gangway Ledge red and black buoy.	1¼	100 yards northwest of South Breaker red bell buoy No. 2SB.	206	SW. ⅛ S.
100 yards northwest of South Breaker bell buoy.	5¼	Close north of Mosquito Island red bell buoy No. 2M1.	229	SW. by W. ⅞ W.
Mosquito Island bell buoy.	1¼	200 yards NNE. Gunning Rocks black spar buoy No. 1.	284	NW. by W. ¼ W.
200 yards NNE. of Gunning Rocks black buoy.	½	100 yards south of Marshall Ledge red spar buoy No. 4.	254	W. ⅛ N.
100 yards south of Marshall Ledge red buoy.	½	50 yards north of Allen Ledge black spar buoy No. 3.	270	WNW. ½ W.
50 yards north of Allen Ledge black spar buoy No 3.	2¼	20 yards southeast of Griffin Ledge red spar No. 8 in Davis Strait.	229	SW. by W. ⅞ W.
8. Davis Strait to Fisherman Island Passage (Chart 313)				
20 yards southeast of Griffin Ledge red buoy in Davis Strait.	3½	Egg Rock North Ledge red spar No. 12, 100 yards on starboard beam.	243	W. ⅞ S.
Egg Rock North Ledge red spar buoy on starboard beam. Pass ¼ mile north of Pemaquid Ledge red and black can buoy.	8	¼ mile south of Thrumcap Island.	247	W. ½ S.
¼ mile south of Thrumcap Island.	2¼	300 yards north of Ram Island Light. (For directions to Booth Bay see p. 176.)	261	W. ¾ N.
9. Fisherman Island Passage to Cape Small (Chart 314)				
300 yards north of Ram Island Light.	3	Cuckolds black bell buoy No. 1C.	227	SW. by W. ⅝ W.
Cuckolds black bell buoy.	3⅝	¼ mile north of Sisters tripod beacon. (For Kennebec River see p. 191).	243	W. ⅞ S.
¼ mile north of Sisters beacon.	1½	150 yards north of White Ledge black spar buoy No. 1.	234	WSW. ¼ W.

Directions, westbound—Continued

From—	Distance in nautical miles	To—	Course True	Course Magnetic
9. Fisherman Island Passage to Cape Small (Chart 314)—Continued				
150 yards north of White Ledge black spar buoy.	4⅛	300 yards north of Glover Rock. Pass midway between it and Small Point.	° 242	*Points* W. by S.
300 yards north of Glover Rock.	⅞	300 yards north of Bald Head Ledge Spindle.	280	NW. by W. ⅝ W
10. Cape Small to Portland (Chart No. 315)				
300 yards north of Bald Head Ledge Spindle. (Head for Monument on Little Mark Island.)	6¼	250 yards north of Jaquish Island red bell buoy No. 2.	273	WNW. ¼ W.
250 yards north of Jaquish Island red bell buoy.	1⅜	125 yards north of Little Mark Island.	279	NW. by W. ¾ W.
125 yards north of Little Mark Island.	¼	Red spar buoy No. 4	275	WNW.
Red spar No. 4. Pass southwest of red buoy and northeast of black buoy.	¼	Black spar buoy No. 3	-----	Various.
Black spar No. 3	1¾	Black spar No. 5 (Stave Island Ledge buoy).	291	NW. ⅝ W.
Black buoy No. 5	1⅛	Black buoy No. 7	252	W.
Black buoy No. 7	1½	100 yards south of Deer Point Rock red and black spar buoy.	234	WSW. ¼ W.
Deer Point Rock buoy. Pass to southward of Deer Point buoy, pass NE. of black spar No. 7 and NW. of black can No. 9.	⅝	Black can No. 9	-----	Various.
Black can No. 9	½	Red spar No. 12	216	SW. ⅝ W.
Red spar No. 12	1⅝	250 yards north of Cow Island.	256	W ¼ N.
250 yards north of Cow Island.	¾	100 yards northwest of red spar No. 4.	245	W. ¾ S.
Red spar No. 4	¾	50 yards northwest of red spar No. 2.	216	SW. ⅝ W.
Red spar No. 2. Bring Breakwater Light in range with spire in South Portland.	1⅜	Anchorage buoy C (white spar), Chart No. 325.	212	SW. ⅜ W.

Directions, eastbound

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
1. Portland to Cape Small (Chart 315)			°	Points
Anchorage white spar buoy C. Breakwater Light and spire in South Portland in range astern.	1⅜	50 yards northwest of red spar No. 2.	32	NE. ⅜ E.
Red spar No. 2	⅞	100 yards northwest of red spar No. 4.	36	NE. ⅝ E.
100 yards northwest of red spar No. 4.	¾	250 yards north of Cow Island.	65	E. ¾ N.
250 yards north of Cow Island.	1⅝	100 yards south of red spar No. 12.	76	E. ¼ S.
100 yards south of red spar No. 12.	½	Black can No. 9	36	NE. ⅝ E.
Black can No. 9. Pass northwest of black can No. 9 and northeast of black spar No. 7.	⅝	100 yards south of Deer Point horizontal striped buoy.	-----	Various.
100 yards south of Deer Point horizontal striped buoy.	1½	100 yards north of black spar No. 7.	54	ENE. ¼ E.
100 yards north of black spar No. 7.	1⅛	100 yards north of black buoy No. 5.	72	E.
North of black spar No. 5.	1¾	100 yards northeast of black spar No. 3.	111	SE. ⅝ E.
100 yards northeast of black spar No. 3. Avoid shoal water off southwest end of Haskell Island.	¼	50 yards south of red spar No. 4.	-----	Various.
Red spar No. 4	¼	125 yards north of Little Mark Island. Island has stone monument.	95	ESE.
125 yards north of Little Mark Island.	1⅜	250 yards north of Jaquish Island red bell buoy. If bound to New Meadows, see directions on page 196.	99	SE. by E. ¾ E.
250 yards north of Jaquish Island red bell buoy.	6¼	300 yards north of Bald Head Spindle.	93	ESE. ¼ E.
2. Cape Small to Fisherman Island Passage (Chart 314)				
300 yards north of Bald Head Ledge Spindle.	⅞	300 yards north of Glover Rock. Pass midway between it and Small Point.	100	SE. by E. ⅝ E.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
2. Cape Small to Fisherman Island Passage (Chart 314)—Continued			°	*Points*
300 yards north of Glover Rock.	4⅛	150 yards north of White Ledge black spar buoy. (For directions to Kennebec River see p. 191.)	62	E. by N.
150 yards north of White Ledge black spar buoy.	1½	¼ mile north of Sisters tripod beacon.	54	ENE. ¼ E.
¼ mile north of Sisters tripod beacon.	3⅝	Cuckolds black bell buoy. If bound to Boothbay Harbor, see directions on p. 176.	63	E. ⅞ N.
Cuckolds black bell buoy.	3	300 yards north of Ram Island light.	47	NE. by E. ⅝ E.
3. Fisherman Island Passage to Davis Strait (Chart 313)				
(For directions Damariscotta River see p. 172)				
300 yards north of Ram Island light.	2¼	¼ mile south of Thrumcap Island.	81	E. ¾ S.
¼ mile south of Thrumcap Island.	8	Egg Rock North Ledge red spar 100 yards on port beam. Pass 150 yards north of Eastern Egg Rock beacon.	67	E. ½ N.
Egg Rock North Ledge red spar on port beam.	3½	20 yards southeast of Griffin Ledge red spar in Davis Strait. Pass north of black spar No. 7.	63	E. ⅞ N.
4. Davis Strait to Owls Head via Muscle Ridge Channel (Chart 312)				
20 yards southeast of Griffin Ledge red spar in Davis Strait.	2¼	50 yards north of Allen Ledge black spar No. 3. If bound to St. George River, see directions on p. 161.	49	NE. by E. ⅞ E.
50 yards north of Allen Ledge black spar No. 3.	½	100 yards south of Marshall Ledge red buoy No. 4.	90	ESE. ½ E.
100 yards south of Marshall Ledge red spar No. 4.	½	200 yards NNE. of Gunning Rocks black buoy No. 1.	74	E. ⅛ S.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
4. Davis Strait to Owls Head via Muscle Ridge Channel (Chart 312)—Continued			°	Points
200 yards NNE. of Gunning Rocks black spar No. 1.	1¼	Mosquito Island red bell buoy No. 2M1.	104	SE. by E. ¼ E.
Close north of Mosquito Island red bell buoy No. 2M1.	5¼	100 yards northwest of South Breaker red bell buoy.	49	NE. by E. ⅞ E.
100 yards northwest of South Breaker red bell buoy.	1¼	250 yards north of Lower Gangway Ledge red and black nun buoy.	26	NE. ⅛ N.
250 yards north of Lower Gangway Ledge red and black nun buoy.	3¼	150 yards west of Upper Gangway Ledge buoy. Whitehead Light astern.	36	NE. ⅝ E.
150 yards west of Upper Gangway Ledge red and black buoy.	½	150 yards east of Ash Island black bell buoy No. 11.	31	NE. ¼ E.
150 yards east of Ash Island black bell buoy No. 11.	1¾	Sheep Island bar red nun buoy No. 2.	12	NNE. ⅝ E.
Sheep Island bar nun buoy No. 2 close on starboard beam.	1⅛	200 yards southeast of Dodge Point beacon.	26	NE. ⅛ N.
200 yards southeast of Dodge Point beacon.	¼	350 yards north of north end of Monroe Island. If bound to eastward via Eggemoggin Reach, see section 6B on p. 51. If bound to Penobscot Bay, see directions on p. 151.	45	NE. by E. ½ E.
5. Owls Head through Fox Island Thorofare (Charts 310, 309 and 311A)				
350 yards north of north end of Monroe Island.	4¼	¼ mile SSW. of Fiddler Ledge stone beacon.	83	E. by S.
¼ mile SSW. of Fiddler Ledge stone beacon.	1⅝	Sugar Loaves black spar No. 5 100 yards on starboard beam.	51	ENE.
Sugar Loaves black spar No. 5 on starboard beam. Keep at least 100 yards off the beach.	⅞	100 yards north of Young Point beacon.	42	NE. by E. ¼ E.
100 yards north of Young Point beacon.	⅝	225 yards north of Calf Point (western side Young Cove).	76	E. ¼ S.
225 yards north of Calf Point.	1⅛	250 yards southwest of Grindstone Ledge buoy.	105	SE. by E. ⅛ E.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course True	Course Magnetic
5. Owls Head through Fox Island Thorofare (Charts 310, 309 and 311A)—Contd.			°	Points
250 yards southwest of Grindstone Ledge red buoy No. 10.	⅜	Dobbin Rock red buoy No. 8.	50	ENE.
Dobbin Rock red buoy No. 8.	⅝	100 yards south of Fish Point Ledge red buoy.	43	NE. by E. ⅜ E.
100 yards south of Fish Point Ledge red buoy.	⅝	150 yards south of Goose Rocks Light.	89	ESE. ½ E.
150 yards south of Goose Rocks Light.	1	100 yards south of Channel Rock red bell buoy No. 2.	110	SE. ⅝ E.
100 yards south of Channel Rock red bell buoy No. 2.	4½	300 yards north of Deer Island Thorofare Light.	84	E. by S.
6. Through Deer Island Thorofare to Casco Passage (Charts 309 and 308)				
300 yards north of Deer Island Thorofare Light. Pass north of black spar No. 15, south of red spar No. 16, and north of black spar No. 13.	1⅝	Black spar No. 11	62	E. ⅞ N.
Black spar No. 11	½	Red spar No. 14	73	E.
Red spar No. 14	1	West side Camp Island on starboard beam.	82	E. ⅞ S.
West side Camp Island abeam. Bring summit of Russ Island astern.	⅞	Black spar No. 7 on starboard beam.	56	ENE. ½ E.
Black spar No. 7 on starboard beam. Pass south of buoys S8 and S6.	1⅜	Haycock beacon on starboard beam.	71	E. ⅛ N.
Haycock beacon on starboard beam.	⅜	Black spar No. 3 abeam	56	ENE. ⅝ E.
Black spar No. 3 abeam	1⅝	Long Ledge red spar No. 2 close abeam.	82	E. ⅞ S.
Long Ledge red spar No. 2 on port beam.	1⅝	Egg Island bell buoy close on port beam.	76	E. ⅜ S.
Egg Island red bell buoy.	1¼	200 yards north of black spar No. 7.	58	ENE. ¾ E.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
6A. Merchant Row to Casco Passage (Charts 309 and 308)			°	Points
300 yards southwest of Deer Island Thorofare Light.	1	Midway between Farrel and Sparrow Islands.	137	SSE. ¼ E.
Midway between Farrel and Sparrow Islands. Pass south of red and black spar marking 14-foot spot.	2⅜	400 yards south of Barter Island Ledges spindle.	96	SE. by E. ⅞ E.
400 yards south of Barter Island Ledges spindle heading for Southern Mark Island.	2¼	⅜ mile W. by N. from Southern Mark Island.	84	E. by S.
⅜ mile W. by N. from Southern Mark Island (grassy).	6	200 yards north of black spar No. 7.	43	NE. by E. ⅜ E.
6B. Owls Head to Casco Passage via Eggemoggin Reach				
400 yards north of Monroe Island.	5¼	¼ mile SSE. of McIntosh Ledge buoy.	42	NE. by E. ⅜ E.
¼ mile SSE. of McIntosh Ledge buoy.	7⅝	½ mile northwest of Resolution Island.	30	NE. ¼ E.
½ mile northwest of Resolution Island.	3	½ mile southwest of Cape Rosier.	36	NE. ⅞ E.
½ mile southwest of Cape Rosier.	2½	Perpendicular striped bell buoy.	96	SE. by E. ⅞ E.
Perpendicular striped bell buoy.	1¼	400 yards NNE. of Pumpkin Id. Ledge black buoy.	49	ENE.
400 yards NNE. of Pumpkin Id. Ledge black buoy. Bring Blake Point astern.	¾	400 yards northeast of black buoy No. 11. (Easterly one of two black buoys.)	78	E. ½ S.
400 yards northeast of black buoy No. 11.	2	300 yards southwest of Byard Point.	127	SE. ⅞ S.
300 yards southwest of Byard Point.	1⅞	300 yards ENE. of outer black buoy off North Deer Isle.	115	SE. ⅛ E.
300 yards ENE. of outer black buoy off North Deer Isle. Bring wharf at Sargentville astern.	3⅛	100 yards southwest of red buoy No. 4B.	134	SSE. ½ E.
100 yards southwest of red buoy No. 4B.	1	300 yards ENE. of Conary Ledge black buoy.	118	SE.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
6B. Owls Head to Casco Passage via Eggemoggin Reach—Continued			°	Points
300 yards ENE. of Conary Ledge black buoy.	2	300 yards southwest of Devil Head.	131	SSE. ¾ E.
300 yards southwest of Devil Head.	2¾	100 yards south of red spar buoy No. 4.	124	SE. ⅝ S.
100 yards south of red spar buoy No. 4. Pass northward of black buoys Nos. 7 and 5.	⅞	Close south of red spar No. 2NR. (See directions in section 7 following.)	84	ESE. ⅞ E.
7. Through Casco Passage to Bass Harbor Bar (Chart 308)				
200 yards north of black spar No. 7.	½	Close southward of red spar No. 2NR.	91	ESE. ¼ E.
Close south of red spar No. 2NR.	1¼	Casco Passage fairway bell buoy.	83	E. by S.
Casco Passage fairway bell buoy.	4⅞	Bass Harbor Bar fairway buoy.	74	E. ¼ S.
8. Bass Harbor Bar to Petit Manan via direct route (Chart 1202)				
Bass Harbor Bar fairway buoy.	1¾	100 yards southeast of black bell buoy off the Nubble.	88	ESE. ½ E.
100 yards southeast of black bell buoy off the Nubble.	5⅛	Baker Island red whistling buoy. (For directions Frenchman Bay see p. 92.)	86	ESE. ¾ E.
Baker Island red whistling buoy.	8⅜	Schoodic Island red whistle buoy.	49	ENE.
Schoodic Island whistle buoy.	7⅞	Petit Manan bell buoy.	76	E. ½ S.
8A. Bass Harbor Bar to Petit Manan via Western way (Charts 306, 305, and 1202)				
Bass Harbor Bar fairway buoy.	1¾	100 yards southeast black bell buoy off the Nubble.	88	ESE. ½ E.
100 yards southeast black bell buoy off the Nubble.	1⅜	Black spar No. 3 abeam	28	NE. ⅛ E.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
8A. Bass Harbor Bar to Petit Manan via Western way (Charts 306, 305, and 1202) —Continued			°	*Points*
Black spar No. 3 on port beam.	1⅛	Spurling Point black and white fairway buoy.	357	N. by E. ⅜ E.
Spurling Point fairway black and white can buoy, heading for Bear Island Light.	1⅜	¼ mile off Bear Island Light.	24	NE. ¼ N.
¼ mile southwest Bear Island Light. (For directions Frenchman Bay see p. 91.)	2	200 yards north of Lewis Rock black buoy No. 3A.	79	E. ⅝ S.
200 yards north of Lewis Rock black buoy No. 3A.	8⅜	Schoodic Island red whistle buoy.	76	E. ½ S.
Schoodic Island red whistle buoy.	7⅞	Petit Manan fairway bell buoy.	76	E. ½ S.
9. Petit Manan through Moosabec Reach (Charts 305 and 304)				
Petit Manan black and white fairway bell buoy.	8½	⅜ mile north of Nash Island Light.	33	NE. ¾ E.
⅜ mile north of Nash Island Light.	2	Green Island on starboard beam, distant ¼ mile.	55	ENE. ⅝ E.
Green Island abeam. Bring Nash Island light astern and pass in mid-channel through Tabbott Narrows.	2	¼ mile WNW. of black buoy No. 11.	44	NE. by E. ¾ E.
¼ mile WNW. black buoy No. 11. Bring Bar Island astern.	1½	¼ mile north of Pomp Island.	73	E. ¼ S.
¼ mile north of Pomp Island.	2⅝	Black buoy No. 9 close on starboard beam.	80	E. ⅞ S.
Black buoy No. 9. Follow channel buoys carefully, passing southward of red buoys.	1	Red buoy No. 6	86	ESE. ⅝ E.
Red buoy No. 6	1⅛	¼ mile north Mark Island (wooded). If bound to Englishman Bay, see directions on p. 73.	72	E. ⅛ S.

Directions, eastbound—Continued

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
10. Moosabec Reach to West Quoddy Head (Charts 1201, 304, and 303)			°	*Points*
¼ mile north of Mark Island.	3¼	200 yards north of Pulpit Rocks (bare).	69	E. ⅛ N.
200 yards north of Pulpit Rocks.	1⅝	100 yards north of black bell buoy No. 3.	77	E. ⅝ S.
100 yards north of black bell buoy No. 3.	2⅞	½ mile south of Libby Island Light. If bound to Machias Bay, see directions on p. 69.	91	ESE. ⅛ E.
½ mile south Libby Island Light.	5	½ mile south of Double Shot Island.	63	E. ⅝ N.
½ mile south of Double Shot Island.	4½	Little River red whistle buoy.	53	ENE. ½ E.
Little River red whistle buoy.	14	Sail Rock black whistle buoy. (For directions to Eastport and Calais see p. 62.)	46	NE. by E. ⅞ E.

ST. CROIX RIVER AND APPROACHES

The waters comprising the approaches to the St. Croix River are Quoddy Roads, Lubec Narrows, Friar Roads, and Passamaquoddy Bay (Chart 801). The principal entrance is around the northern end of Campobello Island through Head Harbor Passage, and is deep and generally clear. The channel through Lubec Narrows is also frequently used, especially at high water. The tidal currents are strong, and sailing vessels can make no headway beating against them.

Quoddy Roads lies between the southwestern end of Campobello Island and West Quoddy Head; it is the usual anchorage for vessels seeking shelter against northerly and westerly winds or waiting for a favorable tide to pass through Lubec Narrows. The entrance between Liberty Point Ledge and West Quoddy Head is about ¾ mile wide, with a least depth of 28 feet (8.5 m.) near the middle of the entrance; the best water leads about ¼ mile eastward of West Quoddy Head. The anchorage affords shelter against all but east and southerly winds in 12 to 25 feet (3.7 to 7.6 m.); vessels anchored here for shelter when the wind hauls eastward get under way and pass through Lubec Narrows to the anchorage in Johnson Bay. The northern and western parts of the roads between West Quoddy Head and Lubec are full of shoals, partly bare at low water, on which are numerous fishweirs.

West Quoddy Head, on the western side of the entrance of Quoddy Roads, is high and wooded. **West Quoddy Head Lighthouse,** a red and white horizontally banded tower at the eastern end, is the most prominent mark. The light is fixed white, 83 feet (25.3

m.) above the water, and visible 15 miles. The fog signal is a steam whistle sounding a group of 2 blasts, each of 2 seconds duration, every 30 seconds; silent intervals 2 and 24 seconds. The lookout tower of the Coast Guard, located on the highest part of the ridge, is prominent.

Sail Rock and **Little Sail Rock** are two bare rocks of a group of ledges which lie ¼ mile southeastward of West Quoddy Head Lighthouse. Swirls form just southward and eastward of Sail Rock during the strength of the tidal current, and it should be given a good berth. A black whistling buoy is moored ⅜ mile south-southeastward of Sail Rock, in line with it and West Quoddy Head Lighthouse.

Round Rock and **Liberty Point Ledge** lie a little over ¼ mile westward of **Liberty Point,** the eastern point at the entrance of Quoddy Roads. These rocks show above water, and vessels should pass at least 300 yards southward of the southernmost rock.

Middle Ground, with a least depth of 4 feet (1.2 m.), is a shoal in the middle of Quoddy Roads, ⅝ mile northward of West Quoddy Head. It is marked on its southwestern side by a red buoy.

Wormell Ledges, partly bare at low water, lie along the southern shore of Quoddy Roads westward of West Quoddy Head.

Above Middle Ground and Wormell Ledges, Quoddy Roads is full of shoals, largely bare at low water, through which is the buoyed channel to Lubec Narrows.

Lubec Channel has been dredged to a width of 500 feet and a depth of 12 feet (3.7 m.) at mean low water, but low spring tides may fall 4 or 5 feet (1.2 to 1.5 m.) below this level. The average draft of vessels passing through this channel is 12 feet (3.7 m.); the deepest draft are regular steamers drawing 16 feet (4.9 m.), and they pass only from about 2 hours before to 1 hour after high water. It is necessary for sailing vessels to have a fair wind to pass through the dredged channel and the Narrows, the most favorable time being about 2 hours before high water.

Lubec Channel Lighthouse (white tower on black pier) marks the western edge of the channel. The light flashes white every 15 seconds, and the fog signal is one stroke of a bell every 10 seconds.

Lubec Narrows is a narrow strait between Mullholland Point (marked by Lubec Narrows Lighthouse) and the town of Lubec. The channel has been dredged 250 to 400 feet wide and 12 feet (3.7 m.) deep and has strong tidal currents and eddies; for current information, see page 61. The narrowest part of the channel is at the northern end.

There are shoals, bare at low water, on both sides of Lubec Narrows. Making off from the northeastern point of Lubec, opposite Lubec Narrows Lighthouse, is a dangerous ledge, on the shore end of which is a breakwater which shows out of water; the northern end of this ledge is marked by a black buoy, which also marks the western side of the northern end of the dredged channel.

Lubec, with a population of about 3,000, is a town on the western side of the Narrows. There are several fish factories with wharves that go dry at low water. The steamboat wharf on the north side of the town has a depth alongside of 18 feet (5.5 m.) and is equipped

with a large transit shed. There is a customs office and public landing float just eastward of the steamer landing. Lubec is connected with Eastport by ferry and is visited by steamers running between Boston and St. John, New Brunswick. There is also steamer connection with Grand Manan Island. There are no adequate hotel accommodations at Lubec. A standpipe 1 mile west of the town is prominent.

Johnson Bay, on the northwest side of Lubec, is a well-sheltered anchorage for vessels of any draft, and is frequently used. It is approached from southward through Quoddy Roads and Lubec Narrows and from northward through Friar Roads. The southwestern part of Johnson Bay is shoal for a distance of ½ mile from its head, and a shoal with 17 feet (5.2 m.) over it lies on the west side, near the middle. The shores of the bay should be given a berth of about 300 yards. The best anchorage for deep-draft vessels is just southward of a line from Lubec Narrows Lighthouse to Rodgers Island, in 7 to 9 fathoms (12.8 to 16.5 m.).

A channel, navigable by launches at high water, exists between Johnson Bay and South Bay. It is crossed by a fixed bridge, and local knowledge is necessary.

Pope Folly is a wooded islet ¼ mile northward of the northern entrance to Lubec Narrows. The bar connecting it with the shore southeastward has a least depth of 15 feet (4.6 m.) in mid-channel, and is crossed by most local vessels bound to Lubec or through Lubec Narrows. A ledge extending northeastward from the island is marked at its end by a black buoy.

Dudley Island, ½ mile northward of the northern entrance to Lubec Narrows, is high and mostly grass covered.

Treat Island, the larger of the islands between Lubec Narrows and Eastport, is high and grass covered on the south end and wooded on the north end. Three hundred yards northwestward of Treat Island is **Burial Islet,** grass covered and distinguished by a single tree in the center; and 350 yards westward of Treat Island is **Gull Rock,** bare at all times.

Friar Roads (Eastport Harbor).—This harbor is on the western side of Campobello Island, north of Johnson Bay and east of Moose Island (Eastport). It is approached from northward around East Quoddy Head and from southward through Quoddy Roads and Lubec Narrows, and is the principal approach to Passamaquoddy Bay and St. Croix River. Vessels seldom anchor in Friar Roads, as the water is deep, the bottom irregular, and the tidal currents have considerable velocity.

Harbor de Loutre, in the northwestern part of Campobello Island, is sometimes used as an anchorage by small vessels.

Friar Bay, a broad bight in the west shore of Campobello Island, southeastward of Eastport, is sometimes used as an anchorage.

Welshpool is a fishing village on Campobello Island. A rock-filled wharf here affords good protection for fishing boats and small launches in westerly weather.

Whirlpools.—Between Dog Island and Deer Point, the southern extremity of Deer Island, there are whirlpools and eddies which at the strength of the tide are dangerous for small boats.

Broad Cove, in the south shore of **Moose Island** and west of Eastport, is a good anchorage for vessels of any draft; vessels anchored off Eastport get under way and anchor here or in Johnson Bay to ride out a gale. The head of the cove is shoal for a distance of ¼ mile. Rocks bare at low water extend 400 yards southeastward and southward from Shackford Head, on the western side of the entrance, and are marked at their southwest end by a red buoy. A good berth for vessels of moderate size is about 250 yards off the point on the eastern side near the head of the cove, with the lone tree on Burial Islet in line with the high spire in Lubec, in 4 to 6 fathoms (7.3 to 11 m.). The eastern side of the cove is bold and should be favored when entering.

A wrecked barge with foremast standing and decks awash at low water lies on the point eastward from **Shackford Head.**

There is a wharf, bare at low water, at the head of the cove.

Eastport, on the southeastern end of Moose Island, has a population of about 4,500 and has some commerce, its principal business being in fish, coal, and general merchandise. Vessels discharging and loading usually lie at the wharves, some of which are dry at low water; others have from 5 to 15 feet (1.5 to 4.6 m.) at their ends. The steamer wharf has about 19 feet (5.8 m.) alongside. There is a customs office on the water front and a public float landing. In 1926 there were no adequate hotel accommodations at Eastport.

Communication.—There is regular steamer service with Boston and St. John, New Brunswick. A local Canadian steamer plies between Grand Manan Island and way ports to St. Stephen, calling at Eastport and Lubec. There is rail connection with Calais and a good highway paralleling the St. Croix River northward. There is a regular ferry service with Lubec.

Pilots.—Pilotage is not compulsory for Maine ports. There is a pilot residing at West Quoddy Head, and vessels desiring his services should signal the Coast Guard lookout station. Pilots for the local inside waters can be obtained from among the local fishermen at Eastport.

Towboats.—There is one towboat at Eastport. Vessels desiring a towboat should signal the Coast Guard lookout station on West Quoddy Head. Schooners laden with coal are towed to Calais on high water only.

Supplies.—Coal in limited quantities may be had in Eastport. Fresh water may be taken from the wharves or can be supplied by the towboat to vessels at anchor. Provisions, gasoline, and ship chandler's stores may be had in Lubec, Eastport, and Calais. There is no fuel oil available. Portland is the nearest United States port where fuel oil can be obtained.

Repairs.—Light repairs to hulls and machinery of vessels can be made at Eastport, vessels being hauled out on the beach. There are no facilities for dry-docking vessels.

Storm-warning displays, day and night, are made at Eastport from the customhouse tower and from a steel tower on the hill near the schoolhouse.

Anchorage.—The best anchorage off the town for small vessels is abreast the customhouse and quite close to the wharves, where the current has the least velocity.

Caution.—Vessels should keep in mind the two rocks which lie off the Eastport water front—**Page Rock,** with 16 feet (4.9 m.) over it, and **Margie Rock,** with 14 feet (4.3 m.) over it.

Clark Ledge, covered near high water only, lies about 225 yards from the wharves off the northern part of Eastport, and is marked by a spindle.

Dog Island, small, with grassy top, is about ¼ mile northwestward of Clark Ledge and close to Moose Island. A shelving ledge extends 100 yards off its high-water mark. It is marked by an unwatched flashing white light with a red sector covering Clark Ledge.

Cobscook Bay.—This bay, making in westward of Moose Island, is a large irregular bay with several arms. It is approached through the channel leading between Moose Island on the north and Seward Neck on the south. The arms of the bay are full of rocks and have dangerous currents, which require local knowledge to keep the vessel in the channel. Strangers seldom enter Cobscook Bay, and then only with a pilot, generally taken from Eastport. The deepest draft using it is 12 feet (3.7 m.). Good anchorage is found in many of the arms and coves, but everywhere in the channel the currents are too strong and the bottom too rocky for anchorage. Ice obstructs navigation during the winter.

Pennamaquan River, making northwestward from Cobscook Bay 2 miles inside the entrance, has ample depth for about 1¾ miles above the entrance, and the principal dangers are marked by buoys. It is bare at low water for ¾ mile below **Pembroke,** a town on the railroad 3 miles above the entrance of the river, and the channel is usually marked by perches in summer. There is a fish cannery on the western branch at Pembroke; the deepest draft using the river is 12 feet (3.7 m.), and the usual draft not over 6 feet (1.8 m.).

Dennysville is a village at the head of the northwestern branch of Cobscook Bay, 8½ miles above the entrance of the bay. The river is bare for ½ mile below the town at low water, and the deepest draft that can be taken to the town is about 12 feet (3.7 m.) at high water and with local knowledge. The channel is unmarked and difficult.

Whiting is a village at the head of the southern branch of Cobscook Bay, 9½ miles above the entrance of the bay. The river is bare for 1 mile below the town at low water, and 12 feet (3.7 m.) is the deepest draft that can be taken to it at high water and with local knowledge. The channel is unmarked and difficult.

Bar Harbor, the thoroughfare between Moose Island and the mainland northward, has a through depth of about 4 feet (1.2 m.) at low water but is fringed with shoals, many of them bare at low water, and is unmarked and difficult without local knowledge. It is crossed by a railroad drawbridge between Carlow Island and Pleasant Point, with a draw 30 feet wide, and by a fixed highway bridge about 1 mile southwestward, which has a headroom of about 5 feet (1.5 m.) at high water.

Pleasant Point, marked by prominent green buildings, is an Indian reservation on the point of that name 3½ miles northward of Eastport. There is no wharf.

Passamaquoddy Bay is a large bay indenting the shore of New Brunswick east of the mouth of the St. Croix River. **Western Passage,** the principal entrance to the bay, is between **Deer Island** on the east and Moose Island (Eastport) on the west. This passage has deep water and is comparatively free from dangers; it is 4 miles long from Eastport to Passamaquoddy Bay. Anchorage can be had out of the current in several coves on the sides of the passage, Johnson Cove being the best for vessels.

Frost Ledge, showing bare in places near low water, lies on the western side at the northern end of Western Passage, 300 to 600 yards eastward of Frost Island. It is marked at its eastern end by a black buoy.

St. Andrews is a Canadian town and port near the eastern point at the entrance to the St. Croix River. It is a railroad terminus and has some commerce. The anchorage is between the town and Navy Island, and is available for light-draft vessels only. A channel 13 feet (4.0 m.) deep has been dredged into the harbor from southeastward and northwestward. The channel from northwestward was reported to have shoaled to about 5 feet (1.5 m.) in 1923. The channel is marked by lights, buoys, and beacons. The railroad and steamboat wharf has a depth of 12 feet (3.7 m.) at the end.

A large hotel with a red roof is prominent at St. Andrews.

Boundary marks.—From West Quoddy Head northward to Calais, there are numerous range marks consisting of small white pyramidal shaped concrete beacons so placed as to mark the International Boundary Line between the United States and Canada. The mariner should not mistake these marks for aids to navigation.

St. Croix River (chart 801).—This river, emptying into Passamaquoddy Bay from northward, forms the boundary between Maine and New Brunswick. It has a deep and comparatively clear channel for 8 miles above the mouth at Navy Island to Devils Head. Above this point it has a narrow winding natural channel with a least depth of about 12 feet (3.7 m.) for 3¼ miles to Hills Point, thence a dredged channel 12 feet (3.7 m.) deep and 150 to 200 feet wide to the steamer landing 1 mile below Calais, and 9 feet (2.7 m.) deep and 100 feet wide to Calais and St. Stephens. These channels have probably shoaled some in recent years.

These channels are marked by buoys and lights, and strangers should have little trouble in taking a draft of 6 feet (1.8 m.) to Calais at low water with the aid of the chart. With a deeper draft they should take advantage of the tide or employ a pilot. Vessels can anchor and lie afloat below **The Ledge,** a village on the New Brunswick side 2½ miles above Devils Head, but above this point there is no room for anchorage.

Robbinston is a village on the west bank of the St. Croix River near the entrance. It is marked by a prominent brick chimney. There are fish factories with small wharves, but there is no steamer service.

Red Beach is a village on the west side of the St. Croix River 6 miles above the entrance. There is no commerce by water.

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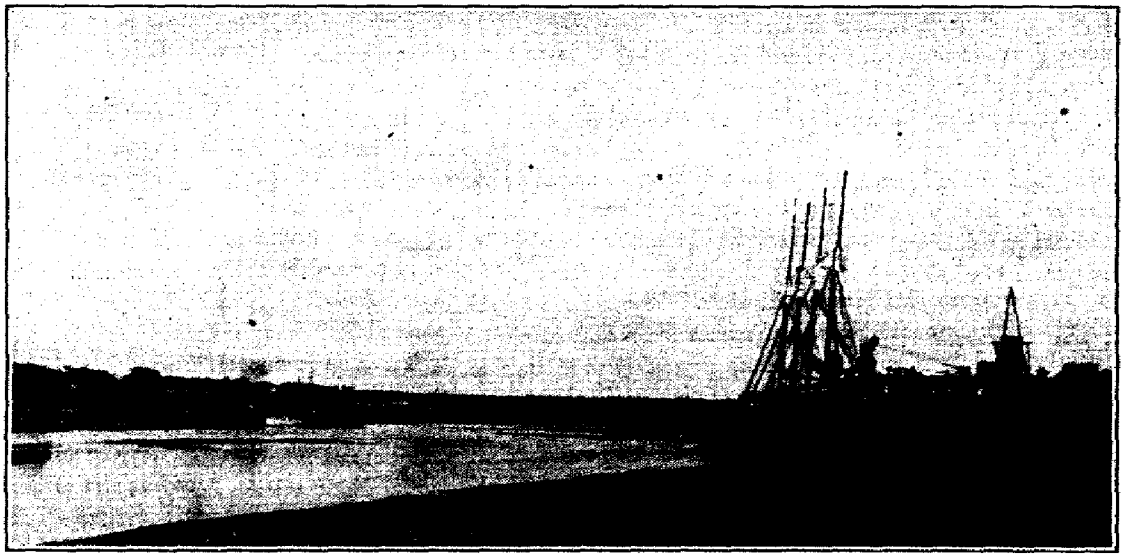
Dochet Island, in mid-channel off Red Beach, is marked by St. Croix River Lighthouse, a white dwelling. Scattered shoals, sunken and awash, surround the island and lie in mid-channel for a distance of 1⅛ miles southward of it. The deeper and broader channel leads eastward of these shoals, and is marked by a single black buoy on the edge of the shoals extending eastward from Dochet Island. The channel leading westward of the shoals, between them and **Little Dochet Island,** a wooded islet midway between the southern end of the shoals and the western shore, is marked by several buoys and is generally used by local vessels, but should be used with caution by strangers.

Calais, a city of 6,000 people, is on the south bank of the St. Croix River about 14 miles above its mouth and 23 miles above Eastport. Its principal trade is lumber and coal. It is the terminus of a railroad running through Maine and into Canada. It is the head of navigation for the St. Croix River. Schooners laden with coal are



Calais, Me., schooner unloading coal at low tide

towed to Calais at high water and lie aground on the mud while discharging. All the wharves are bare at low water.

St. Stephen, on the Canadian side of the river opposite Calais, is connected with the latter by an international bridge. Customs and immigration officers are stationed on each side of the bridge. St. Stephen has some commerce and has steamer service with St. Andrews, Eastport, and Grand Manan Island.

Ice.—During January, February, and March St. Croix River is usually obstructed by ice and not navigable above Robbinston, but the channel is sometimes kept open by tugs and the regular steamers. Quoddy Roads and Eastport Harbor are never closed by ice.

Freshets.—Spring freshets usually cause the water to rise above the level of the wharves at Calais and are accompanied by strong currents. They are seldom noticeable outside of the river.

Tides.—The mean rise and fall of tides is about 18 feet (5.5 m.) at Eastport, 19 feet (5.8 m.) at Robbinston, and 20 feet (6.1 m.) at

Calais; under special conditions the extreme limits may be as much as 5 feet (1.5 m.) above mean high water or below mean low water.

The Quoddy power project.—At the date of this volume (1927) preliminary steps are being taken toward the development of a huge electric power project utilizing the great rise and fall of the tide in Passamaquoddy and Cobscook Bays. By a series of dams and gates Passamaquoddy Bay will be formed into an "upper pool" and Cobscook Bay will form the "lower pool." Locks are to be provided for the accommodation of shipping. The power house is to be in the vicinity of Bar Harbor, where the power will be generated from the water flowing from the upper pool to the lower pool. It has been stated by the originators that from 500,000 to 700,000 horsepower can be generated.

CURRENTS, ST. CROIX RIVER AND APPROACHES

In Grand Manan Channel the flood sets in a general northeast direction and at strength attains a velocity of about 2½ knots. The ebb sets in a southwesterly direction with a velocity at strength of about 2½ knots. Predicted times of slack water for every day in the year are given in the Atlantic Coast Current Tables.

Approaching the entrance to Quoddy Roads, if less than 2 miles from the northern shore, the set of the flood is more northward, and about 1 mile southeastward of West Quoddy Head the flood sets directly into the Roads. For a distance of ½ mile southeastward of West Quoddy Head the currents are dangerous an account of swirls and eddies, which are apt to draw a vessel, in a light breeze, onto Sail Rock.

Along the eastern side of Campobello Island the flood sets in a northeasterly direction following the trend of the shore, the ebb setting in the opposite direction.

Along the northwestern side of Campobello Island, 1 mile north of East Quoddy Head, the flood sets strongly westward on the islands lying in the passage westward of Campobello Island. The direction of the flood then changes more southward, following the general direction of the passage until nearly to Eastport, where the set is more westerly, toward the passage between Deer and Moose Islands and toward the entrance to Cobscook Bay. The ebb generally sets in a reverse direction.

Through Lubec Narrows the flood sets northward, following the general direction of the dredged channel; southward of the Narrows it has a velocity of about 4 knots at strength, but in the Narrows it attains a velocity of about 6 knots during spring tides. The ebb sets southward, following the general direction of the channel, and in the Narrows has a velocity of about 8 knots during spring tides. Below the Narrows its velocity is about 4 knots and the set is in the general direction of the channel. The currents at strength form dangerous eddies on both sides of the channel in the Narrows; these are avoided by keeping in mid-channel. It is slack water in the Narrows about 1 hour before high and 1½ hours before low water; the duration of slack is short, from 5 to 15 minutes. With a strong fair wind small

sailing vessels can pass through the Narrows with an adverse current at any time after the current has been running 3 hours.

Northward of Lubec Narrows the first of the flood current sets along the west shore of Campobello Island eastward of Popes Folly; it afterwards sets more westward, south of Popes Folly, and across the entrance of Johnson Bay, meeting the flood from Friar Roads westward of Treat Island, and both setting into Cobscook Bay.

Western Passage of St. Croix River.—The flood sets northward into the passage, and off Deer Point, abreast Dog Island, it forms whirlpools and eddies, which are dangerous to open boats. The whirlpools and eddies are strongest 2 to 3 hours before high water and during spring tides; the flood then attains a velocity of about 6 to 7 knots. The least disturbance is usually about 300 yards northward of Dog Island, where there is a comparatively narrow direct current known locally as "straight water," which can be readily followed between the whirlpools and eddies on the Deer Island side and the eddies on the Eastport side of the passage. The ebb sets southward, but does not attain the velocity of the flood.

Above Deer Point the flood sets northward with decreasing velocity and follows the general direction of the channel with strong countercurrents and eddies close to the shore, where the configuration of the land is favorable; it continues ½ to ¾ hour after the time of high water. The ebb sets southward with reduced velocity and disturbance off Deer Point, and the inshore reverse currents are less marked than on the flood; it continues ¾ to 1 hour after the time of low water.

St. Croix River.—The flood sets northward with countercurrents inshore on both sides where the conformation of the land is favorable for them. The ebb sets southward with less marked countercurrents.

Cobscook Bay and tributaries.—The tidal currents follow the general direction of the channels, but in the coves there are strong reverse eddy currents, and heavy overfalls are formed over the submerged rocks and ledges. The velocity is estimated at 5 to 8 knots, and some of the buoys are towed under when the currents are at strength.

Directions.—Directions for Eastport and Calais via either Head Harbor Passage or Lubec Narrows are given in the table following.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
1. East Quoddy Head to Eastport (Chart 801)				
¼ mile north of Head Harbor light.	1⅛	East end Casco Island on starboard beam.	° 240	Points W. ⅞ S.
East end Casco Island on starboard beam. Pass 300 yards off Cherry Island fog signal.	3¾	Off Eastport water front	218	SW. by W. ¼ W.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
2. West Quoddy Head to Eastport via Lubec Narrows				
(Local knowledge is necessary for navigating this passage with large vessels)			°	*Points*
¼ miles east of Sail Rock Whistling buoy.	⅞	West Quoddy Head black bell buoy.	321	N. by W. ¾ W.
West Quoddy Head bell buoy.	¾	Midddle Ground red nun buoy No. 2.	295	NW.
Middle Ground red nun buoy No. 2.	1	Lubec Channel Light close on port beam.	331	N. ¾ W.
Lubec Channel Light	½	Red nun buoy No. 6 on starboard beam.	11	NNE. ¾ E.
Red buoy No. 6	½	Charley Point on starboard beam.	329	N. by W.
Charley Point abeam	¼	Black spar buoy No. 7	349	N. ⅞ E.
Black spar buoy No. 7. Swing around black buoy to a position 250 yards northwest of Popes Folly.	¼	250 yards northwest of Popes Folly Island.	-----	Various.
250 yards northwest of Popes Folly Island.	¾	Northeast end of Treat Island on port beam.	22	NE. ¼ N.
Northeast end of Treat Island abeam.	1½	¼ mile off Eastport	3	NNE.
3. Eastport to Calais (Chart 801)				
300 yards northeast Clark Ledge beacon.	3¼	350 yards west of Clam Cove spindle.	328	N. by W.
350 yards west of Clam Cove spindle.	7¼	½ mile E. by N. from Liberty Point.	335	N. ⅜ W.
½ mile E. by N. from Liberty Point.	2¾	⅜ mile east of red spar buoy No. 2A.	341	N. ⅛ E.
⅜ mile east of red spar buoy No. 2A.	1⅛	Dochet Island black buoy.	333	N. ⅝ W.
Dochet Island black buoy. Head for summit Devil Head.	½	Abeam point on east bank of river.	312	NNW. ½ W.
Abeam point on east bank.	2⅛	200 yards southwest red buoy southwest of Oak Point.	324	N. by W. ⅜ W.
200 yards southwest of red buoy.	1	150 yards off Spruce Point Light.	275	NW. by W. ¾ W.
Spruce Point	5	Calais and St. Stephen. Follow buoys and other aids to navigation.	-----	Various.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
4. Eastport to sea via Head Harbor Passage (Chart 801)			°	Points
300 yards southeast Cherry Island fog signal.	2¾	Middle of Casco Island on port beam.	38	NE. by E. ¼ E.
Middle of Casco Island abeam.	1⅛	Head Harbor Light abeam. Round light at a distance of ¼ to ½ mile. If bound westward, see directions on p. 38.	60	E. ⅞ N.
5. Eastport to sea via Lubec Channel (Chart 801)				
(Local knowledge required)				
¼ mile off Eastport	1½	Northeast end Treat Island just abaft starboard beam.	183	SSW.
Off Treat Island	¾	Popes Folly Island on port beam.	202	SW. ¼ S.
Popes Folly Island. Swing around island to a position close east of black spar buoy No. 7.	¼	Black spar buoy No. 7	-----	Various.
Black spar buoy No. 7	¼	Charley Point abeam	169	S. ⅞ W.
Charley Point abeam	½	Red nun buoy No. 6	149	S. by E.
Red nun buoy No. 6	½	Close eastward of Lubec Channel Light.	191	SSW. ¾ W.
Lubec Channel Light	1	Middle Ground red nun buoy No. 2.	151	S. ¾ E.
Red nun buoy No. 2	¾	West Quoddy Head black bell buoy.	115	S. E.
Black bell buoy	⅞	¼ mile east of Sail Rock whistle buoy. Round whistle buoy, and if bound westward see directions on p. 38. Directions for the inside route to Portland will be found on p. 40.	141	S. by E. ¾ E.

COAST FROM WEST QUODDY HEAD TO MACHIAS BAY

From West Quoddy Head to Little River (charts 1201 and 303), about 14 miles, the coast is, for the most part, high, rocky, covered with trees, and with precipitous faces seaward. It is generally bold-to, and the only outlying dangers are **Morton Ledge,** with 6 feet (1.8 m.) of water over it, lying about ⅜ mile offshore, 2¼ miles southwestward of West Quoddy Head Lighthouse, and marked by a red nun buoy, and a 13-foot (4 m.) spot ¼ miles southwestward of Long Point, about 2 miles eastward of Little River Lighthouse.

The shore is broken by the following unimportant coves, named from eastward with their distances in miles from West Quoddy Head Lighthouse: Carrying Place Cove, 1¼; Wallace Cove, 1¾; Hamilton Cove, 3; Julia Cove, 3¼; Boot Cove, 4; Baileys Mistake, 5½; Haycock Harbor, 6¼; Sandy Cove, 6½; Moose Cove, 7¾; Bog Brook, 9½; Black Point Cove, 11¾; Long Point Cove, 12¼; and Schooner Brook, 13¾. The largest of these are Baileys Mistake and Moose Cove. When passing along outside, both of these will appear to be good, open anchorages, but neither has good holding ground, nor can they be used as a harbor of refuge. Both have ledges, not buoyed, at their entrances, and afford shelter only from northerly winds.

When running close along the coast, the following are the only distinguishing marks between West Quoddy Head and Little River: **Carrying Place Cove** has a Coast Guard station and a few other buildings in the low divide at its head. **Boot Cove** has a few small fishermen's houses on the shore at the head. **Baileys Mistake** is distinguished by the cultivated land and a small settlement **(South Trescott)** at its head; there are landings only for small craft at high water; **Bailey Ledge,** on the west side of the entrance, is bare at low water and unmarked. **Moose Cove** has no distinguishing marks except a wooded islet on the northeast side of the entrance, and **Eastern Head Ledges,** ⅛ mile southward of the islet, which are bare at low water.

Little River (chart 303).—This harbor is 14 miles westward of West Quoddy Head and about 9½ miles eastward of Libby Islands; the entrance is marked by Little River Lighthouse on Little River Island. It is a small but excellent harbor of refuge, sheltered from all winds, has 12 to 30 feet (3.7 to 9.1 m.) of water with good holding ground, and is easy of access. The channel leads northward of the lighthouse and has a depth of about 28 feet (8.5 m.). The anchorage is about ½ mile long and ¼ mile wide, just inside of Little River Island. The harbor is never obstructed by ice so as to prevent vessels from entering.

Little River Ledge, bare at low water, lies 100 yards from the north shore just inside the entrance, and is marked by a red buoy. A ledge extends 110 yards from the south shore just eastward of a prominent point ½ mile above Little River Island. With these exceptions there are no dangers in the harbor if the shores be given a berth of 100 yards.

Little River Lighthouse, on the southeast end of Little River Island (wooded, with rocky shores), is a white conical tower. The light is fixed white, with a white flash of 0.6 second duration every 15 seconds; 57 feet (17.4 m.) above the water, and visible 13 miles. The fog signal is a bell, sounding 1 stroke every 30 seconds.

Cutler is a village on the north side of Little River. It has communication by telephone, and by highway with the railroad at East Machias. It is the headquarters of many small fishing boats. Gasoline and provisions are obtainable. The depth at the principal wharves does not exceed 3 feet (0.9 m.) at low water.

To enter Little River, pass northward of Little River Island, giving it a berth of 100 to 200 yards, and pass southward of the red buoy just inside the island. Anchorage can be selected anywhere in mid-channel inside the island. Small local craft anchor off the

wharves in 6 to 18 feet (1.8 to 5.5 m.). The passage southward of Little River Island has a rocky bar across it with a least found depth of 10 feet (3.0 m.) in mid-channel, but has not been closely examined, and should not be used by strangers.

Little Machias Bay (chart 303), about 2½ miles westward of Little River, is not used for an anchorage, as it is exposed to southerly and southeasterly winds, and is close to Little River and Machias Bay, both excellent anchorages. The bay is ⅝ mile wide at the entrance, wider inside, and about 2 miles long. **Long Ledge,** in the middle of the bay 1 mile inside the entrance, is covered at high water. Above this ledge the bay is much obstructed by ledges and shoals. There are some houses on the shores of the bay, but no wharves except for small craft at high water.

Old Man, a small but prominent rocky island, sparsely wooded on top, lying 1 mile off the entrance of Little Machias Bay, is a good mark and may be safely approached as close as 400 yards.

Black Ledges are bare islets in the middle of the entrance of Little Machias Bay; there is deep water close-to on both sides.

MACHIAS BAY AND RIVER

(chart 303) is the approach to the towns of Machiasport and Machias. It is easily entered either day or night, and affords well-sheltered anchorage for the largest vessels. It is about 6 miles long, and the main entrance between Cross Island on the east and Stone Island on the west is about 2 miles wide. The principal guide to the entrance is Libby Islands Lighthouse, which lies 9 miles westward of Little River Lighthouse and 9 miles eastward of Moose Peak Lighthouse. Avery Rock Lighthouse, in the middle of the bay, 4 miles from the entrance, is the guide for vessels bound up the bay. The best anchorages for vessels are Starboard Cove and the head of the bay above Avery Rock Lighthouse.

Cross Island, the large island on the southeast side of the entrance to Machias Bay, is wooded and has no prominent marks except a few unpainted shacks on **Quaker Head,** the most prominent marks in approaching Cross Island Narrows from westward. There is a Coast Guard station in a small cove at the eastern end. A skeleton tower near it is the most prominent mark from outside. **Storm signals** are displayed from this tower.

Cross Island Narrows is a channel leading into Machias Bay east of Cross Island. This passage is much obstructed by rocks, sunken or awash at various stages of the tide, and should not be used by vessels without local knowledge. Small craft can go through the narrows by the following:

Directions.—Pass on either side of Old Man at a distance of 300 to 500 yards, and then bring it astern on a 276° true (NW. by W. ¾ W. mag.) course, heading for Thornton Point Ledge spindle. Pass 75 yards southward of the spindle and steer 276° true (NW. by W. ¾ W. mag.) for a black buoy and pass close northward of it. Give the point on the northeast side a berth of 200 yards and steer 313° true (NNW. ½ W. mag.) for the middle of Chance Island (wooded on north part), with the summit of Mink Island (thickly wooded) astern, and pass 100 yards northeastward of the black buoy off Quaker Head (low and flat). **Dog Fish Rocks,** between Quaker Head and the buoy, are bare at low water only.

Cross Island Narrows are seldom obstructed by ice in the winter, and for that reason the cove southwestward of Mink Island is much used as a winter anchorage by small fishing boats.

North West Harbor, a bight in the north shore of Cross Island near its western end, has from 4 to 9 fathoms (7.3 to 16.5 m.) of water, but is little used as an anchorage.

Libby Islands, in the middle of the entrance of Machias Bay, consist of two grassy islands connected by a bare ledge. The lighthouse and buildings on the southwest end are the most prominent marks. Several vessels have been lost on the eastern side of the islands in thick weather.

Libby Islands Lighthouse is a white conical granite tower. The light is fixed white, 91 feet (27.7 m.) above the water, and visible 15 miles. It is obscured when bearing about east-northeast (mag.). The fog signal is an air diaphone (blast 2 seconds, silent 13 seconds).

Scabby Islands are described on page 70.

Foster Channel is a narrow passage, marked by two buoys, between Foster Island and Ram Island, and leads from Englishman Bay to the western entrance of Machias Bay. It has a depth of 19 feet (5.8 m.) and can be used by vessels up to 15 feet (4.6 m.) draft when the buoys can be seen. A red buoy at the eastern end of the passage lies 1¼ miles northwestward of Libby Islands Lighthouse. To go through the passage from eastward pass 100 yards southward of the red buoy, steer 279° true (NW. by W. ½ W. mag.), and pass 25 yards northward of the black buoy.

Ram and **Foster Islands** are grass-covered and surrounded by ledges. Foster Island has a shanty at each end, and there is also a shack on Ram Island.

Stone Island is wooded and has a bare rocky face at the south end.

Stone Island Ledge, on the east side, is bare at low water and marked by a spindle.

Starboard Island is grassy at the southwest end and sparsely wooded at the northeast end.

Starboard Cove, on the western side of the bay 2½ miles northward of Libby Islands Lighthouse, is formed on the south by Starboard Island and a bar, bare at half tide, connecting it with the shore. It is an excellent anchorage, except in easterly weather, with 15 to 24 feet (4.6 to 7.3 m.) of water, and is much frequented by coasting vessels making an anchorage for the night if bound through Moosabec Reach. A good berth is in the middle of the cove, with the north end of Starboard Island in line with the south end of Stone Island, in 18 to 21 feet (5.5 to 6.4 m.). Small vessels can anchor closer to the bar, taking care, however, not to shut out the north end of Stone Island by the north end of Starboard Island.

Starboard Cove is entered eastward of Starboard Island, passing on either side of Stone Island. Approaching from westward, bring Libby Islands Lighthouse astern on a 344° true (N. ⅜ E. mag.) course, and pass 250 yards westward of Stone Island and the same distance eastward of Starboard Island. There is a white church with a steeple just northward of Starboard Cove.

Starboard post office is a small settlement on the western side of Starboard Cove. There is a small wharf with a reported depth of 6 feet (1.8 m.). Gasoline and some provisions are obtainable.

Howard Bay, northward of Starboard Cove, is exposed to southeast winds, the holding ground is poor, and it is not a good anchorage. There are no wharves. Broken ground, including a rock bare at low water, extends 5/8 mile southeastward and eastward from Howard Point.

Bucks Harbor is a shallow cove in the west shore of the bay inside of Bar Island and 4 miles north-northeastward of Libby Islands Lighthouse; a small fishing village of the same name is located on the shore of this harbor. Small vessels can anchor 200 yards off the southern side of Bar Island in 8 to 15 feet (2.4 to 4.6 m.). There is an abandoned fish cannery on **Bucks Neck,** with a wharf now in ruins, and another wharf, bare at low water, south of it.

Local fishermen report the existence of a *sunken rock* about 200 yards (NW. 3/4 W. mag.) from Bucks Head. Vessels should keep a mid-channel course in entering.

All of the islands in Machias Bay above the entrance are high and wooded, with rocky shores, and have no distinguishing marks.

Avery Rock, in the middle of Machias Bay, 4 miles above the entrance, is marked by Avery Rock Lighthouse, a white tower on dwelling. The light is fixed red and the fog signal is a bell, 1 stroke every 10 seconds.

Larrabee Cove, largely dry at low water, and **Indian Cove** are small coves in the west shore of the bay, northwest of Avery Rock Lighthouse; these coves are of no importance, but good anchorage for vessels of 8 feet (2.4 m.) draft will be found on the flats between Salt Island and Bare Island, near their entrances. There are small wharves nearly bare at low water in Indian Cove. A rock in the middle, bare at low water, is the principal danger. **Larrabee** is a village and post office at the head of Larrabee Cove.

Holmes Bay, a large bight in the northeastern part of Machias Bay and east of Hog Island, is so shallow that it can not be used as an anchorage, and is seldom entered except by small fishing boats.

Machias River empties into the northwestern part of the bay; it has a narrow, winding channel, leading through flats which are mostly bare at low water. The least depth in the channel up to the town of Machiasport is about 19 feet (5.8 m.). A little below the town of Machias it shoals to 4 feet (1.2 m.) at low water. Machias is at the head of navigation, and about 6 1/2 miles above the mouth of the river.

Machiasport is a village on the west bank of Machias River, 2 1/2 miles above the entrance. It has several fish canneries, and wharves with depths of 6 to 7 feet (1.8 to 2.1 m.). There is water on the wharves. There is but little shipping at Machiasport, and in 1926 there was no hotel at the town.

East Machias River, emptying into Machias River from northeastward 1 mile above Machiasport, is practically bare at low water at East Machias, a village on the railroad 1 1/2 miles above the entrance. Some lumber is shipped from a wharf 1/2 mile above the entrance. Above this point the channel is difficult, and is little used except by small craft.

A highway drawbridge crosses Machias River 1 1/2 miles above Machiasport and 2 1/2 miles below Machias. It has a center pier draw, the north opening 47 feet wide and the south opening 33 feet wide. The best water is in the north opening.

Machias is a town on the railroad at the head of navigation on Machias River. It ships some lumber in small coasting vessels, the deepest draft being about 14 feet (4.3 m.) There is a depth of about 4 feet (1.2 m.) at low water to the lumber wharves. Machias is on the main highway, and good hotel accommodations are available.

Towboats.—There are no towboats on Machias Bay. The nearest one is stationed at Eastport. Local fishing boats equipped with power do all the towing required.

Supplies.—Gasoline and provisions are obtainable at Machiasport and Machias. There is water on the wharves at Machiasport. Coal is obtainable only in case of emergency.

Repairs—There are no marine railways for the repair of hulls. There are machine shops at Machias for ordinary repairs to machinery.

Storm-warning displays of the United States Weather Bureau are made at Machiasport.

Ice.—In severe winters Machias River is closed to navigation, and drift ice will sometimes fill the bay above Avery Rock. In ordinary winters the bay and river are open to Machiasport.

The **currents** follow the general direction of the channel and are not strong except in the river.

Tides.—The mean rise and fall of tides is about 13 feet (4.0 m.).

DIRECTIONS, MACHIAS BAY

From eastward.—Many vessels have been wrecked on the eastern side of Libby Islands in thick weather, through failure to hear the fog signal. Steer for Libby Islands Lighthouse on any bearing northward of 251° true (W. mag.), and when Avery Rock Lighthouse is open from the western end of Cross Island, bearing 342° true (N. ⅛ E. mag.), shape the course to pass about ½ mile eastward of the northern end of Libby Islands. Steer for Avery Rock Lighthouse on a 356° true (N. by E. ⅜ E. mag.) course. Pass westward of the lighthouse, giving it a berth of over 200 yards, and steer 352° true (N. by E. mag.) for the eastern end of Round Island. Anchorage for vessels may be had anywhere between Avery Rock and Round Island, or eastward or northeastward of the latter at a distance not greater than ½ mile, in 5 to 7 fathoms (9.1 to 12.8 m.).

From westward.—Steer for Libby Islands Lighthouse on any bearing northward of 57° true (ENE. ¾ E. mag.) and pass ½ mile northwestward of the lighthouse. Then steer 29° true (NE. ⅜ E. mag.) until Avery Rock Lighthouse bears 356° true (N. by E. ⅜ E. mag.). Then steer for the latter on that bearing, and follow the directions in the preceding paragraph.

Machias River to Machiasport.—The channel in Machias River is marked by buoys at the turns as far as Machiasport, and is easily followed. The best time is at low water, when the flats are visible.

Pass about 200 yards eastward of Round Island and steer 339° true (N. ⅛ W. mag.) for ½ mile to a position 100 yards northeastward of a black buoy, then 295° true (NW. mag.) for ⅜ mile, keeping the next black buoy well on the port bow until ⅛ mile from it, and then hauling westward to pass 100 yards northward of it. From this position, a 274° true (NW. by W. ⅞ W. mag.) course for ⅞ mile will lead to a position southward of a red buoy, and then a 310° true (NNW. ¾ W. mag.) course for ¼ mile will lead to a position

westward of a second red buoy. After passing the buoy, the wharves at Machiasport should be kept a little on the starboard bow for about ¼ mile; then swing slowly eastward and keep the wharves a little on the port bow until in mid-channel abreast them. Small vessels often anchor in the channel for a distance of ½ mile southward of the wharves at Machiasport.

Above Machiasport.—The channel leads between shoals bare at low water on each side, and is unmarked except by private stakes, which are in position only a part of the time. Local knowledge is necessary to carry the best water, but strangers in small craft should have no trouble in going to Machias on a rising tide with the aid of the chart.

ENGLISHMAN AND CHANDLER BAYS

(chart 304) form a large bight in the coast between Libby Islands and Head Harbor Island, with Roque Island and numerous smaller islands in the middle. The bays unite northward of Roque Island and form a good anchorage, with depths of 3¼ to 6 fathoms (6.9 to 11 m.), good holding ground.

Englishman Bay, eastward of Roque Island, has numerous dangers before reaching the anchorage northward of Roque Island, but the channel is marked by buoys, is broad and easily followed in the daytime in clear weather. The principal entrance to the bay from eastward is between Scabby Islands on the east and The Brothers on the west, and affords a straight course to Shoppee Island, above which is the anchorage. The bay may be entered from Machias Bay through Foster Channel. Vessels from westward, bound to the anchorage at the head of Englishman Bay or to Chandler River, usually pass through Chandler Bay. Foster Channel and the adjacent islands are described on page 67.

Scabby Islands, on the eastern side of the main entrance to Englishman Bay, are grass-covered. A mound on the larger Scabby Island is the most prominent mark in approaching Foster Channel from westward.

Scabby Island Ledge, awash at low water, lies 250 yards southwestward of the southwest end of Scabby Island.

Codhead Ledge, 1½ miles northwestward of Scabby Islands, is awash at low water and marked by a red buoy on its western side.

Shag Ledge, ⅞ mile eastward of Codhead Ledge, has a low grass-covered islet on its western end. The northeast end of the ledge is covered only at high water, and the south end shelves off to 13 feet (4 m.).

Pierson Ledge, northward of Shag Ledge, is a rock bare at low water.

Hickey Island, in the entrance of Little Kennebec Bay, has a rock awash at low water 250 yards eastward of it. The northern end of the island is wooded.

Little Kennebec Bay is an anchorage westward of Machias Bay, and makes northward from the eastern part of Englishman Bay; it is of no commercial importance, and is frequented mostly by fishermen. There is good anchorage in 12 to 40 feet (3.7 to 12.2 m.) of water, soft bottom and well sheltered, inside of Sea Wall Point, but it is seldom used, being so near Machias Bay and Starboard Cove, which are much easier of access and better anchorages. There is a small fish wharf at Bare Cove. Chart 303 or 304 is the best guide for entering.

The Brothers, on the western side of the main entrance to Englishman Bay, consist of a string of grassy islands, with rocky shores.

Green Island, northward of The Brothers, is grassy. **Green Island Ledge,** partly bare at low water, extends ¼ mile eastward from the island and is marked by a red buoy. A ledge awash at high water extends 200 yards westward from Green Island.

Pulpit Rock, 1 mile westward of The Brothers, is a bare rocky islet. Its southern and eastern sides should be given a berth of 100 yards.

Halifax Island is grass covered on top, with rocky sides, and has a prominent mound at its western end. The islands westward are partly wooded.

A rock bare at low water lies 350 yards southeastward of the southeast end of Halifax Island. The bottom is uneven between Halifax and Green Islands, and this passage should not be used by vessels of over 17 feet (5.2 m.) draft.

A rock, covered well at high water, lies 350 yards southward of Double Shot Island. **Shag Rock,** lying ¼ mile eastward of Double Shot Island, is high and bare.

Roque Island Harbor is formed on the north and west by Roque Island, and on the south by Great Spruce Island and the islands extending eastward to Halifax Island. It affords shelter from all winds, but is used only by small local vessels. The holding ground is not good except in spots, the entrances to the harbor are generally foul, and it should be avoided by strangers. The best entrance is from eastward, passing north of Halifax Island.

To enter, pass ⅜ mile northward of Halifax Island on a 253° true (W. ¼ N. mag.) course, heading for the south end of Lakeman Island until Halifax Island is passed, and then keep near the middle of the harbor. Or, coming from northward in Englishman Bay, steer 149° true (S. by E. mag.), with the western side of Shoppee Island (wooded) in range with the western side of Pond Cove Island astern, which leads clear between unmarked spots in Englishman Bay to the entrance of the harbor. The best anchorage is in the western or northwestern part of the harbor where the bottom is soft.

The principal dangers in Roque Island Harbor are a spot with 8 feet (2.4 m.) on it lying ¼ mile off the middle of the north side of Great Spruce Island; and Seal Ledge, bare 3 feet (0.9 m.) at low water, lying 300 yards westward of the southern point at the eastern end of Roque Island.

The Thorofare, connecting the southwest side of Roque Island Harbor with Chandler Bay, has a depth of 9 feet (2.7 m.) in a narrow crooked channel.

The bottom is visible in the shoaler parts of the channel. The Thorofare is in constant use by small vessels with local knowledge.

Directions.—To pass through from eastward, enter in mid-channel between a rock on each side, bare a few feet at high water. Keep in mid-channel throughout the passage, except at a point 300 yards inside the eastern entrance, where the northwest side should be slightly favored to avoid a rock on the southeast side, bare at about half tide; and at the western entrance, where the wooded island on the north side should be favored, to avoid a shoal extending 250 yards northward from the point on the south side.

Shoppee Island is flat, and wooded except at the northwest end.

A reef, on the outer end of which are rocks bare at low water only, extends northeastward from Roque Island to within 3/8 mile of Shoppee Island. It is marked by a black buoy at the end.

Roque Bluff is a post village on and eastward of Shoppee Point, on the northeast side of Englishman Bay. There is a wharf, in bad repair, with a depth of about 4 feet (1.2 m.) on the point southeastward of Pond Cove Island. The yellow bluffs at the mouth of **Englishman River** show up prominently from the southward.

Shorey Cove is a bight, with 8 to 13 feet (2.4 to 4 m.) of water, in the north shore of Roque Island. It is a good anchorage for small vessels, but is little used. There are no dangers if the southern and western shores of the cove be given a berth of over 300 yards.

Pond Cove, on the northeast side of Englishman Bay above Shoppee Point, has excellent anchorage westward or northwestward of Pond Cove Island, at a distance not greater than 1/2 mile, in 12 to 18 feet (3.7 to 5.5 m.), soft bottom. The entrance is westward of Pond Cove Island, between it and Little Ram Island, and is clear with the exception of a rock, bare at low water, lying 300 yards northeastward of Little Ram Island. The part of the cove northward of Pond Cove Island is shoal.

Chandler River, at the head of Englishman Bay, is very narrow and crooked to **Jonesboro,** a village at the head of navigation, about 3 1/2 miles above its mouth. The river is bare at low water at Jonesboro. The channel is unmarked, and strangers should not attempt to enter without a pilot. Vessels of 10-foot (3 m.) draft go up to it at high water. Twelve feet (3.7 m.) is the deepest draft entering the river. Provisions can be obtained at Jonesboro. Ice closes the river to its mouth from December to April.

Mason Bay, making westward at the head of Englishman Bay, has an unmarked channel with a depth of 13 feet (4.0 m.) into the entrance from southward, but is practically bare at low water and has many rocks inside the entrance. There is a small settlement on the south side just inside the entrance. Fish traps are numerous in the vicinity.

Chandler Bay is on the west side of Roque Island, and extends northward from Mark Island to Squire Point, the northwestern point of Roque Island, where it joins Englishman Bay. A good channel leads eastward of Ballast Island and around Squire Point into Englishman Bay and Chandler River. The principal dangers in this channel are buoyed, and it can be readily followed in the daytime in clear weather. This bay is the approach from westward to Chandler River and the anchorage in Englishman Bay, and is the one generally used by strangers. There is no anchorage in the bay until north of Roque Island. Vessels of 21-foot (6.4 m.) draft can safely pass up the bay, but the anchorage for vessels of this draft is limited to 1/2 mile square or less.

Black Ledge, a pinnacle bare at low water, lies on the western side of the approach to Chandler Bay from the sea, 1/4 mile eastward of Head Harbor Island.

Breaking Ledge, with 9 feet (2.7 m.) over it, lies 1/2 mile eastward from Head Harbor Island. It is marked by a black can buoy placed 200 yards eastward of the ledge.

Eastern Ledges are about 1/4 mile long east and west and lie 1 1/4 miles eastward (true) from Mark Island. At the easterly end is a rock bare at low water, and at its westerly end are two sunken rocks nearly awash at low water. A rock, covered near high water and nearly always marked by a breaker, lies 5/8 mile east-northeastward of Eastern Ledges.

Great Spruce Ledges lie close to the south side of Great Spruce Island. The southernmost rock is covered at high water.

Little Spruce Ledge, off the southwest side of Little Spruce Island, is partly bare at low water.

Ballast Island, on the western side of the main channel through Chandler Bay, is grassy; a black buoy marks the end of the ledge extending eastward from it.

DIRECTIONS, ENGLISHMAN AND CHANDLER BAYS

The following directions are for a draft of 17 feet (5.2 m.) or less to the anchorage northward of Roque Island. Vessels bound from eastward usually go to the anchorage through Englishman Bay, and if bound from westward usually enter through Chandler Bay. The bottom is rocky and uneven and has not been closely examined, and there are many unmarked shoals. For these reasons, caution is necessary.

Through Englishman Bay.—Pass about midway between The Brothers and Scabby Islands and steer 307° true (NW. by N. mag.) for Shoppee Island (flat, with scattered trees) until nearly up to it, passing well eastward of a black buoy 7/8 mile south-southeastward of Shoppee Island. Pass about 300 yards westward of Shoppee Island and select anchorage above it or in Pond or Shorey Coves.

If entering through Foster Channel (see p. 67), from the black buoy at the western end steer 275° true (NW. by W. 3/4 W. mag.) for 1 7/8 miles to a position 200 yards southward of the red buoy marking Codhead Ledge, then 291° true (NW. 3/8 W. mag.) for 2 1/2 miles, and pass 300 yards westward of Shoppee Island.

Through Chandler Bay.—If entering from eastward, follow the directions on page 40 for approaching the eastern end of Moosabec Reach until northward of Mark Island; or, if bound from westward through Moosabec Reach, follow the directions on page 53 until northward of Mark Island. Then bring the western end of Mark Island astern on a 348° true (N. 3/4 E. mag.) course, and pass about 250 yards eastward of the black buoy eastward of Ballast Island and the same distance westward of Roque Island Ledge red buoy. From this buoy, steer 38° true (NE. by E. 1/8 E. mag.) for Little Ram Island, and pass about 250 yards southeastward of Great Bar black buoy. Select anchorage anywhere northward of Roque Island or in Pond or Shorey Coves, taking care to avoid the shoal on the western side northward of Great Bar.

CHANDLER BAY TO PLEASANT BAY

Moosabec Reach.—This thoroughfare (chart 304) is the narrow passage west of Chandler Bay, leading between the mainland on the north, and the group of islands between Chandler Bay and Pleasant Bay on the south. Mark Island, heavily wooded, is the prominent guide to the eastern entrance, and Nash Island Lighthouse to the western entrance. This passage is an important thoroughfare and is

much used by vessels of 12 feet (3.7 m.) or less draft in the daytime; a draft of 23 feet (7 m.) can be taken through at high water. Sailing vessels of over 12-foot (3.7 m.) draft are advised to take a pilot. The eastern entrance has been straightened and dredged to a width of 300 feet and a depth of 14 feet (4.3 m.). It is well buoyed and can readily be followed in the daytime in clear weather, but strangers should not attempt to pass through at night.

Pilots can sometimes be had at the eastern entrance by sending to Kelley Point, and at the western entrance by sending to either Cape Split Harbor or Tabbott Narrows, or from local fishing boats. The channel westward of the dredged channel has a least width of 300 yards in several places before reaching Tabbott Narrows, but it is straight, and the most prominent dangers are marked by buoys or spindles. Vessels headed off by the wind or caught in a fog while passing through the Reach anchor anywhere in the channel where the bottom is soft. Ice obstructs navigation during January and February. The mean rise and fall of tides is 11½ feet (3.5 m.).

Directions from eastward and westward are given on pages 40 and 53. Approaching from southward, steer for the eastern end of Mark Island on a 304° true (NW. ¾ N. mag.) course, which will lead between Breaking Ledge and the dangers near Eastern Ledges, and pass eastward and northward of Mark Island, giving it a berth of over 200 yards.

Jonesport is a fishing town on the north shore of Moosabec Reach, about 2 miles westward of Kelley Point. There is telephone communication and a highway to points east and west. The depths at the ends of the cannery and steamer wharves are about 15 feet (4.6 m.) at low water. On approaching the town the two brick stacks of the fish factories are prominent. Gasoline and provisions are available, and there are machine shops where repairs to gasoline engines can be made. There is no regular steamer service, but considerable quantities of lobsters and fish are shipped. There are no hotel accommodations available at Jonesport.

The **Tidal Currents** have considerable velocity in the dredged channel, particularly at the light on the stone jetty which extends northwestward from Nova Rocks. The current floods to the eastward and ebbs to the westward.

Beal Island, on the south side of the Moosabec Reach opposite Jonesport, has a village (**Beal post office**) at its northern end. The main wharf, on the north side, has a depth of 8 feet (2.4 m.) at the end; the wharves in a cove on the west side are bare at low water.

Indian River and **West River,** making northward at the western end of Moosabec Reach, have crooked unmarked channels fringed by rocks, and are frequented only by local fishermen. There are no landings except for small craft at high water.

The following is a description of the islands adjacent to the usual route bound westward from Moosabec Reach through Tabbott Narrows. **Pomp Island** is grassy and has a single clump of trees. **Hardwood Island** is wooded, and has a house on the north end and a quarry on the south end. A 13-foot (4 m.) shoal is reported to exist in mid-channel between this island and Fessenden Ledge. **Shabbit Island Ledge** has a small spot bare at high water. **Shabbit Island** is low and wooded in the center. **Sheep Island,** on the

northwest side of Tabbott Narrows, is grassy, and **Ram Island,** on the southeast side, is wooded.

Islands and channels south of Moosabec Reach (chart 304).—Lying between Chandler Bay and Pleasant Bay and extending about 5 miles southward from Moosabec Reach is a group of islands, which, though of no commercial importance, form several prominent landmarks for vessels passing along the coast. The passages between these islands lead to several small and sheltered anchorages, of which Mistake Harbor is the only one available for strangers on account of numerous unmarked rocks and ledges.

Head Harbor is between Head Harbor Island, the easternmost of the group, and Steel Harbor Island, and is a sheltered anchorage with depths of 15 to 21 feet (4.6 to 6.4 m.). The harbor is small and has unmarked rocks bare at low water on both sides of the entrance and anchorage. Strangers should not enter without a pilot. The rocks of **Man Island,** the eastern side of the entrance, are dark, and those on the western side are light in color. There is a small settlement on **Crow Point,** at the western end of Head Harbor, and another farther northward, on the western end of **Head Harbor Island.**

Mistake Harbor.—This harbor, on the northwest side of Steel Harbor Island, is small, but affords a secure anchorage with depths of 4 to 7 fathoms (7.3 to 12.8 m.). It is entered from southward through Main Channel Way, a deep but narrow channel leading between **Steel Harbor Island** on the east and **Mistake** and **Knight Islands** on the west. With care the harbor may also be entered by vessels through Mud Hole Channel; vessels delayed by a head wind in Mistake Harbor sometimes beat out through the Mud Hole Channel. The black buoy in the middle of Mistake Harbor marks a rock bare at low water only.

Green Island is the largest of the islands and rocks extending northwestward along the south side of Mistake Harbor. The northernmost rock of the group is bare at low water and lies 350 yards northward of Green Island and 200 yards northwestward of the outer bare rocks northeastward of the island. At the northwestern end of the group are two sunken rocks with 4 feet (1.2 m.) over them, which lie 300 yards northwestward of the outer bare rock lying 300 yards northwestward of the island.

Moose Peak Lighthouse, on the southwest side at the entrance to Main Channel Way, is a white tower connected with a white dwelling. The light is flashing white (flash 4 seconds, eclipse 26 seconds), 72 feet (21.9 m.) above the water, and visible 14 miles.

Eastern Bay lies between Head Harbor and Great Wass Islands northward of Mistake Harbor; a thorough local knowledge is required for its navigation.

Mud Hole Channel is ½ mile westward of Moose Peak Lighthouse and leads northwestward to the Mud Hole, a narrow cove in Great Wass Island used by boats which enter at high water and lie aground at low water. There is good anchorage for a small vessel at the entrance to Sand Cove and Mud Hole, in 14 to 30 feet (4.3 to 9.1 m.), soft bottom.

On the southwest side of Mud Hole Channel and extending nearly 1 mile in a southeasterly direction from Little Cape Point, Great

Wass Island, is a group of rocks and ledges called **Black Ledges,** many of which are bare at half tide. **Channel Rock,** the southeasternmost of the Black Ledges, is awash at high water and lies 600 yards northeastward of **Freeman Rock,** a bare rock about 40 feet (12.2 m.) high.

The principal dangers on the northeast side of Mud Hole Channel are a rock, bare at low water, lying 150 yards off the southwest side of the island on the northeast side, at the entrance, and a sunken rock lying 350 yards westward of Green Island and 250 yards southward of the bare rock northwestward of the island.

Directions, Mistake Harbor.—Give the south end of Steel Harbor Island a berth of about ¼ mile when southeastward of it and enter in mid-channel, about 400 yards eastward of Moose Peak Lighthouse, on a 301° true (NW. ½ N. mag.) course. When through the narrowest part of the channel select anchorage between the northwest end of Knight Island and the black buoy ½ mile northwestward of it, in 4 to 7 fathoms (7.3 to 12.8 m.).

To leave by Mud Hole Channel.—From Mistake Harbor steer 287° true (NW. ¾ W. mag.) for the southwest side of Minx Island in range with the high bluff on the south side of Sand Cove North, and pass about midway between the outer bare rock northeastward of Green Island and the black buoy northward. Pass 200 to 400 yards southeastward of Minx Island and steer 181° true (S. by W. ⅞ W. mag.), with eastern end of Minx Island in range with the northwestern end of Head Harbor Island astern. When a little over ¼ mile westward of the outer bare rock northwestward of Green Island steer 123° true (SE. ¾ S. mag.), pass about ¼ mile southwestward of the rock, and pass about midway between Water Island and Channel Rock to sea.

Western Bay, lying westward of Great Wass Island, has numerous groups of islands which lie generally in a north and south direction. Between the groups are passages that lead to the western end of Moosabec Reach and are used by vessels with local knowledge. There is a small settlement on the western side of Great Wass Island in the vicinity of the Coast Guard station, in a cove locally known as **Blackduck Cove.**

The passage between Great Wass Island and Crumple Island has numerous unmarked sunken rocks and is also obstructed by a line of ledges and rocks extending from Browney Island to Great Wass Island. There is a narrow channel with a depth of about 11 feet (3.4 m.) through these ledges. This passage should not be used by a stranger.

Crumple Island is a high, bare, rocky island with several nubbles; on its summit is a flagstaff and lookout house. Fisherman and Browney Islands lie northwestward of Crumple Island, with rocks and ledges between. **Egg Rock,** a bare, rocky islet, lies 1½ miles westward of Crumple Island, with numerous rocks and ledges between. **Western Egg Rock** is a small, bare, rocky islet about ½ mile northward of Egg Rock. **Seahorse Rock** is bare at half tide and lies ⅜ mile westward of Egg Rock. It is marked by a red bell buoy placed southwest of the rock.

The passage between Seahorse Rock, Western Egg Rock, and Ram Island on the east, and the Sand and Drisco Islands on the west, has a broad channel in its southern part, although there are

unmarked dangers on either side. The northern end of the passage, on either side of Hardwood Island, is foul, and the passage should not be used by strangers.

The passage westward of the Sand and Drisco Islands and Shabbit Island and eastward of Black Rock, Flat Island, and Plummer Island is comparatively clear. There is also a comparatively clear passage westward of Black Rock, Flat Island, and Green Island and eastward of Cone Island. Both passages can be used by vessels in the daytime and clear weather with the assistance of the chart.

Sand and **Outer Sand Islands** are partly wooded. The **Drisco Islands, Stevens,** and **Plummer Islands** are wooded. **Flat** and **Green Islands** are comparatively low and covered with grass. The highest parts of **Stanley Ledge** (¼ mile southward of Outer Sand Island) and **Batson Ledge** (⅜ mile eastward of Sand Island) show above high water. **Black Rock** is a low, bare rock lying 1¼ miles south-southwestward of Flat Island and 2⅛ miles south-southeastward of Nash Island lighthouse.

Cape Split Harbor, lying 2 miles northeastward of Nash Island lighthouse, is a secure anchorage for small vessels, and with the aid of the buoys is easily entered in the daytime. The harbor has extensive flats and ledges, between which is a channel 200 yards or more wide. The anchorage with best swinging room is ⅜ to ½ mile inside the entrance, from abreast a red buoy to just above a black buoy, in 3 to 4 fathoms (5.5 to 7.3 m.); and vessels of less than 9-foot (2.7 m.) draft can anchor in the entrance of the cove on the eastern side opposite the black buoy, in 9 to 15 feet (2.7 to 4.6 m.). The flats are soft mud in places, and small vessels are sometimes beached on them. A reef, which shows well at low water, extends 400 yards southward and southwestward from the eastern point at the entrance, and is marked on its western side by a red buoy. There is a landing and small settlement on the bay; some motor-boat supplies are obtainable.

The approach to Cape Split Harbor between Sheep Island and The Ladle is clear if these islands be given a berth of over 300 yards. From westward the approach is clear between the spindle southward of Norton Island and the Pot Rocks. Enter the harbor midway between the red and black buoys at the entrance on a 12° true (NNE. ¾ E. mag.) course.

PLEASANT, NARRAGUAGUS, AND PIGEON HILL BAYS

(chart 305) indent the shore between Nash Island Lighthouse on the east and Petit Manan Lighthouse on the west, and form the approach to the villages of Addison, Harrington, Millbridge, and Cherryfield, all on tributaries of the bays. They are frequented mostly by local fishing boats and a few lumber schooners. The bays are separated by islands and rocks, through which several thoroughfares lead.

Pleasant Bay.—This bay is a secure anchorage and is easily entered in the daytime. There are numerous islands and ledges in the bay, but the important dangers are marked by buoys. The entrance is marked by Nash Island Lighthouse. A channel in no place less than ½ mile wide, with depths of 6 fathoms (11 m.) or more, leads up the bay to an anchorage in 5 to 6 fathoms (9.1 to 11 m.) westward of Night Cap Island and southward of Barton Ledge.

The best and most frequently used anchorage is southeastward and eastward of Birch Islands, in 14 to 18 feet (4.3 to 5.5 m.).

Cone and **Nash Islands,** on the eastern side of the entrance to Pleasant Bay, are grassy. A ledge, the southern end of which shows bare, extends about 500 yards southward from Nash Island.

Nash Island Lighthouse is a white square tower connected with dwelling. The light is fixed red, 51 feet (15.5 m.) above the water, and visible 9 miles. The fog signal is a bell (1 stroke, silent 20 seconds; 2 strokes, silent 20 seconds).

The Ladle, ¾ mile southwestward of the entrance to Cape Split Harbor, has a bare symmetrical mound at its northern end.

Pot Rock and **Big Pot,** westward of The Ladle, are bare rocks.

Flint Island, on the west side at the entrance of Pleasant Bay, is sparsely wooded. The southeastern side should be given a berth of at least ½ mile.

Coles Ledge, ¼ mile eastward of Flint Island, is bare near low water and marked on its eastern side by a black buoy.

Flint Island Narrows is a deep passage leading from Pleasant Bay to Narraguagus Bay, between Flint and Dyer Islands. It is used principally by steamers, and is not recommended for sailing vessels on account of ledges which make out from the southern shore of Dyer Island and contract the channel to a width of about 200 yards. A black buoy is placed on the northern edge of the ledges making off from the northeastern side of Flint Island and marks the eastern entrance to the Narrows. The course through the Narrows is 232° true (WSW. ¼ W. mag.), passing 50 yards northwestward of the black buoy and about 150 yards off the northwest sides of Flint and Shipstern Islands.

Norton Island is grassy. **Norton Island Ledge,** ¼ mile westward of Norton Island, is bare in spots at high water. The reef extending ¼ mile southward from the west end of Norton Island is partly bare at high water, and marked by a spindle at the end.

Narrows Island Ledge is bare at half tide.

Pleasant River, emptying into the head of Pleasant Bay from northeastward, can be approached on either side of Birch Islands, the channel eastward of them having a depth of 16 feet (4.9 m.) and that westward 17 feet (5.2 m.). For a distance of about 2 miles up the river to Wass Point, the channel, with a depth of over 12 feet (3.7 m.) narrows gradually from 400 to 200 yards, and affords good anchorage in 3 to 6 fathoms (5.5 to 11.0 m.). Above Wass Point the channel is narrow and crooked, with a least depth of 5 feet (1.5 m.) at one place just below Addison Point, and is suitable only for small craft, except with local knowledge. Above this the river is navigable at high water to Columbia Falls, about 10 miles above its mouth.

The channel is partially marked by buoys and easily followed with the aid of the chart to Wass Point. For about 1 mile above to White Point, the channel is bordered by ledges, bare at various stages of the tide, and marked by beacons and sometimes by local bush stakes, but is difficult to follow. From White Point to Addison Point, there are shoals on either side bare at low water; the channel is unmarked, but is most easily followed at low water or on a rising tide. The river above Addison Point is unmarked and difficult. Pilots for the

river can usually be obtained from local fishing boats. Ice obstructs navigation from December to April.

Nightcap Island, on the east side at the entrance to Pleasant River, is grassy, with a few bushes on the north side. **Nightcap Ledge,** extending southward from the island, is bare at the inner end at half tide.

Barton Ledge, 3/8 mile northward of Nightcap Island, is bare at low water and marked by a horizontally striped buoy.

Bunker Ledge, 1/4 mile westward of the southern Birch Island, is bare at half tide, and marked on its eastern side by a black buoy.

Birch Islands are wooded. **Raspberry** and **Mink Islands,** northward of Birch Islands, are grassy. **Fort Island** is marked by a shanty.

Addison, a village about 5 miles above the mouth of Pleasant River, has a little trade. Vessels of 12 feet (3.7 m.) draft can go up at high water as far as this; there is from 2 to 4 feet (0.6 to 1.2 m.) of water alongside the wharves. Just above Addison Point the river is crossed by a highway bridge (width of draw 36 feet). The village of **Columbia Falls** is 5 miles above and has railroad communication.

Harrington Bay is separated from the upper part of Pleasant Bay on the east by **Ripley Neck,** and from Narraguagus Bay on the west by **Foster Island.** The bay extends 2½ miles in a northerly direction from Strout Island to Chamberly Island, where it is met by Harrington River from northeastward and by Flat Bay and Mill River from northwestward. It has a depth in the channel of 4¾ fathoms (8.7 m.), and good anchorage in 5 to 7 fathoms (9.1 to 12.8 m.), but is seldom used except by local vessels.

Flat Bay and **Mill River** are mostly bare at low water, and seldom used except by an occasional wood schooner.

Harrington River has a narrow, crooked unmarked channel, with a depth of 2 feet (0.6 m.) at low water to the town of **Harrington,** at the head of navigation on Harrington River about 4 miles above its mouth. The greatest draft taken up to the town is 12 feet (3.7 m.); the usual draft is 6 to 10 feet (1.8 to 3 m.). There is 2 feet (0.6 m.) alongside the wharves at low water. The town has railroad communication. Ice forms in the river and bay between December and April as far down as Ripley Neck.

Strout Island, in the middle of the entrance of Harrington Bay, is sparsely wooded. **Strout Island Ledges,** southeastward of Strout Island, are covered at high water; the south end is bare at low water and marked by a red buoy. A rock awash at low water and marked by a red buoy lies 1/4 mile eastward of the south end of Strout Island Ledges. **Shag Islet** is a low, bare rock.

Dyer Island Narrows, the passage between Dyer Island and Foster Island, has a depth of 9 feet (2.7 m.) at low water, and connects Harrington Bay with Narraguagus Bay. This passage is buoyed, but is not suitable for sailing vessels on account of the sharp turns and narrowness of the channel. There are numerous dangers close to the channel, and the buoys must be closely followed.

To go through Dyer Island Narrows, pass about 50 yards southwestward of the red and black buoy lying 300 yards westward of the northern end of Strout Island, steer 321° true (N. by W. ¾ W. mag.), and pass 50 yards northward of the next black buoy. Haul sharply

southwestward around this buoy, leaving it about 50 yards on the port hand, and steer 209° true (SW. ¼ W. mag.) to a position 100 yards westward of another black buoy. Then steer 235° true (WSW. ⅝ W. mag.), and pass close northward of the black buoy at the western end.

Narraguagus Bay.—This bay lies north-northeastward of Petit Manan and northwestward of Nash Island. The lower part of the bay is a well sheltered anchorage, much used as a harbor of refuge in all seasons by vessels up to 18-foot (5.5 m.) draft. The principal dangers in the channels are buoyed, and the lighthouses on Nash Island, Petit Manan, and Pond Island (Narraguagus light) are guides for the entrance. It is connected with Pleasant Bay by Flint Island Narrows, and with Harrington Bay by Dyer Island Narrows, both previously described.

Jerry Ledge, off the southeast end of Bois Bubert Island, is bare at low water.

Jordans Delight Ledge, in the middle of the entrance to Narraguagus Bay, has a rock at its southwest end, bare at low water and marked by a spindle.

Black Ledge, at the northeast end of Jordans Delight Ledge, is bare at half tide. The ground in this vicinity is very broken and should not be crossed by vessels.

Mackerel Rock, an unmarked rock with 10 feet (3.0 m.) over it, lies 1¼ miles, 111° true (SE. ½ E. mag.) from Narraguagus Lighthouse, and ⅝ mile northeastward of Black Ledge, in range with the latter and Petit Manan Lighthouse.

Jordans Delight is a rocky island, sparsely wooded on top.

Pond Island shows from southward as a bare conical hill 160 feet (49 m.) high, and is marked on its eastern side by Narraguagus Lighthouse.

Narraguagus Lighthouse is a white tower connected with dwelling. The light is fixed white, 54 feet (16.5 m.) above the water, and visible 11 miles. During fog, a bell is struck by hand in answer to signals.

Douglas Islands are wooded.

Douglas Island Harbor lies north of the Douglas Islands (wooded) and west of Pond Island. It has anchorage in 4 to 6 fathoms (7.3 to 11 m.), but is seldom used, the anchorage above Trafton Island being better. Considerable sea makes into the harbor in heavy southerly weather. The harbor is clear except at its southwest end, where **Douglas Island Ledges,** partly bare at low water, extend 350 yards northwestward from the middle Douglas Island. The dangers in the southern part of the harbor will be avoided by keeping the summit of Pond Island bearing southward of 94° true (ESE. mag.).

Entering Douglas Island Harbor northward of Pond Island, pass northward and at least ¼ mile westward of the black buoy on the end of the ledge which extends nearly ⅜ mile northward from Pond Island. The harbor may also be entered from southward between the islands, the best channel being between the wooded island near the southwest end of Pond Island on the east, and the eastern one of the three Douglas Islands and the bare rock 250 yards southward from it on the west. Entering by this passage, avoid two rocks, bare

at low water, which lie 125 yards southwestward of the wooded islet lying 250 yards off the middle of the west side of Pond Island.

A narrow channel, said to have a depth of at least 8 feet (2.4 m.) at low water, but bordered by rocks sunken and awash, on either side, leads from Douglas Island Harbor into the head of Pigeon Hill Bay. It is sometimes marked by bush stakes, but local knowledge is necessary to carry the best water. The best water leads about 75 yards northward of Currant Island (wooded in the center) and then about 283° true (NW. by W. ⅛ W. mag.) with the highest point of Pond Island astern, until into the main channel of Pigeon Hill Bay.

Shipstern Island, on the eastern side, at the entrance of Narraguagus Bay, is high, round, and wooded, and has rocky bluffs on its south side.

Western Reef, extending ⅜ mile southward from Tommy Island, has a bare rock on its southern end, and is marked by a red buoy.

Tommy Island is low and sparsely wooded.

Trafton Island is wooded. There is a good channel on either side.

Trafton Island Ledge, in the middle of the entrance to the cove on the north side of Trafton Island, is a bare rock.

Halftide Ledge, ⅝ mile northward of Trafton Island, is partly bare at low water and marked by a spindle near its northern end.

Wyman is a small settlement of fishermen on the western side 1¾ miles northward of Trafton Island. A fish cannery and wharf is located here; gasoline and some provisions are obtainable.

Narraguagus River, emptying into Narraguagus Bay from northward, has a least depth of about 4 feet (1.2 m.) to Millbridge, 2 miles above the mouth at Wyman. The channel is narrow, crooked, and leads between flats on each side bare at low water. It is partially marked, but local knowledge is necessary to carry the best water. Strangers should navigate it on a rising tide.

Millbridge is a small town on the west side of the Narraguagus River near its mouth. There is no shipping at Millbridge, and in 1926 both wharves were in ruins. The river is crossed by a fixed highway bridge at the town. There is some lobstering and fishing out of Millbridge. Gasoline and some provisions can be obtained.

Narraguagus River between Millbridge and Cherryfield, a distance of about 4 miles, is bare at low water throughout most of its length, and the deepest draft using it is about 5 feet (1.5 m.) at high water and with local knowledge.

Cherryfield has railroad communication. Its principal industry is lumber.

Pigeon Hill Bay.—This bay, having its entrance on the eastern side of Petit Manan Bar and northward of Petit Manan Lighthouse, is easy of access by day, and affords good anchorage in 12 to 24 feet (3.7 to 7.3 m.), but is seldom used except by local fishermen. The channel is unmarked except at the entrance. There is a small settlement, and a wharf, bare at low water, on the west side near the Carryingplace. A watch tower on the western side is visible above the trees in all directions.

Whale Ledge, on the east side at the entrance to Pigeon Hill Bay, is bare at half tide. A red buoy marks a 13-foot (4.0 m.) spot 300 yards southward of it.

Egg Rock shows at low water as a large ledge of dark bowlders, with several high parts which are always out of water. There is a narrow channel between Egg Rock and **Bois Bubert Island,** but a stranger should not attempt it.

Gull Rocks are a large ledge, bare at half tide, making off ¼ mile from the shore of Bois Bubert Island about 1⅜ miles northward of Egg Rock. These rocks are avoided by keeping in mid-channel.

Pigeon Hill, the high, bare-topped hill on the western shore near the head of the bay, is conspicuous, and a landmark for some distance at sea.

The thoroughfare connecting the head of Pigeon Hill Bay with Douglas Island Harbor is described on page 81.

In entering Pigeon Hill Bay, having made the red buoy on the east side of the entrance, a 349° true (N. ¾ E. mag.) course with Pigeon Hill ahead and Petit Manan Lighthouse astern, will lead ¼ mile westward of the red buoy, and clear of all dangers until inside the bay. Follow a mid-channel course in the bay, and anchor above Gull Rocks in 3 to 4 fathoms (5.5 to 7.3 m.), soft bottom. Small vessels anchor on the west side off the Carrying place.

Petit Manan Bar connects Petit Manan Island with Petit Manan Point on the mainland; it is composed of ledges and large bowlders, between which is a channel, marked by a perpendicularly striped buoy, which may be used by vessels of 8 feet (2.4 m.) draft at low water when the sea is smooth. The sea breaks along the whole length of the bar with a swell or in heavy weather, and the tidal currents set over it with considerable velocity, the flood northeastward, the ebb southwestward; sailing vessels are cautioned not to approach the bar in a light breeze.

The buoy marking the channel across Petit Manan Bar is 1¼ miles north-northwestward of Petit Manan Lighthouse and 1 mile south-southeastward of the end of Petit Manan Point. The buoy can be left close to on either side.

Another channel across the bar, ⅜ mile southeastward of **Petit Manan Point,** is used by small local boats at all stages of the tide, but it is unmarked and difficult, and should not be attempted by strangers.

Petit Manan Island is low and bare, and marked by the lighthouse and several buildings.

Petit Manan Lighthouse is a gray granite tower. The light is fixed white, with a white flash of 6 seconds duration every 2 minutes, 123 feet (37 m.) above the water, and visible 17 miles. The fog signal is an air whistle (blast 3 seconds, silent 27 seconds).

Supplies.—Gasoline and provisions are obtainable at all of the towns and villages on the rivers at the head, but Wyman and Millbridge are the only places convenient to the bays where supplies are obtainable.

Repairs.—There are no facilities for repairs.

Pilots are not necessary to enter the bays. Local fishermen can usually be found to pilot vessels up to the towns on the tributaries.

Ice.—From December to April ice usually forms on Pleasant River and Harrington River to their mouths, and very frequently on Harrington Bay. Ice seldom obstructs navigation in Narraguagus River

except in January and February, during which time the river is usually frozen to the mouth.

Anchorages.—The usual anchorage for vessels seeking shelter in Narraguagus Bay is between Trafton Island and Lower Middle Ground buoy, in 21 feet (6.4 m.), soft bottom; vessels of 10-foot (3 m.) draft or less sometimes anchor in 14 to 17 feet (4.3 to 5.2 m.) north of Trafton Island, about midway between it and the spindle on Halftide Ledge. Vessels bound up to Millbridge anchor in 14 to 16 feet (4.3 to 4.9 m.) about ½ mile east of Wyman, the wharf bearing about 274° true (WNW. mag.). Good anchorage in 24 feet (7.3 m.), soft bottom, will be found about ⅜ mile northeastward of the spindle on Halftide Ledge.

Vessels also anchor in Pleasant Bay in 5 to 6 fathoms (9.1 to 11 m.) westward of Nightcap Island and southward of Barton Ledge; the best and most frequently used anchorage for small vessels in Pleasant Bay is southeastward and eastward of Birch Islands, in 14 to 18 feet (4.3 to 5.5 m.).

Tides.—The mean rise and fall of tides is 11 feet (3.4 m.) at Nash Island, 12 feet (3.7 m.) at Addison Point and 11 feet (3.4 m.) at Millbridge.

DIRECTIONS, PLEASANT AND NARRAGUAGUS BAYS

This locality is very rocky and broken, and has not been examined by means of a wire drag. Vessels should therefore avoid all rocky and broken areas, as there is no certainty that all of the shoals are charted, or that the least depth on those charted has been found.

Pleasant Bay.—Vessels entering Pleasant Bay from eastward, southward of the islands between Chandler and Pleasant Bays, can pass ¼ mile southward of Seahorse Rock bell buoy, and steer 277° true (NW. by W. ⅝ W. mag.) for 3¼ miles to a position ⅜ mile southwestward of Black Rock, and then 316° true (NNW. ¼ W. mag.) for 2¼ miles to a position ⅜ mile west-southwestward of Nash Island Lighthouse.

Then steer 338° true (N. ¼ W. mag.) for nearly 2 miles, passing ⅜ mile eastward of Cole Ledge buoy and to a position ⅜ mile westward of Norton Island Ledge. Then steer 12° true (NNE. ¾ E. mag.) for the eastern end of Birch Islands in range with Tumbledown Dick Head, and pass 250 yards westward of Nightcap Island. Anchor anywhere eastward or southeastward of the south end of Birch Islands, in 14 to 18 feet (4.3 to 5.5 m.), soft bottom.

Entering from Tabbott Narrows, steer 267° true (WNW. ½ W. mag.) with the south end of Ram Island astern, and pass nearly ¼ mile northward of The Ladle and the same distance southward of the spindle on the end of the ledge extending southward from Norton Island. Pass southward and westward of Norton Island Ledge at a distance of about ¼ mile, steer 12° true (NNE. ¾ E. mag.), and proceed as directed in the preceding paragraph.

Entering from westward, from the perpendicularly striped bell buoy 1 mile southward of Petit Manan Lighthouse, steer 32° true (NE. ½ E. mag.) for 8 miles to a position ½ mile northwestward of Nash Island Lighthouse Then steer 338° true (N. ¼ W. mag.) and proceed as directed in entering from eastward. The 32° true (NE.

½ E. mag.) course leads ⅜ mile southeastward of **Jo Leighton Ground**, a rocky area with a least found depth of 15 feet (4.6 m.). Vessels should exercise care not to be set upon it.

Harrington Bay.—Follow the directions for entering Pleasant Bay, until 1 mile north-northwestward of Nash Island Lighthouse, and then steer 319° true (NNW. mag.) with the lighthouse astern, and pass midway between Otter Island and Strout Island. Follow the western side of Strout Island at a distance of about 200 yards and pass about 100 yards eastward of the red and black spar buoy. Then steer about 1° true (N. by E. ¾ E. mag.), pass 125 yards westward of Shag Islet, and then follow the eastern shore at a distance of about 300 yards. Anchor anywhere in the channel on the eastern side of the bay.

Narraguagus Bay.—In entering from eastward, southward of the islands between Chandler Bay and Pleasant Bay, pass ¼ mile southward of Seahorse Rock bell buoy, and steer 277° true (NW. by W. ⅝ W. mag.) for 3¼ miles to a position ⅜ mile southwestward of Black Rock, then steer 300° true (NW. ⅜ N. mag.) for the southwest end of Trafton Island until ⅜ mile west-southwestward of Shipstern Island. Then haul westward and pass southward and westward of Trafton Island at a distance of about 300 yards, and steer 356° true (N. by E. ⅜ E. mag.). The depth will shoal gradually from 5 fathoms (9.1 m.) abreast Trafton Island to 15 feet (4.6 m.) about 1¾ miles above its southwest end, and anchorage can be selected in any depth desired.

Or, to pass eastward of Trafton Island, steer for its southwest end on a 300° true (NW. ⅜ N. mag.) course until ¼ mile southwestward of Western Reef red buoy. Then steer 353° true (N. by E. mag.) and pass about 400 yards westward of the buoy, and midway between Trafton and Tommy Islands. Pass 200 to 300 yards eastward of Trafton Islands and steer 336° true (N. ⅜ W. mag.). The depth will shoal gradually from 6 fathoms (11 m.) abreast Trafton Island to 15 feet (4.6 m.) 1¼ miles northward of it, and anchorage can be selected in any depth desired.

In entering from Moosabec Reach vessels can pass ¼ mile northward of Cone Island, at least ¼ mile southward of Flint Island and Shipstern Island, and proceed as directed in the preceding paragraphs.

From westward.—From the perpendicularly striped bell buoy 1 mile southward of Petit Manan Lighthouse, steer 13° true (NNE. ⅞ E. mag.), pass about ⅝ mile southeastward of Bois Bubert Island, about 400 yards westward of Jordans Delight, the same distance eastward of Narraguagus Lighthouse and about 200 yards eastward of the black buoy northeastward of the lighthouse. Then steer 336° true (N. ½ W. mag.) to a position 300 yards westward of Trafton Island, and then steer 356° true (N. by E. ¼ E. mag.) to the anchorage. Or, to pass eastward of Trafton Island, from a position 200 yards eastward of the black buoy 400 yards northeastward of Narraguagus Lighthouse, steer 10° true (NNE. ⅝ E. mag.) and pass midway between Trafton and Tommy Islands. Pass 200 to 300 yards eastward of Trafton Island and steer 336° true (N. ⅜ W. mag.).

COAST FROM PETIT MANAN TO FRENCHMAN BAY

The bight inclosed between Petit Manan Bar and Schoodic Peninsula is the approach to Dyer and Gouldsboro Bays and Prospect Harbor. Prospect Harbor is the most important village, although Gouldsboro and Steuben can be reached by small craft at high water. These waters are frequented only by local fishermen and a few lumber schooners. There are many rocks in the approach and tributaries, not closely examined, and vessels should use caution when crossing broken areas where the charted depth does not considerably exceed the draft.

Moulton Ledge, off the entrance to Dyer and Gouldsboro Bays, 3 miles west-northwestward of Petit Manan Lighthouse, is bare at low water, and is marked by a red and black buoy placed southwest of the ledge. There are several other unmarked ledges and broken ground in this vicinity, and it should be avoided by vessels.

Dyer Bay (chart 305), the entrance to which lies 3 miles northwestward of Petit Manan Lighthouse, has excellent anchorage in 4 to 7 fathoms (7.3 to 12.8 m.), but it is unmarked and seldom used except by small local vessels. Petit Manan Point, on the eastern side of the bay, has a large watch tower which forms a prominent mark. A group of islands and rocks, with narrow, deep passages between them, extends from westward across the entrance of Gouldsboro Bay and part way across Dyer Bay entrance, leaving a good passage nearly ½ mile wide between the easternmost bare ledge, The Castle, and Petit Manan Point. One mile above The Castle the channel is contracted to a width of 250 yards by rocks and ledges, which extend out from both shores and have a depth of 9 to 11 feet (2.7 to 3.4 m.) over them. Above this the channel widens to ½ mile, and contracts gradually to ¼ mile westward of **Sheep Island.** The least depth in the channel is 3¼ fathoms (6.3 m.), but a stranger should not attempt to enter at low water with a vessel of more than 9-foot (2.7 m.) draft. There are no commercial wharves.

Pinkham Bay, at the head of Dyer Bay, is full of rocks and ledges; a narrow, crooked channel with a depth of 8 feet (2.4 m.) at low water leads for some distance toward its head, which runs dry at low water.

Dyer Harbor, north of Sheep Island and west of Good Point, is shallow; the upper part is dry at low water.

Carryingplace Cove makes southeastward, north of Sheep Island; the head of this cove is nearly all dry at low water and is 300 yards from Pigeon Hill Bay.

The **tidal currents** are strong in the entrance of Dyer Bay, but follow the general direction of the channel except near Dyer Point, where they set in and out of Gouldsboro Bay.

The Castle, Bonnychess Ledge, and **Little Ledge** are bare ledges, without distinguishing marks.

Yellowbirch Head, on the east side, ⅞ mile northeastward of The Castle, is a high, bare bluff. The channel at this point and for ⅜ mile above is contracted to a width of about 300 yards by unmarked ledges on either side, having least found depths of about 9 feet. (2.7 m.). The best water is about in mid-channel.

Directions, Dyer Bay, entering from eastward.—From the perpendicularly striped bell buoy 1 mile southward of Petit Manan

Lighthouse, steer 315° true (NNW. ⅜ W. mag.) for 3¼ miles until the south end of Petit Manan Point is ⅝ mile distant and in range with Egg Rock, bearing 60° true (E. by N. mag.). Then steer 351° true (N. ⅞ E. mag.) and pass 250 yards eastward of The Castle. Then bring it astern on a 359° true (N. by E. ⅝ E. mag.) course, heading to pass in mid-channel westward of Sheep Island. Select anchorage near the middle of the bay when over 1¼ miles above The Castle, in 4 to 7 fathoms (7.3 to 12.8 m.), but do not go over ¼ mile above Sheep Island.

Entering from westward.—From the whistling buoy off Schoodic Island, steer 46° true (NE. by E. ¾ E. mag.) for 7 miles, passing ⅜ mile southeastward of Little Black Ledge, ⅝ mile northwestward of Stone Horse Ledge, and to a position ⅜ mile southward of The Castle. Pass about 250 yards eastward of The Castle and proceed as directed in the preceding paragraph.

Gouldsboro Bay.—This bay (chart 305) lies 4 miles northwestward of Petit Manan Lighthouse and 6 miles northeastward of Schoodic Island. It forms an excellent anchorage in 2 to 9 fathoms (3.7 to 16.5 m.). It is the approach to the villages of Gouldsboro and Steuben, 6½ and 7 miles, respectively, above the entrance, but the approaches to these villages are unmarked and can be navigated only by small craft at high water, and are little used. Ice obstructs navigation in the bay from December to March. In severe winters the bay is closed to the entrance.

Sally Islands, a chain of small islands and ledges, extend across the entrance; through the chain are two navigable channels known as Eastern Way and Western Passage. When approaching from westward, care must be taken not to mistake the passages, the islands being difficult to recognize. Inside the islands, the bay is free from outlying dangers and the water shoals gradually toward its head.

Eastern Way, or Ship Channel, leads into the bay between Eastern Island (wooded on top) and Bald Rock (a bare rock); it is about 350 yards wide between the 18-foot (5.5 m.) curves, and has a spot with 24 feet (7.3 m.) over it about 200 yards west of Eastern Island. This channel has the strongest tidal currents, and when the current is running ebb sailing vessels can enter only with a strong favorable breeze. The currents set diagonally across the channel.

Western Passage leads into the bay between Sally Island (rocky, with grass on top) and Sheep Island (thickly wooded in center). It is about 200 yards wide between the 12-foot (3.7 m.) curves and leads close along the eastern side of Sheep Island westward of ledges bare at half tide; the least depth in the channel is 18½ feet (5.7 m.). The tidal currents run true with the channel and have a velocity of 2 to 3 knots at strength.

There is a passage from Dyer Bay to Gouldsboro Bay north of Sally Islands. It is obstructed by rocks, partly bare at low water only, which extend 300 yards southward and southwestward from the southern end of Dyer Neck, and by a shelving ledge which extends 250 yards northeastward from Eastern Island. The channel where narrowest, abreast Eastern Island, is 250 yards wide, and the range of the northwest sides of Bald Rock and Sheep Island, bearing 240° true (W. by S. mag.), leads through the middle of it.

Point Francis, on the western shore, 3½ miles above the entrance, is high and wooded, and is prominent from the lower end of the bay.

Joy Bay, a shallow body of water 1½ miles long, with a narrow, crooked channel to the village of Steuben, makes northward from Gouldsboro Bay at Rogers Point; it separates into two coves at its head; the eastern one is **Steuben Harbor** and the western **Joy Cove. Steuben** can be reached at high water by vessels of 7 to 8 feet (2.1 to 2.4 m.) draft; the channel is nearly bare at low water, and is unmarked and seldom used.

Gouldsboro Harbor is a large shallow arm with numerous ledges at its entrance, making into the northwestern part of Gouldsboro Bay and extending about 2½ miles to the village of Gouldsboro, which is of no commercial importance. The harbor has a narrow, crooked, unmarked channel, nearly dry at low water, and is seldom used.

Directions, Gouldsboro Bay.—A depth of 4 fathoms (7.3 m.) can be carried into the bay through the Eastern Way, and 18 feet (5.5 m.) through the Western Passage. The tidal currents have a velocity of 2 to 3 knots at strength through these passages, and in Eastern Way they set diagonally.

From eastward, entering through Eastern Way.—From the perpendicularly striped bell buoy southward of Petit Manan Lighthouse steer 312° true (NNW. ⅝ W. mag.) a little over 4 miles; the tidal currents set across this course with considerable velocity, the flood northeastward and ebb southwestward. Continue nearly this course and pass midway between Eastern Island and Bald Rock. When inside the islands steer a little more northward and stand up the middle of the bay; the water shoals gradually toward the head, and anchorage can be had anywhere between the entrance and Point Francis by giving the shores a berth of 500 yards.

From eastward, through Western Passage.—From the perpendicularly striped bell buoy southward of Petit Manan Lighthouse steer 305° true (NW. ¾ N. mag.) for the northeastern side of Sheep Island. Pass about 100 yards off the eastern side of the island, steer 343° true (N. ⅛ E. mag.) and stand up the middle of the bay.

From westward, entering through Eastern Way.—From the whistling buoy off Schoodic Island steer 46° true (NE. by E. ¾ E. mag.) for 4¼ miles, passing ⅜ mile southeastward of Little Black Ledge and for ½ mile beyond, until Cranberry Point is in line with Prospect Harbor Lighthouse. Then steer 29° true (NE. ¼ E. mag.) for the eastern end of Eastern Island until about ¼ mile from the island. Then steer about 342° true (N. mag.) and pass about midway between Eastern Island and Bald Rock. Then steer more northwestward to avoid the rocks, bare at low water only, lying 300 yards off the southwest side of the south end of Dyer Neck, and then stand up the middle of the bay.

From westward, through Western Passage.—From the whistling buoy off Schoodic Island steer 46° true (NE. by E. ¾ E. mag.), and continue the course for 1 mile after Cranberry Point is in range with Prospect Harbor Lighthouse. Then steer 343° true (N. ⅛ E. mag.), keep the eastern side of Sheep Island aboard, distant about 100 yards, to clear the ledges which extend 450 yards westward of Sally Island, and stand up the middle of the bay.

Indian Harbor is a small cove between Gouldsboro Bay and Prospect Harbor, inside a group of grassy islands. It has depths of 10 feet (3.0 m.) in the entrance and 3 to 5 feet (0.9 to 1.5 m.) at the

head. The best water leads westward of Western Island, and then favors the northeast side of Indian Harbor to the head. Small craft enter from Gouldsboro Bay, inside of all the islands, but strangers should not attempt this passage.

Corea is a post village of fishermen at the head of Indian Harbor. The wharf is bare at low water. A church and a group of houses are prominent for a considerable distance offshore. There is a store here, where supplies in limited quantities can be obtained.

Prospect Harbor.—This harbor (chart 305), 3 miles northeastward of Schoodic Island and 6 miles northwestward of Petit Manan Lighthouse, is the approach to the village of Prospect Harbor. The outer harbor has ample depth and affords anchorage for the largest vessels, exposed to southerly winds. It is easily entered, but seldom used.

The ledges off the entrance to Prospect Harbor divide the approach into two channels; both are clear and deep if the ledges between them be avoided.

Little Black Ledge and **Big Black Ledge** show at high water, and **Old Man** and **Old Woman** are partly bare at low water. The latter is marked by a red buoy at its southwest end.

Sand Cove, the eastern branch at the head of Prospect Harbor, has ample depth until near the head, but is seldom used.

Inner Harbor, the western branch at the head, is marked on the eastern side by Prospect Harbor Lighthouse (fixed red with white sectors), and on the western side by Clark Ledges spindle. It has a depth of 2 to 5 fathoms (3.7 to 9.1 m.) just inside, sheltered from all but southeast winds, and is extensively used by small local vessels. The anchorage is on the southwest side in soft bottom, about 200 yards northward of a line joining Clark Ledges spindle and the fish factory on Clark Point.

Prospect Harbor is a village of fishermen on Inner Harbor. The depth is 18 feet (5.5 m.) at the cannery wharf on Clark Point, and about 5 feet (1.5 m.) at the wharves just inside Clark Point. The wharf at the head is bare before low water. Gasoline and provisions are obtainable.

Birch Harbor, on the western side of Prospect Harbor, 1½ miles above the entrance, has a depth of 6 feet (1.8 m.) for ½ mile, and shoals rapidly above. There is a small settlement of fishermen near the head; the landings are bare at low water. The channel is unmarked and difficult. The best water in entering favors the southwest side to avoid **Roaring Bull,** a rock bare at extreme low water.

Bunker Harbor, on the west side of Prospect Harbor, just inside the entrance, has a small settlement of fishermen at the head. The landings are bare at low water. The entrance is obstructed by ledges. The outer one is **Bunker Ledge,** partly bare at low water only and marked at its eastern end by a black buoy. Inside of this are ledges awash at high water. The channels are unmarked and the one southward of the ledges in the entrance is said to be the best.

Directions, Prospect Harbor.—Entering from eastward, from a position midway between the perpendicularly striped bell buoy southward of Petit Manan Lighthouse and the red buoy ⅝ mile northward, a 285° true (NW. by W. mag.) course for 5½ miles will lead about midway between Moulton Ledge buoy and Stone Horse Ledge, and to the red bell buoy off the eastern point at the entrance to

Prospect Harbor. Continue the course until ¼ mile northwestward of the buoy, and then steer for Prospect Harbor Lighthouse on a 322° true (N. by W. ¾ W. mag.) course until off the entrance to Inner Harbor. Then steer 286° true (NW. ⅞ W. mag.) into the inner harbor, passing 150 yards northward of the spindle. Anchorage can be selected eastward or northeastward of the fish factory.

Entering from westward, vessels can pass ⅜ mile eastward of Schoodic Island and then steer 10° true (NNE. ½ E. mag.) for 3 miles, passing midway between Bunker Ledge and Old Woman buoys, and continue the course for 1 mile beyond to a position a little over ¼ mile off the western shore; then a 349° true (N. ⅝ E. mag.) course, heading for Prospect Harbor Lighthouse, will lead eastward of a black buoy and to the spindle. The course into the inner harbor is then 286° true (NW. ⅞ W. mag.) as described in the preceding paragraph.

Schoodic Harbor (chart 306), between Prospect Harbor and Frenchman Bay, has ample depth but is exposed to the sea and never used as an anchorage. There are no wharves. There are several islands and ledges in the entrance.

Schoodic Island is low and partly wooded on the south end. The north end is grassy. It is bordered by extensive ledges.

Schoodic Ledge, northward of Schoodic Island, is covered near high water and breakers are always visible. The channel between Schoodic Island and Schoodic Ledge is marked by a buoy on either side. It has ample depth and is generally used by small local vessels and motor boats, bound along the coast.

Middle Ledge is bare at about half tide.

The island in Schoodic Harbor northward of Schoodic Ledge has a few trees in the center.

Arey Cove, 1 mile westward of Schoodic Island, is exposed to a heavy sea and never used. There are no distinguishing marks.

FRENCHMAN BAY

(chart 306) lies westward of Schoodic Peninsula and eastward of Mount Desert Island. It is the approach to the towns and important summer resorts of Bar Harbor, Winter Harbor, South West Harbor, North East Harbor, and many smaller villages. The bay is frequented by passenger steamers, yachts, small pleasure craft, and fishing vessels and a few cargo vessels. The bay proper is about 10 miles long and has an average width of about 4 miles. Halfway toward its head is a group of islands extending across the bay, between which are two good channels leading to the upper part. Vessels of the largest size and deepest draft can find an anchorage, and navigation is not difficult for strangers.

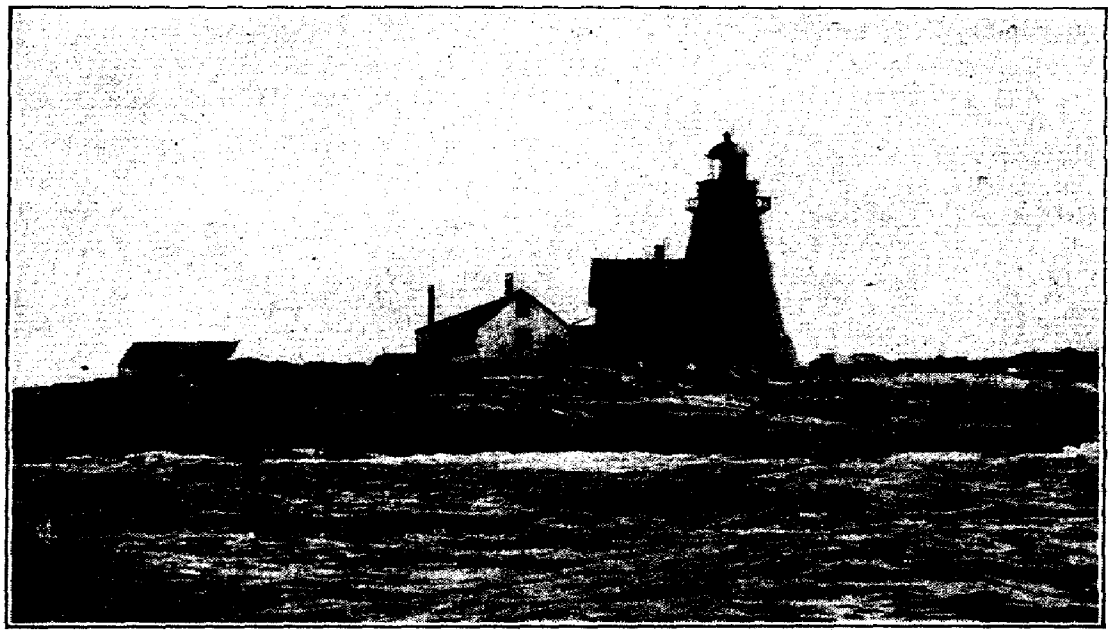
The principal entrance is from southward, between Schoodic Peninsula and Baker Island, but small vessels can enter from southwestward through Western Way. Small vessels may also enter the head of Frenchman Bay at high water through Mount Desert Narrows.

Prominent objects.—The principal guides to the entrance of Frenchman Bay from the sea are Mount Desert (Rock) Lighthouse, Great Duck Island Lighthouse, Baker Island Lighthouse, Winter

Harbor Lighthouse, and Egg Rock Lighthouse. **Mount Desert Island** is mountainous, the highest on the coast of Maine. **Cadillac Mountain,** the highest point, is 1,532 feet (467 m.) above the sea, and is visible in clear weather between 35 and 45 miles. There are several others nearly as high. **Schoodic Mountain,** near the eastern entrance to the bay, is 437 feet (133 m.) high and the most prominent mark on the eastern side.

Mount Desert Rock, 17½ miles southward of Mount Desert Island and 11½ miles outside the nearest island, is a rocky islet about 20 feet (6.1 m.) high, with a lighthouse on the top.

Mount Desert Lighthouse is a gray conical tower. The light is flashing white (flash 2 seconds, eclipse 13 seconds), 75 feet (22.9 m.) above the water, and visible 14 miles. The fog signal is a reed



Mount Desert Rock Lighthouse

horn, sounding a group of three blasts every 60 seconds (each blast 5 seconds, silent 25 seconds).

Anchorage.—Winter Harbor is a good anchorage, and is frequently used by vessels entering for shelter; it is usually open throughout the winter. Bar Harbor is partially protected, except against heavy southeasterly winds, but has poor holding ground except near the head of the harbor. Large vessels sometimes anchor northward or northwestward of Bar Island. Stave Island Harbor is a good anchorage, but is seldom used except by local boats. South West Harbor is a well-sheltered and frequently used anchorage.

Pilots.—No licensed pilots are available and none are needed to enter. Local fishermen can usually be obtained as pilots for the tributaries.

Supplies.—Gasoline and provisions are obtainable at all of the towns and villages. Water from the wharves and coal in limited quantities can usually be obtained at Bar Harbor and Winter Harbor.

Repairs.—There are no facilities for repairs to hulls. There are machine shops for minor repairs to machinery at Bar Harbor.

Ice.—During the winter, navigation is practically closed by ice above Porcupine Islands. Steamers usually run all winter but have considerable trouble with ice. Winter Harbor is said to be always open, and is the only harbor of refuge available in winter.

Tides.—The mean rise and fall of tides varies from 10.3 feet (3.1 m.) at the entrance to 10.6 feet (3.2 m.) at the head.

Communication.—Mount Desert Ferry is the terminus of a railroad, and has frequent steamer communication with Bar Harbor. There is steamer communication between Bar Harbor and all of the towns on the bay and with practically all towns westward along the coast as far as Rockland. There are good automobile roads on Mount Desert Island, and there is a highway bridge at the Narrows connecting with the mainland.

DIRECTIONS, FRENCHMAN BAY

The bay is rocky, but the water is deep and generally free from dangers except near the shores. The main part of the bay, from a little southward of Egg Rock Lighthouse to the entrances of Skilling River, Sullivan River, and Eastern Bay, including the channels between Jordan and Long Porcupine Islands, and between Burnt Porcupine and Sheep Porcupine Islands, has been examined by means of a wire drag.

The tributaries, with the exception of the main part of Winter Harbor and the channels northward and southward of Sutton Island, have not been examined by means of a wire drag, and vessels navigating them should proceed with caution when crossing areas where the charted depth does not considerably exceed the draft.

The following directions are good for vessels of the deepest draft, and lead to Eastern Bay at the head of Frenchman Bay. General directions for entering the harbors and arms of Frenchman Bay are given in the description of the tributaries following.

From eastward.—From the whistling buoy off Schoodic Island, steer 296° true (NW. mag.) for Egg Rock Lighthouse for 3¼ miles until ¼ mile southwestward of a red bell buoy and Winter Harbor Lighthouse is in line with the southern end of Turtle Island. Then steer 313° true (NNW. ½ W. mag.) for 4 miles, with the east side of Sheep Porcupine Island ahead, passing ½ mile northeastward of Egg Rock Lighthouse, to a position 300 to 500 yards eastward of Round Porcupine Island.

Or, from the whistling buoy off Schoodic Island, steer 284° true (NW. by W. ⅛ W. mag.) for 4¾ miles to Egg Rock whistling buoy. Continue the course about ⅜ mile past the buoy, and then steer 342° true (N. mag.) to a position 300 yards eastward of Round Porcupine Island.

From a position 300 yards eastward of Round Porcupine Island, steer 329° true (N. by W. ⅛ W. mag.), pass midway between Burnt Porcupine and Sheep Porcupine Islands, and when 1½ miles northward of them pass ¼ mile eastward of Bald Rock black buoy. Then steer 300° true (NW. ⅜ N. mag.) for 2 miles, and pass ¼ mile

northeastward of Sunken Ledge buoy. When about ¼ mile past this buoy and Sands Point bears 252° true (W. mag.), steer 266° true (WNW. ¾ W. mag.), pass about ¼ mile northward of Sands Point, and pass southward of the red buoy marking Googin Ledge, giving it a berth of over 100 yards.

From westward.—From the whistling buoy 1⅛ miles south-southeastward of Baker Island Lighthouse, steer 13° true (NNE. ⅞ E. mag.) for 6¼ miles, heading for Egg Rock Lighthouse. When Egg Rock whistling buoy is ½ mile distant ahead and Great Head bears 266° true (WNW. ¾ W. mag.), steer 341° true (N. mag.) for 3¾ miles, with the west side of Burnt Porcupine Island ahead, to a position 300 yards eastward of Round Porcupine Island. Then follow the directions preceding.

Or, having come from westward through the passage northward of Sutton Island, as described under the directions for South West Harbor on page 103, pass about 200 yards southward of Seal Harbor gas buoy and steer 58° true (ENE. ⅞ E. mag.) for 2½ miles, following the shore of Mount Desert Island at a distance of ¼ mile. When 200 yards southward of Otter Cliff Ledge bell buoy, steer 21° true (NE. ½ N. mag.) for 1¾ miles, passing about 400 yards southeastward of Great Head, to a position 200 yards eastward of Schooner Ledge black buoy. Then steer 353° true (N. by E. mag.) for 3¼ miles to a position 300 to 500 yards eastward of Round Porcupine Island. Then follow the directions preceding.

WINTER HARBOR

(chart 317), on the eastern side of Frenchman Bay, just inside the entrance, is a frequently used harbor of refuge, with good anchorage in 5 to 9 fathoms (9.1 to 16.5 m.), good holding ground. It is comparatively free from dangers, and although open southward, a heavy sea never enters. Ice seldom interferes with navigation. The principal entrance from southward is deep and free from dangers. Winter Harbor Lighthouse is the principal guide. It can also be entered from northward, close along the western side of Grindstone Neck. The dangers along this channel are marked, but it is used only by local vessels of 12-foot (3.7 m.) or less draft; the aids are colored for vessels bound north; that is, northbound vessels will find black buoys on the port side.

Turtle Island, on the western side of the entrance, is wooded. **Turtle Island Ledge,** bare at half tide, extends ¼ mile off the southwest side of the island.

Mark Island is grassy and marked by **Winter Harbor Lighthouse,** a white tower connected with dwelling.

Of the islands northward of Turtle and Mark Islands, **Ned** and **Heron Islands** are partly wooded, **Spectacle Island** has a house and a few trees, and the others are grassy or bare rocks. All are surrounded by extensive ledges, bare at various stages of the tide.

Grindstone Neck, forming the west side of Winter Harbor, is wooded, but has many cottages and hotels visible. A standpipe on the highest point is prominent. The wharf on the west side 1 mile above the south end is in ruins.

Grindstone Ledge, extending 400 yards southward from Grindstone Neck, is bare at half tide and marked by a spindle. There is a red buoy a little southward of the end of the ledge.

Sand Cove, on the northwest side, at the head of Winter Harbor, is the usual and best anchorage. The wharf on the western side has a depth of 14 feet (4.3 m.) at the end, but was in bad repair in 1926. A yacht club and landing on the west side of the cove are prominent.

Winter Harbor is a town on the two coves at the head of Winter Harbor. **Winter Harbor Cove,** the westerly of the two coves, is the most frequently used anchorage for local fishing boats, and is generally fully occupied. The wharves are bare at low water. A spindle and red buoy mark a ledge on the north side at the entrance; the mid-channel is clear inside. Gasoline and provisions are obtainable.

The automobile ferry between Bar Harbor and Winter Harbor lands at **Hammond Cove.**

Directions, Winter Harbor.—The entrance to Winter Harbor from southward is deep and clear. Vessels can steer for Winter Harbor Lighthouse on any course between 339° true (N. ¼ W. mag.) and 21° true (NE. ½ N. mag.). They should pass at least 300 yards eastward of the lighthouse and steer north-northeastward for ¾ mile until inside the harbor, and then more northward, following the western shore into the middle of Sand Cove. Anchorage can be selected in the cove according to draft. If bound to the village, the north-northeasterly course from 300 yards off Winter Harbor Lighthouse can be continued until between the red and the black buoys at the entrance to the coves at the head. Then haul westward, pass southward of the red buoy on the north side at the entrance to the inner harbor, and enter in midchannel.

To enter Winter Harbor from northward, westward of Grindstone Neck, pass midway between the black buoy off Crow Island and the old wharf northeastward, and follow the western shore of Grindstone Neck southward at a distance of 150 yards for ¾ mile to a black buoy, and at a distance of 75 yards while passing eastward of the black buoy and a spindle just southward of it. After passing the spindle follow the shore at a distance of 100 yards for 200 yards, then steer 121° true (SE. ⅜ S. mag.) and pass close southward of a red buoy. When well past the buoy, vessels can haul northward into Winter Harbor and follow the directions preceding.

FRENCHMAN BAY, EAST SIDE, WINTER HARBOR TO SULLIVAN HARBOR

Egg Rock, in the middle of Frenchman Bay, is low and grassy and marked by **Egg Rock Lighthouse,** a white square tower on a dwelling. Ledges, bare at various stages of the tide, extend ¼ mile northeastward and ⅜ mile southwestward of the lighthouse. The light is flashing red with a reed horn fog signal.

Ironbound Island, the largest of the islands in Frenchman Bay, is thickly wooded and has no prominent marks.

Cod Ledges, eastward of Ironbound Island, have a least found depth of 19 feet (5.8 m.), but have not been closely examined and probably have less. Vessels should pass eastward of the black buoy marking them.

Halibut Hole, the passage between the north end of Ironbound Island and Jordan Island, is deep and clear with the exception of a rock on the northeast side, 200 yards off the shore of Jordan Island, with a least found depth of 17 feet (5.2 m.), not closely examined. The channel is southward of the rock. The western entrance to Halibut Hole is marked on the south side by a black gas buoy.

Stave Island Harbor.—This is an excellent harbor of refuge on the eastern shore of Frenchman Bay, formed by the mainland on the east, **Stave Island** on the north, and **Jordan Island** on the south; the anchorage has a depth of 3½ to 6 fathoms (6.4 to 11 m.), soft bottom, and is sheltered from all winds. It is considerably used as an anchorage by local fishing craft.

The buildings and wharf of the fish factory located in the northeastern part of the harbor are prominent. The automobile ferry from Bar Harbor lands in Hammond Cove.

South Gouldsboro is a village on the northeastern shore of Stave Island Harbor. There is a long cannery wharf with a depth of about 11 feet (3.4 m.) at the end. The other wharves are nearly bare at low water. Gasoline and some provisions are obtainable.

Summer Harbor is the local name given to a small settlement in the southeast end. The harbor is clear with the exception of a rock with 7 feet (2.1 m.) over it lying 200 to 400 yards from shore in its southeast part. The north end of the harbor eastward of Stave Island is shoal. There is a narrow channel into the harbor from southward over **Jordan Island Bar,** which is used only by small local craft; the channel has a depth of about 4 feet (1.2 m.) and lies 100 yards off Jordan Island.

The main entrance to Stave Island Harbor is between Stave and Jordan Islands. There is a rock with 4¼ fathoms (7.6 m.) on it nearly midway between Jordan and Stave Islands, the deeper channel lying southward of it. **Yellow Island,** lying 200 yards westward from the north end of Jordan Island, is named from the color of its rocks and is wooded. To enter, pass 200 to 300 yards northward of Yellow Island on a 72° true (E. mag.) course. Approaching Stave Island Harbor from southward there is a broad, clear channel between Ironbound and Long Porcupine Islands, and the approach northward of the Porcupine Islands is also clear. There is no navigation from Stave Island Harbor to Flanders Bay inside of Stave Island, except for small craft at high water.

Flanders Bay.—This bay is on the northeast side of Frenchman Bay, inside Stave and Calf Islands. It is an excellent anchorage, but is little used except by small craft. It forms the approach to the villages of West Gouldsboro and East Sullivan. The bay can be entered across Stave Island Bar between Calf and Stave Islands, or around the north end of Calf Island. The latter has the best water, but the former is more direct, and is generally used.

Hall Point, on Ash Neck, is marked by a prominent white residence.

Calf Island is wooded except on the south end, which is low and bare. A house and barn on the southeast side is visible from southward.

Little Calf Island and Thrumcap are partly wooded islands on the extensive shoal extending southward from Calf Island.

Calf Island Bar, connecting Calf and Stave Islands, has a depth of 9 to 11 feet (2.7 to 3.4 m.) in a buoyed channel, and can be used by vessels of 8 feet (2.4 m.) draft at low water.

An extensive chain of bare and sunken ledges extends through the middle of Flanders Bay from the north end to near the south end. The southerly ledge is bare at half tide and marked by a black buoy off its south end. The opening between the south end of **Long Ledge** (partly bare at high water) and the ledge with 5 feet (1.5 m.) over it southward, has a least found depth of 19 feet (5.8 m.) and was marked in 1926 by private barrel buoys on each side.

West Gouldsboro is a village at the head of the southeasterly tributary of Flanders Bay. There is a depth of 4 feet (1.2 m.) to within ¼ mile of the village, above which the channel is bare at low water to the landing. The channel is unmarked and difficult, and seldom used even by local boats.

East Sullivan is a village at the northern end of Flanders Bay. The wharf is bare at low water and boats seldom go to it.

To enter across Calf Island Bar, give the western shore of Stave Island a berth of ¼ mile and steer 19° true (NE. ¾ N. mag.) for the bar buoys, passing ⅜ mile southeastward of the Thrumcap. Pass the black buoy and the red buoy on the bar close-to, and from the latter steer 61° true (E. ⅞ N. mag.) for Halftide Ledge black buoy. Pass about 100 yards southward and eastward of it and steer 344° true (N. ¼ E. mag.) for the prominent house on Hall Point until about ⅜ mile from it. Then steer 308° true (NW. by N. mag.), pass midway between Hall Point and a black buoy, and follow the shore of Ash Neck at a distance of 300 yards. Anchor ¼ mile to ⅜ mile northwestward of Ash Point, in 3 to 4 fathoms (4.9 to 7.3 m.).

The entrance to Flanders Bay between Preble and Calf Islands is clear and deep. Enter in mid-channel, and follow the shore of Calf Island, giving it a berth of 200 yards. When northeastward of the island, steer 111° true (SE. ½ E. mag.) and pass 100 yards southward of Halftide Ledge black buoy. Round the buoy at this distance and proceed as directed in the preceding paragraph.

Eastern Point Harbor is a sheltered anchorage for small craft on the north side of the eastern end of Preble Island. The head of the harbor is shallow, and is separated from Sorrento Harbor by a partly dry reef.

Sorrento Harbor is a small anchorage, used by small pleasure craft in summer, on the north side of Frenchman Bay north of Preble and Dram Islands. The entrance from southward favors Dram Island slightly, and is narrowed by reefs bare at low water, which extend 100 yards from Preble Island and 50 yards from Dram Island. The entrance from westward is narrowed by a reef, partly showing at high water, which extends 175 yards from the north side. The best water is found 100 yards north of Dram Island on a 91° true (ESE. ¼ E. mag.) course.

Sorrento is a summer resort on the north side of Sorrento Harbor. It has several summer hotels. The steamer which connects with the railroad at Mount Desert Ferry makes regular calls at Sorrento. There is a float landing maintained in the summer season. There is a depth of about 11 feet (3.4 m.) at the steamer wharf.

SULLIVAN HARBOR

(chart 306) is an arm of Frenchman Bay making northward from the north end. It forms the approach to Hancock Point, Mount Desert Ferry, Sullivan, and Franklin. It is used by the regular steamers as far as Sullivan, and by vessels up to 13 feet (4 m.) carrying stone from the quarries above Sullivan. The least depth to the falls just above Sullivan is about 20 feet (6.1 m.).

Bean Ledge, eastward of Bean Island, shows at high water.

Bean Island, in the middle of the entrance to Sullivan Harbor, is grassy and has a few trees on its east end. The generally used channel leads westward of it.

Crabtree Ledge, on the west side at the entrance to Sullivan Harbor is marked by a lighthouse (white tower on black pier).

Hancock Point is a steamer landing on the western side of Sullivan Harbor westward of Crabtree Ledge Lighthouse.

Mount Desert Ferry, on the west side of Sullivan Harbor, 1½ miles above the entrance, is the terminus of a railroad, and has steamer communication with Bar Harbor and the other towns on Frenchman Bay. The wharf has a depth of about 12 feet (3.7 m.) at its end.

Sullivan is a small village on the north side of Sullivan Harbor, 3½ miles above the entrance. There is a depth of about 15 feet (4.6 m.) at the steamer wharf, but there is a ledge with a depth of 10 feet (3 m.) 100 yards southward of it.

Sullivan Falls, the contracted section of the river, ½ mile above Sullivan, is said to have a depth of about 7 feet (2.1 m.) at low water, but is obstructed by ledges and the tidal currents are dangerous. Vessels using it go in and out at high water slack.

An electric power line is carried across the river at the falls by means of two high towers.

A highway bridge crosses the river about ½ mile above the falls. There is a swing span with a horizontal clearance of 82 feet 10 inches. At the date of this volume the regulations governing the opening of this bridge had not been promulgated.

West Sullivan, on the north side just above the falls, has several quarries at which vessels load to 13 feet (4 m.).

Taunton Bay is the name given to the expanded section of Sullivan River, 6 miles above the entrance. An unmarked channel with a depth of about 8 feet (2.4 m.) leads through it to near the head, but the bay outside this channel is bare, or nearly so, at low water.

Franklin, a town on the railroad at the head of Taunton Bay, has several quarries at which vessels load to a draft of 12 feet (3.7 m.) at high water.

Ice obstructs navigation in Sullivan River during January, February, and March.

Tides.—The mean rise and fall of tides is about 10½ feet (3.1 m.) below the falls and about 6½ feet (1.9 m.) above. The tidal currents through the falls are dangerous at strength. Highwater slack is 1⅓ hours and low water slack 1¾ hours later in the falls than below them.

Directions, Sullivan Harbor and Taunton Bay.—The main entrance to Sullivan Harbor is between Bean Island and Crabtree Ledge Lighthouse. Vessels can also enter by the buoyed channel

eastward of Bean Island, but this channel is seldom used. The channel from the entrance to Sullivan has ledges bare and submerged on either side but has ample depth and is well marked.

Approaching Sullivan Harbor from southward, when in mid-channel between Burnt Porcupine and Sheep Porcupine Islands, steer 343° true (N. ⅛ E. mag.) for 4½ miles and pass between Crabtree Ledge Lighthouse and Bean Island; the former should be given a berth of 100 yards, and the western end of Bean Island a berth of over 200 yards. Then steer 15° true (NE. by N. mag.) with Crabtree Ledge Lighthouse astern, and pass westward of a red spar buoy, and to a mid-channel position between the two spindles above Mount Desert Ferry. Then steer 21° true (NE. ½ N. mag.) to a position 125 yards eastward from Moon Ledge black buoy. Then steer more northward and anchor, favoring the northern shore, in 3½ to 7 fathoms (6.4 to 12.8 m.) off the town of Sullivan. The water shoals abruptly on both sides of the channel throughout the harbor.

Navigation through the falls just above Sullivan is safe at slack water only. Vessels sometimes go in on the flood tide but always come out at high water slack. The channel is unmarked above Sullivan, has dangerous ledges on either side, and is unsafe except with local knowledge.

Pilots can usually be obtained near the entrance.

FRENCHMAN BAY, SULLIVAN HARBOR TO MOUNT DESERT NARROWS

Skilling River (chart 306) is an arm of the northern part of Frenchman Bay westward of Sullivan Harbor. The entrance is 1⅝ miles wide between Crabtree Point on the east and Meadow Point on the west, but it contracts rapidly to a width of 400 yards 1¾ miles above Crabtree Point. Above this the river leads about 4 miles in a northwesterly direction to the post village of North Hancock.

The channel is narrow and crooked and has numerous rocks and ledges, making its navigation difficult. Strangers wishing to enter the river with vessels should get a pilot at Bar Harbor, or anchor 1½ miles above Crabtree Point in 5 to 7 fathoms (9.1 to 12.8 m.), and get a pilot from South Hancock. The river is unmarked, and is seldom used except by local fishing craft. The wharves are generally small and bare at low water. Strangers in small craft can enter with the aid of the chart.

South Hancock, Hancock, and **North Hancock** are villages along the main road, some distance from the bay, and have little business by water.

Eastern Bay forms, with Mount Desert Narrows, a thoroughfare from the head of Frenchman Bay to Blue Hill Bay, north of Mount Desert Island. It is generally deep and clear in mid-channel to the entrance of Mount Desert Narrows, except for **Googin Ledge,** nearly ½ mile long, bare in the center at low water and marked on the southwest side by a red buoy. The channel leads southward of it.

The naval coaling plant situated on the north side of Eastern Bay is now abandoned, and the hoists were being dismantled in 1926.

Lamoine Beach is the name of a settlement in this vicinity.

There is good anchorage for deep-draft vessels between Googin Ledge and a position northwestward of the coaling station in 6 to 9 fathoms (11.0 to 16.5 m.). There is also good anchorage about ¼

mile from shore off the entrance of **Salisbury** and **Emery Coves,** in 7 to 8 fathoms (12.8 to 14.6 m.). At **Hadley Point,** Eastern Bay merges into Mount Desert Narrows, and **Berry Cove** makes into the northern shore. There is good anchorage in 3 to 4 fathoms (4.9 to 7.3 m.) off the entrance to this cove, which is shallow at its head.

Jordan River, making northward just west of Berry Cove, has a narrow, crooked channel with 5 feet (1.5 m.) at low water up to Lamoine. Strangers should take a pilot at Berry Cove (**East Lamoine**); the channel is not marked so as to be followed, except by persons well acquainted with the locality. **Lamoine** is a town on the east bank of the river just above the entrance; a draft of 15 feet (4.6 m.) can be taken up to it; the wharves are dry at low water and there is little business.

Mount Desert Narrows (chart 307) connects the head of Frenchman Bay with the head of Blue Hill Bay northward of Mount Desert Island. It is crossed by a highway drawbridge having two openings 36 feet wide; the north opening is generally used.

The channel is bare at low water and is used at high water by boats up to 9-foot (2.7 m.) draft. It is narrow and difficult and is fringed with reefs. The most difficult part was marked in 1926 by small private buoys.

Strangers should not attempt to use it with a greater draft than 4 or 5 feet (1.2 or 1.5 m.), and should go through on a rising tide. The mean rise and fall of tides is 10½ feet (3.2 m.), and high water occurs at about the same time as at Eastport and Bar Harbor. The flood current sets westward and ebbs eastward.

Directions.—The following remarks may be of use to strangers in going through the Narrows: Having passed through Eastern Bay, pass at least 200 yards northward of Hadley Point and steer westward for 1⅛ miles with the steel tower at the north end of the bridge ahead, until 250 yards northward of the north end of Thomas Island (wooded). Then swing a little northward and head for Trap Rock (low bare islet) showing a little to the right of the northerly steel tower for ⅜ mile until 400 yards from Trap Rock and past a reef on the south side. Then haul southwestward to round the reef extending 250 yards southwestward from Trap Rock, and then steer westward for the draw, with the north end of Thomas Island astern, being guided by the private buoys or other marks. After passing through the draw give the shore on the south side a berth of 150 yards to avoid ledges making off it, until ¼ mile from the bridge, and then haul south-southwestward into Western Bay, giving Haynes Point on the western side a berth of 300 yards to avoid ledges off it.

BAR HARBOR

(chart 318) is a town and anchorage on the eastern side of Mount Desert Island, 3½ miles above Egg Rock Lighthouse. This harbor is formed by an indentation in the shore of Mount Desert Island and two islands northward; a breakwater extending southwesterly from Round Porcupine Island to within ⅛ mile of the shore affords some shelter against southerly winds. The bottom is generally rocky and poor holding ground except near the head of the harbor, and the water deepens quickly from 4 to 13 fathoms (7.3 to 23.8 m.) A swell

heaves in during southeast winds, and vessels should not attempt to ride out a gale here from that direction.

All of the islands surrounding Bar Harbor are high and wooded, and have no prominent marks. When approaching from southward, **Round Porcupine Island** is distinguishable on account of its bare rocky slopes.

Cromwell Cove, westward of the end of the breakwater, has several float landings, but is seldom used as an anchorage.

Bar Harbor is an important summer resort and yachting center. It is connected by steamer with the railroad at Mount Desert Ferry, and with the principal towns on Frenchman Bay, and westward along the coast to Rockland. Coal in limited quantities can be had at the wharf or from lighters. Water can be had from the wharves or from water boats. The steamboat wharves at the eastern end of the water front have depths of 10 to 13 feet (3.0 to 4.0 m.). The coal and other wharves westward have depths of 1 to 4 feet (0.3 to 1.2 m.).

The usual anchorage is southward and southeastward of the eastern end of Bar Island, in 1 to 13 fathoms (1.8 to 23.8 m.), the depths shoaling rapidly toward the bar southward of Bar Island. The southern limit of the anchorage is marked by white barrel buoys placed by the harbor master to leave a clear channel to the wharves.

The principal entrance is from eastward between **Round Porcupine** and **Sheep Porcupine Islands,** and is clear. Passing about 300 yards northeastward of Round Porcupine Island, a 289° true (NW. 5/8 W. mag.) course will lead to the anchorage. Local vessels sometimes enter from northward between Sheep Porcupine Island and the islet eastward of Bar Island, where the depth is 8 feet (2.4 m.). There is a deep channel 150 yards wide into the harbor from southward between the end of the breakwater extending southwestward from Round Porcupine Island and the western shore; it is generally used by local vessels entering from southward. To enter by this channel, pass 50 yards westward of the end of the breakwater, and give the shore northward of the breakwater a berth of 300 yards or more.

Large vessels frequently anchor northward or northwestward of **Bar Island,** in 7 to 10 fathoms (12.8 to 18.3 m.), soft bottom. The bar inside of Bar Island will be avoided by keeping the north side of Sheep Porcupine Island open from the north side of Bar Island. The western shore is fairly bold, with the exception of a rock, bare at low water, lying 5/8 mile westward of Bar Island and 250 yards from the shore at the entrance of **Duck Brook. Bald Rock Ledge,** the highest part of which shows at low water, lies 7/8 mile northward of Bar Island, and is marked at its southwest end by a red buoy. Vessels should keep over 1/4 mile southward of a line joining the buoy and Bald Rock (a bare rocky islet).

FRENCHMAN BAY, BAR HARBOR TO SOUTH WEST HARBOR

The southeast side of Mount Desert Island between Bar Harbor and Seal Harbor is rocky and precipitous. The small coves indenting the shore are of no importance to navigation. Several dangers lie off the shore, but the most dangerous either show above water or are marked by buoys.

The Thrumcap, 1½ miles southward of Round Porcupine Island, is a round rocky island, with a clump of trees in the center.

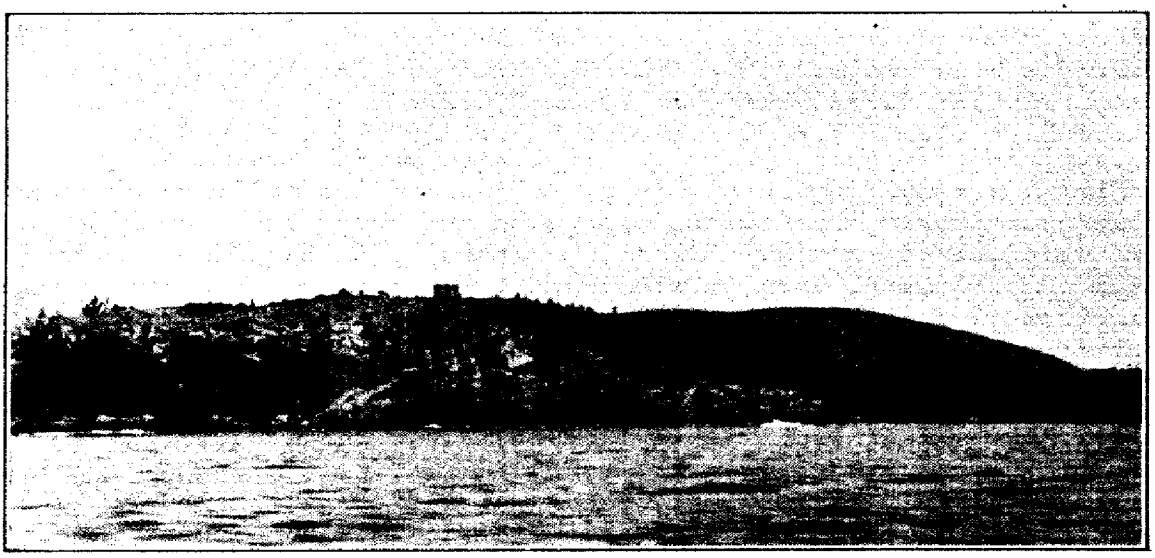
Newport Ledge, 400 yards from shore, midway between the Thrumcap and Schooner Head, is bare at extreme low water and marked on its eastern side by a black buoy. The bottom inside of it is broken, and should not be crossed by vessels.

Egg Rock is described on page 93.

Schooner Head and **Great Head** are prominent rocky headlands, and Great Head is distinguished by an observation tower on the top.

Schooner Ledge, 350 yards from shore, midway between Schooner Head and Great Head, is bare 4 feet (1.2 m.) at low water and marked by a black buoy 300 yards eastward of it.

Newport Cove, a small cove westward of Great Head, is exposed southward, has poor holding ground and is never used as an anchorage. There is a bare rock off the entrance.



Mount Desert Island; stone tower on Great Head bearing northwestward

Otter Cliff Ledge, 400 yards eastward of Otter Creek Point, is bare at half tide and marked by a black bell buoy. A circular stone observation tower has been built on the summit of Otter Cliff. This tower resembles a lighthouse.

Otter Cove, a long cove making northward of the west side of **Otter Creek Point,** has deep water in the entrance and is bare for ⅜ mile from the head. It is exposed southward and not used as an anchorage. There is a naval radiocompass station about ¼ mile northward from Otter Cliff. The call letters are NQC. The radio towers and a water tank are prominent. The other coves and islands are described under "South West Harbor and approaches."

SOUTH WEST HARBOR AND APPROACHES

South West Harbor, Somes Sound, North East Harbor, and several other coves lie in the southeast side of Mount Desert Island, inside a large group of islands and shoals. These waters are the approaches to several important villages and summer resorts, and are

frequented by passenger steamers, fishing boats, and many pleasure craft. South West Harbor is also extensively used as a harbor of refuge. They can be approached through the channels on either side of Sutton Island or through Western Way.

Baker Island, the most southeasterly of the islands in this vicinity, is wooded and marked in the center by Baker Island Lighthouse. It is surrounded by ledges, bare and submerged, and should be given a berth of at least ⅜ mile. **The Thumper** is a ledge, bare at low water, lying 300 yards southward of the island. Another ledge, partly bare at low water, lies ¼ to ⅜ mile off the southwest side.

Baker Island Lighthouse is a white tower connected with dwelling. The light is fixed white, with a white flash of 5 seconds' duration every 90 seconds, 105 feet (32 m.) above the water, and visible 16 miles.

Little Cranberry Island is low and wooded, and has no prominent marks visible from southward or eastward. **Islesford** is a post village on the northwest end. There is a large wharf and several fish houses. The passage between Little Cranberry and Great Cranberry Islands is used at any stage of the tide by small local craft, but it has many unmarked ledges and should not be used by strangers.

Cranberry Harbor is southward of Sutton Island between Little Cranberry and Great Cranberry Islands. It is frequented by small local vessels, and coasting vessels sometimes anchor here, but South West Harbor is a much better anchorage. The usual anchorage is in 14 to 20 feet (4.3 to 6.1 m.) in the middle of the harbor with the wharves at Islesford bearing about 50° true (ENE. mag.), taking care to keep well clear of the black buoy on the end of the ledge which extends 350 yards westward from the east side at the entrance.

Great Cranberry Island is wooded and has no prominent marks visible from southward. **Cranberry Isles** is a post village on the island. There are two wharves in **Spurling Cove** on the north side, a fish wharf on **Long Point** at the northeast end, and a wharf, bare at low water, in **The Pool,** a shoal cove in the eastern side, obstructed by many reefs.

South Bunker Ledge, in the southern approach to Western Way, is bare 4 feet (1.2 m.) at low water and marked by a spindle.

The Nubble is a dangerous reef, mostly bare at low water and having a few rocks bare at high water, extending ½ mile southeastward from Mount Desert Island. It is marked off its end by a black bell buoy.

Western Way, between the western side of Great Cranberry Island and Mount Desert Island, is a frequently used passage for vessels bound to South West Harbor and vicinity, and is generally used by all small vessels bound between points westward and any point in Frenchman Bay. The channel is buoyed and the least depth is 14 feet (4.3 m.) on a bar at the northern end, but there are unmarked spots of 10 to 12 feet close to the sailing lines, and the passage should not be used by strangers with a greater draft than 10 feet (3.0 m.).

South West Harbor (chart 306) is the most important harbor on the south side of Mount Desert Island. It is an excellent, well-sheltered anchorage in 2 to 8 fathoms (3.7 to 14.6 m.), and can be entered from eastward, northward of Sutton Island, by vessels of

the deepest draft. The approach from southward across Cranberry Island Bar has a depth of 14 feet (4.3 m.).

Deep-draft vessels can anchor midway between Greening Island and the southern shore, in 7 to 9 fathoms (12.8 to 16.5 m.). Smaller vessels can anchor farther in, the depths shoaling gradually to 12 feet (3.7 m.) 150 yards eastward of the islet which lies 400 yards from the head of the harbor. In the daytime, with clear weather, a pilot is not required to enter from eastward. Strangers coming from westward and crossing Bass Harbor and Cranberry Island Bars can take a pilot at Bass Harbor, if desired. Pilots for the waters eastward and westward can generally be found at South West Harbor by making inquiries on shore. Anthracite coal, water, and ship chandler's stores in limited quantities can be had alongside the wharves. There is steamer communication with Bar Harbor and points westward along the coast to Rockland.

South West Harbor is the name of the village and resort on the north side of the harbor. The steamer landing on **Clark Point** is the principal wharf and has a depth of about 14 feet (4.3 m.).

Manset, on the south side of South West Harbor, has several fish cannery wharves, varying in depth from 8 to 15 feet (2.4 to 4.6 m.).

Greening Island, on the north side at the entrance of South West Harbor, is low and wooded, but has several houses visible. A large house at the eastern end is prominent. It has several float landings. Shoals border it on all sides.

The passage between Greening Island and the point westward has a least found depth of 15 feet (4.6 m.) and is extensively used. It is buoyed, and a ledge in the middle is marked by a light on a spindle. The best water from southward leads 100 to 150 yards westward of the red buoy at the south end, 100 yards eastward of the light, and eastward of the black buoy a little northward of the light.

Somes Sound (chart 306 or 307) is a narrow body of water, about 4½ miles long and ¼ to ¾ mile wide, making into the south shore of Mount Desert Island. It lies between steep, rocky shores and has a narrow entrance with few dangers. With the aid of the chart good anchorage can be selected in the sound in 9 to 12 fathoms (16.5 to 21.9 m.), but it is out of the way and little used. Sailing vessels should enter under easy canvas on account of the heavy squalls of wind which occasionally strike down from the mountains. Greening Island lies in the middle of the approach, with a channel on either side of it.

Hall Quarry is an unused quarry and small settlement on the west side of Somes Sound 3½ miles above the entrance.

Somes Harbor is a small cove at the head of Somes Sound. The entrance is narrow and marked by buoys.

Somesville (Mount Desert post office) is a village on Somes Harbor. The principal wharf has a depth of 8 feet (2.4 m.).

North East Harbor has its entrance northwestward of Bear Island. The head of the harbor is shoal, but there is anchorage 200 yards wide for very small vessels for a distance of ⅜ mile inside its entrance, favoring the western side, in 3 to 4 fathoms (5.5 to 7.3 m.). Vessels generally anchor just outside the entrance, between it and buoys Nos. 2 and 4, in 4 to 6 fathoms (7.3 to 11 m.). There are several large summer hotels on the shores of the harbor, and it is

an important yachting center. There are several landings for small craft. The harbor is little used except by yachts. The steamer landing for North East Harbor is ¾ mile westward of the entrance and just westward of Gilpatrick Cove.

A rock, bare at low water, lies in the middle of the entrance to North East Harbor, and is marked by a buoy on either side. The best passage into North East Harbor lies westward of the rock.

Bear Island, on the eastern side of the entrance to North East Harbor, is high and marked on its western end by a lighthouse. The passage north of the island is blocked by reefs. There is a buoy depot of the Lighthouse Service on the northwest side of the island.

Sutton Island, about 1 mile long and wooded, lies in the middle of the passage between the south shore of Mount Desert Island and Cranberry Islands. **Sutton,** a post office and summer resort, is on its western part. There is a small wharf and several float landings. The channel north of Sutton Island has a depth of about 8 fathoms (14.6 m.) and is generally used—the ledges are marked by buoys. The channel south of it has a depth of about 17 feet (5.2 m.) and is contracted by rocks; the principal dangers are marked by buoys, and its navigation is not difficult in the daytime with the aid of the chart.

Bracy Cove, ⅝ mile eastward of Bear Island, is exposed to southeast winds, has a rocky and uneven bottom, and is unfit for anchorage.

Seal Harbor makes into the south shore of Mount Desert Island about 1⅜ miles east of Bear Island; it is an anchorage for small vessels, but is exposed to southeasterly winds. There is a steamboat landing, depth 11 feet (3.4 m.), and the village of Seal Harbor, a summer resort, on the eastern shore, and a coal wharf on the western side. A black buoy marks the end of the ledge which extends from the western shore halfway across the entrance of the harbor. The anchorage is about 400 yards in diameter, in the middle of the cove, in 16 to 18 feet (4.9 to 5.5 m.); the head of the cove must be given a berth of over 300 yards. The approach is between Seal Harbor gas buoy on the east and Bowden Ledge buoy on the west. Seal Harbor has steamer service with Bar Harbor and Rockland.

East Bunker Ledge, 1 mile eastward of Sutton Island, is ¼ mile long and has two sections bare at high water. There is a stone beacon near its southwestern end and a black buoy marking a 6-foot (1.8 m.) rock 200 yards northward of its northern end.

DIRECTIONS, SOUTH WEST HARBOR

The channel northward of Sutton Island is deep and well marked and has been examined by means of a wire drag; it is used by all vessels entering from northward and by most of those entering from eastward and southeastward. The channel southward of Sutton Island has unmarked rocks with a least found depth of 16 and 17 feet (4.9 and 5.2 m.). It has been examined by means of a wire drag. Its navigation is easy in the daytime with the aid of the chart. Vessels of 14 feet (4.3 m.) or less draft, approaching from southward or westward, usually enter through Western Way, but this passage is not recommended for strangers with a greater draft than 10 feet (3 m.).

From eastward, northward of Sutton Island.—Pass 200 yards southward of Seal Harbor gas buoy and steer 259° true (W. ⅝ N. mag.) for the southeast end of Greening Island, until midway between Bear Island and the western end of Sutton Island. Then steer 249° true (W. ¼ S. mag.) and pass 100 to 200 yards southward of the red buoy lying nearly 200 yards southward of the southeast end of Greening Island. Then steer 269° true (WNW. ½ W. mag.) and select anchorage according to draft.

From westward through Western Way.—Crossing Bass Harbor Bar close to the fairway buoy lying about 350 yards southward of Bass Harbor Head Lighthouse, steer 89° true (ESE. ½ E. mag.) and pass about 100 yards southward of Long Ledge black bell buoy. Round the buoy at this distance and steer 25° true (NE. ⅛ N. mag.) for a little over 1 mile to the fairway buoy.

From the fairway buoy steer northeastward about 300 yards and pass between Cranberry Island Ledge red buoy and Flynn Ledge black buoy. From the latter buoy steer 356° true (N. by E. ¼ E. mag.) for the fairway buoy at the northern end of Western Way. Then steer 323° true (N. by W. ⅝ W. mag.) and follow the western shore at a distance of about 400 yards into South West Harbor.

Approaching southward of Long Island, pass about 1 mile southward and eastward of Long Island Head and steer 6° true (NNE. ¼ E. mag.) for nearly 8 miles, passing ⅜ mile eastward of The Drums buoy, ¼ mile westward of South Bunker Ledge spindle, and to the fairway buoy nearly ¾ mile northward of the spindle. Then proceed as directed in the preceding paragraph.

ISLANDS OFF BLUE HILL BAY

(Chart 308.) Under this heading are described all of the islands southward of Bass Harbor Bar and Casco Passage from the Duck Islands westward to Swan Island.

This area includes numerous islands, generally wooded and having few prominent marks. The only ones having settlements are Swan Island, Long Island, and Great Gott Island. The area is very broken and rocky and has numerous bare and submerged ledges, many of them unmarked. The through route by way of Casco Passage and Bass Harbor Bar is used by many vessels, but the passages through the islands southward are seldom used except by local fishermen. With the exception of the broad channel leading between Black and Placentia Islands on the east and Long and Swan Islands on the west, which has been examined by means of a wire drag, the area has not been closely examined and strangers should use it with extreme caution and should avoid crossing broken areas.

Great Duck Island, the most southeasterly of the islands off Blue Hill Bay, is partly wooded and appears as two islands from eastward or westward. The lighthouse at the south end and the buildings around it are prominent.

Great Duck Island Lighthouse is a white cylindrical tower. The light is flashing red (flash 1 second, eclipse 9 seconds), 67 feet (20.4 m.) above the water, and visible 14 miles. The fog signal is an air diaphone sounding a 2½-second blast every 20 seconds.

Little Duck Island, ¾ mile north-northeastward of Duck Island, is partly wooded and has no distinguishing marks.

The Drums is a dangerous ledge 2 miles northeastward of Long Island. It is bare at low water and marked by a black buoy at the southeast end. The range of the western ends of Green and Placentia Islands leads well westward of it.

Horseshoe Ledge is bare at low water and marked by a spindle.

Drum Island is a bare rock 400 yards eastward of the easterly Green Island.

Green Islands are two rocky islets with grass on top lying ¾ mile southward of Black Island.

Black Island is wooded. There are a few houses and a small wharf on the north side. Three ledges lie off its east side; **Inner Dawes Ledge** is bare at high water, **Outer Dawes Ledge** is awash at high water, and **Grindstone Ledge** is bare at about half tide and marked by a spindle.

Placentia Island is wooded except on its eastern end, which is grassy.

Little Gott Island and **Great Gott Island** are generally wooded. There is a small settlement of fishermen and a post office **(Gott Island)** on the west side of Great Gott Island, the approach to which is by the passage between the islands. This passage can be entered from southward at low water, but a bar, bare at low water, crosses it at the northwest end. There are no wharves. The houses of the settlement are the most prominent marks in this vicinity.

Bass Harbor Bar and Bass Harbor are described on page 107.

Staple Ledge, between Placentia Island and the north end of Swan Island, is bare at low water only, and marked by a horizontally striped buoy.

Long Island, the most southerly of the large islands off Blue Hill Bay, is wooded and has no prominent marks visible from seaward.

Long Island (Lunt) Harbor is a cove on the north side of the island. **Frenchboro** is a village of fishermen in the cove. There is a large fish-packing wharf with a depth of 1 to 2 feet (0.3 to 0.6 m.) at low water; the other wharves are bare before low water. Gasoline and provisions are obtainable. The cove has good holding ground and is used as an anchorage by local boats, but it is somewhat exposed in northeasterly weather. Ice seldom interferes with navigation. Mail comes by small boat from Swan Island, to which there is steamer communication.

The passage between Long and Swan Islands has deep water, but there are many unmarked ledges. The best channel leads between John Island and Beach Ledge bell buoy, thence between the westerly **Sister Island** and **Ram Island.** Any of the passages can be used by small craft with the aid of the chart. The islands are all wooded and have no prominent marks, except Ram Island, which is marked by a single tree. **Sunken Money Ledge** is bare at low water. **Dry Money Ledge** is a white rock islet about 10 feet (3.0 m.) high. **Otter Island Ledge** is awash at low water.

John Island is wooded and has many dead trees. **John Island Dry Ledge** is ¼ mile in diameter and has rocks showing at high water. **John Island Sunken Ledge** has 6 feet (1.8 m.) over it and is marked on its south side by a red buoy.

Swan Island is the largest of the islands off Blue Hill Bay. There are three post villages on the island—Atlantic, Swan Island, and

Minturn. The people are mostly fishermen. The island has several sheltered coves, but all except Mackerel Cove and Burnt Coat Harbor are generally foul and little used.

Mackerel Cove and Atlantic are described with Blue Hill Bay on page 110.

Burnt Coat Harbor.—This is a small, well-sheltered anchorage on the southwestern side of Swan Island; it is much used by local fishermen, but seldom by other vessels. The anchorage eastward of the lighthouse is about 500 yards wide, with depths of 3½ to 6 fathoms (6.4 to 11.0 m.), soft bottom. There is also good anchorage for small craft in the channel northward of the lighthouse in 13 to 24 feet (4.0 to 7.3 m.).

Burnt Coat Harbor Lighthouse on the west side at the entrance is a white tower connected with dwelling. The light is fixed white, 75 feet (22.9 m.) above the water, and visible 12 miles. The fog signal is a bell, sounding 1 stroke every 15 seconds.

Swan Island is a village on the west side of Burnt Coat Harbor. It is connected with Rockland by steamer. The steamer wharf has a depth of 10 feet (3.0 m.) and the fish wharves less. Gasoline and provisions are obtainable.

Minturn is a quarry and small settlement on the east side of Burnt Coat Harbor. The wharf is said to have a depth of 6 feet (1.8 m.), and vessels load here to 14 feet (4.3 m.).

From the perpendicularly striped bell buoy off the entrance, a 42° true (NE. by E. ⅜ E. mag.) course will lead through the entrance, passing midway between the lighthouse and the spindle opposite. Anchorage may be had eastward or northeastward from the lighthouse, or in the channel northward.

To enter inside Baker and Harbor Islands.—This passage is available for small craft entering from eastward. It is extensively used by local boats but narrow and difficult, and strangers are advised to use it only on a rising tide. In entering, pass between the northerly Baker Island and the south shore of Swan Island, favoring Baker Island slightly to avoid two reefs bare at low water on the north side. Then steer 292° true (NW. ½ W. mag.) for ½ mile, passing northward of a reef awash at low water on the south side and drawing in to 100 yards off the north shore abreast Stanley Point. Then haul northward through the passage eastward of Harbor Island, passing 50 yards southwestward of the southerly of two thickly wooded islets, and the same distance northeastward of a ledge, bare at half tide, opposite the islets. Then haul northwestward into the main channel.

Directions, Burnt Coat Harbor.—The main entrance to the harbor is from southwestward, between Harbor Island and the point northward, and is marked on the north side by a lighthouse (white tower connected with dwelling) and on the south side by a spindle marking a rock bare at low water.

Vessels entering from southward may make the perpendicularly striped whistling buoy 3 miles westward of Long Island, then steer 342° true (N. mag.) for 2¾ miles, passing 350 yards westward of Green Island, to the perpendicularly striped bell buoy off the entrance. From southeastward, they may pass ¼ mile southward of Southwest Point of Long Island, steer 267° true (WNW. ⅝ W.

mag.) for 1¾ miles to a position ¼ mile south-southwestward of a red buoy, then 304° true (NW. ⅝ N. mag.) for 2¼ miles to a position 350 yards westward of Green Island, and then 342° true (N. mag.) to the bell buoy. From Jericho Bay, vessels may pass midway between the two buoys marking the passage between Hat Island and Marshall Island, and steer 108° true (SE. ¾ E. mag.) to the bell buoy.

Islands southwestward of Swan Island.—**Harbor Island** is wooded except on the northwest side. **Baker, Scrag, Heron, Ringtown, Hat,** and **Marshall Islands** are wooded. **Green, Gooseberry,** and **Brimstone Islands** are bare and grassy. **Gooseberry Island Ledge,** southeastward of Gooseberry Island, is bare at low water only and is marked by a black buoy at the southeast end. **Yellow Ledge,** southeastward of Ringtown Island, has a rock bare at high water and a considerable area bare at low water. There are many other bare and submerged rocks, most of them unmarked. This area has not been closely examined and should be navigated with extreme caution.

BLUE HILL BAY

(charts 307 and 308) lies west of Mount Desert Island; it is about 14 miles long and contains several large and some small islands, between which are good channels with deep water. The dangers are comparatively few, and the most prominent are marked by buoys. There are numerous coves on both sides of the bay, and its head is divided into several large arms, the most important of which is Union River Bay.

Blue Hill Bay forms the approach to the villages of McKinley, South Blue Hill, Blue Hill, and Surry, and the city of Ellsworth. It is frequented by regular passenger steamers to Blue Hill, a few coasting vessels to Ellsworth, and many fishing vessels.

Supplies.—Gasoline and provisions are best obtainable at McKinley or Ellsworth, although they are kept at all of the villages. Coal can be obtained at Ellsworth and there is water on the wharves.

Repairs.—There is a marine railway at Ellsworth, but it is suitable for launches and small sailing yachts only.

Pilots.—Local fishermen are the only pilots available around the entrance. Vessels seldom take pilots. Pilots for Union River can be obtained at the mill near the entrance or by telephoning to Ellsworth.

Tides.—The mean rise and fall of tides is about 10 feet (3.0 m.).

Communication.—Blue Hill is connected by steamer with Rockland. Ellsworth has railroad communication and is on the main highway. The other settlements are reached by small boat, or by road from Ellsworth or Bar Harbor.

Directions for Blue Hill Bay are given on page 114.

BLUE HILL BAY, EAST SIDE

Placentia, Little Gott, and Great Gott Islands are described on page 105.

Bass Harbor Bar, connecting Great Gott Island with Mount Desert Island at Bass Harbor Head, has been improved by dredging a channel 14 feet (4.3 m.) deep and 250 feet wide across it. The

channel lies 350 yards southward of **Bass Harbor Head Lighthouse** (white tower connected with dwelling) and is marked by a perpendicularly striped buoy, which may be left close to on either side. The channel is on the through route used by most vessels of 12 feet (3.7 m.) or less draft, and it is sometimes used by vessels of 18 feet (5.5 m.) draft at high water and with a smooth sea. In heavy weather breakers sometimes form entirely across it.

Bass Harbor, in the south end of Mount Desert Island, just westward of Bass Harbor Bar, is an important fishing port, and is sometimes used as an anchorage by vessels bound through the inside pasage, but the outer harbor is exposed southward. The outer harbor is clear with the exception of **Weaver Ledge,** in the middle, bare about 2 feet (0.6 m.) at low water and marked by a black buoy on the southeast side and a red buoy on the northwest side. Vessels can enter on either side and anchor between Weaver Ledge and the entrance to the inner harbor, in 5 to 7½ fathoms (9.1 to 13.7 m.), bottom soft in places.

The inner harbor is a crooked channel, 100 yards wide, with depths of 2 to 4 fathoms (3.7 to 7.3 m.), and forms a secure anchorage for small craft. The entrance is marked by two buoys on the western side. The channel inside is unmarked and there are shoals close to it on either side.

McKinley is a village on the east side of Bass Harbor. It has fish factories and is the headquarters of many fishing vessels. The principal wharves are on the east side at the head of the outer harbor, and have depths up to 16 feet (4.9 m.). There are landings for small craft, bare at low water, on the inner harbor. Gasoline and provisions are obtainable. A stack and water tank are prominent from southward.

Bernard is a village on the west side of the harbor.

Mitchell Cove and **Duck Cove,** northward of Bass Harbor, are shoal and foul and have no landings.

Goose Cove, on the eastern side of Blue Hill Bay, 2 miles northward of Bass Harbor, is frequented by fishing boats. A red buoy marks a shoal in mid-harbor. **West Tremont** is a village at the head of the cove.

Goose Cove Rock and **Rumell Hub** are rocky islets with grass on top.

Seal Cove, 4 miles northward of Lopau Point, is a sheltered anchorage for small vessels except with westerly winds. A rock awash at high water lies 300 yards off the north side just inside the entrance, and a ledge partly showing at high water lies off the shoal bight on the south side. Entering midway between the rock and ledge, anchor near the middle of the cove, in 3 to 6 fathoms (5.5 to 11 m.). There are no wharves.

Moose Island, north of the entrance to Seal Cove, is covered with grass and bushes. The point eastward of the island has a few small huts. The bar connecting the island and the point is bare at low water.

Hardwood Island is wooded at the north end and grassy, with scattered trees, southward. There is a small wharf on the east side.

Sawyer Cove, on the eastern shore of Blue Hill Bay eastward from the north end of Hardwood Island, is an anchorage for small

craft. On the northeast side at the entrance is a ledge awash at high water.

Pretty Marsh Harbor makes into the eastern shore of the bay northeastward from Hardwood Island. There is good anchorage for vessels 300 to 500 yards from the eastern shore eastward of Folly Island in 5 to 6 fathoms (9.1 to 11.0 m.). The northern and western sides of the cove inside West Point are shoal, and a shoal extends 350 yards southeastward from the point. **Folly Island** is grassy, with a few trees. A shoal extends 150 yards southeastward from Folly Island, and a ledge with 3 feet (0.9 m.) over it lies 200 to 300 yards eastward from the island; otherwise there are no dangers away from the shores.

John Island is a grassy islet, and there is a lower grassy islet 400 yards northward.

Bartlett Narrows leads between Mount Desert Island and Bartlett Island. The channel is narrow, but has deep water, with few dangers, and is not difficult. The mid-channel westward of Folly and John Islands is clear. If passing eastward of Folly Island give it a berth of about ¼ mile, and give the south end of John Island a berth of over 100 yards. The eastern shore of the Narrows from West Point to its northern end is bold and should be favored. In the narrowest part keep the eastern shore aboard distant 100 yards to avoid a ledge which extends 200 yards southward from a group of bare rocks.

A ledge with 2 to 3 feet (0.6 to 0.9 m.) over it lies 400 to 600 yards from the eastern shore ⅜ mile northward of Bartlett Narrows. It will be avoided by keeping westward of a line from the north end of the Narrows to the north end of Black Island.

Bartlett Island is generally wooded and has a few houses. There is a wharf on the east side, just northward of Birch Island Cove. There is a bare rocky islet close to the northeast end of the island.

Western Bay is northeastward of Bartlett Island, and is a part of the waters which separate Mount Desert Island from the mainland. Mount Desert Narrows, described on page 98, is at the head of Western Bay. Vessels of any size can select anchorage in the bay below Alley Island, in 10 to 12 fathoms (18.3 to 21.9 m.), but the broken ground with 5½ to 6 fathoms (10.1 to 11 m.) extending ⅜ mile off the southeast side of Oak Point should be avoided. With the aid of the chart, good anchorage can also be selected in 3½ to 6 fathoms (6.4 to 11 m.) southeastward and eastward of Alley Island. The range of the summit of Bartlett Island over the middle of Black Island (thickly wooded) clears the shoal which extends ¼ mile southeastward from Alley Island.

Foul ground extends about ¼ mile from the south shore between Green Island and Indian Point. **Clark Cove,** eastward of Indian Point, has an anchorage in 12 to 18 feet (3.7 to 5.5 m.), but a ledge with little water over it extends ¼ mile from its southeast shore ¼ mile eastward from Indian Point.

Goose Cove is a large shallow bight on the north side of Western Bay above Alley Island, and at its head is the village of **West Trenton.** The head of the cove is dry at low water for a distance of ½ mile, and thence it deepens gradually to 7 feet (2.1 m.) ½ mile farther down. There are no wharves.

BLUE HILL BAY, WEST SIDE

Mackerel Cove is a good anchorage on the north side of Swan Island, at the eastern entrance of Casco Passage. There are islets and numerous ledges in the cove, but the entrance from northward is easy of access in the daytime. There is a narrow channel into Mackerel Cove from York Narrows which follows closely the shore of Swan Island, passing southward of Orono and Round Islands. On account of numerous unmarked dangers, it should not be used by vessels except with local knowledge.

Atlantic is a post village on the south side of Mackerel Cove. The wharf is said to have a depth of 5 feet (1.5 m.) and there are dangers in the approach. A church spire is prominent from eastward.

The Triangles is a bare ledge from which a reef covered at half tide extends ¼ mile northward. A red buoy marks the eastern side of a rock bare at low water, lying 400 yards southeastward of **Crow Island** (has two trees). A black buoy marks a rock with 6 feet (1.8 m.) on it, lying 300 yards northwestward of North Point of Swan Island.

Enter Mackerel Cove between the black buoy and the red buoy and steer about 181° true (S. by W. ¾ W. mag.) so as to pass westward of a black buoy which marks a 11-foot (3.4 m.) spot. Anchorage can be selected between the red buoy and inner black buoy in 4 to 5 fathoms (7.3 to 9.1 m.), taking care to give the eastern shore a berth of 300 yards; there is also a good berth about midway between the inner black buoy and the bare ledge, lying ¼ mile northwestward of the wharf, in 4 fathoms (7.3 m.). A rock with 4 feet (1.2 m.) over it lies ¼ mile northwestward of the bare ledge.

Casco Passage and York Narrows.—Northward of Swan Island, between it and Black Island, there is a narrow passage which separates into two branches in its western part. The eastern end and northern branch is known as Casco Passage, the southern branch as York Narrows. They form a part of the different inland passages from Mount Desert to Whitehead (see tabulated courses on pages 40 to 54). Casco Passage and York Narrows are well marked by buoys, and at the eastern entrance, on the north end of Orono Island, there is a large black tripod. The islands are generally low and wooded, and have no prominent marks.

Casco Passage is the straighter and better channel, and has a depth of 18 feet (5.5 m.) and a width of 150 yards; there are rocks with little depth on each side. Vessels of 16-foot (4.9 m.) draft have been taken through. Directions for the passage are given on pages 42 and 52. The current through Casco Passage and York Narrows sets eastward on the flood and westward on the ebb. The velocity is influenced greatly by strong winds. There is a rock, bare at low water, 125 yards off the south side of Black Island.

York Narrows has a width of but little over 100 yards, and has dangerous ledges on both sides. It is not recommended for vessels of a greater draft than 9 feet (2.7 m.) at low water, except with local knowledge. The following **directions** will lead through the Narrows:

Pass about 50 yards northwestward of the black buoy northward of Orono Island tripod, and steer 222° true (SW. by W. ¼ W. mag.) for the western edge of the trees on Buckle Island, with the eastern

edge of the trees on Black Island astern. On this course pass 15 to 25 yards southeastward of two red buoys and about 50 yards northward of a black buoy. Then steer 243° true (W. ¾ S. mag.) with the northern end of the trees on Orono Island astern, pass about 25 yards southward of a black can buoy and give the edge of the bare ledge on the north side of Buckle Island a berth of 150 yards.

Passage north of Pond Island.—This passage is used by vessels entering Blue Hill Bay from westward and sometimes by vessels following the inside passage eastward or westward. It has a least depth of about 19 feet (5.8 m.) in the buoyed channel, but there are dangers close to the sailing lines. The buoys are colored for vessels bound westward, that is, red buoys will be found on starboard hand. Directions are given on page 116.

Pond Island is wooded on its eastern side. The western side is bare and is marked by a house and barn. Lamp Islet is a grassy islet ¼ mile northward of Pond Island.

Channel Rock is about 5 feet (1.5 m.) above high water. A submerged ledge extends ⅜ mile east-southeastward of it.

Green Island is grassy and marked by **Blue Hill Bay Lighthouse** (white tower connected with dwelling). The shoal of which it is a part is bare at low water from the island to the shore 1⅛ miles northward and for a distance of ¼ mile southward of the island. It is marked by a black buoy off the south end. **Sand Islet,** ¼ mile northeastward of the lighthouse, is nearly covered at high water.

Flye Island Ledge, having rocks with depths of 7 to 13 feet (2.1 to 4.0 m.), not closely examined, extends to a point 1 mile south-southwestward of Blue Hill Bay Lighthouse.

Herrick Bay is a shallow and unimportant bight on the western side of Blue Hill Bay northwestward of Blue Hill Bay Lighthouse. It is dry at low water for a distance of nearly 1 mile from its head. There is good anchorage in the approach to the bay ¼ to ¾ mile from the western shore northward of Naskeag Point, in 4 to 7 fathoms (7.3 to 12.8 m.). The range of the western ends of Flye and Long Islands leads westward of Flye Island Ledge.

Ship and Barges Ledge, ⅝ mile south-southeastward of Ship Island, is 350 yards long and bare at half tide. It is marked by a tripod beacon on the south end, a spindle on the north end, and a black bell buoy 250 yards eastward.

West Barge is a flat grass-topped rock 600 yards westward of Ship Island. **East Barge** is a round grassy islet on the end of the shoal extending 200 yards southward from Ship Island.

Ship, Trumpet, Bar, and **Tinker Islands** are a chain 4 miles long in the middle of Blue Hill Bay. The islands are joined by shoals bare at low water, except for a channel between Trumpet and Bar Islands, which has a depth of 17 feet (5.2 m.), and is marked by a perpendicularly striped buoy. Ship and Bar Islands are high and grassy, and Bar Island is marked by a house and barn. Trumpet Island is low and grassy. Tinker Island is partly wooded and has an old house at its southeast end.

Cow and Calf Ledge, extending ¼ mile westward and northward from the north end of Tinker Island, has several rocks with little water, and one rock bare at half tide. It is marked by two red buoys.

Allen Cove, on the west side of Herriman Point, 3½ miles northward of Blue Hill Bay Lighthouse, is rarely used as an anchorage.

The shores are foul. The anchorage is in the middle in 2 to 5 fathoms (3.7 to 9.1 m.), and is open northward.

Long Island is generally wooded, with many clear sections, and has some inhabitants. **Seaville** is a post office on the island.

South Blue Hill, a village on the western side of Blue Hill Bay just south of Sand Point, has a fish cannery.

Salt Pond, just south of the entrance to Blue Hill Harbor, has falls at the entrance, is crossed by a fixed bridge, and can not be entered.

Darling Island lies just eastward of the entrance to Blue Hill Bay. **Darling Ledge,** the top of which shows at low water, extends ¼ mile southward of Darling Island. There is foul ground between the ledge and the shore. The ledge is marked, on its southeast side, by a red buoy.

Morgan Bay, lying northeastward of Long Island and on the west side of Newbury Neck, is about 3 miles long, but is little used. The entrance is obstructed by **Jed Islands** and the surrounding ledges, leaving a deep, narrow channel close to the western shore on either side of Conary Nub.

To enter, pass in mid-channel westward of Conary Nub on a 38° true (NE. by E. mag.) course, and keep the western shore aboard distant 200 yards until abreast Seal Ledge. Or pass 125 yards eastward of Conary Nub on a 2° true (N. by E. ¾ E. mag.) course, and pass midway between Seal Ledge and the western shore. Good anchorage can be selected in the bay, in 2 to 6 fathoms (3.7 to 11.0 m.), for which the chart is the guide.

Conary Nub is a rock with a clump of scrub. **Seal Ledge** is awash at high water. **Black Rock** is on a shoal with 7 to 10 feet (2.1 to 3.0 m.) which extends ⅜ mile northeastward of Seal Ledge. **Bird Rock,** westward of Jed Islands, is about 3 feet (0.9 m.) high. **South Ledge,** ¼ mile southwestward of Jed Islands, is covered at half flood. A rock with 4 feet (1.2 m.) over it lies ¼ mile southwestward of South Ledge. Danger will be avoided by keeping westward of a line from Conary Nub to the southwest end of Newbury Neck.

BLUE HILL HARBOR

(chart 307) is in the northwestern part of Blue Hill Bay, northwestward of Long Island. It consists of a large bight, called the outer harbor, and a small arm extending northwestward to the village of **Blue Hill,** called the inner harbor. Ledges extend 200 to 400 yards from the western shore of the outer harbor, and at a point 1 mile southward of the entrance of the inner harbor they extend ½ mile from shore. Anchorage, sheltered from northerly and westerly winds, will be found in the outer harbor in 4 to 8 fathoms (7.3 to 14.6 m.).

The channel in the inner harbor is narrow and crooked. The entrance has a depth of about 18 feet (5.5 m.), but it is so narrow that a stranger should not depend on carrying a greater depth than 8 feet (2.4 m.) at low water. There is secure anchorage for small vessels just inside the entrance, in 3 to 4 fathoms (5.5 to 7.3 m.). The steamer landing for Blue Hill is on the north side ⅝ mile above the entrance and has a depth of about 12 feet (3.7 m.) at its

end. Ice closes the harbor from December to April. There is steamer service with Bar Harbor and Rockland.

Many of the rocks show except at high water, and the principal dangers are buoyed. **The Triangles** are three rocks, bare at low water only. The entrance is 50 yards wide between **Sculpin Ledge** (bare at one-quarter ebb and marked by a red buoy) and a ledge southward of it which has 8 feet (2.4 m.) on its northern end and extends to the shore southwestward. Eastward of the entrance is a detached shoal 350 yards long, with 4 feet (1.2 m.) over it, the eastern end of which is marked by a black buoy. Vessels can enter on either side of the shoal.

To enter northward of it, pass 50 yards eastward and 100 yards northward of the black buoy and steer 279° true (NW. by W. ⅝ W. mag.) for Sculpin Ledge red buoy. Leave it about 20 yards on the starboard hand and steer 320° true (NNW. mag.). Select anchorage near mid-channel 200 to 500 yards above Sculpin Ledge, in 3 to 4 fathoms (5.5 to 7.3 m.), bottom soft in places. If going to the wharf, be guided by the chart and buoys.

To enter westward of the shoal, steer 323° true (N. by W. ⅝ W. mag.) with a rock awash at high water, lying in the entrance of the eastern cove on the north side of the inner harbor, in range with the arch in the culvert at the head of the cove. Keep the range until about 250 yards from Sculpin Ledge, and then keep a little eastward of it to allow room for making the turn westward. Pass about 20 yards southward of Sculpin Ledge red buoy, steer 320° true (NNW. mag.), and anchor as directed in the preceding paragraph.

UNION RIVER BAY

is a large bay extending about 5½ miles in a northerly direction between Oak Point on the east and Newbury Neck on the west. It is free from dangers, except near its northern end. The head of the bay is separated into two arms, Union River, the eastern, leading to the city of Ellsworth, and Patten Bay, the western, leading to the town of Surry.

Patten Bay is a long, narrow arm making northwestward from Union River Bay. The town of **Surry** is at its head. The deepest draft entering is 10 feet (3.0 m.), but the depth in the channel up to the town is only 2 feet (0.6 m.) at low water. There is good anchorage at the entrance near mid-channel as far as 1½ miles above the entrance in 4 to 5 fathoms (7.3 to 9.1 m.). A ledge, partly bare at half tide, extends 400 yards from the northern shore ¾ mile westward of Weymouth Point, and is marked by a red buoy. Between the buoy and a point 1 mile above, the northern shore is fairly bold, while the opposite side should be given a berth of 300 yards. Ice closes the upper end of the bay during January, February, and March.

Union River.—This river empties into the head of Union River Bay from northward and forms the approach to the city of Ellsworth, 4 miles above the entrance. There are several rocks off the entrance and the most prominent are buoyed. It is about 1 mile wide at the entrance but contracts to 250 yards 1 mile above. Union River has been improved by dredging a channel through the flats at the

entrance, and for a distance of 1 mile below Ellsworth and had a depth of about 3 feet (0.9 m.) at low water to Ellsworth in 1926. It has considerable trade, mostly in sailing vessels, which always take a towboat. The river has many sawdust shoals. Freshets occasionally occur in the spring. Ice closes the river from December to April.

Whitmore Cove, on the eastern side of Union River at the entrance, is small and shoal. There is a sawmill and wharf on the cove. Pilots may be obtained here, or a towboat by telephone from Ellsworth.

Ellsworth is a city of 3,000 population on the railroad at the head of navigation on Union River. It has some trade, the deepest draft being 12 feet (3.7 m.). The wharves have depths of 4 to 5 feet (1.2 to 1.5 m.) There is a small gas towboat here. Coal in limited quantities and other supplies are obtainable, and there is water on the wharves. The river water is fresh at low water. There is a marine railway capable of hauling out launches and small sailing yachts. Ellsworth is on the main highway.

Directions, Union River.—Directions through Blue Hill Bay to the entrance of Union River are given on page 115. The channel in Union River is narrow and difficult, and strangers in vessels should not enter without a pilot. The dredged channel was marked by small private buoys and stakes in 1926. With the aid of the chart and the following directions, small craft should be able to go to Ellsworth, but should do so on a rising tide.

Pass between Lord Rock red buoy and Tupper Ledge black buoy and steer northeastward to the red buoy at the entrance of the dredged channel. The dredged channel across the flats at the entrance favors the eastern side. Stakes are sometimes used in marking this channel. From the red buoy at the entrance the course is 31° true (NE. ⅜ E. mag.) for 350 yards, then 9° true (NNE. ½ E. mag.) for ⅜ mile, keeping about 150 yards off the eastern shore, and then 341° true (N. mag.) for ⅝ mile to a position close westward of a spindle at the entrance to the narrow part of the river. From this point to the entrance of the dredged channel 1 mile below Ellsworth there are no marks, and a general mid-channel course is best, although in the bend just before reaching the dredged channel the best water slightly favors the east side. The dredged channel in the upper end does not follow a mid-channel course.

DIRECTIONS, BLUE HILL BAY

Blue Hill Bay is approached from eastward across Bass Harbor Bar, from southward between Black Island and Swan Island, and from westward through Jericho Bay, which is entered through Merchants Row, Deer Island Thorofare, or Eggemoggin Reach. The channels between Blue Hill and Jericho Bays are Casco Passage, York Narrows, and the passage northward of Pond Island. These approaches are more or less obstructed by islands and ledges, but are sufficiently marked to be safely navigated in clear weather. At high water small vessels can also enter the head of Blue Hill Bay from Frenchman Bay through Mount Desert Narrows (described on p. 98).

The generally used inside route, used by most vessels of 12 feet (3.7 m.) or less draft, across Bass Harbor Bar and through Casco Passage, leads across the south end of Blue Hill Bay. Directions for it are given on page 42.

The vessels **bound to points in Blue Hill Bay** do not often exceed 12 feet (3.7 m.) draft, and these vessels usually follow the inside passage, generally entering from eastward across Bass Harbor Bar and from westward by the passage between Pond Island and Blue Hill Bay Lighthouse. Vessels of too deep draft, or when there is too much easterly or southeasterly swell on Bass Harbor Bar, can enter the bay southward of Little Gott and Placentia Islands and northward of Black Island, but this passage has not been closely examined and is not recommended for a greater draft than 15 feet (4.6 m.). Vessels of the deepest draft can enter by the main channel between Black and Placentia Islands on the east and Long and Swan Islands on the west. This passage has been covered sufficiently by means of a wire drag to insure a clear channel as indicated on the chart.

Above the entrance, Blue Hill Bay is deep and generally free from dangers, and several channels are available.

From Bass Harbor Bar.—Directions to Bass Harbor Bar from eastward and from Bass Harbor Bar westward through Casco Passage are given on page 41. Vessels bound from Bass Harbor Bar to Union River usually use the channel between Tinker and Hardwood Islands, and between Long and Bartlett Islands. This channel is deep and unobstructed and the chart and buoys are the guides. Small craft sometimes use the more protected passage between Moose and Hardwood Islands and through Bartlett Narrows (described on p. 109). Bound to Blue Hill Bay from Bass Harbor Bar, the most direct route leads eastward of the chain of islands and reefs extending from Ship and Barges Ledge to Tinker Island, and southward and westward of Long Island. It is deep and clear and the chart is the guide.

Entering between Black and Placentia Islands.—This passage has a rock with a least found depth of 18 feet (5.5 m.), not closely examined, 250 yards off the southwest end of Little Gott Island. Vessels of 15 feet (4.6 m.) or less draft may use it by favoring the north shore of Black Island, 250 yards off, after passing Inner Dawes Ledge (a rock islet), and round the north end of Black Island at a distance of 200 yards. Then steer west-southwestward and round the southwestern end of Placentia Island at a distance of 400 to 500 yards. The course can then be shaped northward into Blue Hill Bay, or if bound to Casco Passage, northeastward to pass northeastward of Staple Ledge buoy and North Point of Swan Island. Directions through Casco Passage are given on page 42.

Entering from southward.—Pass ¾ mile eastward of Long Island Head, and steer 334° true (N. ¾ W. mag.) for the western end of Green Islands. Or, passing ⅜ mile or more southward of Great Duck Island Lighthouse, bring it astern on a 282° true (NW. by W. ⅜ W. mag.) course, heading for the western end of Green Islands, and pass about ⅜ mile northeastward of The Drums buoy. Pass 400 to 500 yards westward of Green Islands and steer 315° true

(NNW. 3/8 W. mag.) for 2 1/4 miles to a position 1/4 mile westward of Placentia Island. The course can then be shaped as desired.

Entering from westward.—Vessels entering Blue Hill Bay from westward generally come through Eggemoggin Reach or Deer Island Thorofare, and enter Blue Hill Bay by the passage between Pond Island and Blue Hill Bay Lighthouse. The regular steamer, drawing about 10 feet (3 m.) and entering from Eggemoggin Reach, passes between Hay Island Ledge horizontally striped buoy and the red buoy northward, then between Smuttynose and Mahoney Islands, then close eastward of the black buoy 3/8 mile southward of Blue Hill Bay Lighthouse, and then between Blue Hill Bay Lighthouse and Sand Islet. This route should not be used by strangers except in small craft. The deeper channel (about 19 feet (5.8 m.)) leads through the buoyed channel 1/2 mile northward of Pond Island.

Vessels entering Blue Hill Bay from Eggemoggin Reach can use the directions on page 51. **Entering from Deer Island Thorofare,** they can use the directions on page 50 to Egg Rock beacon in Jericho Bay. From a position 1/4 mile west of Egg Rock beacon steer 19° true (NE. 3/4 N. mag.) for 3 1/4 miles, passing 3/8 mile east-southeastward of Mahoney Island, to a position 50 yards westward of buoy No. 3, and then 69° true (E. 1/4 N. mag.) passing 50 yards southward of a red buoy and 100 yards northward of a black buoy, into Blue Hill Bay. The course can then be shaped as desired.

JERICHO BAY

(Chart 308) is the body of water between Swan and Marshall Islands on the east and Isle au Haut and Deer Isle and adjoining islands on the west. The inside routes leading from Casco Passage and York Narrows to Deer Island Thorofare and Merchant Row and from the passage north of Pond Island to Eggemoggin Reach lead across its head, and this section is used by many vessels. The part of the bay southward of these thorofares has deep water but there are many ledges, rocks, and small islands, and this part is little used except by local fishermen.

The islands on the eastern side are described under "Islands off Blue Hill Bay" on page 104. Casco Passage and York Narrows, the passage north of Pond Island, and Herrick Bay are described under "Blue Hill Bay." Some of the dangers on the western side are described with Merchant Row and Deer Island Thorofare following.

Spirit Ledge, 3/4 to 1 1/4 miles southwestward of Marshall Island, is in two sections; the northeastern is bare at high water and the southwestern is bare at about half tide.

Boxam Ledge, off the southwest side of Marshall Island, is bare at low water.

Drunkard Ledge, 2 miles southwestward of Marshall Island, is bare at low water.

Marshall Ledge, off the west side of Marshall Island, is bare at low water.

Directions, Jericho Bay, from southward.—The channel leading into Jericho Bay between Spirit Ledge and Three Bush Island on the east, and Drunkard Ledge, Blue Hill Rock, and North Popplestone Ledge on the west, the main part of the bay northward, and

also the channel leading into the bay between Marshall and Swan Islands, have been partially examined by means of a wire drag. Approaching from southward, it is advisable to pass between Marshall and Swan Islands, where the dangers are well marked. The entrance between Marshall Island and Isle au Haut is obstructed by a number of unmarked submerged ledges, and is little used.

Vessels may pass ¼ mile southward of Southwest Point of Long Island, steer 267° true (WNW. ⅝ W. mag.) for 1¾ miles to a position ¼ mile south-southwestward of a red buoy, then steer 301° true (NW. ⅜ N. mag.) for 5⅜ miles, passing midway between Green and Brimstone Islands, 350 yards northeastward of Ringtown Island, 200 yards northeastward of the black buoy northward of Marshall Island, and to a position 200 yards southwestward of the red buoy westward of Hat Island; or from the whistling buoy 1¾ miles southeastward of Heron Island, a 337° true (N. ½ W. mag.) course for 2 miles will lead to a position midway between Green and Brimstone Islands, and the 301° true (NW. ⅜ N. mag.) course can then be followed to a position 200 yards southwestward of the red buoy westward of Hat Island.

Bound to Merchant Row.—From this position, vessels steer 261° true (W. ⅞ N. mag.) passing northward of a black bell buoy and ¼ mile northward of West Halibut Rock horizontally striped buoy, to a position ½ mile westward of West Halibut Rock, then follow directions on page 43.

Bound to Deer Island Thorofare.—From a position 200 yards southwestward of the red buoy westward of Hat Island, vessels can steer 310° true (NNW. ⅞ W. mag.) for 2½ miles, passing ¼ mile northeastward of Whaleback Ledge red buoy, and to a position 200 yards southwestward of Shabby Island (marked by a few trees). Then bring Shabby Island astern on a 293° true (NW. ⅜ W. mag.) course, with Sheep Island a little on the port bow, and pass 250 yards northeastward of black buoy No. 1 and 100 yards northeastward of black buoy No. 3; then haul westward and follow the directions for Deer Island Thorofare on page 42.

Bound to Eggemoggin Reach.—Pass 200 yards westward of the red buoy westward of Hat Island and steer 0° true (N. by E. ⅝ E. mag.) for 2⅝ miles to ⅜ mile west of Egg Rock beacon. Then steer 330° true (N. by W. mag.), heading for Devils Head, until midway between Hay Island Ledge buoy and Channel Rock buoy, and then haul northwestward and follow the directions given on page 43.

EGGEMOGGIN REACH

(Chart 309) lies between the Deer Isles and the mainland and connects Blue Hill Bay and the head of Jericho Bay with Penobscot Bay near its head. It is 11 miles long and has a least width of ⅜ mile at Byard Point. The reach has several villages along its shores. Regular steamers between Rockland and Blue Hill make landings at all of the villages. The eastern entrance is well marked by **Devils Head,** a prominent, high rocky bluff on the south end of Hog Island, and the western entrance by **Pumpkin Island Lighthouse** (white tower connected with dwelling) and **Cape Rosier** (high and thickly wooded).

The main channel through Eggemoggin Reach has been examined by means of a wire drag. The depth is sufficient for deep-draft ves-

sels, but the channel is narrow and the bottom irregular in places and the passage is not recommended for a greater draft than 18 feet (5.5 m.) except with local knowledge. The principal dangers for this draft are buoyed, and can be easily avoided in the day time and clear weather.

Mahoney Island, just eastward of the entrance to Eggemoggin Reach, has scattered trees. **Smuttynose Island,** ½ mile northwestward of Mahoney Island, is grass covered. **Mahoney Ledge,** westward of Mahoney Island, is partly bare at low water.

Greenlaw Cove, on the southwest side of the eastern entrance to Eggemoggin Reach, has a narrow unmarked channel with shoals on both sides, and is suitable only for small craft with local knowledge. **Mountainville** is a post village near the head. The landing is said to be nearly bare at low water. There is little business by water.

Devil Head Ledge, extending ¼ mile southeastward from Devils Head, is partly bare at high water and marked off its end by a red buoy. **Channel Rock** is bare at extreme low water and marked by a black buoy. **The Bowlders,** 400 yards northwestward of Channel Rock, are bare at low water.

Naskeag Harbor, north of **Harbor** and **Hog Islands,** has a fish cannery and the post village of **Naskeag** on the north side. The harbor can be entered from eastward or westward, but there are many unmarked dangers and strangers should not attempt to enter except in small craft.

Centre Harbor, a small cove on the eastern side of the Reach northeastward of **Torry Islands,** is an anchorage for small craft only. The town of **Brooklin** is at the head of the harbor. A rock marked by a black spindle with cage lies in the middle of the entrance northward of **Chatto Island;** the channel is close southward of the rock. Between the spindle and the fish factory on the north side the cove has depths of 8 to 10 feet (2.4 to 3 m.), and above this is mostly dry at low water. The steamer landing is on the north side at the entrance and has a depth of about 14 feet (4.3 m.). There is good anchorage off the entrance in 4 fathoms (7.3 m.) bottom soft in places. The main approach to Centre Harbor is from westward, but local vessels enter by the channel eastward of Torry Islands, passing in mid-channel on either side of the bare rock 350 yards eastward of the easterly Torry Island. This passage should be used by strangers only in small craft.

Benjamin River, the approach to the town of Sedgwick, makes into the eastern shore 2 miles northward of Center Harbor. The channel at the entrance, northward of Cape Carter, has a least depth of 19 feet (5.8 m.), but is much obstructed by ledges on both sides, leaving a passage only 100 yards wide at its narrowest part. The town of **Sedgwick** can only be reached at high water, as the river runs dry some distance below.

North Deer Isle is a post village at the north end of **Deer Isle.** The steamer wharf, known as **Scotts Landing,** ⅜ mile westward of **Tinker Ledges,** has a depth of about 14 feet (4.3 m.). Gasoline and some supplies are available.

Billings Cove, on the northern shore of the Reach, lies east of **Byard Point,** marked by a large white house on the summit. It affords anchorage in the middle just inside the entrance in about 5

fathoms (9.1 m.). **Sargentville,** a post village on the eastern shore of the cove, is one of the landings for steamers passing through the Reach in summer. There is an automobile ferry between Sargentville and Scotts Landing.

Eggemoggin is a summer resort at the north end of Little Deer Isle southeastward of Pumpkin Island Lighthouse. The steamer wharf has a depth of about 12 feet (3.7 m.).

Buck Harbor is on the north side of the Reach, north-northeastward of Pumpkin Island Lighthouse; it affords excellent anchorage, and is often used by small vessels. **Harbor Island,** in the middle of the harbor, has a good channel around it, which forms the anchorage. Shoals extend 250 yards off the northeast side of Harbor Island, and the channel is narrow between them and the shore northeastward. **Harbor Ledge,** at the north end of the shoals, is marked by a black buoy. The channel between the rock and the north end of Harbor Island has a depth of 12 feet (3.7 m.). Small craft can anchor in the bight on the northeast side of Harbor Island. The best anchorage for vessels is westward and northwestward of Harbor Island, in 5 to 6 fathoms (9.1 to 11 m.). The post village and landing of **South Brooksville** is at the head of the harbor. The steamer wharf has a depth of 12 feet (3.7 m.). There are several hotels with float landings.

Orcutt Harbor lies just westward of Buck Harbor and northward of Pumpkin Island Lighthouse. It is about 1¼ miles long and ¼ mile wide. It has good anchorage in 3½ to 8½ fathoms (6.4 to 15.5 m.) in the middle of the harbor just above a small wooded islet. A reef, bare at low water, extends 300 yards southward from **Condon Point,** on the east side at the entrance. When inside this reef, favor, if anything, the eastern side of the entrance to avoid a sunken rock lying nearly 200 yards from the western shore and the same distance southward of the wooded islet. In the slight expansion ½ mile above the islet care must be taken to avoid two sunken rocks, one lying 200 yards from the western shore and the other 150 yards from the southeast side of the expansion.

Horseshoe Cove is a long, narrow cove, the entrance to which lies northwestward of Pumpkin Island Lighthouse; it is navigable only for small craft with local knowledge. There are no wharves.

Thrumcap Island, 1 mile northward of Pumpkin Island Lighthouse, is low and grassy. **Thrumcap Ledge,** southwestward of Thrumcap Island, is partly bare at high water. **Merriman Ledge** is bare at low water only and marked by a black buoy on its north side.

Of the islands near the western entrance to Eggemoggin Reach, **Spectacle Islands** are grassy, **Twobush Islet** is bare, **Hog Island** has scattered trees and a house and barn in the center, and **Pond Island** is grassy, with a small clump of trees on the northeast side and a shanty at the south end. **Western Island** is grassy on its eastern end and has a thick clump of trees on its western end. **Green Ledge** is grassy.

Anchorage.—Vessels can anchor anywhere in the Reach where the depth is suitable and the bottom soft, making a lee of either shore, according to the wind. Small craft anchor in the coves.

Tides.—The mean rise and fall of tides is about 10 feet (3 m.).

Supplies.—Gasoline and provisions can usually be obtained near most of the steamer landings. No other supplies are obtainable.

Directions.—For directions for Eggemoggin Reach see pages 43 and 51.

DEER ISLAND THOROFARE

(chart 309) is a narrow passage leading along the south side of Deer Isle, between it and the numerous islands southward. It joins Jericho Bay on the east and Penobscot Bay on the west and forms one of the chain of inland passages. It is used by the passenger vessels between Rockland and points eastward, and by many other vessels and small craft bound through the inland passages. It has a least width of 150 yards in several places and a least depth of 15 feet (4.6 m.) in a dredged channel 300 feet wide through the bar between Moose and Crotch Islands. It is used by vessels up to 16 feet (4.9 m.) draft, but there are unmarked rocks with 9 to 14 feet (2.7 to 4.3 m.) close to the channel, and local knowledge is necessary to carry through a greater draft than 9 feet (2.7 m.) at low water The dangers for vessels of this draft are marked, and the channel easily followed in the daytime and with clear weather.

Southeast Harbor lies northwestward of the eastern end of the thorofare, between **Stinson Neck** on the east and **Whitmore Neck** on the west. It is an excellent anchorage for vessels using the thorofare. The entrance is easily distinguished and the principal dangers are marked by buoys.

Oceanville is a post village on the south side of Southeast Harbor. There is a cannery here and a wharf with little depth. **South Deer Isle** is a village at the head; it has a wharf with a reported depth of about 6 feet (1.8 m.) at high water.

To enter Southeast Harbor, enter Deer Island Thorofare southward of Long Ledge tripod, between a red and a black buoy, steer 264° true (W. by N. mag.) and pass 100 yards southward of Lazygut Ledge red buoy. When 400 yards westward of this buoy, steer 298° true (NW. mag.), and pass about 350 yards northeastward of Boat Rock horizontally striped buoy and buoy No. 1; select anchorage northeastward of Whaleback, taking care to avoid the rock with 11 feet (3.4 m.) over it. From westward in Deer Island Thorofare, pass between Haycock Rock spindle and Sheldrake Rock, and from a position 250 yards eastward of the latter a 328° true (N. by W. ¼ W. mag.) course leads into the harbor.

Webb Cove, on the north side of Deer Island Thorofare, has rocks in the entrance, but there is good anchorage inside in 8 to 12 feet (2.4 to 3.7 m.). The best water favors the west side of the entrance. There is a quarry on the cove and a wharf with a reported depth of about 8 feet (2.4 m.).

Stonington is a town on the north shore of Deer Island Thorofare. It has steamer communication with Rockland and Bar Harbor and intermediate points, and is the headquarters for the large granite quarries on the adjacent islands. The steamboat wharf has a depth of 12 feet (3.7 m.), but there is a ledge off the wharf, marked by private buoys. The other wharves have less depths. Gasoline, provisions, and some ship chandlery are obtainable. There are telephone and telegraph connections with the mainland.

A towboat engaged in towing rock barges from the quarries is stationed at Stonington and is available at times.

Prominent objects.—At the eastern entrance the most prominent object is Long Ledge tripod beacon. **Shabby Island** is marked by a few trees. At the western entrance **Mark Island** (wooded on top) with **Deer Island Thorofare Lighthouse** (white tower attached to dwelling) are the most prominent marks. There is an unused quarry on the north side of Crotch Island and an active quarry on Thurlow Head. A large standpipe (painted red) and a high brick chimney are prominent in approaching Stonington from the westward.

Anchorage.—The best anchorage for vessels bound through the thorofare and overtaken by night or bad weather is Southeast Harbor. When overtaken by fog, they may anchor anywhere near the channel where the bottom is soft and depth suitable. Many small vessels anchor on the north side of the channel abreast Stonington, the generally used anchorage being between the steamer wharf and the red buoy ⅜ mile eastward.

Ice closes the thorofare and Southeast Harbor for about one month each winter.

Tides.—The mean rise and fall of tides at Stonington is 10 feet (3.0 m.).

Currents.—The tidal currents follow the general direction of the channel and are not strong. The direction of the currents is influenced by the wind; with strong easterly winds both the flood and ebb set westward, and with westerly winds they set eastward. When not influenced by the wind the flood sets eastward and the ebb westward, and continues to run about ¾ hour after high and low waters.

Directions.—For directions through Deer Island Thorofare see pages 42 and 50.

MERCHANT ROW

This passage (Chart 309), leading from Jericho Bay to East Penobscot Bay and passing between the islands and ledges lying between Deer Island and Isle au Haut, is used by vessels in the winter, when Deer Island Thorofare is closed by ice, and by deep-draft vessels at all times. It is not quite so direct as Deer Island Thorofare, but the channel is wider, and is good for a depth of 26 feet (7.9 m.). There are numerous ledges and rocks on both sides of this passage, but the principal ones are marked by buoys or spindles, and the channel can be readily followed in clear weather and daylight.

Directions for Merchant Row from eastward are given on page 43. Deep-draft vessels can enter through the passage between Marshall and Swan Islands and Jericho Bay, as directed on page 117. Directions for entering Merchant Row from southwestward in Isle au Haut Bay are given on page 132.

Halibut Rocks, in Jericho Bay eastward of the entrance, are two rocks, the northerly one marked by a red slatted beacon. There is a black bell buoy northward of the rocks.

West Halibut Rock, 1 mile westward of Halibut Rocks, has 2 feet (0.6 m.) over it and is marked by a horizontally striped buoy. A rock with 9 feet (2.7 m.) over it lies 400 yards northeastward of the

buoy. **A local magnetic attraction** is reported on the broken ground ½ mile east-northeastward of Southern Mark Island.

Southern Mark Island is about 30 feet (9.1 m.) high and grassy. **Southern Mark Island Ledge,** ¾ mile northward, has a rock bare at high water.

Colby Ledge is bare at half tide and marked by a spindle. A ledge with 15 feet (4.6 m.) over it lies 300 yards southward of the spindle.

Barter Island Ledges are partly bare at high water and marked by a spindle.

Ewe Island is a prominent, round, thickly wooded islet, ⅜ mile northwestward of Merchant Island.

Farrel and **Scraggy Islands** are wooded; there are several bare rocks off the south side of Scraggy Island. **Sparrow Island** is grass covered. The islands and rocks southward and westward are described on page 128.

Deer Island Thorofare Lighthouse, a white tower connected with dwelling on the north side at the entrance, is the most prominent mark entering from westward.

FOX ISLANDS THOROFARE

This thorofare (Chart 311a), leading from East Penobscot Bay to West Penobscot Bay, between North Haven and Vinalhaven Islands, is one of the chain of inshore passages commencing at Bass Harbor and ending at Whitehead. It is about 7 miles long, and the channel, with a depth of 18 feet (5.5 m.) or more, has a least width of about 150 yards in several places; the principal dangers are marked by buoys and spindles, which can be easily followed in the daytime with clear weather. The least depth in the channel is 19 feet (5.8 m.), but the thorofare is seldom used by vessels of over 14 feet (4.3 m.) draft at low water. The main channel has been examined by means of a wire drag.

Carver Cove, in the south shore of the thorofare, near its eastern end, is a secure anchorage, easy of access, and convenient for vessels windbound in East Penobscot Bay or passing through the thorofares. The anchorage is about ½ mile from the head of the cove and 197° true (SW. by S. mag.) from the hospital on Widow Island, in 16 to 20 feet (4.9 to 6.1 m.), good holding ground. The entrance on either side of Widow Island is clear, if the shores be given a berth of about 200 yards; but the point on the south side, at the eastern entrance of the cove, must be given a berth of over 300 yards.

Kent Cove, in the north shore of the thorofare, north of Widow Island, is a secure anchorage, with 15 to 24 feet (4.6 to 7.3 m.) good holding ground. Goose Rocks Lighthouse is the prominent guide for entering either in the daytime or at night, the entrance being westward of the lighthouse. **Kent Ledge,** the only outlying danger, has 5 feet (1.5 m.) over it and lies ¼ mile northeastward of Fish Point Ledge red buoy, and the same distance from the northwest shore of the cove.

Waterman Cove makes into the north shore west of Kent Cove; it is a good anchorage for small vessels, the water shoaling gradually from 18 feet (5.5 m.) at the entrance to 5 feet (1.5 m.) near its head, where a narrow channel leads into a shallow cove called the **Cubby**

Hole. **Waterman Ledge,** with 4 feet (1.2 m.) over it and marked by a red buoy, lies in the mouth of the cove ¼ mile from the western shore. The better entrance is between the buoy and Fish Point Ledge. **Fish Point Ledge,** partly bare at half tide and marked at its southeast end by a red buoy, lies 400 to 600 yards southeastward of Fish Point, with foul ground between.

Seal Cove is a large arm extending 1½ miles southward from Fox Islands Thorofare southeastward of the village of North Haven. Large areas in the cove have depths of 8 to 12 feet (2.4 to 3.7 m.), bottom soft in places. Good anchorage can be selected in the channel of the thorofare between the entrance of Seal Cove and the western end of the village of North Haven, in 4 to 6 fathoms (7.3 to 11.0 m.), soft bottom.

Perry Cove is a long, narrow arm making westward on the west shore of Seal Cove; it is of no importance as an anchorage and should be avoided by strangers.

Southern Harbor makes northeastward between the Dumpling Islands and Amesbury Point, near the western end of the thorofare. It has good anchorage in 19 to 22 feet (5.8 to 6.7 m.), soft bottom, in the middle of the harbor; the water shoals gradually toward its head.

In the western entrance of Fox Islands Thorofare there is good anchorage for vessels of any draft westward or northward of Sugarloaves, and between Crabtree Point Ledge and Amesbury Point, in 5 to 7 fathoms (9.1 to 12.8 m.), soft bottom.

North Haven is a village on the north shore of Deer Island Thorofare. It has steamer communication with Rockland, Bar Harbor, and other villages. The steamer wharf has a depth of about 11 feet (3.4 m.) and the other wharves less. Gasoline and provisions are obtainable. Small craft anchor on the north side of the channel, taking care to leave a clear channel to the steamer wharf. Two ledges off the town, both marked by buoys, must be avoided. There is telegraph and telephone communication with the mainland.

Prominent objects.—Channel Rock tripod, at the eastern entrance, is a prominent mark. **Widow Island** is marked by a large brick building formerly used as a hospital, and is easily distinguished. **Goose Rocks Lighthouse** (white conical tower on black base) is on the north side of the channel, north of Widow Island; it is the guide for the eastern entrance of the thorofare and for the anchorage in Kent Cove. **Browns Head Lighthouse** (white cylindrical tower connected with dwelling) marks the entrance to the thorofare from westward. **Sugarloaves** are a ledge of prominent high rocks lying 600 yards northwestward of Browns Head Lighthouse. **Fiddler Ledge** beacon (gray stone), lying 1⅜ miles westward of Browns Head Lighthouse, is a prominent mark when approaching from westward. Drunkard Ledge spindle is ½ mile westward of the beacon. Broken ground, which should be avoided by vessels, extends ¼ mile southward of the line joining the beacon and spindle. A large standpipe just back of North Haven shows up prominently in approaching from either direction. The thorofare is often closed by ice in the winter season.

Tidal currents.—The currents are not strong; they meet at Iron Point, in the middle of the thorofare, the flood setting in from both ends and the ebb setting out. The mean rise and fall of tides is about 9½ feet (2.8 m.).

Directions.—For directions through Fox Island Thorofare see pages 44 and 50.

PENOBSCOT BAY

(charts 309, 310, and 311) is the largest and most important of the many indentations on the coast of Maine. It is about 20 miles wide from Isle au Haut on the east to Whitehead on the west, and is 28 miles long from its entrance to the mouth of the Penobscot River. A chain of large and small islands divides it into two parts known as East and West Penobscot Bays; the southern part of East Penobscot Bay is known as Isle au Haut Bay. Numerous harbors indent its shores, those of the most importance being Rockland, Rockport, Camden, and Belfast on the western shore, and Castine on the eastern. The bay is the approach to Penobscot River, which has several towns, and the city of Bangor at the head.

The sea approaches to the bay are well marked by the lighthouses on Monhegan Island and Matinicus Rock, and the entrances by Saddleback Ledge Lighthouse on the east and Whitehead and Twobush Island Lighthouses on the west sides of the bay. The harbors are well lighted and the more important dangers are indicated by buoys or beacons. A number of coasting and a few foreign vessels enter the bay, especially in summer. In winter many of the harbors are obstructed by ice, and the Penobscot River is sometimes entirely closed by it. The thorofares are only occasionally obstructed by ice and are much used by vessels bound along the coast.

Penobscot Bay is a region of rocks and ledges, and extreme caution is necessary in navigating. It can be entered from eastward through Eggemoggin Reach, Deer Island Thorofare, or Merchant Row, and from westward through Muscle Ridge channel or Twobush Channel. The main channel through these thorofares and the main part of both East and West Penobscot Bay, from a line joining Isle au Haut and Matinicus Islands northward to the entrances of Penobscot River and Belfast Harbor have been examined by means of a wire drag.

Pilots.—Pilotage is not compulsory for vessels entering Penobscot Bay, and vessels seldom take pilots. There are no regular licensed pilots, but local fishermen are competent pilots for the tributaries or the inside passages, and can usually be obtained from boats at work near the entrances or from the towns in the vicinity. Pilots for the inside passages between Bass Harbor Bar and Rockland can usually be obtained from Southwest Harbor, Bass Harbor, or Rockland.

Towboats.—There are towboats at Rockland and Bangor.

Supplies.—Gasoline and provisions are obtainable at all of the towns and villages; and coal, water, and ship chandlery at Rockland and Bangor, and usually in limited quantities at Camden, Belfast, Bucksport, and Winterport. Matinicus and Criehaven are the only places on the islands off the entrance to Penobscot Bay where gasoline and provisions can be obtained.

Repairs.—The only marine railways available in Penobscot Bay in 1926 were at Rockland and Camden (see their descriptions). Much of the repairing to small vessels and motor boats is done on the beaches at low water. Ordinary repairs to machinery can be made at Rockland and Bangor, and minor repairs at Camden and Belfast.

Communications.—Rockland, Bangor, Belfast, and intermediate landings have steamer communication with Boston. There is also steamer communication from Rockland to Portland, and to all of the towns and villages on the islands and thorofares eastward as far as Blue Hill and Bar Harbor. The main steamer lines generally run throughout the year, but are more frequent in summer. Rockland, Belfast, and the points on the Penobscot River have railroad communication.

Tides.—The mean rise and fall of tides varies from 9 feet (2.7 m.) near the entrance to about 10 feet (3.0 m.) in Eggemoggin Reach and near the head of Penobscot Bay. The rise and fall increases in passing up the Penobscot River, the mean range at Bangor being about 13 feet (4.0 m.).

ISLANDS AND ROCKS OFF PENOBSCOT BAY

The area including these islands and rocks (charts 225 and 1203) has an extreme length of 21½ miles from Threefathom Ledge, eastward of Seal Island, to Roaring Bull, westward of Metinic Island. There is no secure harbor for vessels at any of the islands, but the small craft of local fishermen moor in Matinicus Harbor, the cove on the eastern side of Matinicus Island northward of Wheaton Island. The waters of this area are well surveyed, and there are deep passages between the islands, as shown on the chart. On account of the broken nature of the bottom, however, vessels, particularly deep-draft ones, should avoid all broken ground, especially with depths less than 10 or 12 fathoms (18.3 or 21.9 m.).

These waters are frequented mostly by local fishermen. The only settlements are on Matinicus and Ragged Islands, to which there is steamer communication from Rockland.

Seal Island, the easternmost, is bare, rocky, about 60 feet high (18.3 m.), and 1 mile long. There are several small houses near its eastern end. **Eastern Ledge,** on which the sea generally breaks, extends 350 yards off the east end of the island. **Threefathom Ledge** lies 1½ miles eastward of Seal Island.

Malcolm Ledge, lying midway between Seal Island and Wooden Ball Island, is ⅜ mile long. The north end of the ledge is awash at high water; the south end is bare at half tide.

Wooden Ball Island is bare, rocky, about 60 feet (18.3 m.) high, and 1 mile long. The eastern point of the island is a prominent knob about 80 feet (24.4 m.) high, and there are a few small houses at the low place in the western part of the island.

Matinicus Rock, the southernmost islet, is about 40 feet (12.2 m.) high, and is marked near its south end by Matinicus Rock Lighthouse.

Matinicus Rock Lighthouse is the southernmost of two cylindrical granite towers. The light is flashing white (1 flash alternating with a group of 2 flashes every 15 seconds). The fog signal is an air whistle sounding a blast of 5 seconds and silent 25 seconds.

Nomans Land, Matinicus Island, Tenpound Island, and **Ragged Island** are partly wooded, and are the principal ones of a group of islands and rocks about 5 miles long. There are numerous, high, bare rocks, including **Green** and **Brig Ledges,** on the east and south sides of Ragged Island, and broken ground extends ¾ mile southward from it to **Inner Breaker,** which has a depth of 3 feet (0.9 m.) over it and is marked by a red buoy. **South Breaker** is on a small rock, awash at lowest tides and marked by a horizontally striped buoy, 1¾ miles southward of Ragged Island and 1⅝ miles northwestward of Matinicus Rock Lighthouse.

Criehaven is a village of fishermen in the cove on the western side of Ragged Island. The steamer wharf has a depth of about 6 feet (1.8 m.) and the other wharves are shoal. Gasoline and provisions are obtainable. There are shoals on the south side just outside the entrance to the harbor, and the best water favors the north side until inside. The harbor is a poor shelter in westerly weather. At such times the steamer lands at a wharf in **Marsh Cove,** on the southeast side of Ragged Island, and anchorage can also be had here. The wharf here is nearly bare at low water.

Shag Ledge, close to the northeast end of Ragged Island, is high, bare, and rocky. **The Hogshead** is a small bare rock ¼ mile northeastward. Tenpound Island is grassy with a few trees.

Western and **Eastern Black Ledges** are bare rocks eastward of Matinicus Island. **Tuckanuck Ledge,** 200 yards eastward of **Eastern Black Ledge,** is covered at high water. A rock with 10 feet (3.0 m.) over it lies ¼ mile south-southwestward of Western Black Ledge. **Mackerel Ledge,** bare at half tide, lies 700 yards north-northeastward of Eastern Black Ledge.

Matinicus Harbor (chart 225) is a cove on the east side of Matinicus Island inside Wheaton Island and a breakwater making out from the north shore to **Indian Ledge.** Small vessels can anchor in the middle, south-southwestward of Indian Ledge, in 4 fathoms (7.3 m.), exposed to northeasterly winds. Small craft can anchor inside the breakwater, where there is an area 200 yards square with depths of 1 to 7 feet (0.3 to 2.1 m.), protected from all winds. This anchorage is usually full of local fishing boats in bad weather. The entrance to the inner harbor is on either side of **Dexter Ledge,** awash at high water and usually marked on the southwest side by a small private spindle. The usual entrance is 125 feet southwestward of the highest part of the ledge and 50 feet southwestward of the spindle.

Matinicus is a town on Matinicus Harbor. It has steamer communication with Rockland. The principal wharf, on the northwest side, has a depth of about 2 feet (0.6 m.) at low water, and the other wharves are bare. Gasoline, provisions, and some motor-boat supplies are obtainable.

The thorofare between **Wheaton Island** and the point westward is bare at low water. There are small wharves, and small craft sometimes anchor here. **Old Cove,** westward of the south end of Wheaton Island, is seldom used as an anchorage.

Harbor Ledge is a rock with 4 feet (1.2 m.) on it, lying 300 yards northeastward of the entrance of Matinicus Harbor, and is marked on its south side by a horizontally striped buoy. **The Barrel,** lying

300 yards northeastward of Harbor Ledge, is a rock bare at half tide at the south end of a sunken ledge 300 yards long.

Nomans Land, the largest of the rocks and islets northeastward of Matinicus Island, is sparsely wooded and has a shanty on its west side.

Twobush Islet is grassy on top and is joined to the northeast end of Matinicus Island by a sunken ledge. **Twobush Ledge,** high and bare, lies southeastward of the islet; sunken rocks extend 350 yards eastward and northeastward from the ledge. **Beach Ledges** are two rocks, bare at a little below high water, between Twobush Ledge and Matinicus Island. **Whaleback** is a rock, bare at low water, lying ¼ mile westward of Nomans Land, and is marked on its northwest side by a black buoy. **Zephyr Ledges** are two rocks, bare at low water, lying ¼ mile northeastward of Nomans Land. **Zephyr Rock,** the northeast end of the group, is a rock with 5 feet (1.5 m.) over it lying ⅝ mile northeastward of Nomans Land, and is marked on its northerly side by a black buoy.

Local boats bound to Matinicus Harbor from northward carry a draft of 6 feet (1.8 m.) at low water through the channel between Matinicus Island on the west and Twobush Island and Beach Ledges on the east. Strangers should use this passage only in small boats and with a smooth sea.

Black Rocks are three bare rocks ¼ mile westward of Matinicus Island.

Bantam Ledge is a rock bare at half tide, with deep water around it, lying 2⅜ miles 283° true (NW. by W. ¼ W. mag.) from the south end of Ragged Island. It is marked by a horizontally striped buoy, placed 100 yards south of the ledge.

Foster Ledges are two rocks with 6 and 13 feet (1.8 and 4.0 m.) over them; the southwestern and shoaler rock is marked on its south side by a horizontally striped buoy. The ledges lie 1¾ miles westward of the north end of Matinicus Island.

Pigeon Ground is broken ground about 2 miles long in an east-northeasterly direction, lying 2 miles southward of Large Green Island. There are depths of 3½ and 2½ fathoms (6.4 and 4.6 m.) on its eastern and western parts, respectively.

Green Island Seal Ledges lie ⅝ to ⅞ mile south-southeastward of Large Green Island, with broken ground between. The southern part of the ledge is awash at high water; its north end is covered at half tide. A black whistling buoy is moored about ⅜ mile southeastward of the ledge.

Large Green Island is low and grassy, and has some houses on its northern part. **Herring Ledge,** partly bare at low water, extends ⅜ mile southward from the island.

Little Green Island is low and grassy, and has one house near its eastern end. **Collins Rock,** with 5 feet (1.5 m.) over it, lies 1⅛ miles eastward of the island.

Northern Triangles is a reef about 1 mile long in an east-southeasterly direction lying 1 mile northward of Little Green Island. In the western half of the reef are some ledges bare at low water. Northern Triangles black buoy is placed about ½ mile northward of the eastern end of the reef. A ledge with 15 feet (4.6 m.) over it lies 2 miles northward of Little Green Island and 2 miles southeastward

of Twobush Island Lighthouse, and is marked by a horizontally striped buoy.

Alden Rock, with 4 feet (1.2 m.) over it and marked, on its southern side, by a horizontally striped buoy, lies 1⅜ miles northwestward of Little Green Island. An unmarked rock with 14 feet (4.3 m.) over it lies ¾ mile west-northwestward of Alden Rock. The 14-foot (4.3 m.) rock is at the eastern end of broken ground nearly 1 mile long, with least depths of 25 to 28 feet (7.6 to 8.5 m.).

Southern Triangles are three rocks awash at low water lying midway between Little Green and Metinic Islands. The southwestern rock lies ⅝ mile from the other two. A black buoy lies 200 yards southeastward of the easternmost rock.

Metinic Island is nearly 2 miles long, 70 feet (21.3 m.) high near its northern end, and partly wooded; it has no wharves. **Metinic Green Island,** low and grassy, lies ⅜ mile southwestward of Metinic Island, with foul ground between. A rock awash at low water lies 300 yards southwestward of Metinic Green Island. **Wheeler Rock,** with 5 feet (1.5 m.) over it, lies ⅜ mile north-northeastward, and **Wheeler Big Rock,** awash at high water, lies 300 yards northward of the northeast point of Metinic Island. **Green Point Shoal,** with 19 feet (5.8 m.) over it, lies ⅞ mile eastward of the middle of Metinic Island.

Broken ground extends 2 to 3 miles westward and southwestward from Metinic Island. The following are the shoaler places determined by the survey:

Black Rock, covered at high water, lies ⅝ mile westward of the middle of Metinic Island. A rock with 14 feet (4.3 m.) over it, lies ⅜ mile southwestward of Black Rock.

Metinic Island Ledge, with 8 feet (2.4 m.) over it and marked at its southwest end by a horizontally striped buoy, lies 1¾ miles westward of Metinic Island, on the range of the north end of the latter and the middle of Large Green Island. A rock with 26 feet (7.9 m.) over it lies ⅝ mile northeastward of it. **Hooper Shoal,** with 17 feet (5.2 m.) over it, lies ⅝ mile southwestward from Metinic Island Ledge.

Roaring Bull, awash at low water and generally marked by breakers, lies 2¾ miles westward of Metinic Green Island. It is marked on its northwest side by a black buoy. A ledge, with a least depth of 4½ fathoms (8.2 m.), lies ⅝ mile north-northwestward of Roaring Bull.

Southeast Breaker is on a ledge about ½ mile long in a northeast direction, the higher part of which is bare at half tide. It lies 2 miles southwestward of Metinic Green Island, on the range of the south end of the latter and the north end of Large Green Island.

Haddock Ledge, with 13 feet (4.0 m.) over it, lies 1¼ miles southward of Southeast Breaker and 2½ miles southwestward of Metinic Green Island.

EAST PENOBSCOT BAY

is the part of Penobscot Bay lying eastward of Vinalhaven, North Haven, and North and South Islesboro; its southern end, between Isle au Haut and Vinalhaven Island, is called **Isle au Haut Bay.** The islands in East Penobscot Bay have numerous coves and small

harbors, but few of these are available anchorages, some on account of their depth and others on account of the numerous dangers which obstruct their entrances. East Penobscot Bay is entered from eastward through Eggemoggin Reach, Deer Island Thorofare, and Merchant Row, and from southward between Isle au Haut and Vinalhaven Island. Saddleback Ledge Lighthouse is the guide to this entrance. Numerous unmarked ledges lie westward of Isle au Haut and off the western entrance to Merchant Row and Deer Island Thorofare. Northeastward of Northhaven Island there are numerous islands and ledges.

The channel to the head of Penobscot Bay leads eastward of **Eagle Island,** marked by a lighthouse, and passes between the islands in a north-northwesterly direction to Cape Rosier. A depth of over 5 fathoms (9.1 m.) can be taken up the bay by closely following the directions.

Saddleback Ledge Lighthouse, on a rocky islet in the middle of the southerly entrance to East Penobscot Bay, is a gray conical tower with white dwelling attached. The light is fixed white, 54 feet (16.5 m.) above the water, and visible 13 miles. The fog signal is a bell, sounding one stroke every 10 seconds. There is broken ground between the lighthouse and Vinalhaven, and deep-draft vessels should enter eastward of the lighthouse.

Head Harbor is a small bight in the south shore of Isle au Haut, just west of **Eastern Head;** it is exposed to southerly winds and used only by fishermen. The bottom is rocky, except in the northwestern part, where the depth is from 4¾ to 9 fathoms (8.7 to 16.5 m.). There are a few houses in the northeastern part, but no wharves.

Roaring Bull Ledge, 1 mile south-southwestward of Head Harbor, is bare at half tide and marked by a spindle. There is a red whistling buoy ⅝ mile southward of the ledge.

Western Ear is a wooded island at the southwest end of Isle au Haut. **Western Ear Ledge,** ¼ mile southward of Western Ear, is bare at half tide.

The western side of Isle au Haut is fringed with many rocks and shoals, bare and submerged. The westernmost visible at high water are **The Brandies,** three bare rocks 1 mile westward of the southern part of Isle au Haut, and **Kimball Rock,** awash at high water, ⅝ mile westward of the western end of **Kimball Island.** Several rocky spots with depths of 18 to 30 feet (5.5 to 9.1 m.) lie outside the line joining these rocks.

Moore Harbor is a cove on the western side of Isle au Haut, about 2½ miles above Western Ear. This harbor has many outlying ledges off the entrance and in the harbor, and is an unsafe anchorage.

Isle au Haut Thorofare is on the western side of Isle au Haut, between it and Kimball Island; though called a thorofare, it has a bar near its eastern entrance, dry at low water, extending from Isle au Haut to Kimball Island. It has a greatest width of ¼ mile at its western end, and is a secure anchorage for small craft or very small vessels in 5 fathoms (9.1 m.). A buoy and spindle mark the two principal dangers.

Enter Isle au Haut Thorofare between Isle au Haut Lighthouse (on Robinson Point) and **Sawyer Ledge** black buoy, and pass southward of **Inner Ledge** spindle, giving it a berth of over 50 yards.

Then keep in mid-channel except in the choke at the entrance of the anchorage, where the northern side should be favored slightly. Avoid a rock, bare at low water only, which lies 90 yards from the northwest side of the anchorage.

Isle au Haut is a village on the south side of Isle au Haut Thorofare. There are several wharves. Gasoline and provisions are obtainable.

Lookout is a village and summer resort at the eastern end of Isle au Haut Thorofare. It has steamer communication with Rockland to a wharf on Point Lookout. There is a buoyed channel to the wharf from Merchant Row, leading between Merchant and Hardwood Islands. Merchant Row is described on page 121.

Hardwood Island is round and heavily wooded. **Ram Island,** ¼ mile southwestward of Hardwood Island, has a clump of trees on its north side. **Channel Rock,** nearly ½ mile westward of Ram Island, is covered at high water and is marked by a large white tripod beacon, upper half slatted. **Ram Island Ledge,** bare at low water, lies 400 yards southeastward of Channel Rock tripod.

Scraggy Ledge is a bare ledge ⅜ mile westward of Channel Rock tripod. There is foul ground between it and **West Halibut Ledges;** the latter are bare. **Outer Scrag Ledge,** 1 mile northwestward of Scraggy Ledge, is partly bare at high water. **Brown Cow,** 1 mile north-northwestward of Outer Scrag Ledge, is awash at high water. It is the westernmost danger at the western end of Merchant Row.

Winter Harbor, Seal Bay, and **Smith Cove** make into the northeastern part of Vinalhaven Island, south of the eastern entrance to Fox Islands Thorofare; they are of no commercial importance and not safe for a stranger to enter.

Fox Islands Thorofare is described on page 122. Carver Cove and Kent Cove are two excellent anchorages, easily entered by strangers, in Fox Islands Thorofare near its eastern entrance.

Little Thorofare is a passage into Fox Islands Thorofare north of the main entrance. It is not buoyed, and strangers should not attempt to use it.

Passage north of Northhaven Island.—There is a passage northward of Northhaven Island, which is used in winter when Fox Islands Thorofare is closed by ice. To go through this passage, pass about 300 yards southward of Eagle Island and steer 275° true (WNW. mag.) for **Spoon Ledge** (high, with grass on top). On this course pass 400 yards northward of **Grass Ledge** (high and grass-covered) and the same distance northward of **Oak Island,** the grassy island southeastward of Spoon Ledge. Pass midway between Oak Island and Spoon Ledge and steer 242° true (W. by S. mag.) for 12¼ miles to Rockland Breakwater Lighthouse.

Deer Island Thorofare, south of Deer Isle, is described on page 120.

Burnt Cove and **Crockett Cove** are two small coves lying between Fifield Point and Barred Island, on the southwestern side of Deer Isle. They are of no importance as anchorages, and are foul, especially Burnt Cove. **West Deer Isle** is a village on Burnt Cove. **Southwest Harbor** is on the western side of Deer Isle, about 4 miles north of Deer Island Thorofare Lighthouse. It is about ½ mile wide at the entrance and 1 mile long, with anchorage in 3 to 5 fathoms (5.5 to 9.1 m.), but is not much used, as it is open southward.

The village of **Sunset** is on the eastern shore of the harbor; there are no wharves.

Northwest Harbor, on the northwestern side of Deer Isle, is about ⅜ mile wide and 1¼ miles long. A large part of its upper half is bare at low water, but in mid-harbor below the small wharf on the northeast side good anchorage will be found for small vessels in 13 to 17 feet (4.0 to 5.2 m.), soft bottom. The harbor is sheltered from all but northwesterly winds. There is also good anchorage off the entrance of the harbor between Gull Ledge and Heart Island, in 3½ to 5 fathoms (6.4 to 9.1 m.). The village of **Deer Isle** is near the head of the harbor; the steamboat landing is at North Deer Isle on Eggemoggin Reach. During January and February the harbor is closed by ice.

Directions.—Approaching Northwest Harbor from southward, pass 300 to 400 yards westward of the bare ledge off the north side of **Dunham Point,** steer 33° true (NE. ½ E. mag.) for the eastern end of Little Deer Isle, and pass 300 to 400 yards northwestward of a red buoy which marks the southwest end of a ledge bare at half tide. When well past the buoy, steer 67° true (E. ½ N. mag.) for **Heart Island** (high, grassy, partly wooded knoll near Deer Isle), and pass 300 to 400 yards northward of **Gull Ledge** partly bare at high water). When past Gull Ledge, steer 124° true (SE. ½ S. mag.) for the middle of the entrance of Northwest Harbor.

Approaching Northwest Harbor from northwestward, pass 150 to not over 250 yards southwestward of the southwest point of **Pickering Island** (high and wooded), and from this position a 124° true (SE. ⅝ S. mag.) course for 2¾ miles will head to the middle of the entrance.

Eagle Island is wooded, and has a lighthouse (white tower attached to dwelling) at the eastern end. There is a post office **(Eagle)** and small settlement on the island, and a wharf at which vessels sometimes land at high water.

The other islands in this vicinity are wooded and have no prominent marks. **Great Spruce Head Island** is the highest (220 feet (67 m.) on the north end). **Butter Island** is inhabited, and has a post office **(Dirigo Island)** in summer. **Oak Island** has a shack near its center.

Burnt Island is wooded except for its northwest end, which is grass covered.

Eggemoggin Reach and the islands off its western entrance are described beginning on page 117.

Egg Rock, the most westerly of the dangers north of Northhaven Island, is a small, grass-covered rock. **Egg Rock Ledge,** ¼ mile southwestward of Egg Rock, has a least depth of 2 feet (0.6 m.), and is marked on the east side by a horizontally striped buoy.

Resolution Island, the northwesterly island of the group between Northhaven Island and Cape Rosier, is 60 feet (18.3 m.) high, partly wooded, and has an inconspicuous house on the north end and a flagstaff in the center.

Long Island, Islesboro, and the adjacent islands and coves separating East and West Penobscot Bay at their heads, are described under a separate heading on page 139. Bagaduce River and Castine Harbor are described on page 134 and Penobscot River on page 152.

DIRECTIONS, EAST PENOBSCOT BAY

This region is an area of rocks and ledges, many of them unmarked, and extreme care is necessary in navigating it. The main part of East Penobscot Bay, from a little southward of Saddleback Ledge Lighthouse to the entrance of Penobscot Bay by the channel between Eagle and Hardhead Islands, has been examined by means of a wire drag. The principal thorofares east and west have also been dragged. Areas near the shores were not covered.

The principal traffic through East Penobscot Bay is in an east and west direction, through the inside passages, but there is a clear channel, good for the deepest draft vessels and with the principal dangers marked, through the bay from sea to the head. The following directions lead in a depth of over 5 fathoms (9.1 m.) to the entrance of Penobscot River. For directions through the thorofares, see their descriptions.

1. Approaching from eastward or southward.—Approaching from eastward or southeastward, shape the course for Roaring Bull Ledge whistling buoy, lying 1¾ miles southward of Isle au Haut, and from the buoy steer 295° true (NW. ⅛ W. mag.) for Saddleback Ledge Lighthouse.

Or, steer for Saddleback Ledge Lighthouse on any bearing between 295° true (NW. ⅛ W. mag.) and 343° true (N. mag.); the latter bearing leads 1 mile eastward of Threefathom Ledge.

When northward of Seal, Wooden Ball, and Matinicus Islands, steer for Saddleback Ledge Lighthouse on any bearing northward of 59° true (ENE. ⅞ E. mag.). This bearing leads ½ mile southeastward of Bay Ledge bell buoy.

Pass ¼ to ½ mile eastward of Saddleback Ledge Lighthouse and proceed as directed in section 2 or 2 A.

1A. Approaching from southwestward.—The passages between the islands eastward and westward of Matinicus Island may be used with the assistance of the chart. (See the description of the islands on p. 125.) One of the best is as follows:

Steer for Matinicus Rock Lighthouse, passing southward of South Breaker buoy, pass ½ mile northwestward of the lighthouse, and steer 17° true (NE. ⅞ N. mag.) for 4½ miles to a position ¾ mile off the northwest side of Wooden Ball Island. Then steer 27° true (NE. mag.) for Saddleback Ledge Lighthouse, the distance to which is 10½ miles. The last course leads about ¼ mile westward of **Snippershan,** which has a least depth of 6 fathoms (11 m.), as determined by means of a wire drag, and lies 4¼ miles southwestward of Saddleback Ledge Lighthouse.

Or, pass 1½ to 2 miles southward of Monhegan Island, and steer 64° true (E. ¾ N. mag.) for 17½ miles, heading for the north end of Matinicus Island. When about 1½ miles from the island, and its southwest end is closed on the northeast end of Ragged Island, the position should be ½ mile southward of Foster Ledges horizontally striped buoy. Then steer 45° true (NE. by E. ⅝ E. mag.) for 13 miles, and pass ½ mile northward of Matinicus Island and ¼ to ½ mile southward and eastward of Saddleback Ledge Lighthouse. Then follow the directions in section 2 or 2 A.

Or, pass 1½ to 2 miles southward of Monhegan Island and steer 55° true (ENE. ½ E. mag.) for 16 miles to the black whistling buoy between Pigeon Ground and Green Island Seal Ledges. From this buoy the course continued for 13½ miles will lead 1 mile southeastward of Bay Ledge bell buoy and to Saddleback Ledge Lighthouse. The lighthouse will be made in line with the summit of Isle au Haut ahead.

2. Saddleback Ledge to Fort Point.—Pass ⅜ mile eastward of Saddleback Ledge Lighthouse and steer 351° true (N. ¾ E. mag.) for 12¼ miles, passing ⅝ mile westward of The Brown Cow and ⅛ mile eastward of a horizontally striped buoy ⅞ mile southward of Eagle Island Lighthouse to a position ¼ mile eastward of Eagle Island Lighthouse. Then steer 322° true (N. by W. ¾ W. mag.) for 5¼ miles to a position ½ mile westward of **Green Ledge,** the grassy islet westward of Western Island. Then steer about 2° true (N. by E. ¾ E. mag.) for 9 miles, passing about ⅜ mile westward of Cape Rosier, and then following the eastern shore at a distance of about ½ mile. When Fort Point Lighthouse bears 19° true (NE. ¾ N. mag.), steer for it. Pass over 200 yards westward of Fort Point Ledge beacon and midway between the beacon and the lighthouse. Pass ¼ mile eastward of Fort Point and follow the directions for Penobscot River on page 154.

2 A. Saddleback Ledge to Merchant Row or Stonington.—The directions of this section are good for a depth of 28 feet (8.5 m.) to Merchant Row, and are good for vessels of 12-foot (3.7 m.) or less draft through the passage eastward of Crotch Island to Deer Island Thorofare, but lead close to unmarked dangers with less depth. Strangers are advised not to use them with a greater draft than 10 feet (3.0 m.).

Bring Saddleback Ledge Lighthouse astern on a 15° true (NNE. ⅞ E. mag.) course, heading for the prominent standpipe at Stonington. **Farrel Island** (wooded) will be made ahead, and Scraggy Ledge (bare) a little on the starboard bow. When ½ mile or more southward of Scraggy Ledge, stand eastward until the standpipe is in line with the eastern end of Farrel Island, and then steer this range, course 11° true (NNE. ⅝ E. mag.), which will lead nearly 200 yards eastward of the rock with 11 feet (3.4 m.) over it lying 400 yards southward of Scraggy Ledge, and pass midway between Scraggy Ledge and Channel Rock tripod.

From a position 300 yards northwestward of Channel Rock tripod, steer 31° true (NE. ¼ E. mag.) for the summit of Green Island and pass 300 to 400 yards southeastward of **John Island,** the low, grassy island with some scrubby trees lying ⅜ mile southward of Crotch Island. Pass 150 to 200 yards eastward of **Sand Island,** the rocky, wooded island close to the southeast end of Crotch Island, and steer 348° true (N. ½ E. mag.), following the shore of Crotch Island at a distance of 250 to 300 yards and passing westward of two red buoys. When a little past the second buoy steer 45° true (NE. by E. ⅝ E. mag.), with the entrance of Mill Cove astern, and pass about 100 yards eastward of a black buoy into Deer Island Thorofare. Select anchorage in the channel off Stonington.

Bound eastward through Merchant Row.—Steer the 31° true (NE. ⅜ E. mag.) course of the preceding paragraph until **Harbor**

Island, the grassy island with a few trees lying on the northeast side of Merchants Island, opens northward of Ewe Island. Then stand eastward, pass about 400 yards northward of Ewe Island and 100 yards southward of Mid-Channel Ledge horizontally striped buoy. Then steer 96° true (SE. by E. 7/8 E. mag.) and turn to the directions for Merchant Row on page 51.

BAGADUCE RIVER AND CASTINE HARBOR

Bagaduce River empties into the eastern side of East Penobscot Bay near its head. It is the approach to the town of Castine, on the north side, just inside the entrance, and to several smaller settlements farther up. The entrance, known as Castine Harbor, has ample depth and is easily entered; there is but little business by water in this section. **Dice Head Lighthouse** (white tower connected with dwelling) is on the north side at the entrance.

The channel for 6 miles above Castine is buoyed and is used by small craft and local vessels of 6 to 8 foot (1.8 to 2.4 m.) draft, carrying wood products, but is narrow and so contracted by rocks in places that navigation is possible at slack water only, on account of the current. It is not safe for strangers.

Castine is an important summer resort town situated 1 mile eastward of Dice Head Lighthouse. The locality is rich in historical interest, and there are many tablets about the town marking spots of special interest. The steamboat wharf has a depth of about 15 feet (4.6 m.), and there are several other wharves with less water. There is a float landing for small craft. Castine has steamer service with Rockland (steamer connects with trains), Camden, and Belfast. Gasoline, water, and provisions are obtainable. There are numerous hotels which are kept open during the summer season only.

West Brooksville is a village on the south side 1½ miles above Castine, and **North Castine** is a village on the north side 2¼ miles above Castine.

North Brooksville is a village on the southern branch of Bagaduce River, about 7 miles above Castine. At high water small vessels sometimes go to the bridge crossing the river at the village, but the channel is unmarked and unsafe for strangers. Small craft with local knowledge can go about 3 miles above North Brooksville.

Penobscot is a village at the head of navigation on the north branch of Bagaduce River, 7½ miles above Castine. The approach to the village is by a channel dredged 4 feet (1.2 m.) deep, in which some shoaling has occurred.

Anchorage.—The best anchorage for vessels is in Smith Cove, southward of Castine, in 4 to 11 fathoms (7.3 to 20.1 m.), soft bottom, sheltered from all winds. The holding ground abreast the town is not good and the general depth is about 12 fathoms (21.9 m.).

Ice.—The river is usually free from ice at Castine and for some distance above, but in very severe winters the river is entirely closed.

Tides.—The mean rise and fall of tides is about 10 feet (3 m.) from Castine to the head.

Directions, Castine Harbor.—The eastern shore northward and southward of the entrance is bold, and can be followed at a distance of ¼ mile. There is a perpendicularly striped bell buoy in the en-

trance. Pass close to this on either side, and steer 57° true (ENE. ⅝ E. mag.) into the harbor to abreast the wharves at Castine, passing about 100 yards southward of Otter Rock Shoal black buoy. If going to an anchorage, from the wharves steer 101° true (SE. by E. ⅜ E. mag.) for Henry Point and anchor in 5 to 11 fathoms (9.1 to 20.1 m.), 200 to 500 yards southward of the point.

VINALHAVEN AND NORTH HAVEN ISLANDS

These islands and numerous smaller ones adjoining (charts 309 and 310) lie in the entrance of Penobscot Bay and separate East and West Penobscot Bays. The principal settlements are the villages of Vinalhaven, North Haven, and Pulpit Harbor. The eastern side of the islands is described with East Penobscot Bay on page 128 and Fox Islands Thorofare, leading between the islands, is described on page 122.

Aside from the vessels passing through Fox Islands Thorofare, the coves among the islands are frequented mostly by local fishermen, and vessels carrying granite from the quarries. The coves are generally foul and not sufficiently well marked for the use of strangers except in small craft.

The south and west coasts of Vinalhaven Island are fringed by numerous islands and rocks to a distance of about 2 miles. Between them are channels which are used principally by small local vessels and vessels loading granite at some of the quarries. Carver Harbor is the best anchorage, and the only one of any importance. The channels are well marked by buoys, and are generally not difficult in the daytime and clear weather for vessels of 12-foot (3.7 m.) or less draft.

Brimstone and **Otter Islands** are the largest and most prominent of the eastern islands, and Saddleback Ledge Lighthouse, in the entrance of East Penobscot Bay, is a guide for approaching from eastward. **Diamond Rock,** ⅜ mile northeastward of Brimstone Island, is a round rock about 20 feet (6.1 m.) high, and is a good mark. The large standpipe at Vinalhaven is prominent for many miles. **Green Island,** the large wooded island westward of Vinalhaven, is marked at its south end by **Heron Neck Lighthouse** (white tower connected to dwelling). **Hurricane Island** is the most prominent westward of Vinalhaven. Its southeast end is marked by a village and the large buildings of a quarry.

Arey Cove and **Robert Harbor,** on the southeast side of Vinalhaven Island, are much obstructed by rocks and ledges, and are unsafe for strangers. There are two quarry wharves.

Carver Harbor is a secure anchorage for small vessels on the southwest side of Vinalhaven Island. The anchorage is about 500 yards long and 250 yards wide, and has been dredged to a depth of 16 feet (4.9 m.), and an additional area on the south side to a depth of 10 feet (3 m.). The village of **Vinalhaven,** at the head of the harbor, is of some importance for its shipment of granite and fish. There is communication by telephone and steamer with Rockland. The deepest draft of vessels entering is 12 feet (3.7 m.); the depth at the wharves is 6 to 15 feet (1.8 to 4.6 m.). Water, provisions, and gasoline can be obtained. There are marine railways with a capacity

of about 10 tons. Ice closes the harbor during January and February, but a channel is kept open to the steamboat wharf. Storm warnings are displayed at the village. A standpipe back of the town is prominent.

Indian Creek, just eastward of Carver Harbor, has an entrance from sea and also from Carver Harbor through a thorofare crossed by a drawbridge. It has a quarry at the head from which granite is lightered to vessels in Carver Harbor at high water. The channel is not safe for strangers.

Sand Cove, making northward from Carver Harbor, is foul. There is a wharf at the head at which vessels lie aground at low water while loading.

The Reach is a narrow, much-obstructed channel leading northwestward from the entrance of Carver Harbor, inside Green Island. It is buoyed and used by vessels between Carver Harbor and Rockland, but it is the most difficult part of the route, and care is required.

Old Harbor is a small cove at the northern end of The Reach and northeastward of the northern end of Green Island. It affords good anchorage for small craft in 9 to 17 feet (2.7 to 5.2 m.), soft bottom, and small vessels can anchor in or off the entrance in 3 to 6 fathoms (5.5 to 11 m.).

Hurricane Sound lies between Vinalhaven and Green Island on the east, and Hurricane Island and White Islands on the west. It has deep water, but is little used except by local vessels and vessels loading granite. Several passages lead into the sound, but there are no good anchorages.

The Basin is a large irregular bight in the west side of Vinalhaven Island, about 2½ miles north of Heron Neck Lighthouse. **Barton Island** lies in the middle of the entrance, leaving a narrow, crooked, and shallow channel north and south of it. The depth of water in the basin varies from 1½ to 18 fathoms (2.7 to 33 m.).

Lairey Narrows leads between Leadbetter Island on the north and Lairey Island on the south. This passage is a part of the route between Carver Harbor and Rockland, and the principal dangers are buoyed.

Leadbetter Narrows is a narrow passage between the Vinalhaven shore on the north and Leadbetter Island on the south; passing south of the eastern side of Leadbetter Island, it leads in the northern end of Hurricane Sound. In making this passage the northern shore or Vinalhaven shore should be favored. There is a small stone wharf on Leadbetter Island at the narrows. There is also a quarry and wharf on the shore of Vinalhaven, eastward from the narrows. Leadbetter Narrows should not be attempted by strangers except in the case of launches or small craft.

Dogfish Island, lying northwestward of Leadbetter Narrows, has an abandoned stone wharf at its northern end.

Crockett Cove is just eastward of Crockett Point, the southeastern point at the western entrance to Fox Islands Thorofare. The cove is 1 mile long and 200 yards wide at the entrance, is obstructed by ledges, and is suitable only for small craft with local knowledge.

Bartlett Harbor is a small cove with deep water and good anchorage sheltered from all but westerly and northerly winds. It is about

2 miles above Stand-in Point on the western shore of Northhaven Island. There is a rock with 9 feet (2.7 m.) over it in the middle of the entrance; it has deep water close-to around it.

Pulpit Harbor is on the northwest side of Northhaven Island, 4 miles northeastward of Stand-in Point and 2⅜ miles southwestward of **Webster Head,** the high, partly wooded head at the north end of the island. The entrance has a clear width of 150 yards, and the harbor is a secure anchorage for small vessels of about 13-foot (4.0 m.) or less draft. **Pulpit Rock,** high and pointed, is near the end of the reef, which extends 250 yards northeastward from the western point at the entrance, and is a good mark.

To enter, give the north side of Pulpit Rock and the eastern shore just northward of the entrance a berth of over 100 yards, and enter in mid-channel eastward of Pulpit Rock on a 191° true (SSW. ½ W. mag.) course. Keep in mid-harbor and anchor in its broad part in 4 to 5½ fathoms (7.3 to 10.0 m.). The post village of Pulpit Harbor is on the northeast side of the harbor.

Pilots for these waters can usually be obtained at Rockland or Carver Harbor, or from local fishing boats.

DIRECTIONS, CARVER HARBOR

These directions are good for vessels of 12-foot (3.7 m.) or less draft in the daytime and with clear weather, but lead close to unmarked dangers, and should be used with extreme caution by strangers. The channels have not been dragged.

From Merchant Row.—Pass between Channel Rock tripod and Scraggy Ledge, and southward of the 11-foot (3.4 m.) rock 400 yards southward of Scraggy Ledge. Then steer 227° true (SW. by W. ¾ W. mag.), passing well southeastward of the black buoy marking the Triangle Ledges (bare at low water) and 150 yards southeastward of the black buoy marking **Halibut Ledge** (bare at low water). Make good this course for 5¾ miles to a position 250 yards southeastward of Crosby Ledge red buoy. Then steer 241° true (W. by S. mag.), pass 250 yards southward of Sheep Island and 50 to 100 yards southward of red buoys Nos. 2B and 4. A ledge with a least depth of 10 feet (3.1 m.) lies 250 yards southward of buoy No. 2B.

Passing southward of buoy No. 4, steer 279° true (NW. by W. ⅝ W. mag.) with either Saddleback Ledge Lighthouse or Diamond Rock in range with the south extreme of Carver Island astern, until 300 yards southwestward of Point Ledge spindle. Then steer 298° true (NW. ⅛ N. mag.) and pass between **Folly Ledge** (bare at high water) and **Green Ledge** (grassy top), slightly favoring the latter. Pass about midway between Green Ledge and **Green Island Knob** (awash at high water) and steer about 33° true (NE. ½ E. mag.) for the entrance of Carver Harbor, passing between a red and a black buoy (the latter marks the eastern end of a reef bare at low water only). Pass about 75 yards westward of Potato Island, and enter the harbor in midchannel. Anchor about 150 yards from the western shore, abreast or a little above the steamboat wharf, in 16 feet (4.9 m.).

From eastward.—Give Saddleback Ledge Lighthouse a berth of about ¼ mile and then bring it astern on a 285° true (NW. by W.

mag.) course, heading for the flagstaff on the knoll on the west side at the entrance of Indian Creek. On this course pass 300 yards northward of Diamond Rock, about ¼ mile southward of the black buoy marking the north end of **Diamond Rock Ledge** (bare at low water) and pass between Carver Island and the red buoy marking the south end of **Sheep Island Ledge** (partly bare at low water). From a position 250 yards northward of Carver Island, steer 256° true (W. ⅜ N. mag.) and pass 100 yards southward of red buoy No. 4. Then follow the directions in the preceding paragraph.

From southward.—Steer for the standpipe at Vinalhaven on a 4° true (NNE. mag.) course, passing westward of the red buoy marking the southwest end of Colt Ledge, and between the black buoy marking the eastern end of **Breaker Ledge** (bare at low water) and the red buoy marking the southwest end of Arey Ledges (higher parts are bare rocks). Continue the course for the standpipe until about ¾ mile past these buoys and about ¼ mile southeastward of Folly Ledge. Then steer abut 320° true (NNW. mag.) and pass about 200 yards southwestward of Green Ledge (grassy top). Pass about midway between Green Ledge and Green Island Knob, steering about 33° true (NE. ½ E. mag.) for the entrance of Carver Harbor, and enter as directed in a preceding paragraph.

Or, from Heron Neck whistling buoy No. 2, steer 41° true (NE. by E. ¼ E. mag.) for Heron Neck Lighthouse until about 350 yards from the lighthouse. Then steer 75° true (E. ¼ S. mag.) and pass midway between Heron Neck and **Heron Neck Ledge** (a bare rock). Continue the course and pass about 300 yards southward of the southeast point of Green Island. Then haul northward between Green Island and Folly Ledge and follow a mid-channel course westward and northward of the ledge. Then steer 24° true (NE. ¼ N. mag.) for the standpipe at Vinalhaven and pass about 200 yards westward of Green Ledge. Then steer 33° true (NE. ½ E. mag.) for the entrance of Carver Harbor, and enter as directed in a preceding paragraph.

From Rockland through Lairey Narrows and The Reach.—Passing 200 yards southward of Rockland Breakwater Lighthouse, steer 99° true (SE. by E. ⅝ E. mag.) for 5¼ miles to Fox Islands Thorofare bell buoy (perpendicularly striped). Then steer 125° true (SE. ¾ S. mag.) for the perpendicularly striped bell buoy westward of Green Islet, and pass northward of two black buoys. From the bell buoy, steer 107° true (SE. ⅞ E. mag.) for the north end of Lairey Island, to a position 25 to 50 yards southward of a red buoy. Then steer about 101° true (SE. by E. ⅜ E. mag.), pass midway between the north end of Lairey Island and the south end of the bare rocks northward, and pass about 100 yards northward and eastward of a horizontally striped buoy. Then stand southward to a mid-channel position between the eastern side of **Cedar Island** (wooded) and the grassy islet opposite.

Then steer 135° true (SSE. ⅜ E. mag.) for 1⅛ miles to a position 50 yards southwestward of Dog Point Ledge red buoy. Then steer 118° true (SE. mag.), pass midway between the northeast point of Green Island and the rock awash at high water lying southward of the island in the entrance of Old Harbor, and pass in mid-channel eastward of the island close to the northeast end of Green

Island. Pass close westward and about 50 yards southward of buoy No. 4 and steer 113° true (SE. ⅜ E. mag.) to a position about 50 yards northeastward of black buoy No. 1A. Then steer 152° true (S. ⅞ E. mag.), and pass 100 feet eastward of the black spindle on the end of the ledge extending eastward from a grassy island. A rock with 3 feet (0.9 m.) over it lies 200 feet northeastward of the spindle, and the channel has a width of but little over 100 feet between the rock and the edge of the ledge just northward of the spindle. Great care is required in passing this point.

Pass about 100 yards southwestward of red buoy No. 2 at the south end of The Reach, and steer 92° true (ESE. ¼ E. mag.), heading a little northward of red buoy No. 4. When nearly up with the latter buoy, steer about 33° true (NE. ½ E. mag.), pass eastward of a black buoy and about 75 yards westward of Potato Island, and enter Carver Harbor in mid-channel. Anchor about 150 yards from the western shore, abreast or a little above the steamboat wharf, in 16 feet (4.9 m.).

LONG ISLAND (ISLESBORO)

and the adjacent islands and shoals (charts 310 and 311), 15 miles long, separate East and West Penobscot Bays near their heads. The main island is nearly divided in the middle. A chain of islands and rocks, through which several channels lead, extends for 5 miles southward from the larger island. The island is an important summer resort, and is frequented by many pleasure boats in summer. Dark Harbor, Islesboro, and North Islesboro, are villages on the island.

McIntosh Ledge, the most southerly of the dangers, lying about ¾ mile southeastward of Robinson Rock, is awash at low water and marked by a horizontally striped buoy on its southwest side.

Robinson Rock, the most southerly visible danger, is a grassy rock with several smaller bare rocks around it. Unmarked ledges extend for a greatest distance of ⅝ mile north-northeast and south-southwest of the rock.

Mark Island, the most southerly wooded island, is high, rounded, and prominent. A spindle and red bell buoy mark the reef extending southward from it.

Goose Rock, ½ mile north-northeastward of Mark Island, is about 15 feet (4.6 m.) high and grassy. **Saddle Island** is thickly wooded and **Lasell Island** is high and wooded except at its north end. **Goose** and **Mouse Islands,** eastward of Saddle and Lasell Islands, are rocky islets with grass on top, and there are several bare and submerged rocks between them. A spindle marks a ledge northeastward of Mouse Island.

Lime Island, ¼ mile northeastward of Lasell Island, is low and generally wooded, and there is a bare rock ¼ mile northeastward of it. **Job Island** is thickly wooded. The southerly **Ensign Island** is wooded, and the northerly is wooded in the center and has a house on the west side. There is a landing on the east side.

The channel between Mark, Lasell, and Lime Islands on the west, and Saddle, Goose, and Mouse Islands on the east is used by most local vessels bound from Rockland or westward to Eggemoggin Reach or points in the northern part of East Penobscot Bay. The

least depth found by an examination with a wire drag was 29 feet (8.8 m.). The principal dangers are marked.

Dark Harbor is a summer resort occupying the southern part of South Islesboro. It has steamer communication with the adjoining towns, the steamer landing being on the eastern side, just south of the cove called Dark Harbor. A large hotel and water tank on the hill back of the wharf, and a white house on the wharf, are prominent. The cove called Dark Harbor is crossed by a dam just inside the entrance and is seldom used by boats. Small craft frequenting the resort land at numerous float landings on Gilkey Harbor.

Gilkey Harbor, on the western side of South Islesboro, between it and **Sevenhundred Acre, Warren,** and **Spruce Islands,** is a secure anchorage and is frequented by many yachts in summer. There are numerous wharves for small craft in the southern part, but no commercial wharves. Gasoline and provisions are obtainable at Dark Harbor, on the eastern side. The harbor is frequently closed by ice during the winter.

Cradle Cove is a shallow indentation on the northeast side of Sevenhundred Acre Island. In 1926 there was a small railway here suitable for hauling out launches and small yachts.

The main entrance to Gilkey Harbor is from southwestward, between Job Island and Ensign Islands, and has a least depth of about 27 feet (8.2 m.) in mid-channel, with unmarked rocks of less depth near the sides. It is partially buoyed and easily entered. The entrance from northward has **Grindel Point Lighthouse** (white tower with covered way to dwelling) on the north side; it is narrow and not recommended for a greater draft than 12 feet (3.7 m.). The channel inside the entrance was marked by a buoy and private spindles in 1926.

Small craft can enter Gilkey Harbor by a narrow crooked channel westward of the south end of South Islesboro and eastward of Job and Minot Islands. The channel is said to be good for a depth of abouth 6 feet (1.8 m.) at low water with local knowledge. It was marked by private spindles in 1926, red on the west side and black on the east side. The best water favors the east side of the thorofare.

Directions.—The following courses lead through Gilkey Harbor, entering by the main channel from southward and leaving through the northern channel: Pass about ½ mile northwestward of Mark Island and steer 28° true (NE. ⅛ E. mag.) for the eastern end of Sevenhundred Acre Island for 4⅝ miles, passing nearly ½ mile westward of Job Island, ¼ mile eastward of Ensign Islands, and to a position 100 yards northwestward of Minot Ledge black buoy. Then steer 39° true (NE. by E. ⅛ E. mag.) to a position 300 yards southeastward of the eastern end of Sevenhundred Acre Island. Then steer 8° true (NNE. ⅜ E. mag.), and pass 100 yards westward of Thrumcap Ledge black buoy and 300 yards eastward of Spruce Island. When the north end of Warren Island opens northward of Spruce Island, steer 306° true (NW. ¾ N. mag.) for Grindel Point Lighthouse and pass the northeast point of Spruce Island at a distance of 250 yards. When a little past this point steer 287° true

(NW. 7/8 W. mag.) and pass about 25 yards northward of a red buoy, 250 yards southward of Grindel Point Lighthouse, and nearly 300 yards northward of the north end of Warren Island.

Gooseberry Point, about 1/2 mile northeast of Grindel Point, is low and flat, with a clump of trees at its outer end.

Islesboro Harbor is an open bight in the northeastern side of South Islesboro, west-northwestward of the south side of Cape Rosier. It affords good shelter in westerly winds, and has a depth of 7 fathoms (12.8 m.). Off the southern point at the entrance is a ledge partly bare at half tide and marked by two buoys. Vessels can pass on either side of the ledge, being guided by the buoys. Foul ground extends nearly 1/4 mile from the western shore, and will be avoided by keeping the knoll northward of the harbor open from the north point of the harbor. There is a wharf and a village (Islesboro) on the south side.

Sabbathday Harbor is a small cove in the southeastern side of North Islesboro, and a little over 2 miles northward of **Hewes Point,** the high point on the south side at the entrance to Islesboro Harbor. It is open southward and affords anchorage for small vessels in 6 to 18 feet (1.8 to 5.5 m.). There are several summer houses on its shores, and a wharf and village (**North Islesboro**) on the west side.

Parker Cove, on the east side of North Islesboro, is a shallow cove, used only as an anchorage by small local craft. **Long Island Ledge,** eastward of the entrance, is distinguished by a wreck visible at all stages of the tide.

Seal Harbor, at the southwestern end of North Islesboro and about 3 miles north of Grindel Point Lighthouse, is a good anchorage, sheltered from all but southwest winds. This harbor is used by vessels bound up or down the bay as an anchorage for the night, and is easy of access. Vessels of any size can anchor with ample swinging room about 1/2 mile eastward of Flat Island, in 9 to 11 fathoms (16.5 to 20.1 m.). Anchorage can be had nearer the head of the harbor, keeping the southern shore aboard distant about 1/4 mile, in 8 to 10 fathoms (14.6 to 18.3 m.). The northern side of the harbor is foul. The entrance from northward is 400 yards wide, with depths of 18 to 28 feet (5.5 to 8.5 m.), between Seal Island and a shelving ledge which extends 1/4 mile northward from **Flat Island.** The latter is grassy, and **Seal Island** is wooded and has a white summer residence, with a red roof, on its western side.

Crow Cove is an anchorage for small craft only. There is a wharf on the south side with a depth of about 7 feet (2.1 m.) at the end.

Approaching Seal Harbor from southward, give the eastern shore a berth of 1/2 mile for a distance of 1 mile northward of Grindel Point Lighthouse, and then steer about 50° true (ENE. mag.) and pass about midway between Flat Island and the southern shore. Approaching from northward, pass 300 yards southwestward of Seal Island, heading about 129° true (SE. by S. mag.).

Hog Island, 1/4 mile north-northeastward of Seal Island, is wooded. The ledge extending 1/4 mile north-northeastward from it has three rocks bare at half tide. **Sprague Ledge,** 5/8 mile north-northeastward of Hog Island, has a least depth of 2 feet (0.6 m.), and **Barley Ledge,** a little farther northward, is bare at low water and marked by a spindle.

Marshall Point, near the north end of the island, is marked by prominent yellowish bluffs.

Turtlehead Cove is a broad bight in the north end of North Islesboro. It is sheltered from southerly and easterly winds, and has good anchorage in 18 to 40 feet (5.5 to 12.2 m.), soft bottom. The anchorage has a clear width of about 3/8 mile and is in the eastern part of the cove. The eastern shore must be given a berth of 250 yards, and the south end of the cove 500 yards. In the western half of the cove a shoal, bare in one spot at low water and with 9 feet (2.7 m.) near its north edge, extends 3/8 mile from shore. The north end of Turtlehead bearing anything eastward of 62° true (E. 7/8 N. mag.) clears the shoal. **Turtlehead,** the north end of North Islesboro, is a prominent wooded head joined to North Islesboro by a low, narrow neck.

TWOBUSH AND MUSCLE RIDGE CHANNELS

are entrances to West Penobscot Bay from westward, the former leading southward and the latter northward of an extensive group of islands and shoals.

Twobush Channel is broad and deep and has been examined by means of a wire drag. The principal dangers are buoyed and it is used in preference to Muscle Ridge Channel by large vessels and tows, and is generally used at night by all except small local vessels.

Twobush Island Lighthouse, a white square tower on a small island on the north side, is the principal guide to the channel. The light is flashing white (flash 0.5 second, eclipse 4.5 seconds), with a flashing red sector bearing between 196° true (SW. by S. mag.) and 247° true (W. 5/8 S. mag.) and obscured when bearing between 61° true (E. by N. mag.) and 196° true (SW. by S. mag.). It is 65 feet (19.8 m.) above the water and visible 14 miles. The fog signal is a bell, sounding a group of two strokes every 20 seconds.

Halibut Rock, 1 5/8 miles northeastward of Twobush Island Lighthouse, and **Northeast Pond Ledge,** 5/8 mile northeastward of Andrew Island, are bare at half tide.

The larger islands between Twobush Channel and Muscle Ridge Channel are generally wooded and of little importance except for their granite quarries. The smaller islands are bare and grassy and there are many bare and submerged rocks. **Dix Island** is distinguished by large buildings and **High Island** by a quarry and iron stack. **Fisherman** and **Marblehead Islands** are grassy.

Muscle Ridge Channel is much used by vessels in daylight and clear weather on account of its being sheltered and affording anchorage in case of bad weather. The channel has been examined by means of the wire drag, and is good for a depth of 4 fathoms (7.3 m.), but it is narrow in places, especially at the southwest end of Owlshead Bay, and is not recommended for a greater draft than 15 feet (4.6 m.) at low water, except with local knowledge. From its entrance at Whitehead it extends in a northeasterly direction about 6 miles to Sheep Island, and the channel passes between numerous rocks and ledges. These dangers are well marked and in daylight and clear weather with a fair wind no difficulty will be experienced by sailing vessels.

Whitehead Lighthouse, a gray tower attached to a red house on the southeast end of **Whitehead Island,** is the principal guide to the entrance of Muscle Ridge Channel. The light is fixed white, 75 feet (22.9 m.) above the water, and visible 14 miles. The fog signal is a steam whistle (blast 5 seconds, silent 25 seconds). There is a **storm-warning** display station near the lighthouse and a Coast Guard station on the southwest side of the island.

Seal Harbor is an anchorage much used by coasters, on the western side of Muscle Ridge Channel, between Whitehead and Sprucehead Islands; it has 18 to 23 feet (5.5 to 7 m.) of water, with soft bottom. The post village of **Sprucehead** and a large granite quarry are on the north side of Seal Harbor. The principal dangers are buoyed, and the harbor is easy of access in the daytime. **Long Ledge** shows in two places at high water.

Enter Seal Harbor between the two black buoys which lie about 250 yards southward of Burnt Island and nearly ¼ mile northwestward of Lower Gangway Ledge horizontally striped buoy, and steer 304° true (NW. ½ N. mag.). Pass between a red buoy and Long Ledge black buoy, and anchor in 3 to 4 fathoms (5.5 to 7.3 m.) 300 to 400 yards westward of the red buoy.

Dix Island Harbor is an anchorage on the south side of Muscle Ridge Channel between Andrew, Birch, and Dix Islands; it is reached from southwestward through a narrow and crooked channel leading between the ledges north of Hewell Island; it is unsafe for strangers to enter.

Weskeag River empties into the western side of Muscle Ridge Channel at the head of the bight westward of Ash Island. This river has a narrow and crooked unmarked channel, unsafe for strangers. The village of **South Thomaston** is at the head of navigation, 2 miles above its mouth; the greatest draft taken to the village is 10 feet (3 m.) at high water; 4 feet (1.2 m.) can be taken into the entrance at low water. Vessels seldom enter.

Fisherman Island Passage leads from Muscle Ridge Channel to Penobscot Bay, between Fisherman Island and Sheep Island. Several dangers lie in this passage, but the principal ones are marked by buoys and can be easily avoided in the daytime in clear weather.

Owlshead Bay lies between Sheep and Monroe Islands on the east and the mainland on the west, and is a continuation of Muscle Ridge Channel northward of Fisherman Island Passage. The channel through Owlshead Bay is very narrow on the western side of Sheep Island, where it is marked by two buoys. Vessels can anchor in the middle of the bay abreast **Monroe Island,** in 8 to 10 fathoms (14.6 to 18.3 m.), and small vessels can anchor in the entrance of the cove between Dodge Point and the bare ledge southwestward, in 2 to 4 fathoms (3.7 to 7.3 m.).

Owlshead is a prominent hill marked by a lighthouse on the top.

Naval Trial Course.—A measured mile has been established off Monroe Island. The course is marked by prominent beacons on shore and by white buoys, one being placed at each end of the course.

The following information concerning the dangers close to the sailing line through Muscle Ridge Channel and Owlshead Bay is given to identify the dangers:

South Breaker, 3/8 mile southward of Whitehead Lighthouse, is awash at low water and marked at the southwest end by a red buoy. **Yellow Ledge** is awash at high water and marked by a spindle. **Burnt Island Ledge** is bare at low water and marked on its southwest side by a black buoy. **Hurricane Ledge** is bare at lowest tides and marked on its northwest side by a red buoy. **Garden Island** is bare, with a little grass on top, and **Garden Island Ledge** is bare at half tide and marked by a spindle. **High Clam Ledge** is bare and grassy at its south end and bare at low water at its north end. **Channel Rock** is awash at high water and unmarked. **Otter Island Ledge** is bare at half tide and marked by a spindle. The rock 350 yards eastward of **Emery Island** is bare at low water and marked by a spindle. **Dodge Point Ledge,** eastward of Dodge Point, is bare at half tide and marked by a spindle. **Owlshead Ledge,** southeastward of Owlshead, is bare at low water and marked by a black buoy.

ROCKLAND HARBOR

This harbor (chart 310 or harbor chart 320), one of the most important in Penobscot Bay, is on the west shore of West Penobscot Bay between Owlshead on the south and Jameson Point on the north. It affords anchorage for the largest vessels, but is somewhat exposed to easterly winds. Northeasterly winds raise a heavy sea in the southwestern part, but shelter may be found behind the breakwater, which extends 3/4 mile in a southerly direction from Jameson Point and is about 4 feet (1.2 m.) above high water. Rockland Breakwater Lighthouse marks the end of the breakwater. The principal dangers are marked, and the harbor is easy of access both day and night.

There are several rocks and ledges in the harbor. The chart is the guide for avoiding them. Those visible are **Shag Rock,** a cluster of bare rocks marked by a black tripod beacon; **Lowell Ledge,** a cluster of rocks bare at low water and having a black buoy 300 yards northeastward, marking **Spear Rock,** with 3 feet (0.9 m.) over it; and **Seal Ledge,** bare at half tide and marked by a spindle.

Rockland, the city on the western shore of the harbor, has a large trade in lime and some general merchandise. It has a population of 8,000. Several lines of steamers touch here, and a number of small steamers ply to the islands in the bay. Some of the wharves are dry, or nearly so, at low water, but there is from 6 to 15 feet (1.8 to 4.6 m.) alongside the principal ones, according to location. The bottom is soft mud, and some vessels lie aground at low water while loading and unloading. Rockland is the terminus of a branch of the Maine Central Railroad, which connects with the main line at Bath. There are float landings on the northern side of Tillsons Wharf.

A channel dredged to 14 feet (4.3 m.) and marked by buoys has been dredged to the lime works in the northwestern part of the harbor.

Prominent objects.—The most prominent features in approaching Rockland Harbor are the high elevated tank and the large yellow hotel on Jameson Point. Owlshead, marked by a lighthouse, and the lighthouse at the end of the breakwater are also prominent.

Anchorages.—Vessels anchor anywhere in the harbor where the depth and bottom are suitable, taking care to keep 300 yards from the end of Tillsons Wharf, and leaving a clear channel for the steamboats landing at this wharf. Deep-draft vessels entering for the night usually anchor just inside the breakwater and ½ mile from the south shore of the harbor. Standing westward in the harbor the water shoals gradually toward the wharves. There are depths of 12 to 14 feet (3.7 to 4.3 m.) in the harbor eastward of Tillsons Wharf and northward of South Ledge, and less water in the bight in the northern part of the harbor between Tillsons Wharf and Jameson Point; only small vessels or small craft anchor in this part of the harbor.

Pilots are not necessary to enter or leave the harbor and are seldom taken; if desired they can sometimes be found on fishing vessels off the mouth of the bay. There are no regularly licensed pilots for the port.

Towboats can usually be had at Rockland.

Supplies.—Coal can be obtained alongside the wharves and water at the principal wharves and from the towboats. Provisions, gasoline, and some ship-chandler's stores can be had in the city.

Repairs.—There is a shipyard equipped to make ordinary repairs to coasting and fishing vessels. The marine railway can handle vessels up to about 600 tons dead weight, and 13-foot (4 m.) draft aft, and 9-foot (2.7 m.) forward. The nearest place where large vessels can be dry-docked is Portland.

Directions.—Approaching Rockland Harbor, Rockland Breakwater Lighthouse may be steered for on any course between 287° true (NW. ⅞ W. mag.), through west to 205° true (SW. ⅛ S. mag.). The first course leads ¼ mile northward of Owlshead Lighthouse and the second leads about ⅜ mile eastward of The Graves spindle. Enter the harbor southward of the lighthouse, giving it a berth of 100 yards or more.

WEST PENOBSCOT BAY, ROCKLAND TO BELFAST

Under this heading are described the harbors and towns on the western shore. Long (Islesboro) Island and adjacent islands are described on page 139.

Clam Cove, on the west side of West Penobscot Bay, about 2 miles northward of Rockland Harbor, is shoal at the head and not a good anchorage. There are no wharves. **Brewster Point Ledge,** extending ⅜ mile southeastward from Brewster Point, on the south side at the entrance is covered at its highest point at high water and marked by a black buoy. **Ram Islet** is a grass-covered rock ¼ mile northeastward of Brewster Point; a black buoy marks the end of the shoal extending northeastward from it.

Rockport Harbor.—This harbor (chart 310 or 321), on the western side of West Penobscot Bay, about 4 miles northward of Rockland Harbor, is a good anchorage for vessels of any size, sheltered from all but southerly winds, and is easy of access. Vessels can anchor anywhere between the entrance and a point 1 mile southward of the head, in 7 to 10 fathoms (12.8 to 18.3 m.), soft bottom. Small vessels and motor boats can find anchorage nearer the head. The head of the harbor to the entrances of the two coves near the head

has been dredged to a depth of 12 feet (3.7 m.), and this depth can be taken to the principal wharves at **Rockport,** a town at the head. Rockport ships considerable lime.

Porterfield Ledge, in the middle of the entrance, is bare several feet at low water and marked by a stone beacon and spindle.

On the eastern side at the entrance the prominent marks are a hotel on **Beauchamp Point,** Indian Island Lighthouse on **Indian Island** (grassy), **Lowell Rock** (bare) southward of the lighthouse, and a spindle a little southward of Lowell Rock.

Vessels can enter Rockport Harbor anywhere between the black buoys off Brewster Point and Lowell Rock spindle, giving the spindle and Porterhouse Ledge stone beacon a berth of at least 150 yards, and then stand northward in mid-harbor until ¼ mile from the head, then slightly favor the eastern side to the wharves.

The Graves, ⅞ mile offshore about midway between the entrances to Rockport and Camden Harbors, is a ledge showing bare rocky heads at high water and a large area bare at low water. It is marked by a spindle.

Camden Harbor.—This harbor (chart 310 or 321), on the west side of West Penobscot Bay, is the approach to the town of Camden. It is frequented by many yachts and small craft and has some trade by water. The outer harbor is easy of access and affords good anchorage in 14 to 30 feet (4.3 to 9.1 m.), soft bottom. The anchorage is eastward of a line from the steamboat wharf on Eaton Point to the black buoy northward of Negro Island. The depths in the outer harbor shoal gradually northward to 12 feet (3.7 m.) about ¼ mile from the head of **Sherman Cove,** above which the cove is shoal.

The greater part of the inner harbor has been dredged to depths of 7 to 10 feet (2.1 to 3 m.) and is occupied as an anchorage by small pleasure craft in summer; the entrance is through a dredged channel 80 yards wide and 10 feet (3 m.) deep. A shoal extends 80 yards from the north shore between the steamboat wharf and the shipyard at the entrance of the inner harbor and was marked in 1926 by a pile.

Ice sometimes forms in the harbor from January to March, but is not dangerous for vessels in the outer harbor. Westerly winds clear the harbor of ice.

Camden, the town on the inner harbor, is an important yachting center. There is steamer connection with Boston and Bangor and other points on Penobscot Bay. Camden is not on the railroad, the nearest railway point being Rockland. There is electric railway connection with Rockland and Thomaston. The steamer wharf on Eaton Point has a depth of 14 feet (4.3 m.) alongside. The yacht club, with its wharf and float landing, is on the western side of the inner harbor.

Coal in limited quantities, water, and gasoline may be obtained on the wharves. Provisions and all sorts of motor-boat supplies may be obtained in the town.

There is a shipyard with a marine railway capable of taking vessels up to 160 feet in length and with a capacity of 700 tons. Ordinary repairs to machinery can be made.

Prominent objects.—The most prominent feature in entering Camden Harbor is **Mount Battie,** 800 feet (244 m.) in elevation.

A small stone memorial tower has been erected on the summit, which shows as a long ridge from off the harbor. **Negro Island,** with a lighthouse on its southeastern end, is also prominent.

Northeast Ledges (inner and outer) lie southward of **Northeast Point** and contract the main entrance to Camden Harbor to about 400 yards. The higher parts of both ledges are bare at half tide. A red buoy is placed about 300 yards south-southeastward of the south end of **Outer Ledge,** and the southwest end of **Inner Ledge** is marked by another red buoy.

Northeast Passage is a narrow channel with depths of 12 to 18 feet (3.7 to 5.5 m.), leading into Camden Harbor between Northeast Point and Inner Ledge. It is marked by two spindles, a red one on the end of the ledge extending 50 yards southward from Northeast Point and a black one on Inner Ledge; the deeper water favors the red spindle. At the eastern end of Northeast Passage a black buoy is placed to mark the north end of Outer Ledges and a black bell buoy is placed nearly ⅜ mile northeastward of the spar buoy. This channel is not recommended for strangers with a greater draft than 6 feet (1.8 m.).

Directions, Camden Harbor.—Entering by the main channel, vessels can steer for Negro Island Lighthouse on any course between 354° true (N. by E. mag.) and 264° true (W. by N. mag.), taking care to avoid The Graves. Pass 200 to 300 yards eastward of Negro Island and steer 320° true (NNW. mag.) and select anchorage in the outer harbor, eastward of a line joining the steamboat wharf and the black buoy northward of Negro Island. If going to the inner harbor, pass 100 yards northeastward of the black buoy and steer 285° true (NW. by W. mag.) for the entrance of the inner harbor, pass southward of the pile marking the shoal on the north side at the entrance to the inner harbor, and haul northward in mid-harbor.

To enter by Northeast Channel, from the bell buoy steer 230° true (WSW. mag.) for the north end of Negro Island until up with the black buoy at the northerly end of Outer Ledges. Pass northward of this buoy and steer westward between the two spindles, favoring the one on the north side of the passage.

Duck Trap Harbor is a broad, open bight in the west shore of the bay, 5 miles northeastward of Camden Harbor. Good anchorage, sheltered from all northerly and westerly winds, will be found about ¼ mile from the north shore of the harbor, in 6 to 8 fathoms (11 to 14.6 m.), bottom soft in places. **Haddock Ledge,** the only outlying danger, is a rock with 4 feet (1.2 m.) over it lying a little over ½ mile from the western shore and the same distance southwestward of Spruce Head, the northeast point of the harbor; the rock is marked on its southwest side by a red buoy. With this exception, danger will be avoided by giving the shore of the harbor a berth of about ¼ mile.

Lincolnville is a village at the southwest end of Duck Trap Harbor. It has a crib shelter for small boats, but it is available at high tide only.

A church with a white spire located ½ mile northward of Lincolnville is prominent from the bay.

Great Spruce Head is bold and has a large whitewash mark just above high-water mark by which it may often be identified in fog.

Saturday Cove is a small cove on the west side of West Penobscot Bay, 9 miles northeastward of Camden Harbor. The village of **Northport** is on the south side. There are float landings at the entrance and a wharf at the head bare at low water.

Temple Heights is a small summer settlement ½ mile northward of Saturday Cove.

Northport Camp Ground (Bayside post office) is a summer settlement on the west side of West Penobscot Bay, 2½ miles northward of Temple Heights. It has steamer communication. The steamer wharf has a depth of about 15 feet (4.6 m.). A water tank on the hill back of the village is prominent.

BELFAST BAY AND PASSAGASAWAKEAG RIVER

(chart 311 or 319) empty into the head of Penobscot Bay from northwestward and form the approach to the town of Belfast and the village of **Citypoint,** about 2 miles above Belfast. The bay affords good anchorage, exposed to southeasterly winds, and is easy of access. The depth in the river is about 12 feet (3.7 m.) to Belfast, and there is a small trade to this point. The channel from Belfast to Citypoint is narrow, crooked, and unmarked, is bare at low water and can be used by a draft of about 6 feet (1.8 m.) at high water, but is little used except by small craft. Ice obstructs navigation throughout the river and bay in severe winters. The bay has been frozen over to Islesboro.

Steel Ledge, on the north side of Belfast Bay, is an extensive ledge with a least depth of 3 feet (0.9 m.). It is marked near its south end by a light on a stone base, and by a red bell buoy a little farther south. There is a channel between the ledge and the shore, but it is narrow and little used.

Belfast, on the southwest side of Passagasawakeag River, at the mouth, has several factories and considerable trade by water. Steamers between Boston and Bangor call here. The steamer wharf is the most southerly large wharf and has depths of from 13 feet (4 m.) at the north end to 20 feet (6.1 m.) at the southern end. There is a float landing on the northern side of this wharf.. Vessels go to the upper wharf, above the bridge, drawing up to 18 feet (5.5 m.). Coal in limited qualties and water are obtainable on the wharves, and other supplies in the town. Minor repairs to machinery can be made. Belfast and Citypoint are on a branch of the Maine Central Railroad.

Bridges.—Two highway drawbridges cross Passagasawakeag River. The lower one, at the upper end of Belfast, has openings 48 feet wide, and a headroom of 6.5 feet (1.9 m.) at high water. The second, ¾ mile above, has a single opening 28 feet wide, and a headroom of 7 feet (2.1 m.) at high water.

About 3 miles above its mouth the river is crossed by two bridges with fixed spans and 7 feet (2.1 m.) headroom at high water. The least horizontal clearance is 40 feet.

Anchorage.—Good anchorage can be had in the entrance westward of Steel Ledge, in 3 to 5 fathoms (5.5 to 9.1 m.); also in the river below the steamboat wharf, in mid-channel, or favoring the western shore, in 12 to 16 feet (3.7 to 4.9 m.), soft bottom. Above

the steamboat wharf shoals extend halfway across the harbor from the northeast side, and for a short distance below the bridge extend two-thirds of the distance across. Small vessels can anchor about 75 yards off the upper wharves of the city in 10 to 20 feet (3 to 6.1 m.).

Directions, Belfast Bay and Passagasawakeag River.—Vessels entering Belfast Bay can shape the course to pass anywhere between the red bell buoy southward of Steel Ledge and the western shore, then head north-northwestward in mid-channel, or slightly favoring the western side, until off the steamer wharf. To go above the steamboat wharf, pass 100 yards off it and steer northwestward, following the wharves at a distance of 75 yards.

SEARSPORT AND STOCKTON HARBORS

(chart 311) are at the head of Penobscot Bay westward of the entrance to Penobscot River.

Searsport Harbor is about 4 miles east of Belfast. It is a broad bight, open southward, but it affords good anchorage in 18 to 30 feet (5.5 to 9.1 m.), soft bottom, sheltered from northerly winds, and is used by all classes of vessels. **Searsport** is a town at the head of the harbor. The steamer wharf is in ruins.

Long Cove is eastward of Searsport Harbor, between the northwestern shore of Sears Island and Mack Point. The greater part of the cove is shoal, but good anchorage can be selected just inside the entrance in 2 to 4 fathoms (3.7 to 7.3 m.), sheltered from all but southwesterly winds. On the south side of **Mack Point** is one of the terminals of the **Bangor & Aroostook Railroad.**

There are four wharves, the two westerly ones being built out from fertilizer factories and the two easterly ones belonging to the Bangor & Aroostook Railroad. The most easterly one is a long wharf with rail connections and slips dredged to 25 feet (7.6 m.) on the eastern side and 30 feet (9.1 m.) on the western side. An approach has been dredged to this dock. Close to the westward of this wharf is the coal wharf which is built out to about 20 feet (6.1 m.).

The approach is between Sears Island and the black buoy off the southeast end of Long Cove Ledge. From the western shore of the south half of Sears Island, ledges make off ¼ mile, one of which, **Sears Island Ledge,** is bare at low water. The south end of the ledges is marked by a black bell buoy, which lies ½ mile southwestward of Sears Island.

Long Cove Ledge, awash at lowest tides near its south end, lies 400 to 800 yards southward of the western end of Mack Point, and is marked off its southwest side by a red buoy and off its southeast end by a black buoy. Two red spar buoys mark the western limit of the shoal area westward of Sears Island.

Stockton Harbor is between Cape Jellison and Sears Island, westward of the entrance to Penobscot River. It is a secure harbor for vessels of about 22-foot (6.7 m.) or less draft, and is easy of access. The depths shoal gradually from about 4 fathoms (7.3 m.) at its southern end to 12 feet (3.7 m.) about ¼ mile above the wharves on the east side, above which the harbor is shoal. The lead is a good guide.

Stockton Springs is a village at the head of the harbor. The wharf at the village is bare at low water.

The extensive wharves on the western side of **Cape Jellison** are no longer used and have fallen into ruins.

On **Kidder Point,** on the western side of the harbor, is a large steamer wharf which was not in use in 1926. A brick stack near this wharf is prominent.

Sears Island, on the western side of Stockton Harbor, at the entrance, is high and thickly wooded, and has a small clearing on the south end. A ledge, the outer part bare at half tide, extends 3/8 mile south-southeastward from **Squaw Point** on the eastern side of Stockton Harbor at the entrance. It has a grassy islet in the middle.

A lighted range marks the channel through the entrance to Stockton Harbor; the structures are not prominent by day.

To enter, pass 300 yards eastward of the black can buoy off the southeast side of Sears Island and steer 353° true (N. by E. mag.) on the range, passing in mid-channel through the entrance and westward of two red buoys. When inside the harbor the course can be shaped as desired.

DIRECTIONS, WEST PENOBSCOT BAY

Muscle Ridge Channel, Twobush Channel, and the main part of West Penobscot Bay from the vicinity of Matinicus Island to the entrance of Penobscot River have been examined by means of a wire drag, and the dangers are shown on the charts.

Directions through Fox Islands Thorofare are given on pages 44 and 49 and through Eggemoggin Reach on pages 43 and 51.

Large vessels and the larger tows, approaching Penobscot Bay from southward, either from Boston or Cape Cod Canal, or passing eastward of Cape Cod, usually make the whistling buoy off Cape Ann, and then shape the course for Manana Island gas, whistling, and submarine bell buoy, and then enter through Twobush or Muscle Ridge Channels. Approaching from westward along the coast, they usually make Bantam Rock gas and whistling buoy. Twobush Channel is used by most large vessels and tows, and by all except small local vessels at night.

Entering from the eastward, vessels of the deepest draft should pass southward of Bay Ledge as directed in section 1.

Muscle Ridge Channel is good for a depth of 4 fathoms (7.3 m.), but it is narrow in places and is not recommended for a greater draft than 15 feet (4.6 m.) at low water, except with local knowledge. Directions through the channel are given on pages 44 and 48.

The directions of sections 2 and 2 A for standing up the bay are good for vessels of the deepest draft.

1. Entering from eastward, passing southward of Bay Ledge.—From Roaring Bull Ledge whistling buoy, 1¾ miles southward of Isle au Haut, steer 260° true (W. ¾ N. mag.) for 10 miles to a position 1 mile southward of Bay Ledge bell buoy. Pass 1 mile southwestward of the bell buoy and steer 307° true (NW. ⅞ N. mag.) for 5½ miles, passing 1⅛ miles northeastward of Junken Ledge horizontally striped buoy and to a position ½ mile westward of a red buoy; this course leads ½ mile southwestward of rocky

shoals with depths of 31 feet (9.4 m.). From a position ½ mile westward of the red buoy, steer 339° true (N. ¼ W. mag.) for 4¾ miles to a position ¼ mile eastward of the black bell buoy off the eastern side of Monroe Island. Then follow the directions in section 2 or 2 A.

1 A. Entering from eastward, passing northward of Bay Ledge.—The directions of this section are good for vessels of 18 feet (5.5 m.) or less draft.

From Roaring Bull Ledge whistling buoy, lying 1¾ miles southward of Isle au Haut, steer 274° true (WNW. mag.) for 11½ miles, passing 1¾ miles southward of Saddleback Ledge Lighthouse and 1 mile southward of the islands and rocks westward.

When ¼ mile southward of red whistle buoy No. 2, change course to 281° true (NW. by W. ⅜ W. mag.) and continue for 4 miles to a position ½ mile westward from red nun buoy No. 2. From here follow directions given in section 1.

1 B. Entering from westward through Twobush Channel.—From a position ½ mile southward of Bantam Rock gas and whistling buoy, steer 59° true (ENE. ¾ E. mag.) for 16 miles to a position about ⅜ mile southward of Old Man Ledge gas and whistling buoy. Then steer 48° true (NE. by E. ¾ E. mag.) for 7 miles to a position ¼ mile northward of Marshall Point black whistling buoy. This course leads ⅝ mile southward of Burnt Island, ½ mile southward of Old Cilley Ledge bell buoy and ½ mile northward of an obstruction with 28 feet over it, probably the mast of a vessel.

Or, from Manana Island gas and whistling buoy steer 40° true (NE. by E. ⅛ E. mag.) for 12 miles to a position ¼ mile northward of Marshall Point whistling buoy, passing ⅜ mile northwestward of Duck Rocks bell buoy.

From a position ¼ mile northward of Marshall Point black whistling buoy steer 63° true (E. ⅞ N. mag.) for 5½ miles to a position 300 yards southward of the red buoy southwestward of Twobush Island Lighthouse and 400 yards northeastward of a horizontally striped buoy; then 49° true (NE. by E. ⅞ E. mag.) for 2¾ miles, passing nearly ½ mile southeastward of Twobush Island Lighthouse, to a position ½ mile northwestward of a red buoy marking a 32-foot spot; then 16° true (NE. by N. mag.) for 3 miles, passing ⅞ mile eastward of Andrew Island (wooded), and to a position ¼ mile east-southeastward of the black buoy ¾ mile east-northeastward of Crescent Island (bare rock). Then steer 356° true (N. by E. ¼ E. mag.) for 3¼ miles to a position ¼ mile eastward of the black bell buoy off the eastern side of Monroe Island. Then follow the directions in section 2 or 2A.

2. Monroe Island to Fort Point.—From a position ¼ mile eastward of the black bell buoy lying ¼ mile eastward of Monroe Island steer 10° true (NNE. ½ E. mag.) for 11 miles, passing ⅝ mile westward of Mark Island, and to a position ½ mile westward of the knoll near the middle of the northwest side of Seven-hundred Acre Island. Then steer 18° true (NE. ¾ N. mag.) for 7¼ miles, passing the western shore at Great Spruce Head at a distance of about ¼ mile. When Turtle Head bears 61° true (E. by N. mag.), steer 42° true (NE. by E. ⅜ E. mag.) for 7 miles, pass ⅝ mile northwestward of Turtle Head, ⅛ mile south-

eastward of the black spar buoy southward of Sears Island, and midway between Fort Point Lighthouse and Fort Point Ledge beacon. Pass about ¼ mile eastward of Fort Point and follow the directions for Penobscot River on page 154.

2 A. Monroe Island to Cape Rosier.—From a position ¼ mile eastward of the black bell buoy lying ¼ mile eastward of Monroe Island, steer 35° true (NE. ¾ E. mag.) for 5⅜ miles to a position ½ mile southeastward of McIntosh Ledge horizontally striped buoy. Then steer 27° true (NE. mag.) for 10¾ miles, passing ½ mile westward of Resolution Island to a position ⅜ mile westward of Cape Rosier. Then, if bound up Penobscot River, steer 2° true (N. by E. ¾ E. mag.) and follow a part of the directions in section 2, page 151.

Bound to Eggemoggin Reach.—See directions given on page 51.

PENOBSCOT RIVER

(chart 311), emptying into the head of Penobscot Bay, forms the approach to the towns of Bucksport, Winterport, Hampden, and Brewer, and the city of Bangor, the two latter at the head of navigation, about 24 miles above Fort Point Lighthouse at the entrance. It has considerable trade in regular steamers drawing about 10 feet (3 m.), and many vessels, the deepest draft ordinarily trading to Bangor being about 18 feet (5.5 m.).

Channel.—The main channel in Penobscot River has a least charted depth of 22 feet (6.4 m.) to Crosby Narrows, 3½ miles below Bangor, and 14 feet (4.3 m.) to Bangor. Dredging has been done in places between Bucksport and Bangor to obtain these depths. Unmarked shoals with less depth lie close to the channel in places.

Fort Point, on the west side at the entrance to Penobscot River, is partly wooded and marked on the end by Fort Point Lighthouse, a white tower connected with dwelling. There are several houses farther back and a wharf on the north side of the point.

Fort Point Ledge, ⅜ to ⅝ mile southward of Fort Point Lighthouse, is bare at half tide and marked near the north end by a spindle on a stone beacon.

Fort Point Cove, on the west side of the river northward of Fort Point, is frequently used as an anchorage. The depths are 6 to 24 feet (1.8 to 7.3 m.), shoaling gradually westward.

About 2½ miles above Fort Point the river is divided by **Whitmore Island** into two channels, the principal one leading on the west side of the island and the **Eastern Channel** on the east side; they unite north of Whitmore Island, near the town of Bucksport. Flowing into Eastern Channel from a northeasterly direction is a shallow stream navigable for small coasting vessels and fishermen at high water to the village of **Orland,** about 2¼ miles above its mouth; the channel is crooked and unmarked and bare at low water a little below Orland.

Sandypoint is a village on the west bank of the river 2½ miles above Fort Point. There is little water at the wharves.

Odom Ledge, in the middle of the main channel 3 miles above Fort Point, is marked by a spindle on a stone beacon.

Verona Park is a small summer settlement and wharf on the west side of Whitmore Island about 1 mile below Bucksport.

Bucksport, a town on the east bank of the river, 6½ miles above Fort Point, is the terminus of a branch of the Maine Central Railroad; the Boston to Bangor line of steamers touch here. There is 14 to 18 feet (4.3 to 5.5 m.) at low tide alongside the principal wharves. Bucksport is connected with Whitmore Island by a drawbridge, which crosses Eastern Channel eastward of the principal wharves; the width of draw is 38 feet. Anchorage is found off the western end of the town in 5 to 10 fathoms (9.1 to 18.3 m.). A towboat will sometimes be found here.

There is an automobile ferry in operation between Bucksport and Prospect Ferry. **Fort Knox** is an abandoned fort of imposing appearance.

Marsh River is a shallow stream flowing into Penobscot River from a southwesterly direction, about 3 miles above Bucksport. **Frankfort** is a village of little commercial importance on the west bank. The channel is bare at low water a little below the village. Boats seldom enter.

Shoaling reported.—In 1926 the master of a steamer making regular trips to Bangor stated that considerable shoaling had taken place in the channel southward of Frankfort Flats. At the extreme low tides it was necessary for him to slow down his vessel, draft 11 feet (3.4 m.), at this point. He also stated that shoaling had occurred in the narrow part of the channel just northward of Indian Point.

Winterport is a town on the west bank of the river, 12 miles above Fort Point; it is at the head of winter navigation, as ice closes the river 10 to 12 miles below Bangor. There is 16 feet (4.9 m.) at low water at the steamboat wharf. There is an automobile ferry to the opposite shore.

Hampden, a small town on the west bank of the river, is 19 miles above Fort Point. The village of **Orrington** is on the east bank opposite Hampden. It has no wharves.

Bangor, on the west bank of Penobscot River at the head of navigation, is connected with Boston and points on Penobscot Bay by steamer, and has considerable trade by coasting vessels. Most of the river in front of the city has been dredged where necessary to obtain a depth of 14 feet (4.3 m.). The bottom is rocky and there are a few rocks with a little less than 14 feet (4.3 m.). The depths are about 18 feet (5.5 m.) at the High Head coal wharves and 10 to 14 feet (3 to 4.3 m.) at the others.

Brewer is a town on the east side of Penobscot River opposite Bangor. It is connected with Bangor by a highway bridge and by ferry.

Kenduskeag River empties into Penobscot River from westward at the north end of Bangor. Some dredging has been done in the entrance to a depth of 5 feet (1.5 m.). A drawbridge crosses the river at the entrance. Small vessels sometimes go a little above the bridge.

Anchorage.—The usual anchorage for vessels waiting at the entrance of the river for a towboat or favorable wind and tide is northward of Fort Point on the west side of the channel. Vessels bound up the river anchor anywhere in the channel where soft bottom is found. Vessels towing to Bangor, if the tide does not serve, anchor

in Crosby Narrows, about 5 miles below, and wait for a favorable tide.

Pilots for Penobscot Bay and River can sometimes be had from fishermen or coasters off the entrance, or in the bay. There are no regular pilots for the river except the masters of towboats.

Towboats are always taken by large vessels bound up the river. There is one at Bangor, which can be telephoned for from Fort Point or any part of Penobscot Bay. Vessels towing up the river do not require a pilot.

Supplies.—Coal, water, and gasoline can be had alongside the wharves at Bangor. Water is also taken from the river at Bangor. Provisions and gasoline can be obtained at any of the towns, and ship chandler's stores at Bangor.

Repairs.—There were no marine railways in operation on the river in 1926. Much of the repairing is done on the beaches at low water. Bangor is the only place on the river at which repairs to the machinery of steamers can be made.

Steamers from Boston run to Bucksport, Winterport, and Bangor daily in summer; when the river is closed by ice, they run to Bucksport or Winterport. Bangor has rail connection.

Freshets occur in the river during March and April; they are at times dangerous to vessels.

Tides.—The mean rise and fall of tides varies from 10 feet (3.0 m.) at the entrance to 13 feet (4 m.) at Bangor.

Ice obstructs navigation above Winterport for nearly five months each year, beginning about December. During extreme winters the river is closed to the mouth. The most difficult place below Winterport is abreast Fort Point, where ice jams occur. If vessels can pass this point they can usually go to Winterport.

DIRECTIONS, PENOBSCOT RIVER

Directions to the entrance of Penobscot River through East Penobscot Bay are given on page 132, and through West Penobscot Bay on page 150.

The charted depths in the channel are 22 feet (6.4 m.) to Crosby Narrows, 3½ miles below Bangor, and 14 feet (4.3 m.) to Bangor, but shoaling is reported, and there are numerous unmarked shoals with less depths close to the sailing lines; the channel is crooked and narrow in places, and strangers should not attempt to carry a greater draft than 10 feet (3 m.) to Bangor, and with this draft care is necessary and the use of the lead advisable in places. With a deeper draft a pilot or towboat should be employed. The safest time is on a rising tide. The river is not safe for strangers to run at night.

Fort Point to Bucksport.—From a position ¼ mile eastward of Fort Point, steer 6° true (NNE. ⅛ E. mag.) for 2⅞ miles, passing about 100 yards eastward of the black buoy at the end of the ledge which extends 600 yards southeastward from Sandy Point, and to a position about 400 yards eastward of Odom Ledge stone beacon; then steer 332° true (N. by W. mag.) for ½ mile to mid-river and then follow a mid-river course until westward of Bucksport.

Bucksport to Winterport.—Give the western side of the point (marked by brick buildings) northwestward of Bucksport a berth of over 200 yards in rounding it, steer 357° true (N. by E. ⅜ E. mag.) for ¾ mile for the northern point of Luce Cove, and pass about 200 yards westward of Indian Point (wooded); this course leads through a dredged channel, has unmarked shoals on either side, and care is necessary. Pass 150 yards westward of the north point of Luce Cove and steer 331° true (N. by W. mag.) for nearly 1 mile, heading for Drachm Point. Then steer 281° true (NW. by W. ⅜ W. mag.) for the summit of Treat Hill, and pass about 50 yards southward of a red buoy. Shoaling has been reported here and care is required. When the upper wharves of Winterport are open just clear of Drachm Point, steer 337° true (N. ⅜ W. mag.) and pass 50 yards westward of a second red buoy. From this buoy steer 355° true (N. by E. ⅛ E. mag.) with the summit of Mount Heagan astern for ⅝ mile, until about 250 yards from the western shore. Then steer about 28° true (NE. mag.) in mid-channel past Winterport.

Winterport to Crosby Narrows.—Follow a mid-river course for 2 miles above Winterport to Oak Point, and pass southward and eastward of the latter, rounding it at a distance of 250 yards; the cove westward of Oak Point is shoal. A shelving reef extends a greatest distance of 150 yards off the southeast side of Oak Point, and the bight in the eastern shore opposite is shoal. Keep in mid-river, and when about ¾ mile above Oak Point, pass westward of a ledge, covered at high water and marked by a spindle, lying 125 yards from the eastern bank. Round the point on the western bank above the spindle at a distance of about 150 yards, and follow the southern bank at this distance until southward of a red buoy southward of Bald Hill.

Then haul northward, pass 50 to 100 yards westward of the buoy and round the shore of Bald Hill, at a distance of 150 to 200 yards. Then steer 0° true (N. by E. ⅝ E. mag.) for ¼ mile to a position 150 yards eastward of the next point on the western shore. Then steer 341° true (N. mag.) for ½ mile, following the western bank and giving it a berth of 100 yards. Then keep in mid-river for 2¾ miles and at the south end of Crosby Narrows avoid at high water the ruins of the wharf making out from the mouth of the stream on the west side.

Crosby Narrows to Bangor.—Pass in mid-channel through Crosby Narrows until the narrowest point is reached, then follow the northwest bank at a distance of 75 yards in the bight west of Seven Pines Point (marked by the ruins of some cribs off the point), passing westward of a shoal in mid-channel. Follow the west bank at this distance until abreast the ruins of a crib wharf on the west side, and then keep in mid-channel to abreast the large sawmill on the northwest side ¼ mile above. The best water then favors the south side, 75 to 100 yards off, for ½ mile to the point where the river bends northward, then crosses over and follows the west side, 75 to 100 yards off, for ⅜ mile, to abreast a crib landing in ruins. The chan- for ⅜ mile, and then is in mid-river or slightly favoring the north- nel then follows the southeast bank at a distance of 75 to 100 yards western side to the bridge at Bangor.

COAST FROM MUSCLE RIDGE CHANNEL TO PORT CLYDE (CHART 312)

Muscle Ridge Channel and Seal Harbor are described with Penobscot Bay on page 142.

Norton Island Ledges lie ½ to 1¼ miles westward of Whitehead Island. There is a bare rock near the middle of the south side of the ledge, and rocks bare at low water lie 600 yards east-southeastward and west-southwestward of the bare rock.

Seavey Ledges, westward of Norton Island Ledges, has two rocks awash at high water; there is a depth of 5 feet (1.5 m.) at the southern end of the ledges, lying 300 yards southwestward of the southern one of the two bare rocks.

Wheeler Bay and **Clark Cove,** north-northeastward of Tenants Harbor Lighthouse, are foul and little used. **Clark Island** is a post village on the west side of Clark Cove.

Tenants Harbor.—This is an excellent anchorage, frequently used as a harbor of refuge by small vessels, and is easy of access. It lies 3 miles westward of Whitehead Lighthouse, and its entrance is marked by Tenants Harbor Lighthouse, on the eastern end of Southern Island. It is open eastward and an easterly gale raises a choppy sea in the harbor, but vessels with good ground tackle can ride in safety. Ice seldom obstructs the harbor; during extremely cold weather it is sometimes frozen over for a few days.

Tenants Harbor village is on the northern shore near the head of the harbor; there is a depth of about 9 feet (2.7 m.) at the steamboat wharf. There is no steamer service.

Long Cove, making northward from the entrance of Tenants Harbor, has several stone quarries where vessels load granite; 10 feet (3 m.) is their usual loaded draft. The entrance is 150 to 200 yards westward of Northern Island, between reefs partly bare at low water. There is a bare rock on the eastern part of the reef on the western side of the entrance.

The anchorage with most swinging room in Tenants Harbor is halfway from the western ends of Northern and Southern Islands to the short stone pier on the north side. Small craft anchor more toward the head of the harbor. The bottom is mostly soft mud and good holding ground, and shoals gradually westward. The north side of the harbor eastward of the stone pier is clear, while westward of it are spots with 4 to 9 feet (1.2 to 2.7 m.) over them. The south side of the harbor abreast the western point of Long Cove should be given a berth of 250 yards.

Tenants Harbor Lighthouse is a white tower connected with dwelling. The light is fixed red, with a red flash of 3 seconds duration every 60 seconds, 64 feet (19.5 m.) above the water, and visible 9 miles. The fog signal is a bell (1 stroke, silent 30 seconds, 2 strokes, silent 30 seconds).

Vessels entering Tenants Harbor can pass midway between Southern and Northern Islands, and steer 268° true (WNW. ⅝W. mag.) into the harbor, slightly favoring the northern side.

Hart Ledge extends nearly ¼ mile from shore ¾ mile southwestward of Tenants Harbor Lighthouse. There is a rock covered at high water near its northeast end, and one bare at low water near its southwest end. The ledge is marked off its southeast side by a black buoy.

Mosquito Harbor, 1¾ miles eastward of Marshall Point Lighthouse, is shoal and little used. **Martinsville** is a settlement at the head. **Mosquito Head,** on the eastern side at the entrance, is high and wooded and looks like an island from a distance.

Mosquito Island, off the entrance to Mosquito Harbor, is partly wooded. The islets westward of Mosquito Island, including **Hay Ledge, The Brothers,** and **Gunning Rocks,** are rocky, with grass on top, and **Black Rock** is a bare rock. **Hart Bar,** extending ½ mile northward of **Hart Island,** is partly bare at low water. There are many unmarked submerged ledges in this vicinity.

The passage south of Mosquito Island and north of these islands and rocks is part of the inside route used by many vessels of 12 feet (3.7 m.) or less draft. The principal dangers are buoyed, but there are unmarked rocks with 15 and 16 feet (4.6 to 4.9 m.) Directions through the passage are given on pages 44 and 48.

Old Cilley Ledge, 1½ miles east-northeastward of Burnt Island, is about ⅜ mile long; its eastern end is awash at low water, and its western end is awash at high water. There is a red bell buoy ¼ mile east-southeastward of the eastern end.

Port Clyde (Herring Gut).—This is an excellent, though small, harbor and anchorage, lying between Marshall Point and Hooper Island, and about 9½ miles north-northeastward of Monhegan Island; it is used as a harbor of refuge by fishermen and coasters. A bar with a depth of about 8 feet (2.4 m.) obstructs the northern entrance; vessels of 15-foot (4.6 m.) draft have been taken over this bar at high water by local pilots, but strangers should not attempt to cross it. Ice does not usually interfere with navigation. In very severe winters the harbor may be frozen over for a short time. The anchorage is anywhere in the channel inside of Marshall Point, in 4 to 6 fathoms (7.3 to 11 m.), good holding ground, and has a clear width of 200 to 250 yards.

Marshall Point Lighthouse, on the eastern side of the entrance to Port Clyde, is a white tower with a covered way to shore. The light is fixed white, 30 feet (9.1 m.) above the water, and visible 9 miles. The fog signal is a bell, sounding 1 stroke every 20 seconds. Storm warnings are displayed near the lighthouse.

Port Clyde village is on the eastern side of the harbor. It is the headquarters of many fishing boats, and has a fish cannery and cold-storage plant. The principal wharves have depths of about 6 to 15 feet (1.8 to 4.6 m.). Gasoline, provisions, and some ship-chandlers stores are obtainable. Coal is sometimes delivered from Thomaston by lighters. There is a plant here engaged in producing manufactured articles from kelp which is gathered from rocks along the coast. There are adequate hotel facilities here and a good highway to Thomaston.

Directions, Port Clyde.—Vessels can approach the entrance from eastward, between Mosquito Island and The Brothers; or from westward, through Davis Straits. Directions through these passages are given on pages 44 and 48.

Entering from southward, vessels should pass close eastward of Old Cilley Ledge red bell buoy and steer for Marshall Point Lighthouse on a 335° true (N. ⅝ W. mag.) course, passing a little over ¼ mile eastward of Black Rock and 150 to 200 yards westward of Gun-

ning Rocks. Pass 200 to 300 yards westward of Marshall Point Lighthouse and enter the harbor in mid-channel, passing westward of a red buoy and eastward of a black buoy. Anchorage may be had 125 yards off the wharves at Port Clyde, in 3½ to 5 fathoms (6.4 to 9.1 m.), soft bottom.

Entering from northward.—There are entrances from northward on either side of Raspberry Island, both having a depth of about 8 feet (2.4 m.), but they are narrow and difficult and should not be used by strangers except in small craft. The easterly channel is the best for strangers in small craft. The best water follows the eastern shore at a distance of about 70 yards and passes eastward of a reef which makes eastward from a small islet. Care should be taken to avoid the submerged ruins of a marine railway on the east side just north of the wharves.

MONHEGAN ISLAND

lying 9 miles off the mainland, is one of the important landmarks for vessels bound along the coast. It is 1⅜ miles long, 160 feet (48.8 m.) high, and presents a rocky shore with high bluffs in places.

Monhegan Island Lighthouse, in the middle of Monhegan Island, is a gray conical tower, with a covered way to a white dwelling. The light is fixed white, with a white flash of 5.6 seconds, duration every 60 seconds, 178 feet (54 m.) above the water, and visible 20 miles.

Manana Island, a smaller island close westward of Monhegan Island, is 110 feet (34 m.) high and rocky and has a fog signal on its summit. The signal is an air siren, sounding a group of three blasts, each of 3 seconds duration, every 60 seconds, silent interval 35 seconds. A bell will be struck by hand if the siren is disabled.

Monhegan Harbor is an anchorage for small craft, exposed southward, lying between Monhegan and Manana Islands; it is used principally by local fishermen and has 3 to 5½ fathoms (5.5 to 10 m.) good holding ground, but there is scant room at the anchorage for a small vessel to swing. The deeper water in the harbor favors Manana Island. A depth of 12 feet (3.7 m.) can be taken through the northern entrance, between Monhegan Island and the grass-covered rock on the end of the ledge making out from Manana Island; the best water leads close to the end of the wharf in entering.

Monhegan is a village of fishermen on the east side of Monhegan Harbor. The principal wharf has a depth of about 12 feet (3.7 m.) at the end. The village has telephone communication with the mainland, and communication by steamer with Boothbay Harbor and Thomaston. Gasoline and provisions are obtainable.

Eastern Duck Rock is a large bare rock, with some grass on top, lying 400 yards off the north end of Monhegan Island; the narrow channel between them is near the rock.

Duck Rocks, lying ⅝ mile off the northwest side of Monhegan Island, are two large bare rocks, the western one marked by a large black tripod beacon. **Sunken Duck Rock,** with 6 feet (1.8 m.) over it, lies 350 yards north-northeastward of the tripod, and is marked on its north side by a black buoy. A black bell buoy is moored 650 yards north-northwestward of the tripod.

Allen Shoal lies 1⅞ miles eastward of Monhegan Island Lighthouse and 1 mile from the nearest point of the island. The least depth found by the survey is 5½ fathoms (10 m.), but a depth of about 3 fathoms (5.5 m.) is reported.

A breaker is reported to lie 2¼ miles 96° true (ESE. mag.) from Monhegan Island Lighthouse. Local fishermen consulted in 1926 had no knowledge of this breaker, and its existence is considered extremely doubtful.

Gull Rock Ledge, with 3¾ fathoms (6.8 m.) over it, lies 1 mile south-southeastward of Monhegan Island Lighthouse.

ST. GEORGE RIVER AND THOMASTON

The entrance of this river (chart 312) lies about 9 miles southwestward of Whitehead and north-northeastward of Monhegan; Marshall Point Lighthouse marks the eastern and Franklin Island Lighthouse the western approach. A group of islands, known as the Georges Islands, extends 6½ miles south-southwestward from the middle of the entrance, which is also obstructed by numerous ledges and rocks, the most prominent of which are marked by buoys or spindles. Several channels with deep water lead into the river between these islands and ledges. St. George River extends 10 miles in a northeasterly direction to the town of Thomaston, where the Warren River, a shallow stream of no commercial importance, empties into it from northwestward.

Georges Islands.—These are a group of islands and rocks extending about 6½ miles south-southwestward from the middle of the entrance to St. George River. The larger islands are generally wooded, and the smaller ones grassy or rocky, and there are few prominent marks. Several channels lead between the islands; the most important are Davis Straits, the channel between McGee and Seavey Islands, and the channel northwestward of Caldwell Island.

Old Man Ledge, the most southerly of the dangers, is marked by a spindle; there is a gas and whistling buoy ¼ mile south-southwestward of it. **Old Woman Ledge,** ⅝ mile northward of Old Man Ledge is bare at half tide.

Burnt Island, the eastern large island at the south end of the group, is 160 feet (49 m.) high, wooded, and marked on its summit by a prominent tower. There is a Coast Guard station on the north side.

Georges Harbor is between **Allen, Benner,** and Davis Islands. There is a small settlement of fishermen on the thorofare between Allen and Benner Islands, and small craft sometimes anchor here. The best water is in mid-channel in entering the thorofare from northeastward. Entering from southwestward the south side should be favored.

Davis Straits is the passage between Davis Island on the south and Thompson Island and other small islands on the north. It is part of the through route, used by many vessels of 12-foot (3.7 m.) or less draft. It has ample depth, but **Griffin Ledge,** in mid-channel, has a depth of 10 feet (3 m.) over it. There is a red buoy on the south side of the ledge; the channel is south of the red buoy, and is only 75 yards wide.

Davis Island is grassy and has two knolls with a saddle between. The two southernmost islets on the north side of Davis Straits are grassy and the others are wooded.

Between **Thompson** and **Hooper Islands** the bottom is very broken and there are numerous dangers, most of them marked or visible at some stage of the tide. **The Sisters** are two small ledges awash at low water and marked on the northwest side by a black buoy. **Old Horse Ledge** is bare at low water and marked by a spindle. **Outer Shag Ledge** is bare at half tide and **Inner Shag Ledge** is awash at high water. **Kelp Ledge** has a small part bare at low water. **Gig Rock,** with 5 feet (1.5 m.) over it, is marked, on its northern side, by a bell buoy.

The channel between **Bar** and **Seavey Islands** on the east and **McGee Island** on the west has ample depth, and some of the dangers are buoyed, but there are unmarked dangers close to the channel. It is used by the regular steamers of 10-foot (3 m.) draft. Bar Island is low and grassy, with a few trees, and Seavey Island is grassy and has a house in the center. **Jenks Ledge,** the most westerly danger, is bare at low water and marked by a horizontally striped buoy.

Port Clyde is on the eastern side of the entrance to the river (see p. 157). There is good anchorage in the middle of the northern entrance of Port Clyde, northward of Hooper Island, in 4 fathoms (7.3 m.). The entrance is clear northward of Blubber Island.

Deep Cove, on the eastern shore, just north of the northern entrance to Port Clyde, has good anchorage in 4 to 7 fathoms (7.3 to 12.8 m.), soft bottom.

Gay Cove is a shallow and unimportant cove in the eastern shore of **Gay Island,** the western point at the entrance of the river.

Pleasant Point Gut separates Gay Island from the mainland. Its western part is bare at low water.

Turkey Cove, on the eastern shore, about 1½ miles above **Caldwell Island,** has good anchorage in 3 to 4 fathoms (5.5 to 7.3 m.), soft bottom, about midway between the points at the entrance.

Maple Juice Cove is a long, shallow cove on the west shore about 2¼ miles above Caldwell Island; good anchorage is found in the entrance in 2 to 4 fathoms (3.7 to 7.3 m.). There is a small wharf on the western shore 1 mile northward of Maple Juice Cove.

Otis Cove is a broad cove, shallow at its head, on the eastern shore, about 1 mile above Maple Juice Cove. The village of **St. George** is at its head. There is good anchorage off the entrance in 3 to 5 fathoms (5.5 to 9.1 m.) but no wharves. A bare rock lies 150 yards off the south side of the entrance, and a ledge covered at three-quarters flood, extends 350 yards off the shore ¼ mile northeastward of the entrance.

Broad Cove is a shallow cove on the western shore about 4½ miles above Caldwell Island; the village of **Cushing** is situated near its western shore. There are no wharves. **Bailey Ledge** is bare at low water and marked on the southeast side by a black buoy.

Watts Cove and **Cutler Cove,** at its head, are shallow coves on the eastern shore opposite Broad Cove.

Thomaston is a town of 2,000 people on the railroad at the head of St. George River. The average draft of vessels entering here is

10 to 12 feet (3 to 3.7 m.), and the deepest 16 feet (4.9 m.). There are shipyards where small wooden vessels are built. A steamer runs to Port Clyde and Monhegan. There is only a small amount of water-borne trade here. A pilot for Thomaston can usually be obtained at Port Clyde.

Warren River empties into St. George River west of Thomaston; it is navigable at high water to the village of **Warren,** about 4 miles above Thomaston. There are three drawbridges above Thomaston, with draws estimated to be 40 feet wide. The river is little used.

Channel.—There is a channel in St. George River up to Broad Cove, which has 10 fathoms (18.3 m.), or more water; above this the depth gradually decreases and it narrows to a small stream through extensive flats which show bare at low water. There is a depth of 19 feet (5.8 m.) in the channel to 1 mile below Thomaston. From this point a narrow channel, which is liable to shoal, has been dredged 16 feet (4.9 m.) deep and 90 to 220 feet wide to Thomaston.

Anchorages.—Good anchorage for the deepest draft vessels is found eastward of Caldwell Island in 6 to 8 fathoms (11 to 14.6 m.), soft bottom; above this vessels anchor anywhere in the channel where the depth is not great or in Turkey Cove, Maple Juice Cove, or Otis Cove.

Pilots are usually taken by vessels. The only ones available are local fishermen, which may be obtained from Port Clyde, or from fishing boats at work in the vicinity of the entrance.

Towboats can be obtained from Bath or Bangor.

Supplies.—Gasoline and provisions are obtainable at Port Clyde or Thomaston. Coal in limited quantities, and water are obtainable at Thomaston.

Ice closes the river to navigation from December to March in severe winters. In ordinary winters, it is not usually entirely closed more than one month, although ice sufficient to interfere with navigation may be encountered at any time for a period of three months.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.).

DIRECTIONS, ST. GEORGE RIVER

The approach to the entrance of St. George River has very broken and irregular bottom, with numerous ledges, bare and submerged, and has not been examined by means of a wire drag. Strangers should therefore proceed with caution and avoid crossing broken areas where the charted depth does not greatly exceed the draft.

From eastward.—Follow the directions on page 44 to a position 50 yards northwestward of Allen Ledge black buoy. Then steer 242° true (W. by S. mag.), pass 150 yards southward of Hooper Island Rocks red buoy, and round the buoy at this distance. Then steer 326° true (N. by W. ½ W. mag.) for the western end of Teal Island, and when ¼ mile eastward of the northern end of Bar Island, steer 37° true (NE. ¾ E. mag.) for about 1 mile, heading for Hooper Point. Pass midway between Hooper Point and Channel Rock buoy, and steer 340° true (N. ¼ W. mag.) for the black buoy off Pleasant Point Gut, passing ¼ mile westward of Howard Point, and 200 yards westward of a red buoy off the point.

Pass 150 yards eastward of the black buoy and steer 36° true (NE. ¾ E. mag.) for 2½ miles, passing through the middle of the Nar-

rows. Above the Narrows there is excellent anchorage near the middle of the river off Otis Cove, in 4 to 5 fathoms (7.3 to 9.1 m.). Above this point be guided by chart 312 and the buoys; the safest time is at low water, when the flats are bare, or on a rising tide.

From westward.—When Franklin Island Lighthouse is distant 4 miles or more, steer for it on any bearing between 28° true (NE. mag.) and 51° true (ENE. mag.). Pass about 300 yards northwestward of Franklin Island and steer 51° true (ENE. mag.), heading just clear of the northern end of Caldwell Island. On this course pass about ¼ mile northwestward of Gangway Ledge (bare rock), 250 yards northwestward of Jenks Ledge buoy, and midway between Goose Rock (high and rugged) and Goose Rock Ledge buoy (both buoys horizontally striped). Keep the northwest side of Caldwell Island aboard, distant 200 to 250 yards, steer 36° true (NE. ¾ E. mag.), and pass about 150 yards eastward of two black buoys. Continue the course and follow the directions in the paragraph preceding.

MUSCONGUS BAY

(chart 313), lies between the Georges Islands on the east and Pemaquid Neck on the west, and forms the approach to Meduncook and Medomak Rivers and Muscongus Sound, the villages of Friendship, Round Pond, and Medomak, and the town of Waldoboro. It is obstructed by numerous islands and ledges, and is seldom entered by vessels seeking shelter in heavy weather. Tenants Harbor and Port Clyde, eastward; and Boothbay Harbor, westward, are easier of access and more convenient. Many of the dangers are marked by buoys. The bay is frequented by many local fishing boats.

Meduncook River is an unimportant estuary making in a general northeast direction, just westward of St. George River; the entrance forms an approach to Friendship Harbor, and is a good anchorage with 4 to 5 fathoms (7.3 to 9.1 m.). The approaches to the entrance are the same as for St. George River, and the anchorage is marked by buoys. The river above the anchorage has a narrow, crooked channel, and is obstructed by numerous unmarked rocks and ledges, so that local knowledge is necessary for its navigation.

Directions to the anchorage from eastward are given on page 167. Approaching from westward, follow the directions for approaching St. George River from westward until up with Jenks Ledge buoy, and then steer 357° true (N. by E. ¼ E. mag.) for the summit of Morse Island until up with the red buoy at the entrance. Pass about 50 yards northwestward of the red buoy, steer 40° true (NE. by E. ⅛ E. mag.), and pass about 100 yards eastward of Northeast Point Reef black buoy. The anchorage is northward of the black buoy, and is about ⅜ mile in diameter.

Friendship Harbor.—This harbor lies west of Meduncook River, and is separated from it by **Friendship** and **Garrison Islands,** between which a channel leads from the anchorage in Meduncook River into the harbor. The harbor is about 1 mile long and has good anchorage in 4 to 6 fathoms (7.3 to 11 m.), but is little used.

Ice closes the harbor proper from December to March.

A ledge extends 300 yards southwestward from Jameson Point. A rock bare at low water at the south end of the ledge is marked by a

black spindle. Above the wharf the northern and eastern sides of the harbor should be given a berth of over 200 yards. The southeast side of the harbor should be given a berth of over 200 yards. **Murphy Ledge** is a rock bare at half tide and marked by a red spindle, lying 200 yards from the southeast side of the harbor abreast Jameson Point. In the eastern part of the harbor a shoal extends 350 yards northeastward from the northeast end of Friendship Island, and is marked at its end by a black buoy.

Friendship is a town on the north shore of the harbor; the usual draft of vessels loading here is 10 feet (3 m.). There is a depth of about 12 feet (3.7 m.) at the steamer wharf, but a ledge with little depth lies northeastward of it. Gasoline and provisions are obtainable, and there is water on the wharf.

Directions for the passage from Port Clyde through Meduncook River, Friendship Harbor, and to the head of Muscongus Sound are given on page 167. Directions from southward in Muscongus Bay are given on page 165.

Hatchet Cove is a shallow cove making northward at the western end of Friendship Harbor. A narrow channel, with a least depth of 15 feet (4.6 m.), leads northeastward into the cove near the western point at its entrance. It is of no importance as an anchorage.

Gull Rock, in the western entrance to Friendship Harbor, has two rocks bare at high water.

Medomak River.—This river enters the head of Muscongus Bay westward of Martin Point, the western point at the entrance to Friendship Harbor. Strangers wishing to enter the river in vessels should take a pilot, on account of the many unmarked dangers, narrow and crooked channels, and strong tidal currents, which require local knowledge.

The lower part of the river is about 2 miles wide, but is separated by several islands into two approaches, which have three narrow and crooked channels by which the river proper is entered. The approaches to these channels are through Muscongus Bay or Muscongus Sound. The eastern approach is ⅝ mile wide and comparatively clear of dangers; at its upper end are two passages leading into the river, one through **Back River Cove** and the other **Flying Passage.** Both have good water, but are very narrow in places, with strong tidal currents. **Hockomock Channel,** the western entrance, has a least depth of 4½ fathoms (8.2 m.), but is narrow in places and has strong tidal currents.

The channel in Medomak River has ample depth for 5 miles above the entrance, and some of the dangers are marked, but there are unmarked dangers close to the channel. For the next 2½ miles to within 1¾ miles of Waldoboro, the channel leads between flats bare or nearly so at low water, and shoals gradually to 5 feet (1.5 m.). From that point to Waldoboro the channel has been dredged 75 feet wide and 5 feet (1.5 m.) deep between flats bare at low water. The channel for 3 miles below Waldoboro is marked by bush stakes. It can best be followed at low water when the flats are visible, or on a rising tide. Ice closes the river from December to April.

Medomak is a post village on the western side of Hockomock Channel. There is a wharf at the village and a cannery wharf ½ mile southwestward.

There is a float landing and small settlement on the eastern side of Hockomock Channel inside **Clam Island.**

Broad Cove, on the west side of Medomak River, is used by a few motor boats and small schooners carrying fertilizer and wood products. The channels are unmarked.

Waldoboro is a town on the railroad at the head of navigation on Medomak River. The deepest draft going to the town is about 10 feet (3 m.). The principal wharf has a depth of about 4 feet (1.2 m.). There is but little traffic.

Pemaquid Neck, on the west side of Muscongus Bay, is wooded. Pemaquid Point, the south end, is marked by **Pemaquid Point Lighthouse,** a white tower connected with dwelling. The light is fixed white, 79 feet (24 m.) above the water, and visible 12 miles. The fog signal is a bell (1 stroke every 10 seconds).

Pumpkin Cove Ledge, 1 mile east-northeastward of Pemaquid Point Lighthouse, is unmarked and has a least found depth of 18 feet (5.5 m.); the sea breaks on it in heavy weather.

New Harbor Dry Ledges lie 2 miles northeastward of Pemaquid Point Lighthouse and ¼ mile from the western shore. The ledges are ¼ mile long, with a bare rock at each end, and there is no safe passage between them and the shore. **Little Island,** with a clump of trees, lies 200 yards from the shore ¼ mile southward of New Harbor. It is the highest part of a ledge about ¼ mile long.

New Harbor is a cove on the western shore of Muscongus Bay, about 2⅜ miles northeastward of Pemaquid Point Lighthouse; it is used as an anchorage by small craft only, and though open eastward, is well sheltered from the sea. The channel is narrow between a shelving ledge extending northeastward from the south point at the entrance, and a ledge just inside it which extends halfway across from the north side and is marked at its end by a red buoy. The channel, with a width of about 150 feet, then leads close northward of a black spindle. Inside the spindle a part of the harbor has been dredged to a width of 200 to 250 feet, the lower half of the dredged area to a depth of 12 feet (3.7 m.) and the upper half 6 feet (1.8 m.). There is no regular steamer service. There are several fish plants, and gasoline is obtainable from floats in the harbor.

Muscongus Sound.—This sound is on the western side of Muscongus Bay, between **Muscongus** and **Hog Islands** on the east and the mainland on the west. It is about ⅝ mile wide and 5 miles long, and has several rocks and ledges near its southern entrance, the most prominent of which are marked by buoys. Above Poland Ledges to abreast Muscongus Harbor the depths in the sound shoal gradually from 8 to 4 fathoms (14.6 to 7.3 m.), and anchorage can be selected with the aid of the chart.

Islands and ledges extend 1¾ miles southward from Muscongus Island. **Haddock Island** is wooded and **Ross Island** is grassy. **Webber Dry Ledge** is awash at high water. **Bar Island Ledge** is ¼ mile long and bare in one place at low water; it is marked on the south end by a red buoy. **Bar Island** is grassy, with a cottage in the center.

Marsh Harbor, on the southeast side of Muscongus Island, between it and **Marsh Island,** is not used as an anchorage.

Poland South Ledge has a depth of 9 feet (2.7 m.) and **Poland North Ledge** is bare at low water. Both are marked on the east side by black buoys. The better channel leads eastward of them.

Round Pond is a small landlocked harbor with 12 to 18 feet (3.7 to 5.5 m.) in its middle on the west shore of Muscongus Sound, about 2 miles above the southern end of Muscongus Island; it affords good anchorage for small vessels, but is little used. There is a granite quarry on the north side of the entrance, and Round Pond, a village and landing, is at the head of the harbor. The northeast and southwest ends of the harbor should be given a berth of 350 yards and the west side 200 yards. The best water in entering favors the north side, northward of a black buoy marking the end of a reef making northward from the point on the south side of the entrance.

Muscongus Harbor is a small cove and village on the west shore of the sound about 1½ miles above Round Pond. There is a landing for small craft.

Greenland Cove is the extreme northern end of the sound; it is shallow and of no importance.

Lower Narrows, leading into the head of Muscongus Sound north of Hog Island, has a depth of about 13 feet (4 m.), and is used by steamers drawing 10 feet (3 m.) and sometimes by vessels bound into Medomak River. The principal dangers are marked, but local knowledge is necessary to carry the best water. Directions through the narrows are given following.

Supplies.—Gasoline and provisions are obtainable at Friendship, New Harbor, Round Pond, and Waldoboro. There is water on the wharf at Friendship.

Pilots for these waters are local fishermen, and can be obtained at any of the towns or from boats at work near the entrance.

Tides.—The mean range of tides is about 9 feet (2.7 m.).

DIRECTIONS, MUSCONGUS BAY

This region is an area of rocks and ledges and very broken bottom and has not been examined by means of a wire drag. Vessels should therefore proceed with extreme caution and should avoid broken bottom where abrupt changes in depth are indicated by the chart to depths less than 10 fathoms (18.3 m.).

Directions through the bay from Davis Straits to Pemaquid Point are given on page 45. The following directions lead into the bay from seaward.

From eastward.—Passing southward of Old Man Ledge gas and whistling buoy, steer about 276° true (WNW. mag.) for 3¾ miles, passing ¼ mile or more southward of Shark Island, and to a position 1¼ miles southwestward of Eastern Egg Rock and with Franklin Island Lighthouse bearing 20° true (NE. ¾ N. mag.). Then steer 6° true (NNE. mag.) for Jones Garden Island, passing ¾ mile westward of Eastern Egg Rock tripod, ½ mile eastward of Western Egg Rock Breakers buoy, ¾ mile westward of Franklin Island Lighthouse, and to a position 150 yards westward of Harbor Island Rock horizontally striped buoy. Then steer 34° true (NE. ½ E. mag.) for the summit of Black Island, and keep the northwest side of Harbor Island aboard, distant 300 to 400 yards. On this course

take care to avoid the 15-foot (4.6 m.) rock which lies ⅜ mile eastward of Wreck Island. This danger was discovered in 1926.

Pass 300 to 400 yards westward of Black Island, steer 23° true (NE. ⅜ N. mag.), and pass about 300 yards northwestward of the southwest end of Friendship Island. When Gull Rock bears 262° true (W. ⅞ N. mag.), steer 57° true (ENE. ⅝ E. mag.), and select anchorage near the middle of Friendship Harbor below the black buoy, in 4 to 6 fathoms (7.3 to 11 m.).

Bound to Medomak River, follow the directions preceding to a position 300 to 400 yards westward of Black Island. Then steer 3° true (N. by E. ¾ E. mag.) and pass about ¼ mile westward of Gull Rock. Anchor near mid-channel, about 1¾ miles above Gull Rock, and ⅜ mile below Hungry Island. Above Gull Rock danger will be avoided by giving the shores a berth of 400 yards. If desiring to enter the river, or if bound to Waldoboro, take a pilot; or if in small craft, be guided by the chart.

From westward.—When Franklin Island Lighthouse is distant 4 miles or more, bring it on any bearing between 28° true (NE. mag.) and 51° true (ENE. mag.) and steer for it. When Jones Garden Island bears 6° true (NNE. mag.), steer for it and proceed as directed above.

Or, from a position ¼ mile northward of Pemaquid Ledge buoy steer 61° true (E. by N. mag.) for 3¾ miles, passing ½ mile southward of Pemaquid Point Lighthouse, and to a position ⅜ mile southward of New Harbor Sunken Ledges red buoy. Then steer 51° true (ENE. mag.) for 2¾ miles, heading for Franklin Island Lighthouse, and pass ¼ mile southeastward of the black buoy eastward of Western Egg Rock. When Jones Garden Island bears 6° true (NNE. mag.), steer for it and proceed as directed above.

Directions, Muscongus Sound, from eastward.—Having come from Davis Straits as directed on page 45, pass 200 yards northward of Eastern Egg Rock beacon and steer 284° true (NW. by W. ¼ W. mag.), passing ⅜ mile southward of Western Egg Rock and to a position 400 yards southwestward of Haddock Island Kelp Ledge horizontally striped buoy. Then steer 329° true (N. by W. ¼ W. mag.) and pass about 300 yards southwestward of Webber Sunken Ledge red buoy.

When about 400 yards from the western shore, steer 17° true (NE. by N. mag.), pass midway between Brown Head Ledge buoy and the western shore, about 300 yards off Brown Head, and to a position 100 to 200 yards eastward of Poland South Ledge black buoy. Then steer 355° true (N. by E. mag.) and pass about 250 yards eastward of Poland North Ledge black buoy. When Round Pond is opened, pass close northward of the black buoy on a 253° true (W. mag.) course, and keep the north point at the entrance aboard distance about 75 yards. Anchor in the middle of Round Pond in 14 to 18 feet (4.3 to 5.5 m.).

From southward or westward.—Follow the eastern shore of Pemaquid Neck at a distance of about ¾ mile on a 17° true (NE. by N. mag.) course until abreast Long Cove. Continue the course, pass midway between Brown Head Ledge buoy and the western shore, and proceed as directed in the preceding paragraph.

Directions, Port Clyde entrance through Friendship Harbor to Muscongus Sound.—These directions are good for vessels of 10 feet (3 m.) or less draft. The tidal currents have little velocity, and generally the navigation is not difficult in daylight and clear weather with the aid of the chart and the buoys, but there are three places requiring extra caution. These are at the north end of McGee Island, between Garrison Island and the northeast point of Friendship Island, and in Lower Narrows. This route is used by the regular steamers and many small craft.

Follow the directions on page 44 to a position 50 yards northwestward of Allen Ledge black buoy. Then steer 242° true (W. by S. mag.) and pass 150 yards southward of Hooper Rocks red buoy. Then steer 282° true (NW. by W. ⅜ W. mag.) for the summit of McGee Island until Bar Island is abeam, distant 300 to 400 yards. Then steer about 308° true (NW. by N. mag.), and keep the northern end of McGee Island aboard, distant 100 to 125 yards, when passing between it and the end of the ledge, partly bare at low water, which extends 250 yards westward from the south end of Seavey Island; a shelving ledge also extends 250 yards southward from **Seavey Island.** Continue the course and pass about 50 yards northeastward of a black buoy and 150 yards southwestward of a red buoy.

Then steer 346° true (N. ¼ E. mag.) for the summit of Morse Island with the summit of McGee Island astern, until up with the red buoy between Morse and Gay Islands. Pass about 50 yards northwestward of this buoy, steer 40° true (NE. by E. mag.), and pass eastward and northward of Northeast Point Reef black buoy, rounding it at a distance of about 100 yards. Then steer 283° true (NW. by W. ¼ W. mag.) and pass about 50 yards southward of Crotch Island Ledges red buoy.

When about 300 yards westward of this buoy, steer 327° true (N. by W. ⅜ W. mag.) for the northeast point of Friendship Island, with the northeast end of Morse Island astern until up with the red buoy lying 140 yards southwestward of Garrison Island. Pass 50 yards westward of this buoy, steer 6° true (NNE. mag.), and pass between Garrison Island and the northeast point of Friendship Island, slightly favoring if anything Garrison Island. Pass eastward and northward of a black buoy, rounding it at a distance of about 75 yards, and steer 237° true (WSW. ½ W. mag.) through Friendship Harbor, passing midway between the red spindle on the southern side of the harbor and the black spindle near the end of the ledge extending southward from **Jameson Point.**

Pass about 350 yards southward of **Ram Island** (wooded) and steer 270° true (WNW. ½ W. mag.) to a position 100 yards southwestward of the black buoy southward of Martin Point. Then steer 299° true (NW. mag.) for the red buoy at the end of the ledge extending southward from Bremen Long Island. Pass close southward of this buoy, steer 270° true (WNW. ½ W. mag.) for the south part of **Middle Ledges,** which shows as two wooded clumps; on this course pass 150 yards southward of the south end of Bremen Long Island and close northward of a black buoy, and pass close southward and about 100 yards westward of a red spar buoy. Then steer 329° true (N. by W. ¼ W. mag.) and pass about 150 yards eastward of the north end of the brush-covered islet on the northern part of Middle Ledges.

Pass about 150 yards eastward and 50 yards northward of the red buoy at the north end of Middle Ledges, steer about 270° true (WNW. ½ W. mag.), and pass about 150 yards northward of the point at the northeast end of Hog Island. When about 125 yards from the eastern side of Hockomock Point, steer about 237° true (WSW. ⅝ W. mag.), and pass between the point and the small bare rock on the ledge extending northeastward from Hog Island, slightly favoring, if anything, the rock. The channel is narrow and great care is required at this point. When past the rock, keep the shore of Hog Island aboard, distant about 75 yards for ¼ mile, and pass eastward of two black buoys at the western end of Lower Narrows. Then follow the shore of Hog Island at a distance of about 200 yards for nearly ½ mile until past the black buoy marking the south end of Half Tide Ledge.

JOHN BAY

(chart 313) lies westward of Pemaquid Neck, between it and Rutherford Island. It is about 1¼ miles wide at its entrance and 2 miles long to John Island, above which the Pemaquid River empties into its northeastern end and John River into its northwestern. The depths in the bay are very irregular, and there are several ledges and rocks.

The bay is of no commercial importance; a number of summer resorts are located on its shores, and it is used as an anchorage only by fishermen and yachts well acquainted with the locality. The holding ground is poor, except in a few places near the head of the bay and in the coves. Port Clyde, eastward, and Boothbay Harbor, westward, are preferable at all times.

Pemaquid Harbor is at the entrance to Pemaquid River, northeastward of John Island; the bottom is rocky and irregular, but there is a fair anchorage for small vessels in the eastern part of the harbor between Fish Point and the entrance of Pemaquid River, in 6 fathoms (11 m.). **Pemaquid Beach** and **Pemaquid Harbor** are post villages at the entrance of Pemaquid River, the former on the south side and the latter on the north side. **Pemaquid River** extends northeastward about 2 miles to the village of **Pemaquid Falls.** The river is dry at low water near its head and has a narrow, crooked, and unmarked channel. It is seldom entered. On the point marking the southern entrance to Pemaquid River there is a *prominent stone tower* marking the position of a former fort.

Thurston Ledges are mostly bare rocks which extend 300 yards southward from the north side at the entrance of Pemaquid Harbor, their south edge lying 300 yards northward of Beaver Island.

Pemaquid Harbor can be entered from westward by passing 125 to 150 yards northward of **Beaver Island,** the high, round islet with some trees lying 300 yards northward of John Island. Or, when ½ mile or more southward of John Island, steer 355° true (N. by E. mag.) so as to pass 150 yards eastward of John Island and 125 yards westward of the western bare rocks of **Knowles Rocks.** A ledge, partly bare at half tide, extends 225 yards northeastward from the north end of **John Island.**

McFarling Cove is in the northwestern side of the bay northward and northwestward of Davis Island; a steep hill about 150 feet

(46 m.) high is on the western shore of the cove. There is good anchorage for a small vessel about 300 yards northward, or in mid-channel northwestward, from the north end of Davis Island, in 4 to 6 fathoms (7.3 to 11 m.).

McFarling Ledges lie 450 to 800 yards northward of Davis Island and 300 to 500 yards from the western shore. At the north end is a rock covered at half tide, and at the west end is a rock bare at low water. A red buoy marks the south end.

The Gut (described with Damariscotta River) is a thorofare connecting McFarling Cove with Damariscotta River. It has a depth of 2 feet (0.6 m.) at low water and is crossed by a bridge with a draw.

To enter McFarling Cove steer 273° true (WNW. ¼ W. mag.) with the south end of Beaver Island astern, which leads midway between Corvette Ledge buoy and McFarling Ledges buoy and 250 yards northward of Davis Island.

John River extends northward about 2 miles above McFarling Cove, and separates into two branches, the eastern, **Foster Cove,** the western, **Western Branch. Robinson Cove** makes into the western shore of John River above High Island. There is good anchorage in the river southeastward and eastward of Clarke Point, in 3 to 4 fathoms (5.5 to 7.3 m.). The river is little used.

Thread of Life is a narrow, deep channel lying between Thread of Life Ledges and Crow Island on the east and the southern part of Rutherford Island and Turnip Island on the west. It is used by small local vessels entering John Bay from westward or from Damariscotta River. **Thrumcap Island** is partly wooded in its northern part, **Thread of Life Ledges** are bare or grassy islets, **Turnip Island** has several houses, and **Crow Island** has a few trees. A shelving ledge, awash at low water at its south end, extends 300 yards southward from **Hay Island;** the latter has some trees on its south end.

Directions.—To pass through Thread of Life from westward, steer 61° true (E. by N. mag.) for the north end of Thrumcap Island with Ram Island Lighthouse astern and pass 400 yards southward of The Bulldog (bare at half tide) and 500 yards southward of the rock covered at high water lying ¼ mile eastward of the south end of Inner Heron Island. When about 400 yards from Thrumcap Island, steer 15° true (NNE. ⅞ E. mag.) and pass 200 yards westward of Thread of Life Ledges and 100 yards eastward of Turnip Island. Then keep in mid-channel and pass into John Bay about 100 yards westward and northward of a red buoy lying about 200 yards northward of Crow Island, between it and a black buoy northward of it.

Directions, John Bay.—Stand up the middle of the bay on a 349° true (N. ½ E. mag.) course, heading for the eastern end of High Island, and pass 300 yards westward of John Island and the same distance off the eastern shore northward of Pemaquid Harbor. Then keep in mid-channel until abreast High Island, and then pass about 50 yards westward of a red spar buoy. Anchor near mid-river, about ¼ mile northeastward of the buoy, in 3 to 4 fathoms (5.5 to 7.3 m.).

DAMARISCOTTA RIVER

The entrance to this river (chart 313) is about 3 miles westward of Pemaquid Point Lighthouse and 1 mile northeastward of Ram Island Lighthouse. From its mouth the river trends in a general north-northeast direction for 14 miles to the towns of Damariscotta and Newcastle, at the head of navigation. It is navigable to these towns for vessels of 18-foot (5.5 m.) draft at high water, but the tidal currents are strong, and, although some of the dangers are marked by buoys, strangers should not pass above The Narrows without a pilot.

The channel of the river is crooked, and in many places, owing to islands and ledges, very narrow; for a distance of 11 miles above the mouth of the river a least depth of 5 fathoms (9.1 m.) may be carried in the channel; above this the water shoals gradually to 9 feet (2.7 m.) at low water just below the town of Damariscotta, and this depth can be carried to the town.

The islands and shoals southwestward of the entrance are described with Boothbay Harbor and Linekin Bay.

Little River, on the west side of the entrance, has some cottages and float landings; the channel is narrow and unmarked and suitable only for small craft.

Inner Heron Island, on the eastern side of the entrance to Damariscotta River, is thickly wooded. There is a post village (**Heron Island**) on the island and a steamer landing on the northeast side with a depth of about 12 feet (3.7 m.) at the end. Boats going to the wharf must avoid the reef, bare at half tide, extending northward from the island to a red buoy.

Inner Heron Island Ledge, ¼ mile southwestward of the south end of Inner Heron Island, is bare at low water and marked on the southwest side by a red buoy. **The Bulldog,** 300 yards southward of the island, is bare at half tide. The rock 350 yards southeastward of the island is bare a little after high water. There are other unmarked dangers between Inner Heron Island and the eastern shore, and this passage should not be used by strangers.

Christmas Cove is an anchorage for small craft or a very small vessel on the eastern side of the entrance, ¾ mile north-northeastward of Inner Heron Island. The narrow entrance to the cove proper is midway between two bare rocks, the one on the southeast side being marked by a white tripod beacon. A black spindle marks the north side of the channel just inside the entrance and a red spindle marks the point of a ledge near the south side westward of the steamboat landing. The anchorage with best swinging room is in the middle of the cove off the landing in 4 fathoms (7.3 m.).

Christmas is a post village and summer resort on the eastern side of the cove. The steamer landing is said to have a depth of about 15 feet (4.6 m.) at the end. A large hotel is prominent.

To enter Christmas Cove, enter in mid-harbor, pass midway between the tripod beacon and the outer spindle and northward of the inner spindle.

Landmark.—About 1 mile north-northeast of Christmas Cove there is a high, built-in water tank which forms an excellent landmark.

South Bristol is a village and summer resort on the east side of Damariscotta River 2½ miles above the entrance. The steamer landing has a depth of about 9 feet (2. 7 m.) at the end, but the depth in the approach is only about 6 feet (1.8 m.), and the best water leads midway between a bare rock and the south shore.

The Gut is a thorofare connecting Damariscotta River at South Bristol with McFarling Cove and John Bay. The channel has been improved by dredging to a width of 25 feet and depth of 2 feet (0.6 m.) at low water in the vicinity of the drawbridge, where the channel has its least depth. The bridge has a single draw opening about 28 feet wide. Boats after passing through the bridge from eastward must haul southward to avoid a ledge on the north side just westward of the bridge.

East Boothbay is a village on the west bank of the river, about 3 miles above its mouth; vessels bound up the river and waiting for a favorable wind or tide usually anchor here, and strangers take a pilot if one has not been taken off the entrance. The steamer wharf has a depth of about 8 feet (2.4 m.), and some dredging to this depth has been done off the wharves. A large hotel is prominent. **Kelp Ledge,** just south of the approach to the wharves and 150 yards from the eastern shore, is bare at low water and unmarked.

At **The Narrows,** 1⅜ miles above East Boothbay, the channel is contracted to a width of 100 to 150 yards, and the tidal currents are strong with swirls. **Eastern Ledge,** extending 100 yards from the eastern shore, is a rock with 3 feet (0.9 m.) over it, and is marked at its southwest end by a red buoy. On the west side of The Narrows is a ledge, mostly sunken, extending 250 yards southwestward and 75 yards eastward from **Fort Point.** There are other submerged ledges in this vicinity.

Seal Cove and **Long Cove,** on the east side, just above The Narrows, have many unmarked dangers and are seldom entered.

Clark Cove, on the east side, 2½ miles above The Narrows, is a broad bight, shoal near the shores. There is a steamer landing on the end of the point ⅜ mile southeastward of **McGuire Point.** The long ice-house wharf, northward of the steamer wharf, is in ruins.

Pleasant Cove is on the western shore of the river, opposite Clark Cove, and makes in nearly 1½ miles southwestward. There is good anchorage in the mouth of this cove just northwestward of Carlisle Point, in 2½ to 5 fathoms (4.6 to 9.1 m.), soft bottom. **Pleasant Cove Ledges,** northward of the cove, are covered at high water. There are no wharves in the cove.

Poole Landing is a steamer wharf on the west side of the river ⅝ mile northward of Pleasant Cove Ledges. There is a grassy islet 400 yards northeastward of the wharf.

Damariscotta, on the east bank, and **Newcastle,** on the west bank of the river, 14 miles above its mouth, are connected by a fixed bridge. They are on a branch of the Maine Central Railroad. Vessels of 18-foot (5.5 m.) draft can go to the wharves at either place at high water. The usual draft of vessels loading here is 10 feet (3 m.). There is 8 to 10 feet (2.4 to 3 m.) alongside the wharves. There is but little traffic.

Anchorages.—Vessels bound into the river usually go as far as Meadow Cove, just above East Boothbay, where there is good anchor-

age in 5 to 8 fathoms (9.1 to 14.6 m.), keeping 150 yards from the shore. This is as far as a stranger should attempt to go in a vessel without a pilot. Above The Narrows vessels can anchor anywhere in the channel where the bottom and depth are suitable.

Pilots can be found at Boothbay and at East Boothbay.

Supplies.—Gasoline and provisions can be found at any of the villages. Water can be had on the wharf at Damariscotta.

Ice closes the river for a distance of 8 miles below Damariscotta during January, February, and March.

Currents.—The tidal currents have considerable velocity. The ebb lasts about two hours after low water, in the upper part of the river, and is usually stronger than the flood. The currents follow the general direction of the channel.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.).

DIRECTIONS, DAMARISCOTTA RIVER

This region has many rocks and ledges, and very broken bottom, and has not been examined by means of a wire drag. Extreme caution is necessary.

Directions for approaching from eastward are given on page 45.

Approaching from southward, pass eastward of Pumpkin Island and the islands off the entrance, giving them a berth of 1¼ miles. Pass ⅜ mile southwestward of Thrumcap Island, steer 299° true (NW. mag.) and pass about 400 yards southward and westward of Inner Heron Island Ledge red buoy. Or, coming from Fisherman Island Passage, steer 51° true (ENE. mag.) for the south end of Inner Heron Island, with Ram Island Lighthouse astern, and pass about 400 yards southward and eastward of the black buoy off Little River.

Enter the river about midway between the black buoy and Inner Heron Island Ledge red buoy, and steer 6° true (NNE. mag.) in mid-river for 1½ miles above Inner Heron Island. Pass westward of the red buoy off the entrance to South Bristol, give Farnum Point on the west side, a berth of 300 yards, and when it is abeam change the course to 327° true (N. by W. ⅜ W. mag.), keeping about the middle of the river. Pass eastward of Montgomery Point black buoy and haul in for the western side of the channel off Meadow Cove; anchor in 5 to 8 fathoms (9.1 to 14.6 m.). Small craft should have no trouble in going to the head with the aid of Chart 313. The best time is on a rising tide.

BOOTHBAY HARBOR AND LINEKIN BAY

(charts 314 and 230) are included between Linekin Neck on the east and Southport Island on the west. They form the approach to the town of Boothbay Harbor and numerous smaller summer resorts. They are frequented by many vessels, and by a large number of fishing boats and pleasure craft in summer.

Boothbay Harbor is one of the best anchorages on the coast of Maine, and is much used as a harbor of refuge by all classes of vessels. It lies 14 miles northwestward of Monhegan Island and 9 miles northeastward of Seguin Island, and is reached through Booth Bay,

which is marked at its eastern and western entrances by Ram Island Lighthouse and The Cuckolds Lighthouse, respectively. Lying south of the entrance are several islands and a number of rocks and ledges. The entrance between Linekin Neck on the east and Cape Newagen on the west is 2⅝ miles wide.

Channels.—There are three channels by which to approach the harbor. Fisherman Island Passage has a depth sufficient for the largest vessels, but there are some unmarked spots with a least depth of 13 feet (4.0 m.), lying northwestward and westward of Ram Island, and the bottom is very broken; the passage is not recommended for a greater draft than about 18 feet (5.5 m.) at low water. The channel westward of Squirrel Island has a depth sufficient for the largest vessels, but there are unmarked spots with from 19 to 25 feet (5.8 to 7.6 m.) nearly in the middle of the channel between Squirrel and Burnt Islands. The channel from southward, leading east of Squirrel Island, leads in the deepest water, and 8 fathoms (14.6 m.) can be taken up to the anchorage.

Islands and rocks off Boothbay Harbor.—Islands and rocks extend 4 miles south-southeastward and 7 miles southwestward from the southwest end of Linekin Neck. The ground is very broken, rocks rising abruptly from deep water, and has not been examined by the means of a wire drag. Vessels should therefore avoid crossing this area. A gas and whistle buoy is placed at the southwest end of the broken ground, and deep-draft vessels passing along the coast should pass outside of it.

Bantam Rock, the most southerly visible danger, is 1⅜ miles southwestward of the south end of Damiscove Island. It is bare at low water, and marked on the southwest side by a red buoy.

Damiscove Island is 1¾ miles long, bare except at the north end, which is wooded, and nearly divided in the middle. Damiscove Harbor, at the south end, is used as a small-boat harbor by local fishermen. There is a Coast Guard station on the west side of the harbor. **The Motions,** extending ¼ mile south-southwestward of the southwest end of Damiscove Island, is nearly awash at low water, and marked off the end by a black buoy.

Fisherman Island, northeastward of Damiscove Island, is bare except for a few trees on the south end, and two inconspicuous houses on the west side.

Ram Island, on the south side of Fisherman Island Passage, is a grassy island, marked on the northwest side by **Ram Island Lighthouse.** The lighthouse is a tower with a gray base and white top. The light is fixed red, with two white sectors, bearing between 27° true (NE. mag.) and 49° true (ENE. mag.), and between 256° true (W. ¼ N. mag.) and 263° true (W. by N. mag.), 36 feet (11 m.) above the water, and visible 11 miles. The fog signal is a bell (1 stroke every 20 seconds).

The Hypocrites are two low, bare rocks southeastward of Fisherman Island. **White Islands,** ¾ mile farther southeastward, are two high round islands with a patch of woods in the center of each.

The Cuckolds are two grassy islets off Cape Newagen, on the west side of the entrance of Booth Bay. The easterly islet is marked by **The Cuckolds Lighthouse,** a white tower on a dwelling. The light is group flashing white (flash 0.3 second, eclipse 1.7 seconds, flash 0.3

second, eclipse 3.7 seconds), 59 feet (18 m.) above the water, and visible 13 miles. The fog signal is a reed horn (blast 3 seconds, silent 17 seconds).

Cape Harbor is a harbor for small craft between **Cape Island** (wooded in the center) and **Cape Newagen.** It is used mostly by local fishermen. **Newagen** is a post village on the harbor. There are landings for small craft. There are two entrances to the harbor; the easterly, leading between **The Ark** and Cape Newagen, is said to have a depth of only about 2 feet (0.6 m.) at low water. The main entrance is from westward, and has a depth of about 10 feet (3 m.). The depths inside are 6 to 10 feet (1.8 to 3 m.).

Squirrel Island, in the middle of the entrance of Booth Bay, is an important summer resort. It is wooded and has many cottages visible. There is a steamer landing (depth 15 feet (4.6 m.) or more) and landings for small craft in the northerly of two coves on the west side. **Squirrel Cove,** the southerly, is sometimes used as an anchorage by small craft. A beacon marks the ledge at the south side of the entrance.

Linekin Bay.—This bay lies northeastward of Squirrel Island, between **Linekin Neck** and Spruce Point. The principal dangers are buoyed, and good anchorage can be selected, the depths being 10 to 12 fathoms (18.3 to 21.9 m.) in the lower part of the bay and 5 to 6 (9.1 to 11 m.) in the upper. There are several summer resorts and landings. **Spruce Point Ledges,** bare at low water, lie on the northern side of the entrance, and are marked by two buoys, a black at the south end and a red at the north end. The better entrance is between the black buoy and Negro Island. In the narrow entrance between the red buoy and Spruce Point, give the point a berth of over 150 yards. A 26° true (NE. ¼ N. mag.) course with the southeast point of Squirrel Island astern will lead to the head of Linekin Bay.

Oceanpoint is a summer resort on the south side of the entrance to Linekin Bay. The steamer wharf is about ⅜ mile eastward of **Negro Island,** and has a depth of 10 feet (3 m.). There is a float landing alongside. This is the principal wharf in Linekin Bay, but there are several other small summer resorts and float landings. The most important are **Linekin** on the east side, **Wall Point** on the west side of Linekin Bay and the north side of Lewis Cove, and **Bayville** and **Murray Hill** at the head. All have communication by boat with Boothbay Harbor in summer.

The visible dangers of Linekin Bay inside Spruce Point Ledges are as follows: **Independence Island,** wooded and with a house in the center; **Holbrook Ledge,** bare at low water and marked on its west side by a red buoy; **Seal Rocks,** bare at half tide and marked on its east side by a black buoy; a ledge on the east side surrounding **Perch Island,** with several trees, and marked at the southwest end by a red buoy; and **Fishhawk Islet,** having several trees and a ledge bare at half tide, extending southward. The narrow channel westward of Seal Rocks should be used with caution. There are numerous unmarked rocks at the head, in the vicinity of Bayville and Murray Hill landings.

Spruce Point is wooded, and has a wharf at the southwest end with a depth of 13 feet (4 m.).

Capitol Island is a summer resort with a post office (**Capitol**). Many cottages are visible. There is a steamer wharf at the north end with a depth of about 10 feet (3 m.).

Burnt Island is partly wooded and marked on the southeast side by a lighthouse (white tower with covered way to a dwelling).

Mouse Island, northward of Burnt Island, has a wharf on the north side with a depth of about 12 feet (3.7 m.). The cove westward of it and just southward of the entrance to Townsend Gut has a wharf with ample depth.

Tumbler Island, on the east side of the entrance to Boothbay Harbor, is low and covered with scattered trees. The passage between it and the shore eastward should not be used by strangers.

Boothbay Harbor is a town on the inner harbor. The wharves have depths of 4 to 12 feet (1.2 to 3.7 m.); the deepest draft going to the town is 18 feet (5.5 m.). All kinds of supplies are obtainable. There is a public float landing on the northwest side, westward of the larger steamer wharf. The anchorage for small craft is on the northwest side, inside of McFarland Island, and has been dredged to a depth of about 11 feet (3.4 m.). **McFarland Island** has a wharf and several buildings. A footbridge with a small draw crosses the head of the harbor.

Communication.—Boothbay Harbor and other resorts in this vicinity have steamer communication with Bath on the Kennebec River and with Wiscasset on the Sheepscot River. The steamers run through the inside passage and stop at landings en route. There is also communication from Boothbay Harbor to Portland and Boston.

Anchorages.—The usual and best anchorage is northward of Tumbler Island and to the head of the harbor; there are 4 to 7 fathoms (7.3 to 12.8 m.) good holding ground, anywhere in the channel above the island, the depth shoaling gradually toward the head of the harbor. The anchorage in the inner harbor off the town has a depth of 4 to 5 fathoms (7.3 to 9.1 m.), but is limited in area and usually occupied by small craft and fishermen. The motor-boat anchorage on the northwest side of the inner harbor has a depth of 11 feet (3.4 m.).

Supplies.—Coal in limited quantity can be had at the wharves at Boothbay Harbor where the depths are about 13 feet (4 m.) at low water. Water can be taken alongside the wharves. Gasoline, provisions, and some ship chandlers stores can be obtained in the town. Gasoline and provisions are obtainable at most of the summer resorts. In Boothbay Harbor gasoline may be obtained from floats anchored in the inner harbor.

Repairs.—There is a marine railway with a capacity of 500 tons. The cradle has a length of 175 feet, and the maximum draft that can be accommodated is about 13 feet (4 m.) aft. There are facilities for repairing wooden vessels, and ordinary repairs to machinery can be made.

Storm warnings are displayed from a steel tower on the hill on the western side of the town.

Ice occasionally, in severe winters, obstructs navigation above Tumbler Island during February and March.

The tidal currents have little velocity in the harbor. The mean rise and fall of tides is about 9 feet (2.7 m.).

This region is an area of very broken ground, shoals rising abruptly in places from deep water, and has not been examined by means of a wire drag. Vessels should therefore proceed with caution and should avoid crossing broken ground where the charted depth does not greatly exceed the draft.

From eastward, through Fisherman Island Passage.—Directions from Davis Strait to Fisherman Island Passage are given on page 45. Coming from any other point eastward the course can be shaped to a position ½ mile southward of Thrumcap Island, taking care to avoid Moser Ledge and Pemaquid Ledge.

Passing ½ mile southward of Thrumcap Island, steer 268° true (WNW. ¾ W. mag.), pass northward of the black bell buoy marking the Hypocrites and the black buoy northeastward of Ram Island Lighthouse, and about 350 yards northward of Ram Island Lighthouse, and pass southward of the red buoys marking Gangway and Dictator Ledges.

Pass about 200 yards southward and westward of Dictator Ledge Buoy No. 2A, and steer 321° true (NNW. mag.) for 1⅝ miles to a position 200 yards westward of the red buoy ½ mile eastward of Burnt Island Lighthouse. Then steer 332° true (N. by W. mag.), and pass about 150 yards westward of Tumbler Island red gas buoy. Then steer about 17° true (NE. by N. mag.), and anchor in the middle of the harbor in 5 to 7 fathoms (9.1 to 12.8 m.).

From westward.—The directions on page 47 will lead northward of Seguin Island and to Cuckolds black bell buoy. Pass eastward of the buoy and about ¼ mile eastward of the Cuckolds Lighthouse and steer 2° true (N. by E. ¾ E. mag.) for Burnt Island Lighthouse, passing about ¼ mile westward of Squirrel Island. When about ½ mile from the lighthouse and 300 yards westward of Squirrel Island Ledge red buoy, steer 23° true (NE. ½ N. mag.), passing 250 yards southeastward of a black buoy and to a position 400 yards east-southeastward of Burnt Island Lighthouse. Then steer 351° true (N. ¾ E. mag.) for the eastern end of McKown Point to a position 300 yards westward of Tumbler Island. Then steer about 17° true (NE. by N. mag.) and anchor in the middle of the harbor in from 5 to 7 fathoms (9.1 to 12.8 m.). These courses lead close to depths of 20 and 21 feet (6.1 to 6.4 m.) between Burnt and Squirrel Islands.

From southward.—Pass about ½ mile westward of Bantam Rock gas and whistling buoy and steer 2° true (N. by E. ¾ E. mag.) for Burnt Island Lighthouse and follow the directions in the preceding paragraph. This course passes 1 mile westward of Bantam Rock and ⅝ mile westward of an unmarked 11-foot (3.4 m.) rock.

From westward, eastward of Squirrel Island.—Pass eastward of Cuckolds black bell buoy and about ¼ mile southeastward of the lighthouse and steer 33° true (NE. ⅜ E. mag.). Follow the eastern side of Squirrel Island, giving it a berth of about ¼ mile, steer 332° true (N. by W. mag.), and pass about 200 yards westward of Tumbler Island Ledge red gas buoy. Then steer 17° true (NE. by N. mag.) and anchor in the middle of the harbor in 5 to 7 fathoms (9.1 to 12.8 m.).

To enter the inner harbor off the town.—Pass about 200 yards northwestward of Tumbler Island and steer 29° true (NE. mag.) for McFarland Island until a large bare ledge near the eastern shore is abeam distant about 250 yards. Then steer about 62° true (E. by N. mag.) into the inner harbor, passing southward of the black buoy southward of McFarland Island and another black buoy eastward of the island. The course can then be shaped to the wharves, or small craft may select anchorage on the northwest side northward of the inner black buoy in 10 to 13 feet (3 to 4 m.).

INSIDE PASSAGE FROM BOOTHBAY HARBOR TO BATH

This passage (chart 230) is about 11 miles long and leads between the island lying between Boothbay Harbor and the Kennebec River, forming an inland passage from Boothbay Harbor to Bath. The only vessels using this passage are the small steamers of 10-foot (3 m.) or less draft running from Boothbay Harbor to points on the Kennebec River and small vessels owned in the vicinity. It is used considerably by small craft.

The channel is very narrow in places, has strong tidal currents, is much obstructed by rocks and shoals, and, although many of the dangers are marked, strangers should not attempt to pass through in vessels without a pilot. The passage leads through Townsend Gut, across Sheepscot River, and through Goose Rock Passage into Sasanoa River; about midway through Sasanoa River the channel crosses the southeastern part of Hockomock Bay and then continues through the Sasanoa River, coming out in the Kennebec River opposite the city of Bath. The least depth in the channel is about 10 feet (3 m.), but local knowledge is necessary to carry the best water.

There are several summer resorts and other landings along the thorofare, at which the steamers running between Boothbay Harbor and Kennebec River points make landings.

Bridges.—Two bridges cross the thorofare. The one crossing Townsend Gut is a center pier draw with openings 45.5 feet wide. The one crossing Sasanoa River near its outlet into Kennebec River has a single opening 39 feet wide.

Ice.—The thorofare is usually closed by ice for about two months, but in mild winters has been known to be open all winter.

Townsend Gut is a narrow, crooked thorofare connecting Boothbay Harbor with Sheepscot River. There are unmarked rocks with little depth close to the channel.

Southport is a village and summer resort on the west side of Townsend Gut. There are two wharves at which steamers land, one just southward and the other ½ mile northward of the bridge.

Isle of Springs is a summer resort on Sweet Island, at the north end of Townsend Gut. The steamer landing, on the northeast side, has a depth of about 10 feet (3 m.).

Sawyer Island is a steamer landing and summer resort on the west side of the island of that name. The wharf has a depth of about 10 feet (3 m.), but there is a shoal 75 yards off its face with a depth of about 8 feet (2.4 m.), usually marked at each end by a bush stake.

Goose Rock Passage leads from Sheepscot River into Sasanoa River northward of MacMahan Island, and forms a part of the

inside route. It has ample depth but is narrow in places; the principal dangers are marked.

Little Sheepscot River is a narrow passage leading from Sheepscot River into Sasanoa River westward of MacMahan Island. There is a rock with a depth of about 1 foot (0.3 m.) at low water 100 yards westward of a red buoy marking the end of a ledge. The channel leads between the buoy and the rock. A steamer wharf on the east side of the channel has a depth of about 10 feet (3 m.).

Sasanoa River is an estuary leading from Sheepscot River to Kennebec River, north of Georgetown and Arrowsic Islands. It has numerous coves and bays making off northward and southward, but none of them are of commercial importance. Near its western end the river is crossed by a drawbridge. The principal coves and bays making southward are **Robinhood Cove, Riggs Cove, Hall Bay,** and **Back River,** the latter separating **Georgetown** and **Arrowsic Islands.** Northward is **Heal Cove** and **Hockomock Bay;** from the latter **Montsweag** and **Brooking Bays** lead northward; the former separates Westport Island from the mainland, and joins the Sheepscot River at Wiscasset, through Back River. **Knubble Bay** is the broadest part of the river, after passing Robinhood Cove and The Knubble, before entering Hockomock Bay when coming from eastward. **Great Hell Gate** is the crooked passage from Knubble Bay into Hockomock Bay. **Upper Hell Gate** is about 2 miles from the western entrance to the river; this is the narrowest part, and is only about 60 yards wide.

Robinhood Landing is a steamer landing and small settlement on the point on the south side of Riggs Cove. There is another steamer landing **(Westport)** on the east side of Sasanoa River and the west side of **Westport Island.**

Directions, Inside Passage, Boothbay Harbor to Bath.—This passage is narrow and crooked, has strong tidal currents, and local knowledge is necessary to carry the best water. Strangers in small vessels or yachts should take a pilot at Boothbay Harbor or Bath. With the aid of chart 230 and the following directions, strangers in small craft of 5 feet (1.5 m.) or less draft should be able to go through. The best time is on a rising tide.

The entrance to Townsend Gut can be approached either northward of Mouse Island or westward of Burnt and Mouse Islands. Pass midway between the red buoy at the southern entrance of Townsend Gut and the western shore and follow the western shore at a distance of about 100 feet for ⅜ mile until the channel expands, then head for the draw in the bridge, passing close to the end of the wharf just south of it. After passing through the bridge, follow a general mid-channel course and pass close to the end of the wharf on the west side ½ mile above. Keep in mid-channel for ⅜ mile above this wharf to avoid reefs on the south side, and pass between a spindle and a red buoy at the north end of Townsend Gut.

The generally used channel across Sheepscot River leads from the north end of Townsend Gut north-northwestward for 1¼ miles, passing between Indiantown and Spectacles Islands, past the wharf at Isle of Springs, and between Sweet and Sawyer Islands. It then turns sharply westward, leads 125 yards off the north end of Sweet

Island, and between a tripod beacon and a small island northward of it. The course is then 236° true (WSW. ½ W. mag.) for ¾ mile, passing well northward of a red buoy and southward of a horizontally striped buoy, to a position 100 yards north-northwestward of a black bell buoy; then 215° true (SW. ⅝ W. mag.) for ⅜ mile, passing westward of Clous Ledge spindle and eastward of Whittum Island, to a position 75 yards northward of a spindle off Northeast Point, and then 245° true (W. ¾ S. mag.) for ½ mile, through the middle of Goose Rock Passage, to a position 75 yards northward of a black buoy.

The channel then leads westward, south of a red buoy well toward the south side of the channel, and then northwestward for ¼ mile and northward for 1⅝ miles to Great Hell Gate, following a general mid-channel course to avoid the dangers near the shores. Follow a mid-channel course through Great Hell Gate, except in the middle, where the channel leads 50 yards southward of a spindle, and at the north end, where it leads northward of a black buoy. Then steer 306° true (NW. ⅝ N. mag.) for ⅜ mile, to a position 125 yards northward of Castle Rock, and then haul westward for ⅝ mile and northwestward for ⅜ mile, being guided by the buoys, to the entrance of the narrow part of Sasanoa River.

The best water then favors the southwest side for ½ mile, passing westward of a red buoy, eastward of a spindle, and westward of a small islet 150 yards beyond the spindle. The channel leads between an islet on the west side and a red buoy on the east side ¼ mile beyond the spindle, and favors the east side through Upper Hell Gate, passing eastward of a spindle and two black buoys. From this point to the bridge the channel leads between flats bare or nearly so at low water and is marked by buoys and spindles. After passing through the bridge the mid-channel is clear to the outlet into Kennebec River.

Caution.—At the strength of the current in the narrow places the buoys are often run under for short periods.

SHEEPSCOT RIVER

(shown on Chart 314 and a portion on Chart 230), having its entrance about 5 miles northeastward of Seguin Island, between the Cuckolds and Griffith Head, is the approach to several small villages in the lower end and to the town of Wiscasset, 14 miles above the entrance. The channel has a depth of about 30 feet (9.1 m.) to Wiscasset and is navigable for small vessels at high water for about 4 miles above Wiscasset to the village of Sheepscot. The river is used by small passenger steamers, many small craft, and an occasional coasting vessel to Wiscasset or above. The deepest draft going to Wiscasset is about 20 feet (6.1 m.).

The Cuckolds Lighthouse and Cape Harbor, on the east side at the entrance, are described on page 173. There are rocks, bare and sunken, extending ½ mile westward of the point in this vicinity.

The Sisters, 1⅜ miles from the northwestern shore, at the entrance to Sheepscot River, are three small bare rocks with shoals surrounding them. The westerly rock is marked by a tripod beacon.

The Black Rocks, 1 mile from the northwestern shore of Sheepscot Bay at the entrance, are a group of three bare and several sunken

rocks about 5/8 mile long. The southwesterly rock has 13 feet (4 m.) over it and there is a rock awash at high water 250 yards northeastward of it. The middle rock is 15 feet (4.6 m.) above high water and the northeasterly rock 10 feet (3 m.) above high water. The channel between the Black Rocks and the black buoy, 3/8 mile northward, has not been closely examined and should be used with caution. The area between the black buoy and the northern shore is very broken and should not be crossed.

Griffith Head, on the west side, at the entrance of Sheepscot River, is a white, rocky head, with a bare, rocky island 200 yards eastward. There is a horizontally striped buoy 3/8 mile off the island, marking **Griffith Head Ledge.**

Lower Mark Island, on the eastern side, just inside the entrance, is wooded and a good mark. A ledge, bare at low water, lies 150 to 350 yards eastward of the island.

Cat Ledges are a group of rocks, the higher ones bare, lying 1/2 to 1 mile northward of Lower Mark Island, the outer ones 3/8 mile from the eastern shore. The coves eastward of the ledges are foul and of no importance. There is a red buoy marking a reef with a depth of 22 feet (6.7 m.) 3/8 mile southwestward of Cat Ledges.

Herman Harbor is a long, narrow cove making northward on the western side of the river about 1 1/2 miles above Griffith Head. It has good anchorage in 4 to 7 fathoms (7.3 to 12.8 m.), but has a very narrow entrance between a bare ledge near the west shore and a dangerous reef, bare at low water, which extends 275 yards westward from the wooded island on the eastern side of the entrance. There is a hotel and wharf on the west side near the middle of the harbor, and a small settlement and landings for small craft at the head. The best water in entering leads 100 yards eastward of the middle of the bare ledge on the west side at the entrance.

Five Islands Harbor is a narrow passage between Five Islands and the western shore, forming a secure harbor for small craft, with 3 to 5 fathoms (5.5 to 9.1 m.) at low water. The main entrance is northward of the largest wooded island, between it and a bare rock. A rock with a depth of 10 feet (3 m.) in the middle of the entrance is marked by a horizontally striped buoy. The buoy can be passed close-to on either side in entering. Boats can also enter the harbor from the northeastward, following the western shore, inside of all islands and shoals. **Five Islands** is a small summer resort and post village on the western side of the harbor. It has steamer communication with Boothbay Harbor and Bath. The steamer wharf has a depth of about 12 feet (3.7 m.).

Hendricks Harbor is a cove on the eastern side of Sheepscot River, the entrance lying 3/8 mile southward of **Hendricks Head Lighthouse** (white tower with a covered way to a dwelling). It is used only by small craft. The entrance has a depth of about 9 feet (2.7 m.) between ledges on either side, and the depths inside are 4 to 9 feet (1.2 to 2.7 m.). To enter, pass close northward of a red spindle and close southward of a black spindle. **West Southport** is a post village on the east side of the harbor. There are landings for small craft.

Ebenecook Harbor (chart 230) is an excellent anchorage for vessels up to 20-foot (6.1 m.) draft. Its entrance lies about 1 mile

above Hendricks Head Lighthouse, on the eastern bank of the river, and leads between Dogfish Head on the south and the Green Islands on the north. It is the first anchorage available for large vessels entering the river; but the entrance is narrow, and large sailing vessels require a fair wind when leaving the anchorage. The village of West Southport is near the southern end of the harbor. This end of the harbor should be avoided by strangers in vessels unless they employ a pilot. There are landings for small craft.

To enter Ebenecook Harbor, give the eastern shore of Sheepscot River a berth of over 300 yards for 1 mile above Hendricks Head Lighthouse until up with **Dogfish Head,** which is rocky and grass covered with a low neck behind it. Pass about 125 yards northward of Dogfish Head, and steer about 96° true (ESE. mag.) between it and Green Islands, favoring, if anything, the southern side, until past the south point of Green Islands. Follow the southeast side of Green Islands at a distance of about 200 yards, and steer 74° true (E. mag.) with the south point of the islands astern; anchor on this course near mid-harbor, or favoring the eastern shore, in 4 to 6 fathoms (7.3 to 11 m.), soft bottom.

Extending northward from Ebenecook Harbor to Sawyer Island is a channel, affording good anchorage in places, which is used by small pleasure craft in summer, and is a part of the inside passage used by local vessels between Boothbay Harbor and Bath. Its northern part, and also the passages between the islands and ledges on its western side, require some local knowledge to insure safety. The principal islands and rocks are:

Green Islands are partly wooded; a rock, bare at low water, lies 200 yards northeastward of them, and is marked on its southeast side by a black buoy. A bare ledge lies between Green Islands and Boston Island, and a rock with 4 feet (1.2 m.) over it lies 250 yards westward of the ledge. **Boston Island** is high and grassy, and has several houses on top. **Spectacle Islands** are grassy, with some trees, and a bare rock lies 150 yards westward of their southwest end.

Townsend Gut, Sweet Island, and Sawyer Island, on the eastern side of Sheepscot River, and Little Scheepscot River and Goose Rock Passage, on the western side, are described under the heading "Inside Route, Boothbay Harbor to Bath," on page 177.

Bull Ledge, 1 mile northward of Hendricks Head Lighthouse, is bare in one place at low water, and marked at the south end by a red and black buoy.

Middle Mark Island, a small, round, bare islet, is in the middle of a ledge ¼ mile long, and lies ¼ mile from the western shore and 1½ miles above Hendricks Head Lighthouse. **Mark Island Ledge,** with 7 feet (2.1 m.) on it, lies 250 yards southwestward of the island. The main channel leads eastward of the island.

Powderhorn Island, low and grassy, is on the eastern side of the river 2 miles above Hendricks Head Lighthouse. **Powderhorn South Ledge,** awash in places at low water, extends ¼ mile southward from the island, and is marked at its south end by a red buoy. There is a narrow channel between the buoy and the north end of **Harding Ledge.** The latter is sunken and is marked at its south end by a red buoy.

Powderhorn Ledge, with 4 feet (1.2 m.) on it, lies 200 to 350 yards northward of Powderhorn Island, and is marked on its northwest side by a red buoy.

Middle Ledge, lying 600 yards eastward of the southern side of the entrance to Goose Rock Passage, has a least-found depth of 10 feet (3 m.), although less has been reported; it is marked on its southern side by a horizontally striped buoy.

Clous Ledge, lying ¼ mile eastward from **Whittum Island** (wooded) at the entrance to Goose Rock Passage, is awash at half tide and marked by a black spindle on the middle of the ledge and a black bell buoy off its northern end.

Fourfoot Rock, on the west side of the channel about ¼ mile northward of Clous Ledge spindle, is marked on its southern side by a horizontally striped buoy.

Upper Mark Island is a low grassy ledge, from which a shoal extends 600 yards northward toward Hodgdon Ledge.

Ram Island Ledge, awash in spots at half tide, is on the east side of the channel and extends ⅜ mile in a north-northeasterly direction from Ram Island to the entrance to Back River. It is marked on its eastern side by a black spindle and a black buoy, which are guides to the narrow channel leading northward from Ebenecook Harbor.

Back River is a shallow, narrow, and unmarked stream between Barter Island and the mainland. Its southern entrance is on the eastern side, 3¼ miles northward of Hendricks Head; its northern entrance is from Cross River. Local knowledge is necessary for its navigation. It is used only by small craft and an occasional lumber schooner. There is a wharf on the south end of Barter Island, just inside the entrance. A drawbridge with an opening 41 feet wide and a headroom of 6.3 feet (1.9 m.) at high water crosses the river from Hodgdon Island to the south end of Barter Island. The entrance to Back River is marked by a red gas buoy placed 350 yards westward from the southern end of Barter Island.

Jewett, Long, and **Tarbox Coves** are unimportant coves on the west side of Sheepscot River westward of the entrance to Back River. **Tarbox Landing** is a steamer landing and small settlement just north of Tarbox Cove. **Hodgdon Ledge,** just southward of the wharf, is bare at half tide and marked on the southeast side by a black buoy.

Cross River empties into the east side of Sheepscot River 6¼ miles above Hendricks Head. It has a deep channel for 1¼ miles, but is seldom used.

Greenleaf Ledge, on the west side of Sheepscot River, just south of the entrance to Cross River, is bare at low water and marked by a black buoy. Shoals fill the bight from the buoy to the western shore.

Merrill Ledge, 2½ miles above the entrance to Cross River, is bare at low water in the middle; it is marked at the south end by a spindle and at the north end by a buoy. The channel leads westward of it.

A rock with 12 feet (3.7 m.) over it has been reported to exist about ¼ mile southwestward of Clough Point. The rock is on the west side of the river and lies a little eastward of a line connecting buoys 5A and 5B.

Montsweag Bay and **Back River** form a thorofare from Sasanoa River and Hockomock Bay to Sheepscot River near Wiscasset. The channel is narrow and seldom used except by small local craft. It is marked by perches.

Wiscasset is a town on the west side of Sheepscot River 14 miles above the entrance. The principal wharf has a depth of 24 feet (7.3 m.), and the deepest draft going to it is 20 feet (6.1 m.). The town has railroad communication, and communication with Boothbay Harbor by steamer. In 1926 the steamer wharf was in bad repair, but at that time plans were being made to repair it. Several Arctic expeditions have sailed from Wiscasset.

Sheepscot River above Wiscasset.—There is said to be a depth of about 10 feet (3 m.) at low water for 4 miles above Wiscasset to rapids in the river. Boats of about 4-foot (1.2 m.) draft can go through the rapids at high-water slack and for about 3 miles above. **Sheepscot** is a village just above the rapids. The channel is unmarked above Wiscasset, and local knowledge is necessary for its navigation. Drawbridges cross the river at Wiscasset, at a point 1 mile above Wiscasset, and at Sheepscot. The bridge at Wiscasset has a draw opening 47 feet wide, the second bridge a draw opening 40 feet wide, and the third a draw opening 28 feet wide.

Supplies.—Gasoline and provisions are obtainable at Wiscasset, and usually at Five Islands and Isle of Springs. Boothbay Harbor and Bath are the nearest places where coal and water can be obtained.

Anchorages.—Ebenecook Harbor is the first anchorage available for large vessels entering the river. Above Stover Ledge, anchorage can be had in the channel, the depths being generally 12 fathoms (21.9 m.) or less. Colby Cove, in the west bank about 2¼ miles above Cross River, affords anchorage in 8 to 10 fathoms (14.6 to 18.3 m.); Merrill Ledge spindle is northeastward of the anchorage. The anchorage at Wiscasset is below the bridge and near the wharves of the town. Above Wiscasset, vessels bound to Sheepscot Falls anchor anywhere in the channel where the bottom and depth are suitable.

Pilots can usually be had from the settlements near the entrance or from fishing boats. Vessels bound to Sheepscot Falls generally take a pilot at Wiscasset.

Towboats are sometimes used by vessels bound up the river; they can be had from Bath. Vessels bound above Wiscasset generally tow.

Ice does not usually interfere with navigation below Wiscasset. The river above Wiscasset is usually closed in winter.

Tides.—The mean rise and fall of tides varies from about 8½ feet (2.6 m.) at the entrance to 9½ feet (2.9 m.) at Wiscasset.

Currents.—The currents in the river generally set in the direction of the channel and have considerable velocity in the narrow parts. At the entrance of Cross River the flood sets onto Quarry Point. The ebb sets onto Clough Point.

DIRECTIONS, SHEEPSCOT RIVER

The channel in Sheepscot River is deep, and the principal dangers are buoyed. It is a region of rocks and ledges, many of them rising abruptly from deep water and has not been examined by means of a

wire drag. There are several unmarked rocky shoals with depths of 3¼ to 5 fathoms (5.8 to 9.1 m.) in the middle of the river from Bull Ledge southward. Other ledges with less depth than charted have been reported, and undoubtedly exist. The river should therefore be navigated by vessels with extreme caution.

From eastward.—Having come from Boothbay Harbor or Fisherman Island Passage, pass close to Cuckolds black bell buoy and steer 265° true (W. by N. mag.) for 1 mile until Lower Mark Island is abeam, distant 1¼ miles. Then steer 331° true (N. by W. mag.) for 1¾ miles and pass ½ mile westward of Lower Mark Island and about 250 yards westward of Cat Ledges buoy. When about ¼ mile northwestward of this buoy, steer 2° true (N. by E. ⅝ E. mag.) for nearly 1½ miles and pass 350 yards westward of Hendricks Head Lighthouse.

Or, coming from southward, pass ½ mile westward of Bantam Rock gas and whistling buoy and steer 339° true (N. ⅜ W. mag.) for 6 miles, passing 1⅝ miles westward of the Cuckolds Lighthouse and to a position ⅞ mile westward of Lower Mark Island. Then steer 2° true (N. by E. ⅝ E. mag.) for about 2 miles, passing ¼ mile westward of Cat Ledges buoy and 350 yards westward of Hendricks Head Lighthouse. Then follow the directions in section 2.

From westward.—Pass 1½ miles southward of Seguin Lighthouse and steer 37° true (NE. ¾ E. mag.) for The Cuckolds Lighthouse to a position ⅝ mile southeastward of Tom Rock buoy. Then steer 6° true (NNE. mag.) for 3¼ miles, heading for Hendricks Head Lighthouse until The Cuckolds Lighthouse is abeam, distant 2 miles. Then steer 2° true (N. by E. ⅝ E. mag.) for nearly 2½ miles, and pass ⅞ mile westward of Lower Mark Island, ¼ mile westward of Cat Ledges buoy, and 350 yards westward of Hendricks Head Lighthouse.

Or, the directions on page 47, will lead northward of Seguin Island and The Sisters. Pass ¼ mile northward of The Sisters tripod beacon, and bring it astern on a 20° true (NE. ¾ N. mag.) course. Keep this course of nearly 3 miles, passing ⅜ mile eastward of Black Rocks and Griffith Head Ledge buoy, and to a position ⅞ mile westward of Lower Mark Island. Then steer 2° true (N. by E. ⅝ E. mag.) for about 2 miles, passing ¼ mile westward of Cat Ledges buoy and 350 yards westward of Hendricks Head Lighthouse. Then follow the directions in section 2.

2. Hendricks Head to Wiscasset.—Passing 350 yards westward of Hendricks Head Lighthouse, steer 2° true (N. by E. ⅝ E. mag.) for 4½ miles, passing eastward of Bull Ledge buoy, Middle Mark Island at a distance of 250 yards, Middle Ledge buoy, Clous Ledge spindle and bell buoy, Fourfoot Rock buoy, Upper Mark Island at a distance of 350 yards, and Hodgdon Ledge buoy; and passing westward of Harding Ledge buoy, Powderhorn Island, Powderhorn Ledge buoy at a distance of 175 yards, Ram Island, Barter Island gas buoy, and Stover Ledge buoy at a distance of 200 yards.

From a mid-river position ¾ mile above Stover Ledge buoy, steer 20° true (NE. ¾ N. mag.) for 2 miles to the entrance of the narrow part of the river between Quarry Point and Fowle Point. Then steer more northward and follow a mid-river course for 2 miles. Pass westward of the spindle and red buoy marking the southerly

and northerly ends of Merrill Ledge, and when about ¾ mile above the buoy, favor slightly the eastern bank to avoid the shoal on the western side above Hilton Point. Then keep in mid-river until up with Clough Point, where the river makes a sharp bend westward.

Pass about 200 yards eastward and 100 yards northeastward of Clough Point black buoy, and steer 299° true (NW. mag.), passing about 150 yards off the south end of Davis Island (marked by earthworks and a blockhouse). Pass southward and about 100 yards westward of Middle Ground red buoy, and steer about 344° true (N. mag.) for the wharf. Anchorage may be had about midway between the buoy and the wharf, in 5 to 7 fathoms (9.1 to 12.8m.).

KENNEBEC RIVER

(charts 314, 288, and 289) is northward of Seguin Island and 20 miles eastward of the entrance to Portland Harbor. It is the approach to the cities of Bath and Augusta, the towns of Woolwich, Richmond, and Gardiner, and numerous smaller villages and summer resorts. The river has considerable trade by vessels, the deepest draft being about 26 feet (7.9 m.) to Bath and 14 feet (4.3 m.) to Augusta.

The least depth is about 28 feet (8.5 m.) in a natural channel to Bath, 12 miles above the entrance, but there are unmarked rocky shoals with less depth close to the channel. From Bath to the south end of Swan Island, 20 miles above the entrance, the river has a natural channel with a depth of at least 17 feet (5.2 m.). From this point to Gardiner, 33 miles above the entrance, the channel has been improved by dredging where necessary to a depth of 16 feet (4.9 m.), and width of 150 feet, and from Gardiner to Augusta, at the head of navigation, 39 miles above the entrance, it has been improved by dredging where necessary to a depth of 11 feet (3.4 m.) and width of 125 feet. The main 16-foot (4.9 m.) channel leads eastward of Swan Island.

The project depths of 16 feet (4.9 m.) to Gardner and 11 feet (3.4 m.) to Augusta were restored by dredging during the season of 1925.

Kennebec River formerly had a large trade in ice, and there were numerous ice houses and wharves on the river. In 1926 the ice houses were unused, and the wharves generally in ruins or in bad repair. Some lumbering is done on the river above Augusta, and log booms are found in the river between Gardiner and Augusta.

Sprague and **Morse Rivers,** between Cape Small and the entrance of Kennebec River, are nearly bare at low water at their entrances, and seldom entered even by local boats.

Islands and rocks off the entrance.—The entrance to the river is somewhat obstructed by an area of islands and rocks and very broken ground, not closely examined, extending southward for a distance of 4½ miles from the entrance. The most southerly known danger is **Seguin SSW Ledge,** having a least found depth of 6 fathoms (11 m.) and lying ⅜ mile southeastward of Seguin Island red whistling buoy. The other dangers outside of Seguin Island are **Mile Ledge,** having a least found depth of 10 feet (3 m.) and marked by a horizontally striped buoy, and **Camel Ground,** lying 1 mile

west-southwestward of Seguin Island Lighthouse, and having a least found depth of 3½ fathoms (6.4 m.); Camel Ground is unmarked, and the sea breaks on it in heavy weather.

Seguin Island is 145 feet (44 m.) high, bare of trees, and marked on the top by a lighthouse; it is the most prominent mark in this vicinity.

Seguin Island Lighthouse is a white cylindrical tower connected with dwelling. The light is fixed white, 180 feet above the water, and visible 20 miles. The fog signal is an air diaphone sounding 2 blasts every 20 seconds.

Ellingwood Rock, 400 yards northward of the north end of Seguin Island, is a bare islet about 20 feet (6.1 m.) high.

Seguin Ledges, ½ mile northeastward of Ellingwood Rock, are about 5 feet (1.5 m.) high, and have submerged ledges extending 300 yards northeastward and southwestward from the bare ledge.

Pond Island Shoal is the rocky shoal lying southward and southwestward of Pond Island. It has depths ranging from 5 to 21 feet (1.5 to 6.4 m.) over it, and in heavy gales is covered with breakers. A black bell buoy marks the southern end of the shoal and lies ¾ mile southward of Pond Island Lighthouse. Vessels should not pass between this buoy and Pond Island.

Pond Island, a bare island on the west side of the entrance to Kennebec River, is about 30 feet (9.1 m.) high and marked on the top by a lighthouse.

Pond Island Lighthouse is a white tower connected with dwelling. The light is fixed white, 52 feet (15.8 m.) above the water, and visible 10 miles. The fog signal is a bell (one stroke every 10 seconds).

Wood Island, ¼ mile westward of Pond Island, is high and wooded on the west side. The channel between Wood and Pond Islands should not be used by strangers.

Whaleback is a bare rock about 8 feet (2.4 m.) high on the eastern side of the entrance to the river and nearly ⅝ mile eastward of Pond Island. A shoal extends about 100 yards southward from it. **Salter Island,** northward of Whaleback, is wooded.

Stage Island Bay, Sagadahoc Bay, and **Heal Eddy,** on the east side of Kennebec River at the entrance, are shoal inside, have no wharves, and are of little importance.

South and **North Sugarloaf** are high, rounded, bare, rocky islets in the middle of Kennebec River just inside the entrance. A ledge extends 100 yards southward from South Sugarloaf; **Jack Rock,** bare at low water and marked by a spindle, is near the end of a ledge which extends 125 yards northeastward from South Sugarloaf. Ledges extend 150 yards southward and 125 yards northwestward from North Sugarloaf.

Popham Beach is a summer resort on the west side of Kennebec River just inside the entrance. There is a daily steamer service with Bath, the steamer landing being westward of Fort Popham. The wharf near the Coast Guard station was in ruins in 1926. Gasoline and a limited amount of provisions may be obtained.

Fort Popham is an unfinished and abandoned stone fort on Hunniwell Point.

Baypoint is a summer resort on the east side of Kennebec River, east-southeastward of Fort Popham. The steamer wharf has a depth of about 10 feet (3 m.).

Gilbert Head is high and prominent, wooded except near the end, and marked by a single house.

Shag Rock, on the eastern side of the channel, between Gilbert Head and Cox Head, is awash at high water and marked by a tripod beacon.

Cox Head is high and prominent. There is a steamer landing with a depth of 10 feet (3 m.) on the point at the south end.

Todd Bay, on the east side of Kennebec River northeastward of Cox Head, is almost entirely bare at low water. There is an old quarry on the east side.

Perkins Island, on the east side of the main channel 3 miles above the entrance, is wooded on the north end and bare on the south end. Perkins Island lighthouse, on the west side, is a white tower.

Parker Head is a village on the west side of the river westward of a prominent headland of that name. The approach to the village is by a narrow channel, shoaling gradually to about 3 feet (0.9 m.) at the wharf. The channel to the wharf is sometimes marked by bush stakes.

Back River is a narrow, crooked, and unmarked thorofare connecting Kennebec River with Sasanoa River and Hockomock Bay. It is bare at low water near the north end, and little used. A fixed bridge crosses the thorofare near the middle; it is said to have a headroom of about 8 feet (2.4 m.) at half tide. **West Georgetown** is a steamer landing on the east side of Back River, just inside its southern entrance. It has a depth of about 10 feet (3 m.).

Seal Rock, on the west side of the channel at the upper end of Parker Flats, is awash at high water. There is a black buoy northeastward of it.

Phippsburg is a village on the west side of Kennebec River 5½ miles above the entrance. A white church spire located at Phippsburg is prominent from the river.

Goat Island, northeastward of Phippsburg, is wooded, and the smaller islands near it are bare and grassy.

Pettis Rocks, in the middle of the river 6½ miles above the entrance, are awash in the highest part at extreme high water and marked at the south end by a spindle. **Ram Island,** just northward of Pettis Rocks, is low and grassy, and marked near the middle by a tripod beacon. A reef, bare at low water, extends nearly 100 yards northwestward of the island. Vessels passing westward of the island frequently ground on this reef.

Winnegance is a village on **Winnegance Creek,** ½ mile from the main channel of Kennebec River. The channel is shoal and navigable only by small craft.

Bath is a city on the west side of Kennebec River 12 miles above the entrance. It has considerable trade by water. There are depths of 10 to 25 feet (3 to 7.6 m.) at the wharves, the deepest being at the coal wharf. Small craft land at a public float landing on the south side of a wharf with red buildings and just northward of a water-pipe sign. Directions for anchoring off the city are given following.

Sasanoa River, leading eastward from Kennebec River opposite the south end of Bath, is described beginning on page 178.

Woolwich is a village opposite Bath. It is connected with Bath by ferry. Railroad freight and passenger cars are also ferried across the river here. A highway and railroad bridge was under construction in 1926.

Two miles above Bath the channel of Kennebec River is divided by **Lines Island** into two channels, **East Branch** and **West Branch.** East Branch is used by local boats up to 7 feet (2.1 m.) draft at low water, but the channel is narrow and unmarked, leads between reefs on either side, and is not safe for strangers. West Branch is deep and clear and is generally used. A rock, bare at low water, 50 yards off the southwest end of Lines Island, should be avoided.

Chops is the narrow passage between two headlands ¾ mile above Lines Island. Two steel towers supporting a telegraph line across the channel are prominent. There is ample headroom under the wires.

Merrymeeting Bay is a shoal bay making westward from Kennebec River 17 miles above the entrance. It is the approach to the towns of **Brunswick,** on the **Androscoggin River,** and **Bowdoinham,** on the **Cathance River,** 8 and 4 miles, respectively, above Kennebec River. Boats of 7-foot (2.1 m.) draft can go to Brunswick and 12 feet (3.7 m.) to Bowdoinham at high water. The channels are narrow and unmarked, except by a few bush stakes, and local knowledge is necessary for their navigation. The rise and fall of tides varies from 3 to 5 feet (0.9 to 1.5 m.) at Brunswick, depending on the stage of the river. A fixed railroad bridge with headroom of 20 feet (6.1 m.) at high water crosses the river just below Brunswick.

The channel west of Swan Island, dredged to a depth of 12 feet (3.7 m.) and width of 125 feet, is marked by buoys. It is used principally by the passenger steamers drawing up to 10 feet (3 m.) making landings at Richmond; vessels of this draft do not use it at low water. The principally used channel leads eastward of the island.

Richmond is a town on the west bank of the river 23 miles above the entrance. The steamer wharf is on the channel leading westward of Swan Island, and has a depth of about 12 feet (3.7 m.).

Dresden Landing (Cedargrove) is a small settlement and steamer landing on the east side 2 miles above the north end of Swan Island.

South Gardiner is a village on the west side of the river 30 miles above the entrance. There are lumber mills and wharves with depths of 8 or 9 feet (2.4 or 2.7 m.).

Gardiner is a town on the west side of Kennebec River 33½ miles above the entrance. The deepest draft coming here is about 14 feet (4.3 m.). The wharves have depths of 6 to 17 feet (1.8 to 5.2 m.).

Randolph is a village on the east side, opposite Gardiner. It is connected with Gardiner by a drawbridge having a center pier draw, with openings 68 feet wide on either side.

Hallowell is a town on the west side of the river 37 miles above the entrance.

Augusta, at the head of navigation on Kennebec River, 39 miles above the entrance, is the capital of the State of Maine. The principal wharves are on the western side just below the lower bridge and have ample depth for any of the vessels coming here.

Anchorages.—The holding ground at the entrance below Fort Popham is poor, and vessels should not anchor unless forced to do so. If obliged to anchor when inside Pond Island, it is advisable to come-to in the channel abreast the wharf (in ruins) just above the Coast Guard station, with a long scope of chain; if not blowing strong, a moderate-sized vessel may ride here if care is taken to keep the anchor clear.

Anchorage can be had on the eastern side of the channel southward of Perkins Island South Ledge buoy in 6 to 8 fathoms (11 to 14.8 m.). On the eastern edge of the channel at the anchorage the depths shoal abruptly from 5 fathoms (9.1 m.) to a few feet; drift ice coming down the river generally follows the western shore.

The best and most frequently used anchorage is on the western side of the channel off Parker Flats in 4 to 6 fathoms (7.3 to 11 m.). Large vessels sometimes anchor on the eastern side in this vicinity. Above Parker Flats vessels anchor wherever they find good holding ground and suitable depth, keeping out of the strength of the current.

Anchorage off Bath.—The following are extracts from the regulations prescribed for the anchorage of vessels off the city of Bath:

Vessels may anchor within the following specified limits only:

1. To the northward of a line drawn from the north side of Passmore's Wharf in Bath to a mark erected on the shore in Woolwich, 500 feet north of the Maine Central Railroad ferry slip.
2. To the southward of a line drawn from the derrick on the Bath Iron Works Wharf to Sasanoa Point, in Woolwich.
3. One vessel may be anchored between the Maine Central Railroad ferry slip on the Bath side of the river and the line of the Maine Water Co.'s pipe, provided that such vessel's anchor be not less than 500 feet from the water-pipe line, and that the vessel be so anchored as not to swing below the north side of the entrance to the ferry slip.
4. Vessels in the north anchorage must be so anchored as to leave a clear fairway 150 feet outside of the established harbor lines at Bath and a clear fairway 200 feet from the east, or Woolwich, shore for the passage of steamers, tows, rafts, etc.

Passmore's Wharf is a lumber wharf just north of the passenger ferry wharf and shows between a clock tower and a church spire a little back of the water front. The Bath Iron Works are near the south end of the water front and just south of the Maine Central Railroad ferry slip; the derrick on the wharf is prominent. The Maine Central Railroad ferry is for passenger and freight cars and should not be confused with the passenger ferry farther north. Sasanoa Point is the point on the north side of the thorofare leading eastward from Kennebec River. The water-pipe line is marked by a sign on each side. Deep-draft vessels usually anchor north of the prohibited anchorage. The harbor regulations are enforced by a harbor master.

Pilots will come out to a vessel making signal when near Pond Island. There is a pilot lookout at Popham Beach, from which there is communication with the city of Bath by telephone. Strangers in vessels generally take a pilot, or, if a sailing vessel, a towboat. Strangers of over 17-foot (5.2 m.) draft should take a pilot. Under no circumstances should a stranger attempt to enter at night.

The signals for a pilot are 5 long blasts of the whistle, an ensign displayed in the rigging, or the usual international flag signal. Pilots for the upper part of the river can usually be secured at Bath.

In 1926 the pilotage rates were $2.50 per foot draft for a vessel (with cargo) one way to Bath, and two-thirds that rate for a vessel in ballast.

Towboats.—There is a towboat stationed at Bath and it can be ordered by making a signal to the Coast Guard station.

Repairs.—Bath has facilities for repairing steel vessels above water and for repairing machinery. There are no marine railways available on the river. There are machine shops at Gardiner and Augusta.

Supplies.—Coal can be obtained alongside the wharves at Bath and Augusta, and a limited quantity at Gardiner. Water can be had alongside the wharves at Bath, Richmond, Gardiner, and Augusta; the water in the river is fresh at Richmond and above. Gasoline, provisions, and ship chandler's stores can be obtained at Bath, and gasoline and provisions at any of the cities and towns on the river. Bay Point is the most convenient gasoline station near the entrance.

Communication.—Bath and the principal cities and towns on the Kennebec River above are on or near the line of the Maine Central Railroad. There is regular steamer communication with Boothbay Harbor and Popham Beach.

A highway and railway bridge is being constructed (1926) across the Kennebec River at Bath. It will be a lift bridge with a vertical clearance of 135 feet (41 m.) above mean high water when lifted and a horizontal clearance of 200 feet. The bridge is to be completed in 1928.

Freshets occur in March and April, also after heavy rains in the fall, but they are not dangerous to shipping unless accompanied by ice. A height of 9 feet (2.7 m.) above mean high water usually occurs several times a year at Augusta, but the height diminishes rapidly southward.

Ice usually closes the river to navigation above Bath from December to April. In severe winters the river may be closed below Bath for a limited period. Sailing vessels entering the river do so on the flood tide, and if unable to reach Bath on one tide, anchor below Perkins Island on account of the drift ice, which makes an anchorage in other parts of the river dangerous. Steamers, or vessels assisted by steam, are rarely delayed by ice below Bath.

The tidal currents have considerable velocity at the entrance and in the narrow parts of the river, especially from Pond Island to Fort Popham, Bluff Head to Fiddler Reach, and Telegraph Point to the Chops; some local knowledge of their set is necessary to insure safety to vessels under sail. The direction of the currents at the entrance is influenced by strong winds, especially easterly gales. During spring tides and freshets the velocity of the ebb current is increased and requires special attention. No complete observations have been made to determine the set and velocity of the currents.

Tides.—The mean rise and fall of tides is about 8 feet (2.4 m.) at the entrance, 6 feet (1.8 m.) at Bath, 5 feet (1.5 m.) at Gardiner, and 4 feet (1.2 m.), at Augusta.

This area is a region of rocks and very broken ground and has not been examined by means of a wire drag. Strangers in vessels should therefore proceed with extreme caution, and should avoid crossing broken ground where the charted depth does not greatly exceed the draft.

There are two approaches to the entrance, the eastern between Whaleback and the shoals southwestward, and the western between Pond Island shoal bell buoy and the shoals eastward. The eastern channel has a least found depth of about 5½ fathoms (10 m.), and the western a least found depth of 4 to 5 fathoms (7.3 to 9.1 m.) on the sailing lines. Both are used, but vessels of over 18 feet (5.5 m.) draft generally enter by the eastern channel. The entrance has strong tidal currents, and if the wind is opposed to the current an ugly chop sea is encountered. Strangers in vessels should not attempt to enter in unfavorable weather; sailing vessels entering with an ebb current require a strong, fair wind.

The principal dangers in the river are marked, but the channel is narrow in places. The narrowest place below Bath is eastward of Pettis Rocks, where it is only 75 yards wide. The sections of the dredged channel between the south end of Swan Island and Augusta are not sufficiently well marked to enable strangers to keep in them. With the aid of the charts and the following directions strangers should, in clear weather, be able to carry a draft of 15 feet (4.6 m.) to Bath, 10 feet (3 m.) to Gardiner, and 5 feet (1.5 m.) to Augusta. The best time is on a rising tide.

1. From eastward or southward.—Having come from Boothbay Harbor or Fisherman Island Passage, pass close to Cuckolds black bell buoy and steer 244° true (W. ⅞ S. mag.) for 5 miles, passing about midway between The Sisters and Black Rocks, and pass southward and southwestward of Whaleback, rounding it at a distance of about ¼ mile. Then follow the directions in section 2. This course leads close to a depth of 4½ fathoms (8.2 m.) southward of Whaleback.

Coming from eastward outside the islands, pass ¼ mile southward of Bantam Rock gas and whistling buoy and steer 294° true (NW. ⅜ W. mag.) for nearly 6 miles, heading for Pond Island Lighthouse, and passing ⅜ mile southwestward of Tom Rock buoy, ¼ mile northeastward of White Ledge buoy, and to a position ¼ mile southwestward of Whaleback. Then follow the directions in section 2.

Approaching from southward, pass southward and eastward of Mile Ledge buoy, and eastward of Seguin Island, giving it a berth of over ½ mile; then steer 6° true (NNE. mag.). When Pond Island Lighthouse bears 294° true (NW. ⅜ W. mag.) steer for it and pass ¼ mile northeastward of White Ledge buoy and to a position ¼ mile southwestward of Whaleback. Then follow the directions in section 2.

1A. From westward.—The directions on page 47 will lead to a position nearly midway between Seguin Ledges and Pond Island shoal black bell buoy. Then steer 358° true (N. by E. ¼ E. mag.) with Seguin lighthouse astern, and pass about ¼ mile eastward of the bell buoy and to a position ¼ mile southwestward of Whaleback. Then follow the directions in section 2.

Or steer for Seguin Lighthouse on any bearing northward of 68° true (E. ½ N. mag.), pass preferably westward of the Camel Ground, and stand northeastward, passing between Ellingwood Rock and Jack Knife Ledge buoy and between Seguin Ledges and Pond Island shoal black bell buoy, as in the preceding paragraph.

2. Entrance to Parker Flats.—From a position ¼ mile southwestward of Whaleback steer 311° true (NNW. ⅞ W. mag.) for the end of the old wharf southward of Fort Popham and pass 200 yards northeastward of Pond Island, 100 yards eastward of the horizontally striped buoy just above the island and nearly 200 yards southwestward of South Sugar Loaf; this course leads 150 yards westward of a 3½-fathom (6.4 m.) spot marked by a red buoy. Pass in mid-channel westward of North Sugar Loaf, steer 337° true (N. ½ W. mag.), and pass midway between the light off Fort Popham and Gilbert Head.

When about ¼ mile below Shag Rock tripod steer 1° true (N. by E. ⅝ E. mag.), pass about 200 yards westward of the tripod and 150 yards eastward of Cox Head. Then steer 346° true (N. ¼ E. mag.) for the eastern end of Parker Head until nearly up with Perkins Island South Ledge red buoy. Pass 75 yards westward of this buoy, steer 1° true (N. by E. ⅝ E. mag.), and pass 150 to 200 yards westward of Perkins Island, 100 yards eastward of Perkins Island North Ledge black buoy, and continue the course ¾ mile past Perkins Island to a position 250 yards westward of Back River red buoy.

3. Parker Flats to Bath.—From a position 250 yards westward of Back River buoy steer 319° true (NNW. ⅛ W. mag.) and round Squirrel Point Lighthouse at a distance of about 200 yards. Then steer 6° true (NNE. mag.) for about ½ mile, passing eastward of Goat Island (wooded). Pass in mid-channel southeastward of Lee Island Rock black buoy and steer about 37° true (NE. ¾ E. mag.) to a position 75 yards eastward of the spindle on the southernmost bare rock of the Pettis Rocks. Pass eastward of Pettis Rocks, slightly favoring the rocks, and when about 75 yards eastward of the northernmost grassy rock of the group, steer about 12° true (NNE. ⅝ E. mag.) and pass in mid-channel eastward of Ram Island, slightly favoring, if anything, the island side.

When past the tripod beacon on the northern end of Ram Island steer 0° true (N. by E. ½ E. mag.) on the line of Doubling Point lighted range (white towers), taking care to go nothing westward of the range when about ¼ mile above Indian Point white tripod beacon, to insure clearing a rock with 7 feet (2.1 m.) over it, which lies about 125 yards from the western bank and is marked by a black buoy. Keep in mid river in the narrow part for a distance of a little over 1 mile above Bluff Head, and then stand again on the Doubling Point range, or go nothing westward of it, to avoid rocks with 8 and 10 feet (2.4 and 3 m.) on them. These rocks are marked by two black buoys, which are frequently towed under during the strength of the current. When past the second buoy haul westward in mid-channel through Fiddler Reach and round Doubling Point Lighthouse at a distance of 200 yards.

Pass about 75 yards eastward of the black buoy lying ¼ mile northwestward of Doubling Point Lighthouse, steer 2° true (N. by E. ¾ E. mag.), and pass about 100 yards eastward of Lincoln Ledge

black buoy. Anchor about ¼ mile above black buoy No. 13 or continue up the river in mid-stream and anchor northward of the ferry on the east side within the limits prescribed by the regulations.

4. Bath to Abagadasset Point.—Favor the east side for 1 mile above the upper wharves at Bath, and pass eastward of the black buoys marking Wilson and Stetson Rocks, and between a red buoy and a horizontally striped buoy just north of Stetson Rock. Round Telegraph Point, on the south side, at a distance of about 100 yards, and steer northwestward, passing southwestward of the red buoy marking the south end of Thorne Island Ledge, and northeastward of a black buoy east of Wood Island.

After passing the black buoy steer 308° true (NW. ⅞ N. mag.) for ½ mile and round the southwest end of Lines Island at a distance of 100 yards or more. There is a rock awash close to the island. Follow the western shore of Lines Island northeastward, pass westward of a red buoy 400 yards northward of the island, and steer 23° true (NE. ½ N. mag.) to pass eastward of a black buoy ¼ mile above. Then haul north-northwestward, and pass in mid-channel through the Chops (towers on each side). The course then leads north-northeastward for ⅜ mile, passing eastward of a black buoy and westward of a red buoy, and then northeastward for 1 mile, following the eastern shore at a distance of 150 to 200 yards, until on Abagadasset Point lighted range.

5. Abagadasset Point to north end of Swan Island.—Steer 341° true (N. ⅛ W. mag.) on the range (white structures) astern for ⅜ mile, and pass close eastward of a black buoy and 100 yards westward of a red buoy. Steer 25° true (NE. ¼ N. mag.) for ⅝ mile from the red buoy, to a position 150 yards northwestward of Ames Ledge light, and then 39° true (NE. by E. mag.) for 1 mile to the entrance of the dredged channel. The dredged channel follows the training wall on the east side at a distance of 150 yards for ⅝ mile, and is marked by buoys. It then leads 100 yards westward of a spindle marking a bare rock, and 100 yards off the points on the west side for ½ mile above the spindle. It passes eastward of a black buoy ⅞ mile above the spindle, and favors the east side in the bend from Reed Rock to Goodwin Point, and leads in mid-channel from there to Stearns Point.

6. Swan Island to Gardiner.—Keep in mid-channel for 1 mile above Swan Island to the entrance of the dredged channel off Court House Point. The dredged channel is on the west side of the river, eastward of the black buoy marking the north end of the cut, and the course through it is 15° true (NNE. ⅞ E. mag.). The best water favors the east side off Cedar Grove, ½ mile above the second black buoy, the west side at Campmeeting Point, ⅜ mile above Cedar Grove, and the east side past several unused ice houses and wharves, and leads eastward of a horizontally striped buoy. It leads 200 yards off Indian Point, westward of two red buoys, and then favors the west side, 50 yards off the points, for about ⅝ mile to Eastman Point. The channel leads 100 feet westward of buoy No. 28, and then on a 29° true (NE. ⅛ E. mag.) course for ½ mile to red buoy No. 28a. It then turns eastward and passes in mid-channel between Nehumkeag Island (high and wooded) and the eastern shore. Then steer 7° true (NNE. mag.) through the dredged

cut and pass westward of the red buoy at the north end of the cut. Then favor the eastern shore for ½ mile until past two ice houses. The channel then hauls across to the western shore and favors it until between a red and a black buoy. The channel is in mid river or slightly favoring the eastern side for 1 mile above the buoys, then leads through a dredged channel along the eastern side, eastward of a row of black buoys, to the wharves at Gardiner. Above Gardiner, the chart is the guide. Strangers are advised to run only on a rising tide.

CASCO BAY, EASTERN PART

The part of Casco Bay between Cape Small on the east and Halfway Rock Lighthouse and Harpswell Neck on the west (Chart 315) is full of small islands, ledges, and rocks, between which narrow but deep channels lead to the bays and sounds at the head. These arms afford good anchorages for small vessels, but are little used except by local fishing boats and pleasure craft. There are several small villages in this part of the bay, but no towns. Small steamers from Portland make landings as far east as Orr Island. The settlements eastward are usually connected in summer by small boats with the railroad and electric road at the head of New Meadows River.

Cape Small is the wooded point on the east side of Casco Bay at the entrance. The distinguishing marks are a water tower 1 mile from the end, visible from eastward or westward; **Glover Rock,** a low, bare islet ¼ mile southward of the point; **Bald Head,** a bare round knob on the west side of the point; and **Bald Head Ledge,** bare at half tide and marked by a spindle. There are submerged rocks and very broken ground, not closely examined, in the vicinity of the cape.

Spoonbowl Ledge, with 6 feet (1.8 m.) over it, lies ¼ mile southward from Gooseberry Island Ledge red buoy. Vessels bound from Cape Small to Small Point Harbor should be careful to avoid this ledge. It is usually marked by lobster trap buoys or markers.

East Brown Cow, 1½ miles west-northwestward of Bald Head, is low and bare. **Mark Island,** ¾ mile northward of East Brown Cow, is high and thickly wooded. **Mark Island Ledge,** ¼ mile westward of Mark Island, is bare at low water.

White Bull, 1 mile westward of Mark Island, is high, round, and bare. **Bold Dick,** ⅝ mile west-southwestward of White Bull, is a bare rock about 4 feet (1.2 m.) high.

Small Point Harbor, on the east side of Casco Bay, 1½ miles northward of Bald Head, is considerably used as an anchorage by local fishermen, but seldom by strangers. The principal dangers are marked, but the holding ground is poor.

Smallpoint is a post village on the eastern side of Cape Small Harbor. There is telephone communication and an unimproved highway to Bath, the nearest city.

Cape Small Harbor affords a good anchorage for small craft. It may be entered by passing either northward or southward of Goose Rock, but either passage is shoal, there being about 4 feet (1.2 m.) at mean low water. If passing southward of Goose Rock, haul well to the right and pass 50 to 75 feet off the rocky point of the mainland, then swing in mid-channel into the harbor.

There is a summer hotel with a green roof just eastward of Goose Rock and a float landing is maintained during the summer. Gasoline may be obtained, and there is telephone communication.

Small Point Harbor can be entered either southward or northward of **Wood Island** and **Little Wood Island** in the entrance. Wood Island is rocky and sparsely wooded, and Little Wood Island is thickly wooded. **Gooseberry Island Ledge,** on the south side of the southern entrance, is awash at low water and marked by a red buoy.

Carryingplace Cove is a thorofare, navigable at high water only, on the north side of Small Point Harbor eastward of **Carryingplace Head.**

West Point is a fishing village at the southern entrance of the thorofare. There are wharves for small craft, and gasoline and some provisions may be obtained.

The thorofare leading eastward of **Burnt Coat Island** is marked by buoys. Strangers in small craft should have no trouble in going through it. There are small wharves on the eastern side of the thorofare.

Jamison Ledge, 5/8 mile westward of Burnt Coat Island, is 3/8 mile long, bare at low water, and marked at its south end by a spindle. **Flag Island Ledge,** between it and Flag Island, is bare at low water and unmarked. **Flag Island** is high and thickly wooded. **Long Ledge,** 3/8 mile northwestward of Flag Island, is grassy. **Goudy Ledge,** 5/8 mile northward of Flag Island, is bare at half tide and marked by a spindle. **Rogue Island,** on the west side at the entrance to New Meadows River, is low, with scattered trees. The bottom in this vicinity is very broken and has not been closely examined.

Sebasco Harbor is a good anchorage for small vessels eastward and southward of Harbor Island and 3½ miles northward of Bald Head. **North Blacksnake** is a large bare ledge in the entrance; its northern end should be given a berth of over 100 yards, and the broken ground extending 300 yards eastward from the ledge should be avoided. The entrance is betweeen North Blacksnake and the black buoy lying about 200 yards southward of Harbor Island. Anchorage can be selected 250 to 300 yards off the cove on the eastern side in 5 to 6 fathoms (9.1 to 11 m.); also in mid-channel off the landing inside Harbor Island in 4 fathoms (7.3 m.) The thorofare leading northward from Sebasco Harbor, inside Harbor Island, is bare at low water.

The thorofare leading northward of **Harbor Island** and eastward of **Malaga Island** is marked by two buoys near the southern end, and is easily navigated by small craft. It is considerably used as an anchorage by small fishing craft. **Sebasco** is a settlement on the east side. There is a wharf with a depth of 8 feet (2.4 m.) near the north end of the thorofare and several smaller wharves farther south. A ledge covered at high water extends 350 yards north-northeastward from Bear Island and is marked at its end by a red buoy.

New Meadows River.—This river, at the northeastern end of Casco Bay, is about 8½ miles long from **Bear Island** at the entrance to a highway and an electric-railway bridge at the head of navigation. The channel has a least depth of about 12 feet (3.7 m.) to within ½ mile of the head, and the principal dangers are buoyed. Above that

point the channel is crooked and unmarked and has a depth of about 7 or 8 feet (2.1 to 2.4 m.) to the head. Local knowledge is necessary to carry the best water above **Foster Point,** 3 miles from the head. The river is seldom used except by local fishing boats and small pleasure craft. Small craft can enter New Meadows River from westward 6 miles above its entrance through Simon Gurnet (described on page 199).

Cundy Harbor is a good anchorage for small vessels on the west side of New Meadows River, 1 mile above its mouth. The harbor is clear and has depths of 4 to 6 fathoms (7.3 to 11 m.). A black buoy marks the south end of the bare ledges on the northeast side of the harbor. Cundy Harbor is a post village on its western side. The wharves have depths of 6 to 15 feet (1.8 to 4.6 m.). Gasoline and provisions are obtainable.

The Basin, a cove on the east shore, about 1¼ miles above Cundy Harbor, has a narrow entrance and is used only by small local craft.

Winnegance Bay, on the east side of New Meadows River, 3 miles above the entrance, is a large bight with secure anchorage in 3 to 4 fathoms (5.5 to 7.3 m.). The southeast side of the bay is foul. **Bushy** and **Hen Islets** are near the edge of the foul ground, and **Hen Island Ledge,** bare at its end at low water, extends ¼ mile westward from the south islet. The north side of the bay is clear.

New Meadows is a small village at the fixed bridges crossing New Meadows River at the head. It is frequented by many small pleasure craft. There are float landings and a railway for hauling out launches. A hotel is located here.

Directions, New Meadows River.—Entering from eastward, boats should pass southward of Glover Rock and Bill Wallace ground, and westward of Bald Head Ledge spindle. Passing about ⅜ mile westward of the spindle, steer 340° true (N. ¼ W. mag.) for the eastern edge of Flag Island for 2⅜ miles, passing a little over ¼ mile westward of Wood Island. When the north end of Little Wood Island opens from the north end of Wood Island, steer 8° true (NNE. ⅛ E. mag.) for the western edge of Harbor Island, and pass 250 yards eastward of Jamison Ledge spindle. Pass about 300 yards westward of North Blacksnake (the bare ledges at the entrance of Sebasco Harbor), steer 335° true (N. ¾ W. mag.) for the entrance of New Meadows River, and pass 350 yards westward of Bear Island.

Entering from westward.—Vessels can enter from southwestward, passing between White Bull and Mark Islands, then between Long Ledge and Flag Island, and then between Goudy Ledge spindle and the black buoy northward. A more protected route, generally used by small craft, leads close to the red bell buoy southward of Jaquish Island, then on a 19° true (NE. ¾ N. mag.) course for 2⅞ miles, following the eastern side of Bailey Island and passing westward of the red buoys marking Middle Ground and Littlejohn Rock. Pass northward of the latter buoy and steer 61° true (ENE. ⅞ E. mag.) for 1¼ miles, to a position close westward of the red buoy southward of Oak Island (marked by a few pines), taking care to avoid the 7-foot (2.1 m.) rock which lies southwestward of the buoy; then steer 91° true (ESE. ½ E. mag.) for 1¼ miles, passing close southward of all three red buoys. From buoy No. 2, the course is 77° true (E. ¼ S. mag.) to North Jenny Ledge buoy, and then 48° true

(NE. by E. ¾ E. mag.), passing between Goudy Ledge spindle and the black buoy northward, to the entrance of the river.

From the entrance to New Meadows.—Keep in mid-channel until up with the southern point at the entrance of Cundy Harbor, and then steer 29° true (NE. mag.) to a mid-channel position southeastward of Sheep Island Ledge black buoy. Then steer 7° true (NNE. mag.) for Birch Point until abreast the southern end of Long Island. If going to an anchorage, head into Winnegance Bay, taking care to keep the northern shore best aboard, distant ¼ mile or less. Bound up the river, pass between Birch Point and Long Island, and follow a mid-channel course northward for 1 mile. Pass midway between Bragdon Island and the spindle ¼ mile eastward, and steer north-northwestward in mid-channel for 1¼ miles to the south end of Middle Ground.

Pass westward of the red buoy at the south end of Middle Ground and steer 358° true (N. by E. ¼ E. mag.) to a position close eastward of a black buoy, then 17° true (NE. by N. mag.) to a position close westward of a red buoy. Pass close northward of the buoy to avoid a shoal about 100 yards northward of it, and haul east-northeastward to the eastern shore. Favor the eastern shore until the river narrows, and then keep in mid-channel for ¾ mile above the south end of Howard Point to a place where the best water leads close to the eastern shore, eastward of a bare reef; the channel favors the eastern side just above in the opening underneath the telegraph line and is in mid-channel to the fixed bridges ⅛ mile above.

Ridley Cove is eastward of Yarmouth Island and just westward of the entrance to New Meadows River. It has good anchorage in 5 to 7 fathoms (9.1 to 12.8 m.), but is exposed to southerly and southwesterly winds. It should be avoided by strangers on account of numerous unmarked ledges and rocks which lie off the entrance. From its northern end a narrow, deep channel leads close northward of George Island into Hen Cove, and a narrow obstructed channel, suitable only for small craft in the absence of local knowledge, leads to Quohog Bay. **Hen Cove** has extensive shoals, but is a good anchorage for small craft.

Of the dangers off the entrance to Ridley Cove, **Jenny Island** is 10 feet (3 m.) high and grassy, **North Jenny Ledge** is bare at lowest tides and marked by a horizontally striped buoy at the south end, **Jenny Ledge** is bare 3 feet (0.9 m.) at low water. **Ballaststone Ledge** is 5 feet (1.5 m.) high and grassy, and there are numerous bare spots on **Yarmouth Ledges.**

Quohog Bay is a narrow arm extending about 4 miles in a northeasterly direction; it has good anchorage for small vessels, but is seldom entered by strangers. Numerous unmarked ledges and many small islands lie off its entrance, which is between Yarmouth Island and ledges on the east and Long Point on the west. The buoyed channel from New Meadows River to Orr and Bailey Islands leads across the entrance. There is also a good channel between **Saddleback Ledge** (bare rocks), **Ragged Island** (high and scantily wooded on top), **Blacksnake Ledge** (bare at low water), **Yellow Rock**, and **Twobush Ledge** (grassy) on the east and **Round Rock** (awash at high water), **Middle Ground Rock**, and **Cedar Ledges** (bare) on the west; the course through to the entrance is 14° true

(NNE. 5/8 E. mag.). There are a number of unmarked ledges and sunken rocks in Quohog Bay. **South Ledge** (covered at high water) and **North Ledge** (covered at half tide) extend 3/8 mile southwestward and northeastward, respectively, from Pole Island.

The Gurnet is a narrow unimportant arm making northward on the east side of Orr Island. There are no wharves. The point on the east side is wooded and has a house on the end.

Lowell Cove, in the south end of Orr Island, is used as an anchorage by local fishermen. There is a wharf at the head. **Horse Cove,** in the north end of Bailey Island, is foul near the shores and is little used.

Ram and **Pond Islands,** southeastward of Lowell Cove, are round and grassy. **Pond Island Ledges,** extending 1/2 mile southwestward of Pond Island, have many spots bare at low water.

Halfway Rock, about in the middle of Casco Bay at its south side, is a low, rocky islet, marked by a lighthouse. Ledges extend 1/4 mile southwestward and northward from it.

Halfway Rock Lighthouse is a white granite tower attached to a dwelling. The light is fixed white alternating with fixed red, with a red flash of 5 seconds' duration in the red period every 90 seconds, 76 feet (23.2 m.) above the water, and visible 14 miles. The fog signal is a reed horn (blast 8 seconds, silent 4 seconds; blast 4 seconds, silent 44 seconds).

Drunker Ledges, 2 miles north-northeastward of Halfway Rock, consists of two ledges 1/4 mile apart. The southeast one has 4 feet (1.2 m.) over it and is marked at its southwest end by a red buoy; the northwest one is bare at half tide, and is marked near its western end by a spindle. Between Drunker Ledges and Jaquish Island there is broken ground with depths of 16 to 24 feet (4.9 to 7.3 m.), and in heavy weather the sea breaks on the shoaler places.

Whale Rock, a bare ledge nearly awash at high water, lies 3/8 mile southwestward of Little Mark Island.

Mericoneag and **Harpswell Sounds** are of little commercial importance, but they are the approach to a good and convenient anchorage. Vessels of the deepest draft can enter and find anchorage in 3 1/2 to 10 fathoms (6.4 to 18.3 m.), good holding ground. If in the vicinity of Halfway Rock and unable to beat into Portland against a northwesterly wind, this is the best harbor than can be made.

The entrance lies 3 1/4 miles north-northeastward of Halfway Rock Lighthouse, and is marked on its western side by a stone monument on Little Mark Island. The sounds extend in a northeasterly direction 10 miles, and for the first 4 miles the prominent dangers are marked. About this strangers should not go without a pilot, as the channel is narrow and flats make out some distance from the shore in several places. Directions to the entrance of Mericoneag Sound from eastward are given on page 46, and from westward on page 47.

Jaquish Island, on the east side of the entrance to Mericoneag Sound, is bare and flat. **Turnip Island,** westward of it, is low and grassy.

Charity Ledge, eastward of Jaquish Island, has a charted depth of 15 feet (4.6 m.), but local reports state that there is less water and that it should be avoided.

Little Mark Island, on the west side of Mericoneag Sound at the entrance, is grassy and marked by a pyramidal stone monument. **Great Mark Island** is bare and grassy.

Mackerel Cove, in the southwestern shore of **Bailey Island,** the eastern point at the entrance to Mericoneag Sound, is a good and frequently used anchorage for small craft, with 5 to 11 fathoms (9.1 to 20.1 m.). It is open southwestward, but a heavy sea never enters. The post village of Bailey Island is on the cove; it is connected with Portland by steamer. There are no dangers; the water shoals gradually toward its head. The entrance lies 1½ miles 54° true (ENE. ¼ E. mag.) from the monument on Little Mark Island.

The southwestern point of Bailey Island is marked by a house and a windmill.

Orr Island is a village and summer resort on the south end of the island of that name. It is connected with Portland by steamer. The steamer wharf has a depth of 12 feet (3.7 m.) and the fish wharves less. There is a shoal a little southwestward of the steamer wharf. Gasoline and provisions are obtainable and pilots for any part of Casco Bay. The approach to the wharves is northward of a red buoy and spindle marking the end of a ledge bare at low water, extending from Bailey Island.

About midway between the southern end of Orr Island and the low sand spit westward of it there is a **rocky ledge,** part of which bares at the lower tides and which extends about 100 yards in a north and south direction. Special care should be taken to avoid this reef.

In 1926 a fixed bridge was being constructed across the strait from the southwest point of Orr Island to the point on Bailey Island southwestward from it.

Will Strait is a thorofare between the south end of Orr Island and the north end of Bailey Island. It is used by local fishing boats, but the channel is very narrow and difficult. Strangers should not attempt it except with small craft and on a rising tide.

Harpswell Harbor, on the west side of Harpswell Sound, 3½ miles above Little Mark Island, is a good anchorage in from 3 to 6 fathoms (5.5 to 11 m.), shoaling gradually to the head. There is a landing for small craft on the west side, and a small settlement on the main road back of the landing.

Ram Island, on the west side of Mericoneag Sound northward of the thorofare leading into Potts Harbor, is bare and grassy. Ledges, bare and submerged, extent ¼ mile southward of the island to a red buoy. There is a channel northwestward of the island having a depth of at least 8 feet (2.4 m.) at low water. It leads between shoals on each side, and should not be used by strangers.

There is a thorofare from the north end of Harpswell Sound through **Ewin Narrows, Prince Gurnet,** and **Simon Gurnet** to New Meadows River. It is used by local boats, but the channel is narrow and has many dangers, the tidal currents are strong, and the thorofare should not be used by strangers. It is marked by bush stakes. Simon Gurnet is crossed by a fixed bridge with two openings 40 feet wide, and a head room of 8 feet (2.4 m.) at high water. The southern opening has a depth of about 7 feet (2.1 m.) at low water and is said to be the shoalest place on the route. The northern opening is shoal and unused. The current through Simon

Gurnet is very strong at strength (estimated at 7 to 8 knots) and boats go through only at slack water. The current runs eastward on the ebb. Low-water slack occurs a little before low water at Portland.

At the strength of the current there is a difference of elevation of probably 3 feet (0.9 m.) in the level of the water on either side of the bridge. The flood currents meet in the reach between Prince and Simon Gurnet.

CASCO BAY, WESTERN PART

The part of Casco Bay westward of Harpswell Neck (chart 315) has numerous sounds, bays, and rivers, separated by islands lying in a northeasterly and southwesterly direction. Portland Harbor, at the western end of the bay, is the principal port of Maine. There are many summer resorts and landings on the islands and shores of the bay, and small steamers from Portland run as far east as Orr Island, calling at the landings between. There are broad channels into the bay through Broad, Luckse, and Hussey Sounds, and secure anchorage for vessels of any draft can be found, but vessels seldom enter for an anchorage. The bay is frequented by many yachts and small pleasure craft and some fishing boats. The steamers running to the landings are of 6 to 10 foot draft (1.8 to 3 m.), and most of the wharves on the islands are built for vessels of about this draft.

Potts Harbor is a large irregular bight in the southern end of Harpswell Neck and has **Haskell** and **Upper Flag Islands** and the ledges between them on its southern side. It is a good anchorage, with depths of 4 to 5½ fathoms (7.3 to 10 m.). **South Harpswell** is a village and landing on its eastern shore. There are two entrances to the harbor; the eastern one, from Mericoneag Sound, is buoyed, but it is narrow and crooked, with strong tidal currents, and is suitable only for small craft, or small vessels with local knowledge; the western entrance, between Upper Flag Island and Horse Island, is straight and about 225 yards wide at its narrowest part, between Horse Island and the edge of the shoal between Upper Flag Island and **Thrumcap,** a grass-covered rock. Upper Flag, **Little Birch,** and **Horse Islands** are grass covered.

Outer Green Island, 3¾ miles westward of Halfway Rock Lighthouse, is grassy. **Junk of Pork,** a high rock with surrounding bare ledges, lies 250 yards southward of it. **Johnson Rock,** lying ¼ mile northeastward of Outer Green Island, with foul ground between, has 7 feet (2.1 m.) over it and is marked on its north side by a black buoy. **Green Island Reef** is about ¼ mile long and bare at low water, and lies ½ mile southwestward of **Inner Green Island** (low and grassy), with foul ground between; it is marked on its southwest side by a red buoy. **Green Island Passage,** leading between a red and a black buoy, has a width of ¼ mile and is used to some extent by small vessels; when using it be careful to avoid the southeast end of Green Island Reef eastward of the red buoy.

Jewell Island and **Crotch (Cliff) Island** are partly wooded, and there are numerous cottages and a landing on the northwest side of the latter. **Crotch Island Ledge,** with 3 feet (0.9 m.) over it in

places, extends 3/8 mile southwestward from the southern end of Crotch Island. Its end, with 16 feet (4.9 m.), is marked by a red buoy. There is no safe passage for vessels between the buoy and the island. Jewell Island has a cove with good anchorage for small craft, on the northeast end. There is a landing for small craft at the head of the cove.

Broken Cove is a group of bare rocks and small islets, connected by ledges, extending 5/8 mile northeastward from **West Brown Cow,** a grass-covered islet. The beacon on Stockman Island in range with or open eastward of the northeast point of Ministerial Island leads eastward of the ledges.

Eagle Island is high, wooded, and prominent, and has a house and flagstaff on the northeast side. A ledge, bare at one-quarter ebb, extends 300 yards westward from it. **Eagle Island Ledge,** awash at high water, lies 300 yards southeastward of the southern end of Eagle Island; ledges with 8 to 10 feet (2.4 to 3 m.) over them extend 300 yards southeastward and 500 yards eastward from the rock that shows bare. Partly bare ledges extend 350 yards northeastward from Eagle Island.

Bates and **Ministerial Islands** are grassy, and each has a single house. They are surrounded by extensive ledges. **Stave Island** is partly wooded, and has several houses. **Stave Island Ledge** is bare at low water. It is marked by a black buoy at its northeast end.

Hope Island is sparsely wooded and has a prominent house and flagstaff on the southwest end. There is a private wharf on the west side with a depth of about 8 feet (2.4 m.). **Rogue** and **Sand Islands,** northeastward of Hope Island, are low and grassy. The channel between them is marked by two buoys, and by a private spindle on the end of the ledge on the north side. **Crow Island** is low and grassy. **Little Bangs** and **Stockman Islands** are bare and grassy, and Stockman Island has a tripod beacon at the southwest end. **Goosenest** has an islet about 5 feet (1.5 m.) high, and **Goosenest Ledge** is bare at a little below high water.

Whaleboat and **Little Whaleboat Islands** are partly wooded and have no prominent marks.

Middle Bay makes northeastward on the west side of Harpswell Neck. **Harpswell Center** is a post village on the main road back of the wharf. The bay has good anchorage, but is little used. **Lower Goose** and **Upper Goose Islands,** on the west side, are wooded and have no prominent marks.

Mere Point Bay, shallow and obstructed by flats, lies between Birch and White Islands on the east side and **Mere Point Neck** on the west. There is a steamboat landing on the eastern side of Mere Point Neck near its southern end, and another on the northwest side of **Birch Island.** The planes of the world flight of the United States Army landed at Mere Point after completing their flight across the Atlantic in 1924.

Maquoit Bay makes northeastward on the western side of Mere Point Neck, the entrance lying north of the Goose Islands. It is obstructed by flats, with 1 to 4 feet (0.3 to 1.2 m.) over them, through which a channel with 19 to 24 feet (5.8 to 7.3 m.) leads for a distance of 2¼ miles from its entrance.

The chain of islands between Sister and Bustin Islands are wooded, and there are flats between and northward of them. **Sister Island Ledge,** northward of **Sister Island,** is partly bare at high water. **Bustin Island** has numerous cottages, and there is a steamer landing on its western end. **Little Bustin Island** is marked by a house and a clump of trees in the center.

Bibber Rocks, southward of Bustin Island, are bare. **French Island** is sparely wooded, and there is a wooded islet on its north side.

Freeport River, also known as **Haraseket River,** is west of Maquoit Bay; the approach lies between Bustin Island on the east and **Great Mosher Island** (sparsely wooded) on the west. The entrance of the river is between Moore Point on the east and Stockbridge Point on the west, and is narrow, with a least depth of 20 feet (6.1 m.). From the entrance the channel leads between flats, mostly dry at low water, in a northerly direction, 1¾ miles; a dredged channel, shoaled to about 3 feet (0.9 m.) deep, then leads to the town of Freeport. The principal wharf is bare at low water. The principal dangers in the approach and entrance to the river are marked by buoys; the channel above the entrance is unmarked. **Freeport** has no commerce. **South Freeport,** on the west side ¾ mile above the entrance, has a clubhouse wharf with a depth of about 10 feet (3 m.).

A large stone tower located on the high ground at South Freeport shows up prominently from this section of Casco Bay. Viewed from the bay, the tower has a decided yellowish cast.

Littlejohn and **Cousin Islands,** northward of Great Chebeag Island, are connected by a trestle and have numerous cottages. There are steamer landings on the south side of both islands.

Yarmouth River is a narrow, crooked stream westward of Freeport River; its approach is westward of Cousin Island, in the northwestern part of Casco Bay. The river takes a northwesterly direction about 1¾ miles to the town of **Yarmouth.** The depth to Yarmouth is about 4 feet (1.2 m.) at low water. The river has some trade in fishing boats of about 5-foot (1.5 m.) draft, and small schooners up to about 10 feet (3 m.) draft. The channel is very crooked, leads between flats bare at low water, and is usually marked by bush stakes, but local knowledge is necessary to keep in the channel. The best time for strangers to enter is at low water, when the flats are visible, or on a rising tide. **Cousin River,** a narrow, shallow stream, empties into the mouth of Yarmouth River from northward. It has no commerce by water.

Chebeag Island, the largest island in Casco Bay, is an important summer resort. There are three steamer landings on the east side and one on the west end northward of **Indian Point.** Chebeag Island is the post office.

Chandler Cove is formed by a bight in the southwestern end of Chebeag Island and by Little Chebeag Island; it is a good anchorage with 5 to 10 fathoms (9.1 to 18.3 m.), but is little used. The entrance from southward is through **Luckse Sound** and between the northeastern point of Long Island and Deer Point, the southern point of Great Chebeag Island.

Little Chebeag Island has a patch of woods and a few houses, and a wharf on the southeast side. The western entrance, between the north end of Long Island and the south end of Little Chebeag

Island, is somewhat obstructed by rocks, which are marked by buoys. Directions through the cove from eastward are given on page 46, and from westward on page 47.

Long Island, southwestward of Chebeag Island, has several landings on its northwest side. **Mariner** and Long Island are post offices near its northern and western ends, respectively. The islands southward are described with Portland Harbor.

Broad Cove is a shallow cove in the northwestern part of Casco Bay. There is good anchorage in the middle of the cove, southwest of Prince Point, in 15 to 17 feet (4.6 to 5.2 m.). It is open southward and eastward. There is a private wharf on the eastern side of Prince Point, a landing for small craft on the west side of Broad Cove, and several landings on the western shore southwestward of Sturdivant Island.

Sturdivant Island is grassy and has several cottages. **Sturdivant Island Ledge** is bare in several places at low water. **Basket Island** is wooded in the center. **Upper Basket Ledge** is bare at low water, **Lower Basket Ledge** is bare at half tide, and both are marked by spindles. **Clapboard Island** is wooded and has a private landing on the west side. It is surrounded by ledges, bare and submerged. **Cow Island Ledge** is bare at low water and marked by a spindle. Presumpscot River and Back Cove are described with Portland Harbor.

Anchorages.—In the eastern part of Casco Bay the best anchorage for strangers is in New Meadows River. Local fishermen frequently use Tabasco and Cundy Harbors. Potts Harbor, Harpswell Harbor, and Mackerel Cove are good anchorages in the middle of the bay for small vessels and yachts. Mericoneag Sound and Harpswell Sound and the whole of Casco Bay westward of Harpswell Neck afford good anchorage for large vessels, except in heavy northeast gales. Vessels can enter through Broad Sound, Luckse Sound, or Hussey Sound, and select an anchorage under the lee of some of the many islands, a suitable depth and good holding ground being found in most places. Portland Harbor is a secure anchorage on the western side of the bay, and is generally used by vessels.

Pilots.—Vessels from eastward can sometimes obtain a pilot at Small Point Harbor or vicinity; one can always be had there for the waters northeastward of Halfway Rock. Vessels from westward can take a pilot at Portland, or, standing into Hussey or Luckse Sounds, take one from some one of the islands in the bay if a fisherman is not found outside.

Towboats are seldom used in Casco Bay. They can be obtained at Portland.

Supplies.—Gasoline and provisions can be obtained at any of the villages on the bay. Water has to be taken in casks from wells or ice ponds. Portland is the most convenient place for supplies for vessels.

Repairs.—There are no facilities for repairing vessels except at Portland. There is a railway for hauling out small craft at the head of New Meadows River.

Ice.—Considerable ice forms at the heads of the numerous arms extending northward in Casco Bay, but the principal anchorages are available at any season of the year.

Currents.—The tidal currents are not strong, but on the flood there is a perceptible set northward and on the ebb southward in the bay and across the entrance.

Tides.—The mean rise and fall of tides in the bay is about 9 feet (2.7 m.).

DIRECTIONS, CASCO BAY

This region is an area of rocks and ledges, and, except in the approaches to Portland Harbor, has not been examined by means of a wire drag. Vessels should therefore proceed with caution when crossing broken ground where the charted depth does not greatly exceed the draft.

Directions for the usual traveled route from Portland eastward are given on page 47, while directions for the reverse will be found on page 46. Several other routes are possible and sometimes used. Most of the dangers are marked and the waters are well charted, so that with the aid of chart 315 no difficulty should be experienced in navigating Casco Bay in clear weather.

PORTLAND HARBOR

(Chart 325), at the western end of Casco Bay, is the most important harbor on the coast of Maine. It has a large coastwise and some foreign trade and is open for commerce throughout the year. It is divided into an outer and an inner harbor, the inner harbor being inside of a line joining Portland Breakwater Light and Fort Gorges.

Channels.—The main entrance is from southward, westward of Cushing Island, and has a depth of 6 fathoms (11 m.) or more to the entrance of the inner harbor. There are several ledges off the entrance, most of them marked, which makes the approach to the harbor dangerous in thick weather for deep-draft vessels. There is a 30-foot (9.1 m.) rock ⅜ mile southeastward of Portland Head Lighthouse, and a 29-foot (8.8 m.) rock ¼ mile eastward of Spring Point Ledge Lighthouse, both unmarked. In clear weather vessels can easily avoid the rocks and ledges off and in the entrance.

In addition to the main entrance from southward there are several entrances from eastward between the islands, but these entrances are seldom used except by local vessels familiar with them and by small craft.

The inner harbor has been dredged to a depth of about 30 feet (9.1 m.) to the fourth bridge, 2½ miles above Portland Breakwater Lighthouse, but subsequent shoaling has reduced the available depths somewhat. A large area northwestward of Fort Gorges has been dredged to a depth of 30 feet (9.1 m.) to form an anchorage. There is (1926) a least depth of about 33 feet (10 m.) leading to the State pier.

The broken ground in the approach to Portland Harbor southeastward and eastward of Cape Elizabeth has been examined by means of a wire drag, and the dangers are shown on the charts. A detailed description of them is not necessary.

The approach to Portland Harbor from southward is marked by Portland Lightship and Cape Elizabeth Lighthouse, and from eastward by Halfway Rock Lighthouse (described on p. 198). The en-

trance to the harbor is marked by Portland Head Lighthouse on the western side and Ram Island Ledge Lighthouse on the eastern side.

Portland Lightship, 5¼ miles southeastward of Cape Elizabeth lighthouse, has a red hull with "Portland" on each side, and two masts with a red grating at the foremast head. The light, shown from the foremast, is occulting white (light 1 second, eclipse 1 second), 70 feet (21.3 m.) above the water, and visible 11 miles. The fog signal is a chime whistle (blast 3 seconds, silent 27 seconds). A submarine bell sounds "7–4" every 33 seconds.

The radiobeacon sounds a dash and two dots for 60 seconds and remains silent for 120 seconds. The station does not maintain radio communication.

Cape Elizabeth Lighthouse is a white conical tower with covered way to dwelling. The light is a group flashing white (6 flashes every 30 seconds), 129 feet (39 m.) above the water, and visible 17 miles. About 308 yards to the southwest there stands a similar tower which is no longer lighted. There is a Coast Guard Station and numerous houses near the lighthouse.

There is a **naval radiocompass station** on Cape Elizabeth near the lighthouse. The call letters are NAB.

Portland Head Lighthouse is a white conical tower connected to a dwelling. The light is fixed white, 101 feet (31 m.) above the water, and visible 16 miles. The fog signal is a reed horn (blast 5 seconds, silent 15 seconds).

Ram Island Ledge Lighthouse is a light gray conical tower on Ram Island Reef (bare at low water). The light is group flashing white (flash 0.3 second, eclipse 1.2 seconds, flash 0.3 second, eclipse 4.2 seconds), 77 feet (23.5 m.) above the water, and visible 14 miles.

Cushing Island, on the east side just inside the entrance to Portland Harbor, is mostly grass covered and has two prominent radio towers at its northeast end. **White Head** is a high bluff at its northeastern end. Steamers from Portland land at a wharf on the west side, and there is another wharf in a cove on the northeast side.

Whitehead Passage, between Cushing and Peak Islands, has a depth of about 4 fathoms (7.3 m.), and is sometimes used by vessels up to about 12 feet (3.7 m.) draft, entering from eastward. The principal dangers are marked, but the channel is narrow, and strangers in vessels are advised to use the main channel.

Directions.—To go through Whitehead Passage avoid the broken ground which extends ⅝ mile northeastward from Ram Island. Enter the passage between two spindles, which mark rocks bare at low water, favoring, if anything, the southern one, and pass southward of a red buoy just inside them. Then steer 243° true (W. by S. mag.) for nearly ¼ mile, giving the shore of Cushing Island a berth of about 125 yards. Then steer 299° true (NW. mag.), and pass southward of the red bell buoy at the western end of the passage. Pass 100 yards westward of the bell buoy, steer 351° true (N. ⅝ E. mag.), and pass 100 yards eastward of the black buoy off the north end of House Island. Pass 150 yards northward of House Island Light, steer 274° true (WNW. ¼ W. mag.), and pass northward of the black gas buoy northward of the Breakwater Lighthouse into Portland Harbor.

House Island, on the east side of the main channel northward of Cushing Island, is the site of the quarantine station; an old fort on the southwest end is visible. There is a light on each end of the island.

Peak Island, the large island northeastward of Cushing Island, is used as a summer resort. It has communication with Portland by ferry and steamers. There are several wharves on the west side. Peak Island **(Forest City Landing)** is a post office on the south end and **Trefethen** is a post office on the north end.

Great and **Little Diamond Islands,** northward of Peak Island, are connected by a trestle. Little Diamond Island has many houses visible, and Great Diamond Island has a very prominent elevated water tank. Steamers from Portland make landings at wharves at the southwest end of Little Diamond Island and the south end of Great Diamond Island. There is a buoy depot and wharf on the east end of Little Diamond Island.

The channel between Peak Island and Little and Great Diamond Islands has a depth of 15 feet (4.6 m.) and is used by many small vessels and motor boats bound to points in Casco Bay. The principal dangers are marked.

Diamond Island Roads, formed by Peak, House, and Little Diamond Islands, is a good anchorage for vessels, but is little used as an anchorage except by yachts and small craft making their headquarters at Peak Island. The dredged anchorage northwestward of Fort Gorges is generally used by vessels.

Spring Point Ledge Lighthouse is a white conical tower on a black pier on the northeast end of a ledge, bare in places at low water.

Fort Gorges, 5/8 mile north-northeastward of Spring Point Ledge Lighthouse, is a gray stone structure on **Brooklyn Ledge.** The ledge has a large area bare at low water and a few spots bare at high water. It is marked by a red buoy placed just south of the ledge.

The wreck of a 6-masted schooner lies awash at high water with the stump of 1 mast remaining about 3/8 mile 18° true (NE. by N. mag.) from Fort Gorges.

Portland is on the north side of the inner harbor; it is on several railroads and is a terminus of the Grand Trunk Railroad running through Canada. It also has steamer communication with New York, Boston, and most of the towns eastward along the coast. It has considerable foreign trade, especially during the season of closed navigation in the St. Lawrence River. There are depths of 30 feet (9.1 m.) or more at the Grand Trunk Railroad wharves and the state pier near the eastern end of the water front. The other wharves have less depths. There is a public float landing for small craft on the west side of the Portland Pier, near its head. There is a ferry slip on the outer end of the pier.

South Portland is a town on the south side of the inner harbor opposite Portland. It is connected with Portland by ferry and a highway bridge. There is a shipyard here for the repair of wooden vessels.

Fore River is the name given to the part of Portland Inner Harbor above the first bridge. A channel 30 feet (9.1 m.) deep and 300 feet wide has been dredged in the river to the upper Boston & Maine Railroad bridge, 1 1/4 miles above the first bridge. There are a railroad wharf and several oil wharves on this channel, and the river

is used by many vessels. The flats on each side are bare at low water, and this is the best time for strangers to enter. From the upper end of the dredged channel the river has a narrow, crooked, unmarked channel with a least depth of about 4 feet (1.2 m.) for 1½ miles, and is little used. The flats on each side are bare at low water.

Bridges.—Fore River is crossed by 4 bridges, 3 of which have draw openings. Details of these bridges, together with 3 other bridges, are given in the table following:

Bridge	Width of opening, feet	Headroom at high water when closed, feet
Over Fore River:		
Portland Bridge, highway	100	[1] 30
Boston and Maine Railroad, lower bridge	60	6
Vaughn Bridge	60	5½
Upper Boston and Maine Railroad Bridge	(2)	----------
Over Back Cove:		
Grand Trunk Railroad Bridge	88	5½
Tukey Bridge	67	5
Over Presumpscot River: Martin Point Bridge	43	----------

[1] Tide staff maintained in pier which indicates overhead clearance.
[2] Closed.

NOTE.—General signal for opening bridges, 4 long blasts of whistle.

Back Cove is on the north side of Portland. It has been improved by dredging a channel 30 feet (9.1 m.) deep and 300 feet wide to the Grand Trunk Railroad bridge at the entrance, 14 feet (4.3 m.) deep to Tukey Bridge ¼ mile above, and 12 feet (3.7 m.) deep and 300 feet wide to the head of the cove. Vessels go to a wharf at the first bridge, to a wharf on the north side between the bridges, and to wharves at the head of the cove. The channel is unmarked and leads between flats bare at low water. Some shoaling has taken place since the above dredging was done, and the full project depths are not available. The principal traffic in Back Cove is in schooners which are towed in at high water.

Presumpscot River, northward of the entrance to Broad Cove, has a narrow, crooked channel with a depth of 8 feet (2.4 m.) to Martin Point at the entrance and 6 feet (1.8 m.) for 1 mile above. The channel is unmarked and leads between flats bare at low water. There is no commerce by water. **Martin Point,** on the west side at the entrance, is marked by a prominent building (marine hospital) and flagstaff.

The administration of the Port of Portland is under the supervision of the Harbor Commission of the Port of Portland; but an independent body known as the Directors of the Port of Portland, State of Maine, is in charge of the State's affairs, particularly in connection with the State pier.

Pilots.—A pilot boat will usually be found cruising outside Portland Head, and vessels desiring a pilot will be boarded when making signal. There are licensed pilots for this port, but pilotage is not compulsory. Strangers entering the port in vessels generally

take a pilot. The rates are $3 per foot draft entering, and $2 per foot draft leaving the port.

Towboats can be obtained by making signal outside. They are used by vessels going through the bridges. Regular rates have been adopted for towing vessels within the harbor, but for towing in from sea an agreement is made between the vessel and the towboat.

Anchorage.—The usual anchorage for large vessels is in the 30-foot (9.1 m.) dredged anchorage northwestward of Fort Gorges. The northeastern limit of this anchorage has a 306° true (NW. 5/8 N. mag.) direction from the southwest end of Little Diamond Island. Vessels can also find good anchorage in Diamond Island Roads. The anchorage in the inner harbor is on the south side, south of a line of white buoys. Small vessels anchor on the south side of the inner harbor, eastward of the ferry slip on the north side; and yachts and small craft anchor on the south side, between the ferry slip and the first bridge. The quarantine anchorage is eastward of Fort Gorges. The holding ground in Portland Harbor is good, and it is considered a safe anchorage at all times.

Submarine cables.—Submarine cables and water mains extend across the channels in the following locations, and vessels are cautioned not to anchor near them:

From Overset Island 233° true to Peak Island.

From Peak Island to the southern end of Great Diamond Island, extending in a 322° true direction and lying 600 yards southwestward of buoy No. 13.

From Peak Island to Little Diamond Island, extending in a 298° true direction and lying 50 yards northeastward of buoy No. 15.

From Little Diamond Island and South Portland, extending from the center of the island in an approximately northwest by west direction across the channel to the 8-foot (2.4 m.) curve, then southwestward across the channel, passing close to buoy No. 1 near Fort Preble.

Anchorage and harbor regulations.—The following are extracts from the regulations prescribed for Portland Harbor. The harbor master has charge of the enforcement of the regulations:

SEC. 1. No owner, master, pilot, or other person having charge of any vessel, and no owner, master, pilot, or other person having charge of any vessel towing or otherwise, conducting another vessel to anchorage in the harbor and bay of Portland shall place such vessel in anchorage in said harbor and bay in any anchorage ground other than that hereinafter described, and all persons shall conform to the following rules and regulations:

SEC. 2. Vessels not exceeding 500 tons burden may be anchored on the southerly side of the line ranging with the white buoy off the breakwater and a white buoy on a westerly course, thence on a line ranging with said white buoy and the draw pier of Portland Bridge, but not west of a line drawn from the northerly end of the slip of the Portland and South Portland ferry, Portland, to the northerly end of said ferry company's wharf at South Portland.

Vessels of larger tonnage may also be anchored on the above-described grounds, provided the anchorage grounds designated for such vessels shall be crowded, but not so as to obstruct the free entrance or egress of regular lines of steamers to or from their docks on the northerly side of the harbor.

SEC. 3. Vessels not exceeding 150 tons may anchor to the westward of above lines drawn from northerly end of the ferry wharves and south of line ranging from the white buoy above mentioned with southeasterly end of draw of Portland Bridge.

SEC. 4. Vessels exceeding 500 tons shall be anchored easterly of a line drawn from the southeasterly end of the Portland Company's wharf (1/4 mile west of Fish Point) as now built and the westerly end of the Bay View wharf at Peak Island. This line shall be marked by three white buoys.

SEC. 5. Vessels anchoring within above-described limits must anchor entirely within said boundaries, so that no portion of the hull, spars, or booms shall extend beyond said boundaries after veering chain or when riding to the tide.

SEC. 6. Permits may be granted by the harbor master of the city of Portland to wrecking plants to anchor outside of the above limits for the purpose of recovering sunken property, subject to his supervision. Such plants must comply with all the navigation laws in regard to lights, fog signals, and other requirements, and must move in ample season to give safe and clear passage to arriving and departing regular lines of steamers.

SEC. 7. Vessels may be anchored south of a line ranging with the Spring Point Lighthouse and the white buoy off the breakwater.

SEC. 8. All vessels at anchor in the harbor shall display a distinct white light forward not less than 6 feet above the forecastle deck during the night. All vessels at anchor shall keep their foresails and jibs furled during the night. Anchor watch shall be kept and fog signals sounded in fogs or thick weather.

SEC. 9. Vessels ordered to quarantine shall be anchored on the northeasterly side of a line ranging with the United States Marine Hospital and Fort Gorges, which anchorage shall be designated as the quarantine anchorage.

SEC. 10. All steamers passing up and down the harbor near the ends of the wharves shall run at a slow rate of speed.

Quarantine is enforced in accordance with the regulations of the United States Public Health Service. The quarantine station is on House Island, and vessels subject to visitation do not go above until they have been granted pratique. The boarding boat meets vessels off House Island.

Marine Hospital.—The Marine Hospital is on the Presumpscot River 1 mile from the city. There is also an office at the customhouse.

Supplies.—Coal can be had in any quantity either from alongside piers or by barge. Fuel oil is available, but in 1926 there was no barge service. Water may be had from water boats or from the wharves. The city water is considered suitable both for drinking and boiler purposes. Gasoline, provisions, and ship-chandlers' stores are to be had in the city.

Repairs.—There are good facilities for repairing vessels. There is a marine railway of 2,500 tons capacity. The cradle is 270 feet in length and will take vessels up to 19-foot (5.8 m.) draft aft and 17-foot (5.2 m.) forward.

Lighthouse Service.—The office of the superintendent of the first lighthouse district is in the Press Building.

Weather.—The prevailing winds are southwesterly during the summer and northerly during the winter. At all seasons the heaviest gales are usually from the northeastward or eastward.

Fogs.—Fogs occur most frequently during June, July, and August. At the head of the bays and within rivers it is often comparatively clear when it is thick outside. Winds from the east to the southwest by way of south bring fog; westerly and northerly winds clear it away.

Ice seldom obstructs navigation; when it does it is only for a limited time. The towboats keep a clear channel to the wharves.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.).

DIRECTIONS, PORTLAND HARBOR

Portland Harbor and approach have been examined by means of a wire drag from Fort Gorges, at the entrance to the inner harbor, out to a depth of about 18 fathoms (33 m.) off the entrance, and a little farther in places. This dragged area covers all of the broken ground eastward and northeastward of Cape Elizabeth, except those dangers within a distance of ½ to 1 mile of the shore.

The broken ground off the entrance to Portland Harbor renders the entrance of vessels dangerous in thick weather unless sure of the position. The following courses, if made good, are available for vessels up to 30-foot (9.1 m.) draft, but lead close to dangers; strangers in deep-draft vessels are advised to take a pilot.

From eastward.—Directions good for vessels up to 12-foot (3.7 m.) draft entering Portland Harbor from eastward inside the islands in Casco Bay are given on page 46. Local vessels up to 12-foot (3.7 m.) draft sometimes enter through Whitehead Passage. Deep-draft vessels usually make Bantam Rock gas and whistling buoy and Seguin Island whistling buoy, and pass close to Halfway Rock whistling buoy. From this buoy steer 261° true (W. ¾ N. mag.) for 6¼ miles to a position 100 yards southward of Witch Rock gas and bell buoy; this course leads ½ mile northward of an unmarked ledge with a least depth of 34 feet (10.3 m.). Then steer 291° true (NW. ⅝ W. mag.) for 1⅝ miles to a position 150 yards southwestward of the gas buoy off the southwest end of Cushing Island.

From southward.—Vessels entering Portland Harbor from southward usually make Portland Lightship. From the lightship steer 319° true (NNW. ¼ W. mag.) for 3 miles, heading for Portland Head Lighthouse, to a position ½ mile northeastward of Corwin Rock black bell buoy and ⅝ mile southwestward of West Cod Ledge Rock red buoy. Then steer 344° true (N. mag.) for 3¼ miles, with the east side of Peak Island ahead, until 1 mile from Witch Rock gas and bell buoy and with it in range with Ram Island Ledge Lighthouse; then steer 298° true (NW. mag.) for 2⅝ miles, passing ¼ mile southwestward of Witch Rock gas and bell buoy and ⅜ mile northeastward of Jordan Reef buoy, to a position 150 yards southwestward of the gas buoy off the southwest end of Cushing Island.

Cushing Island to Portland.—Pass 150 yards westward of the gas buoy at the southwest end of Cushing Island and steer 337° true (N. ⅝ W. mag.), passing ¼ mile westward of House Island and 250 yards eastward of Spring Point Ledge Lighthouse. If going to the anchorage northwestward of Fort Gorges, continue about the same course, pass 200 yards westward of the red buoy southwestward of Fort Gorges (stone structure), and at least 200 yards westward of the most westerly bare part of Brooklyn Ledge, and anchor northwestward or north-northwestward of Fort Gorges. If bound to Portland, continue the 337° true (N. ⅝ W. mag.) course for ⅜ mile past Spring Point Ledge Lighthouse to a position 250 yards southwestward of the red buoy southwestward of Fort Gorges. Then steer 271° true (WNW. ½ W. mag.), and pass 400 yards northward of Portland Breakwater Lighthouse, and 125 yards northward of the black gas buoy northward of the lighthouse. The course can then be shaped to the wharves, or they can be followed, 150 yards off, to the first bridge.

COAST FROM PORTLAND TO PORTSMOUTH

This stretch of coast (Chart 1205) extends about 37 miles in a general southwesterly direction from Cape Elizabeth, with but few harbors indenting it, they being principally the resort of fishermen

and small coasters seeking shelter in bad weather. Richmond Island Harbor, Wood Island Harbor, and Cape Porpoise Harbor are the only anchorages available for strangers. There are many summer resorts along the coast, most of them reached by electric road from Portland or Portsmouth.

Cape Elizabeth Lighthouse and Portland Lightship are described on page 205.

Seal Cove (Chart 231) is on the southeast side of Cape Elizabeth northeastward of Richmond Island. It has numerous rocks and ledges and is frequented only by boats of local fishermen. There are no wharves.

Richmond Island Harbor (chart 231), formed by Richmond Island (grassy, with a house and a few trees in the center) and a breakwater extending to the shore, lies 2½ miles southwestward of Cape Elizabeth Lighthouse and 6¼ miles 32° true (NE. ¼ E. mag.) from Wood Island Lighthouse. It is sheltered from northerly and westerly winds, but is exposed to southeasterly and southerly winds. Foul ground extends ⅜ mile from the northern side of the harbor, leaving an anchorage about ⅜ mile wide near Richmond Island, where the depths shoal gradually from 8 fathoms (14.6 m.) at the entrance to 3 fathoms (5.5 m.) ¼ mile from the breakwater at the head. It is little used as an anchorage.

Chimney Rock, lying ⅜ mile from the north side of Richmond Island Harbor, is awash at low water and is marked on its southeast side by a black buoy. Vessels must pass southward of the buoy. A rock with 16 feet (4.9 m.) on it lies 400 yards east-southeastward of Chimney Rock buoy. **Ram Island,** low and grassy, lies ¼ mile northwestward, and **The Brothers,** three small bare rocks, lie 300 yards north-northeastward of Chimney Rock.

Old Proprietor is a ledge, bare at low water, lying nearly 1 mile from shore and 1⅞ miles westward of the western end of Richmond Island. It is marked on its south side by a black buoy. A ledge with 11 feet (3.4 m.) over it lies nearly ½ mile northeastward of Old Proprietor.

Between Richmond Island and Wood Island Lighthouse, a distance of 6¼ miles, the shore forms a large open bight, the southern part of which is **Saco Bay.**

Spurwink and **Scarboro Rivers,** on the north side of the bight, can be entered only by small craft at half tide or higher with a smooth sea. They are seldom entered. **Higgins Beach,** on the west side at the entrance to Spurwink River, has many cottages visible.

Prout Neck, a prominent point nearly 3 miles westward of Richmond Island, is the northern point of Saco Bay; it is partly wooded and has many houses and a standpipe visible. The shore of the bay is known as **Scarboro Beach, Old Orchard Beach,** and **Ferry Beach,** in the order named from northward. The large hotels, pier, and standpipe at Old Orchard Beach are prominent. **Bar Ledge,** with 11 feet (3.4 m.) over it, lies ⅞ mile from shore in the northern part of Saco Bay and is marked on its southwestern side by a red buoy. About ⅝ mile westward of the buoy and the same distance northeastward of the pier at Old Orchard there is a ledge with 2 feet (0.6 m.) over it which extends ½ mile from shore.

Stratten and **Bluff Islands,** grass covered, lie off the northern part of Saco Bay, 1 mile southward of Prout Neck, with deep water

between. The islands are joined by ledges, which also extend ¼ mile eastward from Stratten Island. Stratten Island has a house and barn.

In the southern end of Saco Bay there are islands and ledges which extend 1¼ miles from shore, and inside of them are Wood Island Harbor and the entrance of Saco River. **Eagle** and **Ram Islands** are rocky and grass covered; vessels should pass eastward of them, giving them a berth of ½ mile.

Saco River, having its entrance in the south end of Saco Bay west-northwestward of Wood Island Lighthouse, is the approach to the cities of **Biddeford** and **Saco,** at the head of navigation, about 5 miles above the entrance.

The entrance is between two jetties, the southern one of which is submerged at high water; the channel has been improved by dredging, and there is now a least depth of about 6 feet (1.8 m.) to the head of navigation. A project has been approved for deepening this channel to 8 feet (2.4 m.), but in 1926 nothing had been done.

The depth over the bar is subject to change, but is usually about 4½ or 5 feet (1.3 or 1.5 m.). In 1926, 12½ feet (3.8 m.) was the greatest depth taken to Saco and Biddeford on the ordinary high tides.

The channel in the river is narrow and crooked, and strangers should employ a pilot. A pilot can be obtained from The Pool, southward of the entrance. There are depths of 6 to 8 feet (1.8 to 2.4 m.) at the wharves at Saco and Biddeford.

Most of the traffic on the Saco River consists of coal barges, which are towed up river by a towboat stationed at The Pool.

Small craft can enter with a smooth sea and on a rising tide by passing between **Ram Island Ledge** and **Negro Ledge** buoys, steering westward and passing southward of the red buoy marking **Sharps Rocks,** then passing close to the perpendicularly striped buoy off the ends of the jetties, and favoring the south jetty until near its inner end. The south jetty is covered at high water and marked by pyramidal stone beacons at frequent intervals. The north jetty is visible at high water. **Ice** closes the river from January to April. The mean range of **tide** is about 9 feet (2.7 m.).

Wood Island, eastward of the entrance to Saco River and 7¾ miles southwestward of Cape Elizabeth, has a patch of woods in the center, and is marked at the east end by **Wood Island Lighthouse** (white tower connected with dwelling). The light is fixed red, with a red flash of 3 seconds' duration every 60 seconds, 71 feet (21.6 m.) above the water, and visible 14 miles. The fog signal is a bell (1 stroke, silent 25 seconds, 2 strokes, silent 25 seconds).

Wood Island Harbor is an anchorage for small vessels of about 12 feet (3.7 m.) or less draft, lying on the south side of the ledge extending westward from Wood Island, and has a width of about 250 yards. It is exposed to easterly winds. The anchorage with best shelter is about 200 yards northeastward, northward, or northwestward of Philip Rock spindle (the easterly spindle inside the harbor), in a depth of 15 feet (4.6 m.). Anchorage can also be had 200 to 300 yards northwestward of the red buoy west-southwestward of Negro Island in 15 to 18 feet (4.6 to 5.5 m.).

The south side of the anchorage is formed by **Gooseberry Island** (grassy on top and showing but little above high water), and ledges westward of it which extend 300 yards from Fletcher Neck. **Philip Rock,** near the edge of the channel 450 yards westward of Gooseberry Island, is marked by a black spindle with two cages. The southwest end of the harbor is filled by shoals, with 7 to 12 feet (2.1 to 3.7 m.) over them, the edge of which extends from Philip Rock to Stage Island, and lies 150 yards southwestward of the red buoy west-southwestward of Negro Island. A black spindle with cage marks a rock bare at low water lying about 600 yards westward of Philip Rock and on the south side of the channel leading to The Pool.

To enter Wood Island Harbor from northeastward, give the north side of Wood Island a berth of over ½ mile and steer 232° true (WSW. mag.) for Stage Island monument, passing about midway between Negro Island Ledge black buoy and Ram Island Ledge red buoy. When Negro Island is abeam steer about 187° true (SSW. mag.), and pass about 150 yards eastward of the black buoy eastward of Stage Island. Pass 150 to 200 yards northwestward, and not over 100 yards southward, of the red buoy west-southwestward of Negro Island.

Approaching from southward, steer for Wood Island Lighthouse on a 343° true (N. ⅛ W. mag.) course; Dansbury Reef buoy should be made a little on the starboard bow. Pass midway between the buoy and Washman Rock spindle on a 325° true (N. by W. ¾ W. mag.) course, heading for a 2½-story house on the southern side of Wood Island, and pass 200 yards eastward of Gooseberry Island. Pass midway between Gooseberry and Wood Islands, and steer 272° true (WNW. ⅜ W. mag.), with the red buoy west-southwestward of Negro Island a little on the starboard bow.

Negro Island (low and grassy on top) lies just westward of Wood Island; ledges extend nearly 200 yards northwestward and 300 yards southwestward from Negro Island, and are marked at the southwest end by a red buoy.

Stage Island is marked by a prominent white stone monument. The harbor southwestward of a line joining Philip Rock, Stage Island, and the entrance of Saco River is shoal. **Stage Island Shoal,** partly bare at low water, extends 300 yards east-northeastward from the island and is marked at its end by a black buoy. **Basket Island** has several cottages.

The Pool is a shallow bay making southwestward from Wood Island Harbor inside of Fletcher Neck. The entrance is about 50 yards wide, and the tidal currents have considerable velocity. Small craft can anchor just inside the entrance. **Biddeford Pool** is a post village on the south side of Wood Island Harbor, extending from The Pool nearly to the eastern point of Fletcher Neck. There are wharves on each side of the entrance, with about 12 feet (3.7 m.) at the one on the western side.

A **towboat** is stationed here, and gasoline and some provisions are obtainable. A pilot for the river can be had here.

Washman Rock, bare at half tide, is near the end of a reef which extends nearly 600 yards southeastward from the eastern point of Fletcher Neck, and is marked by a black spindle with cask.

Dansbury Reef is a small ledge with 5 feet (1.5 m.) over it, lying ½ mile southward of Wood Island Lighthouse. It is marked on its southeast side by a red buoy. There are several shoal spots between the reef and Wood Island, and strangers should not enter between them.

A number of rocks and ledges extend ⅝ mile southeastward of **Fletcher Neck.** Vessels will avoid these dangers by keeping Wood Island Lighthouse bearing northward and westward of 350° true (N. ½ E. mag.).

Goosefair Bay is a shallow cove, full of rocks and ledges, lying 2 miles northeastward of Goat Island Lighthouse.

Stage Island Harbor is a small slough, ½ mile northeastward of Goat Island Lighthouse, that is used by boats and small local craft. The entrance is about 50 yards wide between reefs, making northward from Cape Island and southward from Little Stage Island and is not safe for strangers.

Cape Porpoise Harbor (chart 1205) is an anchorage which has been dredged to a width of 500 to 600 feet, with a depth of 15 feet (4.6 m.), lying between the islands and rocks northwestward of Goat Island Lighthouse. The channel at the entrance has been straightened by cutting off the points of ledges and has a width of 190 feet and depths of 18 to 35 feet (5.5 to 10.7 m.). Small local craft sometimes anchor on the flats on the west side of the dredged anchorage and lie aground in the soft mud at low water. Vessels of over 100 tons should not attempt to enter the harbor for refuge on account of the small area of the anchorage; it is advisable for strangers to run either for Portland or Portsmouth if caught in a blow. Vessels of 18-foot (5.5 m.) draft loaded with coal have been brought into the harbor to the wharf on the west side of Bickford Island.

The Old Prince is a ledge with 5 feet (1.5 m.) over it lying 400 to 500 yards southeastward of Goat Island Lighthouse; the ledge is marked by a red bell buoy placed about 200 feet south-southwestward from it, and the buoy should be kept fairly close aboard to avoid the southeast point of the ledge making out from Folly Island. **Folly Island** is grassy and marked by a shanty. Folly Island beacon, a large white tripod, is placed on the partly bare ledge extending eastward from Folly Island; the beacon lies 180 feet from the westerly edge of the dredged channel.

Goat Island Lighthouse is a white tower with a covered way to a dwelling. The light is fixed white, 38 feet (11.6 m.) above the water, and visible 10 miles. The fog signal is a bell (one stroke every 20 seconds).

A red spindle is placed on a ledge bare at low water, and lies 370 feet west-southwestward of Goat Island Lighthouse and 30 feet from the easterly edge of the channel. About 300 yards above the lighthouse the west side of the channel is marked by a black buoy, placed on the northeast side of **Lobster Rock,** which has 4 feet (1.2 m.) over it. Abreast the buoy is an islet, nearly awash at high water, marked by a beacon (pile of stones), which lies 275 feet northeastward of the easterly edge of the channel.

Approaching Cape Porpoise Harbor, give the islands northeastward of the entrance a berth of ½ mile and the shore southwestward

of the entrance a berth of 1½ miles. Steer for Goat Island Lighthouse on a 330° true (N. by W. ¼ mag.) course until up with The Old Prince bell buoy, which lies 600 yards from the lighthouse. Pass close westward of the bell buoy, steer about 315° true (NNW. ⅝ W. mag.), and pass 100 to 150 feet westward of the red spindle abreast the lighthouse and 50 to 60 feet eastward of the black buoy lying 300 yards above the lighthouse. Continue the course about 150 yards above the buoy and then steer 347° true (N. ¼ E. mag.) for the wharf on the west side of Bickford Island. Anchor on or a very little westward of this line, keeping 200 yards or more southward of the wharf.

In 1926 the wharf was old and in a poor state of repair. It is used mostly by fishing vessels, and at the northern end is bare at low water. An electric railway runs to the wharf. Gasoline is obtainable from a float alongside the wharf, and provisions in **Cape Porpoise,** a village near the wharf.

Southwestward of Goat Island Lighthouse is an area of broken ground, with depths of 3¼ to 5½ fathoms (5.9 to 10 m.), which has not been closely examined. Its southern end is a 5½-fathom (10 m.) spot lying 1¼ miles from shore and 2¼ miles south-southwestward of Goat Island Lighthouse. The lighthouse bearing 0° true (N. by E. ½ E. mag.) leads eastward of the broken ground.

Kennebunk River, about 2½ miles westward of Goat Island Lighthouse, is the approach to the summer resort of **Kennebunkport,** just inside its entrance. The beach for ¾ mile eastward and 1¾ miles westward of the entrance is lined with hotels and summer houses. The entrance to the river is between two stone jetties, the easterly one being marked by a fixed white light on the end. In 1926 there was a depth of about 4 feet (1.2 m.) at low water across the bar at the entrance, and in a narrow channel inside to the wharves just below the bridge, 1 mile above the entrance.

The channel is sometimes marked by stakes inside the entrance, but local knowledge is necessary to carry the best water across the bar and inside. The deepest draft entering is an occasional vessel of 12 feet (3.7 m.) draft, loaded with coal. The river is frequented mostly by small pleasure craft. The bridge 1 mile above the entrance has a draw 46 feet wide. Gasoline and provisions are obtainable at the wharves near the bridge. Kennebunkport has railroad and electric-road communication.

Fishing Rock, bare at half tide and marked by a black spindle, lies ⅝ mile southwestward of the entrance of Kennebunk River. About 600 yards eastward of the spindle is a black buoy, placed off the southeast side of rocks that are awash at lowest tides. A rock with 9 feet (2.7 m.) over it lies ½ mile southward of Fishing Rock spindle, and is marked on its south side by a black buoy.

Oak Reef extends ½ mile south-southwestward from the shore west of Kennebunk River entrance. Near the south end of the reef is a black spindle, which lies about ⅜ mile west-northwestward of Fishing Rock spindle.

Kennebunk Beach is a post village extending 1 mile westward of Kennebunk River entrance. Ledges extend ¾ mile from shore southward of the village. There is a prominent yellow bluff at the western end of Kennebunk Beach.

Wells Beach extends 6½ miles southwestward from Kennebunk Beach to the village of **Ogunquit.** The beach southward of **Webhannet River** has numerous cottages. The principal outlying dangers are Fishing Rocks, and **Bibb Rock,** which is bare at low water and lies ⅞ mile from shore and 3½ miles north-northeastward of Bald Head Cliff and marked by a horizontally striped buoy. The principal marks are a standpipe a little northeastward of **Wells,** the cupola of the town hall at Wells, a church spire 1¼ miles southwestward of Wells, and a standpipe at Ogunquit. There is an inlet abreast the village of Wells, said to have a depth of 2 to 3 feet (0.6 to 0.9 m.) at low water, across the bar to a fish wharf inside, and used by small local boats at half tide or higher. It is unsafe for strangers.

Bald Head Cliff is a high, prominent point 3 miles north-northeastward of Cape Neddick. It is marked by a hotel and outbuildings not prominent until close to.

Cape Neddick Harbor (chart 228) is a foul bight ¾ mile northward of Cape Neddick. It is sometimes used as an anchorage by local boats, but is exposed, has many dangers, and should not be used by strangers. Buoys mark the entrance, but the dangers inside are unmarked.

Cape Neddick is a prominent headland extending out about 1 mile from the main shore; off its eastern end is a small, high islet, called **Cape Neddick Nubble,** on which is Cape Neddick Lighthouse. **York Beach** is a large village and much-frequented summer resort in the bights northward and southward of the cape. There are no wharves.

Cape Neddick Lighthouse is a white conical tower. The light is fixed red, 88 feet (26.8 m.) above the water, and is visible 14 miles. The fog signal is a bell (one stroke every 15 seconds).

Boon Island, lying 5¾ miles southeastward of Cape Neddick, is a small, low, rocky islet marked by Boon Island Lighthouse, an important offshore aid. A black spindle is placed 250 yards westward of the lighthouse. The island is surrounded by deep water, but there are numerous detached ledges in the vicinity. The easternmost is **Boon Island Ledge,** 2¾ miles eastward of the lighthouse; it is bare at extreme low water and marked at the south end by a red gas and whistling buoy. Vessels should not pass between this buoy and the lighthouse; and if passing westward of the lighthouse, should give it a berth of 1¾ to 3½ miles to insure a depth of over 5 fathoms (9.1 m.).

Boon Island Lighthouse is a gray granite conical tower connected with dwelling. The light is fixed white, 133 feet (41 m.) above the water, and visible 18 miles. The fog signal is a bell, sounded in answer to signals.

Mount Agamenticus, a smooth oval ridge 673 feet (205 m.) in height, lies 5½ miles northwestward of Cape Neddick and is a prominent landmark in cruising along this section of the coast.

York Harbor.—This harbor (chart 228), 2½ miles southwestward of Cape Neddick and 5½ miles northeastward of Portsmouth Harbor entrance, is the approach to the town and summer resort of York Harbor, on the north side just inside the entrance. It is used by many fishing boats and small pleasure craft and an occasional

vessel loaded with coal or bricks, the deepest draft being 12 feet (3.7 m.). There is a depth of 10 feet (3 m.) in the channel through the entrance and for nearly 2 miles above, but the entrance is crooked and narrow and leads between rocks, bare and submerged, on either side. The width of the channel, with a depth of 10 feet (3 m.), is only 150 feet in several places in the entrance. The channel is buoyed in the entrance and easily entered by small craft in clear weather with the aid of the chart. There are no marks above the entrance.

The most important landmark in approaching York Harbor is the large brick hotel with two flagstaffs on Stage Neck. A white church spire at York Village, one mile inland also is prominent.

Western Point, at the entrance, is bare and rocky, while **East Point** has houses built out to the end.

Black Rocks are two bare rocks on the north side of York Harbor at the entrance. A red buoy lies southward of them. **Stage Neck** is the name given to the peninsula, ¼ mile long on the north side, a little inside the entrance. A rock with a depth of 3 feet (0.9 m.) lies 100 yards southward of the eastern end of Stage Neck and is marked by a red buoy. **Rocks Nose** is a bare ledge extending 150 yards northeastward from the shore on the south side, southward of the middle of Stage Neck.

York Harbor is a town and summer resort on the north side of York River. There are depths of 8 to 9 feet (2.4 to 2.7 m.) at the wharves in the bend northward of the western end of Stage Neck. Gasoline and provisions are obtainable. There is good anchorage off the wharves in 10 to 20 feet (3 to 6.1 m.). York Harbor has communication by railroad and electric roads.

York River, above York Harbor.—This section of the river is crossed by four bridges within a distance of 3½ miles of the entrance, all having draw openings, the least width of openings being 32 feet. Local residents report that these bridges have not been opened for several years. The principal traffic up the river consists of small fishing and pleasure boats.

Directions, York Harbor.—Vessels approaching York River entrance should give the shore northward or southward a berth of at least ¼ mile, or they can shape the course to the bell buoy 1 mile off the entrance. From the bell buoy steer 298° true (NW. ⅛ W. mag.) for 1 mile to a position midway between a red and a black buoy at the entrance. Then steer 268° true (WNW. ¾ W. mag.) for ⅜ mile, passing 50 yards southward of a red buoy and to a position 70 yards northward of the northerly bare rock of Rocks Nose. Then steer 245° true (W. ⅞ N. mag.), passing close southward of a red buoy. Pass 50 yards westward of the western end of Stage Neck and follow the northwest side of Stage Neck at a distance of 70 yards to the wharf abreast the hotel; then head for the wharves on the north side or anchor in the channel off the wharves.

Between Cape Neddick and the entrance to Portsmouth Harbor, a distance of 8 miles, the shore has no marked indentations except York River. Lying offshore 2½ miles are two dangerous ledges: **York Ledge,** the northernmost of these, lies southeastward of York River entrance and is marked by a spindle. **Murray Ledge,** 1½ miles southwestward of York Ledge, has a least depth of 1 fathom (1.8 m.)

and is marked by a horizontally striped buoy. The bottom is very broken between these ledges and the shore, and vessels are advised to pass outside of the whistling buoy 1 mile outside the ledges. Broken ground, with depths of 5¼ to 6½ fathoms (9.4 to 10 m.) extends 2 miles south-southeastward of Murray Rock buoy.

PORTSMOUTH HARBOR

(chart 0329), lying 37 miles southwestward of Cape Elizabeth and about 25 miles northward of Cape Ann lighthouses, is the only harbor of refuge for deep-draft vessels between Portland and Gloucester. The entrance is marked by Whaleback and Portsmouth Harbor Lighthouses, and the principal outlying dangers are marked, so that no difficulty should be experienced when entering in clear weather, either in the daytime or at night. Portsmouth Harbor is formed by the mouth of Piscataqua River, and is the approach to the cities of Portsmouth and Dover and the towns of Newcastle, Kittery, South Newmarket, and Exeter; on the north side of the harbor, opposite Portsmouth, is the United States navy yard.

Portsmouth has some trade in large coasting vessels and barges, principally in coal. Creosote is imported in large tank steamers. The depths in the harbor are sufficient for the largest ships, and the harbor is open throughout the year.

Prominent objects.—In approaching Portsmouth the large hotel at the west end of Newcastle Island is prominent. Other landmarks are the Naval Prison (stone structure on Seavy Island), the lighthouses, and the white buildings of the Coast Guard station on Wood Island.

Portsmouth Harbor Lighthouse, on the northeast end of Newcastle Island, is a white tower attached to a brown building on a white foundation. It is a fixed red light, visible 13 miles. The fog signal is a bell sounding once every 10 seconds.

Whaleback Lighthouse is a gray conical tower connected to red fog-signal house. The light is group flashing white (flash 0.4 second, eclipse 1.4 seconds, flash 0.4 second, eclipse 7.8 seconds), 59 feet (17.9 m.) above the water, and visible 13 miles. The fog signal is a reed horn (blast 5 seconds, silent 25 seconds).

A number of rocks and ledges, some of them bare at low water, extend about 1½ miles eastward of Whaleback Lighthouse and to a distance of ¾ mile from the shore. They are marked by a red buoy on the east side and by a whistle buoy on the southwest side.

Little Harbor is a good anchorage for small craft and vessels of about 10-foot (3.0 m.) draft, and lies on the west side of the entrance to Portsmouth Harbor, ¾ mile westward of Whaleback Lighthouse. Vessels should not attempt to enter in bad southeasterly weather, when the sea breaks across the entrance. The entrance is between two breakwaters, the ends of which are marked by lights, and two buoys mark the entrance outside the breakwaters. Inside the breakwaters an anchorage basin has been dredged 2,000 feet long and 600 feet wide, with a depth of 11 feet (3.4 m.) or more, and is marked on its north side by red buoys. There is room only for very small craft to anchor in the channel above the inner red buoy. The Wentworth is a large white hotel on the north side of the harbor.

To enter Little Harbor, from a position 600 yards southwestward of Kitts Rocks whistling buoy steer 303° true (NW. ¼ N. mag.) for the cupola of the Wentworth showing just northward of the lights in vertical line on the end of the south breakwater. Pass between the two buoys at the entrance, pass about 100 yards southwestward of the light on the end of the north breakwater and midway between it and the lights on the south breakwater, and pass midway between the latter light and the red buoy lying 400 feet northeastward of it. Then steer 269° true (WNW. ¾ W. mag.) and anchor 200 to 400 feet southward of the line of red buoys.

A narrow thorofare, bare at low water, connects the western end of Little Harbor with Portsmouth Harbor between **Marvin** and **Goat Islands.** It is crossed by two bridges and is little used.

Pepperell Cove is on the eastern side of the harbor, northeastward of Portsmouth Harbor Lighthouse, and on the north side of **Fishing Island** (grassy, with two shanties). It has been dredged to a depth of 12 feet (3.7 m.) for an anchorage, and is used by many small coasting vessels and yachts. A red buoy marks the south side at the entrance. **Kittery Point** is a village at the head of the cove. There is a wharf, nearly bare at low water, on the northeast side of the cove abreast the village.

Newcastle is a village on the south side of the harbor and the north end of **Newcastle Island.** It is reached from Portsmouth by crossing several bridges which connect the islands on the south side.

Portsmouth is on the south side of Piscataqua River, about 4 miles above the entrance to the harbor. It is a city of about 14,000 inhabitants and there are depths from 20 to 30 feet (6.1 to 9.1 m.) at the wharves. There is no passenger service by water, but there is a small amount of coastwise trade and an occasional foreign arrival.

The United States navy yard is on **Seavy Island,** on the north side of the river opposite Portsmouth. It is connected with Kittery, on the north shore, by a fixed bridge. The channel northeastward of Seavy Island has several dangers and is little used except by a few boats going to the navy yard.

Kittery is a town on the north side of Piscataqua River opposite Portsmouth. There are landings for small craft and one wharf to which small vessels go. The approach to the wharves is between Badgers and Squash Islands on the northwest and Pumpkin Island on the southeast and requires local knowledge for anything except small craft.

Bridge.—Kittery and Portsmouth are connected by a steel highway bridge with a lift span. There is a horizontal clearance of 260 feet (79 m.) and a vertical clearance of 150 feet (46 m.) above high water when lifted. There is a 19-foot (5.8 m.) clearance at high water when span is closed. There is a tide gauge on the northern pier which indicates the clearance in feet.

The signal for opening this bridge is 4 long blasts of the whistle which will be answered by 3 blasts of the siren on the bridge.

Piscataqua River above Portsmouth (chart 229).—The river above Portsmouth forms the approach to Cocheco, Bellamy, Oyster, Lamprey, and Exeter Rivers, the towns of Durham, Newmarket, and

Exeter, and the city of Dover, all on the railroad. It has ample depth for 3½ miles above the bridge at Portsmouth to the fork, and the principal dangers are buoyed to this point. The channels in the several branches are narrow and crooked and shoal at the heads, and local knowledge is necessary to keep in them. Some of them have been improved by dredging. There is little business by water above Portsmouth, except in small craft and an occasional cargo of coal, the deepest draft being about 10 feet (3 m.) at high water. The tidal currents are very strong in places. Pilots or towboats can be obtained at Portsmouth.

A railroad drawbridge crosses Piscataqua River just above the wharves at Portsmouth. It has a lift draw on the east side of the river, with an opening 57 feet wide. There are several openings for small craft without masts underneath the bridge.

Another drawbridge crosses the western branch of Piscataqua River at Dover Point, 3½ miles above the first bridge. It has a center-pier draw, northerly opening 49 feet, southerly opening 48 feet wide, and a headroom of 8 feet (2.4 m.) at high water when closed. A transmission line is carried across the river by means of high towers on either bank.

Cocheco River has a depth of about 3 feet (0.9 m.) in a narrow, crooked, unmarked channel to the city of **Dover,** 10 miles above Portsmouth. Local knowledge is necessary to keep in the channel. There are several factories at Dover, but little business by water.

In 1926, 8 feet (2.4 m.) was about the maximum draft that could be carried to Dover.

Bellamy River has a depth of about 4 feet (1.2 m.) in a narrow, crooked, and unmarked dredged channel to within ¼ mile of a woolen mill at Dover, above which it is shoal to the mill. Local knowledge is necessary to keep in the channel. It is seldom used.

Oyster River has a narrow, crooked, and unmarked channel, bare at low water, to the village of **Durham,** 8½ miles above Portsmouth. It is seldom used.

Lamprey River has a depth of about 4 feet (1.2 m.) in a narrow, crooked, and unmarked channel to the village of **Newmarket,** 12 miles above Portsmouth. It has little business by water.

Exeter River has a depth of about 4 or 5 feet (1.2 to 1.5 m.) in a narrow, crooked channel, dredged in places, to the town of **Exeter,** 16½ miles above Portsmouth. The approach to the river is through **Little Bay** and **Great Bay,** and the channel through these bays is partially marked by buoys and sometimes by bush stakes. Local knowledge is necessary to keep in the channel through these bays and the river above. There is little business by water.

In 1926, 10 feet (3 m.) was about the maximum draft that could be carried to Exeter.

Pilots.—Pilotage into Portsmouth Harbor is compulsory for all vessels engaged in foreign trade, but not for vessels engaged in the domestic trade. There are licensed pilots for Portsmouth Harbor and Piscataqua River; sailing vessels, if bound to the wharves at Portsmouth or any of the towns on the Piscataqua River or its branches, take a towboat from the anchorage. A pilot to the anchorage is not necessary in clear weather when the aids can be seen. The

towboat captains are usually licensed pilots. Vessels desiring a pilot should signal the Coast Guard station at Wood Island.

The pilot fees are $3 per foot maximum draft inward, and $2 per foot maximum draft outward for foreign vessels. Lump sum rates are charged for coastwise vessels.

Towboats are on the lookout for vessels expected to arrive, and if the tide is slack will tow alongside the wharves without any delay. A vessel desiring a towboat while outside Whaleback Lighthouse can obtain one by making the usual signal (flag in rigging). From the anchorage, steamers generally take a towboat when going to the wharves or to the navy yard.

Anchorages.—The anchorage for large vessels is anywhere on the east and north sides of the channel between Wood Island (the island north of Whaleback Lighthouse) and Clark Island (the small island on the north side about ¾ mile above Fort Point) in 8 to 11 fathoms (14.4 to 20.1 m.). With a southerly wind the best anchorage is above Fort Point on the south side of the channel, in 8 to 10 fathoms (14.4 to 18.3 m.), bottom generally clay. There is no anchorage above Clark Island. See also the description of Little Harbor and Pepperell Cove preceding. Yachts and small coasting vessels generally anchor in Pepperell Cove.

Caution.—There is a submarine cable extending across the channel in a west-northwest direction from Wood Island. Vessels should not anchor in the vicinity of the cable.

Supplies.—Coal can be obtained at the wharves at Portsmouth, water from the towboats or alongside the wharves; gasoline, provisions, and a limited supply of ship-chandler's stores are obtainable in Portsmouth. Fuel oil can be obtained from tank cars only and with prior arrangement.

Repairs.—There are no facilities for dry-docking vessels in Portsmouth with the exception of the large graving dock at the navy yard. Vessels requiring repairs usually go to Portland or Boston. There are machine shops in Portsmouth, and minor repairs to machinery can be made.

Storm-warning displays are made at Portsmouth, the navy yard, and Wood Island.

Ice.—In ordinary winters Portsmouth Harbor is free from ice, but during severe winters there is considerable drift ice which comes down the river with the ebb current; it is seldom an obstruction to navigation and never interferes with vessels at anchor below Clark Island.

Currents.—The tidal currents have considerable velocity and require special care. The predicted times of slack water at Portsmouth Harbor entrance (Whaleback Lighthouse) for every day in the year are given in the Atlantic Coast Current Tables. It is slack water about 2 hours after high and low water at Portland, and the duration of the stand is about 10 minutes. The current attains its maximum velocity about 1 hour before high and low water at Portland. The mean velocity of the flood and ebb current about Portsmouth Harbor Lighthouse is about 3 knots; but during spring tides it is much greater, probably 6 knots.

Tides.—The mean rise and fall of tides is about 8 feet (2.4 m.) at Portsmouth and about 6½ feet (2.0 m.) at Dover Point.

DIRECTIONS, PORTSMOUTH HARBOR

The broken ground off the entrance to Portsmouth Harbor, and the main channel in the harbor as far as Clark Island, have been examined by means of the **wire drag.** The outer limit of the dragged area off the entrance is about 1½ miles eastward of Boon Island Ledge gas and whistling buoy and 4 miles eastward of the Isles of Shoals. This area is a part of the dragged section extending, from a point about 6½ miles southwestward of Isles of Shoals, northward to Cape Elizabeth. The dangers close along the shore were not covered with the wire drag.

From northeastward.—The channel westward of York Ledge spindle and Murray Rock buoy is safe only for small craft with a smooth sea, and all strangers are advised to pass outside of these dangers. Directions to York Ledge whistling buoy from northward are given on page 38. The following courses lead in a least depth of 6½ fathoms (11.9 m.), which is found on spots 2½ miles northeastward of Isles of Shoals. From York Ledge whistling buoy, steer 198° true (SW. by W. mag.) for 2⅜ miles, heading for the tripod beacon on Duck Island, at the north end of Isles of Shoals, until 2 miles from it and Whaleback Lighthouse bears 286° true (NW. by W. ¼ W. mag.); then steer 277° true (WNW. mag.) for 4⅜ miles to a position ¼ mile southward of Kitts Rocks whistling buoy, and pass ⅜ mile westward of it.

From southward.—Small vessels of 12-foot (3.7 m.) or less draft can approach the entrance of Portsmouth Harbor from southward by following the shore at a distance of 1 mile or more. They should avoid Hampton Shoal Ledge, and pass outside of Gunboat Shoal bell buoy; or the following course can be used by vessels of the deepest draft. From White Island whistling buoy, lying 1¾ miles southwestward of Isles of Shoals Lighthouse, steer 340° true (N. ⅜ W. mag.) for 6½ miles, passing ½ mile eastward of Gunboat Shoal bell buoy, and to a position ⅜ mile westward of Kitts Rocks whistling buoy.

Kitts Rocks to Portsmouth.—The following courses lead over a least depth of about 36 feet (11 m.) southwestward of Whaleback Lighthouse, and close westward of a rocky spot with a depth of 34 feet (10.3 m.), eastward of Portsmouth Harbor Lighthouse. Strangers in deep-draft vessels should not go above the anchorage without a pilot or towboat. Pass ⅜ mile westward of Kitts Rocks buoy and steer 344° true (N. mag.) heading a little to the right of Portsmouth Harbor Lighthouse, for ¾ mile, passing a little over ¼ mile westward of Whaleback Lighthouse, and to a position 300 yards westward of the red buoy northwestward of the lighthouse. Then steer 0° true (N. by E. ⅜ E. mag.) for ¾ mile to a position 400 yards eastward of Portsmouth Harbor Lighthouse, and anchor on the north side of the channel northward of the lighthouse or in Pepperell Cove, according to draft.

If going to Portsmouth pass 250 yards northward of the black buoy northward of the lighthouse, and steer 264° true (W. ⅞ N. mag.) for 1⅛ miles, passing 150 yards southward of Clark Island and midway between a black gas buoy and the south side of Seavy Island; the current in this vicinity is strong and care should be taken not to

be set on the ledge on the south side of the channel, marked by the black gas buoy. Round the southwest point of Seavy Island at a distance of 100 yards and steer 325° true (N. by W. ¾ W. mag.) for ⅜ mile to a position 250 yards north-northeastward of black buoy No. 11, then steer 272° true (WNW. ½ W. mag.) to the wharves of Portsmouth, passing 125 yards southward of a light and a spindle marking the shoals between Seavy and Badger Islands.

ISLES OF SHOALS

This group of islands (Chart 330 or 1206) lies from 5 to 6 miles offshore southeastward of Portsmouth Harbor entrance. It comprises seven islands and a number of rocks and ledges. The group is about 3 miles long in a northeasterly direction and is marked at its southwest end by Isles of Shoals Lighthouse. There are several channels between the islands, but they are used only by local fishermen, who sometimes seek shelter there in easterly winds.

Isles of Shoals are frequented mostly by the people connected with the Coast Guard station and lighthouse, a few fishermen, and summer visitors. In the summer season of 1926 there was a small steamer making daily trips from Portsmouth to the Isles of Shoals. Hotel accommodations are available during the season.

Storm-warning displays are made.

Gosport Harbor is well protected except from westerly winds and is considerably used as an anchorage by local fishermen and sometimes by small coasting vessels and yachts.

Duck Island, the northernmost of the group, is low, rocky, and surrounded by ledges, and should be given a berth of ½ mile. There is a large skeleton tripod beacon near the middle of the island.

Appledore Island, the largest of the group, lies about 1 mile southwestward of Duck Island. It is high and has several summer cottages and hotels near the middle of the island, and a landing on its western side. The channel between Duck and Appledore Islands has depths of 4½ to 15 fathoms (8.2 to 27.4 m.), irregular bottom. There is a small 8-foot (2.4 m.) spot marked by a black buoy 300 yards northwestward of the island.

Smuttynose Island lies southward of Appledore Island, with a narrow channel between them having a depth of 20 feet (6.1 m.). There are several houses near the western end of this island and a small cove, **Haley Cove,** where boats lie aground at low water.

Cedar Island is southward of Smuttynose, and is connected with it by a breakwater; westward of this breakwater is **Gosport Harbor,** a small anchorage used by fishermen and others during easterly winds. Another breakwater has been built between Cedar and Star Islands.

Star Island, westward of Cedar Island, has on its northern side a hotel, several houses, and a steamboat landing with a depth of about 18 feet (5.5 m.).

Lunging Island is a low, bare, rocky islet, surrounded by ledges and lying ½ mile westward of Star Island. The channel between these islands is obstructed by rocks which are marked by a buoy.

White Island is the southernmost of the group and is marked by Isles of Shoals Lighthouse; ledges extend ¼ mile southwestward and westward from the island.

Isles of Shoals Lighthouse is a white conical tower. The light is flashing white and red (white flash 3.7 seconds, eclipse 11.3 seconds, red flash 3.7 seconds, eclipse 11.3 seconds), 82 feet (25 m.) above the water, and visible 15 miles. The fog signal is an air siren (blast 3 seconds, silent 27 seconds).

Anderson Ledge, bare at half tide and marked by a spindle, lies 1 mile east-southeastward of Isles of Shoals Lighthouse, and is the farthest outlying danger. The ledge is about 200 yards in diameter and has good water around it.

Cedar Island Ledge shows bare at low water and lies 3/8 mile southeastward from Cedar Island; it is about 300 yards long east and west, and is surrounded by deep water.

Remarks on approaching and passing Isles of Shoals.—The islands can be seen a distance of 10 miles on a clear day, the houses being most prominent, and vessels passing westward can avoid all danger by giving them a berth of 1/2 mile. Passing eastward, care should be taken to avoid Cedar Island and Anderson Ledges; giving the islands a berth of 1 1/4 miles leads well clear. Isles of Shoals Lighthouse covers the entire horizon, but the houses on the islands northward shut the light out occasionally when approaching the islands from that direction. A stranger desiring to land on the islands should be guided by chart 330.

COAST FROM PORTSMOUTH TO NEWBURYPORT

From Portsmouth Harbor entrance to Hampton Harbor, a distance of about 10 miles, the coast has a general southwesterly trend, with no marked indentations. It presents the appearance of a succession of sand beaches separated by ledges extending out about 1/2 mile, with occasional hotels and summerhouses back of the high-water line.

Wallis Sands, 2 3/4 miles southwestward of Whaleback Lighthouse, is marked by the yellow building of a Coast Guard station. At the southern end of Wallis Sands, **Foss Ledges,** partly bare at low water, extend 1/2 mile offshore, and are marked by a black buoy at the outer end.

Rye Harbor is a small cove, almost entirely bare at low water. About 5/8 mile southwestward of the cove is Rye Beach Coast Guard station. **Rye Beach** is a summer resort extending about 1 mile southwestward from the station. At the southern end of the beach, **Rye Ledge,** partly bare at high water, extends over 3/8 mile from shore.

Little Boars Head is a yellow bluff 7 miles southwestward of Whaleback Lighthouse. A summer resort of the same name extends over 1/2 mile northeastward from the bluff. A bare ledge lies 3/8 mile off the bluff.

Great Boars Head is a bluff point making out 1/4 mile at the southern end of Hampton Beach and 9 1/2 miles southwestward of Whaleback Lighthouse. The summer resort of **Hampton Beach** extends northward and southward from the point.

Landmark.—Standing on Great Boars Head is a prominent tall black standpipe which is the most conspicuous mark on this section of the coast.

Hampton Harbor, or **Hampton River,** a shallow stream used only by very small local craft, lies 1½ miles southwestward of Great Boars Head. The entrance is not safe for strangers. There is a trestle across the mouth of the river, under which small craft can pass. A bar and ledges make off from the river to **Old Cellar Rock.** The latter is a reef, ¾ mile long and partly awash at high water, the northeast end of which lies ⅞ mile from shore. **Hampton Shoal Ledge,** with 19 feet (5.8 m.) over it, lies 2½ to 2¾ miles from shore off Hampton River and 131° true (SE. by S. mag.) from Great Boars Head. It is unmarked.

From Hampton Harbor the coast extends 4½ miles in a southerly direction to the entrance of Merrimack River and is known as **Salisbury Beach. Cushing,** a summer resort, extends along the beach from the Coast Guard station southward to the entrance of the river, a distance of nearly 2½ miles. A ledge, with a reported depth of 3 feet (0.9 m.) over it, lies ¾ mile offshore eastward of the station, and is marked at its northeast end by a red buoy.

MERRIMACK RIVER AND NEWBURYPORT HARBOR

Merrimack River is the largest and most important river in the eastern part of Massachusetts. It is the approach by water to the cities of Newburyport and Haverhill, and the towns of Amesbury, Merrimacport, Groveland, and Bradford, and is used by vessels of 10-foot (3 m.) draft at high water up to Haverhill and about 16-foot (4.9 m.) draft at high water to Newburyport. The river is seldom entered for refuge, but the towns on its banks have some coastwise trade, mostly in coal.

The entrance (Newburyport Harbor, chart 331) is obstructed by a shifting bar, with 9 to 12 feet (2.7 to 3.7 m.) over it (according to the condition of the bar), which is dangerous to cross in heavy weather. It is marked by Newburyport Lighthouse on its southern side and two range lights on its northern side, in adition to the buoys. The range does not always lead in the best water across the bar and within the jetties, and the buoys should be followed. Jetties with an opening 1,000 feet wide between the ends have been built from both points at the entrance out to the bar.

Channel.—After crossing the bar, Merrimack River has a least depth of about 12 feet (3.7 m.) at low water for a distance of 7 miles above the entrance to a point ½ mile above the entrance of Powow River, except on a bar 2½ miles inside the entrance, where the depth is only 10 feet (3 m.). From that point to Haverhill, about 18 miles above the entrance, the river has been improved by dredging a channel 150 feet wide and 7 feet (2.1 m.) deep at low water.

Newburyport Harbor Lighthouse, on the south side of Merrimack River entrance, is a white conical tower. The light is fixed white, 50 feet (15.2 m.) above the water, and visible 12 miles.

Newburyport is a city on the south bank of the river 3 miles above the entrance. It has a considerable trade, mostly in coal. The deepest draft going to the town is about 16 feet (4.9 m.), and the usual draft does not exceed 14½ feet (4.4 m.); vessels always enter at high water. There are depths of 12 to 15 feet (3.7 to 4.6 m.) at the wharves. It is on the Boston & Maine Railroad. A high yellow chimney is the most prominent mark from outside.

Amesbury is a town on the **Powow River** 1 mile above Merrimack River and 7½ miles above Merrimack River entrance.

Merrimacport is a village on the north side of Merrimack River about 10 miles above the entrance.

Groveland is a town on the south side of the river 15 miles above the entrance. There is a coal wharf to which vessels of 6 to 9 feet (1.8 to 2.7 m.) draft go.

Haverhill is a city on the north bank at the head of navigation on Merrimack River, 18 miles above the entrance. It has some trade, mostly fuel oil brought up in barges, the deepest draft being 10 feet (3 m.) and usual draft 6 to 8 feet (1.8 to 2.4 m.). Some of the wharves have depths of 10 feet (3 m.) or more. **Bradford** is a town opposite Haverhill, with which it is connected by a highway bridge.

Bridges.—Merrimack River is crossed by eight bridges between Newburyport and the head of navigation at Haverhill. All except the two upper have draw openings. The following are their distances above the ends of the jetties at the entrance, the least width of the draw openings, and the clear height above mean high water when closed:

Highway bridge (Newburyport), 3.2 miles, 76 feet (north) 71 feet (south), 13 feet (4 m.).

Boston & Maine Railroad, 3.3 miles, 69 feet (north) 64 feet (south), 13 feet (4 m.).

Deer Island (North Channel, highway), 5.3 miles, 54 feet, 8 feet (2.4 m.).

Rocks (highway), 11.3 miles, 54 feet, 17 feet (5.2 m.).

Groveland (highway), 14.7 miles, 64 feet, 14.5 feet (4.4 m.).

Haverhill (highway), 17.2 miles, 78 feet, 24 feet (8.8 m.). No draw.

Boston & Maine Railroad, 17.7 miles, no draw, headroom 37 feet (11.3 m.).

County bridge (highway), 17.8 miles, no draw, headroom 30 feet (9.1 m.).

The draws of all drawbridges will be opened at all times on a signal of two long blasts followed by two short blasts of a whistle or horn, except when a tram car or other vehicle is passing over the bridge or approaching it so closely that they can not be safely stopped before reaching the draw. The signal from the bridge shall be three long blasts if the bridge can be opened immediately or two long blasts if it can not be opened immediately.

Prominent objects.—In approaching the entrance of Merrimack River the most prominent objects are the cottages on both sides at the entrance, the large hotels at Cushing, 1½ miles north of the entrance, and a prominent tall yellow chimney, and other marks at Newburyport. The jetties are also distinguishing marks when close in, but care should be taken as the outer ends of these jetties are submerged at high tide. The Coast Guard lookout station and steel signal tower on the south spit are conspicuous.

Anchorage.—The usual and best anchorage in the river is in the channel just above Black Rock beacon and 1¼ miles inside the ends of the jetties in 13 to 16 feet (4 to 4.9 m.).

Pilots.—Strangers entering the river should take a pilot, and it is advisable for all vessels of over 9-foot (2.7 m.) draft to take one,

as the channel over the bar changes after heavy easterly gales and buoys may be missing or temporarily out of place. Vessels bound up the river above Newburyport should take a pilot or towboat. Pilots can be had by making signal outside the bar, standing off and on outside the whistling buoy until boarded. Pilotage is compulsory only for vessels engaged in the foreign trade, of which none enter.

Towboats.—There are no towboats available at Newburyport. The nearest towboat to be had is at Portsmouth. Towboat captains are usually licensed pilots.

Supplies.—Coal in large quantities can be obtained in Newburyport alongside the wharf or in lighters. The water in the river is fresh for about seven months in the year. Water and some shipchandlers' stores can be had at Newburyport, and gasoline and provisions at any of the towns on the river.

Repairs.—There are facilities for the repairs of launches and fishing boats only.

Storm-warning displays are made from a steel tower on the water front at Newburyport and from the Coast Guard station at the south jetty.

Freshets sometimes occur in the spring, but as a rule they do not interfere with navigation.

Ice seldom obstructs navigation as far as Newburyport; drift ice may sometimes interfere with vessels under sail, but steamers and vessels assisted by towboats can usually work their way through. Westerly winds carry the drift ice out to sea; during their continuance the flood current has no effect upon the local formations or drift ice. With the wind from any other direction, the flood current will prevent the drift ice from leaving the river.

Tides.—The mean rise and fall of the tides is about 8 feet (2.4 m.) at the entrance and about 5 feet (1.5 m.) at Haverhill at low river stage.

Directions, Merrimack River.—The river for a distance of 5½ miles above the entrance is shown on Chart 331. Above that point no chart is available. There is a whistling buoy outside the bar, and the channel across the bar is marked by a lighted range and by buoys, but is subject to some change, and strangers in vessels are advised to take a pilot. The lighted range does not always mark the best water, but the buoys are usually shifted to conform with changes in the channel. Small craft may enter with a smooth sea and on a rising tide by following the buoys. The river can not be entered with a heavy sea.

The outer ends of the jetties are submerged at high tide.

After crossing the bar, the channel is well marked and easily followed to Newburyport. A lighted range leads across a bar with a depth of about 10 feet (3 m.) just before reaching the wharves at Newburyport. The channel on the range leads between a red and a black pyramidal beacon with spindles marked "north pier" and "south pier" on the chart. The range shows about 50 yards to the right of a high yellow chimney, and a few feet to the left of a low square chimney farther back.

The channel between Newburyport and Haverhill is marked by buoys at the most difficult points, but it is narrow and crooked, leads

close to rocks in places, and local knowledge is necessary to keep in it. A pilot can be obtained at Newburyport.

Merrimack River can be entered by small craft from Plum Island Sound through **Plum Island River** (described below).

MERRIMACK RIVER TO CAPE ANN

From Merrimack River entrance the coast is sand dunes and trends southward for about 7½ miles to the entrance of Plum Island Sound and Ipswich River. There are many cottages on the south side of Merrimack River entrance, and scattered cottages southward along the beach. Inside the beach is Plum Island Sound and several tributaries forming the approach to villages at their heads.

Plum Island River forms a thorofare for small craft between Merrimack River, just inside its entrance, and Plum Island Sound. It is bare at low water and is said to have a depth of 7 or 8 feet (2.1 to 2.4 m.) at high water, but the deepest draft using it at high water with local knowledge is about 5 feet (1.5 m.). The channel is narrow and unmarked, does not always lead in mid-channel, and local knowledge is necessary for its navigation. It is crossed by a drawbridge having a draw opening 30 feet wide. The approach to the north end of the thorofare is between the east side of Woodbridge Island and the west end of a dike, covered at high water and unmarked.

Plum Island Sound (chart 1206) is the approach to several small rivers and villages and is frequented by many small craft. Vessels seldom enter. It had a depth in 1926 of about 5 feet (1.5 m.) at low water across the bar. The channel is marked by a lighted range and by buoys; it is subject to change, and the range does not always mark the best water. In 1926 the best water led across the bar on a westerly course, and then followed the south shore, as shown on the chart, until inside the bay. After crossing the bar, the channel through the bay has a least depth of about 7 feet (2.1 m.) to the entrances of Parker River and Plum Island River. The channel is marked by buoys, but is narrow and crooked, and difficult without local knowledge.

Ipswich River, emptying into the south end of Plum Island Sound from westward, has been improved by dredging in the lower end to a depth of 6 feet (1.8 m.). After entering the river there is a depth of about 4 feet (1.2 m.) to the town of **Ipswich,** on the railroad 2½ miles above the entrance. The channel above the entrance was marked in 1926 by bush stakes. The river is frequented by many pleasure craft. Gasoline and provisions are obtainable at Ipswich. **Little Neck** is a summer settlement on a prominent hill on the east side at the entrance of Ipswich River. It has a float landing.

In 1926, 10 feet (3 m.) was considered as the maximum draft that could be taken to Ipswich. There is little commerce by water.

Rowley River, emptying into Plum Island Sound near its middle, has a depth of about 2 feet (0.6 m.) to a landing near the railroad station of **Rowley,** 2 miles above the entrance. The village of Rowley is about 1 mile from the station.

Parker River, emptying into the north end of Plum Island Sound from westward, has a depth of about 5 feet (1.5 m.) in a very narrow

channel to a fixed bridge at **Newberry Old Town,** 1¾ miles above the entrance. The channel is marked by buoys, some of them private, but is difficult without local knowledge. Newbury Old Town is a summer settlement, and has a wharf just below the bridge, and several float landings. Gasoline and some provisions are obtainable in summer. It has communication by electric road with Newburyport. The river is navigable by small craft for several miles above Newbury Old Town, but is little used. All of the bridges are fixed.

Ipswich Bay is the bight between the northern point of Cape Ann and Plum Island Beach. Between these points it is about 6 miles wide and makes in southward about 3 miles. The bay is the approach to Ipswich, Essex, and Annisquam Rivers, and has a depth of 4 to 15 fathoms (7.3 to 27.4 m.), except in its southern and southwestern sides, where the shore should be given a berth of a little over 1 mile to avoid the shoals off the river entrances.

Essex Bay and **River** (Chart 243) lie midway between Ipswich and Annisquam Lighthouses. The entrance is over a shifting bar, over which a depth of about 3 or 4 feet (0.9 to 1.2 m.) can be carried at low water through a narrow buoyed channel. The river is navigable to the town of **Essex,** 4 miles above its mouth, through a narrow dredged channel about 6 feet (1.8 m.) deep at low water. Vessels of 12-foot draft (3.7 m.), with local knowledge, have been taken over the bar to an anchorage inside the entrance. By communication with Essex, arrangements may be made to have a pilot come off to a vessel outside the entrance; a pilot or towboat may be had at Gloucester. There are shipyards at Essex where wooden vessels are built, and otherwise there is no traffic except by local fishermen and launches. Local knowledge is necessary to follow the channel across the bar and in the river. Two houses on the east side at the entrance are prominent.

CAPE ANN

Under this heading is described Annisquam River and all of the cape eastward of this thorofare except Gloucester Harbor. It is shown on chart 243.

Cape Ann is very rocky and broken, 235 feet (72 m.) high in its highest point, and covered with numerous summer homes. There are also several granite quarries. Communication is by railroad to Gloucester and Rockport, and by motor stage entirely around the cape.

Annisquam River and **Canal.**—This is a thorofare leading from the eastern part of Ipswich Bay, north of Cape Ann, to Gloucester Harbor, on the south side of the cape. It has a depth of about 8 feet (2.4 m.) on a bar at the north end, and from inside the bar has been dredged where necessary to a depth of 8 feet (2.4 m.) at low water through to Gloucester Harbor. Some shoaling has taken place, and in 1926 a towboat master at Gloucester reported that he could get through with his boat drawing 7 feet (2.1 m.) only about 2 hours after low water. It is narrow and crooked, but is marked by buoys and beacons, and extensively used by many small craft and by vessels up to 10 feet (3 m.) draft. Strangers in small craft should have no trouble in going through with a smooth sea with the aid of chart 243; the best time is on a rising tide. The bar at the

north end can not be crossed in a heavy sea. The mean rise and fall of tides is about 9 feet (2.7 m.).

The thorofare is crossed by two drawbridges near the south end. The southerly is a red highway bridge at the entrance from Gloucester Harbor, and forms the most distinguishing mark by which the entrance may be recognized. It is a double-leaf lift, with a single opening 50 feet wide and a headroom of 7.5 feet (2.2 m.) at high water when closed. The railroad bridge 5/8 mile northward, has a single lift opening 40 feet wide and a headroom of 23 feet (7 m.) at high water when closed.

Vessels approaching from the northward and desiring a pilot or a towboat should signal the Annisquam Lighthouse.

Vessels approaching from the southward can obtain a pilot or towboat from Gloucester.

Annisquam Harbor Lighthouse, on the east side at the northern entrance to Annisquam River, is a white cylindrical tower with a covered way to a dwelling. The light is fixed red, 45 feet (13.7 m.) above the water, and visible 7 miles.

Annisquam is a village and summer resort on the east side of Annisquam River just inside its north end. There are several float landings, and anchorage for small craft in 5 to 8 feet (1.5 to 2.4 m.) in **Lobster Cove,** on the southeast side of the town, anywhere below the bridge. This harbor is frequented by numerous small craft in summer. A channel 6 feet (1.8 m.) deep and 50 feet wide has been dredged into Lobster Cove to near the bridge. The best water leads 50 feet southward of the stone beacon on the north side at the entrance and then leads the same distance off the wharves. There is a prominent yacht club with float landing on the point at the western entrance to Lobster Cove.

Mill River is a tributary of Annisquam River, on the east side, 3/8 mile southward of Annisquam. A channel 6 feet (1.8 m.) deep and 60 feet wide, with an anchorage basin of the same depth, has been dredged into the river for a distance of 3/4 mile from the entrance. There are numerous summer houses and float landings on the river, and it is used by many small craft in summer.

Directions, Annisquam River.—The following directions are intended only for small craft of 5-foot (1.5 m.) or less draft, with a smooth sea on the bar, and in clear weather. The best time is on a rising tide.

Steer for Annisquam Lighthouse on about a 165° true (S. mag.) course, and cross the bar between a red and a black buoy. Pass 100 yards westward of the lighthouse, 50 yards westward of Lobster Rock stone beacon 1/4 mile south-southwestward of the lighthouse, and pass Babson Point, the southwest end of Annisquam, at a distance of 100 yards to avoid rocks close to the point, sometimes marked by bush stakes. Pass 75 yards off the yacht club wharf and bring the club house astern on a 177° true (S. by W. mag.) course until 1/4 mile from it, then steer southwestward, pass 40 yards off the west side of Wheeler Point (covered with cottages), and close westward of the black beacon off Thurston Point.

Then steer south-southwestward for 300 yards close along the shore on the east, and pass close eastward of a red beacon. The channel then leads southwestward for 3/8 mile, passing close east-

ward of two red buoys and about 80 yards westward of the shore at Riverview (marked by many cottages). From the second red buoy, haul a little more southward to pass close westward of a black beacon, and then steer about 151° true (S. by E. ¼ E. mag.) for ¼ mile, and pass eastward of two red buoys off Wolf Hill.

From red buoy No. 10, swing in toward the shore slightly, then out around the black beacon. In 1926 this was the most difficult portion of the passage.

Then pass 125 feet off the end of the point on the east side and 50 feet southwestward of the black beacon No. 7 just southward of the point. Then steer 102° true (SE. by E. ½ E. mag.) for a little over ¼ mile, and pass 60 feet northeastward of the red beacon just north of the railroad bridge. After passing through the railroad bridge, the course in the channel is 174° true (S. ⅞ W. mag.) for ¼ mile to a position 75 feet westward of a black beacon, then 129° true (SE. ¾ S. mag.) to its outlet into Gloucester Harbor. The channel in the south end is well defined by the banks.

Bayview is a village on **Hodgkin Cove,** ¾ mile northeastward of Annisquam Lighthouse. There is a quarry and a long stone pier with a depth of 15 feet (4.6 m.) on the outer half of the southwest side, in a channel about 70 feet wide. The cove at the inner end of the pier on the northeast side has a depth of about 2 feet (0.6 m.) at the entrance and 3 or 4 feet (0.9 or 1.2 m.) inside. There are unmarked rocks in the entrance. The locality is marked by numerous derricks used in the adjacent quarries.

Lane Cove, 1⅜ miles northeastward of Annisquam Lighthouse, is a small cove protected by stone walls at the entrance, forming a harbor for small craft. It has a depth of 12 feet (3.7 m.) at the entrance and 10 feet (3 m.) in the middle inside. Some coal is landed here. **Lanesville** is a village on the cove. The wharf forming the southwest side of the harbor has a depth of 7 feet (2.1 m.) at its outer end. Gasoline and some provisions are obtainable.

Folly Cove, on the north side of Cape Ann, 2½ miles east-northeastward of Annisquam Lighthouse, has a quarry on the east side and a wharf with a depth of 15 feet (4.6 m.) at the outer part, at which vessels load to a draft of 17 feet (5.2 m.). The stone wharf on the northwest side of **Folly Point** is in ruins.

Oceanview is a summer settlement on Andrews Point, at the north end of Sandy Bay. There are no wharves.

Sandy Bay is the large bight in the northeastern shore of Cape Ann, between Straitsmouth Island on the east and Andrews Point on the west. Between these points the bay is 2 miles wide and about 1½ miles long to its head (Rockport Harbor). A breakwater has been partially completed to form a harbor of refuge. It extends 1,200 yards northward from Avery Ledge, then 830 yards northwestward toward Andrews Point. In 1926 it was awash at low water except for a distance of about 300 yards near the middle, where it was above high water. There is a black gas buoy off the northwest end and a red bell buoy off the south end. The bay and approaches have been examined by means of a wire drag. The depths inside the breakwater are 7 to 14 fathoms (12.8 to 25.6 m.), with several rocky spots of less depth in the southern part. A 12-foot (3.7 m.) rock on the south side is marked by a black buoy. The bay is fre-

quently used as an anchorage by schooners and tows. It is exposed in a northeasterly weather, and at such times Gloucester or Salem Harbors are generally used.

The entrance to Sandy Bay between Straitsmouth Island and the red bell buoy marking Avery Ledge has broken bottom and a rocky spot with a depth of 22 feet (6.7 m.) in the middle, which strangers may be unable to avoid. Strangers should not use this channel with a greater draft than 18 feet (5.5 m.). A ledge, bare in places at low water and having a depth of 2 feet (0.6 m.) near the end, extends 270 yards northeastward from the northeast end of Straitsmouth Island. The entrance to the bay westward of the gas buoy at the northwest end of the breakwater is deep and clear.

Pigeon Cove, bearing 298° true (NW. ⅛ W. mag.) from Straitsmouth Lighthouse, is a small cove protected by a breakwater and having depths of 6 to 12 feet (1.8 to 3.7 m.) inside. It is a good harbor for small craft. There are bulkhead wharves around the harbor from which granite is shipped. The best water is on the northeast side. There is a foundry at the head. **Pigeon Rock,** 50 yards off the east point outside the jetty, is nearly bare at extreme low water.

The most prominent feature of Pigeon Cove is a high concrete stack of the iron works located on the cove. Some coal is landed in the cove.

Lying ⅜ and ½ mile southward of Pigeon Cove are two stone piers built out from the shore. The northerly is in bad repair and not used. The southerly has depths of 12 to 15 feet (3.7 to 4.6 m.) and is used by vessels loading granite.

Dodge, Bartlett, and **Mitchell Rocks** lie in a cluster nearly ¼ mile from the western shore of Sandy Bay between the two piers southward of Pigeon Cove. Dodge Rock is bare at low water and is marked by a spindle. The western end of the rocks lies 100 yards eastward of the south pier. The south rock has 14 feet (4.3 m.) over it and lies 275 yards southward of the spindle. Mitchell Rock, with 4 feet (1.2 m.) over it, and another, with 18 feet (5.5 m.) over it, lie 230 and 350 yards, respectively, northward of the spindle and 350 yards eastward of the north pier.

Sandy Bay Ledge is partly bare at high water and extends 200 yards from the western shore of Sandy Bay, southward of the south pier.

Harbor Rock, with 3 feet (0.9 m.) over it, lies 150 yards northeastward of the end of the north breakwater at the entrance of Rockport Harbor and is marked on its southeast side by a red buoy. Inside the rock a shelving ledge extends 75 yards east-northeastward from the end of the north breakwater.

Rockport Harbor, at the southwest end of Sandy Bay, is used as a harbor by many small craft. The entrance is about 200 feet wide between two breakwaters. A channel 12 feet (3.7 m.) deep and 100 to 200 feet wide has been dredged from the entrance to the wharf at the west end. The channel leads south of a red buoy just outside the entrance and 75 feet southward of the end of the breakwater on the north side, heading for the north edge of the southerly wharf until inside, and then for the middle of the wharf. The northern breakwater is marked by a flashing white light placed at its outer end.

There are ledges near the shores, especially on the north side between the end of the breakwater and the first wharf on the north side. Boats should go nothing northward on a line from the end of the north breakwater to the end of the first wharf on the north side, and nothing south of a line from the end of the south breakwater to the south edge of the wharf at the head. The wharves have depths of 6 to 7 feet (1.8 to 2.1 m.). The deepest draft entering is about 9 feet (2.7 m.). Gasoline and provisions are obtainable, and coal is sometimes obtainable in limited quantities. There is water on the wharves. The houses and church spires at the village of **Rockport** are prominent from outside. Rockport has communication by railroad and by motor bus. There is a basin suitable for small craft and protected by stone walls just westward from Rockport Harbor proper.

Straitsmouth Island is low and grassy and has a lighthouse and a few buildings at its eastern end. **Straitsmouth Lighthouse** is a white cylindrical tower. The light is fixed white, 46 feet (14.0 m.) above the water, and visible 9 miles. There is a Coast Guard station on **Gap Head,** westward of Straitsmouth Island; **storm warnings** are displayed there.

Flat Ground is a dangerous ledge ½ mile long, with 2 to 12 feet (0.6 to 3.7 m.) over it, lying ⅞ to 1⅜ miles north-northeastward of Straitsmouth Lighthouse and ¼ to ⅝ mile northeastward of Sandy Bay Breakwater. The ledge is marked by two buoys, a red buoy at its south end and a black at its north end.

Dry Salvages is a bare ledge near the middle of a reef about ¼ mile long in a northerly direction. The ledge is marked by a large red tripod beacon, which lies a little over 1 mile east-northeastward of Straitsmouth Lighthouse.

Little Salvages is a ledge showing well bare at low water. It lies about ¼ mile westward of Dry Salvages. Shoal water extends out a little more than 200 yards from the western side of the bare part of the ledge, and a rock, bare at lowest tides, lies between it and Dry Salvages.

Cape Ann Lighthouses, on **Thatcher Island,** ½ mile off the eastern side of Cape Ann and 1⅜ miles southward of Straitsmouth Island, are two gray stone towers, 300 yards apart. The lights, shown from each tower, are fixed white, 166 feet (51 m.) above the water, and visible 19 miles. The fog signal is an air diaphone, sounding a group of three blasts, each of 3 seconds' duration, silent intervals 3, 3, and 45 seconds. There is a naval radiocompass station on the southwest side of Thatcher Island. The call letters are NWM.

The Londoner is a ledge about ⅜ mile long in a northeasterly direction; it has general depths of 7 to 11 feet (2.1 to 3.4 m.) over it, and lies ½ mile east-southeastward of Cape Ann Lighthouses. Near the southern part of the ledge, on a cluster of rocks which show bare at low water, is a red spindle. There is a passage with 12 to 26 feet (3.7 to 7.9 m.) between The Londoner and Thatcher Island; it should not be attempted by a stranger.

Sandy Bay and approaches, and an area 2½ to 10 miles wide, northeastward, eastward, and southeastward of Cape Ann, have been examined by means of a wire drag.

Massachusetts Bay is the body of water lying westward of a line connecting Cape Ann Lighthouses on Thatcher Island with Race Point Lighthouse on Cape Cod.

GLOUCESTER HARBOR

(chart 243) is one of the most important fishing ports in the United States and an important harbor of refuge; it lies 5 miles southwestward of Emerson Point, the easternmost point of Cape Ann. The entrance is marked on its eastern side by Eastern Point Lighthouse. There is an outer and an inner harbor, the former with a general depth of 4 to 6 fathoms (7.3 to 11.0 m.) and the latter 2½ to 4 fathoms (4.6 to 7.3 m.).

Eastern Point Lighthouse is a white conical tower with a covered way to a dwelling. The light is flashing white (flash 1 second, eclipse 4 seconds), 57 feet (17.4 m.) above the water, and visible 13 miles. The fog signal is a bell, sounding a group of two strokes every 20 seconds.

A breakwater extends 750 yards northwestward from the shore near Eastern Point Lighthouse, and is marked at its end by Gloucester Breakwater Light. The entrance westward of the breakwater is about ⅝ mile wide; but **Round Rock Shoal** lies nearly ¼ mile westward of the end of the breakwater, leaving a channel 150 yards wide and about 3 fathoms (5.5 m.) deep eastward of the shoal, and ⅜ mile wide and 4¾ to 9 fathoms (8.5 to 16.4 m.) deep westward of the shoal. During heavy southeast gales the sea at times breaks nearly the whole distance across the entrance. Strangers should enter westward of Round Rock Shoal.

Normans Woe, on the west side at the entrance to Gloucester Harbor, is a rocky headland with no distinguishing marks. **Normans Woe Rock,** ¼ mile northeastward of Normans Woe and ⅛ mile offshore, is a high dark rocky islet surrounded by extensive ledges. There is a black bell buoy ¼ mile southeastward of it.

Southeast Harbor is the cove in the eastern part of Gloucester Harbor, northward of Black Bess Point and southward of Tenpound Island. It has good anchorage in about 4 to 5 fathoms (7.3 to 9.1 m.) and is generally used by vessels seeking shelter.

Western Harbor is the cove, of semicircular shape, in the northern part of Gloucester Harbor, northward of Tenpound Island. It has good anchorage in from 4 to 5 fathoms (7.3 to 9.1 m.), taking care to give the shore a berth of 300 yards, but is not much used. A part of the town of Gloucester is built on its northern shore, but there are no wharves on this side, and it is now a parkway.

A dredged channel 8 feet (2.4 m.) deep and 50 feet wide, with a least width of 40 feet through the bridges, leads from Western Harbor to **Annisquam River** and forms a thorofare to Ipswich Bay, on the north side of Cape Ann; vessels of as much as 10-foot (3.0 m.) draft are taken through at high water to Ispwich Bay. The tidal currents have considerable velocity through the bridges. It is described on page 229. The bridge at the south end is the most distinguishing mark at the entrance. A black buoy marks the west side of the approach channel.

Tenpound Island is marked by a light on the west side, and has a house and wharf on the north end.

Rocky Neck is a high and partly wooded island, with several buildings, on the east side at the entrance of the inner harbor. It is connected with the shore eastward. **Black Rock,** 100 yards off the western end of Rocky Neck, is bare at half tide and marked by a spindle.

Inner Harbor is ¾ mile long and has depths of 2 to 4 fathoms (3.7 to 7.3 m.). **Harbor Cove,** on the northwest side just inside the entrance to the inner harbor, has been dredged to a depth of 15 feet (4.6 m.) for the entire area of 50 feet outside the harbor lines. A 16-foot (4.9 m.) channel has been dredged along the wharves to abreast the west side of Fivepound Island. From there on a channel 12 feet (3.7 m.) deep and 100 feet wide has been dredged along the front of the wharves on the north side from Fivepound Island northeastward to the head of the inner harbor. **Smith Cove,** on the east side of Rocky Neck, has a depth of 15 feet (4.6 m.) in the entrance, and shoals gradually to 7 feet (2.1 m.) 100 yards from the head, above which it is bare at low water.

Wharves.—There are several wharves at Gloucester having depths of 10 to 18 feet (3.0 to 5.5 m.). Vessels are usually required to pay wharfage. There is a public wharf of stone and landing float at the extreme head of Harbor Cove, with a depth of about 3 feet (0.9 m.), at which small craft can land.

The principal business of the port is in fish, fish products, and the importation of coal.

Pilots.—Pilotage is compulsory for all vessels of over 7-foot (2.1 m.) draft engaged in the foreign trade, but not for vessels engaged in the coastwise trade. A pilot may be had by making signal outside the entrance.

Towboats are stationed at Gloucester and will go outside to a vessel making signal. Large vessels are generally towed in and out. Vessels are reported to Gloucester by telephone from Eastern Point.

Anchorage.—The best and generally used anchorage in the outer harbor for vessels coming in for shelter or bound to Gloucester is in Southeast Harbor, locally known as Pancake Ground. Vessels of 15-foot (4.6 m.) or less draft anchor almost anywhere in the inner harbor, not less than 150 feet from any wharf. Regulations prescribed for Gloucester Harbor require that from Tenpound Island to Fivepound Island, a sufficient passageway of not less than 200 feet in width on the northerly side of said harbor, leaving Babson Ledge buoy on the port hand going in, and a passageway of not less than 150 feet in width from any wharf in Upper Cove, Smith Cove, and Harbor Cove in said harbor, shall be at all times kept open for the passageway of vessels; and no vessel shall be anchored or allowed to lie at anchor in said passageways or in the track of the ferryboats regularly running in said harbor.

Quarantine, when in force, is enforced in accordance with the regulations of the United States Public Health Service.

The Gloucester Coast Guard station is located on the west side of the harbor, southwestward from Freshwater Cove.

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Repairs.—Gloucester has marine railways for hauling out the class of vessels that ordinarily trade from here, the largest capable of hauling out vessels of 200 tons, 125 feet in length, and 16-foot (4.9 m.) draft. There are machine shops for ordinary repairs to machinery. Boston is the nearest place at which repairs to large vessels and extensive repairs to machinery can be made.

Supplies.—Coal is obtainable from the wharves or from lighters, and water from the wharves or from the towboats. Ship chandlery and all other supplies are also obtainable.

Storm-warning displays are made from a steel tower on Fort Point.

Communications.—Gloucester is on the Boston & Maine Railroad, and has steamer communication with Boston.

Ice seldom extends outside Tenpound Island, at the entrance to the inner harbor. The towboats and steamers generally keep the inner harbor open.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.). The highest tides result when easterly and southeasterly gales occur near the times of new and full moon.

Currents.—The tidal currents do not to any great degree interfere with the movements of vessels, as they set directly in and out of the harbor and their velocity is comparatively small. In the narrows, however, between Fort Point and Rocky Neck the current is stronger, especially at half ebb, and the ebb sets onto Black Rock. Vessels coming out on the ebb favor the northwestern side of the channel in passing between Fort Point and the spindle on this rock. The ebb also sets onto Tenpound Island.

DIRECTIONS, GLOUCESTER HARBOR

Gloucester Harbor and approaches have very broken ground and many rocks and ledges, some of them unmarked, and careful navigation is necessary, especially in thick weather. The harbor and approaches have been examined by means of a wire drag, and the dangers are charted. The principal dangers for vessels of 24-foot (7.3 m.) or less draft, to an anchorage in Southeast Harbor, and 18-foot (5.5 m) or less draft into the inner harbor, are marked, and strangers are advised not to enter with a greater draft. Strangers in vessels are advised to enter westward of Round Rock Shoal. In heavy southeasterly gales the sea breaks across the eastern side of the entrance from the breakwater to Round Rock Shoal, and at times breaks nearly the whole distance across to Normans Woe Rock.

1. Approaching.—Passing 1 mile or more eastward and southeastward of Cape Ann Lighthouses and ½ mile or more eastward and southeastward of The Londoner beacon, steer 233° true (WSW. mag.); this course leads ¼ mile southeastward of an unmarked 33-foot (10 m.) rocky spot ⅝ mile southward of Milk Island. Give the shore eastward of Eastern Point Lighthouse a berth of about ½ mile, and pass close to Eastern Point whistling buoy, lying nearly ⅝ mile southward of the lighthouse. Then steer 306° true (NW. ½ N. mag.) for 1 mile to a position 300 yards southwestward of Round Rock Shoal gas buoy, and follow the directions in section 2.

Approaching from southwestward, from the whistling buoy outside of Newcombs Ledge, steer 38° true (NE. ¾ E. mag.) for Eastern Point Lighthouse; or, coming from Salem, bring Baker Island Lighthouse astern on a 64° true (E. by N. mag.) course, heading for Eastern Point Lighthouse. When Tenpound Island Lighthouse bears 30° true (NE. mag.), steer for it to a position 350 yards southeastward of Normans Woe bell buoy and with Eastern Point Lighthouse bearing 75° true (E. mag.).

To anchor in Inner Harbor, steer the 25° true (NE. ½ N. mag.), passing 200 yards westward of Round Rock Shoal gas buoy, 75 yards westward of a red buoy, and 100 yards westward of a horizontally striped buoy marking the ledges southwestward of Tenpound Island, and to a position 300 yards northwestward of Tenpound Island Lighthouse. Then steer about 52° true (ENE. mag.) into the inner harbor, passing southward of Babson Ledge black buoy and northward of Black Rock spindle. Anchorage may be had in the middle of the inner harbor below Fivepound Island.

To anchor in Southeast Harbor, steer the 25° true (NE. ½ N. mag.) course of the preceding paragraphs until ¼ mile past Round Rock Shoal gas buoy and Eastern Point Lighthouse bears 120° true (SE. mag.). Then steer 53° true (ENE. mag.) and anchor in about 4 to 5 fathoms (7.3 to 9.1 m.) anywhere southward of Tenpound Island, giving the island a berth of 250 yards and the shore southeastward of it a berth of not less than 350 yards.

2A. Entering eastward of Round Rock Shoal.—The least depth by this channel is about 18 feet (5.5 m.), rocky bottom. Strangers of over 10 feet (3 m.) draft are advised to use the deeper channel westward of Round Rock Shoal. Steer 19° true (NE. by N. mag.) for Tenpound Island Lighthouse and pass 200 yards westward of the light on the end of the breakwater and midway between a red and a black buoy marking the bar. Or, from Eastern Point whistling buoy steer 323° true (NNW. mag.) until the light on the end of the breakwater is abeam, and then haul northward and pass 200 yards westward of it. From a position 200 yards westward of the light on the end of the breakwater, steer 15° true (NNE. ¾ E. mag.) for 1⅛ miles to a position 150 yards northwestward of Tenpound Island, passing eastward of a red and a horizontally striped buoy; then steer 40° true (NE. by E. mag.) for the middle of the entrance to the inner harbor and enter in mid-channel.

GLOUCESTER HARBOR TO SALEM HARBOR

Off the shore eastward of Manchester Harbor entrance, between Gloucester entrance and House Island, are a number of islands, rocks, and ledges, which extend about ¾ mile from shore. The farthest outlying ones, named in order from eastward, are: **Kettle Island** (grass-covered and rocky), **Great Egg Rock** (high and bare), **Boohoo Ledge** (bare at low water), **Salt Rock** (shows at high water), **Pickett Ledge** (bare at low water), **Gales Ledge,** and **Pilgrim Ledge.** There are several coves, but Manchester Harbor is the only one of interest to navigation.

Magnolia Harbor is a foul cove about 1½ miles westward of the entrance to Gloucester Harbor and inside of Kettle Island. **Magnolia** is a prominent summer resort on the eastern side. There are private wharves for small craft on the eastern side of the harbor.

Manchester Harbor (chart 240) is about 5 miles westward of Gloucester Harbor, and is formed by an arm of the bay extending behind **Gales Point** in a northeasterly direction for 1 mile to the village of **Manchester.** The entrance to the outer harbor is northward of Baker Island Lighthouse, between **House Island** (partly wooded) on the east and Great Misery Island on the west.

There is anchorage in the outer harbor inside Great Misery and House Islands. Vessels desiring to anchor for the night or in head winds may here find fair holding ground and good shelter except in southerly gales. The anchorage is ¾ mile wide, and has from 3 to 6 fathoms (5.5 to 11 m.).

Whaleback is a dangerous ledge lying in the entrance of the outer harbor of Manchester. It is about 400 yards long east and west, and 200 yards wide. Near the middle of its northern side is a rock bare at low water, which is marked by a spindle. There is a clear channel 300 yards wide between the ledge and House Island; the channel westward of the ledge is ¼ mile wide.

Sauli Rock, bare at half tide, lies 300 to 400 yards eastward of the northeast end of Great Misery Island, and is marked on its south side by a horizontally striped buoy.

White Ledge, bare at low water, lies 300 yards northward of House Island, and is marked on its northwest side by a red buoy. A rock covered at half tide lies 250 yards north-northeastward of White Ledge, and is marked off its northwest side by a red buoy.

Chubbs Islet, bare and rocky, lies 300 yards from the north shore of the outer harbor of Manchester, and should be given a berth of over 200 yards.

A channel leading up Manchester Harbor from the outer harbor has been dredged 8 feet (2.4 m.) deep and 60 feet wide as far as the railroad drawbridge, above which it has a depth of 4 feet (1.2 m.). Just southward of the bridge a basin has been dredged to 6 feet (1.8 m.). The channel is well marked by buoys, most of which are maintained by the town of Manchester. Manchester is much frequented by small yachts and pleasure craft during the summer season. There is a yacht club with a float landing on the west side of the harbor.

Supplies and repairs.—Water, gasoline, provisions, and all kinds of motor-boat supplies are obtainable in Manchester. There is a marine railway for hauling out yachts up to 9-foot (2.7 m.) draft and 90 feet in length.

Wharves.—There are public float landings with depths of 6 feet (1.8 m.) on the east side of the harbor just below the bridge, and a public wharf at the head of the channel above the bridge. The depth at the boat yard wharf, on the west side just below the bridge, is about 10 feet (3.0 m.) obtained by dredging. The bridge has a draw opening 50 feet wide, and a headroom of 6½ feet (1.9 m.) at high water when closed; it is opened on notice to the agent at the railroad station.

Ice.—The harbor is usually closed by ice for about two months each winter.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.).

Directions, Manchester Harbor.—Pass ¼ to ⅜ mile northward of Baker Island and bring the lighthouse astern on a 351° true (N. ½ E. mag.) course, passing 350 yards westward of Whaleback spindle and to a position 100 yards eastward of Sauli Rock horizontally striped buoy. Bring this buoy astern on a 27° true (NE. ¼ N. mag.) course to the buoys at the entrance of the dredged channel. The courses through the dredged channel are 41° true (NE. by E. mag.) for a little over ¼ mile, following the buoys to a position close westward of the red buoy off the yacht club, then eastward for 100 yards to pass southeastward of a black buoy marking a ledge bare at low water, and then about 34° true (NE. ⅜ E. mag.), and keep in mid-channel to the head. The harbor is dredged for its full width in the upper end below the bridge.

SALEM, BEVERLY, AND MARBLEHEAD HARBORS

These harbors (Chart 240) form a large, irregular indentation in the shore of Massachusetts Bay, 11 miles southwestward of Cape Ann, and 12 miles northeastward of Boston Harbor entrance. Gales Point is the northern and Marblehead Neck the southern point at the entrance to this large indentation, which includes within its limits the harbors of Manchester, Beverly, Salem, and Marblehead, the distance between the two points being 4 miles. This wide space is studded with islands, bare rocks, and sunken ledges, through which lead the several channels into the harbors.

Salem Harbor is considerably used as a harbor of refuge; Salem and Beverly have considerable coasting trade, mostly in vessels carrying coal and oil, the deepest draft being about 25 feet (7.6 m.). Marblehead Harbor is frequented by many yachts and small craft, and has an occasional cargo of coal.

Channels.—Three main channels lead through the islands and rocks at the entrance. They are known as Main Ship Channel, Cat Island Channel, and Marblehead Channel. There are several other channels of less importance, used only by local boats. These channels have been swept by the wire drag, and all dangers found are shown on chart.

Main Ship Channel, the most northerly, leads between Baker and Great Misery Islands, and northward of Great and Little Haste. It has a depth of about 5½ fathoms (10 m.) until up to Little Haste if the range is closely followed, but there is an unmarked rocky spot with depth of 25 feet (7.6 m.) close to the sailing line. This channel is used by most deep-draft vessels.

Cat Island Channel, the middle channel, has its entrance near **Halfway Rock,** and leads in a northwesterly direction, between Cat and Eagle Islands. The least depths found in Cat Island Channel are about 18 feet (5.5 m.) in the channel northward of Gooseberry Ledge, 19 feet (5.8 m.) between Gooseberry Ledge and Satan Rock, and 23 feet (7 m.) on the eastern side of the channel between Satan Rock and Cat Island, with deeper water in mid-channel. The latter channel is the best. The least depth in Cat Island Channel between Eagle and Cat Islands is about 26 feet (7.9 m.).

Marblehead Channel, the westerly channel, leads in a northerly direction between Cat Island and Marblehead Neck. There are numerous unmarked shoals with 15 to 24 feet (4.6 to 7.3 m.) close to the channel, on which the sea breaks in easterly gales. It is not recommended for strangers with a greater draft than 12 feet (3.7 m.).

South Channel, a branch of Marblehead Channel, leads along the northern shore of the peninsula between Marblehead and Salem Harbors and southward of the numerous rocks and ledges on the east side of the entrance to Salem Harbor. The principal dangers are marked, but the channel is less than 100 yards wide in its narrowest part; it has a least found depth of about 15 feet (4.6 m.), but has not been closely examined and should not be used by strangers except in small craft.

Islands and rocks along Main Ship Channel.—Baker Island, on the south side of the entrance to Main Ship Channel, has houses scattered over it and a lighthouse at the northern end.

Baker Island Lighthouse is white tower and the light is flashing red and white (white flash 0.6 second, eclipse 6.9 seconds, red flash 0.6 second, and eclipse 6.9 seconds), 111 feet (34 m.) above water and visible 12 miles. The fog signal is an air siren; blast 3 seconds, silent 27 seconds.

An extensive area of rocks and reefs extends for 2 miles southeastward of Baker Island. A whistling buoy marks the southeast end and vessels should pass outside of it. **Middle** and **Inner Breakers** are partly bare at low water, and Middle Breaker is marked by a spindle.

Great Misery Island, on the north side of Main Ship Channel at the entrance, has scattered houses and a landing at its northwest end.

Hardy Rocks, 5/8 mile westward of Baker Island Lighthouse and nearly 3/8 mile south-southwestward of the Main Ship Channel range, is bare at low water and marked by a beacon (black spar with two triangles) and a black buoy on the north side.

Bowditch Ledge, 1 1/8 miles west-northwestward of Baker Island lighthouse and 350 yards south-southwestward of the Main Ship Channel range, is marked by a granite beacon with a black staff and cage.

Great Haste, on the south side of the main channel, 2 3/8 miles westward of Baker Island, is a bare rock surrounded by ledges. **Little Haste,** close northwestward of Great Haste, is bare at low water and marked by a beacon (black cask on wooden spar).

Islands and rocks along Cat Island Channel.—Halfway Rock, 2 miles southward of Baker Island, is about 15 feet (4.6 m.) high and marked by a prominent beacon (keg on skeleton tower). It is surrounded by deep water.

North and **South Gooseberry** are high, rocky islets on the western end of the extensive ledges southward of Baker Island. **Dry Breakers,** the southerly part of the ledges, show at high water as a low, bare ledge.

Pope Head, 300 yards northwestward of North Gooseberry, is a rugged bare rock, surrounded by ledges to a distance of 150 yards. A black buoy marks the western side of the ledges.

Satan Rock, 1/2 mile east-southeastward of Cat Island, is a small, bare rock marked by a spindle with black cage; it should be given

a berth of 150 yards on its eastern and western sides and 275 yards on its north side.

Brimbles is a rock bare at low water lying nearly 3/8 mile south-southeastward of Eagle Island. It is marked by a black spindle with four arms (the two arms facing Cat Island Channel are red); the spindle should be given a berth of over 125 yards.

Eagle Island is small, grassy, and rocky, and lies 5/8 mile north-northeastward of the north end of Cat Island.

Grays Rock, 5/8 mile northwestward of Cat Island, is about 10 feet (3 m.) high.

Coney Island is a low, grassy islet with a hut near its middle. **Coney Ledge,** the higher parts of which are covered at high water, is an extensive ledge extending southeastward and southward from Coney Island, and is marked at its easterly end by a black buoy.

Islands and rocks along Marblehead Channel.—Islands and rocks, sunken and bare, extend for 2 miles southward and southwestward from the south end of Marblehead Neck. Many of them are marked by buoys, and the channels between them are used by local boats, but the area should be avoided by strangers. A red bell buoy marks the southeastern end of the broken ground. Those showing above water are **Great Pig Rocks,** bare at high water, and having rocks awash at low water southward of them; **Sammy Rock,** bare at low water; **Ram Islet,** high, rocky, and grassy; **Little Pig Rocks,** awash at high water; **Roaring Bull,** bare at low water and marked by a spindle; and **Tinker Island,** marked by several houses. A bar with little depth connects Tinker Island with the shore.

Tom Moore Rock, at the eastern end of a reef extending 400 yards from the middle of Marblehead Neck, is bare at one-third ebb and marked by a spindle.

Marblehead Rock, 1/4 mile eastward of the northern part of Marblehead Neck, is a high bare rock with a conical beacon on the top.

Cat Island, 7/8 mile northeastward of Marblehead Neck, is 3/8 mile long, bare, and has a large building on the north end, and a wharf on the southwest side. It is surrounded by extensive ledges, bare and submerged. There is a water tank on a small hill near the center of the island. A spindle marks the bare rock at the south end.

Marblehead Harbor.—This harbor is about 1 mile long and 3/8 mile wide and is formed on the east and south by Marblehead Neck and a narrow strip of land called **Marblehead Beach,** connecting the south end of the neck with the mainland. Marblehead Lighthouse, at the north end of Marblehead Neck, marks the easterly point at the entrance. Marblehead Harbor is an excellent anchorage and is much used by yachts during the summer. The depths in the harbor up to Skinner Head are 4 to 5 fathoms (7.3 to 9.1 m.), and vessels up to about 20 feet (6.1 m.) draft can enter. There is 8 to 15 feet (2.4 to 4.6 m.) alongside the wharves. The greater part of the head of the harbor southward of Skinner Head and Boden Point is shoal.

Marblehead Lighthouse, on the north end of Marblehead Neck, is a pyramidal skeleton tower inclosing a cylindrical tower. The light is fixed red, 130 feet (40 m.) above the water, and visible 10 miles.

Marblehead is an important summer resort on the west side of Marblehead Harbor. There are numerous float landings. The float

landings at the foot of the streets are public and have depths of 3 to 12 feet (0.9 to 3.7 m.). The lower public landing is just below the yacht-club landing. There are several private float landings on the east side of the harbor. General information for the harbor is given on page 244 and directions on page 246.

Storm-warning displays are shown from a steel tower at Fort Sewall, the northern entrance point to Marblehead Harbor.

Salem Harbor.—The harbor proper is about 1½ miles long in a southwesterly direction. The channel favors the eastern side of the harbor and has depths of 3½ to 4 fathoms (6.4 to 7.3 m.) in the outer part and about 15 feet (4.6 m.) to the entrance of the dredged channel leading to South River.

The entrance to Salem Harbor is between **Abbott Rock Beacon** (red spindle on stone base) and **Fort Pickering Lighthouse** (brown cylindrical tower) on the west, and **Great Aquavitae Beacon** (black spindle on stone base) on the east.

There is a large wharf and coal terminal on the northwest side of the harbor. The bunkers on this wharf are painted white and show up very prominently in approaching. A channel 21 feet deep (6.4 m.) has been dredged to the main wharf, while there are depths of 12 to 15 feet (3.7 to 4.6 m.) leading to the extension. The dredged channel is marked by 3 dolphins on its southern side.

A channel dredged to 10 feet (3 m.) and marked by buoys leads through the flats to **Derby Wharf.**

South River, on the northwest side of Salem Harbor, separates Salem and South Salem and forms an important approach to the city of Salem. Its entrance is on the west side of Derby Wharf, a long stone jetty with a light (red square tower) on the end. South River has been dredged to a depth of 10 feet (3 m.) and width of 200 to 300 feet to the outer end of Derby Wharf, and to a depth of 8 feet (2.4 m.) inside to near the head. Subsequent shoaling has reduced these depths slightly. There is a large mill and a conspicuous brick stack on the west side just inside the entrance. A drawbridge with an opening 43 feet wide crosses the river about ¼ mile above the outer end of Derby Wharf. There is a public float landing for small craft on the north side at the bridge. The dredged channel at the entrance to the river is marked by buoys and is easily followed by small craft. The mid-channel is clear inside.

Beverly Harbor.—This harbor lies north of Salem Neck, at the west end of Salem outer harbor, and is formed by the confluence of Danvers River, Beverly Creek, and North River. It forms the approach to the city of Beverly. It has considerable trade in coal and oil, carried in barges and vessels up to 25-foot (7.6 m.) draft.

In 1926 the channel had a least depth of 18 feet (5.5 m.), but dredging and rock excavation was being carried on to produce a channel with a least depth of 24 feet (7.3 m.). The latter project also includes the dredging of a channel from beacon No. 1 to Tuck Point, thereby eliminating the bad turn in the present channel. It is estimated that this improvement will be completed in 1927.

Beverly is a city on the north side of Beverly Harbor, just inside the entrance. There are depths of about 24 feet (7.3 m.) at low water at the coal and oil wharves, and 12 to 16 feet (3.7 to 4.9 m.) at the others.

Bridges.—Two drawbridges cross Beverly Harbor just above the principal wharves at Beverly. The lower, a highway bridge, has a single opening 40 feet wide, and a headroom of 10.3 feet (3.1 m.) at high water when closed. The railroad bridge, 100 yards above the highway bridge, has a single opening 38 feet wide, and a headroom of 6.2 feet (1.9 m.) at high water when closed.

Beverly Creek, a tributary of Beverly Harbor from northward just above the bridges, has been improved by dredging a channel 9 feet (2.7 m.) deep for about 1 mile above the entrance to near the head. There is a lumber wharf and a wharf to which coal vessels go, on the east side of the river. The channel leads between flats bare at low water, and is most easily followed at that time. It is marked by spar buoys to the bridge. It is crossed by a drawbridge ¾ mile above the entrance, having a single opening with a width of 40 feet, and a headroom of 4.5 feet (1.4 m.) at high water when closed.

Danvers River is the continuation of Beverly Harbor northwestward. It has a depth of about 7 feet (2.1 m.) at low water for 2 miles above Beverly to the village of **Danversport.** Coal and lumber vessels go to Danversport at high water. The channel is narrow and marked by buoys for one mile above Beverly. It leads between flats bare at low water and is difficult without local knowledge. A drawbridge with an opening 50 feet wide and headroom of 9.4 feet (2.8 m.) at high water when closed crosses the river ½ mile above the bridges at Beverly.

North River, a tributary of Beverly Harbor from southward just above the bridges, is nearly bare at low water in a narrow unmarked channel. It is little used.

Schooners bound for the Danvers River or Beverly Creek are towed by power boats which can be obtained at Beverly.

Prominent objects.—Approaching from eastward, Baker Island, with its lighthouse on its northern end and numerous houses scattered over the island, and Great Misery Island, the high, grassy island, with a clubhouse lying northward of Baker Island, are the most prominent. A large water tank will be seen about ½ mile northward of West Manchester.

Approaching from southward, Halfway Rock, a bare rock about 15 feet (4.6 m.) high, with a beacon on it, will be seen about 1⅞ miles south of Baker Island. Southward of Baker Island lie two high, rocky islets, North and South Gooseberry Islands, and 1¼ miles southwestward of these is Cat Island, long and narrow with a number of houses near the northern end. Marblehead Neck is high and rocky, and has many summer houses and several yacht clubs; Marblehead Lighthouse is on its northern point. Marblehead has several prominent marks.

Anchorage.—Salem Harbor is much used as a harbor of refuge, particularly during the autumn. It is especially convenient for vessels seeking shelter bound eastward and met by an easterly gale, as the direction of the harbor is such that a foul wind for proceeding is a fair wind into the harbor, and a fair wind for proceeding is also a fair wind out. Strangers should not attempt to beat into Salem Harbor on account of the numerous ledges and shoals.

There is good anchorage for vessels in what is known as the outer harbor, westward of Bowditch Ledge and northward or eastward of

Little Haste, in 5 to 7 fathoms (9.1 to 12.8 m.). The most generally used anchorage for vessels is eastward of the entrance to Beverly Harbor and northward of Middle Ground, in 3½ to 6 fathoms (6.4 to 11 m.). Small vessels, especially sailing vessels, also anchor on the east side of Salem Harbor just inside of Naugus Head, in 3½ to 4 fathoms (6.4 to 7.3 m.).

In Beverly Harbor the best anchorage is between Rams Horn and Lobster Rock beacons, a little south of the line joining them, in 3 to 4 fathoms (5.5 to 7.3 m.). Small vessels and motor boats usually anchor on the south side of the channel between Lobster Rock beacon and the bridge, in 12 to 15 feet (3.7 to 4.6 m.).

In Marblehead Harbor the anchorage is anywhere in the middle, in 24 to 30 feet (7.3 to 9.1 m.), good holding ground, and is sheltered from all but northeasterly winds. With good ground tackle vessels have no difficulty in riding out a northeaster. It is much used as an anchorage by yachts.

Pilots are seldom taken. They can be obtained from a Boston pilot boat, or sometimes at Gloucester or from fishing boats at work off the entrance. Deep-draft vessels bound for Beverly Harbor should not attempt to enter without a pilot.

Towboats.—There are no towboats, but one can be obtained from Gloucester or Boston. There are power boats available at Beverly for towing schooners and small barges up the Danvers River.

Supplies.—Coal and water can be obtained at the wharves at Salem and Beverly, and usually from water boats at Marblehead. Gasoline, provisions, and motor-boat supplies are obtainable at all of the cities.

Repairs.—There is a railway at Salem for hauling out small craft of about 10 tons, and railways at Marblehead for hauling out yachts up to 75 tons, 100-foot length, and 10½-foot (3.1 m.) draft. There are machine shops for ordinary repairs to machinery at all of the cities.

Ice.—The head of Salem Harbor on the flats is usually closed by ice every winter during the months of January and February, but the formations rarely extend beyond the coal piers except in unusually severe winters, when they have been known to reach as far out as The Haste, and occasionally as far as Eagle Island. Northerly and northwesterly winds are most favorable to local formation in Salem Harbor. Winds from southward and westward, during light formations, have a tendency to carry the ice off to sea, while those from eastward usually break up the formations both in the harbor and its approaches.

Marblehead Harbor is rarely obstructed by ice to such an extent as to become a hindrance to navigation. Fishermen have made it a refuge when it was impossible to get into Gloucester, Salem, or Lynn Harbors. The formation of ice in Marblehead Harbor is entirely local, and remains but a short time.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.).

Currents.—The tidal current in Salem and Marblehead Harbors has little velocity. In Beverly Harbor it has considerable velocity, and sets across the channel in places. During the first half of the ebb the current sets across the shoal extending northward from Old Hospital Point.

DIRECTIONS, SALEM, MARBLEHEAD, AND BEVERLY HARBORS

The approaches to these harbors have very broken ground, and all of the channels lead between islands and rocks, bare and submerged. Caution is necessary for their navigation at all times, and strangers should not attempt to enter or leave in thick weather. All of the channels in the harbors and their approaches, except the channels between the black buoy and the horizontally striped buoy northward of Little Haste, through South Channel and through Marblehead Harbor, have been examined by means of a wire drag and the dangers are shown on the charts. Strangers should exercise great care in navigating through areas not examined by means of a wire drag. For a description of the channels and depths, see page 239.

DIRECTIONS, SALEM HARBOR

1. Through Main Ship Channel.—With Baker Island Lighthouse bearing between 244° true (W. by S. mag.) and 284° true (NW. by W. ½ W. mag.), steer for it; or, coming from Gloucester, bring Eastern Point Lighthouse astern on a 244° true (W. by S. mag.) course heading for Baker Island Lighthouse; this course leads 350 yards southward of a red buoy marking a 17-foot (5.2 m.) spot.

Pass ¼ mile northward of Baker Island Lighthouse and 200 yards northward of the black buoy off it, and steer 276° true (WNW. ⅛ W. mag.) for 1 mile, passing 250 yards southward of Little Misery Island and to a position 300 yards northward of Bowditch Ledge beacon; on this course Hospital Point light (white tower showing against the trees) is in range with the tallest church spire at Beverly (fixed white rear range light shown from this spire at night), and the range should be closely followed. Pass 300 yards northward of Bowditch Ledge beacon and steer 267° true (W. by N. mag.) for 1½ miles to a position ⅜ mile northward of Little Haste beacon, and 100 yards northward of a horizontally striped buoy. Pass 150 yards westward of the buoy and steer 219° true (SW. ¾ W. mag.), passing about 300 yards southeastward of Abbott Rock beacon and Fort Pickering and 400 yards northwestward of Great Aquavitae beacon. Anchorage can be had in the middle of the harbor off the coal wharves, or the course can be continued to the buoys at the entrance of the dredged channel leading into South River.

2. Through Cat Island Channel.—Vessels approaching Cat Island Channel from southward can pass ½ mile southeastward of Outer Breakers bell buoy and steer for Halfway Rock beacon on a 39° true (NE. ¾ E. mag.) course for 2⅜ miles until 1¼ miles from the beacon and Marblehead Lighthouse is a little abaft the beam, distant 2⅛ miles. Then steer 338° true (N. ⅝ W. mag.) for 2 miles with the west end of Eagle Island ahead, passing midway between Satan Rock spindle and Cat Island, and to a position midway between Brimbles spindle and Martin Rock black buoy. Then steer 302° true (NW. ⅛ N. mag.) for ½ mile to a position 100 yards southwestward of Mid-Channel Rock red buoy, and then 333° true (N. by W. mag.) for 1¼ miles, passing 100 yards eastward and northward of buoy No. 5; then steer 277° true (WNW. mag.) for ½ mile to a position 100 yards northward of the horizontally striped buoy north-

ward of Little Haste beacon, and follow the directions in the preceding paragraph.

3. Through Marblehead Channel.—The following directions are intended for vessels of 12-foot (3.7 m.) or less draft with a smooth sea. Deeper draft vessels are advised to enter by Cat Island or Main Ship Channels. Vessels should shape the course to make Outer Breakers bell buoy.

Pass about 200 yards eastward of the bell buoy and steer 26° true (NE. 3/8 N. mag.) for a little to the left of Baker Island Lighthouse, passing nearly 1/2 mile eastward of Tinker Island and to a position 1/4 mile east-southeastward of Volunteer Rock buoy. Then steer 343° true (N. 1/4 W. mag.) for 1 1/4 miles, passing 200 yards eastward of Marblehead Rock beacon.

Then bring Marblehead Rock beacon astern on a 4° true (N. by E. 5/8 E. mag.) course for 1 mile, and pass about 100 yards westward of Archer Rock buoy and to a position about 300 yards eastward of Chappel Ledge buoy. Then steer 345° true (N. mag.) for 1 1/4 miles, and pass about 400 yards eastward of the black buoys marking Coney Ledge and Coney Island Rock, and about 100 yards eastward and northward of buoy No. 5, northeastward of Great Haste, then steer 267° true (W. by N. mag.) and pass 100 yards northward of black buoy No. 7 northward of Great Haste. From here steer 232° true (WSW. mag.) for 5/8 mile until about 1/4 mile from Abbott Rock beacon, then steer 219° true (SW. 3/4 W. mag.) to the buoys at the entrance of the dredged channel leading to South River, or anchor in mid-harbor off the coal piers.

4. Through South Channel.—This channel should be used by strangers only in small craft. Follow the direction in section 3 until up to Marblehead Rock beacon. Pass 200 yards northeastward of it and steer 331° true (N. by W. 1/4 W. mag.) for Hospital Point Lighthouse to a position 100 yards eastward of Kettlebottom spindle. Then steer 307° true (NW. 5/8 N. mag.) to a mid-channel position between buoys Nos. 7 and 4. Then steer about 256° true (W. mag.) and pass southward of buoy No. 6 and then steer northwestward and pass northward of buoy No. 9. Then steer 264° true (W. 3/4 N. mag.) for the end of the Philadelphia & Reading coal pier, pass southward of two red buoys and give the shore a berth of 250 yards. Anchor in mid harbor off the coal pier, in 3 1/2 to 4 1/2 fathoms (6.4 to 8.2 m), soft bottom, or steer west-southwestward to the buoys at the entrance of the dredged channel leading into South River.

DIRECTIONS, MARBLEHEAD HARBOR

From northeastward.—Follow the directions in section 1 of the directions for Salem Harbor to a position 300 yards northwestward of the black buoy off the north side of Baker Island; then steer 216° true (SW. 1/2 W. mag.) for the northwest end of Cat Island, with the east side of House Island astern, and pass 300 yards southeastward of Hardy Rock buoy and beacon. When about 1/4 mile east of Eagle Island steer 236° true (WSW. 1/4 W. mag.) with Baker Island Lighthouse astern, pass 200 yards southward of Eagle Island, and to a position about 400 yards southeastward of Chappel Ledge buoy. Then steer 225° true (SW. by W. 1/4 W. mag.) for the middle

of the entrance to Marblehead Harbor, and anchor off the town, favoring if anything the westerly side of the harbor, in 4 to 5 fathoms (7.3 to 9.1 m.), soft bottom.

From eastward.—Unmarked detached rocks and ledges with depths of 15 to 25 feet (4.6 to 7.6 m.) lie off the eastern entrance to Marblehead Harbor, and strangers may have trouble in avoiding them. The following course is recommended for vessels of 12-foot (3.7 m.) or less draft. Bring Halfway Rock beacon astern on a 277° true (WNW. mag.) course, heading for north end of Fort Sewall, and pass 350 yards southward of Cat Island beacon, 500 yards northward of Marblehead Rock beacon, and 100 yards northward of the black buoys off the north end of Marblehead Neck. Vessels can then haul southwestward in the harbor.

From southward.—Follow the direction in section 3 of Salem Harbor until up to Marblehead Rock beacon. Pass 200 yards northward of the beacon, steer northwestward and pass 100 yards northward of the black buoys off the north end of Marblehead Neck, then steer southwestward into the harbor.

DIRECTIONS, BEVERLY HARBOR

Strangers of over 15 feet (4.6 m.) draft should not enter without a pilot, as the channel is narrow and crooked in places and, although well marked by aids, requires some local knowledge to keep in the best water. No attempt should be made to enter at night.

Follow the direction of sections 1 or 2 of Salem Harbor to a position 100 yards northward of the horizontally striped buoy northward of Little Haste beacon, then steer 247° true (W. ¾ S. mag.) for ½ mile, to a position 150 yards southward of the red buoy southward of Hospital Point Lighthouse; or follow the directions of section 3 of Salem Harbor to a position 100 yards northward of the black buoy northward of Little Haste beacon and steer 266° true (W. by N. mag.) to a position 150 yards southward of the red buoy southward of Hospital Point Lighthouse.

Then steer 273° true (WNW. ⅜ W. mag.), pass 50 yards northward of black buoy No. 1, and then 301° true (NW. mag.) and pass midway between buoys Nos. 2 and 3 and 75 yards northward of buoy No. 3 A. Then steer southwestward and south-southwestward, passing southeastward of Porter Rock red buoy and about 200 feet westward of Monument Bar beacon. Pass 100 feet eastward of a red buoy and the same distance westward of a black buoy between Monument Bar and Rams Horn beacons, and 100 feet southward of the red buoy northwestward of Rams Horn beacon. Then haul gradually westward, steer about 323° true (NNW. mag.), and pass about 100 yards northeastward of Lobster Rocks beacon. Then follow the wharves at a distance of about 75 yards. In 1926 work was underway toward cutting a channel direct from Monument Bar beacon to Tuck Point. A portion of the reef at Lobster Rocks was also being removed. When these improvements are finished the navigation will be much easier. (For directions from Boston Lightship to Beverly see section 12 on p. 278.)

COAST FROM MARBLEHEAD TO BOSTON HARBOR

The islands and rocks eastward, southward, and southwestward of Marblehead Neck are described under "Salem Harbor and approaches" on page 239.

Phillip Point is high and rocky, and its western and higher part is wooded. A rock with 12 feet (3.7 m.) over it lies 600 yards eastward of **Grass Head,** the eastern end of the point. A reef with bare heads extends 350 yards southward from Phillip Point, and **Dread Ledge,** bare at half tide and marked by a red spindle, lies 500 yards southward of the point.

Nahant Bay is 2 miles wide between Phillip Point and Nahant, and about the same long to Lynn Beach. The village of **Swampscott** is on its northern shore westward of Phillip Point, and the eastern part of the city of Lynn is on its northwest side. Temporary anchorage, exposed to easterly and southerly winds, can be had in the bay in 3 to 6 fathoms (5.5 to 11 m.), but it is little used. The usual anchorage is off Swampscott, southwestward or westward of the southern end of Fishing Point. Small craft can anchor westward of the point in 8 to 15 feet (2.4 to 4.6 m.). The bay is clear; 18 feet (5.5 m.) is found ½ to ¾ mile from its northwest side, shoaling thence to the shore. **Fishing Point, Blaney Rock,** and **Red Rock** are rocky points on the northern side of Nahant Bay.

Lynn Beach is a narrow strip of sand separating Nahant Bay from Lynn Harbor, and is about 1 mile long in a southerly direction to **Little Nahant,** a high, grassy head with several houses. Little Nahant is joined to Nahant by a strip of beach nearly ½ mile long, called **Little Nahant Beach.**

Egg Rock, about 60 feet (18.3 m.) high, lies on the southern side in the entrance to Nahant Bay. The summit of the islet is surmounted by a structure resembling a water tank.

Broad Sound, about 4 miles wide between Nahant on the northeast and Deer Island on the southwest, forms the approach to Nahant and the city of Lynn at its north end, and a continuous line of summer resorts on its west side. It has depths of 3 to 8 fathoms (5.5 to 14.6 m.) in the entrance, but is shoal near the shores.

Nahant is a high peninsula about 1⅜ miles long, with bluff seaward faces. It is occupied by a town and summer resort. It is connected with Lynn by electric railway and highway. A standpipe is the most prominent mark.

There is a Coast Guard station on Nahant Beach just southward of Little Nahant. The white buildings and a steel signal tower are prominent.

Nahant Harbor is the cove on the south side of Nahant. The principal wharf is on the northeast side of the harbor and has a depth of 9 feet (2.7 m.). Entering between Joe Beach Ledge red buoy and Bass Rock spindle, temporary anchorage can be selected off the wharf in 3 or 4 fathoms (5.5 to 7.3 m.) hard bottom. There are wharves on the westerly side of Nahant, northward of Bass Point, with depths varying from 3 to 11 feet (0.9 to 3.4 m.).

Shag Rocks are a group of bare rocks extending 300 yards southward from the southeast end of Nahant. A ledge, awash at lowest tides, extends 100 yards southward from the southernmost Shag Rock.

Lynn Harbor.—This harbor, the northerly end of Broad Sound, is full of shoals, largely bare at low water, through which several channels have been dredged to the city of **Lynn.** Lynn has considerable trade, the deepest draft being about 22 feet (6.7 m.). The principal cargoes are coal, lumber, and building materials.

The easterly channel has been dredged 15 feet (4.6 m.) deep and 300 feet wide, with a turning basin of the same depth 500 feet square at the head. Several private channels have been dredged to depths of 8 to 15 feet (2.4 to 4.6 m.) to give access to the wharves from the turning basin. A basin approximately 200 yards wide and 400 yards long, to form an anchorage for yachts, has been dredged to a depth of 6 feet (1.8 m.) eastward and southeastward of the 15-foot (4.6 m.) turning basin at the head, and extending southward from the Lynn Yacht Club. The anchorage is not marked and there are shoals, bare at low water, on the north and east sides. The easterly channel into Lynn Harbor is marked by buoys at the entrance and by lights at frequent intervals, and leads between flats, bare, or nearly so, at low water. Some local knowledge is necessary to carry the best water, but strangers in small craft should have no trouble in going to Lynn with the aid of the chart.

The principal wharf at Lynn is a coal wharf near the gas works. Several large gas tanks are located just back of the wharf. In 1926 a channel 19 feet (5.8 m.) deep was being dredged from the basin at the head of the Easterly Channel to the coal wharf. Plans called for a depth of 28 feet (8.5 m.) alongside the wharf.

In approaching, Lynn Harbor may be recognized by the huge red gas tanks that stand at the head of the harbor. The twin brick chimneys northeast of Revere Beach form a good landmark, and the black standpipe at Nahant is prominent.

Black Rock Channel, a branch of the easterly channel, leading along the western side of Nahant, is unmarked and suitable only for small craft. There are shoals nearly bare at low water on either side.

Western Channel of Lynn Harbor leads into **Saugus River** at the western end of Lynn. A channel 12 feet (3.7 m.) deep has been dredged through the flats at the mouth and in the river to the General Electric Co. wharf, ½ mile above the bridges at the entrance. The depth at the wharf is 18 feet (5.5 m.). The river has been improved by dredging to a depth of 6 feet (1.8 m.) for ¾ mile above this wharf to a lumber wharf. Western Channel is partially marked across the flats at the entrance by buoys, but local knowledge is necessary to keep in the best water. The channel in the river is unmarked and difficult.

Bridges.—Three bridges cross Saugus River between the entrance and the General Electric Co. wharf and one between that point and the lumber wharf. All have draw openings. The least width of opening through the first three bridges is 50 feet and through the fourth bridge 40 feet.

Repairs.—There is a marine railway at Lynn for yachts of 40-foot length and 7-foot (2.1 m.) draft. All kinds of repairs to machinery can be made.

Pilots.—Pilotage is not compulsory for Lynn Harbor. There are licensed pilots at Nahant, who may be obtained on a signal of five

blasts of a whistle. Strangers in vessels usually take a pilot on account of the narrow, crooked channels. The pilotage rates are given on page 264.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.) at Lynn.

Directions.—For directions for entering Lynn Harbor see the tabulated courses on page 276.

Revere and **Winthrop** are towns and summer resorts occupying most of the west and southwest sides of Broad Sound. At Revere Beach a breakwater has been built out from the shore on **Cherry Island Bar,** forming an anchorage for small craft, with depths of 4 to 6 feet (1.2 to 1.8 m.). Northward of the breakwater there is a long wharf built out to a depth of about 3 or 4 feet (0.9 or 1.2 m.) at low water.

Winthrop Head, a hill 103 feet (31 m.) high and covered with houses, is marked by a light-colored standpipe, the most prominent mark in this vicinity.

Shirley Gut, separating Point Shirley from Deer Island, forms an approach from Broad Sound to the northern part of Boston Harbor. The channel is narrow and has a depth of only about 4 feet (1.2 m.) at mean low water. It is used considerably by small yachts and fishing boats but is too narrow for vessels of any size. It is unmarked.

Deer Island, on the south side of Shirley Gut and separating Broad Sound from Boston Harbor, is described on page 255.

BOSTON HARBOR

The entire harbor is shown on chart 246 and the inner harbor on chart 248. The entrance, between Point Shirley on the north and Point Allerton on the south, is about 4¾ miles wide. A group of islands and shoals lie in and off the entrance, through which several channels lead. There is a depth of 35 feet (10.7 m.) to Boston through Broad Sound North Channel and less through the others. Great Brewster, 104 feet (32 m.) high, is the most prominent of the islands in the entrance.

Prominent objects.—In approaching Boston on a clear day the outstanding landmark is the Boston Customhouse. It is a tall office building and towers above the adjacent buildings. The light-colored standpipe on Winthrop Head is prominent. A turreted tower on Nantasket Hill affords a good landmark when approaching that portion of the harbor.

OUTER HARBOR AND CHANNELS

Under this heading are described the approach channels and the islands and shoals from the entrance to President Roads. Hingham, Quincy, and Dorchester Bays are described under separate headings.

Channels.—Three main channels, all obtained by dredging, lead through the shoals at the entrance to President Roads. There are several other channels of less importance used by local vessels.

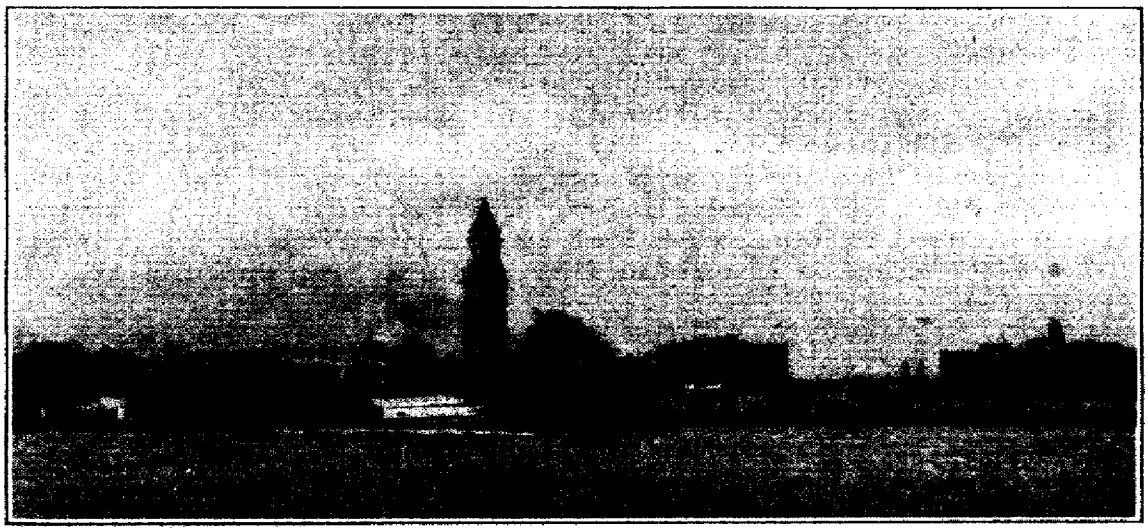
Broad Sound North Channel leads from Broad Sound to President Roads from northeastward, eastward of Deer Island. It has

been dredged 35 feet (10.7 m.) deep and 1,500 feet wide and is well marked by lighted buoys.

In 1926 dredging was being carried on to deepen this channel to 40 feet (12.2 m.) in general, but 45 feet (13.7 m.) through rock, and to a width of 900 feet, except at the outer end, where it is to be 1,100 feet wide.

Finn Ledge, with depths from 25 to 29 feet (7.5 to 8.8 m.), lies on the northern edge of the outer end of North Channel. The ledge is marked by a red gas and bell buoy. Careful navigation is required here, especially in the case of an incoming vessel passing an outgoing vessel at the entrance to the channel.

Broad Sound South Channel leads from Broad Sound in a southwesterly and westerly direction to President Roads. It has been dredged 30 feet (9.1 m.) deep and 1,200 feet wide, and is well marked by buoys and lighted ranges.



Boston Customhouse from the harbor

The Narrows is the channel leading into Boston Harbor from southeastward, between Boston Lighthouse and Lovell Island on the northeast and Point Allerton, Georges Island, and Gallup Island on the southwest. It has been dredged 27 feet (8.2 m.) deep and 1,000 feet wide and is well marked. There are shoals with depths of 21 to 23 feet (6.4 to 7 m.) in the southeastern approach, which may be avoided in the daytime and with clear weather.

Shirley Gut, a narrow approach to Boston Harbor from northward, is described on page 250.

Hypocrite Channel is a natural channel leading between Green Islands on the north and Little Calf Island on the south. It has ample depth, but there are unmarked dangers, and the greatest draft that can be taken through it to Broad Sound South Channel at low water is about 18 feet (5.5 m.). It is not recommended for strangers.

Black Rock Channel, leading into The Narrows from eastward, between Great Brewster Spit and Lovell Island, has an unmarked ledge with a least found depth of 9 feet (2.7 m.) nearly in mid-

channel, which strangers may be unable to avoid. It is used only by small local vessels and is not recommended for strangers.

There is a channel 250 yards wide, leading into The Narrows from westward, between Georges Island and Gallup Island. There is a light near the end of the shoal off the southeast end of Gallup Island. This channel is suitable only for quick-working vessels on account of the sharp turn into The Narrows.

The Nubble Channel, leading from Nantasket Roads to President Roads between Nix Mate and Long Island, has been dredged 15 feet (4.6 m.) deep and 300 feet wide and is well marked by buoys and a beacon. The course through the channel is about 335° true (N. by W. mag.), heading about 100 yards to the left of Deer Island lighthouse and following the buoys.

Sculpin Ledge Channel leads between Long Island and Spectacle Island, and is good for vessels of about 8-foot (2.4 m.) draft to Hingham Bay by the passage southward of Peddock Island. The deeper water favors Long Island, and in coming from President Roads the island should be followed at a distance of about ¼ mile until up with the red buoy off the easterly end of Sculpin Ledge. Pass close eastward of the buoy, and round the southwesterly end of Long Island at a distance of about 400 yards.

The channel leading from Nantasket Roads to Boston, southward of Long Island and Spectacle Island, is partially marked by buoys, and can be used by boats of 8-foot (2.4 m.) draft with the aid of the chart. Directions to Hingham Bay through this channel are given on page 275.

Boston Lightship, off the entrance to Boston Harbor 6 miles eastward of Boston Lighthouse, has a red hull with "Boston" on each side and a red and black mast surmounted by red gallery and lantern. The light is flashing white (every 3 seconds), 48 feet (14.6 m.) above the water, and visible 11 miles. The fog signal is an air siren (blast 3 seconds, silent 17 seconds). A submarine bell strikes "5–4" every 18 seconds. The radio fog signal sounds groups of 1 dash and 1 dot for 60 seconds and remains silent for 120 seconds. The call letters of the lightship are BAGY, but the station does not maintain radio communication.

Thieves Ledge, with 4 to 6 fathoms (7.3 to 11 m.) over it, is ¾ mile long and about ¼ mile wide. It is dangerous in heavy easterly gales, when the sea breaks on it. The ledge is marked northward of its eastern end by a whistling buoy, which lies 2⅝ miles east-southeastward of Boston Lighthouse. There are spots with 5¾ fathoms (10.5 m.) over them lying ½ mile eastward and 1⅛ miles southeastward of the buoy, upon which the sea sometimes breaks in heavy easterly gales.

Harding Ledge, 2⅜ miles southeastward of Boston Lighthouse and 1½ miles from the shore, is an extensive ledge, bare at low water, and marked by a spindle on its shoalest part, and a black gas and bell buoy ⅜ mile northeastward of the spindle. There is a rock, bare at low water, 300 yards southwestward of the spindle, and very broken ground, not closely examined, between the ledge and the shore westward. Vessels should keep outside the gas and bell buoys.

Point Allerton has shoals extending eastward and northward from it. A black gas and bell buoy placed northward of the point

marks the extent of the shoals. **Ultonia Ledge,** the eastern end of the broken ground, has very broken bottom and unmarked spots, with depths of 3¾ fathoms (6.7 m.), ¾ to 1¼ miles eastward of the point. Point Allerton beacon (black cone on granite pyramid) is 350 yards northward of the point and near the end of the part of the shoal, which is bare at low water.

Boston Lighthouse, on the north side of the entrance to Boston Harbor from southward, is a white conical tower on a small island. The light is flashing white (flash 8 seconds, eclipse 22 seconds), 102 feet (31 m.) above the water, and visible 16 miles. The fog signal is a steam siren, sounding a group of two blasts, each of 3 seconds' duration, every 60 seconds. An auxiliary light, 13 yards from Boston Lighthouse, shows a fixed white light with two fixed red sectors covering the dangers in Nantasket Roads.

Shag or **Egg Rocks** are bare, rugged ledges lying ¼ to over ½ mile eastward of Boston Lighthouse. They are surrounded by extensive submerged ledges.

Great Brewster, Middle Brewster, Outer Brewster, and **Calf Islands** are the larger of the islands lying northward and northeastward of Boston Lighthouse. Great Brewster is 104 feet (32 m.) high, has a bluff at the north end, and is the most prominent. These islands are surrounded by several smaller islands and extensive shoals, bare and submerged.

Great Brewster Spit, extending 1 mile westward from Great Brewster Island, is bare at low water and marked at the west end by **Narrows Lighthouse** (white dwelling on piles) and a beacon, and by another beacon (spindle on granite base) on the south side ¼ mile eastward of the lighthouse.

The Graves are a group of bare rocks and ledges about ½ mile long in a northeasterly direction, and are marked near the southwest end by The Graves Lighthouse. **Northeast Grave** is a rock bare at low water 700 yards northeastward of the lighthouse. A gas and whistling buoy is moored about ½ mile northeastward of the ledge and ⅞ mile northeastward of the lighthouse.

The Graves Lighthouse is a conical granite tower. The light is group flashing white (flash 0.2 second, eclipse 1.3 seconds, flash 0.2 second, eclipse 4.3 seconds), 98 feet (30 m.) above the water, and visible 16 miles. The fog signal is a reed horn, sounding a group of two blasts, each of 3 seconds' duration, every 20 seconds.

The material from the dredged channels in Boston Harbor is dumped in Broad Sound 1 to 3½ miles northeastward and north-northeastward of The Graves Lighthouse. A gas buoy and bell buoy, painted white and marked "DG," are maintained on the dumping ground, and are moved to indicate the locality where dumping is in progress. The only place where marked shoaling has occurred lies 1½ miles 20° true (NE. by N. mag.) from The Graves Lighthouse, and this shoal has been removed to a least depth of 7 fathoms (12.8 m.).

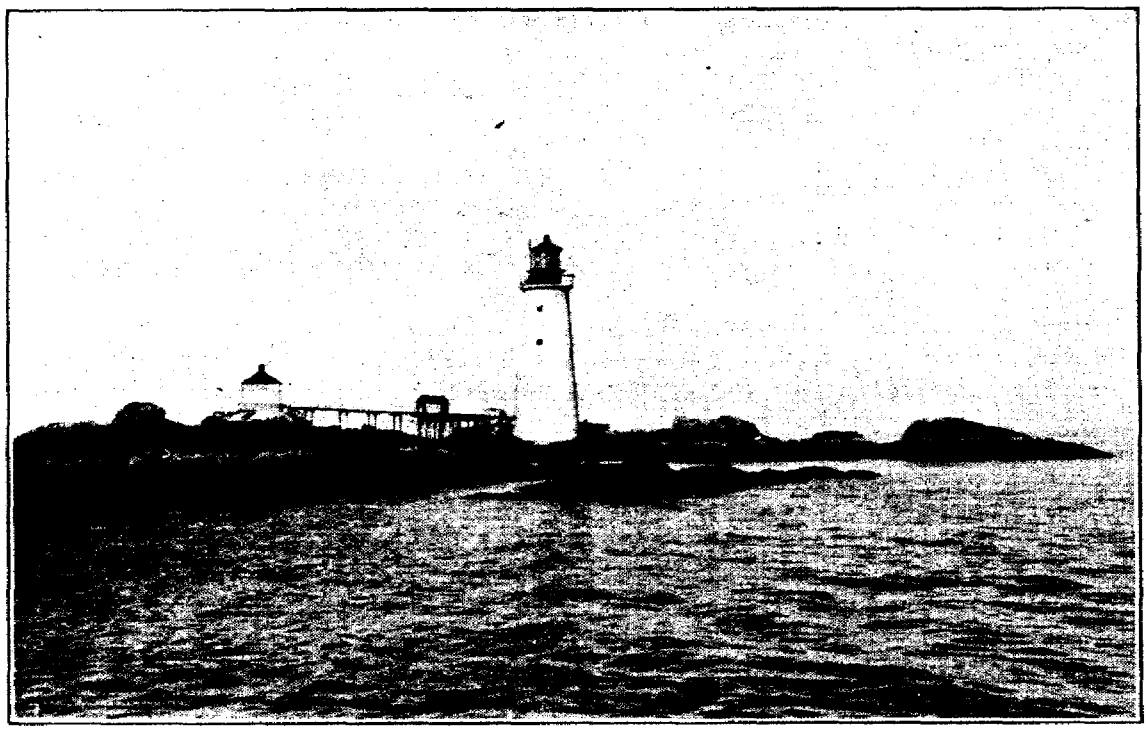
Roaring Bulls, ½ to ⅞ mile southwestward of The Graves Lighthouse, is bare in the highest parts before low water and unmarked.

Green Island, 1¼ miles southwestward of The Graves Lighthouse, is about 30 feet (9.1 m.) high, and is surrounded by several smaller islets and bare and submerged ledges.

Devils Back, 5/8 mile westward of Green Island, is bare at the northeast end at low water.

Lovell Island, on the northeast side of The Narrows and south side of South Channel, has several buildings, and the lights of the Lovell Island range (white conical towers) at the north end. **Ram Head Flats** and **Ram Head** (bare at low water) extend to a greatest distance of 3/4 mile northeastward of the island.

Nix Mate is an extensive reef on the south side of the eastern end of President Roads; near the center is a low grassy island marked by Nix Mate beacon (pyramid on granite base), and at its northwest end is North Channel Front beacon (barrel on spindle on planked dolphin).



The Graves Lighthouse

Gallup Island, westward of Lovell Island, is the site of the United States quarantine station. It has several houses and a wharf on the south side.

Georges Island, southward of Lovell Island and on the north side of Nantasket Roads, has a large fort and several houses. There is a wharf on the west side.

Nantasket Roads, westward of the southern entrance to The Narrows and southward of Georges Island, is a good anchorage. The depths range from 8 to 12 fathoms (14.6 to 21.9 m.). On the westerly side of Georges Island the depths range from 4 to 6 fathoms (7.3 to 11 m.), and better bottom and shelter will be found here in easterly winds. This anchorage is frequently used by vessels seeking shelter in easterly gales.

To enter Nantasket Roads follow the directions on page 272 for Boston Harbor to a position nearly 1/2 mile southward of Boston Lighthouse. Then steer 258° true (W. 1/4 N. mag.), and pass 250 to

300 yards northward of Hunt Ledge horizontally striped buoy. Then bring Boston Lighthouse astern on a 234° true (WSW. mag.) course; at night this course will lead in the white sector of Boston (auxiliary) Light, which is 40 feet from Boston Light and will be in range with it on this course. The course leads southward of two red buoys, marking spots with 16 feet and 14 feet (4.9 and 4.3 m.). When the eastern end of Georges Island closes on the west end of Lovell Island, haul westward and anchor south of Georges Island, keeping Narrows Lighthouse open southward of the island.

Vessels of less than 18-foot (5.5 m.) draft can anchor westward of Georges Island by following the preceding directions until Deer Island Lighthouse is in range with the west end of Gallup Island, bearing 326° true (N. by W. ¾ W. mag.) Then steer this course, pass between Georges Island and the black buoy northeastward of Hospital Shoal, and anchor anywhere westward of Georges Island and southward of Gallup Island, in 4 to 6 fathoms (7.3 to 11 m.) Georges Island is fairly bold on its west side and Gallup Island on its south side.

Rainsford Island, nearly 1 mile westward of Georges Island, is occupied by buildings of city institutions and has a wharf on its south side. Extensive shoals lie southward and southwestward of Rainsford Island.

Long Island, on the south side of President Roads, is 1½ miles long and marked at the north end by **Long Island Head Lighthouse** (white tower with a covered way to a dwelling). There are numerous houses on the middle of the island, and a single tall brick chimney near its highest part.

Deer Island, on the north side of President Roads, and separating Broad Sound from Boston Harbor, is mostly cultivated land in the center, and has some brick buildings and chimneys near its northwest end.

A **naval radiocompass station,** call letters NWM, is located on the northeastern side of Deer Island.

Deer Island Lighthouse, a brown conical tower, is located at the end of a ledge extending ¼ mile southward from Deer Island. The light is fixed white with a red flash every 30 seconds. A red sector covers Finn Ledge and shoals on east side of entrance to Shirley Gut. The fog signal is one stroke of a bell every 10 seconds.

Great Faun Bar and **Little Faun Bar** extend eastward from Deer Island to Broad Sound North Channel. A stone beacon with red spindle is placed on Great Faun Bar 650 yards northwestward of the edge of the channel and near the easterly end of the part of the bar that is bare at low water.

President Roads, a wide and good anchorage, lies between Deer Island Lighthouse and the easterly end of Governors Island Flats. The shoals on the northwest side of the Roads are marked by buoys. The depths in the Roads range from 5 to 10 fathoms (9.1 to 18.3 m.), with Deer Island Lighthouse bearing about 87° true (E. by S. mag.), distant ¼ to 1¼ miles. The quarantine anchorage, on the north side of the Roads, is defined by the harbor master (see "Anchorages"). The Main Ship Channel leads along the southern side of the Roads.

Spectacle Island, on the south side of President Roads at its western end, consists of two islands connected by a gravel spit. It is

marked on the northeast end by the lights of the Spectacle Island range (white conical towers). There are chimneys and an elevated tank on the southwest side of the island, at the northern end of the gravel spit.

BOSTON INNER HARBOR

Channel.—The Main Ship Channel of Boston Harbor has been dredged 35 feet (10.7 m.) deep and 1,200 feet wide from President Roads to the upper end of the navy yard at Charleston. This depth has also been obtained by dredging to the lower bridges in Mystic, Chelsea, and Charles Rivers, but in 1926 slight shoaling had occurred at the mouths of these rivers. An anchorage basin 30 feet (9.1 m.) deep, 350 yards wide, and 7/8 mile long, has been dredged along the northeast side of the Main Ship Channel, southwestward of Bird Island Flats, and considerable dredging has been done to depths of 35 to 40 feet (10.7 to 12.2 m.) at other places along the sides of the 35-foot (10.7 m.) channel. For the channels in the tributaries of Boston Harbor, see their description following.

Governors Island Channel, formerly leading northward and westward of Governors Island Flats, is being filled by the dumping of material from the dredging channels, and is no longer navigable.

The northern part of Boston Harbor, northward of the Main Ship Channel and between the entrance and East Boston, is full of extensive flats, bare at low water, between which crooked natural channels lead. Several channels have been dredged through the flats to depths of 6 to 8 feet (1.8 to 2.4 m.) to yacht clubs at the head. These channels are usually marked by bush stakes or private spindles in summer. The best approach is from southeastward, between the western end of Deer Island Flats and the eastern end of Apple Island Flats. The easterly channel was dredged 8 feet (2.4 m.) deep, and leads to the west side of **Winthrop Beach.** An anchorage basin of the same depth was dredged at the head. A light marks the west side of the entrance of the dredged channel.

Castle Island, on the southwest side of Main Ship Channel 1 mile northwestward of Spectacle Island, is marked by Fort Independence and is connected with the shore westward by a dike. There are a number of bowlders, bare at low water, lying a short distance southeastward of Castle Island.

Pleasure Bay lies immediately westward of Castle Island. There are depths of 16 to 25 feet (4.9 to 7.6 m.) inside, and it is used as an anchorage for pleasure boats.

Old Harbor lies about 1 mile westward from Castle Island. There is a large yacht club on its shores, and there is a channel with a least depth of about 6 feet (1.8 m.) leading to the wharves. In the northeastern part of the harbor an anchorage basin has been dredged to 9 feet (2.7 m.).

Governors Island, on the northeast side of Main Ship Channel and 1/2 mile north-northeastward of Castle Island, is about 100 feet (30 m.) high, grassy, and marked by Fort Winthrop on its summit. The area between Governors Island and East Boston is being filled in.

Reserved Channel has been dredged to 30 feet (9.1 m.) to the bridge, and a modern and extensive freight terminal has been con-

structed on the north side of the channel. This terminal has a berthing space of over 4,500 feet, with depths of 30 feet (9.1 m.) and more alongside. The entrance to the channel is marked by a light.

Beyond the bridge the channel has been dredged to 12 feet (3.7 m.) to its head.

The bridge has a horizontal clearance of 39.8 feet and a headroom of 6.4 feet (1.9 m.) above mean high water when closed. The signal for opening the draw is two long and two short blasts of the whistle.

The **city of Boston** includes within its limits **East Boston, Charlestown, South Boston, Roxbury, Dorchester,** and **Neponset.** East Boston is on the northeastern side of the harbor, and is separated from the city of Chelsea by Chelsea River. There are modern piers here where trans-Atlantic passenger steamers berth regularly.

Chelsea is separated from Charlestown, on the western side of the harbor, by the Mystic River, and Charlestown from Boston proper by the Charles River. The **United States Navy Yard** occupies a large part of the deep water front of Charlestown. South Boston is on the peninsula southeast of the city proper, from which it is separated by South Bay and Fort Point Channel.

Commonwealth Pier, an extensive terminal with slips dredged to 42 feet (12.8 m.), lies about midway between Fort Point Channel and Reserved Channel.

Fort Point Channel and **South Bay** separate Boston proper from South Boston. In a distance of 1 mile from its entrance in Boston Harbor, Fort Point Channel is crossed by eight bridges. A dredged channel 175 feet wide and 22 feet (6.7 m.) deep leads from the entrance to Dorchester Avenue Bridge, a distance of nearly ¾ mile. From the latter bridge to the head of South Bay the depth is 12 feet (3.7 m.). Sailing vessels employ towboats if bound into Fort Point Channel or South Bay.

Bridges, Fort Point Channel.—The draws of the bridges crossing Fort Point Channel are kept closed at certain hours. See "Bridge regulations" on page 266. The following are the drawbridges crossing the channel, named in order from the mouth, the least width of draw openings, and the clear height above mean high water when closed:

Northern Avenue (highway), 75.6 feet, 7.6 feet (2.3 m.).

Congress Street (highway), 51.2 feet (east), 6.4 feet (1.9 m.).

Summer Street (highway), 51 feet, 4.6 feet (1.4 m.).

Dorchester Avenue (highway), 42 feet, 4.6 feet (1.4 m.).

New York, New Haven & Hartford Railroad, 44.3 feet, 8.4 feet (2.5 m.).

New York, New Haven & Hartford Railroad (Y connection), 50 feet.

Broadway (highway), 50 feet.

Dover Street (highway), 40.7 feet, 15.4 feet (4.7 m.).

The signal for opening these bridges is two long followed by two short blasts of the whistle.

Charles River, on the western side of the harbor between Boston proper and Charlestown, is the approach by water to the city of

Cambridge and **Watertown.** The entrance of the river to the first bridge has been dredged for its full width to a depth of 35 feet (10.7 m.). Thence to the **Charles River Dam,** a distance of ½ mile, the depth is about 21 feet (6.4 m.). The lock in the Charles River Dam is 350 feet long between gates, with a clear width of 45 feet, and has a depth of 17 feet (5.2 m.) at low water on the lower sill; the upper sill has 21 feet (6.4 m.) over it at the level of the river above the dam. Charles River above Charles River Dam is maintained at a height of 7.4 feet (2.2 m.) above mean low water; a depth of 14 feet (4.3 m.) can be taken 3 miles above the dam to Western Avenue Bridge, thence 2¼ miles to Arsenal Street Bridge 13 feet (4 m.), thence 2 miles to the head of navigation at the dam at Watertown 9 feet (2.7 m.). Charles River above the dam is used by small vessels and many yachts and small craft. No toll is charged for passage through the lock.

Bridges, Charles River.—Nine bridges, all with draws, cross Charles River between the entrance and Charles River Dam. They are closed during certain hours, as described under "Bridge regulations," on page 266. The first bridge has two draw openings 50 feet wide and a headroom of 23 feet (7 m.) at high water when closed. The others have a least draw width of 36.5 feet and no headroom at high water when closed. The following are the bridges, named in order from the mouth: Charles River, Warren, Boston & Maine (formerly Fitchburg) Railroad for teams, Boston & Maine (formerly Fitchburg) Railroad, Boston & Maine Railroad, Boston & Maine (formerly Eastern) Railroad, Boston & Maine (formerly Lowell Passenger) Railroad, Boston & Maine (formerly Lowell Freight) Railroad, and Boston Elevated Railway.

Between Charles River Dam and the head of navigation 11 bridges cross the river. These bridges all have fixed spans with overhead clearances of 12 feet (3.7 m.) at basin level.

Mystic River, entering the north end of Boston Harbor from northwestward, between Charlestown and Chelsea, is the approach to several wharves near the lower end, and to the towns of **Medford** and **Malden.** The channel in Mystic River has been dredged 30 feet (9.1 m.) deep for a distance of 1 mile above Chelsea Bridge at the entrance, and 16 feet (4.9 m.) deep for a further distance of about ⅜ mile, to a point 150 yards below the second bridge. The river above has been improved by dredging a channel 6 feet (1.8 m.) deep and 100 feet wide to Dennings coal wharf, 2¾ miles above the entrance, and 4 feet (1.2 m.) deep and 100 to 50 feet wide to Medford, 4⅜ miles above the entrance. There is a lock at Medford, 15 feet wide and 45 feet long, and the river has a navigable depth of 4 to 7 feet (1.2 to 2.1 m.) for 2 miles above the lock to **Lower Mystic Lake.** The deepest draft using the lower part of the river is 28½ feet (8.7 m.) and the deepest draft ordinarily going to Medford is 11 feet (3.4 m.), mostly coal barges. The channel above the second bridge is crooked and very narrow in places.

Bridges, Mystic River.—Mystic River is crossed by six drawbridges between the entrance and Medford. The bridges remain closed at certain hours as described under "Bridge regulations," on page 266. The following are the bridges, named in order from the mouth, the width of the draw openings, and the overhead clearance at high water when closed:

Chelsea (north), each opening 125 feet, 13 feet (4 m.).
Malden, 75 feet, 6 feet (1.8 m.).
Boston Elevated, 75 feet, 28 feet (8.5 m.).
Boston & Maine (eastern division), 45 feet, no clearance.
Boston & Maine (western division), 43.5 feet, no clearance.
Wellington, 50 feet, 6.8 feet (2.1 m.).

Little Mystic River is the name given a long slip just northward of the navy yard. It has depths of 18 to 20 feet (5.5 to 6.1 m.) and is crossed by one bridge with a draw span. There is a horizontal clearance of 75 feet and a vertical clearance of 25 feet (7.6 m.) at high water with the bridge closed.

Island End River is a tributary of Mystic River from northward ½ mile above the entrance. There is a large wharf at the western entrance of Island End River with a channel dredged to 30 feet (9.1 m.) leading to it. In 1926 there was a least depth of 24 feet (7.3 m.) to the coke and coal wharf on the west bank of the river and 13 feet (4 m.) to the wharf 350 yards above the coke and coal wharf. Above this the river is shoal; from 4 feet to 1½ feet (1.2 to 0.4 m.) at its head. There is considerable business to the wharves near the entrance, principally vessels carrying coal and oil. A rocky shoal on the east side at the entrance, and the current of Mystic River running across the entrance, make navigation difficult for large vessels. A towboat is usually employed to assist such vessels.

Malden River, a tributary of Mystic River from northward, 1¾ miles above its entrance, has been improved by dredging a channel 6 feet (1.8 m.) deep at mean low water from the mouth of the river to a point about 75 feet below the Medford Street Bridge.

Bridges.—Malden River Bridge, crossing Malden River ½ mile above its entrance, has a draw opening 50.3 feet wide, and a headroom of 7.7 feet (2.3 m.) in the center at high water when closed. Medford Street Bridge, crossing Malden River just above the head of the dredged channel, has a draw opening 35.9 feet wide and a headroom of 3.9 feet (1.2 m.) at high water when closed. The bridges are opened at all times on a signal of two long and two short blasts. See "Bridge regulations" on page 266. Three bridges cross Mystic River below the mouth of Malden River, as described under Mystic River.

Chelsea River, emptying into Boston Harbor from eastward between East Boston and Chelsea, is the approach to important wharves near the entrance, and to the town of **Revere** at the head, 2⅝ miles above the entrance. The 35-foot (10.7 m.) dredged channel of Boston Harbor leads to Meridian Street Bridge, just inside the entrance. From this bridge to Chelsea Street Bridge, ¾ mile above, the channel has been dredged 24 feet (7.3 m.) deep and 150 feet wide. A channel 25 feet (7.6 m.) deep has been dredged by private interests to the Mexican Petroleum Co. wharf, ¼ mile above Chelsea Street Bridge. The channel has been dredged 8 feet (2.4 m.) deep at low water and 150 feet wide from this point to the head of navigation at Revere.

Bridges.—Three drawbridges cross Chelsea River between the entrance and the head of navigation. Meridian Street Bridge has an opening 100 feet wide on the south side and 30 feet wide on the north side, and a headroom of 5 feet (1.5 m.) at high water when

closed. Chelsea Street Bridge has two openings 60 feet wide, and a headroom of 4 feet (1.2 m.) at high water when closed. Grand Junction Railroad bridge has a single opening 70 feet wide, and a headroom of 3 feet (0.9 m.) at high water when closed.

The signal for opening the Meridian Street Bridge is two long blasts followed by two short and one long blast of the whistle. The signal for the other bridges is two long blasts followed by two short blasts, as described under "Bridge regulations" on page 266.

GENERAL INFORMATION

Anchorages.—President Roads and Nantasket Roads are the usual anchorages for vessels in the lower bay. The anchorage for vessels and yachts in the inner harbor is limited, but good holding ground in 3¾ to 5 fathoms (6.8 to 9.1 m.) will be found on both sides of the channel above Governors Island, within the limits prescribed by the harbor master. The anchorage for deep-draft vessels is in the 30-foot dredged anchorage basin on the northeast side of the channel off Bird Island Flats; the northeasterly side of the anchorage is marked by beacons. Yachts and Government vessels anchor off the entrance of Fort Point Channel, between Boston and South Boston, and northward of the New York, New Haven & Hartford Railroad piers, as defined by the anchorage regulations following.

Special signals.—The call for the harbor master or police steamer is three short and one long blasts of the whistle.

The call for the fire boat is three long and two short blasts of the whistle.

The call for the port physician is two long blasts followed by two short and one long blasts.

The call for a pilot is five long blasts of the whistle.

Harbor and anchorage regulations.—A pamphlet containing the rules and regulations of the harbor master, together with photographs showing the various anchorage limits, may be obtained at the harbor master's office, corner of Battery and Commercial Streets. The following anchorage regulations are in force:

UPPER HARBOR, BIRD ISLAND ANCHORAGE

1. All vessels anchoring in this basin shall anchor within the following marks, viz:

The westerly end of the Quincy Market cold storage building on Eastern Avenue in range with the easterly end of the gasometer at the North End Gas Works and southeast of a line with the coal elevators on the pier of the Massachusetts Wharf Coal Co. (adjoining the terminal of the Boston, Revere Beach & Lynn Railroad), in East Boston, in range and 600 feet from the wharves in East Boston. Vessels of light draft to take the inside berth. An area northwest of red spar buoy No. 12 on the northeast side of this anchorage basin is reserved for steamers exclusively. No light vessel shall anchor on this anchorage without the permission of the harbor master.

SOUTH BOSTON ANCHORAGE

2. All vessels anchoring on South Boston flats shall anchor within the following marks, viz:

The round chimney on the cold storage building on Richmond Street in range with the granite block on Long Wharf and southeast of the Metropolitan Coal Co.'s channel.

YACHT ANCHORAGE

3. This anchorage is reserved for yachts and vessels of the United States Government, and they shall anchor within the following marks, viz:

The round chimney on the cold-storage building on Richmond Street, between Commercial Street and Atlantic Avenue, in range with the granite block on Long Wharf; to the westward of the dock between Pier 1 and Pier 2, New York, New Haven & Hartford Railroad; the flagstaff on freight house No. 2, on the Fort Point Channel side of the New York, New Haven & Hartford Railroad Docks in range with the northerly side of the Atlas Stores building in South Boston; and not less than 500 feet from Pier 1, New York, New Haven & Hartford Railroad Docks.

4. No vessel shall anchor northwest of these ranges without permission from the harbor master.

5. No vessel shall anchor in the dredged channel to the American Molasses Co.'s wharf in South Boston nor in the reserved channel to L Street Bridge.

6. Before loading or discharging cargo or coal into or from a vessel at anchor in the upper harbor the master, consignee, or stevedore must obtain a permit from the harbor master. (Such vessel if not anchored in a proper place must be assigned a berth before such permit is granted.)

7. No vessel shall receive or deliver gasoline or other supplies in the streams or channels of the harbor outside of the anchorage areas.

LOWER HARBOR, PRESIDENT ROADS, AND QUARANTINE ANCHORAGE

8. All vessels shall anchor northeast of a line from Deer Island Light in range with Little Calf Island and west of a line from the westerly end of the main prison building of the house of correction at Deer Island in range with the water tower on Winthrop Head.

9. All vessels anchoring between Spectacle and Castle Islands shall anchor southwest of a line drawn from the barn on the hill on Spectacle Island and the southwest end of the fort on Castle Island.

NANTASKET ROADS ANCHORAGE

10. Between April 1 and November 1 in each year all vessels shall anchor southwest of a line of the northeasterly end of the most northeasterly barracks building on Long Island in range with the lighthouse on Long Island Head or northeast of a line of the sea wall on the east head of Long Island in range with the tree on the southeast end of Apple Island and 500 feet from the shore of Georges Island.

11. No vessel shall anchor in The Narrows or the entrance thereto.

12. No vessel shall anchor in Lighthouse Channel southwest of a line between Kelly Ledge and Nash Rock buoys or northeast of a line between Hunt Ledge and the buoy on Point Allerton Bar.

13. No vessel shall anchor in the dredged channels in Broad Sound or so as to obstruct the view of any range light in any part of the harbor.

NOTE.—The words "within the following marks" in these regulations shall mean that vessels according to their lengths shall anchor far enough inside these marks to clear the line of buoys on either side of the channel with the wind from any point.

Harbor regulations.—The following are extracts from the statutes and are enforced by the harbor master:

SEC. 15. Whoever uses a boat propelled in whole or in part by gas, gasoline, or naphtha, unless the same is provided with a muffler or an under-water exhaust, so constructed and used as to muffle in a reasonable manner the noise of the explosion, shall be punished by a fine of not more than $25.

SEC. 17. Whoever wilfully and without lawful authority or license therefor deposits in a harbor or other navigable tide waters stones, gravel, mud, ballast, cinders, ashes, dirt, or any other substance tending to injure the navigation or to shoal the depth thereof shall be punished by a fine of not more than $20.

SEC. 18. No warp or line shall be passed across a channel or dock so as to obstruct vessels passing along the same.

SEC. 21. The master of a vessel within a harbor for which a harbor master is appointed shall anchor his vessel according to the regulations of the harbor master and shall move to such place as the harbor master directs. The master of a towboat having a vessel in tow and a pilot having a vessel in charge shall allow such vessel to anchor only in such place as the regulations of the harbor master provide for anchorage.

SEC. 22. The master of a vessel, before unloading lumber in the stream or channel of a harbor having a harbor master, shall obtain from him a permit, designating where such lumber may be rafted.

SEC. 23. A vessel lying in the harbor or at a wharf or pier in a harbor shall, if so directed by the harbor master, cockbill the lower yards, brace the topsail yards fore and aft, and rig in the jib boom.

SEC. 24. A harbor master may, at the expense of the master or owner thereof, cause the removal of any vessel which lies in his harbor and is not moved when directed by him, and upon the neglect or refusal of such master or owner on demand to pay such expense he may recover the same from them in an action of contract, to the use of the town in which the harbor is situated.

SEC. 25. If the master or other person in charge of a vessel occupying a berth at a wharf or pier fails, after notice from the wharfinger thereof or his agent, to remove his vessel from such berth within such time as the harbor master adjudges reasonable, the harbor master shall cause such vessel to be moved to some other berth or anchored in the stream and may recover the expense of such removal in an action of contract from the master or owners thereof, to the use of the town in which the harbor is situated.

SEC. 26. A harbor master may regulate and station all vessels in the streams or channels of his harbor and may remove such as he determines are not fairly and actually employed in receiving or discharging their cargoes, to make room for such others as require to be more immediately accommodated for such purposes.

SEC. 27. Harbor masters shall report to the department of public works any violation of section 17 or of any law relating to tide water in their respective harbors, and of all shipwrecks in the tide waters of their respective harbors and of any obstructions therein.

SEC. 28. Whoever violates any of the provisions of the 10 preceding sections or refuses or neglects to obey the lawful orders of a harbor master, or resists him in the execution of his duties, shall be punished by a fine of not more than $50, and shall be liable in an action of tort to any person suffering damage thereby.

Holidays.—The following are the legal holidays of the State of Massachusetts and are observed in the port of Boston:

January 1, New Year's Day.
February 22, Washington's Birthday.
April 19, Patriots' Day.
May 30, Memorial Day.
July 4, Independence Day.
September, first Monday, Labor Day.
October 12, Columbus Day.
November, usually last Thursday, Thanksgiving Day.
December 25, Christmas Day.

In addition, the following days, although not legal holidays, are usually observed locally, as directed by proclamation of the governor:

February 12, Lincoln's Birthday.
April, last Saturday, Arbor and Bird Day.
November 11, Armistice Day.

Pilots.—Pilotage into Boston Harbor is compulsory, with a few unimportant exceptions which seldom occur, for all vessels engaged in the foreign trade, but not for vessels engaged in the coasting trade. Pilots cruise in pilot boats, which are designated by the numbers painted in black figures 4 feet high. The pilot boat cruises in the vicinity of the Boston Lightship. Vessels bound for Lynn or Beverly

and desiring a pilot usually speak the pilot boat for information. The office of the Boston Pilots will be found on the Long Wharf. The following are extracts from pilotage regulations for Boston Harbor and tributaries:

Every vessel bound into the harbor of Boston liable to pilotage, which shall arrive within a line drawn from Harding Ledge to The Graves and thence to Nahant Head, without having been offered the service of a pilot, shall be exempt from the payment of pilotage fees; but if thereafter she requests and receives such services, she shall pay the regular rates.

Any vessel of not more than 350 tons register, bound into the port of Boston, declining the services of a pilot shall, if otherwise liable under the provisions of law to the payment of pilotage fees, be liable only for one-half of the regular fees; but if such vessel request and receive such services, the regular fees shall be paid therefor.

No vessel of under 350 tons register bound out from the port of Boston shall be held to pay pilotage fees for services tendered and declined; but if such vessel request and receive such services the regular fees shall be paid therefor.

All coastwise steam vessels not sailing under register regulated by the laws of the United States and carrying a pilot commissioned by United States commissioners, all vessels regularly employed in the coasting trade, all fishing vessels other than whalers, and all vessels of less than 7-feet (2.1 m.) draft of water shall be exempt from the compulsory payment of pilotage.

Whenever any vessel exempt from the compulsory payment of pilotage requests the aid of a pilot, any pilot so requested shall serve such vessel in like manner as vessels not so exempt and shall be entitled to the regular compensation therefor.

The established pilot signal by day is a white and blue flag, white next to the mast, and in the night a white light at the masthead.

A vessel taking steam by the desire of the master thereof shall pay full pilotage fees, but when steam is taken by direction of the pilot in charge such vessel shall be held to pay but 75 per cent of the regular fees.

National vessels, both when inward and when outward bound, shall, if they employ a pilot, pay the same rates as vessels in the merchant service.

When a vessel is anchored for 12 hours or more under any regulation relative to quarantine or to alien passengers the pilot in charge, upon piloting such vessel to her port of destination, shall be entitled to an addition of 25 per cent to the regular fees.

When a pilot, without any fault or negligence of his own or of his associates, is unable to leave the vessel under his charge and is carried to sea he shall be entitled to $5 for each day on which he is necessarily detained from home.

It shall be the duty of every pilot, after having brought a vessel to the inner harbor of Boston, to have such vessel properly moored in the stream or secured to a wharf (below the bridges), at the option of the master, within 24 hours after arrival, weather and tide permitting, without extra charge.

The fees for hauling a vessel from the stream to a wharf (below the bridges), after the expiration of 24 hours from arrival, shall be $10, and for hauling a vessel from the wharf to the stream, provided the vessel does not proceed to sea within 24 hours from the time of anchoring, $10.

If any vessel outward bound, having a pilot on board, should anchor in Nantasket Roads, it shall be the duty of the pilot to remain on board said vessel, if requested by the master, until the next high water; and if detained after that time he shall be entitled to receive $10 per day for each and every day so detained.

No pilot shall leave a vessel outward bound, until outside of Boston Light, without permission of the master of said vessel.

Neponset River.—The pilotage for the several landing places in the towns of Dorchester and Neponset shall not be compulsory. When the services of a pilot are required, the rates of pilotage authorized by the commissioners shall be $1 per foot on inward draft. Outward vessels without cargo, $5 per vessel; with cargo, same as inward.

Hingham, East Weymouth, Quincy, Quincy Point, Weymouth, East Braintree, and **Nantasket.**—The pilotage for the above places shall not be compulsory. When the services of a pilot are required and are offered outside of a line drawn from Nantasket Point to the east point of Peddock Island,

from thence a line drawn to the northwest point of said Peddock Island, from thence in a line to Sunken Ledge, from Sunken Ledge in a direct line to Hangman Island, the rates of pilotage authorized by the commissioners shall be, viz:

East Weymouth [1]			Quincy Point			Hingham		
Draft of water	Rate per foot	Amount	Draft of water	Rate per foot	Amount	Draft of water	Rate per foot	Amount
Feet			*Feet*			*Feet*		
7	$0.88	$6.16	7	$0.72	$5.04	7	$0.92	$6.44
8	.90	7.20	8	.72	5.76	8	.95	7.60
9	.92	8.28	9	.72	6.48	9	.97	8.70
10	.93	9.30	10	.80	8.00	10	1.00	10.00
11	.99	10.89	11	.92	10.12	11	1.00	11.00
12	1.10	13.20	12	1.00	12.00	12	1.10	13.20
13	1.25	16.25	13	1.25	16.25	13	1.25	16.25
14	1.40	19.60	14	Same as East Weymouth.				
15	1.50	22.50	15					
16	1.60	25.60	16					
17	1.70	28.90	17					
18	1.80	32.40	18					
19	1.90	36.10	19					
20	2.00	40.00	20					
21	2.10	44.10	21					
22	2.20	48.40	22					
23	2.30	52.90	23					
24	2.40	57.60	24					
25	2.50	62.50	25					

[1] Nantasket, Quincy, Weymouth Landing, and Braintree, same rates as East Weymouth. Inward and outward rates the same.

Lynn.—The pilotage for the harbor of Lynn shall be $1 per foot inward. Same outward. For Saugus River, $1.25 per foot. Not compulsory.

RATES OF PILOTAGE FOR BOSTON HARBOR

Net tonnage:	Rate per foot draft
Under 500 tons	$3.00
501 to 1,000, inclusive	3.50
1,001 to 1,500, inclusive	4.00
1,501 to 2,000, inclusive	4.50
Over 2,000	5.00

Towboats.—Towboats can be ordered from Boston by making signal off the reporting stations. They can also be obtained by applying at the various towboat offices. Fire and wrecking tugs are to be obtained, and will take tows to or from any point on the Atlantic coast between Nova Scotia and the Gulf of Mexico. Steam lighters can be obtained.

Quarantine.—Quarantine for the port of Boston is enforced in accordance with the regulations of the United States Public Health Service. The quarantine station is on Gallup Island, and vessels are boarded in President Roads. Vessels undergoing quarantine are anchored in President Roads as directed by the port physician. See "Anchorage regulations" preceding. The call for the quarantine officer is two long blasts of the whistle, followed by two short and one long blasts.

Marine hospital.—There is a marine hospital at Chelsea. The service has an office and dispensary at the customhouse, Boston, where out-patients are treated by an officer of the service, who is also the proper person to whom to apply for admission to the hospital.

Supplies.—Fuel oil can be obtained from the wharves or from barges. There are good facilities for bunkering coal burning vessels.

The city water is of a good quality and suitable for either drinking or boiler purposes. Gasoline can be obtained from floats anchored near Fort Point Channel.

Wharves.—The wharves of Boston have depths sufficient for the largest vessels, the greatest depths being 40 feet (12.2 m.) or more, which exist at the Commonwealth Pier. There are public float landings for small craft in Fort Point Channel, at the eastern end of the first bridge and the western part of the third bridge.

Repairs.—There are a number of dry docks and marine railways available for vessels of all sizes. For details see the table on page 6. Repairs of all kinds and of any magnitude can be undertaken. Large vessels are built at Quincy on Weymouth Fore River. The Boston Navy Yard Dock No. 3 is capable of dry docking the largest vessel in the world. It is located just northward of the Reserved Channel.

Weather.—The prevailing winds are southwesterly during the summer and northerly during the winter. At all seasons the heaviest gales are usually from the northeastward or eastward.

Fogs are prevalent throughout the year. For statistics see table on page 9. Winds from the east to southwest bring fog while westerly and northerly winds clear it away.

Storm warnings.—Day signals are displayed from the post-office building and night signals are shown from the customhouse tower. Day and night signals are displayed from a tower on Nantasket Hill near Hull.

Ice.—The channels of Boston Harbor are navigable throughout the year. Ice rarely forms in the main channels. Occasionally during severe winters the greater part of the harbor is frozen, but towboats and steamers keep the main channels open. The Charles, Mystic, and Chelsea Rivers, and the minor passages in the harbor are sometimes frozen during severe weather. When ice is prevalent, the buoys may be displaced or even carried away by it. Local towboats can be employed for the purpose of breaking ice.

A Coast and Geodetic Survey field station is located at 92 State Street where complete files of the Coast and Geodetic Survey charts, coast pilots, tide tables, current tables, and other publications relating to navigation may be consulted and information affecting navigation obtained without charge. The field station is also a sales agency for Coast and Geodetic Survey publications.

A United States branch hydrographic office is established at the customhouse. Bulletins are posted here giving information of value to seamen, 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.

Time ball.—A time ball is dropped daily at noon, seventy-fifth meridian time, from the Ames Building, Boston, and is visible from the harbor.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.) at Boston Lighthouse and about 9½ feet (2.8 m.) at Boston Navy Yard. The predicted times and heights of high and low water for every day in the year at the Commonwealth Pier are given in the tide tables, published in advance by the Coast and Geodetic Survey.

BRIDGE REGULATIONS

The following are extracts from the rules and regulations prescribed by the Secretary of War to govern the opening of the drawbridges across Boston Harbor and tributaries:

BRIDGES WITHOUT CLOSED HOURS

1. The draw in each and every bridge hereafter named in this paragraph shall, upon the signal prescribed in paragraph 7 below being given, be opened promptly at all hours for the passage of any vessel or vessels or other water craft not able to pass underneath it: *Provided*, That when the draw in any of the said bridges shall have been open for 10 minutes or longer it may be closed for the crossing of trains, cars, vehicles, or individuals, if any be waiting to cross, and after being so closed for 10 minutes or for such shorter time as may be necessary for the said trains, cars, vehicles, or individuals to cross, it shall be again opened promptly for the passage of vessels or other water craft if there be any such desiring to pass. The requirements of this paragraph shall apply to each and every one of the following-named bridges, so called, to wit:

Across Chelsea Creek or Chelsea River.—Meridian Street Bridge, Chelsea Street Bridge, and Grand Junction Railroad Bridge.

Across Mystic River.—Wellington Bridge.

Across Malden River.—Malden River Bridge on Revere Beach Parkway and Medford Street Bridge at Malden.

Across Reserved Channel.—L Street Bridge, South Boston.

Across Neponset River.—New York, New Haven & Hartford Railroad Bridge, Neponset Avenue Bridge, and Granite Bridge.

Across Weymouth Fore River.—Quincy Point Bridge and East Braintree Bridge.

Across Weymouth Back River.—Hingham Bridge.

Across Crystal Cove.—Boston, Revere Beach, & Lynn Railroad bridge.

Across Tenean Creek.—Commercial Point or Tenean Bridge.

BRIDGES WITH CLOSED HOURS

2. Between the hours of 9 a. m. and 4.30 p. m. and between the hours of 7 p. m. and 6.30 a. m. on week days, and at all hours on Sunday and on legal holidays observed in the locality, the draws in each and every bridge hereafter named in this paragraph shall, upon the signal prescribed in paragraph 7 below being given, be opened promptly for the passage of any vessel or vessels or other water craft not able to pass underneath it: *Provided*, That when the draw in any of the said bridges shall have been open for 10 minutes or for such shorter period as may be necessary for the passage of vessels or other water craft desiring to pass, between the hours aforesaid, it shall be closed for the crossing of trains, cars, vehicles, or individuals if any be waiting to cross, and after being so closed for 10 minutes or for such shorter time as may be necessary for said trains, cars, vehicles, or individuals to cross, it shall be again opened promptly for the passage of vessels or other water craft if there be any such desiring to pass. Between the hours of 6.30 a. m. and 9 a. m. and between the hours of 4.30 p. m. and 7 p. m. the draws in the bridges hereafter named in this paragraph shall not be required to be opened on week days for the passage of any vessel, vessels, or other water craft except during the periods between 7.05 a. m. and 7.15 a. m., between 8 a. m. and 8.10 a. m., between 5.20 p. m. and 5.30 p. m., and between 6.20 p. m. and 6.30 p. m., and excepting also as provided in paragraphs 4, 5, and 11 of these rules and regulations. The requirements of this paragraph shall apply to each and every one of the following-named bridges, so called, to wit:

Across Mystic River.—Chelsea Bridge South, Chelsea Bridge North, Malden Bridge, Boston & Maine (eastern division) Railroad bridge, and Boston & Maine (western division) Railroad bridge.

Across Fort Point Channel.—Northern Avenue Bridge, Congress Street Bridge, and Summer Street Bridge.

3. Between the hours of 9.10 a. m. and 4.15 p. m. and between the hours of 7.40 p. m. and 6.15 a. m. on week days, and at all hours on Sundays and on legal holidays observed in the locality, the draws in each and every bridge

hereafter named in this paragraph shall, upon the signal prescribed in paragraph 7 below being given, be opened promptly for the passage of any vessel or vessels or other water craft not able to pass underneath it: *Provided*, That when the draw in any of the said bridges shall have been opened for 10 minutes or for such shorter period as may be necessary for the passage of vessels or other water craft desiring to pass, between the hours aforesaid, it shall be closed for the crossing of trains, cars, vehicles, or individuals, if any be waiting to cross, and after being so closed for 10 minutes or for such shorter time as may be necessary for the said trains, cars, vehicles, or individuals to cross, it shall be again opened promptly for the passage of vessels or other water craft, if there be any such desiring to pass. Between the hours of 6.15 a. m. and 9.10 a. m. and between the hours of 4.15 p. m. and 7.40 p. m. the draws in the bridges hereafter named in this paragraph shall not be required to be opened on week days for the passage of any vessel, vessels, or other water craft, excepting that when the tide is high at Charlestown Navy Yard between 6.15 a. m. and 9.10 a. m. the drawbridges hereafter named in this paragraph shall be opened for a period between 6.15 a. m. and 9.10 a. m. not exceeding 10 minutes and within 45 minutes before or after said high tide for the passage of all vessels or other water craft when of a draft of 12 feet or over, if there be any such desiring to pass; the exact time of opening within the prescribed limits of 45 minutes before and after said high tide to be prescribed by the railroad companies, due regard being had for causing minimum interference with railroad schedules, highway traffic, and the interests of navigation. The opening time of each bridge shall be so fixed as to permit continuous passage through the next and following bridges located in direction of course of vessel or other water craft.

Across Charles River.—Charlestown Bridge, Warren Bridge, Boston & Maine (formerly Fitchburg) Railroad bridge, for teams; Boston & Maine (formerly Fitchburg) Railroad bridge, Boston & Maine Railroad bridge, Boston & Maine (formerly Eastern) Railroad bridge, Boston & Maine (formerly Lowell passenger) Railroad bridge, Boston & Maine (formerly Lowell freight) Railroad bridge, Boston Elevated Railway bridge, and Charles River Dam Bridge.

Across Fort Point Channel.—Dorchester Avenue Bridge, New York, New Haven & Hartford Railroad bridge, New York, New Haven & Hartford (Y connection) Railroad bridge, Broadway Bridge, Dover Street Bridge, and New York, New Haven & Hartford (South Bay Junction) Railroad bridge.

4. The draw in Chelsea Bridge, North, shall, upon the signal prescribed in paragraph 7 below being given, be opened promptly at all hours for the passage of any vessel, vessels, or other water craft whose draft is 18 feet or more; and any vessel, vessels, or other water craft proceeding upstream that during any of the periods on week days from 7.05 a. m. to 7.15 a. m., 8 a. m. to 8.10 a. m., 5.20 p. m. to 5.30 p. m., and 6.20 p. m. to 6.30 p. m., shall have passed through Chelsea Bridge North or through any other bridge across Mystic River between Chelsea Bridge North and Boston & Maine (western division) Railroad bridge, shall be passed promptly on signal through each and all of the bridges located upstream from Chelsea Bridge North, the provisions of paragraph 2 of these rules and regulations to the contrary notwithstanding; and any vessel, vessels, or other water craft proceeding downstream that during any of the aforesaid periods shall have passed through Boston & Maine (western division) Railroad bridge or through any other bridge across Mystic River between Boston & Maine (western division) Railroad bridge and Chelsea Bridge North shall be passed promptly on signal through each and all of the bridges located downstream from Boston & Maine (western division) Railroad bridge, the provisions of paragraph 2 of these rules and regulations to the contrary notwithstanding.

5. The draws in Northern Avenue Bridge, Congress Street Bridge, and Summer Street Bridge shall upon the signal prescribed in paragraph 7 below being given be opened promptly at all hours for the passage of any vessel, vessels, or other water craft whose draft is eighteen (18) feet or more.

Any vessel, vessels, or other water craft proceeding upstream through Northern Avenue Bridge shall be afforded continuous passage through Congress Street Bridge and Summer Street Bridge; and any vessel, vessels, or other water craft proceeding downstream through Summer Street Bridge, shall be afforded continuous passage through Congress Street Bridge and Northern Avenue Bridge, the provisions of paragraph 2 of these rules and regulations to the contrary notwithstanding.

6. The length of time that a draw has been open shall be computed from the time that the draw span begins to move in opening, and the length of time that a draw has been closed shall be computed from the time that the draw span ceases to move in closing.

7. When a vessel or other water craft intends to pass through the draw of one of the bridges covered by these rules and regulations the master or pilot of the vessel or craft shall on approaching within signaling distance signify his intention to pass through the bridge by sounding with a whistle or horn the signal prescribed below, viz:

For Meridian Street Bridge: Two long blasts, followed immediately by two short blasts and one long blast.

For all other bridges: Two long blasts, followed immediately by two short blasts.

For Chelsea Bridge, North, by vessels drawing 18 feet or more: Four long blasts.

For Northern Avenue, Congress Street, and Summer Street Bridges, by vessels drawing 18 feet or more: Four long blasts.

The signal given by a master or pilot shall be immediately answered from the bridge by three long blasts of a whistle or horn unless under these rules and regulations a delay in opening the draw is permitted, and in case of such delay the signal shall be immediately answered by two long blasts. A long blast of a whistle or horn as herein provided shall continue for three seconds and a short blast for one second.

8. Upon hearing or perceiving the signals prescribed in paragraph 7, or upon verbal request from the master or pilot of any vessel or other water craft waiting at the bridge, the tender or operator of the draw of the bridge signaled shall at once open the draw for the prompt passage of any vessel or other water craft unless under these rules and regulations a delay in opening the draw is permitted: *Provided*, That the draw may not be opened if there is a train, car, or other vehicle at the time passing over said draw or if a train or car is approaching so closely that it can not be safely stopped before reaching the draw, but the draw shall be opened as soon as it can be cleared, and no person, vehicle, car, or train shall be permitted to begin to cross the draw after it has been signaled to open, excepting as herein provided.

9. Trains, cars, vehicles, or persons shall not be stopped on any draw span for the purpose of delaying the opening of the draw, nor shall any vessel or other water craft be so handled or placed as to delay the opening or closing of any draw span, but all passage over, under, or through a draw span shall be prompt, so as to reduce delays to water and bridge traffic to a minimum. Upon notice from the Secretary of War so to do, the owner or owners of any bridge whose draw is held closed, as authorized in paragraph 2 of these rules and regulations, shall station and maintain at such bridge a tug to aid vessels and other water craft in passing expeditiously through the draw thereof.

10. The owner or owners of every bridge covered by these rules and regulations shall maintain in good and efficient order the draw span and the machinery and appliances for operating the same and for assisting vessels while passing through the draw. The said owner or owners shall also provide and maintain at the draw span such number of draw tenders or operators as may be necessary to open and close the same promptly; and they shall also provide and maintain in good order on the bridge piers or fenders such fixtures as may be necessary to vessels in mooring or making fast while waiting for the draw span to open.

11. These rules and regulations shall not apply to steam vessels owned or leased by the United States, nor shall they apply to vessels employed by the city of Boston or other municipality for police and fire protection. All such United States and municipal vessels shall be passed without delay through the draws of all bridges at any hour of the day or night upon signaling by four long blasts of the whistle.

CURRENTS, BOSTON HARBOR

The time of current from the Boston Lightship to the navy yard in general does not differ by more than ½ hour. The predicted times of slack water at Deer Island Light for every day in the year are given in the Atlantic Coast Current Tables.

The currents at Boston Lightship are described on page 31.

In Broad Sound the velocity of the current at strength in most places is less than ½ knot. This increases to about 1 knot on approaching the entrances of the channels leading into Boston Harbor.

In Hypocrite Channel the velocity at strength is a little over 1 knot.

In South Channel, north of Ram Head, the velocity at strength is almost 2 knots.

Between Deer Island Light and Long Island Head, in the channel, the velocity at strength is nearly 2 knots.

In the Main Ship Channel, from Spectacle Island to the navy yard, the velocity at strength varies between ½ and 1 knot.

Between Boston Lighthouse and Point Allerton, near the middle of the channel, the velocity at strength is about 1½ knots. On the northern side of the channel, southward of Great Brewster Spit, the current turns nearly 30 minutes earlier than in the middle of the channel, and the velocity is about half as great.

In Nantasket Roads, in the middle of the channel, the velocity at strength is about 1½ knots.

In Nantasket Gut the velocity at strength is between 2 and 2½ knots.

In Black Rock Channel the velocity at strength is between 1 and 1½ knots. The flood sets southwestward through the channel and the ebb northeastward, and should be kept in mind when passing through The Narrows.

Between Georges Island and Gallup Island the velocity at strength is nearly 1 knot. The flood sets westward and the ebb eastward.

Between Gallup Island and Long Island Head the velocity at strength is about 1 knot. The flood current sets southward to southwestward and the ebb in the opposite direction.

Between Moon Head and Long Island the velocity at strength is about ½ knot, the flood setting northwestward and the ebb southeastward.

Between Thomsons Island and Spectacle Island the velocity at strength is about ½ knot. The flood sets northwestward and the ebb southeastward.

In Shirley Gut the velocity at strength is between 1 and 2 knots. A current diagram, showing the state of the current in the middle of the channel from Boston Lightship to the navy yard, is given in the Atlantic Coast Current Tables, published annually by the Coast and Geodetic Survey.

GENERAL REMARKS ON APPROACHING BOSTON HARBOR

General remarks on approaching and standing along the coast are given on page 33.

Approaching from Cape Ann.—The soundings in the vicinity of Cape Ann are very irregular and can not be depended on to locate even approximately the vessel's position. The southern end of Jeffrey Ledge, with depths of 19 to 30 fathoms (35 to 55 m.), extends 15 miles eastward from Cape Ann, and depths of over 50

fathoms (91 m.) are found a few miles eastward and a short distance southward from the edge of the bank. A 229° true (SW. by W. ¾ W. mag.) line drawn from the spindle on the Londoner just clears the offshore dangers between Cape Ann and Nahant, but leads over broken ground for a distance of 1½ miles from The Londoner.

At night a number of lighted aids are visible, and they are sufficiently numerous to locate the position readily by cross bearings. In clear weather the course should be shaped to pass well northward of The Graves Lighthouse and enter through the Broad Sound North Channel.

Approaching from Cape Cod.—Approaching the easterly side of the cape, soundings of 20 fathoms (37 m.) indicate a distance of 2 to 3½ miles from the shore, but off the north side of the cape the 20-fathom curve draws closer inshore and the soundings are not so regular. Vessels standing for Boston Lightship will cross the southwesterly end of Stellwagen Bank in depths of 12 to 15 fathoms (21.9 to 27.4 m.); this bank, with depths of less than 20 fathoms (37 m.) on it, begins 5 miles northward of the north end of Cape Cod and extends in a northerly direction for 17½ miles, its width varying from 8 miles at its southerly end to about 2 miles near its northerly end. Soundings in Stellwagen Bank can not be depended on to locate a position on the bank, except in the case of soundings in a depth of 9½ fathoms (17.4 m.), the shoalest water, which is found near its extreme southwest end. The prevailing depths over the shoaler parts of the bank are 12 to 15 fathoms. (21.9 to 27.4 m.).

In clear weather the Pilgrim Monument at Provincetown forms a splendid landmark and is visible for many miles.

As the entrance to Boston Harbor is approached, after crossing Stellwagen Bank, soundings of 20 fathoms (37 m.) or more (at low water) insure a distance of 5 miles or more from the shore and well outside of outlying rocks. Inside the depths of 20 fathoms (37 m.) the soundings are very irregular, and they can not, as a rule, be depended on to keep a vessel out of danger.

At night in clear weather Minots Ledge and The Graves Lights will be sighted shortly after the lights on Cape Cod (Cape Cod and Race Point Lights) are dropped. The course should be shaped for Boston Lightship to avoid the rocks and shoal spots lying eastward and northward of Minots Ledge, and on which the sea breaks in heavy gales.

Tidal currents.—For some distance northwestward of Cape Cod the tidal currents have a slight set southward into Cape Cod Bay on the flood and eastward out of the bay on the ebb. Along the north shore of Massachusetts Bay the flood sets in a general westerly or northwesterly direction and the ebb in a southerly or southeasterly direction. The velocity of the currents is influenced greatly by the force and direction of the wind. Off the entrance to Boston Harbor the flood sets westward and ebb eastward, increasing slightly in velocity as the entrance is approached.

Fogs.—In thick weather Boston Lightship should be steered for when approaching from either Cape Ann or Cape Cod, and the water should not be shoaled to less than 20 fathoms (37 m.) unless the fog signal of the Lightship is heard and the vessel located. From

the Lightship a course may be laid for Boston Lighthouse; and the fog signal of the latter, with a frequent use of the lead, will enable a vessel to reach an anchorage inside of Point Allerton. Unless the Lightship is located no attempt should be made to enter the harbor, and the water should not be shoaled to less than 20 fathoms (37 m.).

Vessels when in the vicinity of Cape Cod, if overtaken by fog or thick easterly weather, may find it convenient to anchor in Provincetown Harbor or on the west side of the cape south of Provincetown, where there is a good lee and holding ground in 7 to 11 fathoms (12.8 to 20.1 m.).

Vessels equipped with radio should not fail to utilize the services of the naval radiocompass stations which are so located as to give a strong fix from bearings received from three stations. The Boston Lightship sends out radio signals in thick weather and also in clear weather from 2.30 to 3 and 8.30 to 9 both a. m. and p. m. Vessels equipped with radio-direction finders should avail themselves of this clear-weather transmission to test the accuracy of their apparatus.

DIRECTIONS, BOSTON HARBOR AND VICINITY

Boston Harbor and approaches has very broken, rocky bottom, and caution is necessary. The area from the entrance of Nantasket Roads and Broad Sound North and South Channels, out to a depth of 25 fathoms (46 m.) or more, has been examined by means of a wire drag, and the dangers are shown on the charts. The area examined in this way extends northeastward to beyond Cape Ann and southward to Cape Cod Canal, the outer limit usually being from 4½ to 7 miles from the shore.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
1. Boston Lightship to Deer Island Lighthouse via Broad Sound, North Channel			°	*Points*
Boston Lightship	5¼	¼ mile northward of Graves gas and whistling buoy.	299	NW. ⅛ W.
Graves gas and whistling buoy.	2⅝	Entrance North Channel, passing midway between red and black gas buoys.	252	W. ¼ S.
Entrance North Channel. Bring Finn Ledge red gas and bell buoy astern.	1¾	Abeam of red gas and bell buoy No. 10.	208	SW. ⅛ S.
Abeam red buoy No. 10.	¾	Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.). Do not get southward of the Spectacle Island range.	238	WSW. ½ W.
Deer Island bearing 350° true (N. ⅜ E. mag.).	1⅝	Abeam red gas and bell buoy No. 2. If bound to Boston, see section 2.	264	W. ¾ N.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
1A. Boston Lightship to Deer Island Lighthouse via Broad Sound South Channel				*Points*
Boston Lightship	5¼	¼ mile northward of Graves gas and whistling buoy.	299	NW. ⅛ W.
Graves gas and whistling buoy.	2	Midway between South Channel Entrance spar buoys Nos. 1 and 2. Then proceed on to Lovell Island range.	237	WSW. ⅜ W.
South Channel entrance. Follow Lovell Island range.	1⅜	Red spar No. 6 on starboard beam.	215	SW. ½ W.
Red spar No. 6. Swing onto Spectacle Island range.	1¾	Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.) Do not follow range beyond this point.	250	W. ½ S.
Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.)	1⅝	Abeam red gas and bell buoy No. 2. If bound to Boston, see section 2.	264	W. ¾ N.
1B. Boston Lightship to Deer Island Lighthouse via The Narrows				
Boston Lightship	6	½ mile southward of Boston Lighthouse.	258	W. ¼ N.
½ mile southward of Boston Lighthouse. (Head for Georges Island Rocks gas buoy.)	1	Deer Island and Narrows Lights in range.	266	W. by N.
Deer Island and Narrows lights in range. (Head for east end of Gallup Island.)	⅞	300 yards beyond south end Lovell Island.	295	NW. ½ W.
300 yards beyond south end Lovell Island. (Deer Island Light should be a little on the port bow.)	1	Nix Mate gas and bell buoy abeam on port hand.	312	NNW. ⅞ W.
Nix Mate gas and bell buoy abeam.	½	Deer Island Light bearing 350° true (N. ⅜ E. mag.) and on Spectacle Island range. If bound to Boston, follow directions in section following.	276	WNW. ⅛ W.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
2. Deer Island Lighthouse to Boston (Bird Island Anchorage)				
				Points
Deer Island Light bearing 350° true (N. ⅜ E. mag.)	1⅝	Abeam red gas and bell buoy No. 2.	264	W. ¾ N.
Abeam red buoy No. 2	⅜	Abeam red gas buoy No. 4.	290	NW. ⅞ W.
Abeam red gas buoy No. 4.	1⅜	Abeam red gas buoy No. 10.	310	NW. ⅞ N.
Abeam red gas buoy No. 10.	⅝	Abeam of red spar No. 12. (See p. 260 for anchorage regulations.)	301	NW.
3. Boston to Deer Island Lighthouse				
In mid-channel abeam red buoy No. 12.	⅝	Abeam red gas buoy No. 10.	121	SE.
Abeam buoy No. 10	1⅜	Abeam red gas buoy No. 4.	130	SE. ⅞ S.
Abeam red gas buoy No. 4.	⅜	Abeam red gas and bell buoy No. 2.	110	SE. ⅞ E.
Abeam red gas buoy No. 2.	1⅝	Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.).	84	E. ¾ S.
4. Deer Island Lighthouse to Boston Lightship via Broad Sound North Channel				
Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.). (South end Spectacle Island should be astern.)	¾	Midway between North Channel gas and bell buoy No. 10 and South Channel gas buoy.	58	ENE. ½ E.
Midway between North Channel gas buoy No. 10 and South Channel gas buoy. (Head for Finn Ledge gas and bell buoy.)	1¾	¼ mile southwest of Finn Ledge gas and bell buoy. Swing slowly around black gas buoy No. 1.	28	NE. ⅛ N.
Midway between Finn Ledge gas and bell buoy and black gas buoy.	2⅝	¼ mile northward of Graves gas and whistle buoy.	72	E. ¼ N.
¼ mile northward of Graves gas and whistle buoy.	5¼	Boston Lightship. If bound to Cape Cod Canal, see p. 39.	119	SE. ⅛ E.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
4A. Deer Island Lighthouse to Boston Lightship via Broad Sound South Channel				*Points*
Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.). Swing on to Spectacle Island range astern.	1¾	250 yards southeast of red spar buoy No. 6. Swing on to Lovell Island range astern.	70	E. ½ N.
250 yards southeast of buoy No. 6.	1⅜	200 yards south of red spar No. 2.	35	NE. ½ E.
Red spar buoy No. 2	2	¼ mile north of Graves gas and whistle buoy.	57	ENE. ⅜ E.
¼ mile north of Graves gas and whistle buoy.	5¼	Boston Lightship	119	SE. ⅛ E.
4B. Deer Island Lighthouse to Boston Lightship, via The Narrows.				
Deer Island Lighthouse bearing 350° true (N. ⅜ E. mag.). Head for north end of Lovell Island.	½	200 yards northeast of Nix Mate gas and bell buoy.	96	ESE. ⅛ E.
200 yards northeast of Nix Mate gas and bell buoy.	1	North end Georges Island on starboard beam.	132	SSE. ⅞ E.
Abeam north end of Georges Island.	⅞	200 yards south of red nun buoy No. 8A. (Deer Island and the Narrows Lights should be in range.)	115	SE. ½ E.
200 yards south of red nun buoy No. 8A.	1	½ mile south of Boston Light.	86	E. by S.
½ mile south of Boston Light.	6	Boston Lightship	78	E. ¼ S.
5. Deer Island Light to Dorchester Bay				
Deer Island Light bearing 350° true (N. ⅜ E. mag.)	1¾	200 yards north of black gas buoy No. 1.	264	W. ¾ N.
Black gas buoy No. 1	½	Red spar No. 2 close on starboard beam.	226	SW. by W. ⅜ W.
Red spar No. 2	⅝	Thompson Island wharf on port beam.	232	WSW.
Abeam wharf	½	Entrance dredged cut between buoys No. 3 and 4.	250	W. ½ S.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
5. Deer Island Light to Dorchester Bay—Continued.				*Points*
Entrance dredged channel.	5/8	Black buoy No. 1 close on port hand.	217	SW. 5/8 W.
Black buoy No. 1	1/4	200 yards beyond red gas buoy No. 6. Pass between two buoys.	244	W. by S.
200 yards westward of gas buoy No. 6.	1/4	Black spar No. 5	257	W. 1/8 N.
Black spar No. 5	1/4	Black spar No. 7. If bound above Commercial Point follow buoys.	222	SW. by W.
6. Deer Island Light to Quincy (Weymouth Fore River).				
(Follow directions in section 4B until abeam of Georges Rock gas buoy. Then swing around buoy to a position 200 yards south of red buoy No. 2, marking 16-foot spot.)				
200 yards south of red spar buoy No. 2.	1 1/2	Wharf on Rainsford Island on starboard beam.	243	W. by S.
Abeam wharf. Head for red buoy No. 4.	1	Black buoy No. 3 on port beam.	210	SW.
Abeam buoy No. 3	1/2	Nut Island on starboard beam.	147	S. by E. 5/8 E.
Abeam of Nut Island. Pass northward of red buoy No. 6, marking 17-foot spot, and head for north side of Bumkin Island.	3/4	Red buoy No. 8 on starboard beam.	89	ESE. 3/4 E.
Abeam red buoy No. 8. Head for peak of Grape Island.	3/8	Red buoy No. 2 on starboard beam.	149	S. by E. 3/8 E.
Red buoy No. 2 abeam.	3/8	Entrance dredged channel, heading for horizontal striped buoy.	187	SSW.
Entrance to dredged channel.	1	Red buoy No. 4 on starboard beam.	212	SW. 1/8 W.
Abeam red buoy No. 4. Follow channel as indicated by buoys.	1 1/8	Turning basin	241	WSW. 3/4 W.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
7. Nantasket Roads to Quincy (Weymouth Fore River), via Nantasket Gut.				*Points*
200 yards south of red spar buoy No. 2.	¾	400 yards northeast Peddock Island (Windmill Point in range with the eastern part of Bumkin Island).	215	SW. ½ W.
400 yards northeast of Peddock Island.	½	⅜ mile south of Nantasket Gut.	158	S. ⅝ E.
⅜ mile south of Nantasket Gut.	¾	Midway between black buoy No. 1 and red buoy No. 2.	216	SW. ½ W.
Midway between black buoy No. 1 and red buoy No. 2.	⅝	100 yards east of red buoy No. 2. From this point follow directions found in section 6 above, beginning with sixth course.	186	S. by W. ⅞ W.
8. Boston Lightship to Entrance Lynn Channel.				
Boston lightship------	5¼	¼ mile northeast of The Graves gas and whistle buoy.	299	NW. ⅛ W.
¼ mile northeast of The Graves gas and whistle buoy.	3¼	¼ mile southwest of Flip Rock buoy.	290	NW. ⅞ W.
¼ mile southwest of Flip Rock buoy.	1⅝	Entrance Lynn Channel. If bound to Lynn see section 9 following.	316	NNW. ⅝ W.
8A. Entrance Broad Sound North Channel to Entrance Lynn Channel				
(For directions through Broad Sound North Channel see section 4 preceding)				
¼ mile east of Finn Ledge red gas and bell buoy. Head for Bass Point.	1¾	¼ mile southwest of Flip Rock buoy.	339	N. ½ W.
¼ mile southwest of Flip Rock buoy.	1⅝	Entrance Lynn Channel.	316	NNW. ⅝ W.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
8B. Shirley Gut to Entrance Lynn Channel				
(Shirley Gut is very narrow and has about 4 feet (1.2 m.) at low water.)				*Points*
Shirley Gut east entrance. (Avoid shoal ground off north end Deer Island.)	1¼	¼ mile east of red buoy No. 4.	63	E. by N.
¼ mile east of red buoy No. 4.	3¼	Entrance to Lynn Channel.	354	N. ¾ E.
9. Entrance Lynn Channel to Lynn				
Entrance Lynn Channel.	¼	Midway between White Rocks Light and red buoy No. 4.	2	N. by E. ½ E.
Midway between White Rocks Light and red buoy No. 4.	⅝	50 yards east of Black Rocks Light.	30	NE.
50 yards east of Black Rocks Light.	⅝	50 yards east of Sand Point Light.	22	NE. ¾ N.
50 yards east of Sand Point Light.	⅜	50 yards east of Black Marsh Light.	-----	Midchannel.
50 yards east Black Marsh Light.	¼	100 yards west of red light.	334	N. by W.
100 yards west of red light.	¼	Basin	353	N. ¾ E.
10. Lynn to Entrance Lynn Channel (bell buoy No. 2)				
Basin	¼	100 yards west of red light.	173	S. ¾ W.
100 yards west of red light.	¼	50 yards east of Black Marsh Light.	154	S. by E.
50 yards east of Black Marsh Light.	⅜	50 yards east of Sand Point Light.	-----	Midchannel.
50 yards east of Sand Point Light.	⅝	50 yards east of Black Rock Light.	202	SW. ¾ S.
50 yards east of Black Rock Light.	⅝	Midway between White Rocks Light and red buoy No. 4.	210	SW.
Midway between White Rocks Light and red buoy No. 4.	¼	Entrance of Channel red bell buoy No. 2 close on port hand.	182	S. by W. ½ W.

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
11. *Entrance Lynn Channel to Boston Lightship*				*Points*
Entrance Lynn Channel (bell buoy No. 2).	1⅝	¼ mile southwest of Flip Rock.	136	SSE. ⅝ E.
¼ mile southwest Flip Rock buoy.	3¼	¼ mile northeast of Graves gas and whistle buoy.	110	SE. ⅞ E.
¼ mile northeast of Graves gas and whistle buoy.	5¼	Boston Lightship. (For directions to Cape Cod Canal see sec. 4, p. 39; for Cape Cod see sec. 4A, p. 39.)	119	SE. ⅛ E.
11A. *Entrance Lynn Channel to entrance Broad Sound North Channel*				
Entrance Lynn Channel (bell buoy No. 2).	1⅝	¼ mile southwest of Flip Rock buoy.	136	SSE. ⅝ E.
¼ mile southwest Flip Rock buoy.	1¾	¼ mile east of Finn Ledge gas and bell buoy. (For directions through Broad Sound North Channel see sec. 1 preceding.)	159	S. ½ E.
11B. *Entrance Lynn Channel to Shirley Gut*				
Entrance Lynn Channel (red bell buoy No. 2).	3¼	¼ mile east of red buoy No. 4.	174	S. ¾ W.
¼ mile east of red buoy No. 4.	1¼	Shirley Gut east entrance. (Avoid shoal ground off north end of Deer Island).	243	W. by S.
12. *Boston Lightship to Beverly Harbor*				
Boston Lightship	10	200 yards northeast Newcomb Ledge whistle buoy.	4	N. by E. ¾ E.
200 yards northeast Newcomb Ledge whistle buoy.	1⅝	200 yards northeast black can buoy No. 1A.	323	N. by W. ⅞ W.
200 yards northeast black can buoy No. 1A.	1⅛	Baker Island Light on port beam distant ⅜ mile. Swing on to range of Main Ship Channel (Hospital Point Light on tallest church spire).	302	NE. ¼ N.
Baker Island Light abeam. Follow range. Pass southward of red buoys Nos. 4 and 8.	2⅜	Smith Point on starboard beam.	276	WNW. ⅛ W.
Smith Point abeam	⅞	200 yards south of red spar buoy No. 10. (For directions to Beverly Harbor see p. 247.)	247	W. ¾ S.

For ready reference there are given in the following table courses and distances from Boston Lightship to various fishing banks and points in Nova Scotia:

From—	Distance in nautical miles	To—	Course	
			True	Magnetic
			°	Points
Boston Lightship	241	Brazil Rock gas and whistle buoy (Nova Scotia).	76	E. ⅜ S.
Boston Lightship. Course passes 2½ miles north of Ammen Rock whistle buoy.	221	Entrance Yarmouth Harbor (Nova Scotia).	67	E. ½ N.
Boston Lightship	70	Platt Bank	46	NE. by E. ½ E.
Do	88½	Cashe Ledge, Ammen Rock whistle buoy.	68	E. ½ N.
Do	71½	Fippennies Bank	68	E. ½ N.
Do	138	Georges Shoal, 2¼-fathom spot on Georges Bank.	105	SE. by E. ¼ E.

DORCHESTER BAY

(chart 246) extends southwestward from President Roads between Spectacle and Thomson Islands on the east and South Boston on the west. The bay is filled by extensive flats, large areas of which are nearly bare at low water and rise abruptly from the edge of the channel. A channel 175 feet wide and 18 feet (5.5 m.) deep has been dredged up to Commercial Point. Subsequent shoaling has reduced this depth to about 15 feet (4.6 m.) just north of Commercial Point. The principal traffic is in coal and building material, which is brought by barges and other vessels that are towed to Commercial Point, Neponset, and Milton Mills. Vessels can select anchorage in the channel of Dorchester Bay below buoy No. 6, the best place being northwestward of Thomson Island and east-northeastward of the buoys marking the northerly end of the dredged cuts. Northward of Commercial Point there is an anchorage basin with depths of about 10 feet (3 m.).

A channel has been dredged 12 feet (3.7 m.) deep from the 18-foot (5.5 m.) channel northward of **Squantum Point** to a large plant situated eastward of the point.

Old Harbor, on the south side of South Boston, is filled by flats with little water over them. Two anchorage basins for yachts have been dredged on the north side of the harbor; the easterly one has a depth of 9 feet (2.7 m.) and the westerly one 6 feet (1.8 m.). There is a recreation pier on the north side at the entrance.

Commercial Point is on the west side at the entrance of Neponset River and can be recognized by a number of large gas tanks and a tall yellow stack. Northward of the point is an anchorage basin with depths of about 10 feet (3 m.) with deeper water at the southeastern corner of the basin. A 12-foot (3.7 m.) channel has been

dredged to serve the wharves northwestward of Commercial Point. The bridge which formerly crossed the river at Commercial Point has been removed.

Neponset River is ¼ mile wide at the entrance and narrows to 100 yards at Milton Mills, the head of navigation. In 1926 there was a least depth of about 16½ feet (5.1 m.) in the dredged channel from Commercial Point to the shipyard of George Lawley & Sons Corporation. From this point there was a least depth of about 12 feet in a narrow channel to the railroad bridge at Neponset. Above Neponset a 6-foot (1.8 m.) channel has been dredged to the head of navigation at Milton Mills.

Bridges.—Three drawbridges cross Neponset River between the entrance and Milton Mills. The New York, New Haven & Hartford Railroad bridge at Neponset has a draw opening 52.3 feet wide and a headroom of 5.9 feet (1.8 m.) above high water when closed. Neponset Avenue Bridge at Neponset has a draw opening 78.7 feet wide and a headroom of 10.9 feet (3.3 m.) above high water when closed. Granite Bridge, 1 mile above Neponset, has a draw opening 50 feet wide and a headroom of 6.4 feet (1.9 m.) at high water when closed. The bridges are opened at all times on a signal of two long blasts and two short blasts, as described under "Bridge regulations" on page 266.

Pilots are generally taken by strangers and may be had by making signal off Thomson Island, anchoring there if necessary; they are not always taken by light-draft vessels bound to Neponset. Pilotage is not compulsory; the rates for the lower part of Neponset River are given on page 263.

Towboats are taken by most vessels in going up and down Neponset River, the master of the tug doing the piloting below Neponset Bridge, where, if bound for Milton, a special pilot is taken and the vessel being towed pays this pilotage.

Directions.—For directions from President Roads to Commercial Point see table of courses on page 274.

QUINCY BAY

(chart 246) indents the southerly shore of Boston Harbor between the peninsula of Squantum and Houghs Neck. The general depths in the bay are 8 to 10 feet (2.4 to 3 m.), but shoals partly bare at low water extend ½ to ¾ mile from its southerly side. **Hangman Islet,** small and rocky, lies near the middle of the entrance to the bay; the reef, extending over ¼ mile southwestward from the islet, is marked near its end by a black spindle. A ledge with 5 feet (1.5 m.) over it lies ⅜ mile northward of Hangman Islet, with foul ground between. **Sunken Ledge,** dry at low water, lies ⅝ mile northeastward of Hangman Islet and is marked by a stone beacon with staff and cage.

Wollaston Channel, near the westerly end of the bay, has been dredged 60 feet wide and 8 feet (2.4 m.) deep to the yacht club house at Wollaston. The channel is marked by buoys; the course through it is 215° true (SW. ⅜ W. mag.).

Eastward of Squantum and connected with it by a causeway lies **Moon Head,** which is recognized by the grassy hill and bluff on its

easterly end. The entrance to Quincy Bay from westward is between Moon Head and Long Island, and is good for a depth of about 8 feet (2.4 m.) at low water. From here the **Back** or **Western Way** leads in a northerly direction between Spectacle Island and Thomson Island to the Main Ship Channel and the Sculpin Ledge Channel in a northeasterly direction along the northwesterly shore of Long Island into President Roads.

Houghs Neck is marked at its northeasterly end by a green hill 100 feet (30 m.) high, called **Quincy Great Hill,** which is mostly settled; a standpipe on the hill is prominent. **Nut Islet,** marked by a power station and stack, lies 300 yards northward of Quincy Great Hill, with a causeway between. There is a channel into Hingham Bay between Nut Islet and Peddock Island.

HINGHAM BAY

(chart. 246) is that part of Boston Harbor lying southeastward of Peddock Island. It is the approach to Weymouth Fore River, Weymouth Back River, Hingham Harbor, and Weir River. The easterly part of the bay is shoal, and extensive shoals make out from the southerly shore and surround the islands in the bay. The easterly entrance is through Nantasket Gut, but there is also an entrance southward of Peddock Island that is frequently used by vessels bound into Weymouth Fore or Back Rivers.

Nantasket Gut is a narrow channel between Peddock Island and Windmill Point and leads into the bay from Nantasket Roads. The tidal currents have considerable velocity but generally follow the direction of the channel; the flood sets southward and the ebb northward. There is an unmarked 16-foot (4.9 m.) spot near mid-channel.

Windmill Point, on the east side of Nantasket Gut, is marked on on its southerly side by a fixed red light and a fog bell. Prominent on Windmill Point is a large hotel with a steamer landing **(Pemberton)** southward of it, which is the terminus of the Nantasket Beach Railroad. Eastward on the slopes of the hill are the town of **Hull** and the Hull Yacht Club houses. **Nantasket Hill** is marked by a stone tower and a skeleton tower from which weather displays are made. Hull is a reporting station and is connected with Boston by steamer.

A dredged channel 12 feet (3.7 m.) deep leads to a dock on **Little Hog Island,** eastward of Hull. The channel starts just southward of Inner Seal Rock Buoy No. 1 and has a general direction of 62° true (E. by N. ¼ N. mag.).

Weymouth Fore River has its entrance on the southwest side of Hingham Bay between Houghs Neck and Grape Island and is the approach by water to **Quincy Point, Weymouth, East Braintree,** and a number of landings. A large shipyard, an electric power plant, and several other industries are located on this river. The river has been improved by dredging a channel 300 feet wide and 24 feet (7.3 m.) deep from Hingham Bay to the bridge at Quincy Point. In 1926 the project depth had been attained except for two rocky ledges where the least depth was 22.4 feet (6.8 m.). Above the bridge the industries are served by a channel dredged by local interests.

There is a channel dredged to 6 feet (1.8 m.) to East Braintree (Weymouth), which is the head of navigation. The river has trade in fuel oil, coal, and gravel; the deepest-draft vessels drawing from 24 to 27 feet (7.3 to 8.2 m.), although it is reported that a vessel drawing 30 feet (9.1 m.) has entered the river.

In entering the river the large twin stacks of the Edison Power Plant on the east side of the river just above the bridge are prominent.

Bridges.—Two bridges cross Weymouth Fore River. Quincy Point Bridge, crossing the river at Quincy Point, has two openings, each 125 feet wide, and a headroom of 8 feet (2.4 m.) at high water when closed. East Braintree Bridge, near the head of navigation, has a draw opening 50 feet wide and a headroom of 12.5 feet (3.8 m.) at high water when closed.

The signal for opening these bridges is two long and two short blasts of the whistle. (See "Bridge regulations" on p. 266.)

Town River Bay, on the northwesterly side of Weymouth Fore River northward of Quincy Point, has several wharves, including a plant for the repair and storage of yachts. There is a depth of 9 feet (2.7 m.) in the channel to the deep hole about ⅜ mile inside the entrance. A 4-foot (1.2 m.) channel has been dredged to Quincy.

Weymouth Back River lies just eastward of Weymouth Fore River and southward of Grape Island. The channel from Weymouth Fore River to the wharf of the fertilizer works on **Eastern Neck,** a distance of 1¼ miles, is buoyed, and has a least width of 200 feet and depth of 12 feet (3.7 m.). A depth of 12 feet (3.7 m.) has been obtained by dredging for ⅞ mile above the fertilizer works to the wharf just above Hingham Bridge. The channel is buoyed, but strangers desiring to enter the river in vessels should take a pilot or towboat. There is good anchorage at the entrance, ¼ to ⅜ mile westward of Grape Island. Hingham Bridge has a draw opening 50 feet wide, and a headroom of 10 feet (3 m.) at high water when closed. It is opened at all times on a signal of two long and two short blasts.

Hingham Harbor and **Weir River** are shallow and lie in the southeasterly end of Hingham Bay. Their common entrance lies close westward of Bumkin Island. The channel, 250 yards wide, with a depth of over 3 fathoms (5.5 m.), leads for ½ mile in a southeasterly direction from the westerly end of **Bumkin Island** and then divides. The branch leading eastward takes the name Weir River. The channel leading to Hingham Harbor trends southward, is narrow, and has a depth of 18 feet (5.5 m.) up to **Crow Point (Downer Landing),** the entrance of the harbor.

Hingham Harbor is a cove 1 mile long, with an average width of about ⅝ mile. At low water it is a dry flat, through which a narrow and tortuous channel winds to the town of Hingham. The upper end has been dredged to a depth of 8 feet (2.4 m.). There are coal and lumber wharves, and a yacht club wharf at Hingham. The channel is sometimes marked by bush stakes in summer.

Weir River leads to the wharf at **Nantasket,** near the southerly end of **Nantasket Beach.** It is filled by extensive flats, mostly bare at low water, between which is a channel with a least width of 100 feet and depth of 12 feet (3.7 m.). The channel is used by

steamers running from Boston to Nantasket and is marked by lights on piles during the summer; the piles remain in position until carried away by ice. A channel 12 feet (3.7 m.) deep has been dredged by private interests through an extensive shoal in the river, cutting off a sharp bend in the original channel. The cut is marked by private spindles. Nantasket has a large steamer wharf and a public float landing for small craft north of it.

Pilots.—Pilotage is not compulsory for Hingham Bay and tributaries, but pilots are usually taken by vessels going into Weymouth Fore River or Weymouth Back River. There are licensed pilots at Hull, and one can be obtained on signal. A pilot for Weymouth Fore River above Quincy Point can be obtained at Quincy Point. Vessels waiting for a pilot can anchor in Nantasket Roads or between Nantasket Gut and Sheep Island. Rates are given on page 264.

Towboats are employed by all large vessels entering the tributaries of the bay, being generally taken from Boston.

Repairs.—The shipyard at Quincy Point has facilities for the construction and repair of the largest ships and engines of steamers.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.).

Additional general information is given under Boston Harbor, on page 260.

Directions.—For directions for entering Hingham Bay see tabulations on page 275.

COAST FROM BOSTON TO PLYMOUTH

Point Allerton, on the south side at the entrance of Boston Harbor, is a grassy hill, covered with houses, and the base of the sea face is protected by a sea wall. Point Allerton Bar, Ultonia Ledge, Harding Ledge, and other dangers lying northward and eastward of the point are described with Boston Harbor.

Nantasket Hill, nearly 1 mile westward of Point Allerton, is marked by an old earthwork and standpipe (with a cone-shaped cover) on its summit; storm warnings are displayed from a skeleton tower on the hill. The town of Hull is on the lower hill southwestward of Nantasket Hill.

From Point Allerton the coast trends southward for 3 miles, and is called **Nantasket Beach.** The beach is occupied by summer cottages, and at its southerly end is **Nantasket,** a popular summer resort. There are three grassy hills on the beach, the most prominent of which is **Strawberry Hill** (about 1 mile southward of Point Allerton), marked at its summit by a prominent standpipe; the other two hills southward are **White Head** and **Sagamore Head.** The wharves at Nantasket and the approach from westward are described on page 282.

From Nantasket Beach the coast, presenting a general hilly appearance, trends 3 miles east-southeastward to Cohasset Harbor. Rocks and sunken ledges extend ½ mile from shore in places. **Black Rock** and **Little Black Rock** are rocky islets, the inner one high.

Cohasset Harbor (chart 242) is a large, shallow cove lying southwestward of Minot Ledge Lighthouse and 5 miles southeastward of Point Allerton. It is of little commercial importance and is not available for strangers, but is the resort of numerous yachts and

fishing craft. Anchorage in 8 to 10 feet (2.4 to 3 m.) can be had in the so-called outer harbor, but boats seldom anchor here. A dredged channel, 60 to 90 feet wide and 6 feet (1.8 m.) deep, marked by buoys and lights, leads to the inner harbor. The latter is sheltered by a breakwater which extends 400 yards northward from near the westerly end of Bassing Beach at the entrance. An anchorage basin 6 feet (1.8 m.) deep has been dredged in the inner harbor and a channel about 4 feet (1.2 m.) deep leads from it to the town landing, on the south side. The fish wharves at the extreme head of the harbor are nearly bare at low water; gasoline and provisions are obtainable.

Numerous rocks and ledges lie in Cohasset Harbor and extend off to Minots Ledge Lighthouse. The most prominent inside the lighthouse are **East** and **West Shag Rocks,** which show at high water.

Minots Ledge Lighthouse

There are three channels to the entrance of Cohasset Harbor—**Western** or **Brush Island Channel,** entering between **Brush Island Ledge** and **Chittenden Rock; Gangway Passage,** leading between **West Hogshead Rock** and **The Grampuses;** and **Eastern Channel,** which leads between **Enos Ledge** and **West Willies.** All of the channels are marked by buoys, but the dangers are numerous; the least depth crossed in entering is about 5 feet (1.5 m.) Gangway Passage is the widest and best entrance for strangers. Strangers, even in small craft, should enter only in clear weather and with a smooth sea. The best time is on a rising tide. The dredged channel leading into the harbor is bare at low water on either side. Chart 242 is the guide for entering.

Minots Ledge Lighthouse, on Outer Minot, is a dark-gray conical granite tower. The light is group flashing white (flash 1–4–3 every 30 seconds, each flash of 0.2 second duration), 85 feet

(25.9 m.) above the water and visible 15 miles. The fog signal is a bell, sounding one stroke every 30 seconds.

Minots Ledge Lighthouse is on the outer of the dangers visible at low water, but submerged rocks and very broken ground, on which the sea breaks in heavy weather and which should be avoided by vessels, extend 1½ miles northeastward and 2½ miles eastward of the lighthouse. The outer limit of the broken ground is marked by a black buoy lying 2½ miles eastward of the lighthouse.

Stellwagen Ledges is the name applied to the large number of rocks and sunken ledges which fringe the coast from Minots Ledge to Scituate Harbor. Some of these sunken ledges lie over 1 mile from shore and have from 7 to 14 feet (2.1 to 4.3 m.) over them in surrounding depths of 4 to 9 fathoms (7.3 to 16.5 m.). When in this vicinity, strangers in vessels should keep over 3 miles from the shore.

Scituate Harbor (chart 232), lying 4½ miles southward of Minots Ledge Lighthouse, is suitable only for small craft with local knowledge and a smooth sea. It is a shallow cove, largely bare at low water except where dredged, and is partially protected by breakwaters which have been built out from the points at the entrance.

There is a least depth of about 14 feet (4.3 m.) to a point just within the north breakwater, and from here there is a least depth of 7 feet (2.1 m.) in a channel marked by buoys, to the town wharf. This channel is narrow, and the mud flats on either side are bare at low water. An anchorage basin has been dredged to 8 feet (2.4 m.) in the middle of the harbor along the south side of the channel, and a similar basin has been provided off the town wharf. A shallow channel has been dredged to the landing of a yacht club in the northwest part of the harbor. This channel is nearly bare at the extreme low waters. The approach to Scituate Harbor is marked by a bell buoy moored about ½ mile eastward of the entrance. The best time to enter is on a rising tide. A channel 6 feet (1.8 m.) deep has been dredged from the coal wharf to the causeway. Gasoline and provisions are obtainable.

Cedar Point, on the north side of Scituate Harbor, is marked by an unused white lighthouse tower. On the high land about 2 miles 267° true (W. by N. mag.) from the entrance of Scituate Harbor is a prominent high tower with pointed top, which can be seen for many miles seaward.

About 1 mile northwestward of the entrance to Scituate Harbor there is a tall yellow chimney that is very conspicuous in approaching. The outer end of the north breakwater is marked by a flashing white light on a red pyramidal skeleton tower.

Four conspicuous yellow bluffs with low beaches between extend 2½ miles southward from Scituate Harbor. They are known as **First Cliff, Second Cliff, Third Cliff,** and **Fourth Cliff.** There are houses on all except Fourth Cliff. A naval radiocompass station is located on Fourth Cliff. The call letters are NWM.

New Inlet, on the north side of Fourth Cliff and 2 miles southward of Scituate, is the approach to North River and South River. The inlet had a depth of about 4 feet (1.2 m.) at low water on the bar in 1926, and is marked by a bell buoy, but is subject to change and is never entered except by boats with local knowledge. Some sand

and gravel are shipped from a plant located on **Herring River,** a tributary to North River from the north. A channel 6 feet (1.8 m.) has been dredged to the wharf at the plant.

North River formerly emptied into the sea near **Rexhame,** but in the great storm of 1898 it broke through the beach and formed its present outlet. The river has been cleared of bowlders to Hanover about 10 miles above the entrance. The depth to this point is about 3 feet (0.9 m.) at low water and 9 feet (2.7 m.) at high water, except at a point just inside the inlet, where it is nearly bare at low water. The river is little used. The bridges crossing it have draws, but they are seldom opened.

South River, emptying through New Inlet from southward, is shoal and seldom used.

Brant Rock is a post village and summer resort on **Green Harbor Point,** 7¾ miles southward of Scituate Harbor. A water tank at the village is prominent.

Green Harbor River has its entrance on the south side of Green Harbor Point. Two small jetties, covered at high water, have been built at the entrance, but the channel is almost bare at low water. The river is used by small fishing boats only, which can usually enter or leave about two hours after low water. It should not be attempted by strangers.

Green Harbor is a small village on the west side of the river. Just southwest of the village there are three high steel **radio towers** that are prominent for many miles.

Several rocks lie off Green Harbor Point to a distance of 1½ miles. **Bartlett Rock** is bare at low water and marked by a red buoy. **Howland Ledge,** ½ mile eastward of Bartlett Rock, has a least found depth of 7 feet (2.1 m.) and is marked by another red buoy. **Farnham Rock,** ¾ mile north-northeastward of Howland Ledge, has a least found depth of 14 feet (4.3 m.) and is marked by a bell buoy and a spar buoy, both red. Scattered rocky spots with depths of 4 to 5 fathoms (7.3 to 9.1 m.) lie northeastward of Green Harbor Point to a distance of 4½ miles and are marked on the northeast side by a red gas and whistle buoy. Vessels should pass eastward of this buoy. The broken ground has been examined by means of a wire drag.

High Pine Ledge, bare at lowest tides, is marked on its easterly side by a red buoy which lies ⅞ mile from shore and 2 miles northward of Plymouth (Gurnet) Lighthouse. The ledge extends from the buoy nearly to the shore, and vessels should not attempt to pass westward of the buoy.

PLYMOUTH HARBOR

(chart 245), the most northerly and westerly harbor in Cape Cod Bay, affords excellent and safe anchorage and is composed of three different harbors—Duxbury Bay, Kingston Bay, and Plymouth Harbor proper. The common entrance is just southward of Gurnet Point, marked by Plymouth (Gurnet) Lighthouse, and is 17 miles southward of Minots Ledge Lighthouse and about 15 miles northward of Cape Cod Canal.

Plymouth Harbor is frequented by many fishing boats and pleasure craft and by occasional cargo vessels up to 17-foot (5.2 m.) draft,

the principal cargoes being coal. The depth through the entrance channel to an anchorage inside or to the junction of the channels leading to Plymouth Inner Harbor, Duxbury Bay, and Kingston Bay, is about 21 feet (6.4 m.) although there is an unmarked 16-foot (4.9 m.) rocky spot which strangers may not be able to avoid. The channel is well marked to this point and easily entered in clear weather. The channels into the tributaries are described under their heading.

Plymouth (Gurnet) Lighthouse is a white octagonal pyramidal tower on Gurnet Point at the north side of the entrance to Plymouth Harbor. The light is a flashing white; flash 0.5 second, eclipse 7.0 seconds, flash 0.5 second, eclipse 4.5 seconds, flash 0.5 second, eclipse 7 seconds. It is 102 feet (31 m.) above the water and visible 16 miles. The fog signal is a reed horn sounding a blast of 3 seconds duration every 15 seconds.

There are a **Coast Guard station** and several houses near the light.

Saquish Head, on the north side 1⅜ miles westward of Gurnet Point, is a bare hill marked by a large house and several shacks.

Duxbury Pier Lighthouse, marking the north side of the channel and the south end of the shoal between the main channel and the Cowyard, is a brown conical tower and has a fog bell. The light is fixed red.

Duxbury Bay, between Duxbury Beach on the east, **Saquish Neck** on the southeast, and the mainland on the west, is about 3 miles long, with an average width of 2 miles. It is full of flats, mostly bare at low water, through which several narrow crooked channels lead. These channels are usually marked by private buoys or bush stakes, but are difficult to follow without local knowledge.

Cowyard is a good anchorage in the southerly part of Duxbury Bay. The anchorage with best swinging room is 300 yards to ⅜ mile west-northwestward and northwestward of Duxbury Pier Lighthouse between the buoys marking the entrances to Plymouth Channels on the south and the buoy marking the entrance to the narrow part of the Cowyard on the north, in 6 to 11 fathoms (11 to 20.1 m.). The channel leading north-northeastward in the Cowyard has a width of about 200 yards and is not marked except at the entrance. Shoals with little water in places rise abruptly on both sides, and at low water the edges of the shoals show by discolored water. Small vessels can pass about 100 yards eastward of buoy No. 1, lying 500 yards northwestward of Duxbury Pier Lighthouse, and steer 14° true (NNE. ½ E. mag.) through the Cowyard. Anchor with the south end of Clark Island bearing about 99° true (ESE. mag.), distant 650 yards; the width of the channel at the anchorage is about 350 yards.

From the north end of the Cowyard abreast **Clark Island,** a crooked natural channel leads north-northwestward for about 1¾ miles to within ½ mile of **Duxbury,** above which a channel was dredged in 1916, 6 feet (1.8 m.) deep and about 50 feet wide through the flats to the yacht-club wharf at Duxbury, with an anchorage basin of the same depth and 100 yards wide off the wharf. There is a depth of about 6 feet (1.8 m.) to the coal and lumber wharf just south of the yacht club.

From the north end of the Cowyard a natural channel leads northward along the east side of Duxbury Bay to the mouth of **Back**

River. There is a depth of 7 feet (2.1 m.) to the bridge at the entrance of Back River, and 4 feet (1.2 m.) in Back River for about ½ mile above the bridge, above which the channel is bare or nearly so at low water. The channel as far as the bridge was partially marked in 1926 by private buoys and bush stakes, but is difficult without local knowledge. It is frequented only by small local craft. The bridge has a draw opening, but it is seldom opened.

Kingston Bay, contained between the mainland and the western point of Duxbury Bay, has a diameter of about 1½ miles, but is so full of flats as to render it unfit for navigation except with a pilot and at high water. The village of **Kingston** is built upon its western shore (about ¾ mile back from the water) on a small stream called **Jones River.** The bay is of little importance as a harbor or port. Several channels lead between the flats of this bay, but they are narrow and crooked. The northernmost and deepest is **Miles** or **South Channel,** and by it about 6 feet (1.8 m.) at low water can be taken to within ⅝ mile of the mouth of Jones River and 3 feet (0.9 m.) to the mouth. The river is bare at low water.

From the southerly end of the Cowyard westward of Duxbury Pier Lighthouse a channel has been dredged to the **Plymouth Cordage Co.'s wharf,** 1¾ miles northwestward of Plymouth, with a turning basin at the wharf. The channel is 250 feet wide and 20 feet (6.1 m.) deep through the bar at the entrance from the Cowyard, and is marked by buoys. The upper part of the channel for a distance of ¾ mile below the wharf is 150 feet wide and 18 feet (5.5 m.) deep; the curve in this part of the channel is marked on its southerly side by black buoys maintained by private parties.

Plymouth Inner Harbor is about 1 mile wide at its northern end, gradually narrowing for 2¼ miles to its southern end. The larger part of the harbor is dry at low water, and its narrow channels are unfit for navigation for strangers except in motor boats or small vessels.

The principal channel leading to Plymouth is marked by buoys and has been dredged to a depth of 18 feet (5.5 m.) and width of 200 feet, widened at the turns. The dredged channel leads to the **State pier.**

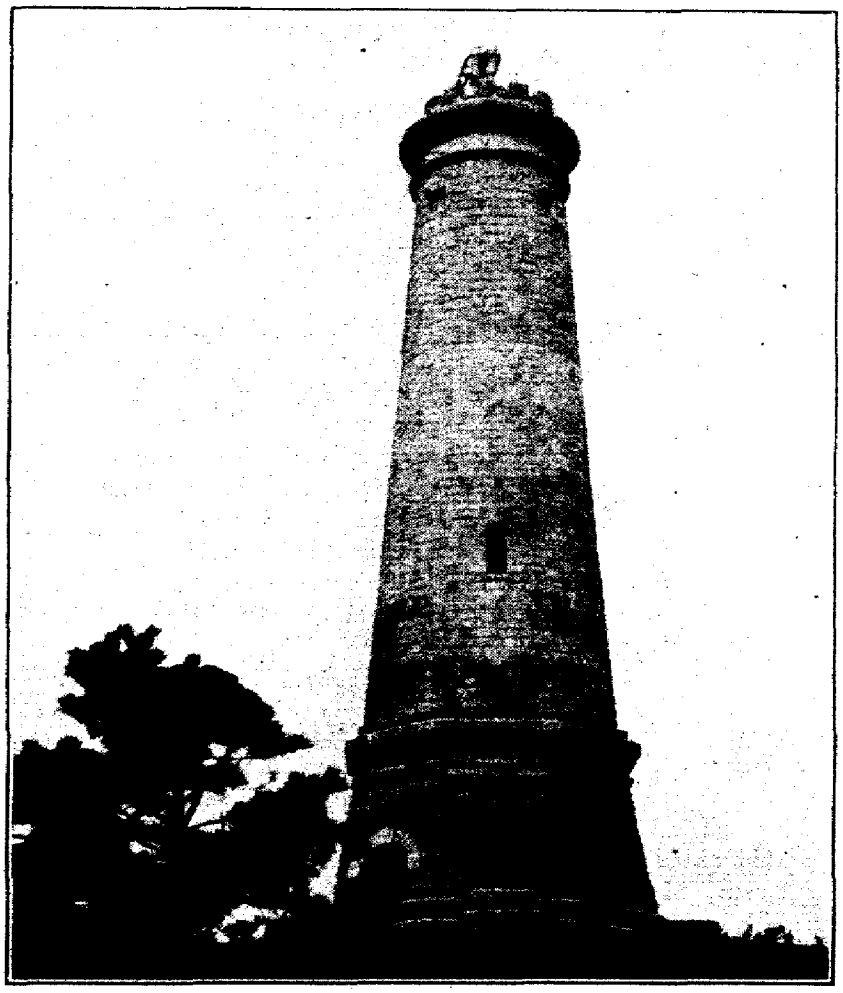
From this pier a 15-foot (4.6 m.) channel has been dredged to a wharf about 400 yards northwestward from it. This wharf is built out from a filled area which is the proposed location of a town wharf.

In 1921 a number of wharves at Plymouth were removed, and the water front southward of the State pier was restored practically as it existed at the time of the landing of the Pilgrims. **Plymouth Rock** is now protected by an appropriate structure built around it. There is only a small amount of water borne commerce at Plymouth, the principal item being coal received.

Prominent objects.—Captains Hill, on the peninsula between Duxbury and Kingston Bays, is about 200 feet (61 m.) high and on its top is **Standish Monument,** which shows prominently from all directions when approaching the harbor. **Manomet Hill,** about 5 miles southward of Gurnet Point, is over 390 feet (119 m.) high, heavily wooded, and is a conspicuous landmark in approaching the entrance. The buildings and the brick chimneys of the Plymouth Cordage Co. at North Plymouth, and the buildings at Plymouth are prominent from eastward and northeastward.

Anchorage.—The best anchorage is in the Cowyard, but small light-draft vessels often find good anchorage under the lee of Long Beach, in 3 to 4 fathoms (5.5 to 7.3 m.), hard bottom. Yachts and small craft anchor in the anchorage basins off the wharves at Plymouth.

Pilots.—There are regular pilots, and one can sometimes be had by making signal if going beyond the Cowyard, and always by inquiry at Plymouth.



Standish Monument

Towboats are not obtainable at Plymouth, but may be ordered from Boston.

Supplies.—Coal, water, and some ship chandlery can be obtained from Plymouth. General supplies can be quickly obtained from Boston by rail.

Tides.—The mean rise and fall of tides is about 9 feet (2.7 m.) at the entrance and about 9½ feet (2.8 m.) at Plymouth. The spring range of tide is about 11 feet (3.4 m.).

The **tidal currents** have considerable velocity, the greatest velocity being between Gurnet Point and Duxbury Pier and at the entrance to the Cowyard. The set is generally in the direction of the channel;

but the ebb sets southward and eastward across Brown Bank, while the flood sets northward and westward above Saquish Head, and sweeps strongly around Duxbury Pier Lighthouse northward into the Cowyard.

Ice.—Beginning about the middle of January, this harbor is usually closed to navigation for a few weeks of every winter by local ice; when there is ice in the harbor the Cowyard is not a safe anchorage. In winter the safest anchorage from ice is in the channel southward or eastward of Saquish Head, and vessels sometimes go to sea on account of drift ice at this anchorage. Westerly winds have a tendency to carry the ice out in fields.

DIRECTIONS, PLYMOUTH HARBOR

The western side of Cape Cod Bay out to a distance of 4½ to 7 miles from the shore, from Boston Harbor to Cape Cod Canal entrance, has been examined by means of a wire drag. The dangers within a distance of ½ to 1 mile of the shore were not generally covered with the drag. The channels in Plymouth Harbor and tributaries generally have soft bottom, but there are many small bowlders scattered through them. The channel through the entrance is well marked and easily followed in clear weather. Above the Cowyard the channels are narrow and crooked, lead between flats bare or nearly so at low water, and local knowledge is necessary to carry the best water. The best time for strangers to navigate the channels inside the harbor is at low water when the flats are visible.

The following directions for approaching will lead to Gurnet Point whistling buoy, which lies ⅝ mile southeastward of Plymouth (Gurnet) Lighthouse. In approaching, Plymouth Lighthouse may be steered for on any course between 183° true (S. by W. ½ W. mag.) through west to 312° true (NW. by N. mag.) until within 1 mile from it.

From Boston.—Steer 104° true (SE. by E. ½ E. mag.), with Boston Lighthouse in range with Deer Island Lighthouse astern, until 2½ miles from Boston Lighthouse and midway between the buoys marking Thieves Ledge and Harding Ledge. Then steer 112° true (SE. ¾ E. mag.) for 6½ miles to a position ⅛ mile northeastward of black whistle buoy No. 1, which marks a 3½-fathom (6.4 m.) spot. Then steer 138° true (SSE. ½ E. mag.) for 9½ miles to a position ⅛ mile eastward of gas and whistle buoy No. 4. Then steer 188° true (SSW. mag.) for 9 miles to Gurnet Point bell buoy.

From Cape Ann.—From a position 1 mile east-southeastward of Cape Ann Lighthouses a 182° true (S. by W. ½ W. mag.) course made good for 38 miles will lead to Gurnet Point bell buoy. Manomet Hill should be made ahead on this course.

From Cape Cod.—Passing about 1½ miles northward of Cape Cod and 2 miles northward of Race Point Lighthouse, a 249° true (W. ⅝ S. mag.) course made good for 15¾ miles will lead to Gurnet Point bell buoy.

Or, having come from Provincetown, from a position ¾ mile southward of Wood End Lighthouse a 268° true (WNW. ⅞ W. mag.) course for 17½ miles will lead to Gurnet Point bell buoy.

From Cape Cod Canal.—From the black bell buoy off the entrance of Cape Cod Canal a 354° true (N. ¾ E. mag.) course for 8½ miles will lead to a position ¼ mile eastward of the red gas and bell buoy off Manomet Point, then a 321° true (NNW. ¼ W. mag.) course for 6⅛ miles will lead to Gurnet bell buoy.

Gurnet bell buoy to the Cowyard.—Pass close to Gurnet bell buoy and steer 256° true (W. mag.) with Duxbury Pier Lighthouse in range with the right-hand stack at the Plymouth Cordage Co. factory and pass 100 yards southward of buoy No. 4 and to a position 100 yards northward of gas buoy No. 3. Then steer 241° true (WSW. ¾ W. mag.) for 1 mile to a position 100 yards northward of buoy No. 5, then 266° true (W. ⅞ N. mag.) for ⅞ mile, and pass 150 to 300 yards southward of Duxbury Pier Lighthouse. When the lighthouse is abeam, haul gradually northward and anchor 300 yards to ⅜ mile west-northwestward or northwestward of it.

Cowyard to Plymouth.—The best time to navigate this channel is at low water, when the flats are visible, or on a rising tide. Pass close to the black buoy at the entrance and steer 203° true (SW. ¾ S. mag.) for ¼ mile, passing 50 yards westward of the second black buoy. When 200 yards past this buoy haul southeastward and steer 145° true (S. by E. ⅞ E. mag.) for ¾ mile, being guided by the buoys and following the beach at a distance varying from 90 to 200 yards. Then haul gradually southwestward, leaving the buoys at the bend at a distance of about 40 yards, and from abreast buoy No. 17 steer 228° true (SW. by W. ½ W. mag.) for ⅜ mile, until between a red and a black buoy. Then steer 242° true (WSW. ¾ W. mag.) until between the red and black buoys, then haul westward and anchor in the basin or go to the wharf.

CAPE COD BAY

(chart 1208) is contained between the peninsula of Cape Cod on the east and south and the mainland of Massachusetts on the west. Between these limits it is about 20 miles in diameter, with deep water, the soundings varying from 10 to 27 fathoms (18.3 to 49 m.), except close to the shore and in its southeasterly part. Race Point, the northwesterly extremity of Cape Cod, is the eastern and Gurnet Point the western point at the entrance. Within the limits of Cape Cod Bay are several harbors—those of Plymouth on the western shore, Sandwich and Barnstable on the southern, and Wellfleet and Provincetown on the eastern shore. It is also the approach to Cape Cod Canal, connecting Cape Cod Bay with Buzzards Bay. A railroad and improved highway runs the length of the cape to Provincetown. The western side of Cape Cod Bay, out to a distance of 4½ to 7 miles from the shore, from Boston Harbor to the entrance of Cape Cod Canal, has been examined by means of a wire drag, and the dangers are shown on the charts.

Cape Cod is a long peninsula, forming the easterly extremity of Massachusetts. It makes out from the mainland, first in an easterly direction for 31 miles and then northward for a little over 20 miles—this latter portion forming what is usually termed the Hook of the Cape. It is composed almost entirely of sandy lands, with high, bare sand hills, and low, nearly level plains, and is well settled. Cape Cod

Bay is on its northern side, and Nantucket Sound on its southern. The name Cape Cod is also generally applied to the south coast of Massachusetts between Monomoy and Falmouth.

Rocky Point lies 3¼ miles southward of Gurnet Point, with a large open bay called Plymouth Bay between. **Warren Cove,** at the southwest end of Plymouth Bay, can be used as a temporary anchorage in southerly winds, in 3 to 5 fathoms (5.5 to 9.1 m.), sandy bottom. A reef with 16 feet (4.9 m.) at its end extends ½ mile northward from Rocky Point.

Between Rocky Point and Manomet Point, a distance of 2½ miles, there are a number of outlying rocks which will be avoided by giving the shore a berth of ½ mile. The shore is backed by high wooded hills, the most conspicuous of which is **Manomet Hill,** 390 feet (119 m.) high. **Manomet Point** is a bluff and is marked by a water tank. **Manomet** is a post office and summer resort near the point. There are a few houses on the shore at **Whitehorse Beach,** 1 mile northwestward of Manomet Point.

Mary Ann Rocks, two rocks bare at low water, lie ¾ and ⅞ mile southeastward of the northerly end of Manomet Point, and are marked on the easterly side by a red gas and bell buoy.

Stonehorse Rocks, bare at low water, lie southwestward of Mary Ann Rocks and are a part of a reef that extends ¾ mile southeastward from Manomet Point.

Stellwagen Rock, with 6 feet (1.8 m.) over it and unmarked, lies 1¾ miles southward of Manomet Point and ⅞ mile from shore.

From Manomet Point to **Peaked Cliff,** a distance of 7 miles, the shore is a line of high bluffs backed by woods. Just southward of Center Hill Point, shoals with little water in places extend ¾ mile from shore. From Peaked Cliff the shore trends southeastward and is low. There are houses on the shore at **Sagamore Beach,** 2 miles northwestward of Cape Cod Canal.

Ellisville Harbor is a small boat harbor about ½ mile northward from **Lookout Point.** The entrance is protected by a jetty on the northern side, but the entrance and basin are shoal and available for small craft only at half tide or better. Cape Cod Canal is described on page 299.

There is a shoal with a depth of about 12 feet (3.7 m.) ½ mile southeastward of the outer end of the north breakwater and about ¼ mile from the shore, and midway between this shoal and the shore is a cluster of rocks awash.

Sagamore is a village on the south side of Cape Cod Canal, 1¾ miles inside its entrance. It has railroad communication. Twin yellow chimneys with a tank between them at the village are prominent.

Sandwich Harbor, 1 mile southeastward of the jetties at the entrance of Cape Cod Canal, is the approach to the village of **Sandwich.** The shore in front of the village is low marsh, faced by a sand beach.

The entrance to the harbor is between two small jetties and was dredged in 1917 to a depth of 6 feet (1.8 m.) and width of 50 feet to a point just inside the beach. The depths at the anchorage inside are 3 to 8 feet (0.9 to 2.4 m.). The channel to the town is bare at low water and has a depth of about 5½ feet (1.6 m.) at high water. The harbor is used only by small local fishing boats. The jetties

should not be confused with the much larger ones at Cape Cod Canal. Sandwich has rail connection and is on the main highway to Provincetown.

From Sandwich Harbor **Springhill Beach** extends 2¼ miles southeastward to Scorton Harbor; it is backed by lowlands, cultivated and settled. There is a water tank on **Scorton Neck,** ¾ mile south-southeastward of the entrance of Scorton Harbor. From this harbor, Scorton Neck and **Sandy Neck** extend 7 miles east-southeastward to Sandy Neck Lighthouse, which is on the west side at the entrance of Barnstable Harbor.

Scorton Harbor, 3½ miles southeastward of the entrance of Cape Cod Canal, has a narrow entrance, bare at low water. It is sometimes entered at half tide or higher by small local fishing boats. At high water boats can go to the highway bridge ¾ mile above the entrance. There are no wharves. **Scorton Ledge,** an unmarked 13-foot (4 m.) ledge, lies ¾ mile north-northeastward of the entrance.

Barnstable Harbor.—This harbor (chart 339), 10 miles southeastward of Cape Cod Canal entrance, is the approach to the town of Barnstable and the village of Yarmouthport. It is used by many local fishing boats but is seldom entered by strangers. The entrance is obstructed by a shifting bar with about 6 feet (1.8 m.) over it at low water. The harbor is nearly filled by flats and shoals, which also extend 2 miles off the entrance from the shore eastward of the lighthouse. The channel is partially marked by buoys but is narrow and difficult for a stranger. Few vessels enter the harbor, the greatest draft being 12 feet (3.7 m.). Strangers should make a signal and remain well outside the bar until a pilot comes out, keeping in a depth of over 6 fathoms (11 m.). With northerly winds a heavy sea makes on the bar, and vessels bound to Barnstable should anchor in Plymouth or Provincetown until the weather moderates. Ice generally obstructs the harbor during a part of the winter.

After crossing the bar the channel has a depth of about 8 feet (2.4 m.) for 3 miles to within ⅜ mile of the wharf at **Barnstable.** A channel was dredged in 1916 to a depth of 6 feet (1.8 m.) and width of 50 feet to the wharf and fish factory on **Maraspin Creek,** 300 yards above its entrance, and a turning basin of the same depth, 150 feet wide and 300 feet long, was dredged off the wharf. The channel is unmarked and some local knowledge is required to keep in it. Gasoline and provisions are obtainable. Barnstable has railroad communication.

A dredged cut, 6 feet (1.8 m.) deep, leads to the wharf at **Yarmouthport.** A high concrete chimney at the ruins of the cold-storage plant is prominent. The port is used only by a few fishermen.

Prominent objects.—**Sandy Neck Lighthouse** (fixed white), on the west side at the entrance of Barnstable Harbor, is a white tower 48 feet (14.6 m.) above the water. There are several small houses on the inside of the beach near the lighthouse. A standpipe a little inland from Yarmouthport is visible above the trees.

Nobscusset Point, 4½ miles eastward from Sandy Neck Lighthouse, has a small breakwater which provides a protected anchorage for small boats. It can be used only at half tide or better.

Between Barnstable and Wellfleet there are a number of creeks that are used at high water by local boats and launches, but all of them are dry at low water. The 3-fathom (5.5 m.) curve is from ¼ to ⅜ mile from shore between North Dennis and Sesuit Harbor, but eastward of the latter it is ½ to 1½ miles from shore.

North Dennis, a village 3½ miles eastward of Sandy Neck Lighthouse, is marked by a water tank and hotel. **Scargo Hill,** southeastward of North Dennis, is 170 feet (52 m.) high and the highest in the vicinity. There is a stone lookout tower on the hill.

Sesuit Harbor, 2½ miles eastward of the water tank at North Dennis, has a jetty on its east side; the entrance is bare before low water. **East Dennis** is a village ½ mile inland.

Wellfleet Harbor.—This harbor (chart 340 or 1208) is on the western side of the hook of Cape Cod, near its southern end. Extensive shoals lie in the entrance and extend about 5½ miles westward of **Billingsgate Island,** which marks the western side of the entrance to the harbor; **Mayo Beach** is at the head of the harbor. The channel into the harbor leads between the shoals and is narrow in places, but it is marked by buoys, so as to be easily followed in the daytime in clear weather; it has a least depth of 14 feet (4.3 m.) until above Smalley Bar. From a little above Smalley Bar a channel 6 feet (1.8 m.) deep and 50 feet wide was dredged in 1916 to the town wharf ⅜ mile eastward of Mayo Beach hotel wharf, and a basin 250 feet wide and 400 feet long was dredged to the same depth off the wharf. The channel above Smalley Bar is unmarked, except for private bush stakes.

In 1926 the wharf was in a dilapidated condition and not fit for use. There are several small oyster and fish wharves on **Duck Creek** just below the railroad bridge. These can only be approached by small craft on the tide.

Wellfleet is a town on the railroad and highway at the head of Wellfleet Harbor. It is frequented only by small fishing and pleasure craft. The harbor is usually closed by ice for a part of each winter. Gasoline and provisions are obtainable in Wellfleet.

Strangers in vessels intending to enter Wellfleet Harbor generally take a pilot and should always do so. It is usual to go into Provincetown Harbor, where a pilot for Wellfleet can be obtained from the local fishermen. In going directly to Wellfleet entrance vessels must depend upon obtaining a local fisherman for a pilot, the vessel anchoring meanwhile, if desirable, in the channel off the shoals until one is obtained. Strangers in small craft should be able to enter with the aid of the chart.

Anchorages.—The best anchorage is in the inner harbor, where the depth ranges from 10 to 15 feet (3 to 4.6 m.). The anchorage in the outer harbor is somewhat exposed in westerly winds; the depth ranges from 14 to 31 feet (4.3 to 9.4 m.) between Billingsgate Island and Smalley Bar, and from 14 to 18 feet (4.3 to 5.5 m.) between Stony Bar and Billingsgate Island. In northerly gales vessels sometimes anchor on the lee side of Billingsgate Shoal in 3 to 8 fathoms (5.5 to 14.6 m.), the shoal breaking the sea so that vessels with good ground tackle can ride out a heavy gale from northward.

Tides.—The mean rise and fall of tides is about 10½ feet (3.2 m.). The tidal currents are weak.

Directions, Wellfleet Harbor.—The directions are good for vessels of 8-foot (2.4 m.) draft, in daylight with clear weather, and lead to an anchorage in 14 to 19 feet (4.3 to 5.8 m.) just northward of Smalley Bar buoy. Strangers of over 8-foot (2.4 m.) draft should take a pilot at Provincetown or after coming to anchor south of Billingsgate Shoal.

Pass ¼ mile southward of the black buoys at the end of Billingsgate Shoal and steer 79° true (E. ⅜ S. mag.) for 4¼ miles, heading for the tall church spire at Eastham until Billingsgate Island bears 8° true (NNE. mag.). Then steer 44° true (NE. by E. ¼ E. mag.) for 1¾ miles, to a position 100 yards southeastward of a black buoy. Then steer 2° true (N. by E. ½ E. mag.) for ¾ mile, and then 312° true (NW. by N. mag.) for ½ mile to a position 50 yards westward of a red buoy. Then pass close westward of another red buoy, and then 33° true (NE. ¼ E. mag.) for 1⅜ miles to a position 50 yards southeastward of the black buoy marking Smalley Bar. Vessels can then steer 2° true (N. by E. ½ E. mag.) and anchor ¼ mile above the buoy, or if in small craft, can follow the chart to the wharves, preferably on a rising tide. The dredged channel is marked by private bush stakes, and the flats on each side are visible at low water.

Pamet River, 4½ miles southeastward of Long Point Lighthouse, leads to the village of **Truro** and is used only by boats and launches; it is bare two hours before low water. A shoal extends 1 mile off the entrance. Two small jetties have been constructed at the entrance.

Prominent objects.—A large church with a spire on the high ground at the village of Truro forms an excellent landmark for this section of the bay. Cape Cod Light and the high radio towers on the outside coast are prominent from the bay. The Pilgrim Monument on a hill at Provincetown is also a very conspicuous landmark.

Ice in Cape Cod Bay.—Plymouth, Barnstable, Wellfleet, and other shallow harbors of Cape Cod Bay are usually closed to navigation a part of every winter. Instances are on record of this ice, and the ice forming in the shallower parts of Cape Cod Bay in severe winters, being driven by the winds out into the bay, where it masses into heavy fields or windrows, sometimes as much as 10 feet or more thick, making the navigation of parts of the bay unsafe or impracticable at times. The prevailing northerly winds drive it down to the southern end of the bay, but occasionally, at intervals of years, it has been known to obstruct Provincetown Harbor for a few days. The movements of the ice are dependent largely on the winds, the tidal currents apparently having little or no effect on it.

PROVINCETOWN HARBOR

(chart 341 or 1208) is formed by a turn in the northern end of the Hook of Cape Cod, and has a diameter of about 2 miles. It is one of the best harbors on the Atlantic coast, being of sufficient capacity for large fleets and having anchorage in 3 to 10 fathoms (5.5 to 18.3 m.), with excellent holding ground. Coasters and fishermen seek shelter here from gales from any direction.

The approach and entrance are free from danger and are marked by three lighthouses—Race Point Lighthouse, on the northwestern point of Cape Cod; Wood End Lighthouse, on the southern end of the Hook, where it turns eastward; and Long Point Lighthouse, on the western point at the entrance to the harbor. At night Cape Cod Lighthouse will show over the land westward of it when approaching the entrance on certain bearings.

Herring Cove, about ¾ mile southward of Race Point Lighthouse, affords a temporary lee from easterly winds; small vessels sometimes anchor well inshore in from 10 feet to 4 fathoms (3 to 7.3 m.), according to draft. The Naval Trial Course (1 mile long) is between Race Point and Wood End Lighthouses and is marked by range beacons (skeleton towers with mast) on shore and by white buoys which lie ⅝ to 1 mile from shore.

Provincetown, on the northwestern side of the harbor, is the home port of many vessels engaged mainly in the cod, mackerel, and other fisheries. The carrying trade of the port that is done by strangers is confined mostly to the transportation of coal, salt, lumber, and wood.

The depth of water at the entrance and in Provincetown Harbor is ample for vessels of deep draft, and there are no outlying dangers. There are a number of wharves, but their use is confined to vessels of less than 13-foot (4 m.) draft. The principal ones are the steamboat and railroad wharf, and 2 fish and cold-storage wharves. At mean low water the depth at the outer ends of these is 8 feet (2.4 m.) for the former and 7 feet (2.1 m.) for the latter. The other wharves run dry or partly dry at low water. The steamboat and railroad wharf is the easterly of the two long wharves. There is a float landing just inside its outer end. Water is piped to the wharf.

Race Point Lighthouse, at the extreme western end of Cape Cod, is a white tower. The light is fixed white, with a white flash of 4 seconds' duration every 90 seconds, 41 feet (12.5 m.) above the water, and visible 12 miles. The fog signal is an air whistle (blast 3 seconds, silent 3 seconds, blast 3 seconds, silent 51 seconds).

Race Point Coast Guard station is about 1½ miles eastward from the light.

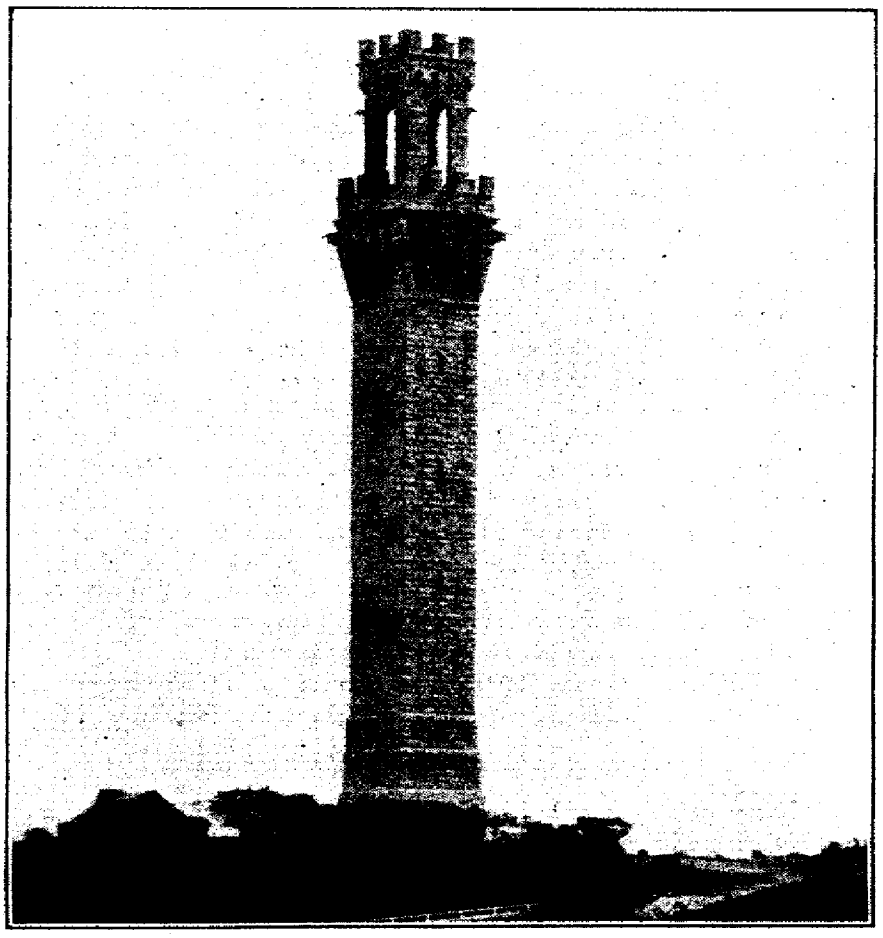
Shank Painter Bar, extending to a greatest distance of ⅝ mile off the shore between Race Point and Wood End Lighthouses, rises abruptly from deep water. It is marked by a black buoy 1¼ miles southward from Race Point Lighthouse and a black bell buoy off Wood End Lighthouse.

Wood End Lighthouse, on the south side of the sand spit forming the southwest side of Provincetown Harbor, is a white pyramidal tower 45 feet (13.7 m) high. The light is flashing red, and the fog signal is a stroke of a bell every 15 seconds. There is a Coast Guard station near the light.

Long Point Lighthouse, at the eastern end of the sand spit, is a white square tower 36 (11 m.) feet high. The light is fixed white, and the fog signal is a bell (1 stroke, silent 30 seconds, 2 strokes, silent 30 seconds). There are the ranges of a speed trial course on the sand spit between the lighthouses. A black bell buoy marks the end of the shoal extending eastward from Long Point Lighthouse.

Prominent objects.—In making the northern part of Cape Cod in clear weather, the most prominent feature is **Pilgrim Monument,** a stone structure about 350 feet (107 m.) above the sea; a tall standpipe and several high church spires in Provincetown will also be seen. It is frequently difficult to recognize natural landmarks on Cape Cod when approaching from seaward, owing to a lack of distinctive features.

The Coast Guard stations and the lighthouses are about the only well-defined marks in places; of the latter, **Cape Cod Lighthouse**



Pilgrim Monument, Provincetown

(white tower 183 feet (56 m.) above the water) is the most important, being the chief guide for this part of the coast. The skeleton radio towers here are prominent day marks.

There is a reporting station on The Highlands, near Cape Cod Lighthouse, from which vessels are reported to Boston.

Pilots are not necessary and are rarely taken by strangers in entering. Pilots familiar with adjacent waters can usually be found among the fishermen.

Towboats are not much used. During the stormy season towboats from Boston are sometimes to be found here; by telegraphing one can be called from there in six hours. There are no special

harbor regulations. The customhouse is near the head of the steamboat wharf.

Supplies.—Provisions and some ship chandler's stores can always be obtained. Coal can not, as a rule, be had for steamers; only a limited quantity is kept on hand. Water is furnished by a water boat; it can also be obtained at the wharves. Gasoline and Diesel fuel oil can be obtained.

Storm-warning displays are made at Provincetown from a skeleton tower on the hill near the Pilgrim monument, and are visible from all directions in approaching the coast. They are also shown at Race Point and Cape Cod Lighthouse.

Communication.—Provincetown is on a railroad, and there is a good highway to Plymouth and Boston. During the summer season there is a daily steamer service with Boston.

Ice forms in Provincetown Harbor in severe winters only, and then only for short periods. Instances are on record of fields of heavy ice from the shallow harbors of Cape Cod Bay being driven northward by the wind and into the harbor, closing it to navigation for a few days. Such conditions are abnormal, occurring only at intervals of years, and under ordinary conditions the harbor is not obstructed by ice during the winter.

Tides.—The mean rise and fall of the tide is about 9 feet (2.7 m.).

Currents.—Off Race Point the tidal currents have considerable velocity; the flood sets southwestward and the ebb in the opposite direction, and tide rips occur during heavy weather when the wind opposes the current. Westward of the stretch of coast forming the western side of the harbor the currents are nearly as strong; here the flood sets in a southeasterly direction, the ebb sets northwesterly. At the entrance and in the harbor the tidal currents have little velocity. With spring tides, at half flood the currents has somewhat greater velocity at the entrance and then sets westward, inside Long Point, and toward the western side of the harbor.

The **eastern side of Cape Cod** is described in United States Coast Pilot, Atlantic Coast, Section B, Cape Cod to Sandy Hook.

DIRECTIONS, PROVINCETOWN HARBOR

These directions are good for vessels of the deepest draft. In thick weather great caution is required, as the lead can not always be depended on to give warning of too close an approach to the end of Cape Cod from westward on account of the abrupt shoaling of the water from 20 fathoms to 3 fathoms (37 to 5.5 m.).

From Boston Lightship a 129° true (SE. ¾ S. mag.) course made good for 31¾ miles will lead to a position 1 mile southwestward of Wood End Lighthouse.

From Cape Ann gas and whistling buoy a 161° true (S. ⅜ E. mag.) course made good for 36¼ miles will lead to a position ¾ mile westward of Race Point Lighthouse.

Approaching from eastward around Cape Cod, give the northerly shore of the cape a berth of about 1½ miles until Race Point Lighthouse bears southward of 210° true (SW. mag.) to avoid Peaked Hill Bar. Race Point Lighthouse can be approached as close as ½ mile, but the shore between it and Wood End should be given a berth of about 1 mile to avoid Shank Painter Bar. The following courses can be used at night:

Passing 2 miles or more northeastward of Cape Cod Lighthouse, steer 300° true (NW. mag.) for 5 miles until up with Peaked Hill Bar gas, whistling, and submarine bell buoys. Then bring the buoys astern on a 267° true (W. by N. mag.) course. When about 4½ miles from the buoys and Race Point Lighthouse bears southward of 199° true (SW. by S. mag.), steer 210° true (SW. mag.) for about 3 miles and pass ¾ mile or more northwestward and westward of Race Point Lighthouse. Then steer 143° true (SSE. mag.), giving the shore a berth of 1 mile or more, until Long Point Lighthouse is open southward of Wood End Lighthouse. Then steer for Cape Cod Lighthouse on any bearing northward of 75° true (E. mag.), pass southward of the black bell buoy lying ½ mile southwestward of Wood End Lighthouse, and give the shore eastward of the lighthouse a berth of ⅜ mile.

Follow the trend of the shore between Wood End and Long Point Lighthouses, giving it a berth of ⅜ mile, and pass southward and eastward of Long Point Lighthouse and eastward of the buoy off it, giving the lighthouse a berth of at least ⅜ mile, until it bears southward of 255° true (W. mag.). Then stand northwestward in the harbor and anchor according to draft, with the lighthouse bearing eastward of 165° true (S. mag.); do not approach the eastern or northeastern shores of the harbor nearer than ¾ mile on account of extensive flats. Toward the northern shore the shoaling is gradual; toward the western shore it is abrupt from 9 to 2 fathoms (16.5 to 3.7 m.).

In thick weather.—Lay courses that will lead farther offshore than the preceding, and pay particular attention to the fog signal at Race Point. After rounding Race Point care must be taken to stand far enough southward to clear Wood End; if the fog signal at Wood End Lighthouse is not heard, and it is known that the vessel is southward of it, stand eastward, using the lead, until the vessel is in 11 fathoms (20.1 m.). Then haul northward and northwestward, keeping in this depth, until Long Point fog signal is heard. Anchor north of this fog signal in 8 fathoms (14.6 m.).

Or, if the wind is easterly, a good lee will be found in 8 to 10 fathoms (14.6 to 18.3 m.) on the westerly side of Cape Cod for a distance of 5 miles south of Provincetown Harbor.

Caution.—From a high bridge, Long Point Light is visible at a number of points across Cape Cod when bearing between 208° true (SW. ¼ S. mag.) and 233° true (WSW. mag.). A good many vessels have gone ashore on Peaked Hill Bar, and particular caution should be exercised here in thick weather.

CAPE COD CANAL

connects the northern part of Buzzards Bay with Cape Cod Bay. It has a length of 11½ miles from Wings Neck Lighthouse, in Buzzards Bay, and a depth of 5 fathoms (9.1 m.) in Cape Cod Bay. It shortens the distance between points north of Cape Cod and points west of Buzzards Bay by 53, 67, or 144 miles, according to the different routes considered, and avoids the outside run along the easterly side of Cape Cod and the exposed ocean route outside of Nantucket Shoals. The western approach to the canal is shown on chart 249 or 251 and the eastern approach on chart 1208.

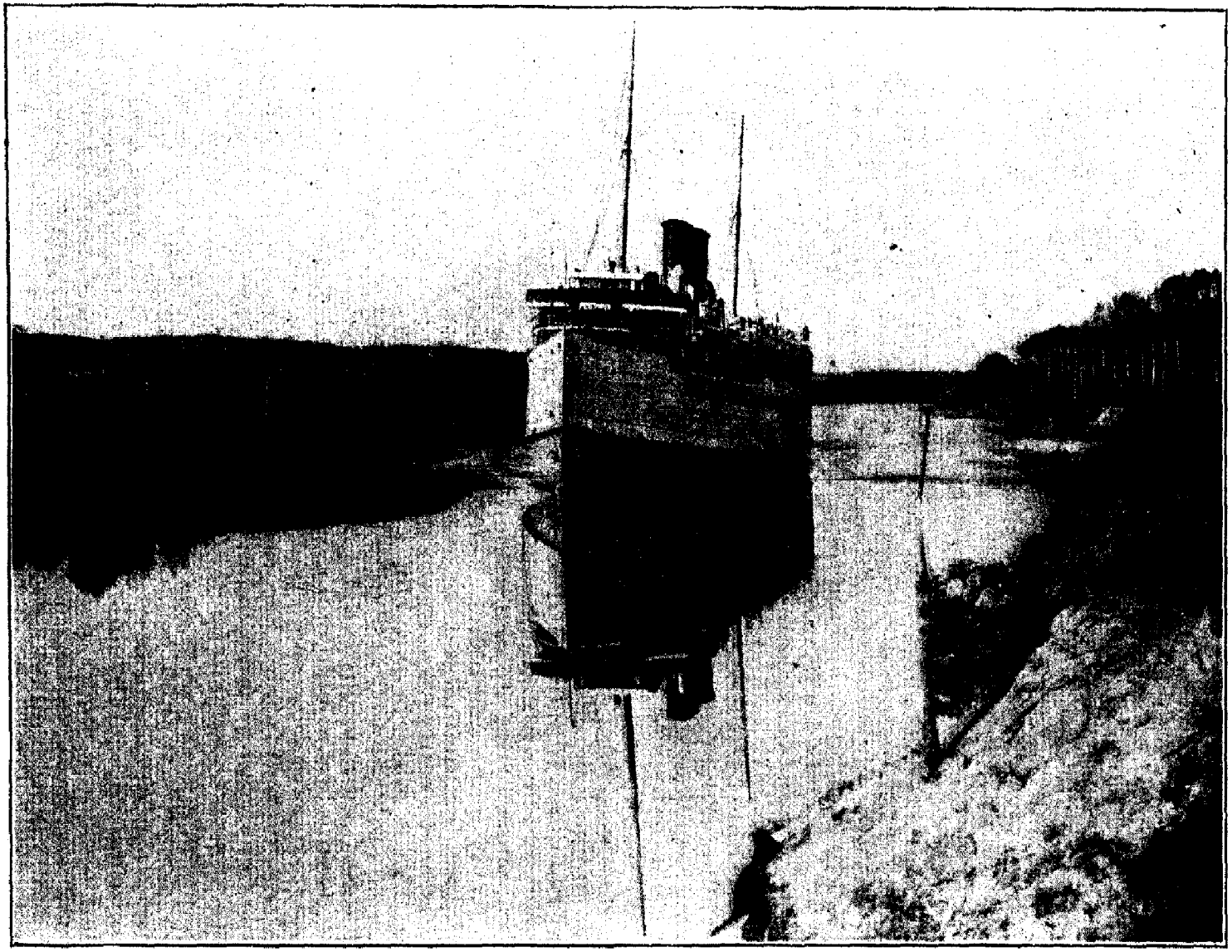


Photo by Fred Small

Steamer (4,989 gross tons) passing through Cape Cod Canal

Cape Cod Canal is stated by the Boston, Cape Cod & New York Canal Co. to be open for vessels of about 22-foot (6.7 m.) draft and less. The general depth in the canal and approach channels is 25 feet (7.6 m.). Passage through the canal is made both with and against the current, vessels with the current being given the right of way over vessels going against the current. Some shipmasters prefer to go through the canal with a fair current, and others express a preference for a head current. The maneuvering qualities of the vessel is usually the decisive factor in making the choice.

The entrance from Cape Cod Bay is protected on its north side by a breakwater 3,000 feet long, built out from the shore to a depth of 5 fathoms (9.1 m.), and a short breakwater which extends from the shore on the south side of the entrance. A light (fixed white on black skeleton tower) is established on the north breakwater 1,700 feet from the outer end.

Caution.—Special attention is called to the fact that this light is not on the end of the breakwater. Several vessels approaching the canal at night have stood into danger because the navigator assumed that the light was located on the outer end of the breakwater.

There is a red gas buoy off the north breakwater, a black spar buoy off the south breakwater, and a black bell buoy a little farther out. A perpendicularly striped gas and bell buoy lies 2½ miles 30° true (NE. mag.) from the entrance.

In approaching the eastern entrance of the canal in clear weather, the jetties and the light at the entrance, and a large square building and the coast guard station on the east bank of the canal are the guides. In thick weather the buoys are the guides. Strangers should not confuse the entrance jetties with the smaller ones at Sandwich Harbor, 1 mile southeastward. The fog is said to be always less dense inside the entrance than outside.

The entrance is marked by a lighted range which leads between the jetties. This range leads to the wharf at a convenient angle and is of value in going alongside at night.

The approach channel from Buzzards Bay to a point 2,000 feet west of the railroad bridge has a bottom width of 250 feet, increased at the turns. The entrance to the canal off Wings Neck Lighthouse, Buzzards Bay, is marked by two pairs of lighted buoys, one with a fog bell, which, in addition to the fog signal on Wings Neck, makes the entrance accessible in thick weather. From the entrance of the dredged channel to the canal proper there are gas buoys and lights, as well as fog signals, at frequent intervals; the lights on the west side are white, and those on the east side red. Two sets of range lights (rear lights fixed white, front lights flashing white) lead through the western approach.

From a point 2,000 feet west of the railroad bridge to the bridge the bottom width of the canal is 150 feet; then 100 feet width for a distance of 33,000 feet; then 200 feet width for a distance of 4,000 feet; then 300 feet width for a distance of 5,000 feet to deep water in Cape Cod Bay.

Fixed white lights on poles are erected at high-water mark on both sides of the canal at intervals of 500 feet between the Buzzards Bay railroad bridge and the breakwater at the east entrance.

Pilotage is not compulsory for vessels carrying a pilot licensed by the United States Steamboat Inspection Service for the canal. Pilots or towboats may be obtained by making a signal upon approaching either end of the canal. Vessels should not fail to signal for a pilot if one is desired. Doing this will avoid delay after entering the canal. The call for a pilot is 3 long and 1 short blasts of the whistle. A telephone office is established on the wharf on the east end of the canal, from which vessels are reported. The following rates were charged for pilotage in 1926:

Commercial vessels

Commercial steamers up to 1,000 gross tons	$15
Commercial steamers over 1,000 gross tons	25
Yachts up to 100 gross tons	10
Yachts 101 to 500 gross tons	15
Yachts over 500 gross tons	20
Tugs up to 200 gross tons	6
Tugs over 200 gross tons	8
Tugs with 1, 2, or 3 barges (light)	10
Tugs with loaded barge	10
Special types	25
Minimum charge	6

Government vessels

Destroyers	$20
Submarines	20
Gunboats	25
Special types	30
Mine sweepers	15
Converted yachts up to 500 gross tons	15
Converted yachts over 500 gross tons	20
Submarine chasers up to 110 feet in length	10
Submarine chasers over 110 feet in length	15
All light tugs	15
Tugs with tow	20

Supplies.—Coal, water, gasoline, and other supplies can be had at the canal company wharf near the eastern end of the canal.

Currents.—Slack water occurs about 2 hours before high and low water at Boston, the east current beginning before Boston low water and the west current before Boston high water. About halfway through the canal the average maximum westerly current occurs about ¾ hour after high water at Boston and the easterly current about ¾ hour after low water at Boston. Under ordinary conditions the currents have an average velocity at strength of 3.6 knots in midstream. Predictions for the times of slack water for every day in the year are given in the Atlantic Coast Current tables.

Bridges cross the canal at Sagamore, Bourne, and Buzzards Bay at distances of 1.6, 5.4, and 6 miles from the Cape Cod Bay entrance. The clearance between the fenders of all bridges is 140 feet. The railroad bridge at Buzzards Bay is a single-lift structure 2½ feet (0.7 m.) above extreme high water. The others are highway bridges, and are two-leaved lift structures, 30 feet (9.1 m.) in the clear above extreme high water.

The whistle signals for the bridges are as follows: Highway bridge, Sagamore, 2 long and 2 short blasts; highway bridge, Bourne, 1 long and 1 short blast; railroad bridge, Buzzards Bay, 3 long blasts.

For all the bridges there is a semaphore and light set about 2,000 feet on each side of each bridge on the right hand of the canal as a vessel approaches the bridges.

Vessels whose height will not permit them to pass under the bridge must give the whistle signal for the bridge, and if on reaching the mooring piles the bridge has not been opened such vessels must stop and make fast to the mooring piles until the bridge is open. If passing at night, they will see a red light on the bridge when it is closed and a green light when it is open.

Storm-warning displays are made from a tower near the inner end of the north breakwater at the eastern entrance to the canal. They are also made near Wings Neck Lighthouse in Buzzards Bay.

Signals.—At the eastern entrance there is a day and night signal on the southern bank of the canal near the water's edge. A red light indicates that the canal is not clear, and a green light indicates that the canal is clear and that the vessel can enter. In case of a red light, a vessel may proceed as far as the wharf, but in no case can it proceed farther until clearance is granted. The signal for a vessel desiring clearance is three long blasts of the whistle. The light signals are visible by day.

Tolls, which are subject to change, are charged for all vessels passing through the canal. Vessels are advised to obtain the existing rates from the Boston, Cape Cod & New York Canal Co., 45 Cedar Street, New York, N. Y. Toll and patrol boats are stationed at each end of the canal to board vessels, collect the tolls, and issue right of way permits.

In 1926 the minimum toll charge for pleasure boats was $9 per single passage. For yachts over 1,000 gross tons, the charge was 15 cents per gross ton.

Ice—The canal proper has never been closed by ice, but Buzzards Bay is closed at times so as to prevent navigation through the canal.

The following are extracts from **General Information** published by the canal company:

All steam vessels will please blow three long blasts when passing in by Wings Neck Light and Sandwich Breakwater.

All vessels are requested to stop at entrance to receive toll collector unless otherwise arranged.

Toll must be paid in cash or satisfactory equivalent.

Vessels should proceed through canal at lowest speed that will afford steerageway, taking every precaution to avoid suction damage to moored vessels.

When dredges or lighters are working in canal, it is very essential that approaching vessels signal which side they will pass of same by giving proper whistle signals.

Please avoid anchoring in fairway off either entrance.

Advance information of arrival will expedite passage and insure prompt pilot service.

Vessels must not pass in canal, and an overtaking vessel must keep at least 1,000 feet astern of the vessel ahead.

Vessels must blow alarm whistle when approaching bridges and slow or stop engines if bridges are not opened promptly.

Directions, Cape Cod Canal.—The broken ground on the western side of Cape Cod Bay and the coast northward, from Boston Harbor southward to the entrance of the canal, out to a distance of about 4½ to 7 miles from the shore, has been examined by means of a wire drag, and the dangers are shown on the charts. Vessels should give

the shore a berth of 3 to 4½ miles between Boston Harbor and Plymouth Bay, and at least 1½ miles between Plymouth Bay and the entrance of the canal.

From Boston.—Steer 104° true (SE. by E. ½ E. mag.), with Boston Lighthouse in range with Deer Island Lighthouse astern, until 2½ miles from Boston Lighthouse and midway between the buoys marking Thieves Ledge and Harding Ledge. Then steer 112° true (SE. ¾ E. mag.) for 6½ miles to a position 100 yards northeastward of black whistle buoy No. 1, which marks a 3½-fathom (6.4 m.) spot. Then steer 138° true (SSE. ½ E. mag.) for 9½ miles to a position ⅛ mile eastward of gas and whistle buoy No. 4. Then steer 168° true (S. ¼ W. mag.) for 20 miles to Canal Approach gas and bell buoy, passing ¾ mile eastward of the red buoy off Manomet Point. The course is then 211° true (SW. ⅛ W. mag.) for 2½ miles to the entrance between the jetties.

Pick up the lighted range and follow it until the weather signal tower on the north bank is abeam, then proceed in mid-channel.

Directions from Cape Cod Canal to Boston Lightship are given on page 36.

Directions from Cape Ann to Cape Cod Canal are given on page 38.

The best track for vessels through the canal is 430 feet south of the north jetty at the entrance, then through the middle of the canal to the railroad bridge at the west end, and 100 feet north of the mooring dolphins on the south bank of the canal west of the railroad bridge. From this point the channel is well marked, as shown on chart 251 or 249.

APPENDIX

COAST PILOTS AND FIELD STATIONS OF THE COAST AND GEODETIC SURVEY

COAST PILOTS

	Price
U. S. Coast Pilot, Atlantic Coast, Section A, from St. Croix River to Cape Cod (this volume)	$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, Porto Rico, and Virgin Islands	.75
Inside Route Pilot, coast of New Jersey	.30
Inside Route Pilot, New York to Key West	.30
Inside Route Pilot, Key West to the Rio Grande	.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

FIELD STATIONS

Boston, Mass., 92 State Street.
New York, N. Y., 311–312, Maritime Exchange Building, 78 Broad Street.
New Orleans, La., room 314, Customhouse.
San Francisco, Calif., room 305–306, Customhouse.
Seattle, Wash., room 202, Burke 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 Notices 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 catalogue 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 Notice 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 can not 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 surveyed waters of the United States, Porto Rico, Virgin Islands, Alaska, Hawaiian Islands, and the Philippine Islands, contain full nautical 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, including the United States and its possessions. A table of tidal differences is given by means of which the tides at about 3,500 intermediate ports may be obtained. Separate reprints from the general Tide Tables are issued for the Atlantic and Pacific coasts of the United States and its dependencies.

Current Tables, which have heretofore been issued as a part of the Tide Tables, are now published separately as Current Tables, Atlantic Coast of the United States, and Current Tables, 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. They 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 can not 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.

Other publications.—Lists of Lights, Buoys, and other Day Marks of the United States, its insular possessions, and the Great Lakes are published by the Bureau of Lighthouses and may be purchased from its sale 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 Division of Publications, Department of Commerce, 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 on the chart by two broken lines to represent the side limits of the improvement. Before completion of the project the depth given is that shown by the latest survey received from the engineer in charge. After completion the depth given is that determined on a certain date which is stated in the channel legend. The actual depth of a completed channel may be greater than the charted depth shortly after dredging and less when shoaling occurs as a result of storms or other causes. These changes are of too frequent occurrence and uncertain duration to chart. Therefore, when a vessel's draft approximates the charted depth of a dredged channel, the latest information should be obtained before entering. The possibility of shoaling along the edges of the channel should always be considered.

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 can not 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 of, 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 paper on which charts are printed directly from copper plates has to be dampened. On drying distortion takes place from the inequalities in the paper, which varies with the paper and the amount of the original dampening; but usually it is not sufficient to affect ordinary navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted upon the chart, especially if the lines to objects be long. The longer the chart the greater the amount of this distortion.

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.

Gas buoys and other unwatched lights can not be implicitly relied on; the light may be altogether extinguished or, if intermittent, 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. 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.

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 is generally the only safe guide and should be faithfully used. 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.

Submarine bells, 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. 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 can not 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 to 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. In using the tables slack water should not be confounded with high or low tide nor a flood or ebb current with a rising or falling tide. In some localities the tide may be at a high or low water stand while the current is at its maximum velocity.

The Tide Tables published by the Coast and Geodetic Survey give the predicted times and heights of high and low waters for most of the principal ports of the world and tidal differences and constants for obtaining the tides at all important ports.

Plane of reference for soundings on charts.—For the Atlantic coast of the United States and Porto 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 Wrangel Strait, Alaska, the plane of reference is 3 feet below mean lower low water. 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 coasts where the tidal range is considerable special caution is necessary. It should be remembered that 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 cross current 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 times 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, though 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. Countercurrents 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 at their 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 baring of the propeller and rudder.

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.

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 Atlantic and Pacific coasts of North America.

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 its means. 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 bearing 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 lying 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 fit, 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 is a good number, as the four angles thus obtained prevent any errors. 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 afterwards 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 continuously 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. In employing the horizontal danger angle, however, charts compiled from early Russian and Spanish sources, referred to in a preceding paragraph, should not be used.

Soundings.—In thick weather, when near or approaching the land or danger, soundings should be taken continuously 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.

Sumner's method.—Among astronomical 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 afterwards 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 Marc Saint 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 principal 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.

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 Saint Hilaire Method of Ex-Meridian Tables should be substituted.

Radiocompass 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 vibrations 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 necessary 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. 16 "radio service"); 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 stations are a long distance apart. The bearings may be corrected for this distortion as explained on page 11.

Radio bearings may be combined with position lines obtained from astronomical observations and used in ways very similar to the well-known Sumner line when avoiding dangerous shoals or when making the coast.

Change of 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 some 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.

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 deflections of the compass are 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 disturbances 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 disturbances 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 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; that is, 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 can not 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 case 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.

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 vessels whose safety is entirely dependent upon an accurate knowledge of the depths. Efforts have been made from time to time by the Coast and Geodetic Survey to utilize various commercial tubes for surveying operations, but the results obtained have not been satisfactory. A tube recently designed by the bureau, however, has been tested extensively by field parties and, as it gives results exceeding in accuracy any other type of tube, has been adopted for survey work. Even with this tube great care is necessary in order to obtain satisfactory results. There are various types of tubes in common use which are too well known to require detailed description here. They are all based on the general principle that air is elastic and can be compressed, and that if a column of air in a tube be lowered into the water in such a way that the air can not escape, yet at the same time the pressure of the water can be transmitted to it, the amount by which the air is compressed furnishes a measure of the depth to which it was lowered. Theoretically this principle is sound, but when we come to apply the theory to actual practice certain elements enter which result in errors in the depth determination. Actual experiments show that errors of 10 to 12 per cent are not uncommon, and that considerably greater errors may occur. It is important to note that the amount of these errors depends on the depth—the greater the depth the greater the numerical value of the error.

These errors are due chiefly to uneven bore of tube, variation of barometric pressure from normal, difference in temperature of air and water, uneven thickness of caps used to close one end of the tube, leakage of water, accumulated salt in the tube, and leakage or failure of gaskets and valves used in the construction of some types of tube.

In order to avoid serious errors tubes should therefore be used with greatest care. A type that can be used more than once should be adopted, and the tubes to be used for sounding to make a landfall should be tested beforehand by stopping for an up and down cast, sending them down on the sounding wire to any desired depth, and comparing their readings with the actual depth to which they were submerged. Additional tests of this nature from time to time during the sounding operations are also valuable. Special care should be taken to prevent leakage by making sure that the cap fits tightly or that the valve and gaskets are water-tight and are working properly. In using the valve type of tube it is very important to make sure that the tube does not submerge after it once clears the water.

INSTRUCTIONS TO MARINERS IN CASE OF SHIPWRECK, AS PUBLISHED BY THE UNITED STATES COAST GUARD

GENERAL INFORMATION

Life-saving 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.

All stations on the Atlantic coast are manned throughout the year by crews of experienced surfmen; upon the Lake coasts the stations are manned from the opening until the close of navigation, with the exception of the one on Beaver Island, Lake Michigan, which depends on a volunteer crew; and upon the Pacific coast they are open and manned throughout the year.

All life-saving stations are fully supplied with boats, wreck guns, beach apparatus, restoratives, clothing provided by the Women's National Relief Association for the shipwrecked requiring it, etc.

Houses of refuge are supplied with boats, provisions, and restoratives, but not manned by crews; a keeper, however, resides in each, who is 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 Florida coast, where the requirements of relief are widely different from those of any other portion of the seaboard.

The life-saving stations are provided with the International Code of Signals, and vessels can, by opening communication, 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, requests for a tug or Coast Guard cutter will be received and promptly forwarded.

All services are performed by the life-saving crews without other compensation than their wages 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 Women's National Relief Association.

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 continue through the day. A continuous lookout is also maintained at every station night and day.

Each patrolman carries Coston signals. Upon discovering a vessel standing into danger he ignites one of these, which emits a brilliant red flame of about two 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 Coston 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 keeper (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 keeper's remonstrance, 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 as 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 life-saving crew.

If circumstances permit, you can assist the life-saving 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 as shown in Figure 2.

Take particular care that there are no turns of the whip line round 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 life-saving 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 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

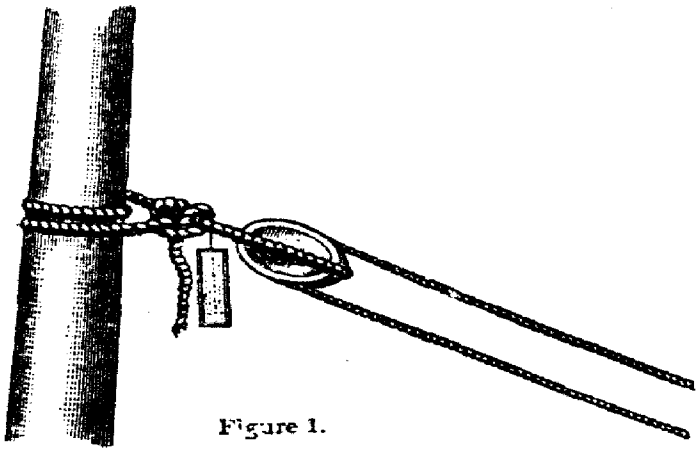


Figure 1.

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.

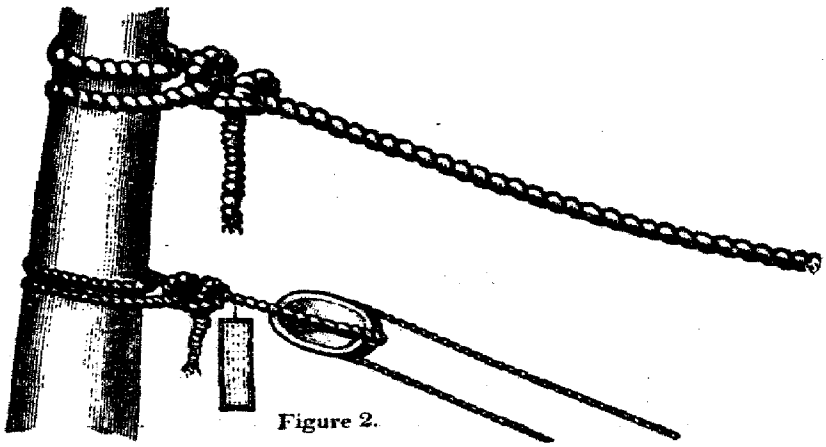


Figure 2.

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.

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, "Signals," on p. 317.

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 life-saving crew abreast of your vessel.

From one to four hours 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 life-saving 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 movements of the life-saving 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.

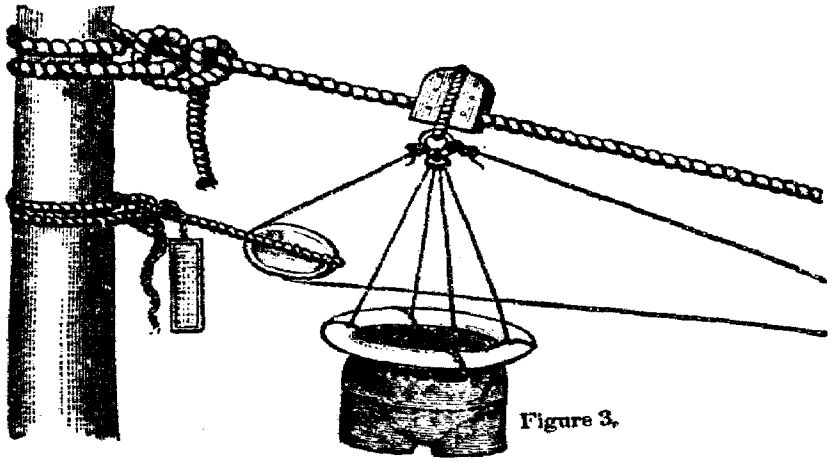


Figure 3.

If not discovered immediately by the patrol, burn rockets, flareup, 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 round 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 life-saving 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 divide the high seas from rivers, harbors, and inland waters described in this volume. Waters inshore of the lines here laid down are "inland waters," and upon them the inland rules and pilot rules given on page 325 apply. Upon the high seas—viz, waters outside of the lines here laid down—the international rules given below apply.

(All bearings are in degrees true and points magnetic; distances in nautical miles, and are given approximately.)

Cutler (Little River) Harbor, Me.—A line drawn from Long Point 226° (SW. by W. ⅞ W.) to Little River Head.

Little Machias Bay, Machias Bay, Englishman Bay, Chandler Bay, Moosabec Reach, Pleasant Bay, Narraguagus Bay, and Pigeon Hill Bay, Me.—A line drawn from Little River Head 232° (WSW. ⅜ W.) to the outer side of Old Man; thence 234° (WSW. ½ W.) to the outer side of Double Shot Islands; thence 244° (W. ⅝ S.) to Libby Islands Lighthouse; thence 231½° (WSW. ¼ W.) to Moose Peak Lighthouse; thence 232½° (WSW. ⅜ W.) to Little Pond Head; from Pond Point, Great Wass Island, 239° (W. by S.) to outer side of Crumple Island; thence 249° (W. ¼ S.) to Petit Manan Lighthouse.

All harbors on the coast of Maine, New Hampshire, and Massachusetts between Petit Manan Lighthouse, Me., and Cape Ann Lighthouses, Mass.—A line drawn from Petit Manan Lighthouse 205½° (SW. ¼ S.), 26½ miles, to Mount Desert Lighthouse; thence 250½° (W. ⅛ S.), about 33 miles to Matinicus Rock Lighthouse; thence 267½° (WNW. ¾ W.), 20 miles to Monhegan Island Lighthouse; thence 260° (W. ⅝ N.), 19½ miles, to Seguin Lighthouse; thence 233° (WSW. ⅛ W.), 18¼ miles, to Portland Light Ship; thence 214½° (SW. ⅜ W.), 29½ miles, to Boon Island Lighthouse; thence 210° (SW.), 11 miles, to Anderson Ledge Spindle, off Isles of Shoals Lighthouse; thence 176¼° (S. by W.), 19½ miles, to Cape Ann Lighthouse, Mass.

Boston Harbor.—From Eastern Point Lighthouse 215° (SW. ⅜ W.), 15¾ miles, to The Graves Lighthouse; thence 139¼° (SSE. ⅜ E.), 7½ miles, to Minots Ledge Lighthouse.

All harbors in Cape Cod Bay, Mass.—A line drawn from Plymouth (Gurnet) Lighthouse 77½° (E. ⅛ S.), 16¼ miles, to Race Point Lighthouse.

RULES OF THE ROAD—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 fore part 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 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 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 than 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), excepting 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 a 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 can not 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 can not 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. 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 gunwale 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 gunwale, 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 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 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 horizotally from the boat into the seaway, shall carry one all-round 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-round 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 six feet and not more than fifteen feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than five feet and not more than ten 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 three miles.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea sailing fishing vessels of less than twenty 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 one 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 twenty 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 one 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 two (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 six nor more than twelve 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 hori-

zon, and shall also, on the approach of or to other vessels, show where it can best be seen a white flare-up light 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 two 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 one hundred and fifty 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 three feet below the anchor light, and at a horizontal distance of at least five feet away from it in the direction of the net or gear.

(h) If a vessel or boat when fishing becomes stationary in consequence of her gear getting fast to a rock or other obstruction, she shall in daytime 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 dragnet, and vessels line fishing with their lines out, shall, if of twenty tons gross tonnage or upward, respectively, at intervals of not more than one 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 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.

(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 vessels, 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 four (a) and the last paragraph of article eleven.

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 one mile. Such light shall be carried as nearly as practicable on the same level as the side lights.

ART. 11. A vessel under one hundred and fifty feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding twenty 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 one mile.

A vessel of one hundred and fifty feet or upwards in length when at anchor shall carry in the forward part of the vessel, at a height of not less than twenty and not exceeding forty 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 fifteen 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 four (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 can not 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 two 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 vessels" 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 when 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 fog horn 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 rain storms, 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 collison 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 closehauled.

(*b*) A vessel which is closehauled on the port tack shall keep out of the way of a vessel which is closehauled 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 or 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 can not 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 can not 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.

RULES OF THE ROAD—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 thereto, 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.[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 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 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 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 sea-going 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 sea-going vessels and ferry boats) 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

[2] 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. 335.

to two points abaft the beam on either side of the vessel, and the afterlight so as to show all around the horizon.

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 or 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 vessels of less than ten gross tons under way during bad weather, the green and red side lights can not 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.[3] 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 station on pilotage duty, shall carry lights similar to those of other vessels of their tonnage.

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

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[3] An act relating to lights on steam pilot vessels.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That 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.

SEC. 2. That this act shall be construed as supplementary to article eight of the act approved June seventh, eighteen hundred and ninety-seven, entitled "An act to adopt regulations for preventing collisions upon certain harbors, rivers, and inland waters of the United States," and to article eight of an act approved August nineteenth, eighteen hundred and ninety, entitled "An act to adopt regulations for preventing collisions at sea."

SEC. 3. That this act shall take effect on June thirteenth, nineteen hundred.

Approved, February 19, 1900.

be obliged to carry the colored side lights; but every such vessel 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 underway.

(*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 6 feet and not more than 12 feet; and the horizontal distance between them, if any, shall not be more than 10 feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all round the horizon, the white light a distance of not less than 3 miles and the red light of not less than 2 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 one hundred and fifty feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding twenty 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 one mile.

A vessel of one hundred and fifty feet or upwards in length when at anchor shall carry in the forward part of the vessel, at a height of not less than twenty and not exceeding forty feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall be not less than fifteen 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 can not 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 ship-owners, 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 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 an 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 one minute, a prolonged blast.

(*c*) A sailing vessel under way shall sound, at intervals or 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 steam vessel when towing shall, instead of the signals prescribed in subdivision (*a*) of this article, at intervals of not more than one 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.

(*f*) 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 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.

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 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 can not be seen for a distance of half a mile, such steam vessel, when she shall have arrived within half a 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 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 answer 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 can not 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.

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 can not 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 mid-channel 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. 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 revenue 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.

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 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 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

The following rules for lights to be carried by ferry boats, 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 searchlights, 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 [4]

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 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 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 shall show all around the horizon, to designate and distinguish such lines from each other, which light 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

[4] 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. 335.

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 OPERATIONS, OR MADE FAST TO A SUNKEN OBJECT WHICH MAY DRIFT WITH THE TIDE OR BE TOWED[5]

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 houses. 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.

[5] 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 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.

Rules 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.

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.

RULES FOR LIGHTS FOR RAFTS AND OTHER WATER CRAFT NAVIGATING BY HAND POWER, HORSEPOWER, OR BY THE CURRENT OF THE RIVER, 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

Any vessel, except rafts and rowing boats under oars, navigating by *hand power, horsepower, or by the current of the river,* shall carry one white light forward, not less than 8 feet above the surface of the water.

Rafts propelled by hand power or by the current of the river, or which shall be anchored or moored in or near a channel or fairway, shall carry white lights, as folows: Rafts of one crib and not more than two in length shall carry one white light. Rafts of three or more cribs in length and one crib in

width shall carry one white light at each end of the raft. Rafts of more than one crib abreast shall carry one white light on each outside corner of the raft, making four lights in all.

The *white light* required by these rules for rafts and other water craft shall be carried, from sunset to sunrise, in a lantern so fixed and constructed as to show a clear, uniform, and unbroken light, visible all around the horizon and of such intensity as to be visible on a dark night with a clear atmosphere at a distance of at least 1 mile. The lights for rafts shall be suspended from poles of such height that the lights shall not be less than 8 feet above the surface of the water.

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.

REGULATION OF MOTOR BOATS

AN ACT To amend laws for preventing collision 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 one. Less than twenty-six feet in length.

Class two. Twenty-six feet or over and less than forty feet in length.

Class three. 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 one 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 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 two and three 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 two. Nineteen square inches.

Class three. 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 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. The glasses or lenses in the said side lights shall be of not less than the following dimensions on motor boats of—

Class two. Sixteen square inches.

Class three. Twenty-five square inches.

On and after July first, nineteen hundred and eleven, all glasses or lenses prescribed by paragraph (b) of section three 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 follow dimension on motor boats of—

Class two. Eighteen inches long.

Class three. 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 two or three shall carry an efficient fog horn.

(*c*) Every motor boat of class two or three shall be provided with an efficient bell, which shall be not less than eight inches across the mouth on board of vessels of class three.

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 a 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 one hundred dollars 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 six of this act.

SEC. 9. That all laws and parts of laws only in so far 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.

REGULATIONS FOR TOWS OF SEAGOING BARGES WITHIN INLAND WATERS

The following regulations limit the length of hawsers between towing vessels and seagoing barges in tow and the length of such tows within inland waters of the United States, designated and defined from time to time pursuant to section 2 of the act approved February 19, 1895. These regulations have been

prepared and are approved by the Secretary of Commerce pursuant to section 14 of the act approved May 28, 1908, entitled "An act to amend the laws relating to navigation, and for other purposes."

The suspension of these regulations on June 4, 1917, "for the duration of the war or until further notice," has expired by limitation, and said regulations are in full force and effect on and after December 21, 1923.

1. Tows of seagoing barges navigating the inland waters of the United States are limited in length to five vessels, including the towing vessel or vessels.

2. Hawsers are limited in length to 75 fathoms, measured from the stern of one vessel to the bow of the following vessel, and should in all cases be as much shorter as the weather or sea will permit.

3. In cases where the prescribed length of hawser is, in the opinion of the master of the towing vessel, dangerous on account of the state of weather or sea, hawsers need not be shortened to that length until reaching the localities named below:

(*a*) Tows bound for Hampton Roads or beyond, before passing Thimble Light.

(*b*) Tows bound up the Chesapeake, to the northward of Baltimore Light.

(*c*) Tows bound up the Delaware, between Fourteen Foot Bank and Cross Ledge lighthouses.

Hawsers may also be lengthened in the same places, under the same circumstances, when tows are bound out.

4. In case of necessity, on account of wind or weather, hawsers of vessels navigating between Race Rock and Gay Head may be lengthened out in the discretion of the master of the towing vessel; but this paragraph shall not apply to Narragansett Bay north of Beavertail Light.

5. In all cases where tows can be bunched it should be done.

(*a*) Tows navigating in the North and East Rivers of New York must be bunched above a line drawn between the Robbins Reef Lighthouse and Owls Head, Brooklyn, but the quarantine anchorage and the north entrance to Ambrose Channel shall be avoided in the process of bunching tows. When tows are entering Long Island Sound from the westward, the lines may be lengthened out to the prescribed length after passing Fort Schuyler; and when bound for New York from Long Island Sound tows must be bunched before passing Whitestone Point.

(*b*) Tows must be bunched above the mouth of the Schuylkill River, Pa.

6. Section 15 of the act approved May 28, 1908, provides:

> That the master of the towing vessel shall be liable to the suspension or revocation of his license for any willful violation of regulations issued pursuant to section 14 in the manner now prescribed for incompetency, misconduct, or unskillfulness.

7. Any violation of these regulations shall be reported in writing as soon as practicable to the board of local inspectors of steam vessels most convenient to the officer or other person who may witness the violation.

Meteorological table compiled by the United States Weather Bureau

[Record for wind direction is for 5 years; record for all other data is for 38 to 41 years]

NANTUCKET, MASS.

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 maximum	Air temperature: Mean: Mean minimum	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: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Average number of times (observations at 8 a. m. and 8 p. m.) from—: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Average number of days with winds of 40 miles or over	Number of days fog
	In.	In.	In.	In.								%		In.		In.													
January	30.04	30.99	28.82	2.17	31.3	37.5	25.1	12.4	57	−4	61	80	7	3.42	14	2.47	15.9	83	6	6	3	4	5	9	14	15	0	4	5
February	30.04	30.97	28.78	2.19	30.7	36.8	24.7	12.1	59	−6	65	78	6	3.11	12	2.77	16.4	72	7	5	2	3	3	8	15	13	0	4	4
March	29.98	30.92	28.47	2.45	35.5	41.0	30.0	11.0	68	6	62	81	6	3.98	13	3.22	16.2	86	7	6	4	6	6	13	9	11	0	4	6
April	29.97	30.68	29.13	1.55	43.4	49.0	37.7	11.3	74	15	59	82	6	2.64	12	2.51	15.2	79	6	8	2	6	8	14	8	8	0	3	7
May	29.99	30.54	29.28	1.26	52.3	58.3	46.3	12.0	86	34	52	84	6	2.67	11	2.78	13.7	60	5	8	5	6	7	20	7	4	0	1	11
June	29.98	30.49	29.31	1.18	61.0	67.4	54.5	12.9	90	43	47	86	5	2.41	10	3.74	12.7	55	5	9	4	5	7	20	7	3	0	1	11
July	29.98	30.51	29.44	1.07	67.8	74.0	61.5	12.5	92	48	44	86	5	2.68	9	3.04	12.0	65	3	6	2	5	8	27	7	4	0	1	13
August	29.99	30.45	28.71	1.74	67.8	73.7	61.9	11.8	89	51	38	86	5	3.05	9	5.73	11.3	60	5	11	4	6	8	18	6	4	0	0	9
September	30.08	30.63	29.48	1.15	62.8	68.3	57.3	11.0	87	41	46	84	5	2.73	9	3.15	12.4	67	6	11	6	5	9	14	5	4	0	1	8
October	30.05	30.61	29.07	1.54	54.2	59.6	48.7	10.9	81	32	49	81	6	3.39	10	3.86	14.5	68	7	9	6	7	4	11	9	9	0	2	3
November	30.05	30.80	29.16	1.64	44.4	49.8	39.0	10.8	66	15	51	80	6	3.28	12	2.88	15.3	79	8	5	2	4	4	9	14	14	0	3	2
December	30.05	30.91	28.73	2.18	35.8	41.6	29.9	11.7	60	−1	61	80	6	3.64	13	2.62	15.5	76	6	6	3	5	3	8	16	15	0	4	2
Mean	30.02				48.9	54.8	43.0	11.8				82	6				14.3												
Total														37.00	134				71	90	43	62	72	171	117	104	0	28	81

BOSTON, MASS.

January	30.05	31.00	28.67	2.33	27.9	35.9	20.0	15.9	70	−13	83	72	6	3.82	12	3.25	11.6	64	7	3	2	3	3	15	15	14	0	1	1
February	30.04	31.03	28.69	2.34	28.8	36.7	20.8	15.9	64	−11	75	69	5	3.44	10	4.45	12.3	60	7	1	3	2	3	10	17	13	0	1	1
March	29.97	30.96	28.56	2.40	35.6	43.3	27.9	15.4	83	−8	91	69	6	4.08	12	3.04	12.4	72	7	4	3	4	4	10	16	14	0	1	1
April	29.97	30.72	28.86	1.86	46.4	54.5	38.3	16.2	87	11	76	68	5	3.55	11	3.18	11.2	60	5	7	6	5	4	10	10	13	0	1	1
May	29.98	30.56	29.19	1.37	57.1	65.7	48.5	17.2	97	31	66	70	5	3.51	11	3.31	10.1	48	6	5	9	4	4	13	11	10	0	0	1
June	29.96	30.57	29.31	1.26	66.5	75.1	57.8	17.3	100	42	58	72	5	3.03	10	5.35	9.3	41	7	5	8	3	3	14	12	8	0	0	1
July	29.96	30.51	29.38	1.13	71.7	80.0	63.4	16.6	104	46	58	71	5	3.36	10	6.04	8.9	60	4	4	5	4	5	20	13	7	0	0	1
August	29.99	30.46	29.26	1.20	69.9	77.8	62.0	15.8	98	47	51	74	5	4.03	10	4.99	8.4	48	5	6	6	4	7	14	11	9	0	0	1
September	30.07	30.65	29.18	1.47	63.2	71.2	55.3	15.9	102	34	68	76	5	3.19	9	4.27	9.2	60	7	4	4	4	5	15	10	11	0	0	1
October	30.05	30.75	28.97	1.78	53.6	61.5	45.7	15.8	90	25	65	74	5	3.86	9	4.92	10.2	54	5	4	4	4	5	13	15	12	0	0	2
November	30.05	30.86	28.73	2.13	42.0	49.3	34.7	14.6	76	−2	78	73	5	4.10	10	5.43	11.2	65	4	3	2	2	4	13	20	12	0	1	1
December	30.05	30.96	28.80	2.16	32.5	39.9	25.1	14.8	69	−14	83	71	6	3.41	11	2.87	11.4	60	6	2	2	1	3	9	22	17	0	1	1
Mean	30.01				49.6	57.6	41.6	16.0				72	5				10.5												
Total														43.38	125				70	48	54	40	50	156	172	140	0	6	13

PORTLAND, ME.

January	30.05	30.88	28.64	2.24	22.4	30.1	14.7	15.4	65	−18	83	74	6	3.81	12	2.48	8.8	56	13	3	1	1	4	11	12	16	1	1	1
February	30.02	30.97	28.65	2.32	23.8	31.6	16.0	15.6	58	−17	75	71	5	3.65	11	3.06	9.1	61	11	3	1	2	4	9	12	14	1	0	1
March	29.96	30.98	28.79	2.19	31.8	39.2	24.4	14.8	79	−7	86	71	5	3.75	13	3.50	9.6	60	10	4	2	3	8	10	10	14	1	1	1
April	29.96	30.72	28.86	1.86	43.0	50.4	35.7	14.7	82	9	73	70	6	3.11	11	3.82	9.2	50	9	6	3	4	8	8	8	13	0	0	2
May	29.97	30.58	29.25	1.33	53.3	61.2	45.4	15.8	94	27	67	73	6	3.67	12	4.86	8.6	59	7	6	6	4	14	9	7	9	1	0	2
June	29.95	30.58	29.18	1.40	62.5	70.8	54.2	16.6	96	38	58	74	6	3.36	11	4.96	7.6	43	5	6	5	5	12	9	8	8	1	0	2
July	29.95	30.48	29.20	1.28	68.1	76.1	60.1	16.0	103	48	55	76	6	3.25	12	3.97	7.5	40	5	4	4	5	15	12	8	8	2	0	3
August	29.98	30.46	29.35	1.11	66.4	74.0	58.8	15.2	95	45	50	78	5	3.57	11	2.47	6.9	48	6	4	4	4	13	11	8	10	2	0	4
September	30.05	30.66	29.05	1.61	59.6	67.3	51.9	15.4	94	32	62	79	5	3.20	10	5.28	7.5	50	7	4	3	4	10	12	8	11	1	0	3
October	30.04	30.72	28.88	1.84	49.9	57.3	42.6	14.7	84	22	62	76	5	3.66	10	3.93	8.2	52	9	3	2	3	7	12	10	13	1	1	2
November	30.01	30.83	28.49	2.34	38.0	44.6	31.4	13.2	72	−6	78	74	6	3.80	11	3.76	8.8	56	11	3	1	2	5	13	11	13	1	1	1
December	30.03	30.97	28.76	2.21	27.6	34.4	20.8	13.6	65	−21	86	74	6	3.68	11	2.69	8.7	60	11	2	1	2	3	14	12	16	1	1	1
Mean	30.00				45.5	53.1	38.0	15.1				74	6				8.4												
Total														42.51	135				104	48	33	39	103	130	114	145	13	5	23

Meteorological table compiled by the United States Weather Bureau—Continued

EASTPORT, ME.

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 maximum	Air temperature: Mean: Mean minimum	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: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Average number of times (observations at 8 a. m. and 8 p. m.) from—: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Average number of days with winds of 40 miles or over	Number of days fog
	In.	*In.*	*In.*	*In.*								%		*In.*		*In.*													
January	30.00	30.90	28.63	2.27	20.4	28.1	12.6	15.5	54	−20	74	76	6	3.84	15	2.78	14.2	78	7	4	3	3	6	12	15	12	0	4	2
February	29.98	31.04	28.35	2.69	21.5	28.7	14.3	14.4	52	−23	75	76	6	3.62	13	2.47	13.8	72	7	6	3	2	3	9	16	10	0	3	2
March	29.93	30.93	28.59	2.34	28.9	35.2	22.6	12.6	65	−8	73	77	6	4.28	14	2.69	13.0	72	6	5	3	3	8	11	14	12	0	3	2
April	29.93	30.72	28.91	1.81	39.0	45.3	32.7	12.6	76	2	74	76	6	2.94	12	1.65	11.4	60	6	8	4	2	12	9	9	10	0	2	5
May	29.96	30.49	29.06	1.43	47.7	55.0	40.5	14.5	87	28	59	80	6	3.80	12	2.05	9.7	55	5	8	4	2	18	9	6	9	1	1	3
June	29.93	30.52	29.10	1.42	55.1	63.3	46.9	16.4	90	30	60	82	6	3.24	12	3.30	8.2	57	4	6	4	2	19	10	6	9	0	0	6
July	29.93	30.46	29.11	1.35	60.4	68.9	52.0	16.9	93	45	48	83	6	3.42	12	2.01	7.4	54	4	4	2	1	25	13	6	5	2	0	10
August	29.96	30.48	29.14	1.34	60.7	68.4	52.9	15.5	90	44	46	82	6	3.26	11	4.09	7.3	56	3	5	2	2	23	11	7	8	1	0	9
September	30.03	30.64	28.93	1.71	55.8	62.5	49.2	13.3	89	30	59	82	6	2.97	11	2.34	8.7	60	3	4	2	1	13	13	7	13	1	0	5
October	30.00	30.66	28.80	1.86	47.5	53.3	41.8	11.5	83	23	60	80	6	3.85	11	5.33	10.8	60	6	3	4	2	12	13	10	12	0	1	3
November	30.01	30.84	28.62	2.22	36.7	42.5	30.6	11.9	67	−13	80	78	7	4.08	12	2.08	12.8	72	7	4	2	2	6	14	15	10	0	2	2
December	29.98	30.97	28.24	2.73	26.3	33.1	19.4	13.7	57	−22	79	76	7	3.97	14	1.85	13.1	77	8	3	3	2	4	8	20	14	0	3	1
Mean	29.97				41.7	48.7	34.6	14.1				79	6				10.9												
Total														43.27	149				69	60	36	24	149	132	131	124	5	19	50

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