U. S. DEPARTMENT OF COMMERCE
CHARLES SAWYER, SECRETARY
COAST AND GEODETIC SURVEY
ROBERT F. A. STUDDS, *Director*

JULY 1, 1950 SERIAL NO. 737

UNITED STATES COAST PILOT

Atlantic Coast Section A

St. Croix River to Cape Cod

FIFTH (1950) EDITION

VK
981
.N3
5th ed.
(1950)

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U S Dept. of Commerce

UNITED STATES
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WASHINGTON : 1950

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National Oceanic and Atmospheric Administration

Climate Database Modernization Program

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Important

The courses and bearings are given in degrees (true), reading clockwise from 000° at north to 359°. In the case of lights all bearings are from seaward. When a course is given as "067°", it means that is the true course to be made good.

Distances are in nautical miles unless otherwise noted. Multiply nautical miles by 1.15 to obtain the approximate statute miles.

The directions of winds are the points from which they blow; of currents, the points toward which they set. These directions are true.

Depths are in feet or fathoms below mean low water. Heights are in feet above high water.

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

Light and fog signal characteristics are not fully described, and light sectors are not always defined. The mariner should consult the Light Lists which are published at intervals of about a year.

When using this Coast Pilot, reference should be made to the latest supplement and also to each Notice to Mariners issued subsequently. Mariners are requested to notify the Director, United States Coast and Geodetic Survey, Washington 25, D. C., of any changes affecting this pilot.

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Preface

THIS is the fifth edition of the United States Coast Pilot, Atlantic Coast, Section A, St. Croix River to Cape Cod. It is based on examinations by the United States Coast and Geodetic Survey and includes the results of a special field inspection made in 1949. Weather information was prepared by the United States Weather Bureau; channel information and data on ports and terminals were obtained from the Corps of Engineers; general information and detailed data on navigational aids were furnished by the Coast Guard; and port information was furnished by local authorities.

This edition is corrected to 1 July 1950, including Notice to Mariners 26 of 1950. It cancels the previous edition published in 1941.

Supplements to the Coast Pilot, containing corrections and additions from various sources, are issued each year. Each supplement is complete in itself and cancels all previous issues. The latest supplement, together with Notices to Mariners subsequent to it, will correct the book to date. Supplements may be obtained free upon application to the United States Coast and Geodetic Survey.

Mariners are requested to forward to the Director, United States Coast and Geodetic Survey, Washington 25, D. C., any information affecting this Coast Pilot.

ROBERT F. A. STUDDS, *Director*.

1 July 1950.

SERVICE FLAG
U. S. COAST AND GEODETIC SURVEY

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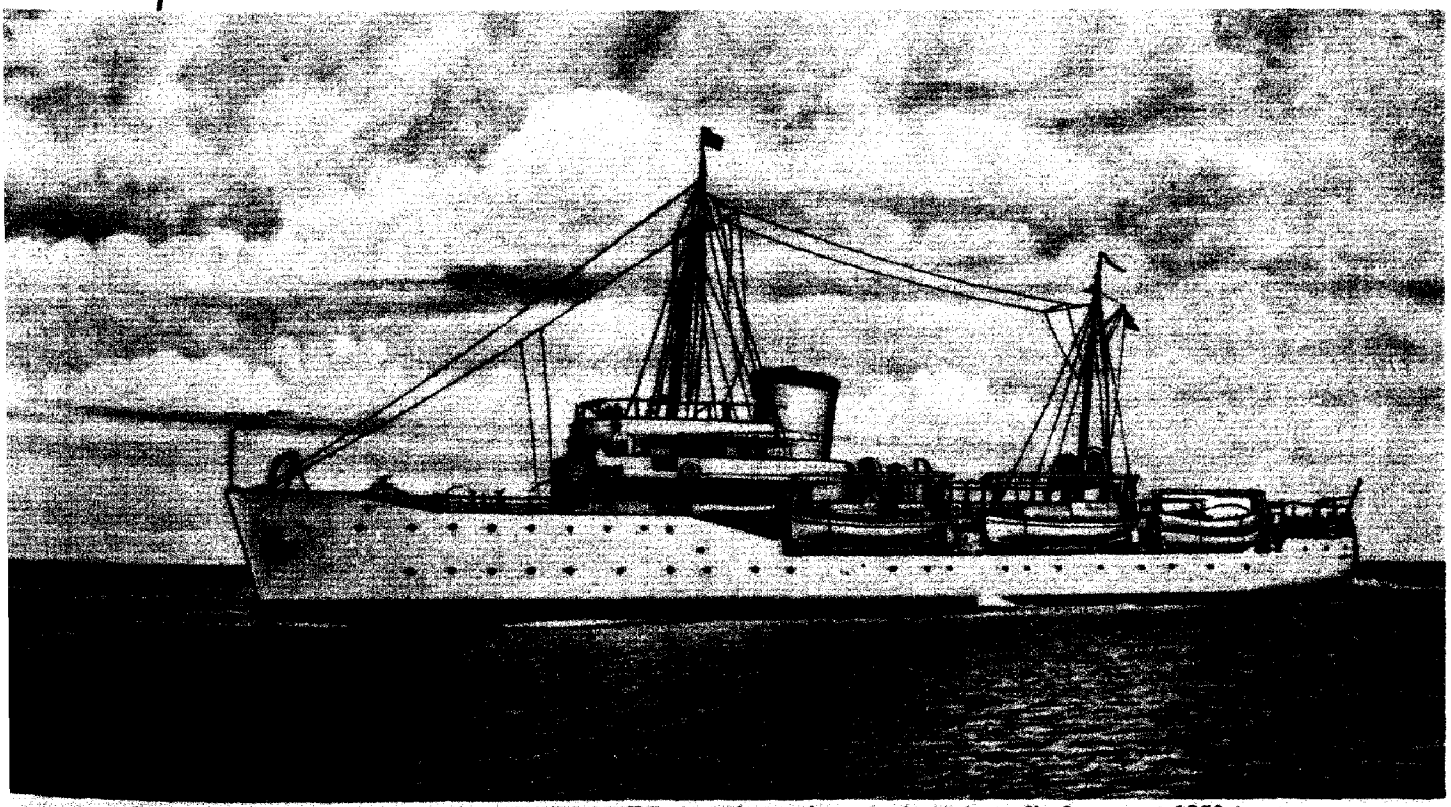
U. S. Coast and Geodetic Survey Charts

St. Croix River to Cape Cod



Coast and Geodetic Survey Ship *EXPLORER*; length 198 feet, draft 15 feet, displacement 1850 tons.

NUMERICAL LIST OF NAUTICAL CHARTS

1 July 1950

No.	Price	Scale
50	$0.75	1:210,100
70	.75	1:675,000
71	.75	1:500,000
77	.75	1:197,250
78	.75	1:200,000
204	.25	1:10,000
205	.25	1:10,000
208	.25	1:10,000
227	.25	1:20,000
228	.25	1:20,000
229	.50	1:30,000
230	.75	1:15,000
231	.75	1:20,000
232	.25	1:5,000
233	.50	1:10,000
235	.25	1:20,000
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252	.75	1:20,000
257	.50	1:20,000
258	.75	1:20,000
259	.75	1:20,000
288	.50	1:15,000
289	.50	1:15,000
297	.25	1:10,000
303	.75	1:40,000
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353	.75	1:40,000
580	.75	1:20,000
581	.25	1:40,000
801	.75	1:40,000
920	.75	1:326,856
1000	.75	1:1,200,000
1001	.75	1:1,207,256
1002	.75	1:1,210,765
1007	.75	1:2,161,580
1106	.75	1:378,888
1107	.75	1:400,000
1108	.75	1:400,000
1109	.75	1:416,944
1110	.75	1:432,720
1111	.75	1:449,659
1112	.75	1:466,940
1113	.75	1:470,940
1114	.75	1:456,394
1115	.75	1:456,394
1116	.75	1:458,596
1117	.75	1:460,732
1201	.75	1:80,000
1202	.75	1:80,000
1203	.75	1:80,000
1204	.75	1:80,000
1205	.75	1:80,000
1206	.75	1:80,000
1207	.75	1:80,000
1208	.75	1:80,000
1209	.75	1:80,000
1210	.75	1:80,000
1350	.75	1:180,000
1351	.75	1:180,000
3075	.75	1:220,000
3076	.75	1:220,000

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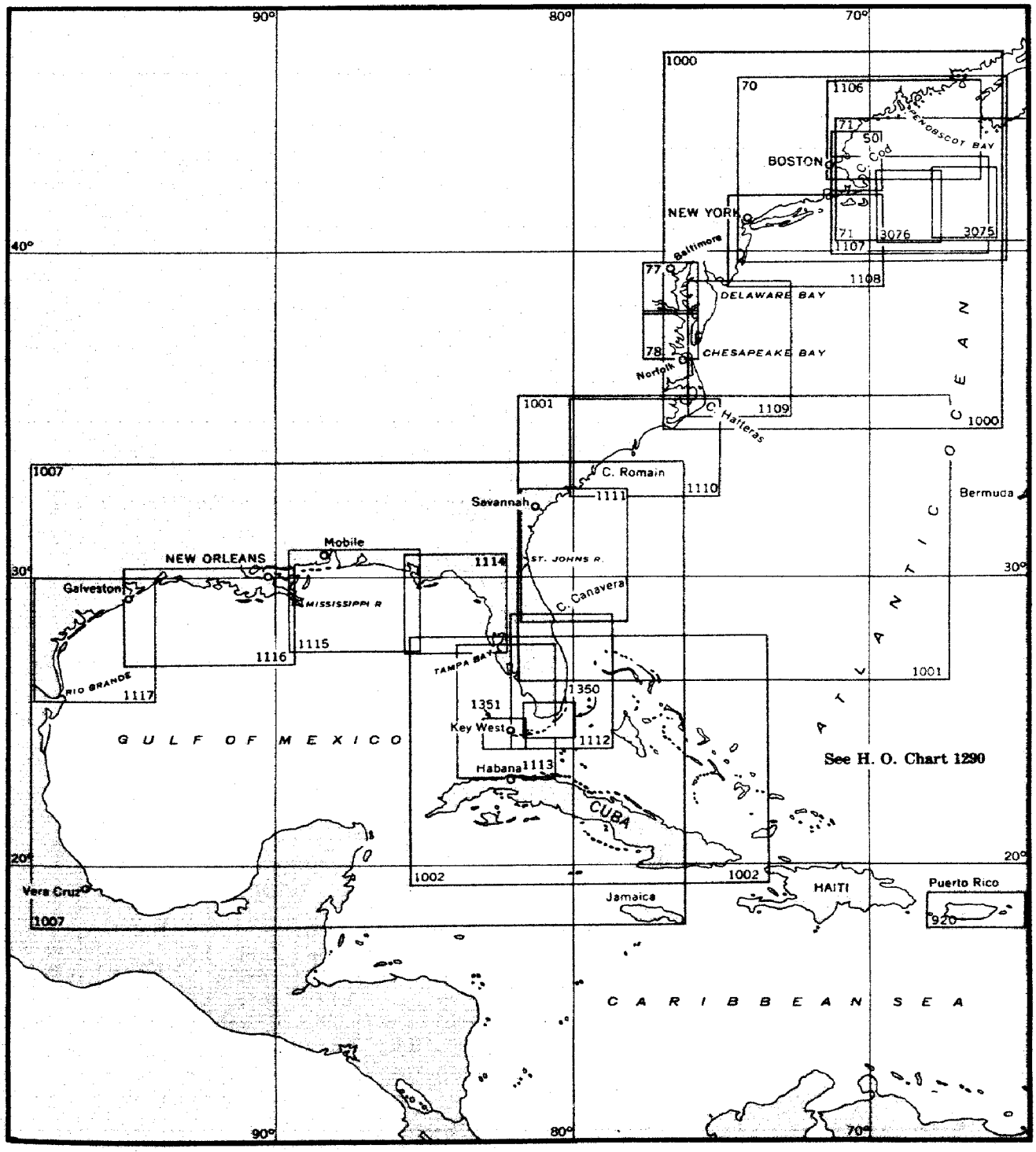
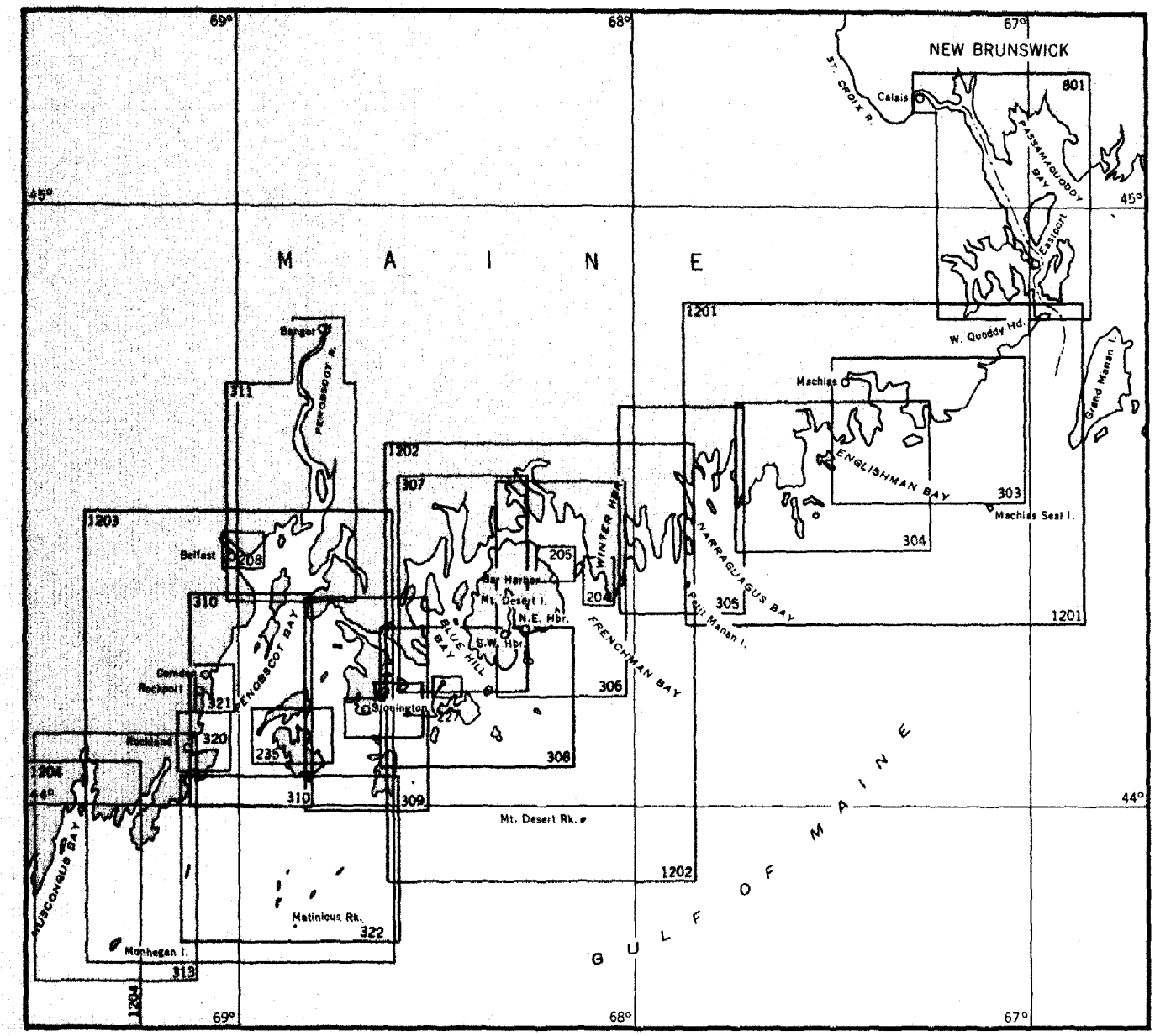
SAILING AND GENERAL CHARTS - ATLANTIC AND GULF COASTS

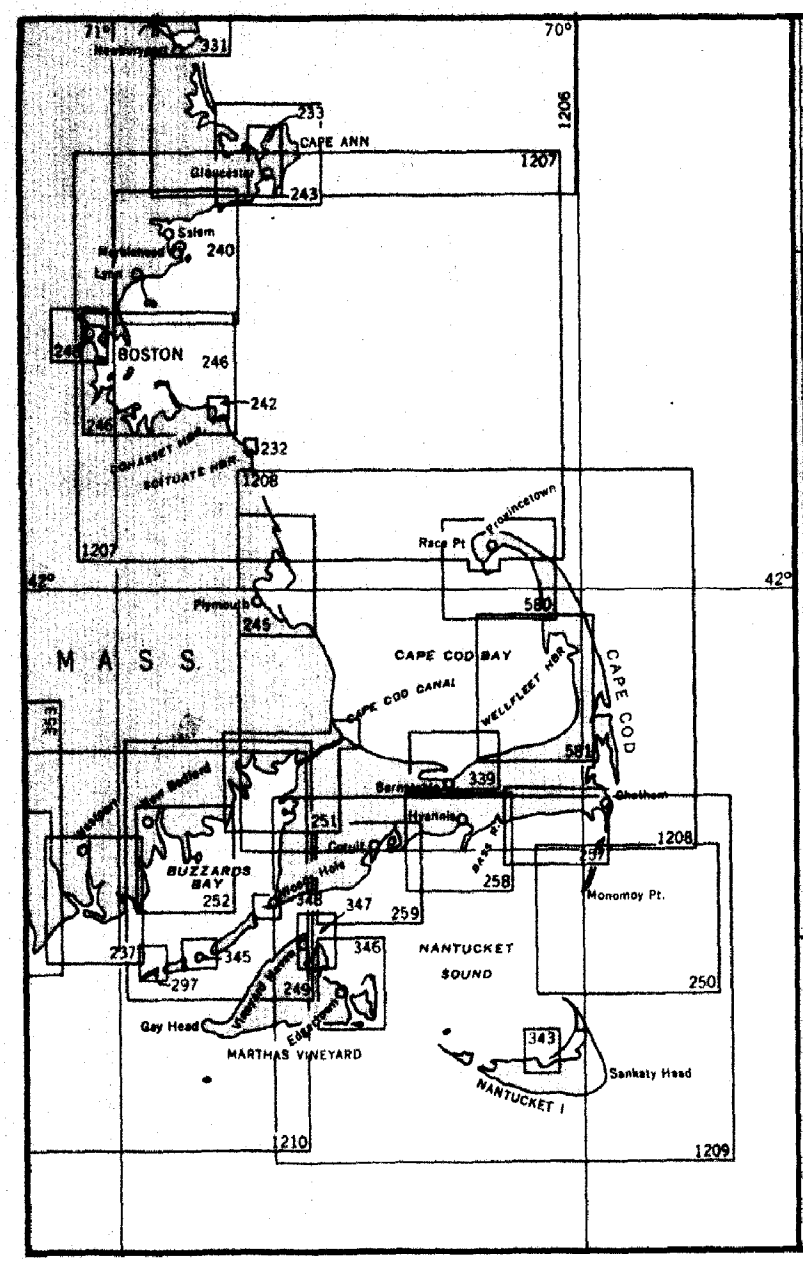


COAST AND HARBOR CHARTS - ATLANTIC COAST

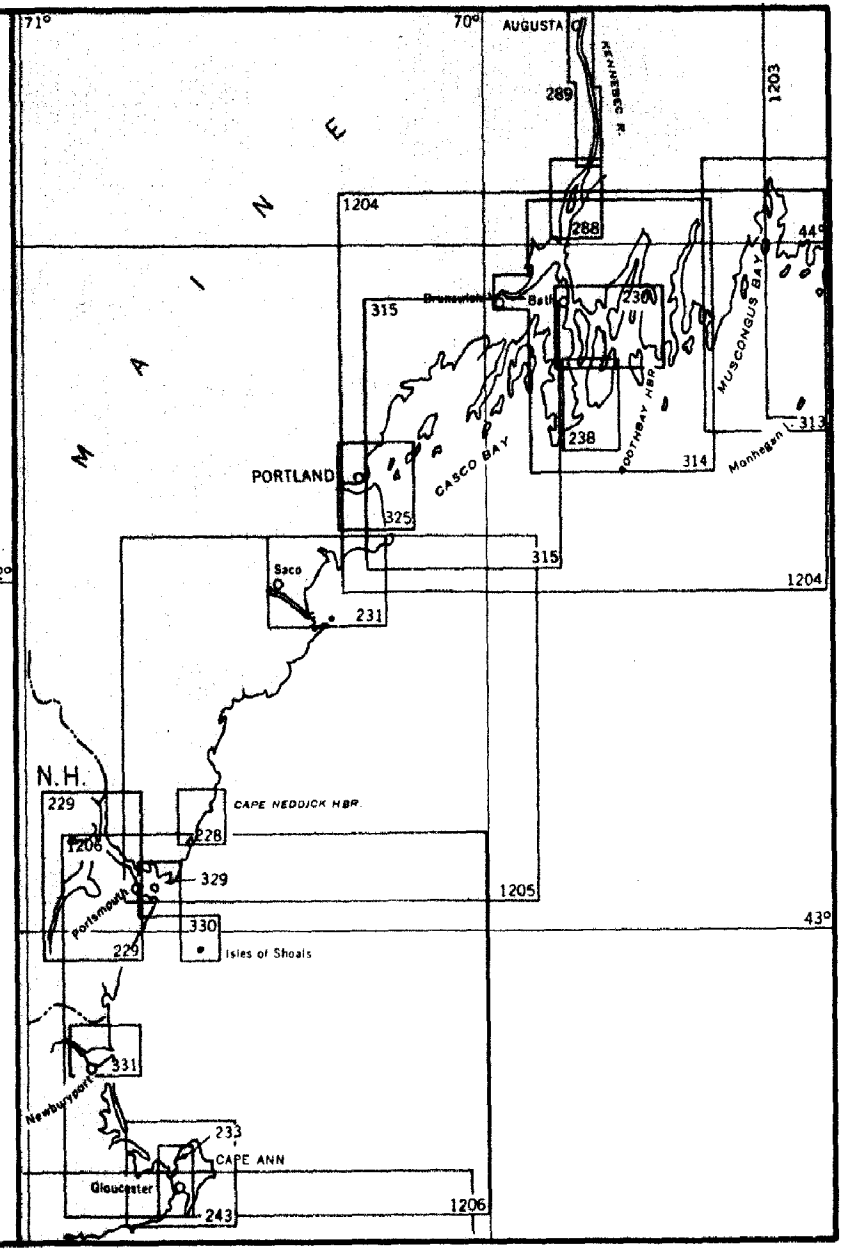
PASSAMAQUODDY BAY TO MONHEGAN I., MAINE



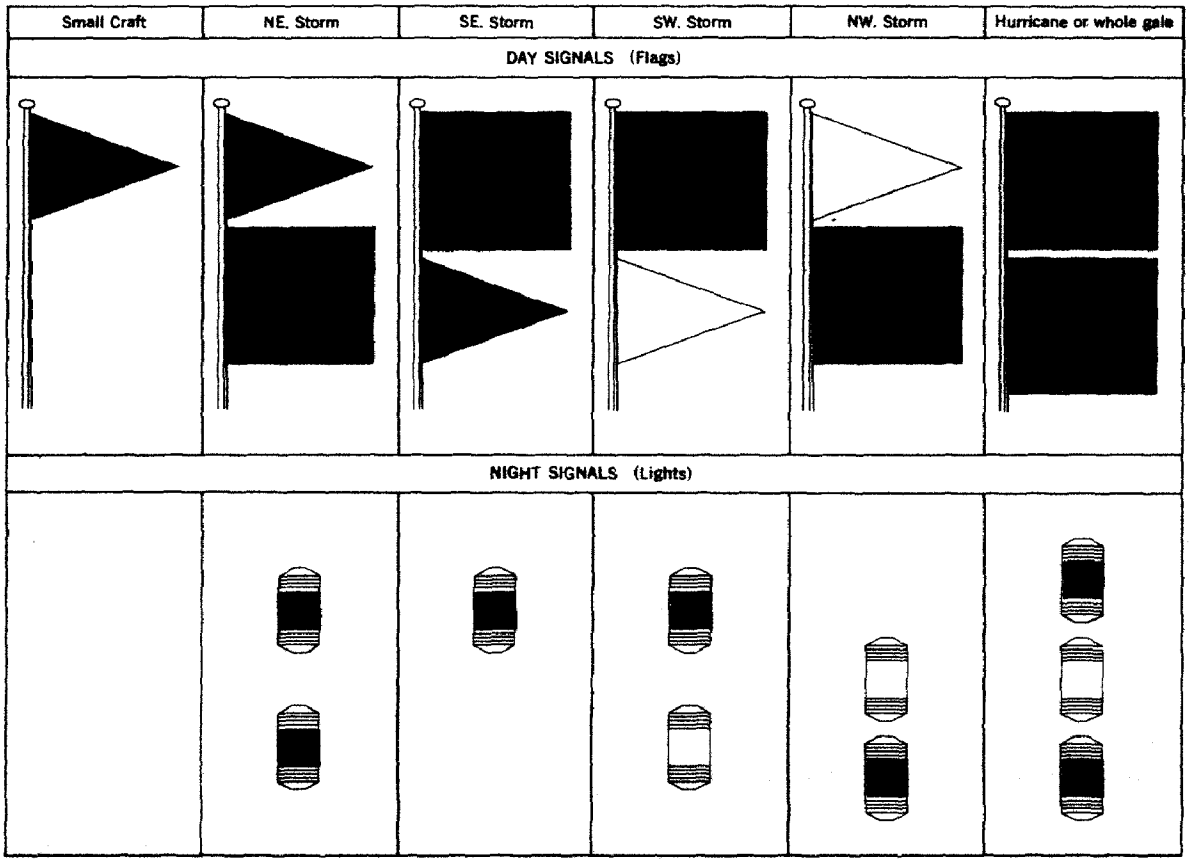
CAPE ANN TO BUZZARDS BAY, MASS.



MONHEGAN I., MAINE TO CAPE ANN, MASS.



STORM WARNING SIGNALS



EXPLANATION OF SMALL CRAFT, STORM, AND HURRICANE WARNINGS

The 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.

The 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, indicates the approach of a storm of marked violence with winds beginning from the *northeast.*

The 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.*

The 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.*

The 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 of one of the extremely severe and dangerous storms which occasionally move across the Great Lakes.

Code Flags and Single Meanings

** General Signal*

Able (Affirm*) *Speed Trial*	**King** *Stop Instantly*	**Uncle** *Standing into danger*	**1**
Baker *Explosives*	**Love** *Stop, Something to communicate*	**Victor** *Require Assistance*	**2**
Charlie *Yes*	**Mike** *Doctor on Board*	**William** *Require Medical Assistance*	**3**
Dog *Keep Clear*	**Nan** (Negative*) *No*	**Xray** *Stop your Intentions*	**4**
Easy *Altering Course to Starboard*	**Oboe** (Option*) *Man Overboard*	**Yoke** *Carrying Mails*	**5**
Fox *Disabled*	**Peter** (Prep*) *About to Sail (Lights out)*	**Zebra** *Shore Stations*	**6**
George *Want a Pilot*	**Queen** *Request Pratique*	**1st Repeat**	**7**
How *A Pilot is on Board*	**Roger** *Way is off my ship*	**2nd Repeat**	**8**
Item (Interrogatory*) *Altering Course to Port*	**Sugar** *Going full speed astern*	**3rd Repeat**	**9**
Jig *Semaphore*	**Tare** *Do not pass ahead of me*	*(Decimal Point)* *Code and Answering Pennant*	**0**

CHAPTER 1

General Information

THE COAST AND GEODETIC SURVEY is charged with (1) the survey of the coasts of the United States and its possessions to insure the safe navigation of coastal and intracoastal waters; (2) the compilation and publication of **nautical charts, Coast Pilots, and tables of predicted tides and currents** to meet the needs of the mariner; (3) the determination of geographical positions and elevations in the interior of the country to coordinate the coastal surveys and provide a framework for mapping and other engineering work; (4) the compilation and publication of aeronautical charts for use in air navigation; (5) observations of the earth's magnetism in all parts of the country to furnish magnetic information essential to the mariner, aviator, land surveyor, radio engineer, and others; and (6) seismological observations and investigations to supply earthquake data required in designing structures.

District Offices of the Coast and Geodetic Survey are located at some of the principal ports in the United States; see Appendix. Files of charts, Coast Pilots, and other publications are maintained at these offices for the use of mariners, who are invited to avail themselves of the facilities afforded.

Sales agents for Charts, Coast Pilots, Tide Tables, Current Tables, and Tidal Current Charts of the Coast and Geodetic Survey are located in many ports of the United States and in some foreign ports; see Appendix for agents located within the area covered by this Coast Pilot. The charts and publications can also be purchased from the Washington Office and from most of the District Offices. Orders mailed to Washington, D. C., should be accompanied by check or money order, made payable to the Treasurer of the United States. Postage stamps or Superintendent of Documents coupons cannot be accepted. The catalog of nautical charts and related publications can be obtained free of charge from the Coast and Geodetic Survey or any of its agencies.

Important.—Mariners and others using this Coast Pilot are urgently requested to forward to the Director, United States Coast and Geodetic Survey, Washington 25, D. C., directly or through a District Office, any information affecting it or the charts that may come to their attention, as well as any suggestions they may have for increasing the value of these publications. Reports of an urgent character should be sent by radio or telegraph.

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

By day a surveying vessel of the Coast and Geodetic Survey, under way and employed in hydrographic surveying, may carry in a vertical line, one over the other not less than 6 feet apart where they can best be seen, three shapes not less than 2 feet in diameter of which the highest and lowest shall be globular in shape and green in color and the middle one diamond in shape and white.

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

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

A vessel of the Coast and Geodetic Survey, when at anchor in a fairway on surveying operations, shall display from the mast during the daytime two black balls in a vertical line and 6 feet apart. At night two red lights shall be displayed in the same manner. In the case of a small vessel the distance between the balls and between the lights may be reduced to 3 feet if necessary.

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

In addition to the signals described, vessels of the Coast and Geodetic Survey when engaged in survey work often hoist one of the following International Code signals:

HD signifying "I am engaged in submarine survey work, you should keep clear of me."

HF signifying "I have a sweep out, you should keep clear of it."

The **wire drags** used by the Coast and Geodetic Survey in sweeping for dangers to navigation may be crossed by vessels without danger of fouling at any point except between the towing launches and the large buoys near them, where the towline approaches the surface of the water. Steamers passing over the drag are requested to change course so as to cross it approximately at right angles, as a diagonal course may cause the propeller to foul the supporting buoys and attached wires.

No attempt should be made to pass between the wire drag launches while the wire is being set out or taken in, unless it would endanger a vessel to do otherwise. In setting out or taking up the wire drag, the tension on the bottom wire is released and the floats at each 100-foot section may cause the wire to be held near the surface. At this time the launches are usually headed either directly toward or away from each other and the operation of taking up or setting out may usually be clearly seen.

Nautical charts are published primarily for the use of the mariner, although they serve the public interest in many other ways. They are compiled principally from the basic field surveys of the Coast and Geodetic Survey, supplemented by data from other Government organizations. They include all available information necessary for safe navigation.

Projections.—Nautical charts, with few exceptions, are constructed on the Mercator projection. On this projection meridians and parallels are straight lines intersecting at right angles. On any particular chart the distances between meridians are equal throughout, but distances between parallels increase progressively from the equator toward the poles, so that a straight line between any two points is a rhumb line. This unique property of the Mercator projection is one of the main reasons why it is preferred by the mariner.

Notes, symbols, and abbreviations.—Charts contain various types of notes placed in association with the title or in the proximity of the detail to which they refer. They may include such matters as scale, projection, date to which chart has been corrected, source of charted data, and explanation of the more important symbols and abbreviations, and index or notation of adjoining charts, controlling depths, caution notes, and the like. These notes are essential for the complete interpretation of the chart and should be thoroughly understood by the chart user.

Accuracy of charts.—Each sounding represents an actual measure of depth and loca-

tion 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 current 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 entrances 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 and boulders abound it is always possible that soundings, 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, coral heads, or boulders.

Dredged channels.—These are generally shown on the chart by two broken lines to represent the side limits of the improvement together with the depth and date. The depth is the controlling depth through the channel on the date charted and does not mean that this depth obtains over the full width of the channel, nor that the depth has not subsequently changed due to either shoaling or dredging. The Coast Pilot generally gives the project dimensions of an improved channel.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact station, especially when in exposed localities. It is safer, when possible, to navigate by bearings or angles referred to fixed objects on shore and by the use of soundings.

Plane of reference for soundings on charts.—For the Atlantic Coast of the United States and the West Indies, the plane of reference for soundings is the mean of all low waters; for the Pacific Coast of the United States, Alaska, and the Hawaiian Islands, it is the mean of the lower low waters. For foreign charts many different planes of reference are in use, but that most frequently adopted is mean low water springs.

The date of a chart is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. Natural and artificial changes, many of them critical, are occurring constantly, and it is important that navigators obtain up-to-date charts at regular intervals, or hand-correct their copies for changes listed in *Notices to Mariners*.

Nautical charts bear three dates, which are important to persons using them: (1) The **edition date** (month and year) of the publication note, *printed* on most charts, centrally in the lower margin; (2) the **print date** (year, month, and day), the latest date *printed* in the lower left-hand corner below the border, which is the date of correction to the printing plate; (3) the **date of issue**, *stamped* in the right lower margin and just to the left of the subtitle. Charts are hand-corrected to show all essential changes for lights, buoys, beacons, recently reported dangers, and other critical information as of date of issue from the Washington, D. C., Office. All important corrections subsequent to the date of issue are published in the *Notice to Mariners*, and should be immediately applied by the mariner to charts on hand or purchased from agents.

Scales of charts.—The scales of nautical charts range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scale 1:80,000 or larger and numerical scales are given in the upper right border for smaller scale charts. For convenience of reference, Coast and Geodetic Survey charts are classified according to scale as follows:

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

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

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

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

Intracoastal Waterway (inside route) charts.—Scale 1:40,000. This is a special series of charts embracing the inside route in New Jersey, the route from Norfolk, Va., to Key West, Fla., on the Atlantic Coast, and from Key West, Fla., to the Mexican boundary on the Gulf Coast.

Caution in using small-scale charts.—It is obvious that dangers to navigation cannot be shown with the same amount of detail on small-scale charts as on those of larger scale; therefore, in approaching the land or dangerous banks, 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, near objects should be used for bearings in preference to objects farther off, although the latter may be more prominent, as a small error in a bearing or in laying it down on the chart has greater effect in misplacing the position, the longer the line to be drawn.

Depth curves.—Since the installation of echo-sounding apparatus on most modern ships, the Coast and Geodetic Survey has been giving special prominence to depth curves on nautical charts of areas where modern hydrographic surveys have been made. Deep-water submarine relief has become important to the navigator, and the more faithfully the chart depicts this relief, the closer the navigator can relate his depth readings to the chart and the more certain will be his position. Previously, the charts were distinguished by many soundings and few depth curves; the newer charts are characterized by many depth curves and fewer soundings.

Compass roses on charts.—The annual change in variation gradually introduces an error in magnetic compass roses on charts, and in some cases, the displacement of position from neglect of this change may be of importance. The compass roses are replotted for every new edition of the chart if the error is appreciable; and the amount and date of the variation and the amount of annual change are stated for each compass rose. On certain of the sailing and general charts the magnetic variation is shown by isogonic lines in addition to the compass roses.

Magnetic disturbance of the compass.—The charts show areas where local magnetic disturbance of the compass, or *local attraction*, is caused by magnetic masses external to the ship. Such disturbances are fairly common in shallow waters; they are never encountered over oceanic depths. Magnetic force diminishes so rapidly with distance that a magnetic center in the visible land would have to be of unprecedented intensity to be capable of affecting the compass of a vessel 0.5 mile from shore.

It is unlikely that all the areas of magnetic disturbance have been located. When

such an area is discovered, the position should be fixed and the facts reported as far as they can be ascertained. It is particularly important to note the time at which the disturbance was encountered, so as to rule out the possibility that the effects were caused by a magnetic storm rather than by local irregularity.

Deviation of the compass.—The magnetic effect of the ship itself combines with any instrumental error of the compass to cause the deviation, which varies with the heading of the ship and with the magnetic latitude. It is customary to counteract the deviation as far as is conveniently possible by soft iron and permanent magnets, suitably placed in or on the binnacle. See U. S. Coast and Geodetic Survey Special Publication No. 96, *Instructions for compensation of the magnetic compass.*

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

Use of electrical equipment affecting magnetic compasses.—Experiments with portable electric megaphones show that such instruments have a definite effect on magnetic compasses, so that when such instruments are within 6 feet of a compass an error of 2° to 4° will result. Closer proximity increases this greatly. Other equipment, such as emergency lights and portable telephones, will have similar effects. So as not to affect magnetic compasses, such electric equipment should not be stowed within 10 feet of magnetic compasses and care should be taken to see that such instruments are not used in proximity of magnetic compasses for a time greater than necessary. Serious deflection of a ship's compass has been caused by the helmsman wearing an electric suit of the type used by airmen. Masters are advised to prohibit the wearing of such garments in the vicinity of the compass.

Tides and Currents.—Tide Tables are published in advance annually by the Coast and Geodetic Survey. See *Publications* at the end of this chapter. Each volume includes full daily predictions of the times and heights of high and low waters for certain reference stations along the coasts. The use of Table 2 of the Tide Tables should be known to every navigator. By means of this table the predictions given for the reference ports are extended so as to enable one to obtain the predictions for each day for a large number of other stations. Table 3 provides a means for computing the height of tide at any time.

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall considerably below the plane of reference of the chart. The water may also rise considerably above mean high water due to similar causes.

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

Current Tables for the Atlantic Coast and for the Pacific Coast of the United States are published in advance annually by the Coast and Geodetic Survey. Each volume

includes the daily predicted times of slack water and the times and velocities of strength of flood and ebb for certain reference stations and a table of current differences and constants by means of which corresponding daily predictions may be readily obtained for numerous other places. Tables for the velocity of current at any time, duration of slack, and rotary tidal currents at certain offshore locations, together with data on the Gulf Stream and wind currents are included. There are also current diagrams for a number of sounds, bays, and harbors 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. See *Publications* at the end of this chapter

Tidal Current Charts are published by the Coast and Geodetic Survey for various localities; see *Publications* at the end of this chapter. These current charts are good for any year and show the direction and velocity of the tidal current for each hour of its cycle. They present a comprehensive view of the tidal current movement of the area as a whole and also supply a means of readily determining the direction and velocity of the current at various localities throughout the area. The Tidal Current Charts are designed for use with the daily current or tide predictions contained in the annual tables.

Destructive and Other Waves.—Wind waves.—The most common type of wave is caused by the wind. The size of ocean waves depends on the strength of the wind, its duration, and the extent of open water over which it blows. As they travel across the ocean, their height continually decreases, their length increases, and several days later they roll toward the coast as a long, low **swell or ground swell.** This swell may be all but hidden by short irregular wind waves until it enters shallow water. Offshore the swell is almost uniform in character until it is deflected by outlying islands and scattered up and down the coast so that a number of systems of swell approach the shore.

Waves from deep water are modified when they get into shoal water. Where the swell approaches a shoreline at an angle it tends to turn parallel to the shore. It bends into bays and around outlying points. When the depth is reduced to less than one-half the wave length, the waves become higher and shorter, the crest arches forward and finding itself unsupported by sufficient water in front, dashes downward breaking into **surf.** Transformations occur everywhere, and therefore, the character of the surf varies considerably on adjacent beaches although caused by a uniform swell offshore. An individual breaking wave either on a beach, an isolated rock, or a shoal is a **breaker.**

When viewed from a vessel, especially a small boat, the surf or breaker never appears as dangerous as it is, and often when comparatively smooth at sea a dangerous surf is running which is not perceptible 400 yards offshore. Many lives have been lost unnecessarily by the crews of stranded vessels being thus deceived and attempting to land in the ship's boats.

When large swells encounter the seaward margin of a submarine terrace they break and form smaller waves of translation or rollers. These **rollers** differ from the usual waves found in deep water in that they are entirely above the still-water level. They may cross the shallow water to the shore without change until they break as surf on the beach. Rollers often transport shingle and other material shoreward along the bottom. They do not break and form surf until the depth of water equals the height of the wave.

Seiche and surge.—Seiche is a stationary vertical wave oscillation with a period varying from a few minutes to an hour or more, but somewhat less than the tidal periods.

It is usually attributed to an external force such as strong winds, changes in barometric pressure, swells, or seismic sea waves disturbing the equilibrium of the water surface. It is found both in enclosed bodies of water and superimposed upon the tidal waves of the open ocean. When these external forces cause a short-period horizontal oscillation of water, it is called surge.

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

Destructive waves.—Unusual sudden changes in height of water level can be caused by seismic sea waves or violent storms. Seismic sea waves sometimes spread out in all directions from places at which severe seismic disturbances occur. They travel long distances and can cause tremendous damage by wrecking ships and inundating coastal regions. Violent storms can produce extreme heights of tide which reflect the piling up of water to high levels or the withdrawal of water with consequent low levels. These two types of destructive waves have become commonly known as **tidal waves**, a name which is technically incorrect as they are not the result of tide-producing forces.

Seismic sea waves.—The destructive effect of great seismic sea waves which occur from time to time should not be minimized. The loss of life and property can be lessened if shipmasters and others acquaint themselves with the behavior of these waves so that intelligent action can be taken when they become imminent.

Tide gage records of the waves of April 1, 1946, in the Pacific and of many others that have occurred in the past show that the recession of the water is usually, though not always, preceded by a smaller but distinct rise of water level. Except for the possible grounding of floating equipment, the rise following the first fall is generally the first destructive part of the series of waves. The waves are so long that they are not visually recognizable as such, but manifest themselves as a rapid rising and falling of the water surface with a period of 12 to 20 minutes.

At Honolulu, which is reasonably well protected from the direct onslaught of the waves, there was on April 1, 1946, first a rise of about ½ foot in 6 minutes followed by a fall of 2¼ feet in the next 7½ minutes. In the 3 succeeding 7½-minute periods there was a rise of 2¾ feet, a fall of about 3½ feet, and then a rise of 4 feet to the third and highest crest of the series. The oscillations continued for many hours. The Honolulu record is probably representative of the pattern, though not the magnitude, of the wave in other parts of the islands where heights of 40 feet or more have been reported. The larger heights occurred on the shores facing the approaching wave, which in this case were the northern shores.

In some harbors there is normally a seiche whose period is determined by the size and depth of the harbor. If the seismic sea waves, even though small, should have a period about equal to that of the seiche, a resonance may be set up which would considerably magnify the usual oscillation and make it difficult to hold a ship to her moorings.

Waves travel outward from the epicenter at speeds which depend on depth. Though their speed may exceed 400 knots in the open ocean, they are relatively low, extremely long, and harmless and hence will pass a ship unnoticed. Upon reaching shoaler water the waves decrease in velocity and length, and increase in height. They become

dangerous on either nearby or distant coasts where depths and shape of coastline conspire to augment them.

Improvements have been and are being made in the quick determination and reporting of earthquake epicenters, but no method has as yet been perfected for determining whether a sea wave will result from a given earthquake. The problem of detecting and reporting the existence of sea waves when they do occur is being studied.

The times required for a seismic sea wave to reach Honolulu from various potential epicentral areas have been computed and are as follows: 7½ to 9 hours from the main islands of Japan, 6 to 6½ hours from Kamchatka, 4¼ to 5½ hours from the Aleutian Islands and Alaska Peninsula, 6 to 12 hours from Mexico and Central America, and 12½ to 15½ hours from South America.

After the receipt of a seaquake warning, safety requires that ships put to sea and that people on shore retreat to high ground away from the water front. If lack of time or other reason makes it necessary for a ship to remain in a harbor, the following account of the experience of a United States naval vessel while lying in the port of Kahului, Maui, on April 1, 1946, may be helpful.

"At or about 0650 this date, the water in this harbor was observed to be receding seaward and the level dropped from 10 to 12 feet in a matter of 15 to 20 minutes. Later the tide surged back into the entrance of the harbor through the jetties with waves washing over the breakwater and, shortly thereafter, over the docks and land on the northeast side. There were officially recorded on the log 20 separate waves from 0650 until 0920. These waves started with great magnitude from 10 to 15 feet in height and lessened as time progressed. Due to the suddenness of the first tidal wave approaching it was impossible to get the vessel safely under way. Later the terrific currents around the harbor entrance made navigation extremely hazardous. In view of these facts, a decision was made to remain alongside the dock and maintain the safety of the ship by the use of mooring lines and wire.

"The vessel was moored starboard side to dock No. 2 and the strong currents within the harbor moved virtually in all directions, causing the ship to alternately move forward, aft, away from the dock, and then toward the dock. During this emergency, the manila lines and two 1⅝ towing hawsers were parted but were replaced immediately. Approximately 30 lines were parted, and all hands were made available at all times to cope with the situation. During the time our lines were being rapidly depleted through breakage, new ones were furnished by the Navy Supply Office and the Marine Corps. In the meantime, the harbor began filling with debris to such an extent that the main generators were shut down, due to the congestion of the sea chest. As a result, the handling of all lines was accomplished by hand, as all our winches and windlasses are operated electrically. It was feared at one time that in low water the vessel might rest on the bottom with a possibility of capsizing. . . . The damage caused is not sufficiently severe to prevent continued operation of the vessel."

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

Use of Oil for Modifying the Effects of Breaking Waves.—Experience has proved the usefulness of oil in modifying the effect of breaking waves and has developed simple and effective methods of using it. The principal facts developed are:

1. The heaviest and thickest oils, notably animal and vegetable oils, are the most effective. Crude petroleum is serviceable and should be used when no better oil is available; it may be improved by mixing with other oils. Refined kerosene is of little value.
2. In cold weather oils thicken and do not spread freely. This tendency to thicken may be reduced by thinning a heavy, sticky oil with petroleum.
3. A small quantity of oil suffices if it can be made to spread to windward.
4. Oil spreads very slowly so a vessel with engines stopped or running slowly before a sea can make a slick to windward but not to leeward, except perhaps close alongside, for the vessel's drift or speed will exceed the rate of spread of the oil.
5. The effect of oil on free waves—that is, on waves in deep water—is greatest.
6. The effect of oil on a surf or waves breaking on a bar where a mass of shallow water is in actual motion is less than on free waves, but oil is of some service under these conditions.
7. A vessel at sea will get the best results by drifting or running slowly before the sea and distributing oil either from canvas bags filled with oakum saturated with oil and slung over the side into the sea or from the waste pipes.
8. In crossing a bar in heavy weather oil in considerable quantities is needed on both sides of the vessel for a short time. A convenient method in this situation is to trail a hose over the bow and pour oil freely through it.
9. In crossing a bar with flood current pour oil overboard and allow the oil to float in ahead of the vessel. To an entering vessel crossing a bar with an ebb current oil is of little use.
10. Oil is useful to vessels and boats when running, lying to, or wearing.
11. A vessel riding to a sea anchor can fasten an oil bag to an endless line rove through a block on the sea anchor. This method distributes the oil ahead and provides a means to haul the bag aboard for refilling.
12. Before boarding a wreck have the wreck use oil freely on both sides, if able to do so. If the wreck cannot use oil, the rescuing vessel should first pass to leeward of the wreck, using oil freely to form a slick into which the wreck will drift. If the wreck is aground, the attending circumstances will indicate the methods to be used.
13. In lowering or hoisting boats in heavy weather, in port or at sea, oil will greatly assist the operation.
14. In towing another vessel in a heavy sea, oil should be distributed from the towing vessel forward and on both sides; if it is only distributed from the after part of the towing vessel, only the tow is benefited.

CORPS OF ENGINEERS.—The improvement of the rivers and harbors of the United States and miscellaneous other civil works are under the charge of the **Corps of Engineers, Department of the Army.** The miscellaneous civil works include the administration of the Federal laws enacted for the protection and preservation of navigable waters of the United States, the establishment of regulations for the use, administration, and navigation of navigable waters, the approval of plans of bridges, the alteration of obstructive bridges, the establishment of anchorage grounds and harbor lines, the removal of sunken vessels obstructing or endangering navigation, and the granting of permits for structures or operations in navigable waters.

Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the areas under their jurisdiction may be obtained direct from the District Engineer Offices; see Appendix.

Anchorage areas and restricted areas in some places are defined and limited by the Corps of Engineers. They also publish regulations controlling the use of these areas. These are enforced by the United States Coast Guard. The areas are shown on the

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large-scale charts of the Coast and Geodetic Survey. Copies of the regulations may be obtained at the offices of the Corps of Engineers. The regulations are quoted at length, where applicable, in the Coast Pilots.

The **Port Series,** prepared jointly by the Corps of Engineers and the United States Maritime Commission, and sold by the Superintendent of Documents, are complete reports covering the principal seaports of the United States. They are primarily of interest to commercial and industrial concerns. The volumes of the series are wide in their scope and treat the subjects of particular interest to the shipping world, such as the physical features of each port (includes list of piers, wharves, and docks, with data), its organization and practices, regulations regarding the movement of ships and goods, port dues and charges, fuel and supplies, water and rail connections, and character and commerce of the hinterlands.

Port and Terminal Charges, a series of four volumes prepared by the Corps of Engineers and sold by the Superintendent of Documents, give detailed information regarding all port services and charges, including dockage, wharfage, storage, and handling charges, at practically all ports of the United States. These publications include the more important governmental regulations affecting the movement of vessels, freight, and passengers. This information includes a digest of the more important regulations of the United States Public Health Service (quarantine and hospital services), the Customs Service, and the Immigration and Naturalization Service.

Protection of navigable waters.—Given below are extracts from the laws of the United States for the protection and preservation of the navigable waters of the United States.

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

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

That, except in case of emergency imperiling life or property, or unavoidable accident, collision, or stranding, and except as otherwise permitted by regulations prescribed by the Secretary as hereinafter authorized, it shall be unlawful for any person to discharge, or suffer, or permit the discharge of oil by any method, means, or manner into or upon the coastal navigable waters of the United States from any vessel using oil as fuel for the generation of propulsion power, or any vessel carrying or having oil thereon in excess of that necessary for its lubricating requirements and such as may be required under the laws of

the United States and the rules and regulations prescribed thereunder. The Secretary is authorized and empowered to prescribe regulations permitting the discharge of oil from vessels in such quantities, under such conditions, and at such times and places as in his opinion will not be deleterious to health or sea food, or a menace to navigation, or dangerous to persons or property engaged in commerce on such waters, and for the loading, handling, and unloading of oil.

The **HYDROGRAPHIC OFFICE** of the United States Navy exists for the improvement of the means of navigating safely the vessels of the United States Navy and the mercantile marine by providing accurate nautical charts, light lists, and sailing direction (pilots) of foreign navigable waters, navigator's tables and manuals of instruction for the use of all vessels of the United States, and for the benefit and use of navigators generally.

Publications issued by Hydrographic Office for the use of mariners are: Charts of the high seas and all foreign waters, Sailing Directions for the same areas, Light Lists, Table of Distances Between Ports, Radio Navigational Aids, Radio Weather Aids to Navigation, International Code of Signals, American Practical Navigator (Bowditch), and several books of navigational tables that are described in the American Practical Navigator and in the General Catalog of Hydrographic Office Publications. Periodic publications of the Hydrographic Office are: The Notice to Mariners (weekly), the Hydrographic Bulletin (weekly), the Daily Memorandum, and the Pilot Charts for various oceans (monthly or quarterly); see *Publications* at the end of this chapter.

Notice to Mariners, containing corrections to the charts, Coast Pilots, Sailing Directions, Light Lists, and other publications, is issued weekly and mailed free on application to the Hydrographic Office, Washington 25, D. C., or through any Branch Hydrographic Office, District office of the Coast and Geodetic Survey, or District office of the Coast Guard. Two editions of this publication are issued: the Western Hemisphere Edition and the World Edition. The paragraph numbers and chart and publication references are identical in both editions. The Western Hemisphere Edition is usually ready for distribution about four days in advance of the World Edition.

WEATHER BUREAU.—Weather forecasts and warnings of the approach of storms over land and ocean areas are issued by the **Weather Bureau,** among services to navigation, commerce, agriculture, and the general public. Other warnings cover a variety of hazards, such as cold waves, frost, forest-fire hazard, floods, and many types of weather conditions affecting the nation's economy.

Meteorological information is collected and transmitted at hourly, 3-hourly and 6-hourly intervals from land stations, ships at sea, and aircraft. These reports form a basis for the forecasting service, for summarization and publication of climatological data having general value and applicability, and for research basic to improvement of the national weather service.

Weather Bureau offices are located in many ports and other localities throughout the continental United States and possessions. Stations in the area of concern to this Pilot, at which the public may compare barometers against Weather Bureau barometers and discuss matters of weather service with Weather Bureau officials, are listed in the Appendix. By international agreement, the Weather Bureau also bears a share in the maintenance and operation of certain weather ships on the free oceans.

Marine meteorological service.—The collection of observations from ships at sea is conducted on a purely voluntary and cooperative basis. The Weather Bureau supplies shipmasters with blank forms, printed instructions, and such other material as is essential to the making and recording of observations. In the course of an average peace-time year, more than 100,000 observations are received from vessels representing every maritime nation and reaching every quarter of the globe. Reports based on this cooperative service by seamen are included in various publications. Among these are the *United States Coast Pilots*, which contain sections on weather and climate, storm charts, and meteorological tables. The *Pilot Charts* issued by the Hydrographic Office contain ocean meteorological data prepared in the Weather Bureau. *Sailing Directions, Naval Air Pilots*, and other publications of the Hydrographic Office also contain summaries of weather information prepared by the Weather Bureau for various parts of the world from reports rendered chiefly by officers of merchant ships.

The hurricane and storm warning service.—This service was established primarily to aid marine interests. Storm warnings are prepared at regular district forecast centers and at special hurricane forecast centers. The warnings are distributed to the public through all neighboring Weather Bureau offices, by radio, the press, and every other available means. During the West Indian hurricane season, June to November, inclusive, special teletype circuits expedite the exchange of special reports from the Atlantic and Gulf coasts. Special ship reports are described under the heading *Reports from Ships*. Special aircraft reports are obtained during the hurricane season from weather reconnaissance planes which fly near the storms, and sometimes into the storm centers. Hurricane warnings, as well as gale and storm warnings, are disseminated also by flag and lantern displays from about 400 storm-warning towers or flagstaffs located on the Atlantic, Gulf, and Pacific coasts and on the shores of the Great Lakes.

Weather information service for overseas air transport.—The Weather Bureau provides forecasts for trans-Atlantic flights, and has helped develop weather service required for regularly scheduled air transport operations over the oceans.

Under agreements with foreign governments, the Weather Bureau now provides weather information service for domestic and foreign aircraft. A detailed forecast, based on all available weather information for the ocean and adjacent land areas, is supplied to the aircraft captain just before departure, and any necessary amendments are transmitted by radio to the aircraft during flight. Forecasts cover wind conditions, icing, turbulence, cloud extent and heights, temperatures, and storms or other severe conditions to be expected en route and at the destination airport and alternates at estimated time of arrival.

General public service.—Weather Bureau publications may be obtained on request from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., upon payment of list price. The current *Price List of Weather Bureau Publications* may be requested from the Weather Bureau, Washington 25, D. C. Certain publications, such as *Annual Meteorological Summaries*, may be obtained free of charge, ordinarily from the individual Weather Bureau offices which prepare them.

Other means by which weather information of public concern is disseminated are described under the headings of *Storm Signals*, *Weather Broadcasts*, and *Reports from Ships* (*Weather reports, United States*) in this chapter. A table of commercial radio stations which broadcast directly from Weather Bureau microphones is contained in the

Appendix. Additional information pertaining to weather radio or teletype services may be requested from the Weather Bureau, Washington 25, D. C.

Storm Signals are displayed by the United States Weather Bureau at numerous places on the coasts of the United States and the shores of the Great Lakes. No visual displays of storm warnings are made at coastal stations in Alaska since distribution of the messages is effected by local radio broadcasts, as a rule.

These storm signals are used to warn of the approach of a storm of marked violence with the wind beginning to blow from the indicated direction.

The mariner must bear in mind that the storm signals do not necessarily mean that a storm will occur at the place where the signal is displayed, but that one is expected either there or within such a distance that vessels leaving port would be liable to be caught in it.

DAY SIGNALS:

Two pennants, red and white, and one flag, square, red, with black center, used either alone or in combination have the following meanings:

Red pennant.—Small craft warning indicates that moderately strong winds that will interfere with the safe operation of small craft are expected.

Red pennant over flag.—Northeast storm.

White pennant over flag.—Northwest storm.

Flag over red pennant.—Southeast storm.

Flag over white pennant.—Southwest storm.

Two flags.—Hurricane or whole gale.

NIGHT SIGNALS:

Red and white lanterns having the following meanings are used at night:

Red lantern.—Southeast storm.

Red lantern over white lantern.—Southwest storm.

Two red lanterns.—Northeast storm.

Two red lanterns with white lantern between.—Hurricane or whole gale.

White lantern over red lantern.—Northwest storm.

For additional information regarding weather broadcasts see *Radio Services.*

The **COAST GUARD** has among its duties (1) enforcement of the laws of the United States on the high seas, in harbors, bays, sounds, roadsteads, and other like bodies of water along the coasts of the United States, its territories and possessions; (2) enforcement of navigation laws, of neutrality laws and regulations, of rules and regulations in relation to anchorage grounds, and of the Oil Pollution Act; (3) inspection of all vessels to insure safety to passengers and crews; (4) aid to distressed mariners and saving of life and property from shipwreck; (5) issuance of marine licenses and certificates; (6) investigation of circumstances connected with shipwreck or collision at sea; (7) destruction of derelicts; (8) construction, operation, maintenance, and inspection of aids to navigation; and (9) publication of Light Lists and Radiobeacon Charts.

Light Lists.—All aids to navigation, such as lights, radiobeacons, fog signals, buoys, and daymarks, are described in these publications which are for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and by the various sales agencies. Mariners are referred to the above publications

for detailed information regarding the characteristics, power, and visibility of lights, as well as descriptions of light structures and daymarks, buoys, and fog signals. Such detailed information is not given in this Coast Pilot; see *Publications* at the end of this chapter.

The Light List is corrected to the date of publication printed on the title page. The mariner is cautioned that the latest list must be used; he should keep his Light Lists as well as his charts corrected from changes announced in the weekly *Notice to Mariners*.

Aids to Navigation.—Lights.—The distances at which lights may be seen in clear weather, given in Light Lists and on charts, are the geographic ranges computed in nautical miles for a height of the observer's eye of 15 feet above sea level; the luminous range is given when the light is not of sufficient power to be seen to the limit of its geographic range. These distances may at times be increased by abnormal atmospheric refraction and, of course, may be greatly lessened by unfavorable weather conditions, such as fog, rain, haze, or smoke. All except the most powerful lights are easily obscured by such conditions.

The navigator who expects to make a light of considerable power should find the geographic range corresponding to his own height of eye by reference to the Visibility Table in the *Light Lists*. For lights of small luminous power it is obvious that the increased geographic range is of no interest.

If, when first sighted, a light can be made to dip below the horizon by at once lowering the eye several feet, it is evident that the vessel is at the limit of the geographic range and that the light is of considerable luminous power. If, under the same circumstances, the light cannot be made to dip, it is evident that the vessel is well within the geographic range and may, in fact, be very close to the light, and that the light is of relatively small power. This same maneuver will also aid in distinguishing the lights of another vessel from the more powerful navigational lights, as a vessel's lights are usually so limited in intensity that they do not carry far enough to be intercepted by the horizon. The distance of a light cannot be estimated by its dimness or brilliance. See inside back cover for *Distance of Visibility of Objects at Sea* table.

Buoys.—For the system of buoyage of the United States—color, shape, numbering, and light characteristics—the mariner is referred to the preface of the *Light Lists*.

Buoys are liable to be carried away, shifted, or capsized; lighted buoys may be extinguished; or audible buoys may not sound as the result of storm, ice conditions, collision, or other accidents. The navigator should, if possible, check his position by bearings on fixed objects on shore and by soundings.

Fog signals that depend upon the transmission of sound through the air have, as aids to navigation, certain inherent defects that should be considered. Sound travels through the air in a variable manner, even in the absence of wind, and its behavior cannot be predicted or guarded against. The distance at which a fog signal can be heard may vary with the bearing of the signal and may be different on different occasions. The intensity of the sound may be greater at a distance than close-to. There are sometimes areas, perhaps close to the signal, where the sound is entirely inaudible. Mariners must not judge their distance from a fog signal by the intensity of the sound and must not assume that a signal is not sounding because they do not hear it.

All these considerations point to the necessity for the utmost caution when navi-

gating near land in a fog. Audible signals are useful, but the navigator's principal reliance should be on the sounding equipment and on radio bearings, if such are available.

Echoes.—When a vessel is in the vicinity of a high rocky shore the navigator may find it advantageous to time the echo of his own signal and thus obtain a rough estimate of the distance offshore. The velocity of sound in air can be taken as 1,100 feet per second. In some localities **echo boards** have been erected to facilitate this operation. Two general types are in use. The first is specially constructed so that the echo will be heard at a specified distance off. The second is a flat surface which will reflect any sound striking it. See the *Light List* for the construction details of each echo board before using it.

Radiobeacons are operated continuously during fog and low visibility and also at scheduled intervals during clear weather, night and day. The more powerful stations have an effective range far greater than is possible with light and fog signals, and bearings of them will furnish the navigator with a valuable indication of his position long before the land is in sight.

A list and descriptive details of all marine radiobeacons are given in the *Light List* and H. O. Publication No. 205, *Radio Navigational Aids*. Radio aircraft ranges and standard broadcast stations that may be received on marine radio compasses are listed in the Appendix. The correction to be applied to convert a great circle direction to the rhumb line direction for plotting on a Mercator chart can be obtained from *Radio Navigational Aids* or Table 1, *Bowditch*, H. O. Publication No. 9.

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

During a period of radio propagation disturbance, radiobeacon observations may be unreliable. See later discussion under *Time Signals*.

Numbering and recording of undocumented vessels.—Under the act of June 7, 1918, as amended, and the regulations issued thereunder, every undocumented vessel operated in whole or in part by machinery, owned in the United States and found on the navigable waters thereof, except public vessels and vessels not exceeding 16 feet in length, measured from end to end over the deck excluding sheer, temporarily equipped with detachable motors, shall be numbered. The requirements contemplate that machinery-propelled undocumented vessels of less than 5 net tons used for commercial purposes, which are owned in the United States and found on such waters, be numbered under the provisions of the act as such vessels, by reason of tonnage, are exempt from documentation. The Numbering Act, however, is for the purpose of identification only and the certificate of award of number which is issued to any such vessel is solely for such purpose. It is not an authorization, license, or permit for any such vessel to engage in trade.

Vessels of 16 gross tons and over used exclusively for pleasure purposes are entitled

to be documented as yachts by the Bureau of Customs. The documentation of such vessels as yachts is not a mandatory requirement, however, and where such vessels are machinery-propelled and found on United States waters, if not documented, they must be numbered under the provisions of the act. There is no restriction as to length, tonnage, or size of such vessels and the provisions of the Numbering Act should not be confused with those of the Motorboat Act of 1940 providing for the equipment of motorboats not exceeding 65 feet in length and with other machinery-propelled vessels. The regulations issued by the Commandant of the Coast Guard under authority of the Numbering Act clarify the language of the statute requiring the following undocumented vessels to be numbered:

(*a*) All boats equipped with permanently installed motors.

(*b*) All boats over 16 feet in length equipped with detachable motors.

The following undocumented vessels are not required to be numbered:

(*a*) Public vessels.

(*b*) All boats not exceeding 16 feet in length temporarily equipped with detachable motors.

(*c*) Motor lifeboats carried as lifesaving equipment on inspected vessels.

The words *temporarily equipped with detachable motors* shall be construed to mean outboard motors which are clamped or otherwise temporarily fastened as distinguished from outboard motors bolted or otherwise permanently secured. The controlling principle shall be whether or not the vessel has permanently installed motors rather than the design or construction of the vessel. A boat designed specifically for the use of an outboard motor as the ordinary means of propulsion, if not exceeding 16 feet in length, is nevertheless exempt from the requirements of the act if temporarily equipped with an outboard motor.

Applications and issuance of numbers.—Upon the purchase of an undocumented vessel which has been issued a certificate of award of number under the provisions of the act of June 7, 1918, as amended, and after completion of the bill of sale on the reverse side of the certificate by the vendor or the former owner, the purchaser should execute the application for number for undocumented motor vessel, which is incorporated on the reverse side of the certificate of award of number (CG 1513) and surrender the certificate, bill of sale, and application for a new number to the Officer in Charge, Marine Inspection, U. S. Coast Guard, having jurisdiction over the area in which the vessel is owned, within the statutory period of 10 days. That officer upon receipt of the certificate with the bill of sale and application properly executed, and upon being satisfied with the evidence of ownership, will assign a number to the vessel and forward the certificate and accompanying papers to the District Commander for processing. He will at the same time issue to the new owner a letter authorizing the operation of the vessel for a limited period, without the certificate of award of number on board, pending the issuance of such papers by the District Commander.

In the case of such vessels which are new or which have never been numbered under the provisions of the act of June 7, 1918, as amended, or which are operating under the old form of certificate of award of number, application should be made to the Officer in Charge, Marine Inspection, U. S. Coast Guard, having jurisdiction over the area in which the vessel is owned, for a certificate of award of number by presenting proper evidence of ownership such as a bill of sale, or builder's certificate, and by the execution of Form CG 1512, application for number for undocumented motor vessel. Upon the

execution of these cards in duplicate and the presentation of evidence of ownership, the Officer in Charge, Marine Inspection, U. S. Coast Guard, will accept the application and accompanying papers, transmitting same to the District Commander for processing and will thereupon assign a number to the vessel, at the same time issuing a letter authorizing the operation of the vessel for a temporary period under the numbers assigned and pending the issuance of a certificate of award of number by the District Commander.

Number required on bows of vessels.—Upon assignment of a number by the Officer in Charge, Marine Inspection, U. S. Coast Guard, or upon receipt of the certificate of award of number, the number awarded shall be painted or attached to each bow of the vessel and shall be in block characters of good proportion and not less than 3 inches in height, reading from left to right and parallel with the waterline, as near the forward end of the bow as legibility of the entire number for surface and aerial identification permits. The number shall also be of a color in contrast with the color of the hull so as to be distinctly visible and legible.

Carrying certificate of award of number.—The certificate of award of number must be kept on board at all times (unless in the custody of the Coast Guard), except in the case of vessels not exceeding 17 feet in length, or vessels whose design or fittings are such that the carrying of such certificate on board would render it imperfect, illegible, or would otherwise tend to destroy its usefulness as a means of ready identification.

Search and rescue operations for surface vessels or aircraft in distress or overdue are coordinated by the Coast Guard. Air-Sea Rescue planes have special markings of chrome yellow on the wing tips and wing-tip floats. The cooperation of vessel operators with the Air-Sea Rescue planes may mean the difference between life and death of some seaman or aviator.

Operators of disabled wooden craft that are, or may consider themselves to be, the object of a search should hoist on a halyard or otherwise place aloft any metallic object that would assist their detection by radar. All Coast Guard patrol vessels, planes, and some buoy tenders utilize this equipment and thus can continue searches in darkness and during other periods of low visibility if it can be assumed that the object of the search can be detected through the use of this aid.

Actual observations have shown that wooden hulls or other non-metallic objects are suited as radar targets according to the size, orientation, shape, and other radar-reflecting qualities of the object. Their value as radar targets may be enhanced by the use of special radar-reflecting devices properly oriented and placed as high above the waterline as possible. The largest metallic object available should be used.

Distress Signals—Submarine emergency identification signals.—The following smoke bomb or flare signals are made by submarines of the United States in cases of necessity:

Black or green.—Indicates torpedo has been fired. Will be used to simulate torpedo firing on special exercises such as convoy exercises.

Yellow.—Indicates that submarine is about to come to periscope depth from below periscope depth. Surface craft terminate antisubmarine counterattacks and clear vicinity of submarine. Do not stop propellers!

Red.—Indicates an emergency condition within the submarine and she will surface immediately if possible. Surface vessels clear the area and stand by to give assistance after the submarine has surfaced. In case of repeated red signals, or if the submarine fails to surface within a reasonable time, she may be

assumed to be disabled. Buoy the location, look for submarine marker buoy, and attempt to establish sonar communications. Advise naval authorities.

The foregoing, all of which mark the submarine's position, are fired from a submerged signal ejector into the air to a height of about 300 feet, then float downward slowly, suspended from a small parachute, and give colored illumination for about 30 seconds.

Submarines are also equipped with marker buoys which are about 3 feet in diameter, painted yellow, and equipped with telephones for communication with the interior of the submarine. A submarine on the bottom in distress and unable to surface will, if possible, release this buoy. An object of this description which is sighted on the surface of the water should be investigated and naval authorities advised.

Aircraft distress signals.—The attention of all navigators of surface vessels is called to the procedure which will be used by United States aircraft in attracting the attention of surface vessels when their assistance is required in any case of distress at sea:

When an aircraft desires to call upon a surface craft to render assistance to survivors or planes in distress the aircraft will circle the vessel at least once, fly across the bow of the vessel at low altitude, opening and closing the throttle, or changing propeller pitch, when possible, then head in the direction of the distress scene. Repeat until the vessel acknowledges by following. The aircraft will use the Aldis Lamp, radio, or message drop to explain the situation if possible. The surface craft should follow the aircraft or indicate that it is unable to comply by hoisting the international flag "NEGAT," or by other visual or radio means.

Danger signal information.—During the war it came to the attention of the Coast Guard that many American masters and officers, when on the high seas and danger of collision appeared imminent, used the danger signal of four or more short blasts of the whistle as provided by Article 18, Rule 3 of the Inland Pilot Rules. The International Rules for the Prevention of Collision provide no danger signal, and the use of four or more short blasts of the whistle is neither appropriate nor applicable. The International Code of Signals provides a special signal, the letter **U** which may be transmitted visually or by means of Morse Code (• • —), using a flashing light or a whistle or siren, which signifies *you are standing into danger*. The International Code Signal **D** which may be transmitted visually or by means of Morse Code (— • •), using a whistle or siren, signifies *keep clear of me—I am maneuvering with difficulty*, and can be used as a warning.

Ship fire signal.—In many ports a standard signal of five prolonged blasts of the whistle or siren has been adopted for use as an alarm in the event of a fire occurring on board the vessel, except vessels underway, or at the dock to which the vessel is moored. Such signal may be used in addition to other means of reporting a fire. The words *prolonged blast* shall mean a blast of from four to six seconds' duration. The signal is not to be used for other purposes. On hearing the 5-blast whistle signal persons on shore should pull a fire alarm box or turn in an alarm to the Fire Department by the most convenient means.

Reports of accidents.—The licensed officer in command of any vessel shall report in writing and in person to the Coast Guard officer nearest the port of first arrival any accident to said vessel involving loss of life, or damage to property, and shall also report in like manner any casualty or loss of life from whatever cause of any person on board such vessel and any stranding or grounding, whether or not any damage has been sustained by the vessel.

CUSTOMS.—The functions of the **Bureau of Customs** include the following: Enter and clear vessels; supervise the discharge of cargo; ascertain the quantities of imported

merchandise, appraise and classify such merchandise, and assess and collect the duties thereon; control the custom warehousing of imported merchandise; enforce customs and other laws by inspecting international traffic by vessels.

The Bureau of Customs administers the navigation laws pertaining to registry, enrollment, and licensing of vessels, including the issuing of commissions to yachts and the assignment of signal letters; the measurement of vessels, administration of tonnage duties, and the collection of tolls; the regulation of vessels in the coasting and fishing trade and limitation of the use of foreign vessels in waters under the jurisdiction of the United States; the recording of sales, conveyances, and mortgages of vessels; the protection of steerage passengers; and the remission of fines, penalties, and forfeitures incurred under the laws governing these matters.

Collection districts and ports of entry located within the area covered by this volume are tabulated in the Appendix.

The **IMMIGRATION AND NATURALIZATION SERVICE** is under the jurisdiction of the Department of Justice. The functions of the Service are the administration of the laws relating to the admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

The primary function of the Immigration Border Patrol, which operates as a part of the immigration force, is to detect and prevent the smuggling and surreptitious entry of aliens into the United States in violation of the immigration laws, and to apprehend smugglers of aliens and aliens who have effected unlawful entry.

The immigration laws provide that there shall be paid to the collector of the customs by the master, agent, owner, or consignee of a vessel arriving at an American port from a foreign port or place a head tax of $8 for, with certain exceptions, every alien passenger thereon entering the United States.

The designated ports of entry for aliens are divided into three classes. Class A is a designated port of entry for all aliens. Class B is a designated port of entry only for aliens who at the time of applying for admission are lawfully in possession of valid and unexpired resident aliens' border-crossing identification cards or valid nonresident aliens' border-crossing identification cards. Class C is a designated port of entry only for aliens who are arriving in the United States as seamen as that term is defined in the last sentence of section 1 of the Immigration Act of 1917 (39 Stat. 874; 8 U. S. C. 173) [That the term *seaman* as used in this Act shall include every person signed on the ship's articles and employed in any capacity on board any vessel arriving in the United States from any foreign port or place.]. No alien may enter the United States at a designated port of entry until and unless he has been inspected by an immigration officer or officers and found to be entitled under the provisions of the immigration laws and regulations to enter the United States. A list of the ports of entry for aliens is given in the Appendix.

QUARANTINE AND HEALTH.—The **United States Public Health Service** is the governmental guardian of the public health, working to prevent the spread of human contagious and infectious diseases.

In addition to its other duties, this bureau administers hospitalization and outpatient treatment at marine hospitals and many other relief stations to legal beneficiaries

of the Government; it administers the foreign and domestic quarantine laws, supervising the medical examination of immigrants and enforcing interstate quarantine laws.

Radio report of disease aboard.—The master of the vessel shall report promptly by radio, to the medical officer in charge at the port of entry, the occurrence or suspected occurrence on board of any of the following communicable diseases: Anthrax, chancroid, chickenpox, cholera, dengue, diphtheria, favus, gonorrhea, granuloma inguinale, impetigo contagiosa, infectious encephalitis, leprosy, lymphogranuloma venereum, measles, meningococcus meningitis, plague, poliomyelitis, psittacosis, ringworm of the scalp, scarlet fever, smallpox, streptococcic sore throat, syphilis, trachoma, tuberculosis, typhoid fever, typhus, yellow fever, or other diseases characterized by fever or skin rash.

Quarantine.—Vessels subject to quarantine inspection include (*a*) all vessels from a port not under the control of the United States, except a vessel which in its current voyage has not touched at any port other than ports under the control of the United States or ports in Canada, Newfoundland, the Islands of St. Pierre and Miquelon, Iceland, Greenland, the west coast of Lower California, Cuba, the Bahama Islands, the Canal Zone, or the Bermuda Islands; or a vessel which having received pratique at a Canadian port located in the international waters of the Juan de Fuca, Haro, Georgia, and Rosario Straits, and Puget Sound and tributaries and connecting waters on the Pacific coast, travels on the same international waters to a United States port and presents a duplicate copy of the Canadian pratique to the quarantine officer.

(*b*) A vessel arriving from any port whether or not under the control of the United States, which has aboard a person infected or suspected of being infected with anthrax, chickenpox, cholera, dengue, diphtheria, infectious encephalitis, measles, meningococcus meningitis, plague, poliomyelitis, psittacosis, scarlet fever, smallpox, streptococcic sore throat, typhoid fever, typhus, or yellow fever, or arrives from a port where at the time of departure there was present or suspected of being present cholera, plague, or yellow fever, or where there was significant increase in the prevalence of smallpox or typhus at the time the vessel touched there.

A vessel shall fly a yellow flag, International Code Flag **Q**—Queen; anchor in the quarantine anchorage; and await inspection.

Only the quarantine officer, quarantine employees, or pilots, shall be permitted to board any vessel subject to quarantine inspection until after it has been inspected by the quarantine officer and granted pratique, except with the permission of the quarantine officer. A person boarding such vessel shall be subject to the same restrictions as those imposed on the persons on the vessel.

Sanitary inspection.—Vessels arriving at a port under the control of the United States from a foreign port shall be subject to sanitary inspection to ascertain whether there exists rodent, vermin, or insect infestation or other unsanitary condition requiring measures for the prevention of the introduction, transmissions, or spread of communicable disease.

Quarantine regulations are given in the text under the names of the ports.

In general, where State quarantine is in force, the minimum requirements of quarantine are in accordance with the regulations of the Public Health Service. National quarantine regulations will be found at the stations of the service and at United States consulates, and will be furnished to vessels upon application, either by officers of the service or by the Bureau in Washington, D. C.

Medical service.—United States merchant seamen are entitled to medical relief

obtainable through the Public Health Service at its established hospitals and relief stations.

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

Relief stations of the Public Health Service are located at the addresses given in the Appendix.

Free medical advice is furnished to seamen by radio. See H. O. Publication 205, *Radio Navigational Aids.*

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.—To prevent the entry or spread within the United States and its territories of injurious insects and plant diseases, the **Bureau of Entomology and Plant Quarantine** enforce quarantines and restrictive orders, issued under authority provided in various acts of Congress, which prohibit or regulate the importation or interstate movement of injurious insects and of plants and products that may introduce or spread insect pests or plant diseases new to or not widely prevalent within the United States or its territories. In compliance with plant-quarantine regulations it inspects at ports of entry plants and plant products that may be brought into the United States or its territories. A list of the ports within the area covered by the volume at which inspectors of this Bureau are located, is given in the Appendix.

The Bureau inspects plants and plant products offered for export and certifies to shippers and interested parties such products in accordance with the sanitary requirements of the country to which they may be exported.

RADIO.—Radio supervision.—The radio communications in the United States and its possessions, except the Panama Canal Zone, are controlled by the **Federal Communications Commission,** Washington 25, D. C.

Responsibility of shipmasters.—Shipmasters have the responsibility of seeing that the general radio regulations are carried out by the radio operators.

Radio inspectors.—Inspectors of the Federal Communications Commission have authority to board ships at United States ports for the inspection of the radio station to determine whether it complies with international treaties, Federal laws, and such rules and regulations of the Federal Communications Commission which may apply. In general, these inspectors operate at the following ports where field officers of the Commission are located and where information concerning radio regulations and communications may be obtained:

Boston, Mass.	San Juan, P. R.	Los Angeles, Calif.
New York, N. Y.	Tampa, Fla.	San Francisco, Calif.
Philadelphia, Pa.	New Orleans, La.	Portland, Oreg.
Baltimore, Md.	Beaumont, Tex.	Seattle, Wash.
Norfolk, Va.	Galveston, Tex.	Juneau, Alaska.
Savannah, Ga.	Houston, Tex.	Honolulu, T. H.
Miami, Fla.	San Diego, Calif.	

Service documents.—The rules and regulations of the International Telecommunication Convention require that when a radio-transmitting installation is compulsory equipment on board a ship, the latter must be provided with the following service documents:

1. The radio license.
2. The operators' certificates.
3. Register (radio service log) in which shall be noted, at the time they occur, service incidents of all kinds, as well as the communications exchanged with land stations or mobile stations and relating to reports of disaster. If the regulations on board permit, the position of the ship shall be indicated once a day in the said register.
4. Alphabetical list of call letters.
5. List of coast and ship stations.
6. List of stations performing special services.
7. The general radio regulations and the additional radio regulations as well as the provisions of the convention necessary for the operations of radio-communication service on board ships.
8. The telegraph rates of the countries for which the station (ship) most frequently accepts radiotelegrams.

The rules and regulations of the United States Federal Communications Commission require certain vessels to have additional service documents, a complete list of which may be obtained from the Federal Communications Commission, Washington 25, D. C., or from its suboffices. For further details concerning the above rules and regulations consult the following publications:

Ship Radiotelegraph Safety Rules.
The Communications Act of 1934, with amendments.
Radio Navigational Aids, H. O. 205.

Weather Broadcasts.—**Major weather bulletins** issued four times daily by United States naval radio stations NSS, Washington, D. C., NPG, San Francisco, Calif., NBA, Balboa, C. Z., and NPM, Honolulu, T. H., include observations from ships at sea, selected land station reports, and weather analyses for specific ocean areas. The information in these bulletins is suitable for preparing weather maps at sea. The naval radio station bulletins and broadcasts issued by marine shore station KPH, Bolinas, Calif., contain ocean area storm advisories, forecasts, and weather summaries in plain language.

The areas covered by these forecasts, summaries, and storm advisories are as follows:

NSS, Washington, D. C.: North Atlantic north of 10° N. latitude and west of 35° W. longitude.
NPG, San Francisco, Calif.: North Pacific from 30° to 50° N. latitude and east of 140° W. longitude.
NBA, Balboa, C. Z.: North Atlantic south of 25° N. latitude and west of 60° W. longitude; North Pacific between the Equator and 30° N. latitude and east of 115° W. longitude.
NPM, Honolulu, T. H.: North Pacific between the Equator and 45° N. latitude and from 140° W. to 160° E. longitude.
KPH, Bolinas, Calif.: North Pacific east of the 180th meridian.

Local weather bulletins containing forecasts, storm warnings when issued, and the weather summaries for specified areas are broadcast on schedule every day by certain Government and commercial radio stations.

Storm warnings, whenever they are issued by the United States Weather Bureau, are the subject of special broadcast by various Government and commercial radio stations of the mobile service.

Emergency broadcasts by Naval Radio Stations.—Storm warnings and notices concerning the safety of navigation at sea of an urgent nature are broadcast by United States Naval Radio Stations (those whose call letters begin with N) in accordance with the urgency, as follows:

A. Notices of an urgent nature, such as tidal waves, hurricanes, typhoons, cyclones, etc., so imminent as to warrant immediate broadcasting:

1. One transmission immediately on receipt.
2. One transmission at the end of the first ensuing silent period.
3. One transmission during the first ensuing on-watch period for ships with one operator, in case both previous transmissions were made during the off-watch period.

B. Storm warnings and notices of less urgency than those specified in A and other than those normally included in scheduled hydrographic broadcasts:

1. One transmission at the end of the first ensuing silent period.
2. One transmission during the on-watch period for ships with one operator in case the previous transmission was made during an off-watch period.

Transmission procedure:

1. Urgent messages as defined in A:

The urgent signal (XXX) is transmitted on 500 kc., followed by QSW—kc. (Directing a shift to the frequency specified) and an appropriate phrase such as "tidal wave." After shifting, the message is transmitted on the wave specified.

2. Less urgent messages as defined in B:

The safety signal (TTT) is transmitted on 500 kc., followed by QSW—kc., and an appropriate phrase such as "storm warning." After shifting, the message is transmitted on the frequency specified.

Emergency broadcasts by Coast Guard Radio Stations.—Storm and hurricane warnings, advisories, and other urgent marine information are broadcast by United States Coast Guard Radio Stations as follows:

A. By radiotelegraph:

1. One transmission immediately on receipt.
2. One transmission during each of the next two ensuing single-operator periods for merchant ships.

B. By radiotelephone:

1. One transmission on receipt.
2. Transmission at 2-hourly intervals thereafter for a period of 6 hours unless the information is canceled or superseded.

Transmission Procedure:

1. Radiotelegraph transmission will follow the same procedure outlined for naval radio stations.

2. Radiotelephone transmissions will be preceded by a preliminary announcement on 2670 kc., containing the appropriate radiotelephone equivalents ("PAN" and/or "SECURITY") of the urgent and/or safety signals together with instructions to shift to certain designated frequencies. After shifting, the message is transmitted on the frequency specified.

Storm warnings are broadcast in plain language and on the frequencies assigned to the service (maritime or aeronautical) for which they are intended.

Scheduled radiotelegraphic broadcasts of weather information affecting the coasts of

the United States, Canada, and Alaska, are also made by Mexican and Canadian radio stations. Most Canadian coastal stations of the mobile service supply weather information on request only and without charge.

Radiotelephonic broadcasts of weather information (United States).—Transmission by voice of weather information from the Weather Bureau is made through certain radio stations of the Coast Guard and of the commercial coastal harbor radiotelephone service. These broadcasts are followed immediately by reports of dangers, obstructions, and changes in aids to navigation.

This service gives to yachts, fishing vessels, tugboats, and any vessels within range, equipped with an ordinary radio receiving set, having a band covering the frequency range of 2 to 3 megacycles, direct official weather information from the Weather Bureau in plain language, and on regular schedules, such as is available to ships equipped with radiotelegraph apparatus and operator. This service should also prove of value to dock terminals, pilots, and yacht clubs.

These radiotelephone broadcasts are made twice daily at definite times and consist of the transmission of weather bulletins issued by the Weather Bureau. The bulletins contain forecasts (and storm warnings whenever they are issued) for specified regions and adjacent coastal waters.

Certain local radio broadcasting stations have microphones installed in nearby Weather Bureau Offices. From these stations forecasts and weather summaries are broadcast on a regular schedule. For stations and schedules in the area covered by this volume see the Appendix.

North of the United States, radiotelephone weather and navigational information are furnished on request and on schedule, without charge, by certain Canadian radio stations.

West Indies.—Radiotelephonic broadcasts of storm and hurricane warnings are made by various stations in the West Indies.

Alaska.—Weather broadcasts are made by Navy and Coast Guard radiotelegraph and radiotelephone stations in Alaska.

For times and schedules of broadcasts, see H. O. Publication 205, *Radio Navigational Aids.*

Circulars giving complete details relative to the broadcasting of weather information are published by the Weather Bureau. These circulars, together with a card descriptive of storm warnings, may be obtained upon application to the Chief, United States Weather Bureau, Washington 25, D. C. Similar information is also given in H. O. Publication 206, *Radio Weather Aids to Navigation.* These publications give the schedules with times and frequencies of weather broadcasts, together with tables for decoding as needed.

At Coast Guard stations, storm warnings are also broadcast on receipt and three times thereafter at 2-hour intervals, whenever they are issued by the Weather Bureau. The first of these special broadcasts begins on receipt of the message at the radio station and the broadcast is repeated on each odd or even hour thereafter for a period of 6 hours. If the warnings are superseded by another message from the Weather Bureau before the completion of three broadcasts, the later information is used and broadcast three times unless superseded again.

Reports from ships.—The master of every United States ship equipped with radio transmitting apparatus, on meeting with a tropical storm, dangerous ice, derelict, or

any other direct danger to navigation, is required to cause to be transmitted a report of these dangers to ships in the vicinity and to the appropriate Government agencies.

Weather reports (United States).—Weather reports should not be sent regularly except from ships with which specific arrangements have been made by the Weather Bureau, but masters of all ships encountering tropical or other severe storms should send special observations by radio. These reports should be sent in the international meteorological code, preceded by the ship's name, unsigned, and checked prepaid, United States Government.

If a copy of the international meteorological code is not on shipboard, the code will be found in H. O. Publication 206, *Radio Weather Aids to Navigation*, or a copy may be obtained on application to the United States Weather Bureau, Washington 25, D. C. If the code is unavailable, the message may be sent in plain language.

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

Time Signals.—The **United States system** of broadcasting time signals begins at 55 minutes 0 seconds of some hour and continues for 5 minutes. Signals are transmitted on every second during that time, except that there is no signal on the twenty-ninth second of any minute, nor on certain seconds at the ends of the minutes, as shown in the following diagram:

Minute	Second										
	50	51	52	53	54	55	56	57	58	59	60
55	—		—	—	—	—					—
56	—	—		—	—	—					—
57	—	—	—		—	—					—
58	—	—	—	—		—					—
59	—										—

The dashes in the above diagram indicate seconds on which signals are transmitted. The seconds marked "60" are the zero seconds of the following minutes. All seconds from 0 to 50, inclusive, are transmitted except the twenty-ninth second. The dash on the beginning of the hour (shown as 59 minutes 60 seconds) is much longer than the others, i. e., 1.3 seconds. In all cases the beginnings of the dashes indicate the beginnings of the seconds, and the ends of the dashes are without significance. It will be noted that the number of dashes sounded in the group at the end of any minute indicates the number of minutes of the signal yet to be sent. In the event of a failure or an error occurring in any of the time signals another time signal will be transmitted 1 hour later on the same frequency.

Standard Frequency Broadcast Service of National Bureau of Standards.—The technical radio services broadcast continuously by the National Bureau of Standards, Central Radio Propagation Laboratory, from its radio station WWV near Washington, D. C., include a total of eight radio frequencies, 2.5, 5, 10, 15, 20, 25, 30, and 35 megacycles, which are on the air at all times, day and night. This insures reliable coverage of the United States and extensive coverage of other parts of the world.

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Station WWVH on the island of Maui, Hawaii, broadcasts on three frequencies, 5, 10, and 15 megacycles. Further information about WWVH is given later in this section.

The services are: (1) Standard radio frequencies, (2) time announcements, (3) standard time intervals, (4) standard audio frequencies, (5) standard musical pitch, 440 cycles per second, corresponding to A above middle C, (6) radio propagation disturbance warning notices.

Megacycles	Power, kw.	Modulation	Audio frequencies cycles per second
2.5	0.7	1	400 or 600
5	8.0	1	440 or 600
10	9.0	1	440 or 600
15	9.0	1	440 or 600
20	*8.5	1	440 or 600
25	0.1	1	440 or 600
30	0.1	1	
35	0.1	1	

*0.1 kw., for first 4 work days after first Sunday of each month.

Time announcements.—The audio frequencies are interrupted at precisely 1 minute before each hour and each 5 minutes thereafter. They are resumed precisely on the hour and each 5 minutes thereafter.

The beginnings of the periods, when the audio frequencies are resumed, are in agreement with the basic time service of the United States Naval Observatory so that they mark accurately the hour and successive 5-minute periods.

Universal Time (Greenwich Civil Time or Greenwich Mean Time) is announced in telegraphic code each 5 minutes. This provides a quick reference to correct time where a timepiece may be in error by a few minutes. The 0- to 24-hour system is used starting with 0000 at midnight. The first two figures give the hour and the last two figures the number of minutes past the hour when the tone returns. For example, at 1655 UT, or 11:55 AM, Eastern Standard Time, four figures (1, 6, 5, and 5) are broadcast in code. The code used, International Morse, is given below. The time announcement refers to the end of the announcement interval, i. e., when the audio frequencies are resumed.

Numerals in International Morse Code

0 —————	2 ..———	4 ....—	6 —....	8 ———..
1 .————	3 ...——	5	7 ——...	9 ————.

A voice announcement of Eastern Standard Time is given following each telegraphic code announcement. For example, at 9:10 e.s.t. the voice announcement in English is: "This is radio station WWV; when the tone returns it will be 9:10 a.m. Eastern Standard Time; 9:10 a.m."

Two standard audio frequencies, 440 cycles per second and 600 cycles per second, are broadcast on all radio carrier frequencies except 30 and 35 mc. The audio frequencies are given alternately, starting with 600 cycles every hour on the hour for four minutes, interrupted one minute, followed by 440 cycles for four minutes, and interrupted one minute. Each ten-minute period is the same.

Standard time intervals.—On each carrier frequency is a pulse of 0.005-second duration which occurs at intervals of precisely 1 second. The pulse consists of five

cycles, each of 0.001-second duration, and is heard as a faint tick when listening to the broadcast. It may be used as an accurate time signal. On the fifty-ninth second of every minute the pulse is omitted. The 1-minute, 4-minute, and 5-minute intervals, synchronized with the seconds pulses, are marked by the beginning or ending of the periods when the audio frequencies are off.

Radio propagation disturbance warning notice.—A warning of radio propagation conditions is broadcast in code on each of the standard radio carrier frequencies at 19 and 49 minutes past the hour. If a warning is in effect, the letter "W" (in International Morse Code • — —) is repeated 6 times following the time announcement; if unstable conditions are expected, the letter "U" (in International Morse Code • • —) is repeated 6 times; if there is no warning, the letter "N" (in International Morse Code — •) is repeated 8 times.

A warning (W) means that radio propagation disturbance of the ionosphere-storm type in the North Atlantic region is anticipated within 12 hours, or is in progress, with its most severe effects on radio transmission paths for which the control points of transmission lie in or near the northern auroral zone. This type of radio propagation disturbance is characterized by low intensities, accompanied by flutter or rapid fading on the normal frequencies used at the different times of the day, or by complete blackouts of signals. By shifting to lower than normal frequencies for that time of day it may be possible to obtain communication, although with lower than normal intensity. Owing to increased auroral-zone absorption during the disturbance, however, usable transmission may be impossible on any high frequency. Also, *during a period of radio propagation disturbance, direction-finder observations may be unreliable.* Sudden ionosphere disturbances (SID) characterized by simultaneous fadeouts in the entire high-frequency spectrum, on paths in the daylight side of the world, are not covered by this warning.

The usual daily time for changing the announced warning is 2119 GMT (4:19 p.m., EST). The notice is, however, changed at any hour when disturbance becomes noticeable or anticipated. After a warning (W), the announcement is returned to "U" and later to "N" as conditions return to normal. Thus any time a radio operator questions reception of North Atlantic paths, it would be advisable to check with the WWV announcement to see whether conditions are considered disturbed by the Bureau's Warning Service.

Distance range of reception.—Of the radio frequencies of WWV, the lowest provides service to short distances, and the highest to great distances. Reliable reception is in general possible at all times throughout the United States and the North Atlantic Ocean, and at some times throughout the world. One should select the frequency that gives the best reception at any particular place and time. This can usually be done by two methods:

A. By tuning to the different frequencies and selecting the one most suitable at that time. For nighttime conditions over the propagation path, lower frequencies than those used during the day are usually necessary because of the skip. Received intensities on usable frequencies are much greater for nighttime than for daytime conditions.

B. By making use of techniques of prediction of usable frequencies.

Additional information on how to receive and utilize the service is given in the Bureau's Letter Circular, LC974, *Technical Radio Broadcast Services, Radio Station WWV*, obtainable on request. The Bureau welcomes reports on reception, methods of use, or special applications of the service. Correspondence should be addressed to

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Radio Station WWVH.—Radio station WWVH, recently established by the National Bureau of Standards on the island of Maui, Territory of Hawaii, broadcasts on an experimental basis, on 5, 10, and 15 megacycles. Station WWVH extends to the Pacific area the following technical services: Standard radio frequencies, time announcements, standard time intervals, standard audio frequencies and standard musical pitch. Omnidirectional antennas radiate approximately 400 watts of power at each carrier frequency.

The program of broadcasts of WWVH, on its three frequencies, 5, 10, and 15 mc., is the same as that of station WWV for standard time intervals, time announcements in code, standard audio frequencies, and accuracy. Reports received indicate that station WWVH may be usefully received at many locations not served by station WWV and that simultaneous reception of WWV and WWVH does not interfere with ordinary use of the standard frequencies and time signals.

The entire broadcast (modulation and carrier) is interrupted for periods of approximately four minutes immediately after each hour and half hour, and for periods of approximately forty minutes beginning at 0700 and 1900 UT. These interruptions are made to permit operation of automatic ionospheric sounding equipment at the Hawaiian field station and to compare the local standards at WWVH with broadcasts by station WWV.

NAVIGATIONAL WARNINGS.—Radiotelegraphic navigational warnings affecting the waters of the United States and possessions are compiled by the United States Hydrographic Office; the United States Coast Guard; and the North Atlantic International Ice Patrol, United States Coast Guard vessel. These warnings contain information of importance to the safety of navigation, such as the position of ice and derelicts, and defects and changes in aids to navigation, mine fields, and the like which are later published in the *Notice to Mariners*.

Radiotelephone transmission by voice of navigational warnings is made immediately after the regular radiotelephonic broadcast of weather information by the same stations, following the same schedule and method of procedure.

These radiotelephone warnings contain the latest reports of local changes in aids to navigation such as are later published in the *Notice to Mariners* and the late and more important reports of obstructions to navigation in nearby waters as received from the Hydrographic Office and local sources.

Complete details relative to radiotelephonic or radiotelegraphic navigational warnings are given in H. O. Publication 205, *Radio Navigational Aids*.

Ships in distress.—Radio-equipped vessels requiring assistance may obtain the services of the Coast Guard by transmitting a request on the international distress and calling frequency 500 kc. to "Any Coast Guard Unit" (radio call NCU), or to any shore radio station addressed to "COGUARD." Shore radio stations will forward to the Coast Guard all information regarding vessels requiring assistance unless such information is contained in a message specifically addressed elsewhere.

If the following information is included in the original request for assistance it will place the responsible Coast Guard officer in a position to determine immediately the

types and number of vessels required to render adequate aid; thus greatly facilitating the work of the Coast Guard and avoiding any unnecessary delay in the dispatching of assistance.

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

Small craft in distress.—Under the provision of the international regulations, which permit the use of any means available to a vessel or aircraft in distress to draw attention and obtain help, small commercial and private craft equipped with radiotelegraph or radiotelephone apparatus that cannot be operated on the international distress frequency of 500 kc. (600 m.) may usually obtain United States Coast Guard assistance by transmitting the distress signal or call and the message on the 2670 kc. (112 m.) frequency. Practically all Coast Guard units maintain a continuous watch on 2670 kc. and will answer emergency calls thereon, if heard.

Medical advice by radio.—Arrangements are made in various countries whereby mariners of all nationalities may obtain medical advice by radio. In the United States and its possessions free medical advice is obtainable through Government and commercial radio stations of its mobile service. The advice is given in language intelligible to the layman. For further details see H. O. Publication 205, *Radio Navigational Aids.*

Loran is a system of position finding by reception of radio signals from specially designed transmitting stations of known position. The name is derived by combining the first two letters of "long," the first two letters of "range," and the first letter of "navigation." It is designed to furnish reliable positions to navigators at greater distances from the transmitting stations than is possible by other methods of radio navigation.

The principle of the Loran system is the determination of the difference of the distances of two radio transmitting stations from the observer, though not the actual distance of either station. This is accomplished by determining how much more time a signal or pulse from one station takes to reach him than a signal or pulse from the other. Upon a chart a curve is drawn through all points whose distances from these stations differ by the amount found from the observation. The vessel must be somewhere on this curve, which is the Loran line of position with reference to these stations. Similarly, another line of position is obtained by comparing the signals received from another pair of stations. Since the vessel must be on both lines, the point of their intersection is its position.

Because of the velocity of propagation of radio waves, 162,000 nautical miles per second, the time differences are extremely small being measured in millionths of a second. These small time intervals are determined visually by measuring on the luminous time scale of the receiver aboard ship or aircraft the separation between reference marks made by the reception of the pulses from the transmitting stations. This time scale is formed by the motion of a point of light, which is the tip of a ray of electrons, controlled by electrical circuits in the receiver. The components of this motion take place in a few millionths of a second and are not visually perceptible, but the complete cycle in the formation of the time scale is repeated over and over at the rate of approximately 25 times per second. Due to persistence of vision, the eye sees a continuous

pattern as in motion pictures. It is on this microsecond time scale that the time difference is measured.

The position of the vessel is found from the time difference by the use of Loran charts or tables. For the service area of each pair of transmitting stations the time differences which a vessel would observe are laid down in a pattern of lines. Each line is labeled with the time difference which is common to all points on it. The navigator has only to select the line of position indicated by the reading of the Loran receiver. Loran tables are used to determine positions of greater accuracy than is possible with the average small-scale Loran chart. The tables furnish the data necessary to plot, on any chart, the required segment of the line of position.

Caution.—Loran Position determinations on or near the base line extensions are subject to considerable error and therefore should be avoided whenever possible. For accurate position determinations in the base line extension area, the use of a radio bearing (or other means) along with Loran lines from another rate is recommended.

Loran charts and tables are compiled and distributed by the Hydrographic Office. They are available for all effective Loran service areas, which include the more frequented portions of the North Atlantic, North Pacific, South Pacific, and Indian Oceans.

The Coast and Geodetic Survey is printing Loran lines of positions on various sailing and inshore navigational charts.

Radar (Radio Detection and Ranging) is one of the most important of recent developments affecting the techniques of navigation. It is an anticollision and piloting device that may be used during darkness and low visibility to detect most objects and to furnish an accurate measurement of range under all conditions. However, it has many limitations as well as advantages. Radar is merely a supplement and a highly valuable adjunct to other navigational methods.

Radar works on the principle of echoes. Instead of sound a radar transmits a radio signal. The radar equipment is basically an instrument for measuring the distance from the transmitter of an object which will reflect electromagnetic energy of radio frequencies.

The accuracy of a position obtained by radar varies considerably with different types of radar and the skill of the operator. In general, the accuracy of radar fixes compares favorably with, and sometimes exceeds, those obtained by other methods.

Advantages.—For navigational purposes, radar has several advantages over other navigational aids; namely:

1. Radar can be used at night and during periods of low visibility, when most other methods are not available.

2. Radar navigation is often more accurate than other methods of piloting. The limitations of accuracy of each set should be determined.

3. Radar fixes can be obtained rapidly. With the PPI (Plan Position Indicator) scope a continuous position is available.

4. A fix can be obtained from a single object, since both range and bearing are provided.

5. Radar may be available at greater distances from land than most methods of piloting.

6. Radar is a reliable anticollision device, permitting higher speeds (with relative safety) during periods of low visibility.

Failure on the part of a Government vessel to make use of radar while under way in

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

7. Radar can be used to locate and track violent tropical storms.

8. Radar reception is not affected by the same factors that cause interference and poor reception in radio communication. Consequently, radar's use is insured when normal radio communication is impossible.

Limitations.—As a navigational aid, radar is subject to certain limitations and disadvantages, as follows:

1. Radar is subject to mechanical failure. Also, as radar sets are sensitive instruments requiring accurate and precise adjustment, any error in the adjustment or synchronization will cause an error in the result.

2. There are both minimum and maximum range limitations. The minimum range is dependent on several factors. Inasmuch as the receiver is disconnected while a pulse is being sent out, any echo returning during transmission of the pulse will not be indicated. Excessive sea return, or echo from nearby water, and other obstruction nearby also affect the minimum effective range. Sea return becomes less with increased range because of the change in the angle of incidence, more of the signal is reflected away from the ship and less is returned in the form of echo. A good practical minimum range is 100 yards.

Maximum range is usually limited by the curvature of the earth to the line-of-sight, or slightly more (about 15 percent), because high frequency radio waves travel in a straight line and do not follow the earth's curvature except under the abnormal atmospheric conditions heretofore mentioned. The approximate maximum range at which any given target will return an echo can be determined by means of the table of *Distance of Visibility of Objects at Sea* in the same manner used for determining the distance at which a light can be expected to be seen at sea. This assumes, of course, that the radar is of sufficient power to extend to such a distance, that the scope is graduated for range to this distance, and that the target is of a nature that it will return a good echo.

3. Interpretation of the information presented on the scope is not always easy, even after considerable training.

4. Radar may be less accurate than other methods of piloting. A visual bearing, for instance, is usually more accurate than the radar bearing.

5. Radar may be unreliable or unavailable during certain atmospheric conditions.

6. Radar requires transmission from the ship.

7. Charts do not always give information necessary for identification of radar echoes.

8. Small boats and buoys may not be detected, especially if a light sea is running, if they are near the shore, or lack sufficient elevation to produce an echo. Most icebergs can be detected at distances equal to that at which a similar land mass could be seen, but *radar is not wholly reliable in the detection of growlers and floe ice large enough to damage or sink ships.*

9. Radar cannot distinguish the *nature* of small targets. One small object capable of returning an echo looks to radar just about the same as another.

The limitations of each radar set should be thoroughly understood by those who are depending upon the information it presents.

PUBLICATIONS.—The following résumé of the United States Government publications of navigational value is included for the ready reference of the mariner.

Certain libraries have been designated by the Congress of the United States to receive prints, as issued, of all publications printed by the Government for public distribution. These publications may be consulted by anyone during business hours.

Sales agencies have been established in various ports by the Coast and Geodetic Survey, Hydrographic Office, and Superintendent of Documents. District Offices of the Coast and Geodetic Survey sell all publications of that Bureau. Branch Hydrographic Offices do not sell any of the publications of that Bureau.

The mailing address of the Coast and Geodetic Survey, Hydrographic Office, Superintendent of Documents, Weather Bureau, Coast Guard, and Federal Communications Commission is Washington 25, D. C.

The Catalog of the United States Coast and Geodetic Survey Nautical Charts, Coast Pilots, Tide Tables, Current Tables, and Tidal Current Charts is distributed free by the United States Coast and Geodetic Survey and its agents.

Nautical Charts.—Coast of the United States, Territories, Possessions, and Philippine Islands:
Issued by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey and its sales agents.
Mississippi River from the Head of Passes to Cairo:
Issued and for sale by the Mississippi River Commission, Vicksburg, Miss.
Illinois Waterway System:
Issued and for sale by the United States Corps of Engineers, Chicago, Ill.
Ohio River:
Issued and for sale by the United States Corps of Engineers, Cincinnati, Ohio.
Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River, St. Regis to Cornwall, Canada:
Issued and for sale by the United States Lake Survey, Detroit, Mich.
New York State Canal System:
Issued and for sale by the Superintendent of Public Works, Albany, N. Y.
Foreign Countries:
Issued by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Coast Pilots.—Coasts of the United States, Territories, Possessions, and Philippine Islands:
Published by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey, and its sales agents.
Foreign countries:
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Tide and Current Tables.—Tide Tables, East Coast, North and South America:
Tide Tables, West Coast, North and South America, including Hawaiian Islands:
Tide Tables, Atlantic Ocean:
Tide Tables, Pacific Ocean and Indian Ocean:
Current Tables, Atlantic Coast, North America:
Current Tables, Pacific Coast, North America:
Tide and Current Tables, Philippine Islands:

Tide and Current Tables, Japan and China:
Published by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey and its sales agents.

Tidal Current Charts.—Boston Harbor, Narrangasett Bay to Nantucket Sound, Long Island and Block Island Sounds, New York Harbor, Delaware Bay and River, San Francisco Bay, Puget Sound Northern Part, Puget Sound Southern Part—Eight Volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey and its sales agents.

Water Temperatures and Densities.—Surface Water Temperatures, Atlantic and Gulf Coasts (TW 1).
Surface Water Temperatures, Pacific Coast (TW 2).
Density of Sea Water, Atlantic and Gulf Coasts (DW 1).
Density of Sea Water, Pacific Ocean (DW 2).
Published by and free on application to the United States Coast and Geodetic Survey.

Notice to Mariners.—Notices to Mariners are published weekly and may be secured free of charge from the United States Hydrographic Office.

Light Lists.—Atlantic and Gulf Coasts, Intracoastal Waterway, Pacific Coast:
Published by the United States Coast Guard.
For sale by the Superintendent of Documents and his sales agents.
Foreign countries:
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Radio.—Charts of Radiobeacon System, Atlantic and Gulf Coasts, Pacific Coast, and Great Lakes:
Free on application to the United States Coast Guard.
Radio Circulars giving schedules, frequencies, and data included in weather broadcasts.
Free on application to the Chief, United States Weather Bureau.
Radio Navigational Aids (H. O. Pub. No. 205).
Radio Weather Aids to Navigation (H. O. Pub. No. 206).
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.
List of radiobeacons:
See Light Lists published by the United States Coast Guard.
Hydrographic Bulletin:
Issued weekly by the United States Hydrographic Office.
International Code of Signals [American Edition] Vol. II—Radio (H. O. Pub. No. 88):
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.
International Convention for the Safety of Life at Sea, London, 1929 (affecting radio), Extracts From:
May be obtained from United States Federal Communications Commission.
Communications Act of 1934:
For sale by Superintendent of Documents.
Ship Radio Telegraph Safety Rules:
From the United States Federal Communications Commission or the Superintendent of Documents.
The International Bureau of Telecommunication Union, Berne, Switzerland, publishes and sells the following:

1. List of Frequencies.
2. List of Coast Stations and Ship Stations.
3. List of Aircraft and Aeronautical Stations.
4. List of Broadcasting Stations.
5. List of Stations Performing Special Services.
6. List of Call Letters of Fixed Land and Mobile Stations.

7. List of Fixed Stations.
8. The Telegraph Rates.

Radio Service Bulletin:
Issued by United States Federal Communications Commission.

Weather.—Instructions to Marine Meteorological Observers. (W. B. Circular M.)
Preparation and Use of Weather Maps at Sea. (W. B. Circular R.)
Codes for Cloud Forms and States of the Sky. (W. B. Circular S.)
Published by the United States Weather Bureau.
For sale by Superintendent of Documents. These publications will also be furnished free of charge on request of ships' officers cooperating with the Weather Bureau.

Miscellaneous.—American Practical Navigator [Bowditch] (H. O. Pub. No. 9).
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office, the Superintendent of Documents, and their agents.

The American Ephemeris and Nautical Almanac:
Published by the United States Naval Observatory.
For sale by the Superintendent of Documents and his sales agents.

International Code of Signals [American Edition] Vol. I—Visual (H. O. Pub. No. 87):
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Pilot Rules for Certain Inland Waters of Atlantic and Pacific Coasts and Coast of Gulf of Mexico:
Published by and free on application to the United States Coast Guard.

Pilot Rules for Rivers whose Waters Flow into the Gulf of Mexico and Their Tributaries and Red River of the North:
Published by and free on application to the United States Coast Guard.

Pilots Rules for Great Lakes and Their Connecting and Tributary Waters:
Published by and free on application to the United States Coast Guard.

Navigation Laws of the United States:
Published by the United States Coast Guard.
For sale by the Superintendent of Documents.

Rules and Regulations relating to the Navigable Waters of the United States:
Published by the United States Corps of Engineers.
For sale by the Superintendent of Documents.

General Rules and Regulations Prescribed by the Board of Supervising Inspectors—four volumes:
Published by and issued free on application to the United States Coast Guard.

Laws Governing Steamboat Inspection:
Published by and issued free on application to the United States Coast Guard.

Annual Report of the Chief of Engineers, United States Army:
Part 1.—Report upon river and harbor improvement work, including flood-control operations.
Part 2.—Commercial Statistics, Water-borne Commerce of the United States.
These volumes may be consulted at the libraries which are public depositories.

Port Series—of the United States:
Prepared by the Corps of Engineers, United States Department of the Army, in cooperation with the United States Maritime Commission.
For sale by the Superintendent of Documents.

Port and Terminal Charges:
Prepared by the Corps of Engineers, United States Department of the Army.
For sale by the Superintendent of Documents.

CHAPTER 2

Regional Information

THE GULF OF MAINE is the great identation of the coast between the Canadian Province of Nova Scotia on the northeast and Massachusetts on the southwest. It includes the Bay of Fundy and Massachusetts Bay as subsidiary features. Because of its changeable weather, frequent fogs, and strong tidal currents, this area has a bad reputation among mariners.

From West Quoddy Head to Penobscot Bay the coast is mostly rocky and is indented by numerous large bays and excellent harbors. Among the many islands along this coast are passages that are much used, usually by vessels of less than 12 feet in draft, as they afford anchorage in head winds or thick weather. The many boulders, rocks, and ledges along and off this coast require the closest attention of the navigator, as in many cases they rise abruptly from deep water and soundings do not generally indicate their proximity until it is too late to avoid them. The navigator should also remember that the spring range of tide is 11 feet at Rockland, 13 feet at Millbridge, and 21 feet at Eastport, 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 coast in thick weather because 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, and several of the beaches are popular summer resorts. The outlying dangers are well marked and fewer in number.

Southward of Portsmouth the coast is low and mostly sandy, 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, mostly bold, and has numerous islands, dry rocks, boulders, and sunken ledges near the shore, with deep channels between. The shores of Cape Cod Bay are mostly sandy, with extensive sand shoals extending out well from the shore in many places. Boulders also occur in places in Cape Cod Bay.

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 thus to Whitehead. Grand Manan Island has nearly perpendicular, dark, rocky faces about 200 feet high on its western side. Pigeon Hill, on the western side of Pigeon Hill Bay near the head, is 307 feet high. Schoodic Head, near the south end of Schoodic Peninsula, on the eastern side of the entrance to Frenchman Bay, is 437 feet high.

Cadillac Mountain, the highest on Mount Desert Island, is 1,532 feet high and the most prominent landmark on this part of the coast; near it are other mountains nearly as high. Isle au Haut is 556 feet high near its northern end and is on the eastern side of the entrance to East Penobscot Bay. The Camden Hills (Mount Megunticook, 1,380 feet) are on the western side of Penobscot Bay above the town of Camden. Monhegan Island, 9.3 miles from the mainland, is 160 feet high and is a mark for all vessels bound into Penobscot Bay from westward. Seguin Island, about 2.3 miles off the mouth of the Kennebec River, is about 145 feet high and is a mark for vessels bound into the river or standing along the coast.

Cape Elizabeth, on the southern side of the entrance to Portland Harbor, is about 90 feet high and is marked by a light and an unused light tower. A tall elevated water tank near the mouth of the Saco River is the most prominent landmark between Portland and Portsmouth. Agamenticus Mountain, 673 feet high and the most prominent land feature between Portland and Cape Ann, is about 4.5 miles inland and 9 miles northeastward of Portsmouth. The Isles of Shoals, lying about 5.5 miles from the coast and southeastward of Portsmouth Harbor entrance, can be seen a long distance, the large hotels being conspicuous marks. Boon Island Light is about 9 miles northeastward of the Isles of Shoals and about 6.5 miles offshore. Cape Ann is high at its northern end, 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, is well settled, and has numerous artificial marks. The prominent objects visible in approaching Cape Cod are described in Chapter 13.

In the approaches to Boston Harbor the most prominent landmarks are two radio towers at Nantasket Beach, a tower on Nantasket Hill, a standpipe on Winthrop Head, the Boston Customhouse tower, and the gas tanks at Chelsea and Dorchester.

The Gulf of Maine is a region of ledges and boulders. The ledges rise abruptly from deep water and the boulders ordinarily lie singly or in clusters on an otherwise flat bottom, so that the navigator cannot depend on soundings to avoid them. 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 sounding apparatus of the greatest assistance in approaching both Georges and Browns Banks from southward and eastward, the bottom slope on that side being well defined.

As a measure of safety, vessels should avoid broken ground where abrupt changes are indicated by the chart to depths less than 10 or 12 fathoms; and in places dangers have been found where least depths of as much as 20 fathoms were the only indications found by the survey. It is always safest, therefore, to select from the chart a sailing line which leads in the deepest water and well clear of broken ground.

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

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 40 miles southeastward from Nantucket Island. They are shifting in nature and the depths vary from 3 and 4 feet on some to 4 and 5 fathoms on others, while slues with depths of 10 fathoms or more lead between those farthest offshore. The easterly edge of the shoals has depths of 4 and 4½ fathoms in places, and trends 166° from latitude 41°18′ N., longitude 69°29′ W., to latitude 40°57′ N., longitude 69°22′ W.

The currents in the area are strong and erratic, reaching a velocity of 3 to 5 knots around the edges of the shoals. The currents are generally rotary in character, and strongest in a northeast-southwest direction. They are made erratic by the obstruction of the shoals, in some cases being deflected to such an extent as to cause the direction to change 180° from one side of the shoal to the other.

When possible Nantucket Shoals should be avoided entirely by deep-draft vessels and by light-draft vessels without local knowledge because of the treacherous currents. There are, however, channels through these various shoals which can be negotiated with local knowledge and caution. At slack water in calm weather these shoals are sometimes difficult to see and a vessel is liable to be taken into shoaler water than was intended.

Calm, clear days are few; when the sea is calm it is usually foggy, and when clear, it is usually rough. Also, a considerable amount of hazy weather is to be expected, and this limits visibility.

Should it become necessary to anchor in this area, open sea anchorage may be had anywhere that depths permit. Consideration should be given to the close proximity of shoals and to the possibility of dragging due to winds and currents. Generally it has been found best to avoid the deeper channels and, when rougher water is experienced, to anchor in the lee of a shoal which would tend to knock down the heavier swells. A scope of five to one or greater should always be used.

Phelps Bank, the southeasternmost part of the Nantucket Shoals, is about 6.5 miles long and 2.5 miles wide. **Asia Rip,** the shoalest point of the bank with a depth of 5¾ fathoms when surveyed in 1939, is the southeastern part of the bank and lies 14 miles 044° from Nantucket Shoals Lightship. The wreck of the S.S. *Oregon* is 3 miles 156° from Asia Rip. The other shoals and rips of Nantucket Shoals are described in *U. S. Coast Pilot, Atlantic Coast, Section B.*

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, 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 of water at 40°37′.0 N., 69°38′.3 W. and 43 miles 159° from Sankaty Head Light. The lightship has a red hull with the word NANTUCKET on each side, and two masts with a circular gallery at each masthead. The light is 65 feet above the water and visible 14 miles; a riding light is on the forestay. The fog signal is a two-tone air diaphone, or a steam whistle if the diaphone is inoperative; the radiobeacon is synchronized with the fog signal for distance finding. A short-

range radiobeacon emits a distinctive warble note for 1 minute following the regular radiobeacon signal to serve as a warning to vessels that they are near the lightship and must navigate with caution; the range will vary with receiving conditions. The code-flag signal and radio call is NNBN. **Storm warnings** are displayed during the daytime. A station whistle buoy is 1 mile 055° from the lightship.

Great South Channel is the passage across Georges Bank between the easternmost of the Nantucket Shoals and the westernmost shoal spots of the bank. The channel is about 30 miles wide and is generally used by vessels over 24-foot draft.

Georges Bank is an extensive bank with depths of less than 50 fathoms that extends over 150 miles northeastward from the offshore end of Nantucket Shoals.

In heavy weather the danger area is the oval-shaped top of the bank which is about 80 miles long in a northeast-southwest direction and 50 miles in maximum width. The bottom in this area is extremely broken and irregular, with a great number of ridges and shoal spots having depths of less than 10 fathoms. Between these shoals are channels of varying widths in which depths of about 20 fathoms may be found. All of this area lies within the 30-fathom curve and so much of it has depths of less than 20 fathoms that it may practically all be considered to lie within a generalized 20-fathom curve.

On the southeast side of the bank, outside the 20-fathom curve, the water deepens gradually and with such regularity that soundings would be of considerable value in approaching the bank. On the northwest side the water deepens more rapidly.

The bottom is mostly sand, sometimes with shell, and in places pebbles. Bottom samples obtained during surveys are described in a great many places on the charts.

The two principal dangers on Georges Bank are Georges Shoal and Cultivator Shoal, which are near the center of the danger area. **Cultivator Shoal** is a ridge nearly 15 miles long, on which depths of 3 to 10 fathoms are found. The 3-fathom spot is near the north end of the shoal and is marked by a whistle buoy in approximate latitude 41°40′, longitude 68°12′. About 20 miles east of Cultivator Shoal is **Georges Shoal,** a ridge about 13 miles long on which are several shallow depths of 2¼ to 3 fathoms. Around these shoals the sea breaks in depths of 10 fathoms during heavy weather and the locality should be avoided by deep-draft vessels.

The entire area within the 20-fathom curve has an extremely broken bottom. There are numerous ridges and shoal spots on which depths dangerous to navigation, particularly in heavy weather, may be found. These shoal spots generally have steep sides, and very little or no indication of their existence is given by soundings. Tide rips and swirls, as well as overfalls, are common in the vicinity of these spots, but are not always visible. They show best with a smooth sea and with the current flowing in certain directions. These disturbances are not usually over the shoalest depths but are commonly alongside them. Small, detached overfalls may be seen in 20 fathoms of water. The tidal currents are rotary with no period of slack water. The velocity at strength is about 2 knots and the velocity of the minimum current which occurs about midway between the times of strength is about 1 knot. The flood sets northward and the ebb southward. The hourly velocities and directions of the tidal current are shown by means of current roses on Coast and Geodetic Survey charts.

A navigator must bear in mind while in an area of this character that it is impossible for the surveyor, without a vast expenditure of time, to determine and locate all of the shoalest spots on the many dangerous shoals found. Sudden shoaling on such a bank

must be considered an indication of possibly dangerous water. This bank has not been wire-dragged.

Submarine canyons are indentations in the edge of the *continental shelf*, which is bounded on its seaward side by the 100-fathom curve. They may be traced from depths of 1,000 fathoms or more to the shoaler areas of the shelf. The navigator who has available some means of echo sounding should have in mind the various canyons in this locality. The soundings in crossing them are very characteristic in each case and such soundings may be used to determine the vessel's position with considerable accuracy.

Some of the more important canyons are named on the charts. **Corsair Canyon,** in approximate longitude 66°10′ W., on the eastern side of Georges Bank, has a northwesterly trend. On the southern side and toward the western end of Georges Bank, and with a northerly trend, are **Lydonia Canyon,** 67°40′ W.; **Gilbert Canyon,** 67°50′ W.; **Oceanographer Canyon,** 68°05′ W.; and **Welker Canyon,** 68°30′ W. Southeastward and southward of Nantucket Shoals, and with a northerly trend, are **Hydrographer Canyon,** 69°00′ W.; **Veatch Canyon,** 69°35′ W.; and **Atlantic Canyon,** 70°15′ W.

Between the 50-fathom curve at the eastern end of Georges Bank and the outer 50-fathom curve on Browns Bank to the northeastward is a gully about 25 miles wide.

Browns Bank, as defined by the 50-fathom curve, is 56 miles long east and west and has an average width of 15 miles. Near the western end of the bank is a sandy ridge with depths of 14 to 28 fathoms. Between the inner 50-fathom curve of Browns Bank and the coastal bank at the southwestern end of Nova Scotia are depths of 52 to 82 fathoms.

Cape Sable, the southern extremity of Nova Scotia, is the southern end of a small island covered with low shifting sand dunes. This island is almost joined to the north to Cape Sable Island which is flat and thickly wooded. Cape Sable Light, shown from a white octagonal concrete tower surmounted by a red lantern, is 97 feet above the water and visible 15 miles. A diaphone fog signal is sounded from a red rectangular wooden building on the southern point of the cape. A lighted whistle buoy is 4 miles southwestward of Cape Sable.

Brazil Rock is a dangerous off-lying rocky shoal with a least depth of 2 fathoms and deep water close-to about 8 miles east-southeastward of Cape Sable Light. The sea breaks heavily over the rock in bad weather, but in fine weather it is marked only by a tide rip. A lighted whistle buoy is moored about 0.5 mile southward of the rock.

Seal Island, 17.5 miles west of Cape Sable, is about 2.3 miles long and consists of two sections joined by a shingle beach. The island is 15 to 20 feet high in places and is thickly wooded. A lifeboat is maintained on the eastern side of the island. Seal Island Light is shown from an octagonal wooden tower, 67 feet high and painted white with two red horizontal bands, about 250 yards from the south end of the island. The light is 102 feet above the water and visible 16 miles. The fog signal is an air diaphone sounded from a long low rectangular building, painted white with a red roof, on the beach at the south end of the island. There is a radio beacon at the light.

Blonde Rock, 3.3 miles southward of Seal Island, dries 2 feet. A 2¼-fathom patch is close southeastward of the rock and a 2-fathom patch is close northward. About 1 mile westward of the rock there is a heavy rip during the strength of the tidal current, but 9 fathoms is the least depth found in this position. A buoy is moored near the 10-fathom curve southward of Blonde Rock, and a lighted whistle buoy is about 2 miles south-southwestward of the rock.

Lurcher Shoal, the most westerly danger off the coast of Nova Scotia in the approach to the Bay of Fundy, is an extensive formation with two separate heads and is about 13 miles offshore and 15 miles west of **Yarmouth. Southwest Shoal,** the larger of the two heads, has a least depth of 1½ fathoms, from which depths of less than 10 fathoms extend about 1.5 miles northward and about 1 mile southwestward. There is a considerable tide-rip over the northern part of this bank. A danger whistle buoy is 0.4 mile west-southwestward of the 1½-fathom spot. **Northeast Shoal,** with a depth of 5 fathoms, is about 2.3 miles north-northeastward of Southwest Shoal.

Lurcher Shoal Lightship is 2.5 miles southwestward of Southwest Shoal. The lightship has a red hull, with the word LURCHER on the sides and NO. 14 on each bow, and two masts and a funnel. The light, 60 feet above the water and visible 13 miles, is shown from the foremast. The fog signal is an air diaphone. There is a radiobeacon. The radio call is VDR. The vessel is removed from station annually for about six weeks for overhaul, usually during August and September, at which time a lighted whistle buoy marks the station.

The **Bay of Fundy,** the name of which is supposed to be a corruption of *Fond de la Baie,* or *Baya Fonda* (deep water), is a northeasterly extension of the Gulf of Maine. It separates the peninsula of Nova Scotia from the State of Maine and the Province of New Brunswick. The bay has a general width of 30 miles and a length of 90 miles from Grand Manan Island at its entrance to Cape Chignecto near its head.

Grand Manan Island, with its associated islets and dangers, divides the entrance into two passages. The western passage, Grand Manan Channel, is 5.5 miles wide and free from dangers. The eastern passage is much wider, but is bordered on each side by outlying rocks and shoals. The Bay of Fundy is deep, but its navigation requires constant attention because of the off-lying dangers in the approach and entrance, the rapid and uncertain tidal currents, and the frequent occurrence of dense fogs.

Grand Manan Island, a part of the Province of New Brunswick, lies nearly 6 miles off West Quoddy Head, Maine. The island is thickly wooded and is about 13 miles long and 6 miles wide. From the ridge along the western shore, which reaches heights of 400 feet in places, the island slopes gradually toward the east. The western side of the island has no notable indentations and is steep-to and safe to approach. The northern end is also steep-to and, further, when fog prevails with southerly and southwesterly winds, there is often a clear space to a distance of 1 mile off this part of the island. The eastern and southern sides have several harbors and anchorages but the approach is difficult because of the numerous islets, rocks, and shoals that extend 7.5 miles southeastward and 10.5 miles southward and southwestward.

Grand Manan Banks, 19 miles southward of Grand Manan Island, have an extent of about 15 miles in a northeast-southwest direction and consist of two sections, **Northeast Bank** and **Southwest Bank,** with a channel 2.5 miles wide between them. The bottom is rocky and the least depth, 16 fathoms, is found on Northeast Bank. The tidal currents on the banks attain a velocity of 1½ knots at half tide at which time there are extensive tide rips with both flood and ebb. The flood current sets to the north-northeast and the ebb to the south-southwest. A good check on the position of a vessel may be obtained by soundings on these banks.

Grand Manan Island and its surrounding islands, rocks, and shoals are shown on *H. O. Chart 1057* and are fully described in H. O. Pub. No. 99, *Sailing Directions for Nova Scotia.* Only the outermost dangers will be described in this Coast Pilot.

Southeast Ledge is 10 miles south-southwestward of **Southwest Head,** the southwestern extremity of Grand Manan Island. The ledge has a depth of 5 fathoms, shows a tide rip, and breaks in heavy weather. A 6-fathom patch, marked by tide rips, is about 1.3 miles northwestward of the ledge.

Murr Ledges, an extensive group of dangerous shoals and rocks, lie 4 miles southward of Grand Manan Island. Depths in the vicinity of Murr Ledges are irregular, and the tidal currents are strong. Vessels should keep well outside all these dangers. **St. Mary Ledge,** the southernmost of the Murr Ledges, is 3 miles southwestward of Gannet Rock. The ledge covers only a high water springs, and deep water is 200 yards southward of it.

Gannet Rock, the easternmost of the Murr Ledges, is a small bare rock about 15 feet high. The western side is steep-to. A detached rocky shoal with a least depth of 2 fathoms is about 700 yards southeast of the light on the rock. Gannet Rock Light is shown from an octagonal wooden tower, 91 feet high, with vertical black and white stripes, surmounted by a red lantern and attached to a dwelling. The light is 106 feet above the water and visible 16 miles. The fog signal is sounded on an air diaphone from a white rectangular wooden building with a red roof. The horn projects from the south side of the building and points 162°.

Old Proprietor Shoal, 5.7 miles east-northeastward of Gannet Rock, dries 9 feet, and is the outermost of the dangers southeastward of Grand Manan Island. The shoal is marked by a daybeacon, and a lighted whistle buoy is moored nearly a mile to the southward. Big Duck Island, eastward of Grand Manan Island, open eastward of Black Rocks and bearing 346°, leads eastward of Old Proprietor.

Clarks Ground is 1.5 miles northeastward of Old Proprietor Shoal. It has a least depth of 6 fathoms and shows a heavy tide rip with a southwest-going current. **Bulkhead Rip,** 1.5 miles northward of Clarks Ground, occurs in deep water and is caused by the uneven rocky bottom. This rip is very heavy during the southwest-going current.

Black Rocks, 1.5 miles eastward of Long Point on White Head Island and 3.8 miles northward of Old Proprietor Shoal, are two rocks about 200 yards apart. The northeasterly and larger rock is 10 feet high and the other is 4 feet high.

White Head Island, 74 feet high, is the largest of the islets off Grand Manan Island. **Cheney Island** and **Ross Island,** between White Head Island and Grand Manan Island, are both 50 feet high. These islands are all joined by flats and ledges. **Gull Cove Light** is shown from a white square wooden 41-foot tower on the east side of White Head Island. The light is 81 feet above the water and visible 14 miles from 169° through south to 033°. A fog signal is sounded on an air diaphone from a white square wooden building near the southern extremity of **Long Point.**

Big (Great) Duck Island is 2.3 miles northward of White Head Island. Drying ledges and a shoal with depths of less than 2 fathoms extend 1.3 miles south-southeastward from Big Duck Island. **Big Duck Ledge,** above water, is near the end of this shoal. A buoy marks the extremity of this danger. An air diaphone fog signal is sounded from a white building with brown roof near the southern end of Big Duck Island.

Long Island, 70 feet high and 2.2 miles northward of Big Duck Island, is joined to Grand Manan Island by ledges and shoals. **Long Island Bay,** between Long Island and **Swallow Tail Point,** 1.5 miles northward, affords anchorage in its northern and southern

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extremities. A light is shown from a white, octagonal, wooden, 50-foot tower with white dwelling and outbuildings near the edge of a high cliff. The light is 148 feet above the water and visible 18 miles from 153° through south to 349°. The fog signal is sounded on an air whistle.

North Head Harbor is the extreme northern part of Long Island Bay. **North Head,** the principal village of Grand Manan Island, is at the head of the harbor. The village has post and telegraph offices and steamer service to the Maine and New Brunswick mainland. The government wharf, on the eastern side of the harbor, will accommodate small ocean-going vessels.

Long Eddy Point, the northern extremity of Grand Manan Island, is 300 feet high and thickly wooded. A fog signal is sounded on an air diaphone from a white wooden house with a red roof on the beach at the extreme end of the point.

Grand Manan 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. It is the most direct passage for vessels bound up the Bay of Fundy from along the coast of Maine. The channel varies in width from 5.5 miles abreast Campobello Island to 10 miles abreast Southwest Head, the southwestern point of Grand Manan Island. The western approach is marked by Machias Seal Island Light, which also marks the westermost of the rocks and ledges that lie southwestward of Grand Manan Island. With the exception of the dangers between Machias Seal Island and Grand Manan Island, the channel is free and has a good depth of water. The tidal current at strength has an average velocity of about 2½ knots and follows 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.

It is reported that the fogs often hang close in to the Maine coast between Machias Bay and West Quoddy Head, extending about one third the way across Grand Manan Channel, while the rest of the passage may be entirely clear of fog.

Jeffreys Bank, with a least found depth of 46 fathoms on **Outer Fall,** lies about 26 miles southward of Matinicus Rock Light. Lesser depths have been reported by fishermen.

Platts Bank has a least found depth of 29 fathoms. Banks with depths of 41 to 50 fathoms are about 10 miles northwestward, 10 miles northeastward, and 15 miles eastward of the shoalest part of Platts Bank.

Cashes Ledge, with depths of less than 30 fathoms, is about 6 miles long. **Ammen Rock,** with a depth of 4¼ fathoms, is near the middle of the ledge in latitude 42°54′ N., longitude 68°57′ W. There is a whistle buoy on the east side. The sea breaks over this rock in heavy weather.

Fippennies Ledge, with a least known depth of 37 fathoms, lies about 16 miles west of Ammen Rock.

Jeffreys Ledge extends northeastward from Cape Ann and has general depths of 16 to 30 fathoms and more. The northeastern point of the ledge is 20 miles eastward of Boon Island Light. A whistle buoy is moored on the ledge about 32 miles east-northeastward of Cape Ann.

Stellwagen Bank lies northward of Cape Cod and off the entrance to Massachusetts Bay; depths found over it are 9 to 20 fathoms, but fishermen have reported a depth of 7 fathoms at the north end.

Rules of the Road.—Rules to prevent collisions of vessels and pilot rules for certain inland waters of the Atlantic and Pacific coasts and of the coast of the Gulf of Mexico apply to the inland waters described in this Coast Pilot within the following boundary. A line drawn from Sail Rock whistle buoy 1 to the southeasternmost extremity of Long Point, Maine, to the southeasternmost extremity of Western Head; thence to the southeasternmost extremity of Old Man; thence to the southernmost extremity of Double Shot Island; thence to Libby Islands Lighthouse; thence to Moose Peak Lighthouse; thence to the eastern extremity of Little Pond Head. A line drawn from the southern extremity of Pond Point, Great Wass Island, to the southernmost point of Crumple Island; thence to Petit Manan Lighthouse; thence to Mount Desert Lighthouse; thence to Matinicus Rock Lighthouse; thence to Monhegan Island Lighthouse; thence to Seguin Lighthouse; thence to Portland Lightship; thence to Boon Island Lighthouse; thence to Cape Ann lighted whistle buoy 2; thence to Boston Lightship; thence to Cape Cod Lighthouse.

Wrecks.—An examination of the record of wrecks along 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 Island, 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.

South of Portland the wrecks have occurred most frequently on the prominent headlands or the shoals off them, namely, 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 to Boston Harbor. Vessels must depend upon making the fog signals or the whistle or bell buoys, and when approaching them should proceed slowly, sounding, 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 cannot be depended upon to fix 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 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 lighted whistle buoy, northeastward of the end of the cape.

Lobster pots.—The inland waters described in this Pilot, particularly those from St. Croix River to the vicinity of Portland, contain numerous lobster pots. Small painted wooden buoys of various designs and colors, secured by small lines, float on the surface; in some cases a second buoy, usually unpainted and hard to see, is attached to the lobster pot. These buoys extend from the shore out to, and in many cases across, the sailing routes. Small yachts and motorboats are cautioned against fouling, which is liable to result in a sprung shaft or propeller.

Fish weirs are numerous along the outside coast. The stakes often become broken off and form a danger to navigation, especially at night. Regulations limiting the areas within which fish weirs may be established have been prescribed by the Secretary of the Army and the supervision of the fishing structures is controlled by the Chief of Engineers, United States Army. Strangers should proceed with caution when crossing areas of possible fish weirs, and should avoid crossing such areas at night, whenever possible.

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

Fishing structures and appliances in navigable waters of the United States will be lighted for the safety of navigation as follows:

The lights will be displayed between sunset and sunrise. They will 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 will be displayed. The outer light will be white, and the inner light will be red. The size, capacity, and manner of maintenance of the light will be such as may be specified in the Department of the Army 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.

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, Southwest 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. Other harbors available for small vessels and motorboats are mentioned in later chapters.

§202 **Anchorage Regulations.**—Regulations governing anchorage areas within the limits covered by this Coast Pilot follow.

§ 202.1 *General.* (a) The areas described in Subpart A of this part are designated as special anchorage areas pursuant to the authority contained in an act amending laws for preventing collisions of vessels approved April 22, 1940 (54 Stat. 150). Section 1 of the act amended Article 11 of the Navigation Rules for Harbors, Rivers, and Inland Waters Generally (33 U.S.C. 180), section 2 amended Rule 9 of the Navigation Rules for Great Lakes and Their Connecting and Tributary Waters (33 U.S.C. 258), and section 3 amended Rule 10 of the Navigation Rules for Red River of the North and Rivers Emptying into Gulf of Mexico and Tributaries (33 U.S.C. 319), vessels not more than 65 feet in length, when at anchor in any special anchorage area, shall not be required to carry or exhibit the white anchor lights required by the Navigation Rules.

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

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

SUBPART A—SPECIAL ANCHORAGE AREAS

§ 202.5 *Casco Bay, Maine*—(a) *Beal's Cove, west side of Orr Island, Harpswell.* The entire cove as defined by the shore line and a line across the entrance bearing 215° and tangent to the shore on the north side.

(b) *Harpswell Harbor, east side of Harpswell Neck, Harpswell.* The entire area lying westerly of a line bearing 8° from the eastern extremity of Stover's Point to the point of land at the northerly end of the harbor, said point of land bearing approximately 275° from the observatory on Orr Island.

(c) *Basin Cove, west side of Harpswell Neck, Harpswell.* All of the area lying northeasterly of a line bearing 350° from the northwest corner of the entrance to the cove.

(d) *Mussel Cove and adjacent waters at Falmouth Foreside, Falmouth.* All the waters lying westerly of a line bearing 123° from Dock House (F. S.) 200 yards, thence 212° to Prince Point.

§ 202.10 *Portsmouth Harbor, N. H., north of Newcastle Island.* Southeasterly of a line bearing 74°30′ from the northeasterly extremity of Goat Island; southerly of a line bearing 89°30′ and passing through a point 100 feet due north of the northern extremity of Salamander Point; southwesterly of a line bearing 300° from Portsmouth Harbor Light; northwesterly of a line bearing 215°30′ from the southwest corner of Frisbee Wharf; and northerly of the shore line and of the breakwater between Newcastle Island and Goat Island.

§ 202.15 *Newburyport Harbor, Mass.* Eastward of a line bearing due north from the northeast corner of the American Yacht Club property to a point 237° and about 900 feet from South Pier; southward of a line bearing 70° to a point 212° and 310 feet from South Pier, thence 90° to a point 180° and about 600 feet from North Pier; westward of a line bearing 180° from North Pier to the shore line.

§ 202.20 *Parker River, Newbury, Mass., 1½ miles above mouth.* That portion of the river extending 3,800 feet downstream from the highway bridge on Route 1A; excluding therefrom a clear approach to the bridge 100 feet wide following generally the deepest water.

§ 202.25 *Beverly and Salem Harbors, Mass.*—(a) *Beverly Harbor, north of Salem Neck.* Southwest of a line bearing 315° from a point due north of and 60 yards from the northerly corner of the Salem Willows Municipal Pier, south of a line bearing 90° from Monument Bar Beacon; east of a line bearing 180° from Monument Bar Beacon; north of a line bearing 278° from the northerly end of the Salem Willows Yacht Club house; and northwest of a line extending from the northerly end of the Salem Willows Yacht Club house to the starting point due north of and 60 yards from the northerly corner of the Salem Willows Municipal Pier.

(b) *Bass River.* All of the area upstream of the highway bridge (Popes Bridge) outside of the dredged channel.

(c) *Salem Harbor.* That part of the harbor lying southwesterly of a line bearing 116° from the eastern extremity of Long Point to a point 20° from the beacon southeast of Pickering Point; thence bearing 160° to a point 47° from the aforesaid beacon; thence bearing 99° to the shore; excluding therefrom the dredged channel and basin to the Dion Boat Yard.

§ 202.30 *Boston Harbor, Mass., and adjacent waters*—(a) *Lynn Harbor.* North of a line bearing 244° from the tower of the Metropolitan District Building, extending from the shore to a point 100 feet from the east limit of the channel; east of a line bearing 358°, extending thence to a point 100 feet east of the northeast corner of the turning basin; south of a line bearing 88°, extending thence to the shore; and south and west of the shore line to its intersection with the south boundary.

(b) *Vicinity of Pleasant Park Yacht Club, Winthrop.* Southerly of a line bearing 276° from a point on the west side of Pleasant Street, Winthrop, 360 feet from the southwest corner of its intersection with Main Street; westerly of a line bearing 186° from a point on the south side of Main Street 140 feet from the southwest corner of its intersection with Pleasant Street; northerly of a line bearing 256° from a point on the west side of Pleasant Street 550 feet from the southwest corner of its intersection with Main Street; and easterly of a line bearing 182° from a point on the south side of Main Street 640 feet from the southwest corner of its intersection with Pleasant Street.

(c) *Mystic River, east side of Chelsea Bridge North.* Northerly of the northerly fender pier of Chelsea Bridge North; easterly of Chelsea Bridge North; southerly of the shore line; and westerly of a line bearing 7° from the easterly end of the aforesaid fender pier.

(d) *Mystic River, west side of Chelsea Bridge North.* Northerly of the northerly fender pier of Chelsea Bridge North and a line extending from the westerly end of the shoreward face of the aforesaid fender pier of the southeasterly corner of the wharf projecting from the Naval Hospital grounds; easterly of the aforesaid wharf; southerly of the shore of the Naval Hospital grounds; and westerly of Chelsea Bridge North.

(e) *Vicinity of South Boston Yacht Club, South Boston.* Northerly of a line bearing 96° from the stack of the heating plant of the Boston Housing Authority in South Boston; easterly of a line bearing 5° from the west shaft of the tunnel of the Boston Main Drainage Pumping Station; southerly of the shore line; and westerly of a line bearing 158° from the northeast corner of the iron fence marking the east boundary of the South Boston Yacht Club property.

(f) *Dorchester Bay, in vicinity of Savin Hill Yacht Club.* Northerly of a line bearing 64° from the stack of the old power plant of the Boston Elevated Railway on Freeport Street in Dorchester; westerly of a line bearing 163° from the stack of the Boston Main Drainage Pumping Station on the Cow Pasture in Dorchester; and southerly and easterly of the shore line.

(g) *Dorchester Bay, in vicinity of Dorchester Yacht Club.* Eastward of a line bearing 21° from the stack located a short distance northwestward of the Dorchester Yacht Club; southward of a line bearing 294° from the southerly channel pier of the highway bridge; westward of the highway bridge and the shore line; and northward of the shore line.

(h) *Quincy Bay, in vicinity of Wollaston and Squantum Yacht Clubs.* Northwesterly of a line bearing 36°30′ from a point on the shore 2,600 feet easterly of the east side of the Wollaston Yacht Club landing; southwesterly of a line bearing 129°15′ from the water tank in Squantum; and southeasterly and northeasterly of the shore line.

(i) *Quincy Bay, in vicinity of Merrymount Yacht Club.* South of a line starting from a point bearing 246°, 3,510 yards, from the stack of the pumping station on Nut Island, and extending thence 306° to the shore; west of a line bearing 190° from the aforesaid point to the shore; and north and east of the shore line.

(j) *Weymouth Fore River, in vicinity of Quincy Yacht Club.* Southwesterly of a line bearing 119° from the outer end of the wharf at Nut Island; northwesterly of a line bearing 199°30′ from Pig Rock Light to the eastern end of Raccoon Island; northerly of Raccoon Island and of a line from its western extremity bearing 245° from Beacon 2A; and easterly of the shore of Houghs Neck.

(k) *Weymouth Fore River, in vicinity of Wessagussett Yacht Club.* Southwesterly of a line bearing 117° from channel light "4"; southeasterly of a line 150 feet from and parallel to the meandering easterly limit of the dredged channel; easterly of a line bearing 188° from the eastern extremity of Rock Island Head; and northwesterly of the shore line.

(l) *Weymouth Back River, in vicinity of Eastern Neck.* The cove on the north side of the river lying northerly of a line bearing 264°30′ from the southwesterly corner of the American Agricultural Chemical Company's wharf (Bradley's Wharf) to the shore of Eastern Neck, about 2,200 feet distant.

§ 202.35 *Plymouth Harbor, Mass.* Southeasterly of a line bearing 39° from Splitting Knife front range light; southwesterly of a line bearing 123° from a point on the southeast face of the State Pier, 40 feet from the northeast corner (intersection of the northeast and southeast faces produced) of said pier; westerly of a line bearing 356° from the northeast corner of the Pilgrim Yacht Club wharf; and northeasterly of the shore line.

SUBPART B—ANCHORAGE GROUNDS

§ 202.130 *Rockland Harbor, Maine*—(a) *The anchorage grounds*—(1) *Anchorage A.* Beginning at a point bearing 158°, 1,075 yards, from Rockland Breakwater Light; thence 255°, 2,000 yards, to a point bearing 225° from Rockland Breakwater Light; thence 345°, 700 yards, to a point bearing 244° from Rockland Breakwater Light; thence 75°, 1,200 yards, to a point bearing 222° from Rockland Breakwater Light; and thence 120°, 1,000 yards, to the point of beginning.

(2) *Anchorage B.* Beginning at a point bearing 273°, 400 yards, from Rockland Breakwater Light; thence 273°, 700 yards, to a point bearing 273° from Rockland Breakwater Light; thence 349°, 850 yards, to a point bearing 305° from Rockland Breakwater Light; thence 89°, 700 yards, to a point bearing 328° from Rockland Breakwater Light; and thence 169°, 900 yards, to the point of beginning.

(3) *Anchorage C.* Beginning at a point bearing 244°, 1,715 yards, from Rockland Breakwater Light;

thence 260°, 490 yards, to a point bearing 248° from Rockland Breakwater Light; thence 350°, 580 yards, to a point bearing 263° from Rockland Breakwater Light; thence 83°, 480 yards, to a point bearing 263° from Rockland Breakwater Light; and thence 169°, 550 yards, to the point of beginning.

(b) *The regulations.* (1) Anchorages A and B are general anchorages reserved for merchant vessels over 100 feet in length. Anchorage C is reserved for small commercial and pleasure craft.

(2) A distance of approximately 500 yards shall be left between Anchorages A and B for vessels entering or departing from the Port of Rockland. Any vessel not anchoring in these areas shall be ready to move on short notice when ordered to do so by the Captain of the Port.

(3) All other vessels within the Rockland Harbor area are prohibited from anchoring within 300 yards or operating within 100 feet of any navy yard, shipbuilding plant, power plant, oil terminal, marine terminal, munitions plant, military or naval arsenal or depot, warehouse, or freight pier without permission from the Captain of the Port, Rockland, Maine, or his authorized representative.

§ 202.131 *Kennebec River in vicinity of Bath, Maine*—(a) *The anchorage grounds.* Vessels may anchor only within the following limits:

(1) Northward of a line bearing 54° true and extending from a point on Passmore's wharf in prolongation with the north side of Commerce Street, Bath, Maine, to a point on the shore in Woolwich, approximately 1,200 feet north of the Maine Central Railroad wharf.

(2) Southward of a line drawn from the derrick on the Bath Iron Works wharf to Sassanoa Point in Woolwich.

(b) *The regulations.* (1) Vessels in the north anchorage shall be so anchored as to leave a clear fairway of 150 feet channelward 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, and other watercraft.

(2) The launching of vessels into the waters between the anchorages or the bringing up of such vessels by their anchors will be permitted: *Provided,* That the vessels so launched shall be removed therefrom within 12 hours from the time of anchorage.

§ 202.132 *Portland Harbor, Maine*—(a) *The anchorage grounds*—(1) *Anchorage A (general)* Beginning at the eastern corner of Grand Trunk Railway Company pier No. 3; thence approximately 90°, 1,700 yards, to Brooklyn Ledge Buoy 16; thence 330°, 350 yards; thence 25°, 780 yards; thence 303°, 750 yards; thence 254°, 560 yards; thence 186°, 750 yards; and thence to the point of beginning.

(2) *Anchorage B (general and quarantine).* Beginning at Brooklyn Ledge Buoy 16; thence 58° to Little Diamond Island; thence along the southwestern shore to the pier on the southern end of Little Diamond Island; thence 143°, 1,200 yards; thence 270° to House Island Light; thence along the western shore of House Island to Fort Scammel Point Light; and thence 329°, 1,620 yards, to the point of beginning.

(3) *Anchorage C.* Bounded on the northwest by House Island; on the north by a line running 90° from House Island Light to Peak Island; on the east by the western shore of Peak Island, by a line running 198° from the westernmost point on Peak Island to Cushing Island, and by the shore of Cushing Island to its westernmost point; and on the southwest by a line running from the westernmost point on Cushing Island to Fort Scammel Point Light.

(4) *Anchorage D.* Southerly and westerly of a line beginning at Lighthouse Channel Buoy 1; thence 35° to Anchorage Buoy E; and thence 145° to the mainland.

(b) *The regulations.* (1) Anchorage B is intended for general purposes, but especially for use by oil tankers and other large deep-draft ships entering harbor at night and intending to proceed to the dock allotted at daylight the following morning or as soon as practicable. This area is also to be used for quarantine anchorage. Vessels must be so anchored in this area as to leave at all times an open usable channel at least 100 feet wide for passage of ferry and other boats between Portland, Peak Island, and Bay Points. Any vessels anchored in this area shall be ready to move on short notice when ordered to do so by the Captain of the Port.

(2) Anchorage C is intended for use only by small vessels and for temporary anchorage.

(3) Anchorage D is for use only by small yachts and pleasure craft and small light-draft coastwise freighters.

§ 202.134 *Boston Harbor, Mass.*—(a) *The anchorage grounds*—(1) *Bird Island Anchorage.* Beginning at a point bearing 93°, 1,400 yards, from the aerial beacon on top of the Boston Custom House tower; thence to a point bearing 81°, 1,600 yards, from the aerial beacon on top of the Boston Custom House tower; thence to a point bearing 102°, 3,100 yards, from the aerial beacon on top of the Boston Custom

House tower; thence to a point bearing 109°, 3,050 yards, from the aerial beacon on top of the Boston Custom House tower; and thence to the point of beginning.

(2) *President Roads Anchorage.* Beginning at a point bearing 261°, 350 yards, from Deer Island Light; thence to a point bearing 261°, 2,900 yards, from Deer Island Light; thence to a point bearing 272°, 2,600 yards, from Deer Island Light; thence to a point bearing 319°, 650 yards, from Deer Island Light; and thence to the point of beginning.

(3) *Long Island Anchorage.* East of Long Island, bounded as follows: Beginning at the southwesternmost point of Gallups Island; thence 270° to Long Island; thence southerly along the eastern shore line of Long Island to Bass Point; thence to the northernmost point of Rainsford Island; thence to Georges Island Gong Buoy 6; and thence to the point of beginning.

(4) *Castle Island Anchorage.* Bounded on the north by Castle Island and adjacent land; on the east by a line between Castle Rocks Fog Signal Light and Old Harbor Shoal Buoy 2; on the southeast by a line between Old Harbor Shoal Buoy 2 and Old Harbor Buoy 4; and on the west by a line running due north from Old Harbor Buoy 4 to the shore line at City Point.

(5) *Explosives anchorage.* In the lower harbor, bounded on the northeast by a line between the northeast end of Peddocks Island and the northeast end of Rainsford Island; on the northwest by Rainsford Island; on the southwest by a line between the western extremity of Rainsford Island and the westernmost point of Peddocks Island; and on the southeast by Peddocks Island.

(b) *The regulations.* (1) The Captain of the Port may authorize the use of the President Roads Anchorage as an explosives anchorage when he finds that the interests of commerce will be promoted and that safety will not be prejudiced thereby. Vessels anchored in this area shall move promptly upon notification by the Captain of the Port.

(2) In the Long Island Anchorage vessels shall anchor in the position designated by the Captain of the Port.

(3) Floats or buoys for marking anchors or moorings in place will be allowed in all areas. Fixed mooring piles or stakes are prohibited.

§ 203 **Bridge Regulations.**—Regulations governing the operation of drawbridges within the limits covered by this Coast Pilot follow.

§ 203.5 *Townsend Gut, Maine; bridge (highway) of town of Southport.* (a) That the draw of the bridge shall be opened promptly upon reasonable signal for the passage of boats, except when there are vehicles, animals, or foot passengers on the bridge; but in no case shall the delay in opening the bridge from this cause exceed five minutes: *Provided,* That the signal may be given by three distinct blasts of whistle, horn, or conch, or by shouting with the voice.

(b) All boats desiring to pass through the draw shall be allowed to do so freely and without interference at a speed not exceeding 5 knots per hour.

§ 203.10 *Kennebec River between Bath and Woolwich, Maine; bridge (highway and railroad) between Bath and Woolwich, Maine.* (a) The corporations or persons owning or controlling the bridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(b) If weather conditions are good and sound signals can be heard when a vessel approaches the bridge and desires to pass through the draw, the person in charge of said vessel shall cause to be sounded, within reasonable hearing distance of the bridge, three distinct blasts of a whistle, horn, or megaphone or three loud and distinct strokes of a bell.

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

(2) When the draw of the bridge cannot be opened immediately, the draw tender shall reply by two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell.

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

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

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

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

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

(f) This section shall be in force on and after April 1, 1928.

§ 203.15 *Presumpscot River, Portland, Maine; bridge (highway) at Martins Point, Portland, Maine.* (a) That on weekdays between April 1 and November 30 the draw shall be opened promptly upon signal between the hours of 7 a. m. and 6 p. m. Between December 1 and March 31 and on holidays and Sundays throughout the year the draw shall be opened only upon timely previous notice in person or in writing or by telephone to the draw tender.

(b) That the signal for opening the draw shall be five blasts of steam whistle on steam vessels or towboats, and five blasts from a horn on sailing or gasoline-driven vessels.

(c) That boats and tows shall approach and pass through the draw at a speed no higher than that required for good steerage way.

(d) This section shall take effect and be in force on and after August 15, 1922.

§203.20 *Back Cove, Portland Harbor, Maine; bridge (highway), known as "Tukeys Bridge," of city of Portland.* (a) That on week days the draw shall be opened promptly upon signal between 7 a. m. and 5 p. m., during the period from October 1 to April 1; and between 6 a. m. and 6 p. m. during the remainder of the year.

(b) That the signal for opening the draw shall be five blasts of steam whistle on steam vessels or towboats and five blasts from a fog horn on sailing vessels.

(c) That at hours other than those specified in paragraph (a) of this section, and on Sundays, the draw may be opened only upon timely previous notice in person or in writing to the draw tender or his assistant.

(d) That boats and tows must approach and pass through the draw at a speed no higher than that required for good steerage way.

§ 203.25 *Fore River, Portland Harbor, Maine; bridges (highway), known as "Portland Bridge" and "Vaughan Bridge."* (a) The corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(b) If the weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through the draw, three distinct blasts of a whistle, horn, or megaphone shall be sounded from the vessel when within reasonable hearing distance of the bridge.

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

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

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

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

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

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

(g) This section shall take effect and be in force on and after October 17, 1935.

§ 203.45 *Exeter River, N. H.; Boston and Maine Railroad bridge and State of New Hampshire Highway Department bridge.* (a) The owners of or agencies controlling these bridges shall not be required to keep draw tenders in constant attendance.

(b) From November 1 to March 31, inclusive, the draws of these bridges shall not be required to be opened for the passage of vessels.

(c) At all other times, whenever a vessel, unable to pass under a closed bridge, desires to pass through the draw, at least four hours' advance notice of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge. Upon receipt of such advance notice, the said representative, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owner of or agency controlling each bridge shall provide arrangements whereby the representative specified in paragraph (c) of this section can be reached readily by telephone or otherwise at any time, and shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that it can be read easily at any time, a copy of the regulations in this section together with a notice stating exactly how he may be reached.

(e) The draw of the railroad bridge need not be opened when a train is approaching so closely that it cannot be stopped safely before reaching the bridge or when a train is approaching within sight or hearing of the draw tender.

(f) Trains and vehicles shall not be stopped on a bridge for the purpose of delaying its opening, nor shall watercraft be navigated so as to hinder or delay the operation of the draw, but all passage over or through a bridge shall be prompt to prevent delay to either land or water traffic.

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

§ 203.50 *Hampton River, N. H.; bridge (highway) between Seabrook and Hampton Beaches, N. H.* (a) The owner of or the agency controlling the drawbridge shall provide the appliances and the personnel necessary for the safe, prompt, and efficient operation of the draw.

(b) The draw shall be operated as prescribed in paragraphs (c) and (d) of this section and shall be opened promptly when the signal prescribed in paragraph (i) of this section for the opening of the draw is received.

(c) On all week days between April 1 and October 31, both dates inclusive, the draw shall be opened promptly for the passage of vessels during the daylight portions of the periods beginning 3 hours before and ending 3 hours after each high water. For the purpose of this section, daylight is construed to begin 30 minutes before sunrise and to end 30 minutes after sunset, and high water shall be deemed to occur 30 minutes later than the time of high water for Portland, Me., as given in the tide tables for the United States published by the Department of Commerce, United States Coast and Geodetic Survey.

(d) At times other than those specified in paragraph (c) of this section, the draw shall be opened only upon at least 3 hours' previous notice given in person or in writing or by telephone to the representative of the owner or agency controlling the bridge except that in case of emergency the draw shall be opened promptly upon such notice. For this purpose the owner shall install and maintain at the bridge a telephone and shall keep conspicuously posted on both the upstream and downstream sides of the bridge in such manner that it can easily be read at any time a copy of the regulations in this section together with a notice stating exactly how the representative specified in this section may be reached.

(e) The owners of the bridge shall provide and keep in good legible condition two board gages painted white, with black figures not less than 6 inches high, to indicate the headroom clearance under the closed drawspan at all stages of the tide. The gages shall be so placed on the bridge that they will be plainly visible to the operator of a vessel approaching the bridge either up or down stream.

(f) Vessels which can pass under the bridge with a clearance of 1 foot or more should not signal for the opening of the draw. In case such a vessel gives the prescribed signal and the draw tender is uncertain as to whether the vessel can safely pass, he will open the draw and if he finds that there would have been a clearance of 1 foot or more had the draw remained closed, he will report the matter immediately to the District Engineer, United States Engineer Office, Boston, Mass., giving the name of the vessel, the time

of opening the draw, the headroom under the bridge as indicated by the gage at the time of opening the draw, and the approximate headroom required by the vessel.

(g) Pilots or masters of vessels are prohibited from signaling for or serving notice of passage unless it is necessary for the draw to be opened for the passage of the vessel. If notice or signal is given and the passage not effected at the proper time, report shall be made to the District Engineer, United States Engineer Office, Boston, Mass., by the draw tender.

(h) Automobiles, trucks, vehicles, vessels or other watercraft shall not be stopped or manipulated in a manner hindering or delaying the operation of the draw, but all passage over the drawspan or through the draw opening shall be in a manner so as to expedite both land and water traffic.

(*i*) *Signals*—(1) *Call signals for opening of draw*—(*i*) *Sound signal.* Three distinct blasts of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell sounded within a reasonable hearing distance of the bridge.

(ii) *Sight signal.* A white flag by day, a white light by night, swung in full circles at arm's length in full sight of the bridge and facing the draw. This signal is to be used in conjunction with sound signals when conditions are such that sound signals may not be heard.

(2) *Acknowledging signals by bridge operator*—(*i*) *Sound signals.* Draw to be opened immediately: Same as call signal. Draw cannot be opened immediately, or if open must be closed immediately. Two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Sight signals.* Draw to be opened immediately: A white flag by day or a green lantern at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately or if open must be closed immediately: A red flag by day, a red light by night swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

(3) *Acknowledging signals by the vessel.* Vessels or other watercraft having signaled for the opening of the draw and having received a signal that the draw cannot be opened immediately, or if open must be closed immediately, will acknowledge said signal by one long blast followed by a short blast, or by swinging to and fro horizontally a red flag by day or a red light by night.

(j) This section shall be in force on and after October 31, 1932.

§ 203.55 *Merrimack River, Mass.; bridges from the mouth to and including the Groverland-Haverhill Bridge.* (a) During the following applicable periods, the draw of each drawbridge shall, upon the signal prescribed in paragraph (e) of this section or upon verbal request at the bridge, be opened promptly for the passage of any vessel or other watercraft not able to pass under the closed draw:

(1) Massachusetts Department of Public Works highway bridge and Boston and Maine Railroad bridge between Newburyport and Salisbury. Between 6:00 a. m. and 10:00 p. m. from May to October, inclusive, and between 8:00 a. m. and 5:00 p. m. from November to April, inclusive.

(2) Essex County highway bridges between Deer Island and Salisbury and at Rocks Village. Between 6:00 a. m. and 10:00 p. m. from May to October, inclusive.

(3) Massachusetts Department of Public Works highway bridge between Groveland and Haverhill. Between 8:00 a. m. and 5:00 p. m. from May to October, inclusive.

(b) At all other times, the draws shall be opened within a reasonable time after notice to the draw tenders in person, by letter, or by telephone. For this purpose the owners of or agencies controlling the bridges shall provide arrangements whereby the draw tenders can be reached readily by telephone or otherwise at any hour of the day or night. They shall also keep conspicuously posted on both the upstream and downstream sides of the bridge, in a position where it can be read easily at any time, a copy of the regulations in this section, together with a notice stating exactly how the draw tender may be reached at all times by telephone or otherwise.

(c) The draw shall not be opened if there is a train, car, or other vehicle passing over the draw, or if a train or car is approaching so closely that it cannot be stopped safely 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 except as provided in this section.

(d) When any draw shall have been open for 10 minutes, it may be closed for the crossing of trains, cars, vehicles, or individuals if there be any 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 any vessel or other watercraft desiring to pass. The length

of time that a draw shall have been open shall be computed from the time it is fully opened, and the length of time that a draw has been closed shall be computed from the time it ceases to move in closing.

(e) When a vessel or other watercraft intends to pass through the draw of any bridge, the master or pilot thereof shall, on approaching within signaling distance, signify his intention to pass through the draw by sounding with a whistle or horn two long blasts followed immediately by two short blasts. If the draw is to be opened immediately, the draw tender shall reply by three long blasts of a whistle or horn. If, under this section, a delay in opening the draw is permitted and it is not to be opened immediately, the draw tender shall reply by two long blasts. A long blast shall be a blast of three seconds' duration, and a short blast shall be a blast of one seconds' duration.

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

(g) The owners of or agencies controlling the bridges shall maintain in good and efficient order the draws and the machinery and appliances for operating the same and for assisting vessels while passing through the draw. They shall provide such draw tenders as may be necessary to open and close the draws promptly. 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 to open.

(h) This section shall not apply to vessels owned or leased by the United States, nor to vessels employed for police and fire protection by any town or municipality touching upon the Merrimack River. All such United States and municipal vessels shall be passed without delay through the draws of all bridges during the periods specified in paragraph (a) of this section upon signaling by four long blasts, and at all other times as soon as possible after notice to the draw tender in person or by telephone.

§ 203.60 *Plum Island River, Mass.; bridge (highway).* (a) The owner of or the agency controlling the drawbridge shall provide the appliances and the personnel necessary for the safe, prompt, and efficient operation of the draw.

(b) On every calendar day between April 1 and November 30, both dates inclusive, the draw shall be opened promptly for the passage of vessels during the daylight portions of the periods beginning 2 hours before and ending 2 hours after each high tide. For the purpose of this section, daylight is construed to begin 30 minutes before sunrise and to end 30 minutes after sunset, and high tide shall be deemed to occur 30 minutes later than the time of high tide for Portland, Maine, as given in the tide tables for the United States published by the Department of Commerce, United States Coast and Geodetic Survey.

(c) Persons requiring the opening of the draw at times other than those specified in paragraph (b) of this section shall, except in an emergency, give at least 3 hours' notice of the time at which such opening will be required. Said notice may be given in person, in writing, or by telephone to the draw tender while in attendance at the bridge or to a designated representative of the owner or agency controlling the bridge. Upon receipt of such notice said owner or agency shall cause a suitable draw tender to be on duty at the bridge at the time specified in the notice, and the bridge shall at such time and for a reasonable period thereafter be opened promptly for the passage of vessels.

(d) The owner of or agency controlling the bridge shall install and maintain at the bridge a telephone and shall keep conspicuously posted on both the upstream and downstream sides of the bridge in such manner that it can easily be read at any time a copy of the regulations in this section together with a notice stating exactly how the representative specified in this section may be reached.

(e) The owners of the bridge shall provide and keep in good legible condition two board gages painted white, with black figures not less than 6 inches high, to indicate the headroom clearance under the closed drawspan at all stages of the tide. The gages shall be so placed on the bridge that they will be plainly visible to the operator of a vessel approaching the bridge either up or down stream.

(f) Vessels which can pass under the bridge with a clearance of 1 foot or more should not signal for the opening of the draw. In case such a vessel gives the prescribed signal and the draw tender is uncertain as to whether the vessel can safely pass, he will open the draw, and if he finds that there would have been a clearance of 1 foot or more had the draw remained closed, he will report the matter immediately to the District Engineer, United States Engineer Office, Boston, Mass., giving the name of the vessel, the time of opening the draw, the headroom under the bridge as indicated by the gage at the time of opening the draw, and the approximate headroom required by the vessel.

(g) Pilots or masters of vessels are prohibited from signaling for or serving notice of passage unless it is necessary for the draw to be opened for the passage of the vessel. If notice or signal is given and

the passage not effected at the proper time, report shall be made to the District Engineer, United States Engineer Office, Boston, Mass., by the draw tender.

(h) Automobiles, trucks, vehicles, vessels, or other watercraft shall not be stopped or manipulated in a manner hindering or delaying the operation of the draw, but all passage over the drawspan or through the draw opening shall be in a manner so as to expedite both land and water traffic.

(i) *Signals*—(1) *Call signals for opening draw*—(*i*) *Sound signal.* Three distinct blasts of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell sounded within a reasonable hearing distance of the bridge.

(ii) *Sight signal.* A white flag by day, a white light by night, swung in full circles at arm's length in full sight of the bridge and facing the draw. This signal is to be used in conjunction with sound signals when conditions are such that sound signals may not be heard.

(2) *Acknowledging signals by bridge operator*—(*i*) *Sound signals.* Draw to be opened immediately: Same as call signal. Draw cannot be opened immediately, or if open must be closed immediately: Two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Sight signals.* Draw to be opened immediately: A white flag by day or a green light at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately or if open must be closed immediately: A red flag by day, a red light by night swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

(3) *Acknowledging signals by the vessel.* Vessels or other watercraft having signaled for the opening of the draw and having received a signal that the draw cannot be opened immediately, or if opened must be closed immediately, will acknowledge said signal by one long blast followed by a short blast, or by swinging to and fro horizontally a red flag by day or a red light by night.

(j) This section shall be in force on and after December 15, 1932.

§ 203.65 *Danvers River, Mass.; bridges (highway and railroad).* (a) The corporations or persons owning or controlling the bridge shall provide the same with the necessary tenders and proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(b) The draw in each of the bridges crossing Danvers River shall, upon the signal prescribed in paragraphs (d) and (e) of this section being given, be opened promptly for the passage of vessels during daylight portions of the periods beginning 3 hours before and ending 3 hours after each high water on every calendar day except Sunday. For the purpose of this section, daylight is construed to begin 30 minutes before sunrise and to end 30 minutes after sunset, and high water shall be deemed to occur 5 minutes earlier than the time of high water for Boston (Commonwealth Pier No. 5) as given in the tide tables for the United States published by the Department of Commerce, United States Coast and Geodetic Survey.

(c) That at times other than those specified in paragraph (b) of this section, the draw shall be opened only upon timely previous notice in person or in writing or by telephone to the draw tender, either at the bridge during the periods stated in paragraph (b) of this section or at his residence thereafter, except that in case of emergency the draw shall be promptly opened upon notification. For this purpose the owner shall install and maintain at the bridge a telephone and shall provide arrangements whereby the draw tender can be readily reached by telephone or otherwise at any hour of the day or night, and notice of such arrangements shall be kept conspicuously posted on the bridge.

(d) If weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through the draw, the person in charge of said vessel shall cause to be sounded within reasonable hearing distance of the bridge, three distinct blasts of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell.

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

(2) When the draw of the bridge cannot be opened immediately, the draw tender shall reply by two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell.

(e) When weather conditions prevent hearing the sound signals, signals shall be made from the vessel by swinging in circles at arm's length a flag.

(1) When the draw of the bridge can be opened immediately, the draw tender shall reply by raising and lowering in vertical plane a number of times a flag.

(2) When the draw of the bridge cannot be opened immediately, the draw tender shall reply by swinging to and fro horizontally a number of times a flag.

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

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

(h) This section shall be in force on and after August 1, 1928.

§ 203.75 *Boston Harbor and the navigable waters tributary thereto; bridges (highway and railroad).* The rules and regulations of this section are prescribed to govern the opening of the draws in the bridges crossing Boston Harbor and the following navigable waters tributary to said harbor: Charles River, Chelsea Creek or Chelsea River, Crystal Cove, Fort Point Channel, Malden River (below Medford Street Bridge), Mystic River, Mystic River (South Channel), Neponset River, Reserved Channel, Weymouth Back River, and Weymouth Fore River.

(a) *General regulations.* (1) The owner or owners of every bridge covered by this section shall maintain in good and efficient order the drawspan 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 drawspan 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 drawspan to open.

(2) Except as specified in paragraph (b) (1) to (b) (4) of this section the draw in each and every drawbridge crossing the waterways described in this section shall, upon the prescribed signal being given, be opened promptly for the passage of any vessel, vessels, or other watercraft not able to pass the closed structure: *Provided,* That when the draw in any of the 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 it shall again be opened promptly for the passage of vessels or other craft if there be any such desiring to pass.

(3) 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.

(4) *Signals.* (i) When a vessel or other watercraft intends to pass through the draw of one of the bridges covered by this section, the master or pilot of the vessel or craft shall, on approaching within signalling distance, signify his intention to pass through the bridge by sounding with a whistle or horn the signal prescribed below, viz, two long blasts followed immediately by two short blasts.

(ii) *Special signals* for Meridian Street Bridge: Two long blasts followed immediately by two short blasts and one long blast. The signal to be given by a vessel drawing 18 feet or more, entitled to passage at all hours as provided in paragraph (b) (1) to (b) (3) of this section, shall be four long blasts.

(5) 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 this section a delay in opening the draw is permitted, and in case of such a delay the signal shall be immediately answered by two long blasts. A long blast of a whistle or horn as provided in this section shall continue for 3 seconds and a short blast for 1 second.

(6) Upon hearing or perceiving the prescribed signal or upon verbal request from the master or pilot of any vessel or other watercraft waiting at the bridge, the tender or operator of the draw of the bridge shall at once open the draw for the prompt passage of any vessel or other watercraft, unless under this section 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 cannot be safely stopped before reaching the draw.

(7) Trains, cars, vehicles, or persons shall not be stopped on any drawspan for the purpose of delaying the opening of the draw, nor shall any vessel or other watercraft be so handled or placed as to delay the opening or closing of any drawspan, but all passage over, under, or through a drawspan shall be prompt, so as to reduce delays to water and bridge traffic to a minimum.

(8) The general regulations of subparagraphs (1) to (7) of this paragraph shall apply in cases of all bridges, but to provide for closed or open periods the special regulations and exceptions in paragraph (b) of this section are prescribed.

(b) *Special regulations*—(1) *Across Fort Point Channel.* Northern Avenue Bridge, Congress Street Bridge, and Summer Street Bridge. 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 named in this subparagraph shall not be required to be opened except on Sundays and on legal holidays observed in the locality, for the passage of any vessel, vessels, or other watercraft except during the periods between 7:05 to 7:15 a. m. and 8 to 8:10 a. m., 5:20 to 5:30 p. m., and 6:20 to 6:30 p. m.: *Provided,* That the draws in the bridges named in this paragraph upon the prescribed signal being given, shall be promptly opened at all hours for the passage of any vessel, vessels, or other watercraft whose draft is 18 feet or more: *And provided further,* That any vessel, vessels, or other watercraft proceeding upstream through Northern Avenue Bridge shall be afforded continuous passage through the Congress Street and Summer Street Bridges, and any vessel, vessels, or other watercraft proceeding downstream through the Summer Street Bridge shall be afforded continuous passage through the Congress Street and Northern Avenue Bridges.

(2) *Across Mystic River.* (i) Chelsea Bridge north, Malden Bridge, Boston Elevated Railway bridge, Boston & Maine (eastern division) Railroad bridge, and Boston & Maine (western division) Railroad bridge. Between the hours of 7:45 a. m. and 10 a. m. and between the hours of 5 p. m. and 6 p. m. the draws in the bridges named in this subparagraph shall not be required to be opened except on Sundays and on legal holidays observed in the locality, for the passage of any vessel, vessels, or other watercraft except during the period between 9 to 9:10 a. m.: *Provided,* That the draws in these bridges shall, upon the prescribed signal being given, be opened promptly at all hours for the passage of any vessel, vessels, or other watercraft whose draft is 18 feet or more: *And provided further,* That any vessel, or vessels, or other watercraft proceeding either upstream or downstream which having passed any of the bridges mentioned in this paragraph shall be afforded continuous passage through the succeeding bridges.

(ii) Highway Bridge opposite Harvard Street, Medford, Mass. (*a*) The owner of, or agency controlling, the bridge will not be required to keep a draw tender in constant attendance at the bridge.

(*b*) Whenever a vessel unable to pass under the closed bridge desires to pass through the draw between the hours of 8:00 a. m. and 4:30 p. m. on weekdays (Monday to Saturday, inclusive) notice to that effect shall be given to the authorized representative of the owner of, or agency controlling, the bridge at least one hour in advance of the time the vessel desires to pass through the bridge. Whenever an opening is required on weekdays between 4:30 p. m. and 8:00 a. m. notice to that effect shall be given not later than 4:00 p. m. Whenever an opening is required on Sunday or on a legal holiday observed in the locality notice shall be given not later than 4:00 p. m. of the day preceding the Sunday or holiday on which the opening is required. In case of emergency, the draw shall be opened promptly upon notification. The authorized representative of the owner of this bridge is the Superintendent of Bridges, Metropolitan District Commission, Charles River Dam, Boston, Massachusetts.

(*c*) The owner of, or agency controlling, the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in a manner that it can easily be read at any time, a copy of the regulations in this subdivision, together with a notice stating how the authorized representative specified in subdivision (ii) (*b*) of this subparagraph may be reached.

(*d*) The temporary regulations of this subdivision shall be revoked upon the termination of the present national emergency, or prior to that time upon 30 days' notice by the Secretary of the Army whenever in his judgment the interests of navigation warrant such action.

(3) *Across Mystic River (South Channel).* Chelsea Bridge south. Between the hours of 7:45 a. m., and 10 a. m. and between the hours of 5 p. m. and 6 p. m. the draw in the bridge named in this subparagraph shall not be required to be opened except on Sundays and on legal holidays observed in the locality, for the passage of any vessel, vessels, or other watercraft except during the period between 9 a. m. and 9:10 a. m.: *Provided,* That the draw in this bridge shall, upon the prescribed signal being given, be opened promptly at all hours for the passage of any vessel, vessels, or other watercraft whose draft is 18 feet or more.

(4) *Across Charles River.* Charlestown Bridge, Warren Bridge, Boston Elevated Railway bridge, Boston & Maine Railroad bridge, and Charles River Dam bridge.

(5) *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,

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and Dover Street Bridge. 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 named in this subparagraph shall not be required to be opened except on Sundays and on legal holidays observed in the locality, for the passage of any vessel, vessels, or other watercraft excepting that when high tide at Charlestown Navy Yard is between 6:15 a. m. and 9:10 a. m. the draws shall be opened within 45 minutes before or after said tide for a period of 10 minutes for the passage of all vessels or other watercraft having a draft of 12 feet or over, if there be any such desiring to pass; the exact time of opening 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 watercraft.

(6) *Applicability.* This section 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.

(7) *Effective date.* This section shall take effect on December 1, 1930, and all regulations or parts of regulations in conflict therewith are hereby revoked to take effect on that date.

§ 204 **Danger Zone Regulations.**—Regulations governing danger areas within the limits covered by this Coast Pilot follow.

§ 204.2 *Atlantic Ocean in vicinity of Duck Island, Maine, Isles of Shoals; naval aircraft bombing target area*—(a) *The danger zone.* A circular area with a radius of 500 yards having its center on Shag Rock in the vicinity of Duck Island at latitude 43°00′12″, longitude 70°36′12″.

(b) *The regulations.* (1) No vessel shall enter or remain in the danger zone from 8:00 a. m. to 5:00 p. m. (local time) daily, except as authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

§ 204.4 *Cape Cod Bay south of Wellfleet Harbor, Mass.; naval aircraft bombing target area*—(a) *The danger zone.* A circular area with a radius of 1,000 yards having its center on the aircraft bombing target hulk James Longstreet in Cape Cod Bay at latitude 41°49′46″, longitude 70°02′54″.

(b) *The regulations.* (1) No vessel shall enter or remain in the danger zone at any time, except as authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

§ 207 **Navigation Regulations.**—Regulations governing navigation in special areas within the limits covered by this Coast Pilot follow.

§ 207.7 *Salem Harbor, Mass.; seaplane restricted area*—(a) *The area.* The waters of Salem Harbor adjacent to the United States Coast Guard Air Station on Winter Island, Salem, Massachusetts, bounded as follows: Beginning at Fort Pickering Light at the southeastern tip of Winter Island; thence westerly along the southern shore of Winter Island to a point on the high water line bearing 264°, about 1,100 feet from Fort Pickering Light; thence 220°, 1,650 feet, to the northeast corner of Salem Terminal Company wharf, latitude 42°31′21″ N., longitude 70°52′30″ W., thence southeasterly in the line of the north side of said wharf extended 2,400 feet to its intersection with a line drawn between the beacon located southeasterly of Pickering Point and Buoy C9 located easterly of Abbott Rock Beacon; thence 34°, along the line drawn between the beacon located southeasterly of Pickering Point and Buoy C9, 1,100 feet; thence 80°, 5,600 feet, to Buoy N4; thence 350°, 600 feet; thence 260°, 3,350 feet, to Buoy N10; thence 305°, 1,200 feet, through Buoy C11, to a point on the line drawn between the beacon located southeasterly of Pickering Point and Buoy C9; thence 34°, 1,600 feet, to Buoy C9; thence 45°, 4,500 feet, to Buoy CT; thence 338°30′, 800 feet, to lighted channel Buoy C; thence 254°, 3,650 feet, to Channel Buoy C; thence 198°, 2,850 feet, to Abbott Rock Beacon; thence 218°, 1,800 feet, to the point of beginning. (All bearings refer to true meridian.)

(b) *The regulations.* (1) No vessel shall moor or anchor within the restricted area.

(2) No fish trap stakes or anchors or lobster pots shall be placed within the restricted area in any manner that will allow the buoys, floats, bobbers, or markers connected thereto to float on the surface within the area.

(3) Lobster pots set outside the restricted area shall be so set that the buoys, floats, bobbers, or markers connected thereto will not under any condition of tide or wind float within the area.

(4) This section shall be enforced by the Commanding Officer, United States Coast Guard Air Station, Salem, Massachusetts, and such agencies as he may designate.

§ 207.10 *Charles River, Mass.; dam of Charles River Basin Commission.* (a) The movements of all vessels or boats in and near the lock shall be under the direction of the superintendent in charge of these structures and his assistants, whose orders and signals shall be obeyed.

(b) Every vessel using the lock and drawing more than 10 feet shall be accurately and distinctly marked at the bow and stern, showing the exact draft of water at such portions of the vessel.

(c) All steam vessels desiring to pass through the lock shall signal for the same by two long and two short blasts of the whistle.

(d) (1) All vessels passing through the lock shall have their outboard spars, if any, rigged in, and booms amidships, and secured. All standing and running rigging must be triced in to keep it from blowing out and fouling the drawbridge. Every vessel of 200 tons and under shall be provided with at least two, and every vessel of more than 200 tons shall be provided with at least four good and sufficient lines, cables, or hawsers. Anchors shall either be stowed or shall hang from hawse pipes, hauled up close, clear of the water if possible. Vessels with anchors under foot or hanging from catheads will not be permitted to enter the lock.

(2) All vessels must be sufficiently manned and must have a sufficient number of round and fore-and-aft fenders to protect the lock from injury. All heavy rope fenders must be securely lashed to prevent their falling into the lock and interfering with the gates.

(e) All vessels approaching the lock while any other vessel going in the opposite direction is in or about to enter it shall be stopped where they will not obstruct the free passage of such other vessel.

(f) It shall be the duty of every master or person in charge of any vessel upon approaching the lock from the upstream end to ascertain by personal observation whether or not the upper lock gate is open, and a vessel shall not be permitted to come within 100 feet of the upper lock gate until the gate has been wholly withdrawn into its recess.

(g) All towboats, whether towing or not, and other steam vessels of less than 100 tons gross may enter the lock under their own power and without having lines out, but all other vessels, including those which are accompanied by towboats, must attach not less than two good and sufficient lines, cables, or hawsers to the bollards or other fixtures provided for the purpose to check the speed of the vessel and to stop it as soon as it has gone far enough to permit the lock gate behind it to be closed, and each line, cable, or hawser shall be attended on board while passing into the lock by one or more of the vessel's crew. Where vessels are so long that in order to get them wholly within the lock it is necessary to approach within 150 feet of the lock gate ahead, the speed of the vessel must be slow and fully under control by the lines, cables, or hawsers. Steam vessels of more than 100 tons gross, not including towboats, will not be permitted to turn their propellers on entering the lock after the bow of the vessel has entered, but will be drawn in by means of capstans on the lock walls or otherwise, and their speed must be checked and the vessel stopped by lines, cables, or hawsers as in other cases. All steam vessels may leave the lock under their own power. The master or person in charge of a vessel shall arrange to have any line, cable, or hawser handed or thrown from the lock walls by the superintendent or his assistants, made fast on the vessel as requested or directed, so that in cases of emergency such line, cable, or hawser may also be used to check the speed of and stop the vessel.

(h) When a vessel is in position in the lock it shall be securely fastened in a manner satisfactory to the superintendent, or his assistant in charge of the lock at the time, to prevent the vessel from moving about while the lock is being filled or emptied, and the lines, cables, and hawsers used for this purpose shall be attended as far as is necessary or required while the filling or emptying is in progress.

(i) No vessel which has iron or irons projecting from it or lumber or other cargo projecting over its sides shall enter the lock, except at such time and with such precautions to prevent damage to the lock or its appurtenances as the superintendent, or the assistant in charge of the lock at the time, may require.

(j) All persons, whether in charge of vessels or not, are prohibited from willfully or carelessly damaging the lock, any of its appurtenances or the grounds adjacent thereto, and from throwing any material of any kind into the lock. No line shall be attached to anything except the bollards and other fixtures provided for the purpose.

(k) Upon each passage through the lock, the master or clerk of a vessel shall make a statement of the kind and tonnage of the freight carried.

(l) No person shall cause or permit any vessel or boat of which he is in charge to remain in the lock or its approaches for a longer time than is necessary for the passage of the lock, unless he is especially permitted to do so by the superintendent or the assistant in charge of the lock at the time, and if such vessel or boat is, in the opinion of such superintendent or assistant, in a position to obstruct navigation it shall be removed at once as requested or directed by such superintendent or assistant.

(m) All registered merchant vessels shall pass through the lock in the order directed by the superintendent or the assistant in charge of the lock at the time. Unregistered craft will not be allowed to pass through the lock separately unless especially permitted by such superintendent or assistant.

(n) The lock shall be operated promptly for the passage of all vessels upon signal, excepting only in such cases as are specifically provided for in this section.

§ 207.20 *Cape Cod Canal, Mass.; use, administration, and navigation.* These regulations follow the description of the canal in a later chapter.

CURRENTS.—The *Current Tables* should be consulted for specific information relative to times, directions, and velocities of the current at the numerous locations listed therein. They are revised annually to include the results of new observations as they become available.

Tidal current charts, described in Chapter 1, are available for Boston Harbor and Georges Bank.

Detailed results of extensive observations taken at about 50 lightship stations, many of which have been discontinued, along the Atlantic Coast of the United States are given in Coast and Geodetic Survey Special Publication No. 230, *Coastal Currents along the Atlantic Coast of the United States*. This publication is sold by the Superintendent of Documents, Washington 25, D. C.

Considerable current information, usually of a more general nature than that contained in the above-mentioned publications, appears under the name of the place to which it applies in this volume of the Coast Pilot.

The current movement is very nearly simultaneous throughout the offshore area of the Gulf of Maine. It is generally rotary in character, the direction of flow changing continuously in a clockwise movement with no period of slack water.

The maximum flood sets northward or northwestward, depending upon the locality, about 2 hours after the time of maximum flood at Pollock Rip Channel. The maximum ebb sets southward or southeastward about 8 hours after maximum flood at Pollock Rip Channel. The minimum before flood sets westward or southwestward about 11 hours after maximum flood at Pollock Rip Channel, and the minimum before ebb sets eastward or northeastward about 5 hours after maximum flood at Pollock Rip Channel.

Over Georges Bank the velocity at strength varies from about 1 knot to 2 knots. The velocity of the minimum current which occurs midway between the times of strength is usually about one-half the velocity at strength.

The velocity and direction of the tidal current for each hour after maximum flood at Pollock Rip Channel are shown for a number of locations by means of current roses on Coast and Geodetic Survey Chart Numbers 70, 71, 1000, 1107, 3075, and 3076. Similar information in tabular form and daily predictions of the current in Pollock Rip Channel are contained in the *Atlantic Coast Current Tables*. More detailed current information for Georges Bank and the eastern approaches to Nantucket Sound is shown

on the tidal current charts for Georges Bank and vicinity contained in Coast and Geodetic Survey Special Publication No. 230, *Coastal Currents along the Atlantic Coast of the United States.*

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

Off Nova Scotia, outside the 50-fathom curve, the velocity at the time of strength is about 1½ knots; inside the 50-fathom curve the velocity is between 1½ and 2½ knots. The tidal currents offshore from Cape Sable are very uncertain, both in velocity and direction. It is reported that the tidal current on Browns Bank occasionally runs to the northeastward for 15 hours continuously with a velocity of 2 knots, while at other times the set is as strong to the southwestward.

In Grand Manan Channel the average velocity at strength of current is about 2½ knots. The currents set approximately parallel to the channel, the flood setting northeastward and the ebb southwestward. Daily predictions of the current in Grand Manan Channel are contained in the *Atlantic Coast Current Tables.*

At the entrance to the Bay of Fundy, 5 miles southeastward of Gannet Rock, the slacks and strengths occur at about the same time as corresponding phases of the current in Grand Manan Channel. The flood has an average velocity at strength of about 2½ knots and sets 040°. The ebb has an average velocity at strength of about 4 knots and sets 230°.

Along the axis of the Bay of Fundy from Grand Manan Island to Cape Spencer the slacks and strengths occur about ½ hour later than corresponding slacks and strengths in Grand Manan Channel. The average velocity at strength is from 1½ to 2 knots. The flood sets northeastward and the ebb southwestward.

Eastward of Mount Desert Island the tidal currents along the coast are stronger and more regular than those farther west. Between Mount Desert Island and Portland there is a westward resultant drift along the coast.

With easterly or southeasterly winds the currents have a tendency to set toward the shore.

At Portland Lightship the tidal current is weak, being on the average less than ¼ knot at time of strength, setting 335° on the flood and 140° on the ebb. Since the tidal current is weak, currents of 1 knot or more occur only with strong winds. The largest velocity likely to occur is about 1½ knots.

At Boston Lightship the tidal current is weak, averaging less than ¼ knot at strength. The velocity and direction of the current is, therefore, greatly influenced by the wind. The largest velocity likely to occur is about 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.*

Over Stellwagen Bank, and in the channel between it and Cape Cod, the flood current sets westward and the ebb northeastward to eastward. The velocity at strength increases from about ¼ knot at the northern end of the bank to over 1 knot at the southern end.

Along 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 5°.

WEATHER.—New England and adjacent waters are in an area of cool summers and cold winters. The frequent passage of LOWS from the interior of the continent over this region causes variable weather, frequent changes of air mass, occasional gales, and a rather even distribution of precipitation throughout the year. Winds are predominantly from northwest in winter and southwest in summer. Gales are most frequent from the northeast in winter, and from the south or southwest in summer. Fogs are most frequent in the summer.

Pressure and general circulation.—In summer this area is on the northwestern border of the North Atlantic HIGH. This pressure distribution accounts for the normally gentle southwest winds. In winter, the average pressure map shows this area on the southwestern edge of the Iceland LOW, and the predominant wind west and northwest. The average winter speed is 16 knots. Actually, the winter pressure is the most variable of anywhere in the United States. This area is a favorite path for the centers of LOWS moving into the North Atlantic.

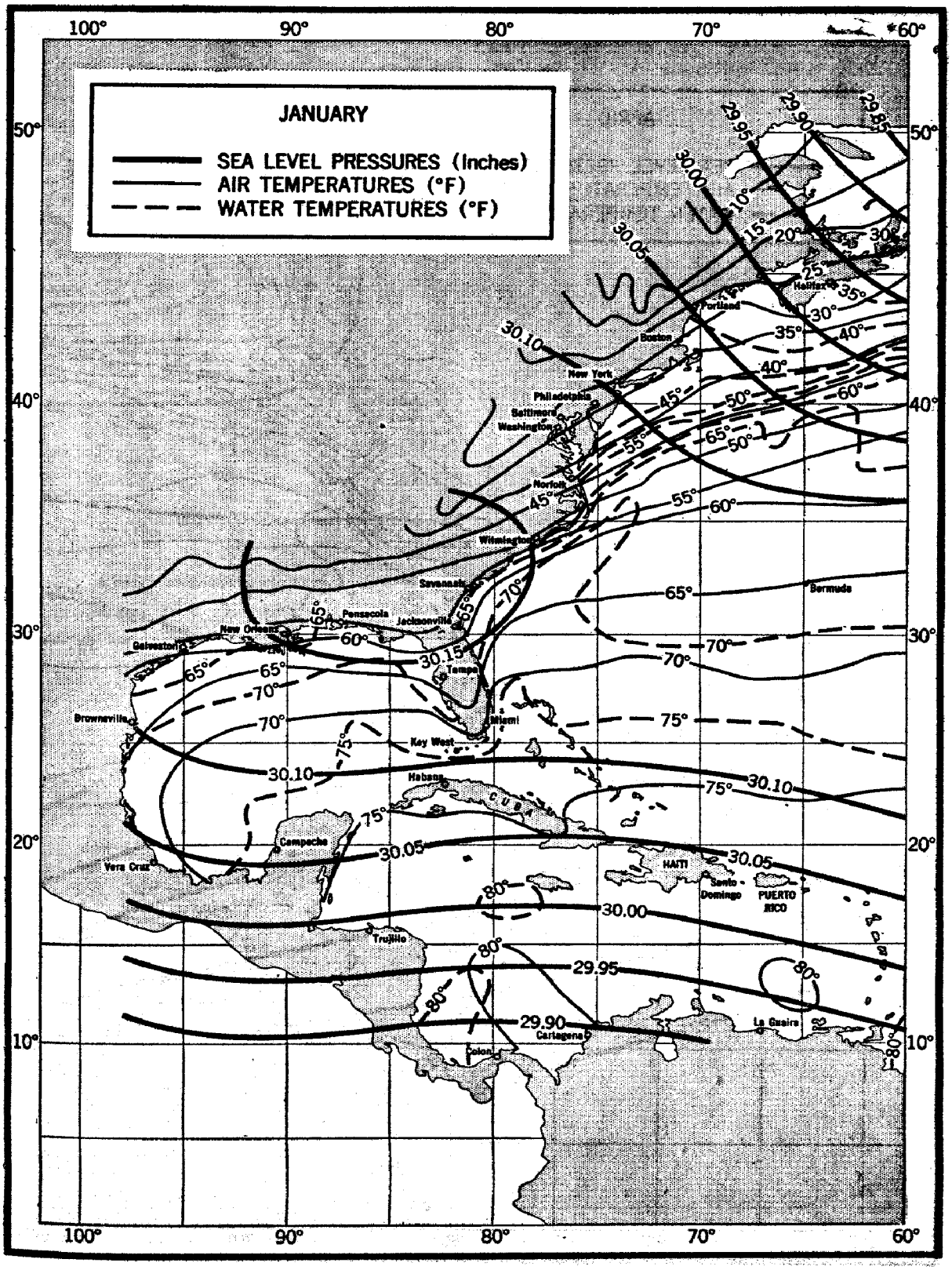
Winter winds over ocean square 40°–45° N., 65°–70° W. are not as variable as this storminess would seem to indicate. From 45 to 50 percent of the winds blow from the west and northwest, while only 10 to 13 percent blow from the east and southeast. Summer winds are lighter and steadier than winter winds.

The paths of nearly all LOW centers that leave the continent tend to converge toward the New England-Lower St. Lawrence Valley region. These LOWS frequently intensify on approaching the ocean, resulting in changeable and stormy weather in this area. Many storms on reaching this region have become occluded so that considerable cloudiness and dismal weather accompany their passage. The fact that so many of the frontal systems are occluded when they pass over this area accounts for the prevalence of northwest winds in winter even though LOWS pass frequently.

Hurricanes occasionally reach this coast. The notable one of September 14–15, 1944, moved northward along the New England coast with great violence. The center of this hurricane followed the coastline covered by this Pilot closely, moving at some 30 to 40 miles per hour. Over the water there were wind velocities over 80 miles per hour, and over the land area velocities up to 65 miles per hour. Examples of maximum (5-minute) velocities were: North Truro, 65 E; Boston, 60 NE; Rockport, 70 E; Portland, 40 NE; and Eastport, 39. The lightship *Vineyard* dragged from her station and sank about two miles to the northward. There were some 40 deaths in New England and several million dollars damage to marine and land property but Weather Bureau warnings allowed time for preparations that saved many lives and much property that would otherwise have been destroyed. A general discussion of hurricanes is given in a later section.

LOWS are much more frequent in winter than in summer. The tracks are more regular in winter, which indicates more rapid and consistent movement at this season. The weather may change quickly and the barometer rise or fall considerably in a short time as with the passage of a front or the approach of a LOW center. In summer the LOWS are less frequent, less well developed, and more listless in their advance than in winter.

Climate of the water areas.—Cold water from the north is found between the coast and the warmer Gulf current to the east. Near the coast, therefore, water temperatures are lower than air temperatures in summer. In winter, however, water temperatures are higher than air temperatures. This combination favors land fogs in the winter time and sea fogs in the summer.


JANUARY
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
Halifax
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Pensacola
Jacksonville
New Orleans
Galveston
Tampa
Miami
Key West
Brownsville
Havana
CUBA
Campeche
Vera Cruz
HAITI
Santo Domingo
PUERTO RICO
Trujillo
Cartagena
Colon
La Guaira
Bermuda
29.85
29.90
29.95
30.00
30.05
30.10
30.15
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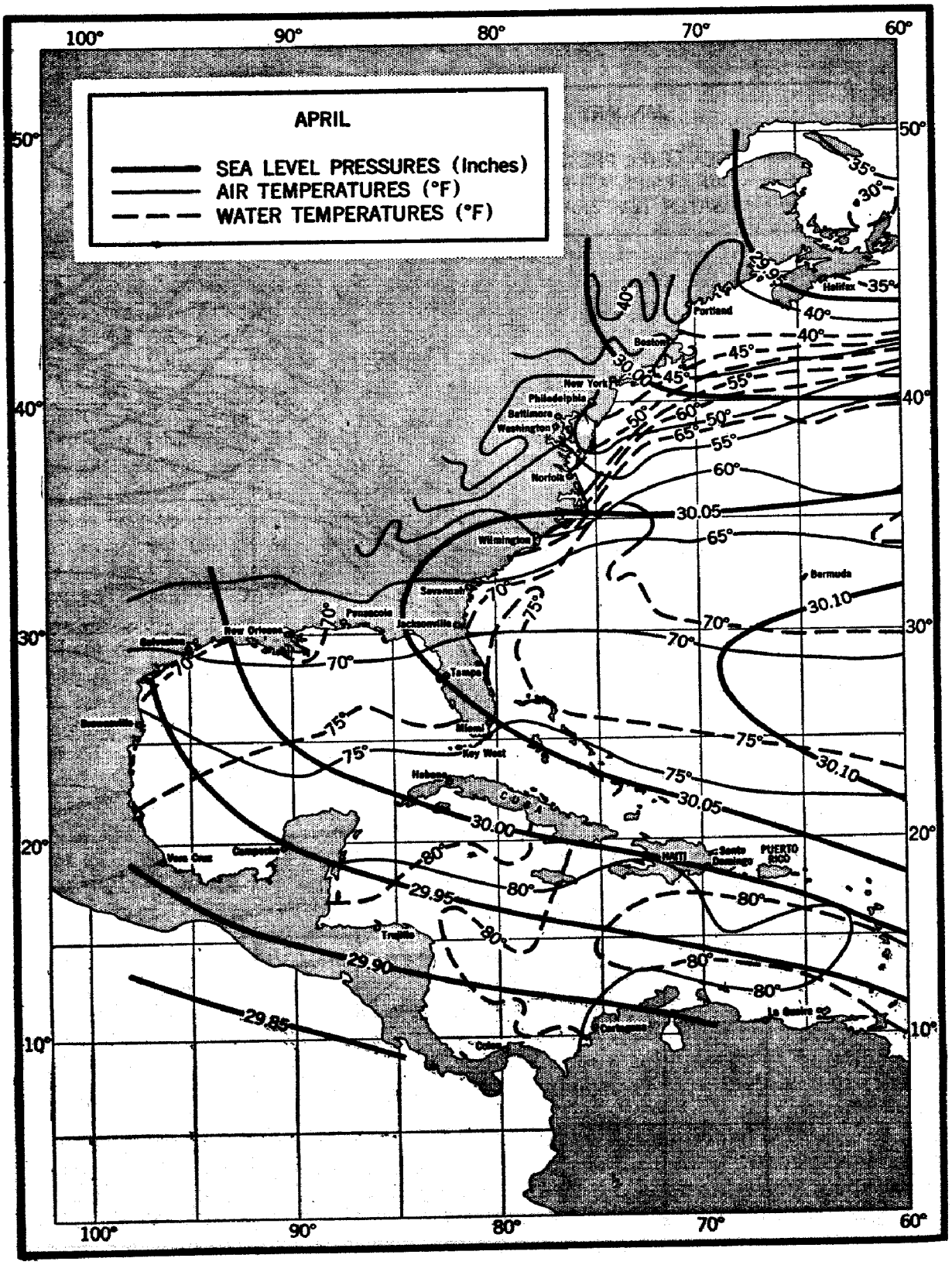
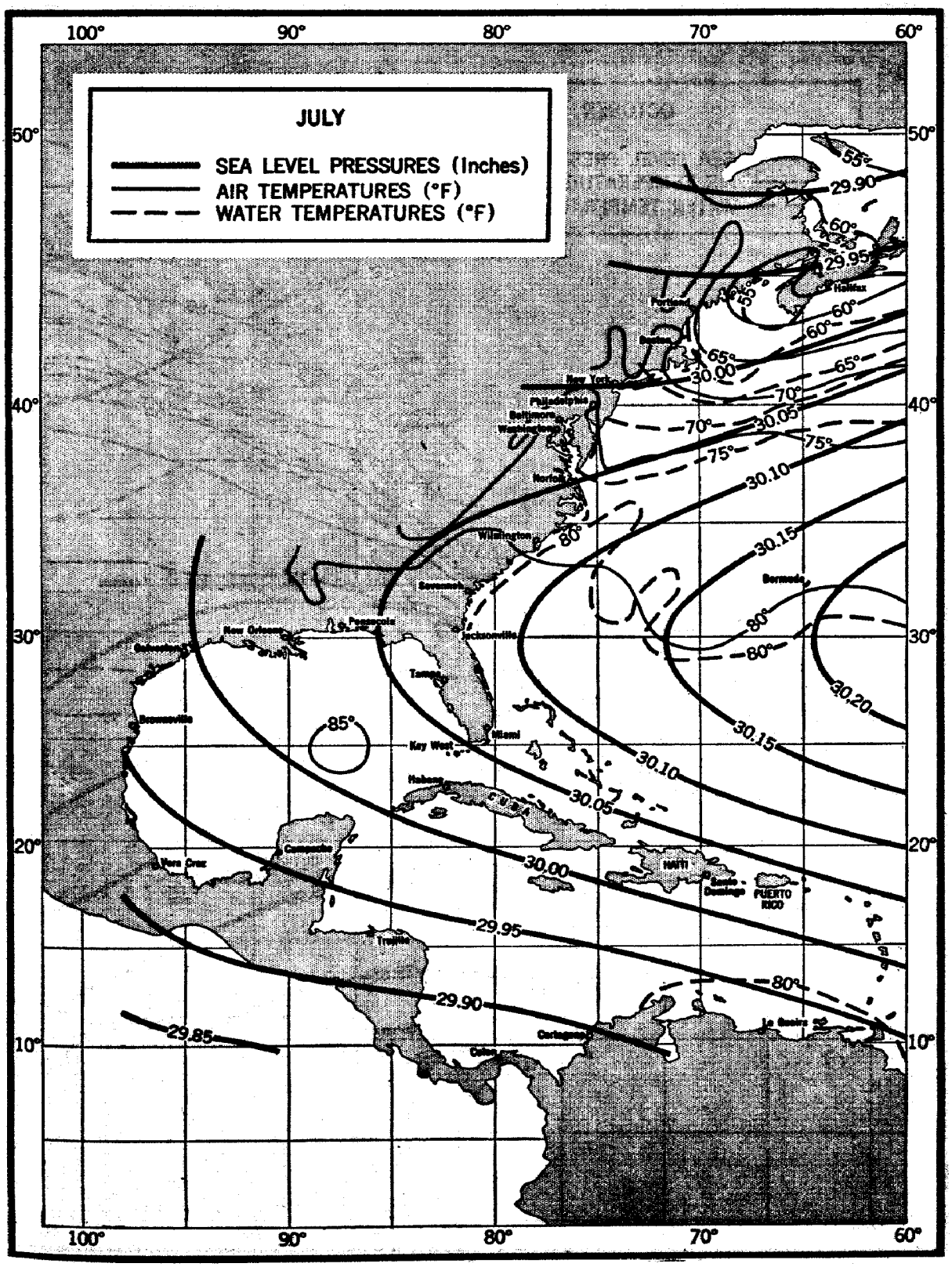
60°
65°
70°
75°
80°


APRIL
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
Halifax
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Pensacola
Jacksonville
New Orleans
Tampa
Miami
Key West
Havana
Bermuda
Veracruz
Campeche
HAITI
Santo Domingo
PUERTO RICO
Trujillo
Cartagena
Colon
30.05
30.10
30.00
29.95
29.90
29.85


JULY
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
29.85
29.90
29.95
30.00
30.05
30.10
30.15
30.20
55°
60°
65°
70°
75°
80°
85°
Halifax
Portland
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Jacksonville
Pensacola
New Orleans
Galveston
Tampa
Miami
Key West
Havana
CUBA
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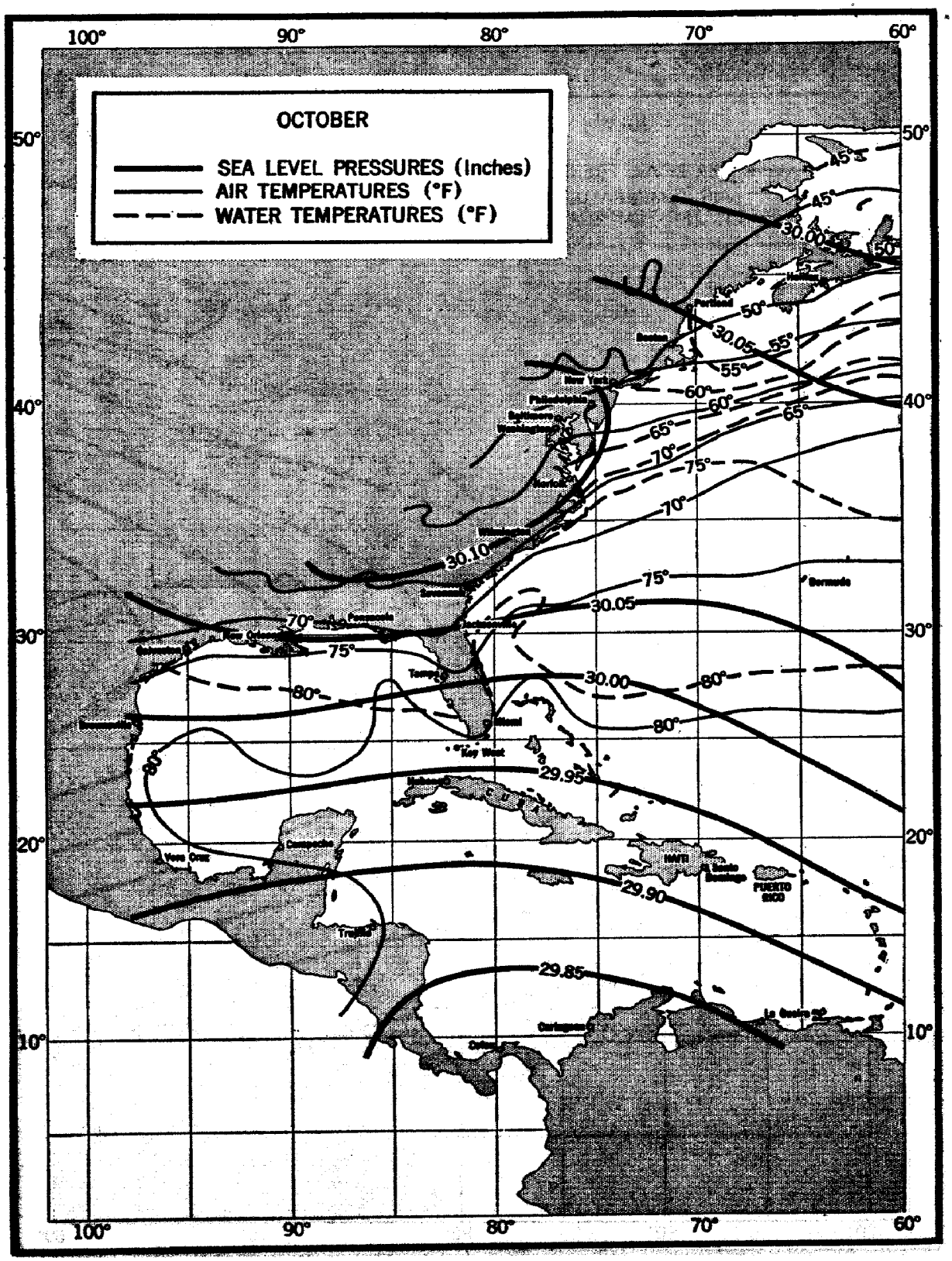
HAITI
Santo Domingo
PUERTO RICO


OCTOBER
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
45°
50°
55°
60°
65°
70°
75°
80°
30.00
30.05
30.10
29.95
29.90
29.85
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Jacksonville
Pensacola
New Orleans
Galveston
Tampa
Miami
Key West
Bermuda
Brownsville
Campeche
Vera Cruz
Trujillo
Cartagena
Colon
La Guaira
HAITI
Santo Domingo
PUERTO RICO

Wind Force and State of Sea Surface with Specifications and Equivalents

Beaufort No.	Description of wind	Sea area: State of sea surface	Sea area: Description of sea	Sea area: Scale	Specifications for use on land	Nautical miles per hour	Terms used in U. S. Weather Bureau forecasts
0	Calm	Sea like a mirror—smooth	Glassy-calm	0	Calm; smoke rises vertically	Less than 1	Light.
1	Light air	Ripples with the appearance of scales are formed but without foam crests.	Rippled	1	Direction of wind shown by smoke drift, but not by wind vanes	1 to 3	
2	Light breeze	Small wavelets, still short but more pronounced. Crests have a glassy appearance and do not break.	Smooth	2	Wind felt on face; leaves rustle; ordinary vane moved by wind.	4 to 6	
3	Gentle breeze	Large wavelets; crests begin to break; foam is not white but of glassy appearance, perhaps scattered whitecaps.		3	Leaves and small twigs in constant motion; wind extends light flag.	7 to 10	Gentle.
4	Moderate breeze	Small waves, becoming longer; fairly frequent whitecaps.	Slight	4	Raise dust and loose paper; small branches are moved.	11 to 16	Moderate.
5	Fresh breeze	Moderate waves, taking a more pronounced long form; many whitecaps are formed. (Chance of some spray.)	Moderate	5	Small trees in leaf begin to sway; crested wavelets form on inland waters.	17 to 21	Fresh.
6	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere. (Probably some spray.)	Rough	6	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.	22 to 27	Strong.
7	Moderate gale (high wind)	Sea piles up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.	Very rough	7	Whole trees in motion; inconvenience felt in walking against wind.	28 to 33	
8	Fresh gale	Moderately high waves of greater length; edges of crest begin to break into the spindrift. The foam is blown in well-marked streaks along the direction of the wind.	High	8	Breaks twigs off trees; generally impedes progress.	34 to 40	Gale.
9	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Sea begins to "roll." Spray may affect visibility.		9	Slight structural damage occurs (chimney pots and slate removed).	41 to 47	
10	Whole gale (heavy gale).	Very high waves with long overhanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea takes a white appearance. The rolling of the sea becomes heavy and shock-like. Visibility affected.	Very high	10	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	48 to 55	Whole gale.
11	Storm	Exceptionally high waves (small and medium-sized ships might be for a time lost to view behind the waves). The sea is completely covered with long white patches of foam along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	Phenomenal [1]	11	Very rarely experienced; accompanied by widespread damage.	55 to 65	
12	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.		12		Above 65	Hurricane.

[1] As might exist at the center of a hurricane.

Tidal stirring in summer keeps the water along the coast relatively cold, particularly so when an offshore wind drives the warmer surface water out to sea.

In winter winds are predominantly from the cold interior of the continent so that air temperatures are apt to be lower as one approaches land. In summer, on the contrary, winds are predominantly from the south or southwest and are warmer than the water and thus favorable for the formation of fogs.

When there is insufficient wind in summer to keep the air stirred up, the air next to the cold water forms a cold, or dense, layer or cushion of varying thickness. It is possible for the land to be sweltering while sailors need sweaters. An experience illustrating this is related by Dr. C. F. Brooks of Blue Hill Observatory, Milton, Massachusetts:

"On July 5, 1935, the hottest day in the history of the Weather Bureau at Portland, Maine, with 94° F. Maximum, Mr. Roger Duncan in a small sailboat only 5 miles offshore reported cold weather, with a moderate southwest wind. The wind was weaker than ashore—another effect of the cushion. In York Harbor early that evening the sailboat entered the hot air. Yet the contrast was so sharp that it was hot only from the waist up, and one's hands hanging down were chilled by the cold air. The cold layer was about 4 feet thick. There was no mixture of fog, so dry was the land wind. The interface between warm and cold air had an undulatory motion, so that surprisingly fluctuating looming occurred. With shore and islands dancing around and lengthening and contracting vertically, accordion fashion, Mr. Duncan said it was difficult to pick up buoys marking the harbor entrance."

This layer of cold air may be so shallow that sailing vessels find their mast extending into the warmer air. It is possible to have one direction of wind in the mainsail and another in the topsail. This is most apt to occur on warm days when the general wind is offshore and the cold air moves landward.

When the wind is from a southerly quarter and brings warm, moist air into contact with the cold water, fog forms. These fogs are often dense. They may be localized, however, occurring first where the water is coldest. Passages between islands leading into embayments have strong tidal currents which keep the water well mixed and colder on the surface. These channels are foggier than other waters, the effect being so pronounced in some cases that only the middle portions of the channel are foggy.

In the winter months 60 percent of the observations record winds from west, northwest, or north while in summer 50 percent or more are from the quadrant south, southwest, or west. The months of most variable winds are April, September, and October. The average wind speed also varies seasonally, being highest, about 16 knots, in winter, and lowest, about 8 knots, in summer.

An analysis of the wind record at shore stations shows that highest average speeds occur with south or southwest winds from May through September, and with northeast winds in all other months.

Thunderstorms are relatively infrequent over the water area, being reported in only one percent of the observations of the months June through October, while at land stations they occur on 3 to 5 days per month during the summer. Thundersqualls tend to decrease in intensity as they become distant from the land, the cold water counteracting the convection necessary for their existence.

Climate of the land areas.—In January, land temperatures average from 21° F. at Eastport to 28° F. at Boston. In July, temperatures average from 72° F. at Boston,

where 104° F. is the highest recorded in 78 years, to 60° F. at Eastport, where 93° F. is the highest in 74 years of record.

Precipitation is evenly distributed throughout the year, being ordinarily between 3 and 4 inches a month.

Thunderstorms occur almost entirely in the summer half of the year, there being an average of 15 to 20 days with thunderstorms per year. Fog occurs in all months but is most frequent in winter. A large portion, though not all, winter precipitation falls as snow.

Gales.—Gales may occur in any month but are most frequent from October through April. They are by far most frequent from NNE to ENE, the next most frequent direction is W to NW. The percentage of observations reporting gales ranges from none in June and July to 9 in February. Percentages in other months are: November, 5; December, 7; January, 8; March, 6.

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.

The frequency of fog over the land and ocean is in opposite phase—the maximum of land fogs occur in winter, the maximum of ocean fogs in summer. Most summer fogs are those that form over the ocean when warm, moist air from the southwest is chilled by the cold water. In winter only 2 to 3 percent of observations over water indicate fog, while in summer some 20 percent of the observations note fog. This is accounted for by the increased frequenty of south and southwest winds in summer. In winter, although fogs are infrequent, 69 percent occur with winds from the quarter south to west. In spring, the second most foggy season, 57 percent of fogs are accompanied by winds from the south, southwest, or west. In June, July, and August, the foggiest months, 61 percent of fogs occur with winds from this quarter. In autumn, when only 5 percent of observations indicate fog, half of the observations with fog have wind from the quarter south to west, but 13 percent of fogs occur with calms.

The force of the wind with fog varies with the season as would be expected; the highest winds in winter, the lowest in summer and autumn. Winter fogs occur with wind force 1–3 in 51 percent of the observations, force 4–7 in 48 percent of observations, and force 8–12 in 9 percent of observations. By contrast, summer and autumn fogs have 73 to 75 percent of observations with winds force 1–3, only 13 percent with winds force 4–7, and rarely any with force 8 or higher.

Clouds and precipitation.—The area is rather cloudy all year; summer averages about 0.5 of sky cover, winter 0.6. Precipitation most frequently accompanies the passage of frontal systems although there are some "passing showers" in the summer.

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.

HURRICANES.—Severe tropical cyclones of the North Atlantic Ocean are usually called West Indian Hurricanes, but actually many of these storms form, move and die far out from the mainland and hundreds of miles from the West Indies. The storm field advances in a straight or curved track, sometimes with considerable speed, at other times at a much slower rate. The areas of the individual storms vary from less than 100 to more than 500 miles in width, with a comparatively calm center. Centers ranging from 4 to 22 miles across have been observed. This center is a region of lowest atmospheric pressure around which winds blow in a more or less circular course, spiraling inward in a counterclockwise direction. The wind at the outer edge of the storm area is light to moderate and gusty, and it often increases toward the center to speeds too high for instrument recording. Although the air movement inside the center or *eye* of the hurricane is usually light and fitful, the seas in this area are in most cases very heavy and confused, rendered so by the shifting violent winds which surround it. Furthermore, after the center has passed a vessel, she may expect a sharp renewal of the gales, but blowing now from a different and more or less opposite direction. The fully developed tropical cyclone, encompassing many tens of thousands of square miles, is perhaps the most destructive of all storms.

Tropical cyclones occur over all the tropical oceans except the South Atlantic. They form in or near the region of *doldrums*, or light to calm wind movements near the Equator. In the North Atlantic, hurricanes form over a wide range of ocean between the Cape Verde Islands and the Windward Islands, over the western part of the Caribbean Sea, and over the Gulf of Mexico. While some may move northward in the beginning, especially those that form southeast of Bermuda, the majority take a westerly to northwesterly course. Of these, some curve gradually northward, either east of or above the larger islands of the West Indies, then turn northeastward or eastward near to

or at some distance from the Atlantic Coast of the United States. Others pass over or to the south of the greater islands and enter the Gulf of Mexico, then curve northward or northeastward and strike some part of the east Gulf Coast, or else continue westward and strike the west Gulf Coast. The most common path is curved, the young storms moving generally in a westward direction at first, turning later to the northwestward and then to the northeastward. A considerable number of hurricanes, however, remain in low latitudes and do not turn appreciably to the northward. Freak movements are not uncommon, and there have been storms describing loops, hairpin-curved paths, and other irregular patterns. Movement toward the southeast is rare in the West Indian region, and when it does occur it is of short duration. The entire Caribbean area, the Gulf of Mexico, the coastal regions bordering these bodies of water, and the Atlantic Coast are in danger of disturbances during the hurricane season.

Hurricanes Which Have Passed Over This Region Since 1900.

Year	*Dates*	*Year*	*Dates*
1902	June 11–20	1934	June 4–21
1902	June 19–July 1	1934	September 5–9
1903	September 13–17	1936	September 8–26
1904	September 8–16	1936	September 25–October 1
1911	August 24–30	1938	September 16–22
1912	September 11–23	1938	October 23–24
1915	July 31–August 5	1940	August 30–September 3
1916	July 12–22	1944	July 13–19
1920	September 27–October 1	1944	July 31–August 4
1923	October 14–19	1944	October 13–21
1924	August 16–27	1945	June 20–27
1927	August 19–27	1945	September 12–19
1932	September 9–17	1949	August 24–29
1933	September 10–16		

Note: The dates give the full duration of the hurricane. The hurricane usually passes the Cape Cod to Sandy Hook region near the end of the dates given.

The hurricane season generally begins in June and closes with November. The months of greatest frequency, are August, September, and October. Hurricanes are most likely to be severe during August, September, and October. During all the months of the season, however, the chance of encountering an intense storm is great enough to warrant a careful watch of the weather elements in these waters. The table shows the number of tropical storms that have been recorded in North Atlantic waters during the 50-year period 1900–49, according to records of the United States Weather Bureau. The June hurricanes which form in the West Indian region usually move in a direction between west and north while they are south of 25° North Latitude. In late September, October, and November, hurricanes of this region are more likely to move in a direction between north and east, passing through the Yucatan Channel, or over Cuba, Florida, or the Bahamas. Of the hurricanes that come from the Atlantic into the West Indies, the majority occur in August and September, and move on a west-northwesterly course

in low latitudes, reaching the coast before curving toward the north and northeast. Late in the season, October or November, the movement of hurricanes that form east of the West Indies is often toward the north in the open Atlantic. Paths of past hurricanes, selected as typical of the different months of the hurricane season, are to be found on the *Pilot Charts* of the *North Atlantic Ocean* and *Central American Waters*, published monthly by the United States Hydrographic Office.

The average speed of movement of West Indian Hurricanes is about 10 to 13 knots. This speed, however, varies considerably according to the location of the storm, its development and surrounding meteorological conditions. The highest rates of progression usually occur when the storm is moving northward or northeastward in the middle or higher latitudes.

Storm tides and the hurricane wave.—The winds on the right side of the center (looking forward along the hurricane's path) are blowing in the same direction as the hurricane is moving, and are felt with greater force at a point over which the hurricane moves than are winds in other parts of the hurricane. These winds drive the water forward and flood the coast in advance of the hurricane. The highest tide occurs to the right of the point where the hurricane center crosses the coast. These high tides or storm waves are one of the great dangers from the hurricane. A hurricane of large diameter generally creates higher tides on the coast than one of smaller diameter, and a slow moving hurricane may produce higher tides than one of rapid progress. In each case, the higher water is caused by the greater duration of the drive of the wind in the same direction. A tidal rise in water level may begin when the hurricane center is 500 or more miles distant, and will continue until the hurricane center moves inland. This rise is called the *hurricane tide*, and is superimposed on the normal gravitational tide. The rise is most pronounced in a partially enclosed body of water, such as the Gulf of Mexico, where the concave coastline does not readily permit the escape of water, which is thus piled up on the coastline. The strongest winds and greatest fetch being in the right quadrant, the strongest current therefore is directed along and to the right of the storm attach. Heights of *hurricane tides* near the centers of storms vary from 3 to 10 feet above mean sea level. On the Atlantic Coast the average is less, and on small islands, around which the current may flow easily, there is little or no tidal effect.

The *hurricane wave* itself, sometimes erroneously called a tidal wave, is the concerted lifting up of the level of the sea at or near the center of an intense hurricane. It usually is not a series of individual waves, but one big uplift of water, and is most noticeable in the calm center. It has been noticed in all areas where tropical storms occur. Hurricane waves occur as readily on small islands as on continental coastlines. This wave has been responsible for heavy losses of life, and precautions should always be taken against it, especially at and to the right of the point where the center will cross the coastline. The hurricane wave is superimposed upon the hurricane and gravitational tides prevailing at the time, but it usually subsides quickly, although the tidal effects may remain for some time. This wave has been ascribed to the decrease in atmospheric pressure, but even in the most severe hurricanes this would only permit a rise of approximately 5 feet, and the rise would be gradual. It now is thought, rather, that the wave is caused by the draining effect of the wind on the forward side of the calm center following against the current set up by a strong wind from the opposite direction on the rear side of the calm center. Waves of 30 feet or more in height have been reported, and instances of waves of 20 feet can be credited.

Showers have been commonly observed 300 to 500 miles in advance of a West Indian hurricane. As the storm moves somewhat nearer, there is likely to be a slight rise of the barometer as the weather clears. At the outer limits of the hurricane area itself, rainfall again is usually in the form of showers. As the center approaches further, the characteristic squalls of the hurricane begin; that is, the showers increase in frequency and intensity. Nearer the center, the rain is heavy to excessive, and continuous. Hurricane floods may do enormous damage in mountainous areas, and have resulted in high death tolls in such portions of some of the larger West Indian Islands.

Information regarding tropical cyclones by radio.—Modern developments in radio communication have made it possible for organized meteorological services to collect daily weather reports from island stations, from ships at sea, and from planes, and thus to locate tropical cyclones when they develop, and to issue warnings to shipping as to their intensities and probable movements. As a further aid, the mariner may secure weather reports direct by radio from other ships in the vicinity of the tropical cyclone. Although these radio weather reports and warnings have made it unnecessary in many instances for the navigator to depend entirely upon his own observations and knowledge in avoiding dangerous positions with respect to the storm center, it is still an essential of good seamanship that he understand the rules for ascertaining from his own observations the existence of a tropical cyclone and for locating its center. *Attention is directed to the heading hurricane seamanship at the end of this section.*

Rules for establishing the existence of a storm and locating its center.—During the season of tropical storms, any interruption in the diurnal cycle of the barometer should be considered an indication of a change of weather. The barometer is by no means an infallible guide for warnings much in advance, but after the beginning of a storm it will, more or less, indicate the rapidity of approach and distance from the center, and its indications should in no case be disregarded.

One of the earliest indications of the approach of a tropical storm is the appearance of the sky and general clearness of the atmosphere. These storms are said to be preceded by a day of unusual clearness, when distant objects, not ordinarily visible, stand out with great distinctness. The atmosphere at such times is more than usually oppressive.

These conditions are frequently accompanied by a high barometer. The barogram shows pressure variations at San Juan during the passage of the hurricane of September 13, 1928. The changes in pressure differ in detail for individual storms. Later, there may follow a restless oscillation or pumping of the mercury, related to the disturbed condition of the atmosphere. Then the sky becomes overcast and remains so, at first with a delicate tufted cirrus, *mares' tails*, which shows no disposition to clear away at sunset, but which later becomes gradually more and more dense until the *bar*, or dark mass of the true hurricane cloud, appears upon the horizon. From the main body of this cloud, portions are detached from time to time and drift across the sky, their progress marked by squalls of rain and wind of increasing force.

Rain, in fact, forms one of the more prominent features of the storm. In the outer portions, it is fine and mistlike, with occasional showers. These later increase in frequency and in copiousness. In the neighborhood of the center, rain falls in torrents. Usually the rain area extends farther in advance of the storm than in the rear.

When the sky first becomes overcast with the characteristic veil of cirrus, the storm

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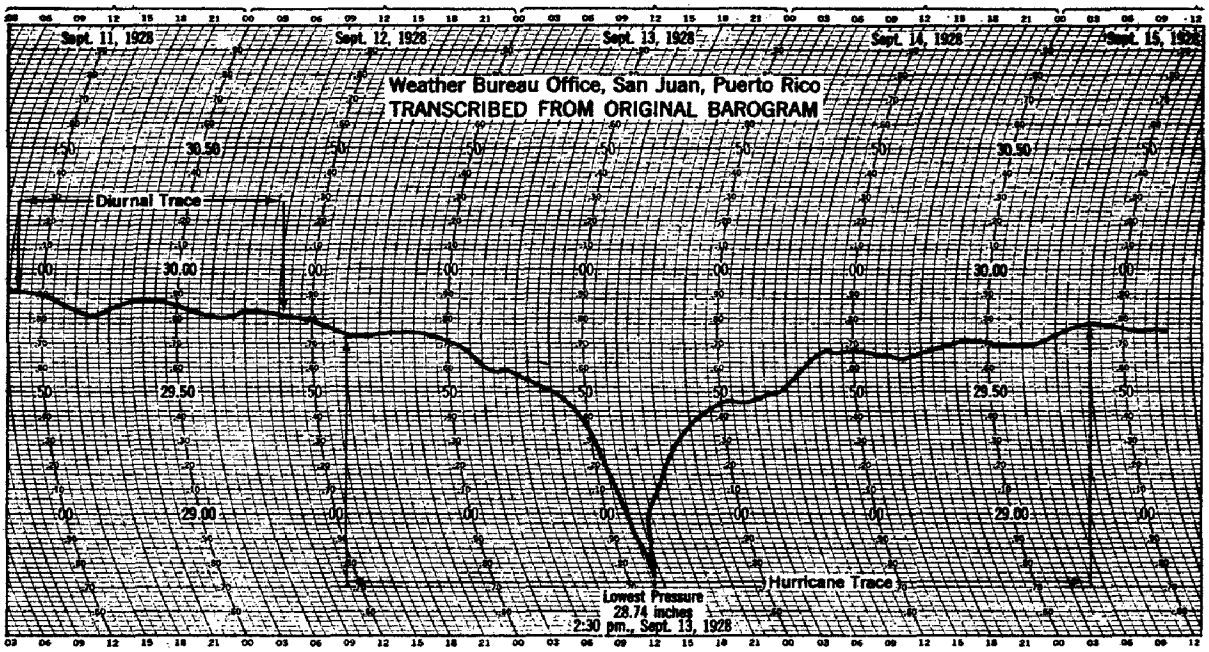


center most probably lies in the direction of greatest density of the cloud. It sometimes happens that the snow white fibrous mares' tails appear when the center is about 300 to 400 miles distant.

After the slight rise of the barometer as the storm first approaches, there follows a continuous fall. In front of the storm, if it is advancing from an easterly direction toward the observer, the winds blow from a northerly point (northeast, north, or northwest). If it is advancing from a southerly direction toward the observer, the winds blow from an easterly point (southeast, east, or northeast). In general, a high barometer (or restless pumping of the barometer), followed by an unusually long fall in pressure, when concurrent with other indications warns of the approach of a hurricane.

Surrounding the actual storm area is a territory of large extent throughout which the barometer reads a tenth of an inch or more below the average, the pressure diminishing toward the central area, but with no such rapidity as is noted within the area itself. Throughout the outer ring unsettled weather prevails. The sky is ordinarily covered with a light haze, which increases in density as the center of the storm approaches. Showers are frequent. Throughout the northern portion of this ring (in the Northern Hemisphere at moderately low latitudes) the wind rises to force 6 or 8—the *reinforced trades*—and is accompanied by squalls.

Storm swells.—A further indication of the approach of a hurricane is an unusually rough, increasing sea. Another usual early indication is the occurrence of a long, heavy swell. Noticeable at a considerable distance, sometimes 2 or 3 days in advance of the storm (300 to 800 miles), the early swell will not usually match the winds or local waves observed at the vessel. The direction of the swell, and the time between crests, depend on the force and fetch of the winds at the place where the swell was formed. The normal

frequency of swells in deep Atlantic waters is 8 per minute. Hurricanes set up swells with a greater wave length and period. Swell frequency is indicative of hurricane intensity. In severe storms the frequency decreases to 4 per minute. Swells will approach the observer from approximately the direction of the storm *at the time the swell was formed.*

The normal frequency of swells in the Gulf of Mexico is 12 to 15 crests per minute. This corresponds to a period of 12 to 15 seconds between crests. An approximate rule for deep water is that groups of swells travel at a speed in knots equal to 1½ times their period. Using the rule, these storm swells travel about 20 knots. The average movement of the tropical storms is about 10 knots. Storm swells therefore are useful in detecting storms at some distance. In the case of a storm which entered the Gulf 800 miles from an observer, he might notice the swell at the vessel about 40 hours before the storm arrived, under the conditions described above. Occasionally the swell warning may not extend well ahead of the storm, however. For instance, a storm, upon arriving in the Gulf, might set up a swell whose period was 12 seconds, and which therefore would travel at about 18 knots. If the storm itself traveled at about 15 knots, the swell would reach a vessel 540 miles away only 6 hours before the storm. Hence with a rapidly moving storm the swell may offer less of a warning, particularly in the Gulf of Mexico or at similar locations where land intervenes to prevent the arrival of the swell until the storm already is close to the vessel. In general, this warning is more effective in the case of large storms which advance slowly.

The height of the swells is also an indication of the storm's intensity, particularly when they have not encountered shallow water. Caution must be used in observing the direction of movement of swells from a coastal position, since the shallow water along the coast tends to turn the swell movement toward a direction at a right angle to the coastline (or at a right angle to the contour lines of a shoal portion of ocean floor).

Within the tropical cyclone, the winds turn to the left of the storm swell in the Northern Hemisphere. Waves do not deviate markedly from the wind in the absence of a cyclonic storm or other unusual weather condition.

If the swell comes always from the same direction, and increases, the hurricane may be following a direct path which will bring its center either toward the vessel, or near to her starboard side if she were to head into the swell. Should an observer facing the swell find that it comes in some time later from his left, the hurricane is likely to be following a path which will take its center to his left. Should an observer facing the swell find that it comes in some time later from his right, the hurricane is likely to be following a path which will take its center to his right.

The height of a swell decreases as the swell advances. An approximate rule for deep water is that swells lose one-third of their height each time they travel a distance in miles equal to their length (crest to crest) in feet. In terms of swell frequency, an approximate rule for deep water is that swells lose one-third of their height each time they travel a distance in miles equal to 5 times the square of their period (the number of seconds between successive crests).

A hurricane swell having 5 crests per minute would, then, lose one-third of its height each time it traveled about 700 miles (which travel would require only about a day for so long a swell—this point is discussed later under the heading *Compass bearing of the hurricane's center*). There is some indication that the period of the swell also increases as the swell advances, although at the present time this matter is controversial.

Should land intervene between the hurricane and the vessel, the early swell may be reduced, confused and unreliable as an indication of the hurricane's action.

As the storm center approaches, the barometer continues to fall. The wind increases in speed and blows in heavy squalls, and the changes in its direction become more rapid. The wind, in general, will back to the left during this time if the center is moving toward the observer's left, or veer to the right if toward his right as he faces into the wind. Rain in showers accompanies the squalls, and when the center comes closer the rain is usually continuous and is attended by furious gusts of wind. The air is thick with rain and spume drift. Objects at a short distance are often hardly visible. If a vessel is on the line of the hurricane's advance, the wind will remain from the same direction, or nearly so, until the center is close to the vessel, or upon her.

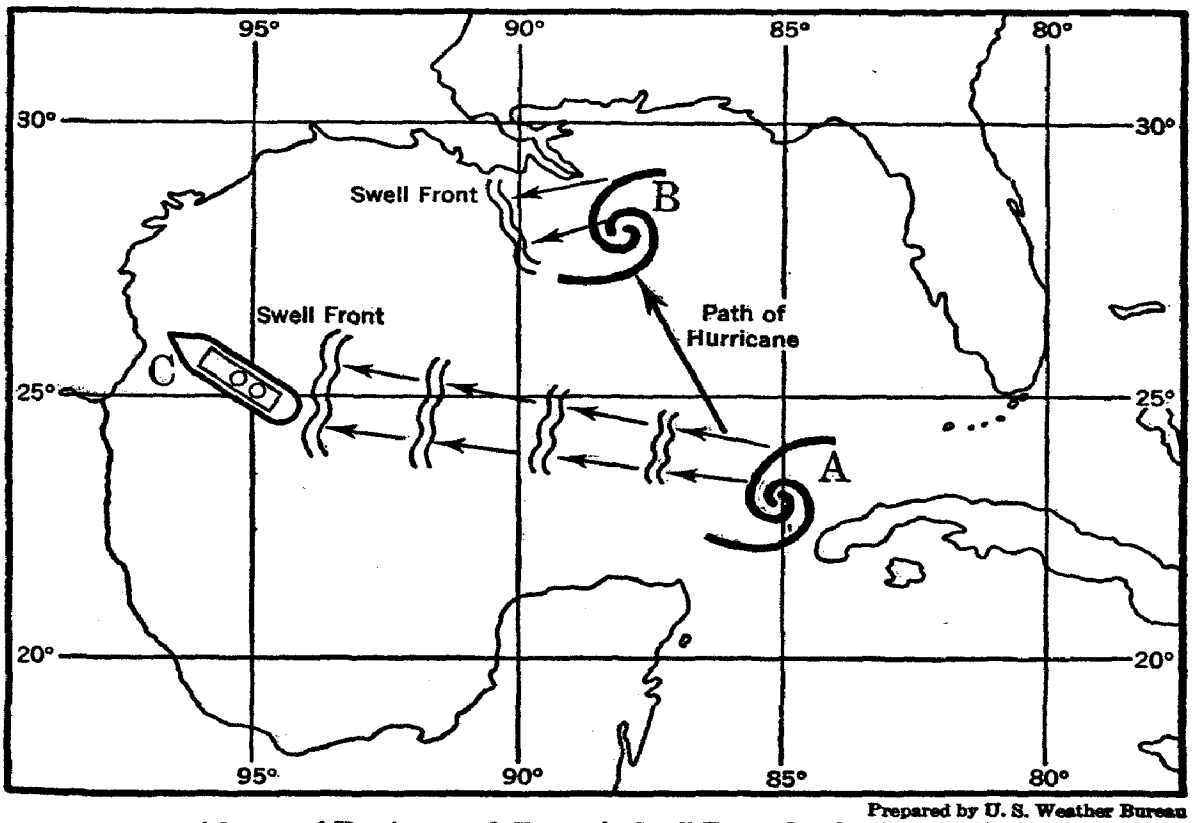
Distance of the hurricane's center.—The distance from the center of a hurricane can be estimated from a consideration of the height of the barometer and the rapidity of its fall, and the velocity of the wind and the rapidity of its changes in direction. If the barometer falls slowly and the wind increases gradually, it may reasonably be supposed that the center is distant. With a rapidly falling barometer and increasing winds, it may reasonably be supposed that the center is approaching dangerously near, the more so if the winds blow closely from the direction of the increasing swell. When clearly observed, these signs will be valuable supplements to the radio reports of the storm's bearing and location. Moreover, a hurricane, however closely studied, may change its path with little apparent warning. The following old table from Piddington's *Horn Book* may serve as a guide, but it can give only an imperfect estimate of the distance and too much reliance must not be placed upon it.

Average fall of barometer per hour	Distance in miles from center
From 0.02 to 0.06 inch	From 150 to 250.
From 0.06 to 0.08 inch	From 100 to 150.
From 0.08 to 0.12 inch	From 80 to 100.
From 0.12 to 0.15 inch	From 50 to 80.

Compass bearing of the hurricane's center.—If an observer faces into the wind, the storm center is likely to be located 8 to 12 points to his right in the Northern Hemisphere. When the storm is distant, it may be 10 to 12 points, and when the barometer has fallen 5 or 6 tenths of an inch it may be nearer to 8 points. Two or more observations, apart in point of distance, would aid in estimating the location of the center, and two or more observations, apart in point of time, will aid in estimating the movement of the center.

In estimating the direction of the hurricane from a consideration of swell indications, the swell's travel time must be taken into account. The direction from which the swell comes can indicate only the position of the storm at the time when the swell was generated. The speed of movement of a group of deep water swells, in knots, is roughly 1½ times the number of seconds between successive crests. Thus a normal group of swells having 12 to 15 crests per minute in the Gulf of Mexico would advance about 7 knots. A group of hurricane swells having 4 to 5 crests per minute would advance at about 20 knots. The swell's travel time, in hours, is about two-thirds of the estimated distance of the storm, in nautical miles, divided by the number of seconds

between successive crests. Actually, the individual wave is believed to travel with twice the speed of the group of swells but the group speed governs the speed of advance of the *swell front*; see diagram. The direction of the storm, and its distance, both are estimated for the time when the swell was formed. If a swell is believed to have left the storm 36 hours before arriving at the vessel, then the direction from which the swell arrives reveals only the probable direction of the hurricane 36 hours previously.



Prepared by U. S. Weather Bureau

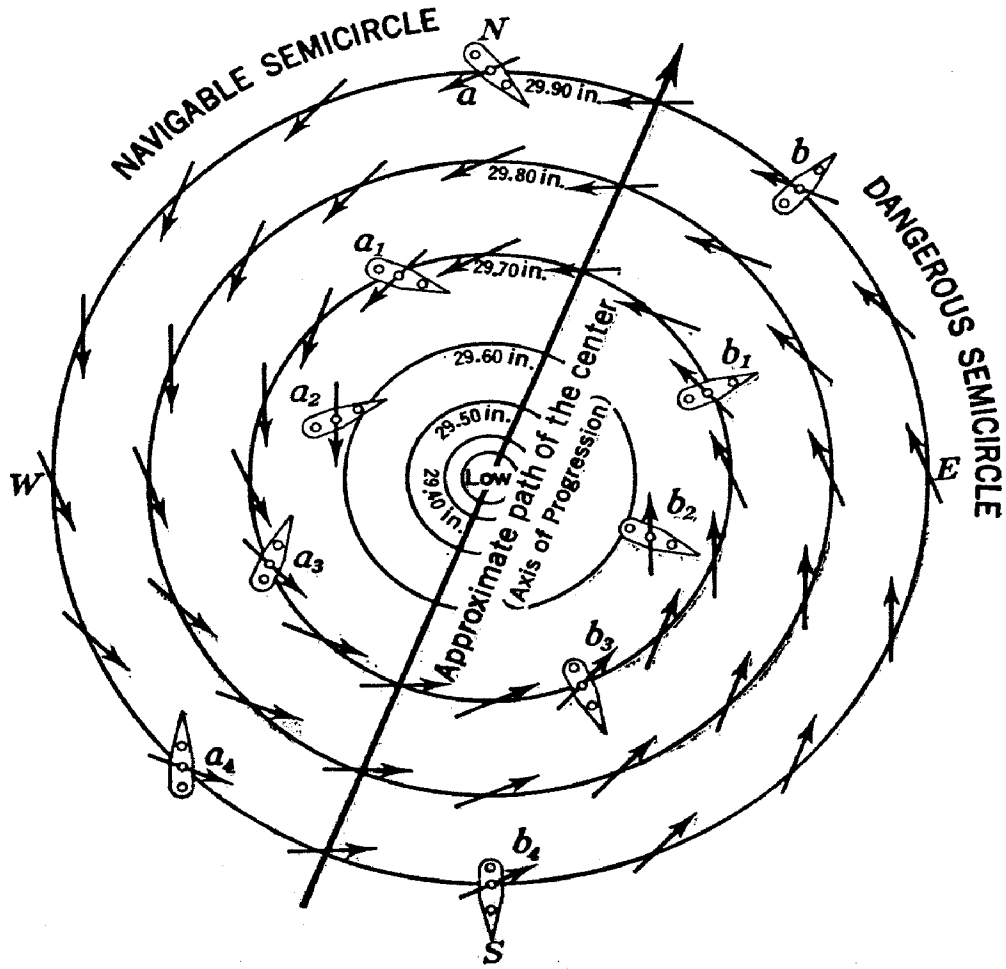
Advance of Hurricane and Change in Swell Front; By the time swell front A reaches vessel at C, hurricane has traveled to B.

High cirrus clouds associated with a tropical cyclone move with the general air stream in which the storm is embedded. Since these clouds usually extend a considerable distance ahead of the storm center, especially in the direction of the front right quadrant, the direction of movement of the cirrus is often significant. This is especially so when a change is observed in the direction of movement of these very high clouds, indicating a corresponding change in the direction of movement of the storm. If the cirrus clouds move very slowly, however, the hurricane will tend to move at a small angle (generally less than 20°) to the right of the movement of the cirrus clouds. Moreover, very young storms may fail to follow the path of the cirrus clouds.

Practical rules.—When there are indications of a hurricane, vessels should remain in port or seek one if possible, taking every precaution to avert damage by striking light spars, strengthening moorings and, if a steamer, preparing steam to assist the moorings.

In stormward ports, including the ports of the southern States, hurricanes are generally accompanied by very high tides, especially in the front right quadrant. Vessels may be endangered by overriding the wharf where moored, if the position is at all exposed. In a few other bays, especially facing from the storm on larger coasts, and larger bays on islands, the water level may be lowered dangerously. Vessels unable to reach a port and having sea room to maneuver usually observe the following rules:

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



HURRICANE DIAGRAM [NORTHERN HEMISPHERE]

To find in which semicircle the vessel is situated.—A line drawn through the center of a hurricane in the direction in which it is moving is called the storm track, or axis of progression. In the Northern Hemisphere, the semicircle on either side of the axis is

called, respectively, the right-hand or dangerous semicircle and the left-hand or navigable semicircle. In the *Hurricane Diagram,* vessels marked *a* are in the navigable semicircle and vessels marked *b* are in the dangerous semicircle.

If (while the vessel's position does not change) the wind veers to the right, the vessel will be in the dangerous semicircle; that is, in the right-hand semicircle with regard to the direction in which the storm is moving. If the wind backs to the left, the vessel will be in the left-hand or navigable semicircle. Should the wind not shift its direction, and the barometer continue to fall (assuming the vessel's position does not change between readings), the vessel is probably in the path of the storm. Should the ship be to the westward of the storm center in low latitudes, it may be assumed that the center will draw nearer more or less directly. It then becomes especially important to determine its path, and so learn whether the vessel is in the right or left semicircle of the storm area.

At this point it may be recalled that the winds in the dangerous semicircle are likely to be more severe than in the navigable semicircle. Furthermore, there is a distinct tendency for West Indian hurricanes to curve to the right. In the absence of good information, it would appear that the side of such a hurricane nearest the Equator would be the most likely to place a vessel within the navigable semicircle, especially in low latitudes (where young storms tend to move generally toward the west prior to curving), in the Caribbean during earlier months of the season, or in more eastern Atlantic waters during the later months. In the absence of good information, general considerations might suggest that a somewhat more westerly location with respect to the storm center would be more likely to place the vessel within the navigable semicircle at certain other times and places, especially in middle or higher latitudes.

Handling the ship within the storm area.—If, from the weather indications given above and such others as his experience has taught him, the navigator is led to believe in the approach of a storm, he should at once—

First. Determine the bearing of the center.
Second. Estimate its distance.
Third. Plot its apparent path.

The first two of these determinations will locate the approximate position of the center, which should be marked on the chart. The relation between the position of the ship and the position and prospective track of the center will indicate the proper course to pursue (1) to enable the vessel to keep out of, or to escape from, the dangerous semicircle and to avoid the center of the storm; (2) to enable the vessel to ride out the storm with the least danger if unable to escape from it.

In order to determine the path of the storm, and consequently in which semicircle the ship finds herself, it is necessary to wait until the wind shifts. When this occurs, plot a new position of the center 10 points to the right of the new direction of the wind as before, and the line joining these two positions will be the *probable* path of the storm. If the ship has not been stationary during the time between the two sets of observations (as is likely unless at anchor), allowance must be made for the course and distance she has traveled in the interim.

Two bearings of the center, at an interval of 2 to 3 hours, will in general be sufficient to estimate the course of the storm, provided an account is kept of the ship's way, but if the storm be moving slowly a longer interval will be necessary.

Should the wind not shift, but continue to blow steadily with increasing force, and with a falling barometer, it may be assumed that the vessel is on or near the storm track. Owing to the slow advance of storms in the Tropics, a vessel in low latitudes might come within the disturbed area by overtaking the center. In such a case a slight decrease in speed would probably suffice, but it should be borne in mind that the storm path is by no means constant either in speed or direction, and that it is particularly likely to curve away from the Equator.

A vessel hove-to in advance of a tropical cyclonic storm will experience a long heavy swell, a falling barometer with torrents of rain, and winds of steadily increasing force. The shifts of wind will depend upon the position of the vessel with respect to the track followed by the storm center. Immediately upon the track, the wind will hold steady in direction until passage of the central calm, the *eye of the storm,* after which the gale will renew itself, but from a direction different from that which it previously had. To the right of the track, or in the *right-hand semicircle* of the storm (the observer being supposed to face along the track), the winds, as the center advances and passes the vessel, will constantly shift *to the right.* The rate at which the successive shifts follow each other increases with proximity to the center. In this semicircle, then, in order that the wind shall draw aft with each shift and the vessel not be taken aback, a sailing vessel must be hove-to on the starboard tack. Similarly, in the *left-hand semicircle,* the winds will constantly shift *to the left.* Here a sailing vessel must be hove-to on the port tack so as not to be taken aback. These rules hold for all cyclonic storms north of about 5° or 8° North Latitude.

Since the wind circulates counterclockwise in the Northern Hemisphere, the rule in that hemisphere is to face into the wind and the storm center will be on the right hand. If the wind traveled in exact circles, the center would be 8 points to the right. However, the wind follows more or less a spiral path inward, which brings the center from 8 to 12 points to the right.

The number of points to the right may vary during the same storm. Since the wind usually shifts in squalls, its direction should be taken just after a squall.

The center will bear more nearly 8 points from the direction of the lower clouds than from that of the surface wind.

Ten points to the right (in north latitude) when facing into the wind is a good average allowance to make if in front of the storm, but a larger allowance should be made when in the rear. If very near the center the allowance should be reduced to 8 or 9 points in the front quadrants.

The direction of the storm center can be determined with fair accuracy if the vessel is definitely within the wind system of the cyclone. The direction of movement of the storm can be determined roughly from the change of the barometer and the shifts of the wind. It is helpful, in judging the probable course of West Indian hurricanes, to study the recorded paths of storms in different months as shown on the various *Pilot Charts,* since the places of origin and the area traversed vary with the season. For example, tropical storms originating in the western Caribbean Sea in June nearly always move northwestward into the Gulf of Mexico. In November storms originating in the same region usually move northeastward into the Atlantic.

With storms of varying area and different intensities, the lines of equal barometric pressure (isobars) lie much closer together in some cases than in others, so that it is

quite impossible more than to guess at the distance of the center from the height of the mercury or its rate of fall.

At the same time, storms travel at varying rates of speed. In the Tropics this ranges from 5 to 15 knots, generally decreasing as the storm track turns northward and curves, but increasing again as it passes well into the mid-latitudes of the North Atlantic, where hurricanes may travel as fast as 40 to 45 knots. Within the Tropics, the storm area usually is small, the region of violent winds seldom extending more than 150 miles from the center. The barometer, however, falls rapidly as one progresses from the circumference toward the center, a difference of more than 3 inches having been observed in this distance.

The winds accordingly blow with greater violence and are more symmetrically disposed around the center in the Tropics than in higher latitudes. After the storm has curved it gradually widens out and becomes less severe, and its own speed of travel increases as the speed of its winds becomes more moderate. Its center no longer is a well defined area of small size, marked by a patch of clear sky and near which the winds blow with the greatest violence. Out of the Tropics, the strongest winds often are found at some distance from the center.

The central area of calm, and perhaps blue sky, characteristic of tropical cyclones, is not found in well-developed storms which form outside of the Tropics. Sometimes there is found, in LOW's where the cyclonic circulation is but imperfectly developed, a region of relative calm and clear sky lying between the easterly winds to the front of the depression and the westerly winds in the rear. The phenomenon is not, however, analogous to the *eye* of the tropical cyclone. The *eye* appears to be caused by intensity of rotation, and to disappear when this has diminished sufficiently. Occasionally, a cyclone which formed in the Tropics will maintain its organization, including the calm center, until it reaches middle latitudes.

It must not be forgotten that the shifts of wind will occur in the order described above only when the vessel is stationary. When the course and speed are such as to maintain a constant relative bearing between the ship and storm center, there may be no shift of the wind. Should the vessel be outrunning the storm, the wind may shift in a direction opposite to that given, and a navigator in the right semicircle, for instance, should he judge only by the shifts of wind without taking his own run into account, might imagine himself on the opposite side. In such a case, the barometer must be the guide. If it falls, one is approaching the center. If it rises, one is receding.

An examination of the *Hurricane Diagram* shows how this is. A vessel hove-to at the position marked b, and being passed by the storm center, will occupy successive positions in regard to the center from b to b_4, and will experience shifts of wind, as shown by the arrows, from east through south to southwest. On the other hand, if the storm center be stationary or moving slowly, and a vessel be overtaking it along the line from b_4 to b, the wind will back from southwest to east, and is likely to convey an entirely wrong impression as to the location and movement of the center.

Hence it is recommended that a vessel suspecting the approach or proximity of a cyclonic storm should stop (if a sailing ship, heave-to on the starboard tack) for a while, until the path of the center is located by observing the shifts of the wind and the behavior of the barometer.

If the wind remains steady in direction and increases in force in heavy squalls

while the barometer falls rapidly, say, at a rate greater than 3 hundredths of an inch per hour, the vessel is probably on or near the track of the storm and in advance of the center.

In this position, with plenty of sea room, the proper course is to run with the wind well on the starboard quarter, if north of the Equator. The vessel thus will make her way into the navigable semicircle, and be most likely to increase her distance from the center. The wind will draw more forward as she recedes from the center, but the compass course first set should be adhered to until well clear.

The procedure is the same if the observations place the ship anywhere within the navigable semicircle.

The most critical situation is that of a vessel finding herself in the forward quadrant of the dangerous semicircle, particularly if at some distance from the center, where the wind shifts but slowly and the barometer indications are indecisive, both causes combining to render the bearing of the center obscure.

The general objective, however, of putting as much distance as possible between oneself and the storm center should be kept in mind.

With steamers this may not be difficult, although, should the storm be curving, the course first set may have to be altered later in order to continue to draw away.

A *sailing vessel* will be set by the wind directly toward the path of the storm and may become involved with the center without being able to avoid it. If so caught in the dangerous semicircle, a *sailing vessel* should haul by the wind on the starboard tack when in north latitude, keep coming up as the wind draws aft, and carry sail as long as the weather permits. If obliged to heave to, do so on the starboard tack when in north latitude.

This maneuver, while it may not carry the vessel clear of the storm track, will make the best of a bad situation.

A vessel so hove-to will find the shifts of wind drawing aft, enabling her to come up to them instead of being headed off, as would be the case on the other tack.

Moreover, since the sea changes its direction less rapidly than the wind, the vessel will come up more nearly head-on to the old sea, instead of having it more abeam as on the opposite tack.

A general rule for *sailing vessels* is always to heave-to on whichever tack permits the shifts of wind to draw aft.

The *Hurricane Diagram* (representing a cyclonic storm in the Northern Hemisphere after curving) illustrates these rules for *sailing vessels* graphically.

For simplicity the area of low barometer is made perfectly circular and the center is assumed to be 10 points to the right of the direction of the wind at all points within the disturbed area. Let us assume that the center is advancing about north-northeast, in the direction of the long arrow, shown in heavy full line. The ship a has the wind at east-northeast; she is to the left of the track, or in the navigable semicircle. The ship b has the wind at east-southeast, and is in the dangerous semicircle. As the storm advances these ships, if lying-to, a upon the port tack, b upon the starboard tack, as shown, take with regard to the storm center the successive positions a to a_4, and b to b_4. The wind of ship a shifts to the left, of ship b to the right, and in both cases draws aft. This diminishes the probability that either ship will be struck aback with possible serious damage to spars and rigging, a danger to which a vessel lying-to on the opposite tack constantly would be exposed, since the wind in the latter case constantly would

tend to draw forward. The ship *b* continually is beaten by the wind and sea toward the storm track. The ship *a* is drifted away from the track, and should she be able to carry sail would soon find better weather by running off to the westward.

Should *steamers* find it necessary to heave-to, the method of doing so must depend upon the position within the storm area.

A steamer is concerned more with the damage resulting from heavy seas than from wind. Furthermore, a steamer is not dependent for her course upon the direction of the wind, but is free to maneuver to keep away from the storm center, where the heaviest and most confused seas are found, unless other circumstances such as proximity to the land prevent this.

If unable to escape from the storm (and this can be done only in low latitudes or otherwise when the storm covers a comparatively limited area), the principal objective of a steamer is that of avoiding the center of the storm.

Referring to the *Hurricane Diagram*, it is obvious that in the Northern Hemisphere, if a steamer finding herself in the left-hand (*navigable*) semicircle at a or a_1 should obey the rule for sailing vessels and heave-to on the port tack, her head will lie toward the storm track and the greatest danger. On the other hand, under the same circumstances, if the steamer heaves-to on the starboard tack, her head will lie away from the storm track, and such headway as is made over the ground will all be in the direction of safety.

Following the same reasoning, a steamer in the Northern Hemisphere, caught in the right-hand (*dangerous*) semicircle at b or b_1 in the diagram and obliged to heave-to, should do so head to sea. In this case both the wind and sea are constantly beating her toward the storm track, and less leeway will be made when lying-to head to sea than in any other position.

Many steamers behave better when hove-to with the sea astern, or on the quarter, but the adoption of this method must depend upon the position of the vessel within the storm area. Referring again to the diagram, it will be seen that, in the Northern Hemisphere, a steamer may heave-to safely with the sea astern or on the starboard quarter if in the forward quadrant of the left-hand semicircle at position a or a_1. This course, however, should never be preferred when in the forward quadrant of the right-hand semicircle (position b or b_1) for the reason that any headway made over the ground would be, in all probability, toward the storm center where the high and confused seas would be likely to inflict damage.

If, in spite of all endeavors, the storm center should pass directly over a vessel, she will experience a short period of calm, but the seas will be high, confused and dangerous, being swept in from all directions. After a short interval the wind will burst with hurricane force from a point different from, but not necessarily opposite to, that from which it was blowing before. The vessel must be prepared to meet this wind, and to avoid being caught aback.

Rules for maneuvering.—The rules for maneuvering in the Northern Hemisphere, insofar as they may be generalized, are:

Right or dangerous semicircle.—Steamers: Bring the wind on the starboard bow, make as much way as possible, and if obliged to heave-to, do so head to sea. Sailing vessels: Keep close-hauled on the starboard tack, make as much way as possible, and if obliged to heave-to, do so on the starboard tack.

Left or navigable semicircle.—Steam and sailing vessels: Bring the wind on the

starboard quarter, note the course and hold it. If obliged to heave-to, steamers may do so stern to sea; sailing vessels on the port tack.

On the storm track in front of the center.—Steam and sailing vessels: Bring the wind 2 points on the starboard quarter, note the course and hold it, and run for the left semicircle. When in that semicircle, maneuver as above.

On the storm track in the rear of the center.—Avoid the center by the best practicable route, having due regard for the tendency of cyclones to curve to the northward and eastward.

In all cases, it is advisable to increase the vessel's distance from the center as soon as possible, keeping in mind that the whole storm field is advancing. If a vessel should find herself inside the relatively calm center, or *eye*, it should be realized that the gales will be renewed sharply from another quarter upon leaving the center, and that the new wind direction need not be directly opposite the old wind direction. When the storm center moves away, the barometer may be expected to rise, and the wind and sea to subside.

Importance of information by radio.—Since coastal vessels generally have radio facilities, the main value of the preceding discussion of hurricanes is that it may assist in understanding, and acting sensibly in the light of, radio reports, forecasts and advisory messages. Apparent lack of agreement between radio reports and local indications then becomes a signal for special caution and a close radio watch. Further information about radio reports will be found in Chapter 1 under the heading *Weather Broadcasts.*

Destruction by hurricane of aids to navigation.—Caution should be observed when navigating over an area recently visited by a hurricane. Lights and beacons are damaged or swept away in the storm, and high tides and floods may make familiar landmarks unrecognizable. Temporary markers and devices are usually placed as quickly as possible after the storm has passed, but these guides are not necessarily the same as those destroyed. Thus a signal may be placed near but not exactly at the place of the original one. A small light may replace a larger one, a buoy may be used or other expedient substitutes placed.

Hurricane seamanship.—This item is based on Instructions to the Pacific Fleet by Admiral Nimitz, February 13, 1945. The West Indian hurricane, the counterpart of the Western Pacific typhoon, may well be encountered anywhere in the Caribbean, Gulf of Mexico, and in much of the Western Atlantic. The same principles of seamanship are applicable to the more frequent and extensive, though less violent, North Atlantic extra-tropical storms.

Many fine ships, crews, and cargoes have been needlessly lost as the result of taking too little heed of unmistakable weather symptoms in sufficient time to enable the master to take evasive or preventive action.

A hundred years ago, a ship's survival depended almost solely on the competence of her master and on his constant alertness to every hint of change in the weather. To be taken aback or caught with full sail on by even a passing squall might mean the loss of spars or canvas; and to come close to the center of a genuine hurricane or typhoon was synonymous with disaster. While to be taken by surprise was thus serious, the facilities for avoiding it were meager. Each master was dependent wholly on himself for detecting the first symptoms of bad weather, for predicting its seriousness and movement, and for taking the appropriate measures to evade it if possible and to battle

through it if it passed near to him. There was no radio by which weather data could be collected from all over the oceans and the resulting forecast by expert meteorologists broadcasted to him while afloat on the high seas. There was no one to tell him that the time had now come to strike his light sails and spars, and snug her down under close reefs or storm trysails. His own barometer, the force and direction of the wind, and the appearance of sea and sky were all that he had for information. Ceaseless vigilance in watching and interpreting signs, plus a philosophy of taking no risk in which there was little to gain and much to be lost, was what enabled him to survive.

Seamen of the present day should be better at forecasting weather at sea, independently of the radio, than were their predecessors. The general laws of storms and the weather expectancy for all months of the year in all parts of the world are now more thoroughly understood, more completely cataloged, and more readily available in various publications. Weather and hurricanes are described above in this chapter. The Pilot Charts, available to all ships, give excellent information as to the probable incidence and movements of cyclonic storms.

A navigator is held culpable if he neglects "log, lead, and lookout" through placing blind faith in radio fixes. Likewise, a seaman is culpable if he regards personal weather estimates as obsolete and assumes that if no radio storm warning has been received then all is well, and no local weather signs need cause him concern.

Mariners are reminded to give full consideration to the adverse weather likely to be encountered in the West Indian hurricane area during the season. In this connection, masters should refresh themselves as to ship-handling in heavy weather. In order to know what outside weather reports are broadcast and what he should be getting, the mariner should be familiar with *Radio Weather Aids to Navigation* (H. O. 206).

Masters should be fully aware of the stability characteristics of their ships, particularly the effect of free-liquid surfaces upon stability.

Any, and possibly all, of the following conditions can be expected if the vessel is so poorly handled that she finds herself within the destructive area of a severe cyclonic storm.

1. Visibility reduced to 1,000 yards or less and sea becoming mountainous and nearly indescribable.
2. Ship not merely rolling, but heeled far over continually by the force of the wind, thus leaving very little margin for further rolling to leeward.
3. Ingress of water through ventilators and other topside openings.
4. Switchboards and electrical machinery shorted and drowned out and possible fires resulting from short circuits.
5. Free water over engineroom or fireroom floor plates and probably in other spaces.
6. Loss of steering control, failure of power and lighting, and stoppage of main engines. Loss of means of radio communication.
7. High winds and seas carrying away masts, funnels, boats, davits, and deck structures, and generally making it impossible for crew to secure gear adrift or to jettison deck cargo or top-side weights.
8. The storm "taking charge" and making impossible various evasive and security measures which might have been effective at an earlier stage.

An experienced and prudent seaman, analyzing the foregoing, will readily appreciate that a vessel so situated is indeed in dire circumstances. He will also realize that

it is now too late to prevent serious damage or actual foundering. At the same time, he will fail to understand why the vessel was allowed to continue until such dangerous conditions became unavoidable and the vessel placed in jeopardy.

It is emphasized that in bad weather, as in other situations, safety and fatal hazard are not separated by any sharp boundary line but shade gradually from one into the other. There is no "little red light" which is going to flash on and inform the master that from now on there is extreme danger from the weather and that measures for the ship's safety must now take precedence over further efforts to continue the voyage without delay or deviation. This time of decision will always be a matter of personal judgment. Naturally, no master is going to cut thin the margin between staying afloat and foundering, but he may nevertheless unwittingly pass the danger point even though his ship is not yet *in extremis*. A ship that keeps going as long as the severity of wind and sea has not yet come close to capsizing her or breaking her in two may nevertheless become helpless to avoid catastrophe later if things get worse. By then she may be unable to steer any heading but in the trough of the sea, or may have her steering gear, lighting, and main engines disabled, or may be helpless to secure or jettison deck cargo. The time for taking measures for a ship's safety is while still able to do so. Nothing is more dangerous than for a seaman to be grudging in taking precautions lest they turn out to have been unnecessary. Safety at sea for a thousand years has depended on exactly the opposite philosophy.

LOCAL SERVICES.—Pilotage is not compulsory in the State of Maine, except for the port of Portland. See *Pilots* under heading of Portland Harbor. Local pilots are available in other localities.

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

Pilotage is compulsory for ports in Massachusetts, except for 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 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 Stonington, Bangor, Bath, Portland, Portsmouth, Gloucester, and Boston. 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.

Quarantine for all ports within the limits of this volume is enforced in accordance with the regulations of the United States Public Health Service. The locations of these various quarantine stations are in the Appendix.

Standard time.—The standard time of the meridian 75° west, Eastern, five hours slow of Greenwich time is used in the United States within the limits of this volume.

Daylight saving time.—From 2:00 a.m. on the last Sunday in April to 2:00 a.m. on the last Sunday in September the clocks are advanced one hour.

Legal holidays.—The following are the legal holidays in the States of Maine, New Hampshire, and Massachusetts:

January 1, New Year's Day.—All.
February 22, Washington's Birthday.—All.
March 17, Evacuation Day.—In Suffolk County, Massachusetts, only.
April 19, Patriot's Day.—Maine, Massachusetts.
April 28, Fast Day.—New Hampshire.
May 30, Memorial Day.—All.
June 17, Bunker Hill Day.—In Suffolk County, Massachusetts.
July 4, Independence Day.—All.
Labor Day.—All.
October 12, Columbus Day.—Massachusetts, New Hampshire.
November 11, Armistice Day.—All.
Thanksgiving Day.—All.
December 25, Christmas Day.—All.

Harbor masters are appointed for the principal ports, and they have charge of the anchorage and berthing of vessels in their respective harbors. Harbor regulation for certain ports are given under the respective port headings. The *Port Series* of Publications give full information regarding port regulations. Federal anchorage regulations are given in this chapter. Federal laws prohibit the dumping of ashes, other refuse materials, or any kind of oil into the navigable waters of the United States.

Supplies.—Boston, Portland, and Portsmouth are the principal ports at which general supplies, provisions, and ship chandlery can be obtained. Coal is available at Boston, Lynn, Portland, Portsmouth, and Searsport. Boston and Portland have stocks of fuel oil. Diesel oil is available at Beverly, Boston, and Gloucester. Yacht and small boat supplies including gasoline are available at many of the smaller ports.

Repairs.—Boston is the only port where repairs of any magnitude to large vessels can be made. Portland is equipped for repairing vessels up to about 800 tons, while schooners, towboats, and fishing vessels can be repaired in Gloucester, Rockland, and Camden. Small motorboats and yachts can be hauled out, and ordinary repairs to machinery can be made at several other places.

Communications.—The area covered by this Coast Pilot is well served by rail, truck, bus, and air lines.

INLAND WATERWAYS.—The following data concerning the Intracoastal Waterway from Boston to the Rio Grande, the New York Canal System, the Mississippi River with its navigable tributaries are included for ready reference.

The **Intracoastal Waterway** affords a protected route, with the exception of various sections, for vessels between Boston, Mass., and the Rio Grande; a distance of approximately 2,900 miles. No toll is charged for passage as the waterway is under Federal jurisdiction. Navigation is restricted, however, by the limiting depths, and horizontal and vertical clearances in the various sections of the waterway.

Boston to New York Harbor.—Between Boston and Long Island Sound it is necessary to pass through comparatively exposed waters and no inland route exists except for the passage through the Cape Cod Canal and its approaches. The canal extends from Cape Cod Bay to Buzzards Bay and with its approach channels affords a sea-level waterway 12.6 miles in length. The project depth is 32 feet over a width of 450 to 500 feet. The minimum vertical clearance is 135 feet at high water. Cape Cod Bay

and the canal are fully described in this volume. Buzzards Bay to New York is fully described in *United States Coast Pilot, Atlantic Coast, Section B.*

New York Harbor to Norfolk.—Between New York and Manasquan Inlet the route follows the outside coast. From Manasquan Inlet to Delaware Bay the inside route follows the New Jersey Inland Waterway. The State-maintained channels have a project depth of 6 feet. The Corps of Engineers have been authorized to maintain a waterway with a project depth of 12 feet over a width of generally 100 feet. The minimum horizontal clearance is 30 feet. Up to 1950 no work had been done on this project by the Corps of Engineers. The route then follows Delaware Bay and River to the Chesapeake and Delaware Canal, through the canal to Chesapeake Bay. The canal has a project depth of 27 feet over a width of 250 to 400 feet. The minimum vertical clearance is 135 feet at high water. *United States Coast Pilot, Atlantic Coast, Section C,* fully describes the route between New York and Norfolk.

Norfolk to Key West.—This waterway consists of dredged channels and land cuts roughly parallel to the coast. The project depth is 12 feet from Norfolk to St. Johns River with minimum clearances of 47 feet horizontal and 80 feet vertical. From St. Johns River to Miami the project depth is 8 feet with minimum clearances of 52 feet horizontal and 79½ feet vertical. From Miami to Cross Bank the project depth is 7 feet with a minimum horizontal clearance of 40 feet. Between Cross Bank and Key West the waterway follows a natural channel 5 feet deep. *United States Coast Pilot, Atlantic Coast, Section D,* fully describes the route between Norfolk and Key West.

Key West to the Rio Grande.—Between Key West and Apalachicola, the waterway follows the outer coast. From Apalachicola to the Rio Grande, it consists of dredged channels and land cuts roughly parallel to the coast. The project depth is 12 feet over a width of 125 to 150 feet. The minimum clearances are 75 feet horizontal and 70 feet vertical. *United States Coast Pilot, Gulf Coast,* fully describes the route between Key West and the Rio Grande.

Note.—In the following discussion of the Mississippi River and its tributaries all mileages are given in statute miles. Distances on the Mississippi River are in statute miles from Head of Passes. Mileages on tributaries are in statute miles above the mouth of the tributary.

The **Mississippi River,** *Gulf of Mexico to Baton Rouge.*—This section of the river is a deep-water channel and is described in the *United States Coast Pilot, Gulf Coast.* Navigation is safe and easy at all seasons. The bridge 2 miles above New Orleans has a vertical clearance of 135 feet above high water. Baton Rouge is 228.9 miles above Head of Passes, Gulf of Mexico.

Baton Rouge to Cairo, Mile 228.9 to Mile 964.0.—The project depth of the channel is 12 feet over a width of 300 feet. This dimension is greatly exceeded during medium and high stages. The minimum clearances are horizontal 600 feet and vertical 58 feet at extreme high water, 109 feet at low water.

Cairo to the mouth of the Missouri River, Mile 964.0 to Mile 1,159.3.—The project for this section of the Mississippi River is 9 feet deep and 300 feet wide from Cairo to the northern boundary of the city of St. Louis, thence 200 feet wide to the mouth of the Missouri River. The minimum clearances of the 10 fixed bridges crossing this section are horizontal 500 feet and vertical 47 feet at extreme high water, 88 feet at low water.

Navigation is continuous throughout the year except when the river is blocked by ice.

Mouth of the Missouri River to St. Paul and Minneapolis, Mile 1,159.3 to Mile 1,821.0.—The project provides for a channel 9 feet deep. The minimum clearances of the 51 bridges and the 27 locks between the Missouri River and the Northern Pacific Railroad bridge in Minneapolis are horizontal 56 feet, vertical 59 feet at normal pool levels, and length of lock 320 feet. The navigation season is usually from April to December.

The **Red River** enters the Mississippi River 300.8 miles above Head of Passes. The project provides for a channel 9 feet deep and 100 feet wide from the Mississippi to Mile 31.0, thence a lateral canal with locks to Shreveport, La., Mile 325.0, thence continued improvement to Fulton, Ark., Mile 462.9. In 1949 preliminary engineering was underway for the lateral canal, however, the Red River has been improved by snagging, dredging shoals, and clearing of the banks to Fulton. A minimum depth of 6½ feet can be taken from the mouth to Mile 35.5, where the Black River enters, thence 3 feet to Alexandria, La., Mile 121.0, thence 1 to 2 feet to Shreveport, thence 1 foot or less to Fulton. From about January to July the minimum depth to Shreveport is 5 feet and to Fulton 4 feet. The minimum clearances on the river are horizontal 100 feet and vertical 37 feet at high water.

The *Black River* enters the Red River 35.5 miles above the mouth. At about Mile 57.0, above Jonesville, La., the Black River is joined by the Tensas and Little Rivers and the name changes to the *Ouachita River*. The project provides for a channel 6½ feet deep from the mouth to Camden, Ark., Mile 350.8, and a channel 7 feet deep from the mouth to Arkadelphia, Ark., Mile 417.0. The project has been completed to Camden, Ark., and project depths or greater are available for that distance. However, between Camden and Arkadelphia, navigation is restricted to small craft from January to June; the remainder of the year only a few inches may be expected. The minimum clearances of the 16 bridges and 6 locks are horizontal 55 feet, length of lock 268 feet, and vertical 57 feet at normal pool level. The project for the *Tensas River*, La., which enters the Black River above Jonesville and *Bayou Macon*, La., which enters Tensas River at Mile 42.7, provides for the removal of snags to Tendal, La., Mile 137.8 on the Tensas River and to Floyd, La., Mile 111.6 on Bayou Macon. In ordinary seasons navigation is possible between January and June, the remainder of the year depths reduce to 1 foot. The minimum clearances on the Tensas River are horizontal 55 feet and vertical 8 feet at high water, 22 feet at low water; on Bayou Macon, horizontal 58 feet, and vertical 1 foot at high water, 30 feet at low water.

Boeuf River enters Ouachita River at Sicily Island Gorge about Mile 81.0. The river has been snagged to Wallace Landing, La., Mile 166.0. In ordinary seasons navigation is restricted to between January and June, the remainder of the year the depths usually reduce to 1 foot. The minimum clearances are horizontal 58 feet and vertical 8½ feet at high water, 28½ feet at low water. *Little Missouri River* enters Ouachita River about Mile 379.0. The river was snagged to Rawles Bluff, Ark., about Mile 23.0 but no work has been done in recent years and vessels attempting to navigate the stream encounter leaning trees, snags, and other similar obstructions. Minimum clearances of the bridges over the previously snagged portions are horizontal 12 feet and vertical 2½ feet at high water, 25 feet at low water.

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The **Yazoo River** enters the Mississippi River at Vicksburg, Miss., through a dredged canal 431.7 miles above Head of Passes. The project provides for a depth of 6½ feet in the canal, a distance of 9 miles, and a depth of 4 feet over a width of 200 feet in the river to the junction of the *Tallahatchie* and *Yalobusha Rivers* at Mile 189.0. The minimum clearances are horizontal 83 feet and vertical 50 feet at high water.

The *Big Sunflower River* enters the Yazoo River about Mile 44.0. The project provides for a channel 4½ feet deep and 100 feet wide from the mouth to the mouth of the *Hushpuckena River* at Mile 171.4. Project depth is available to Pentecost, Miss., Mile 124.6, from January to June. The minimum clearances are horizontal 36 feet and vertical 12 feet at high water, 31 feet at low water.

The **Arkansas River** enters the Mississippi River at Mile 575.0 above Head of Passes. The project provides for clearing and snagging from the mouth to *Neosho (Grand) River* in Oklahoma, Mile 459.3. Under average conditions 4-foot draft vessels can be taken to Pine Bluff, Ark., Mile 117.0, from the first of February to the middle of July. From the middle of August to the middle of December the draft is generally limited to about 2 feet. The minimum clearances to Pine Bluff are horizontal 160 feet and vertical 56 feet at high water; to the head of the project, horizontal 130 feet and vertical 2 feet at high water, 42½ feet at low water.

The *Fourche La Fave River* enters the Arkansas River at Mile 192.2. The river is navigable to Perryville, Ark., Mile 22.2.

The *Petit Jean River* enters the Arkansas River at Mile 234.9. The river is navigable to Rocky Crossing, Ark., Mile 28.2.

The *Poteau River* enters the Arkansas River at Mile 362.0. The river is navigable to Branden, Okla., Mile 8.6.

The *White River* enters the Mississippi River 583.5 miles above Head of Passes. The river is considered navigable downstream from Branson, Mo., Mile 520.0, however, the project provides for channel maintenance only to Batesville, Ark., Mile 301.0, and for locks and dams to provide a 4-foot channel from Batesville to Guion, Ark., an additional 33 miles. Under ordinary conditions, boats of 6-foot draft may be taken from the mouth to Peach Orchard Bluff, Ark., Mile 169.0, from the first of February to the last of June. The rest of the season the controlling depth is generally 3 feet. A depth of 4 feet will be found between Batesville and Guion. The minimum clearances to Guion are horizontal 36 feet, length of lock 147 feet, and vertical 47 feet at high water.

The *Black River* enters the White River at Jacksonport, Ark., Mile 264.8. The project provides for channel maintenance to Poplar Bluff, Mo., Mile 211.0. A depth of 2 feet prevails from the mouth to the *Current River* in Arkansas, Mile 96.0, thence 1½ feet to Poplar Bluff. Vessels up to 7-foot draft may operate in the lower 15 miles of the river for about 6 months of the year. Minimum clearances are horizontal 32 feet and vertical ½ foot at high water, 18 feet at low water.

Buffalo River, Ark., enters the White River at about Mile 389.0. The river is considered navigable from its mouth to *Rush Creek*, Mile 22.0, however, at present there is no water-borne traffic.

The **St. Francis River** enters the Mississippi River 669.7 miles above Head of Passes. The project provides for channel maintenance to Marked Tree, Ark., Mile 148.2. During five months of the year a depth of 6 feet or more can be carried to Parkin, Ark., Mile 101.0 and for about 7 months a depth of 1 foot or more will be found. The mini-

mum clearances to Marked Tree are horizontal 78 feet and vertical 7 feet at high water, 47½ feet at low water.

The *L'Anguille River* enters the St. Francis River at Mile 11.8. The project provides for channel maintenance to Marianna, Ark., Mile 8.3. For five months depths of 3 feet are available and for seven months, less than 3 feet.

Blackfish Bayou, Ark., enters the St. Francis River at Mile 38.3. The project provides for channel maintenance to *Fifteen Mile Bayou*, Mile 6.0. For five months depths of 3 feet are available to *Frenchmans Bayou* and for seven months less than 3 feet.

The **Wolf River** enters the Mississippi River at Memphis, Tenn., 732.7 miles above Head of Passes. The lower 3 miles of the river has been developed to provide additional water front for the city of Memphis. A project provides for a channel 9 feet deep from the mouth to Hendman Ferry Road with widths varying from 125 feet in the upper end of the project to 250 feet at the mouth.

The **Hatchie River,** Tenn., enters the Mississippi River about 774 miles above Head of Passes. Snagging and clearing on the river and its tributaries has been completed a distance of 148.3 miles, however, only a small portion has been done in recent years.

The **Obion River,** Tenn., enters the Mississippi River 821.5 miles above Head of Passes. Snagging and clearing on the river and its tributaries has been completed a distance of 208.8 miles, however, only a small portion has been done in recent years.

Mayfield Creek, Ky., enters the Mississippi River 960.2 miles above Head of Passes. Snagging and clearing on the creek has been completed a distance of 5 miles.

The **Ohio River** enters the Mississippi River 964.0 miles above Head of Passes and 2 miles below Cairo, Ill. The project provides for the construction of dams and locks to provide a channel 9 feet deep for the entire river from the mouth to Pittsburgh, Pa., Mile 981.0. The minimum clearances in the 46 locks and 53 bridges are horizontal 110 feet, length of lock 600 feet, and vertical 63 feet at normal pool level. Running ice and ice gorges may occur during the months of December, January, or February, but seldom later.

The *Tennessee River* enters the Ohio River at Mile 48.4. The project provides for a channel 9 feet deep by the construction of locks and dams, from the mouth to the junction of the French Broad and Holston Rivers at Mile 652.1, 4.4 miles above Knoxville, Tenn. The minimum clearances in the 10 locks and 32 bridges are horizontal 60 feet, length of lock 265 feet, and vertical 50 feet at normal pool level. The *Hiwassee River* enters the Tennessee River at Mile 499.4. The river is navigable to Charleston, Tenn., Mile 18.8, with depths of 8½ feet. The minimum vertical clearance is 27 feet. The *Clinch River* enters the Tennessee River near Kingston, Tenn., at Mile 567.7. The river has a channel 9 feet deep to Mile 18.8. The *Little River* enters the Tennessee River at Mile 635.6. A channel 9 feet deep at minimum pool elevation leads to Singleton, Tenn., Mile 12.0. The *French Broad River*, one of the rivers forming the Tennessee River, is navigable to Douglas Dam, Tenn., Mile 24.1. The project for the river provides for a channel 2½ feet deep.

The *Cumberland River* enters the Ohio River at Mile 60.6. The project provides for a channel 6 feet deep to Waitsboro Shoals, Ky., Mile 513.0, thence 4 feet deep an additional 3 miles to Burnside, Ky., Mile 516.0. The minimum clearances of the 15 locks and 21 bridges are horizontal 52 feet, length of lock 280 feet, and vertical 74½ feet at normal pool level, 34 feet at extreme high water.

The *Tradewater River*, Ky., enters the Ohio River at Mile 107.0. The project depth is 9 feet to a coal tipple at Mile 3.0. A depth of 8 feet is usually available.

The *Wabash River*, forming part of the boundary between Illinois and Indiana, enters the Ohio River at Mile 132.8. Most of the Wabash River, the entire *White River*, an important tributary of the Wabash River, and short portions of the forks of the White River are classed as navigable streams. However, there has been no through navigation on these rivers for many years and there is no project at present for maintenance of a navigable channel.

The *Green River* enters the Ohio River at Mile 196.9. The project depth is 5½ feet to Mammoth Cave, Ky., Mile 197.8. The minimum clearances of the 6 locks and 8 bridges are horizontal 35½ feet, length of lock 137½ feet, and vertical 64½ feet at normal pool level, 26 feet at extreme high water. The *Rough River* enters the Green River at Mile 71.0. The project provides for a slack water channel of 4 feet to Hartford, Ky., Mile 29.5. The minimum clearances of the 1 lock and 2 bridges are horizontal 27 feet, length of lock 123 feet, and vertical 26½ feet at normal pool level, ½ foot at extreme high water. The *Barren River* enters the Green River at Mile 149.5. The project provides for a channel 5½ feet deep to Bowling Green, Ky., Mile 30.1. The minimum clearance of the 1 lock is horizontal 56 feet and length of lock 360 feet. *Bear Creek*, Ky., enters the Green River at Mile 168.4. The project depth is 5½ feet to Mile 8.0. The *Nolin River* enters the Green River at Mile 183.5. The project depth is 5½ feet to Meredith Ferry, Ky., Mile 7.8.

The *Kentucky River* enters the Ohio River at Mile 435.2. The project provides for a channel 6 feet deep from the mouth to Mile 258.6 above Beattyville, Ky. The minimum clearances in the 14 locks and 23 bridges are horizontal 38 feet, length of lock 145 feet, and vertical 43½ feet at normal pool level, 2 feet at extreme high water.

The *Scioto River* enters the Ohio River near Portsmouth, Ohio, at Mile 624.5. The project provides for the construction of a harbor channel immediately above the mouth of the Scioto River.

The *Big Sandy River* enters the Ohio River at Mile 664.0. The Big Sandy River divides at Louisa, Ky., Mile 27.2, forming *Levisa* and *Tug Forks*. The project provides for a depth of 6 feet from the mouth to Louisa, Mile 27.2, thence on Levisa Fork to Cox Branch, an additional 17.5 miles and on Tug Fork to Bear Branch, an additional 12.5 miles. The minimum clearances of the 5 locks and 7 bridges are horizontal 52 feet, length of lock 158 feet, and vertical 46½ feet at normal pool level, 7½ feet at extreme high water.

The *Kanawha River* enters the Ohio River at Point Pleasant, W. Va., Mile 715.4. The project provides for a channel 9 feet deep from the mouth to Mile 90.6. The minimum clearances of the 3 locks and 9 bridges are horizontal 56 feet, length of of lock 360 feet, and vertical 51 feet at normal pool level, 27 feet at extreme high water.

The *Little Kanawha River* enters the Ohio River at Mile 796.4. The project depth is 4 feet from the mouth to Creston, W. Va., Mile 48.0. The minimum clearances of the 5 locks and 5 bridges are horizontal 23 feet, length of lock 125 feet, and vertical 50 feet at normal pool level, 1½ feet at extreme high water.

The *Muskingum River* enters the Ohio River at Marietta, Ohio, Mile 808.8. The

project depth is 4½ feet from the lock near the mouth to Mile 93.1. The minimum clearances of the 11 locks and 24 bridges are horizontal 35½ feet, length of lock 156½ feet, and vertical 15½ feet at normal pool level, zero feet at extreme high water.

The *Beaver River* enters the Ohio River at Rochester, Pa., Mile 955.6. A project to provide a depth of 12 feet from the mouth of Beaver River to and up the *Mahoning River* to Struthers, Ohio, thence this depth to continue up Lake Erie at or near Ashtabula, Ohio, has been approved but no work has been done.

The *Allegheny River*, at the head of the Ohio River, has a project depth of 9 feet to Mile 72.0, 2 miles above East Brady, Pa. The minimum clearances of the 8 locks and 22 bridges in the improved section are horizontal 56 feet, length of lock 300 feet, and vertical 28¼ feet at normal pool level, 4 feet at extreme high water. Drafts of 2 to 5 feet operate in the river above the project.

The *Monongahela River*, at the head of the Ohio River, has a project providing for slack-water navigation its entire length, from Pittsburgh, Pa., to above Fairmont, W. Va. about Mile 128.0. A depth of 9 feet is available to Mile 100.3, thence 7 feet to above Fairmont. The minimum clearances of the 13 locks and 41 bridges are horizontal 56 feet, length of lock 182 feet, and vertical 42½ feet at normal pool level, 12 feet at extreme high water. The *Youghiogheny River* enters the Monongahela River at Mile 14.5. The project provides for a channel 9 feet deep to West Newton, Pa., Mile 19.3. The project has not been completed and at present navigation is possible to McKeesport, Pa., just inside the mouth.

The **Missouri River** enters the Mississippi River 1,159.0 miles above Head of Passes. The project depth is 9 feet from the mouth to Sioux City, Iowa, Mile 761.5. The minimum clearances of the 22 bridges from the mouth to Mile 386.2, above Kansas City, Kans., are horizontal 120 feet and vertical 71½ feet above the zero of the Weather Bureau gages. The Weather Bureau publishes the gage readings daily. The navigation season of this section of the river is generally from March 15 to November 30. A channel with a minimum depth of 6 feet and a minimum width of 200 feet is generally available during the navigation season. The minimum clearances of the 22 bridges on the Missouri River from Mile 386.2 to Sioux City, Mile 761.6, are horizontal 160 feet and vertical 63¼ feet above the zero of the Weather Bureau gage. The navigation season on this section of the river is generally from April 1 to November 15. A channel with a minimum depth of 5½ feet is generally available to Omaha, Nebr., Mile 632.0, thence 3½ feet to Sioux City.

The *Gasconade River* enters the Missouri River at Mile 103.5. A depth of 3 feet is available to Mile 3.0, thence less than a foot to Gascondy, Mo., Mile 61.4.

The *Osage River* enters the Missouri River at Mile 129.1. The project depth is 3 feet from the mouth to Bagnell Dam, Mo., Mile 75.4. The minimum clearances of the 1 lock and 4 bridges are horizontal 42 feet, length of lock 220 feet, and vertical 32 feet at high water, 59½ feet at low water.

The *Big Sioux River* enters the Missouri River above Sioux City, Iowa. A project provides for the construction of a harbor in the mouth of the river. The project has not been completed.

The **Illinois River** enters the Mississippi River 1,181.9 miles above Head of Passes. The Illinois River, together with the *Des Plaines River*, the *Chicago Sanitary and Ship Canal*, and the south branch of the *Chicago River*, forms the **Illinois Waterway** con-

necting the Mississippi River and the Great Lakes. The project provides for a channel 9 feet deep and 300 feet wide from the mouth of the Illinois River, through the river and Des Plaines River to Lockport, Ill., Mile 291.1, thence 9 feet deep with present width to the controlling works, Mile 293.1, thence 9 feet deep with a width of 225 feet to the junction with the Calumet-Sag Channel, Mile 303.5. From Mile 303.5 the waterway divides, one portion continues up the Chicago Sanitary and Ship Canal and the south branch of the Chicago River to Lake Street, Chicago, Mile 325.6, with a least depth of 9 feet, thence through the Chicago River into Lake Michigan. The other branch follows the Calumet-Sag Channel to the lock at Blue Island, Ill., Mile 319.5, thence a channel 9 feet deep and 300 feet wide in the Calumet and Little Calumet Rivers to turning basin 5, Mile 327.3. From this point Lake Michigan may be entered by continuing up Calumet River to Calumet Harbor. The project provides further for a channel 9 feet deep and 225 feet wide along the Grand Calumet River to Indiana Harbor and to Gary, Ind. The minimum clearances from the Mississippi River to Lake Michigan are: Via the Chicago River, horizontal 72 feet and vertical 17 feet at ordinary water; via Calumet River, horizontal 70 feet and vertical 12½ feet at ordinary water. The minimum clearances from the Mississippi to the junction of the Chicago Sanitary and Ship Canal and the Calumet-Sag Channel are horizontal 110 feet and vertical 35 feet at high water.

The **Illinois and Mississippi Canal** enters the Mississippi River at the mouth of **Rock River,** 1,443.1 miles above Head of Passes. The project provides for a canal from the mouth of the Rock River to the Illinois River near Bureau Junction, Ill. A feeder canal joins the main canal at Mile 47.3 and leads to Rock Falls, Ill. Depths of 6½ feet are found in the main canal and 5½ feet in the feeder canal. Minimum clearances in the 32 locks and 58 bridges on the main canal are horizontal 35 feet, length of lock 143 feet, and vertical 16½ feet above normal pool level. The minimum clearances in the 2 locks and 25 bridges in the feeder canal are horizontal 35 feet, length of lock 143 feet, and vertical 12 feet at normal pool level. The navigation season is usually from April 1 to November 15.

The **Galena (Fever) River** enters the Mississippi River about 1,529 miles above Head of Passes. Navigation by small craft to the city of Galena, Ill., Mile 3.8 is possible. Above Galena navigation is restricted to small craft during periods of high water. Two drawbridges cross the river between the mouth and Galena with a minimum horizontal clearance of 93 feet and a minimum vertical clearance, closed, of 15¾ feet at normal pool, ¼ foot at extreme high water.

The **Black River** enters the Mississippi River 1,662.2 miles above Head of Passes. The project provides for a channel 9 feet deep from the mouth to Mile 1.4 at the La Crosse, Wisconsin terminal. The minimum horizontal clearance is 127 feet.

The **St. Croix River** enters the Mississippi River 1,775.3 miles above Head of Passes. The project provides for a channel 9 feet deep to Stillwater, Minn., Mile 24.5, thence 3 feet to Taylors Fall, Minn., Mile 52.3. Minimum clearances to Stillwater are horizontal 103 feet and vertical 57 feet at normal pool level. Navigation season is usually from April to December.

The **Minnesota River** enters the Mississippi River 1,808.0 miles above Head of Passes. The project provides for a channel 4 feet deep from the mouth to Shakpee, Minn., Mile 25.6. Local interests have completed a channel 9 feet deep and 100 feet

wide from the mouth to Port Cargill, Minn., Mile 13.1. The minimum clearances to Port Cargill are horizontal 100 feet and vertical 63 feet at normal pool level.

New York Canal System.—The New York canals, built by the State of New York, afford free waterway communication between the Hudson River and Lake Champlain on the east and Lakes Erie and Ontario on the west. The canal system comprises the following lines or branches: **Erie Canal,** Waterford to Tonawanda, 338 statute miles with 245 bridges and 35 locks; **Oswego Canal,** Three Rivers Point to Lake Ontario, 24 statute miles, with 14 bridges and 7 locks; **Cayuga-Seneca Canal,** from junction with the Erie Canal to Ithaca and Watkins including Cayuga and Seneca Lakes and spur to Montour Falls, 92 statute miles with 16 bridges and 4 locks; and **Champlain Canal,** Waterford to Whitehall, 60 statute miles with 34 bridges and 11 locks. The channel dimensions for the waterway are 12 feet deep at normal pool level; the minimum widths are 75 feet in earth, 44 feet in rock, and from 110 to 200 feet in river and lake sections. The inside dimensions of the lock chambers on the improved canal routes are approximately 310 feet long, 45 feet wide, with a depth on the mitre sills of 12 feet at normal pool level. For the most part the bridges are fixed structures except when local conditions as to grade render other types preferable. The maximum dimensions of a vessel or other watercraft which may enter the canals is 300 feet long, 43½ feet wide, and 15 feet overhead clearance above the water surface.

In the improved canal channels the speed of boats shall not exceed 6 statute miles per hour, except in canalized rivers and lakes on which the speed limits are posted when practicable. The limits are strictly enforced.

The United States Lake Survey, Detroit 26, Michigan, has prepared and placed on sale charts showing the natural navigable water embraced in the canal system. These charts do not include the Erie Canal from Lyons to the Niagara River, which is of artificial formation.

The Division of Operation and Maintenance, Department of Public Works, Albany 1, New York, issues the pamphlet *Rules and regulations governing navigation and use of the New York State Canal System,* which also contains descriptions of the routes, structures, and terminals.

In recent years the season of navigation has been from April 5th to 20th, as the time of opening and from November 15th to 30th, as the time of usual closing dates for the various types of vessels.

Lake Champlain connects with the New York canal system at its southern end and the Canadian Canal System at its northern end to form part of an international waterway between the United States and Canada. The limiting depth at low lake level is 10 feet over a width of 90 feet. The limiting vertical clearance at low lake level is 92 feet. Charts of Lake Champlain are published by the United States Lake Survey.

The **Richelieu River** and **Chambly Canal** connect Lake Champlain and the **St. Lawrence River.** The limiting dimensions of the smallest lock are 111½ feet in length, 23¼ feet in width, and 6½ feet in depth over the sills. The minimum overhead clearance is 120 feet. Navigation season is from about the middle of April to the middle of November. The *St. Lawrence River Pilot* (Canadian Edition) issued by the Department of Mines and Resources, Ottawa, Canada, fully describes the river and canal. Charts are published by the same agency.

The Canadian Government requires permits or let-passes from pleasure boats

entering Canadian waterways, which may be obtained at their canal statistical offices at St. Johns and Prescott, or at the first lock in the St. Lawrence River below Prescott. American vessels when leaving Canada shall report at the customs office.

CHAPTER 3

Sailing Directions

ROUTES AND SAILING DIRECTIONS for vessels approaching or standing along this coast and for entering the principal ports are given in tabular form for the convenience of the navigator. The courses and distances given will be found dependable if used judiciously in connection with the latest charts. Unless otherwise noted in the tables these courses lead through water as deep or deeper than that available at the port to which they lead.

These are slack-water courses and due allowance must be made for currents and wind. The courses as tabulated should be used in conjunction with the general information given concerning the currents, depths, and cautions.

All bearings and directions are true. The geographical positions given are those of the turning points and not the reference objects. In cases where a course extends across two or more charts the geographical position of a junction point has been given.

Sailing directions for bays, harbors, channels, and the like not shown in the tables will be found under the headings of the various features.

When crossing the banks or approaching the coast, navigators should not neglect to take soundings at frequent intervals. Due to the irregular bottom, the soundings are of little value for locating the position, but are essential for safety in preventing too close an approach to danger.

Vessels equipped with radio compass should make frequent use of radiobeacon signals. The area has good Loran coverage. However, in view of the fact that several base line extensions are within this section the precautions given in Chapter 1 should be followed.

North Atlantic Lane Routes

The practice of following recognized routes across the North Atlantic has contributed to the safety of life at sea. Vessels should follow, as far as circumstances will permit, the North Atlantic lane routes. Attention is called to the fact that three lanes are used by vessels from and to United States ports bound to and from Fastnet or Bishop Rock, eastward of the seventieth meridian, depending on the season of the year. Vessels bound from or to United States ports to or from the north of Ireland have the option of following the three Canadian seasonal tracks, remaining on the third track during the operative dates of the fourth or most northern track.

The following tables give the courses and distances to be followed between Boston and Portland and the western termini of the great circle courses. Details of the great circle courses and the general instructions relative to the lanes are given on the back of H. O. Chart 1262.

Table 1.—From Boston

BOSTON LIGHTSHIP BEARING 022°, DISTANT 1.0 MILE; 42°19′.5 N., 70°46′.0 W.

Position	True course	Distance
Track A, Extra Southern		
Eastbound		
1. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1106.	*Degrees*	*Nautical miles*
Direct	099	1095.2
2. **Latitude 39°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955		
Westbound to Boston		
1. **Latitude 40°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955.		
Direct	276	1079.5
2. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1106.		
Track B, Southern		
Eastbound		
1. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1106.		
Direct	096	1079.5
2. **Latitude 40°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955.		
Westbound to Boston		
1. **Latitude 41°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955.		
Direct	272½	1067.4
2. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1106.		
Track C, Northern		
Eastbound		
1. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1106.		
Direct	091	927.6
2. **Latitude 42°00′.0 N., longitude 50°00′.0 W.** Chart H.O. 0955.		
Westbound to Boston		
1. **Latitude 43°00′.0 N., longitude 50°00′.0 W.** Chart H.O. 0955.		
Direct	267½	920.1
2. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1106.		

Table 2.—From Portland

PORTLAND LIGHTSHIP BEARING 270°, DISTANT 1.0 MILE; 43°31′.6 N., 70°04′.2 W.

Position	True course	Distance
Track A (Extra Southern)		
Eastbound		
1. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		
Direct	*Degrees* 103	*Nautical miles* 1067.9
2. **Latitude 39°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955.		
Westbound to Portland		
1. **Latitude 40°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955.		
Direct	280	1048.2
2. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		
Track B, Southern		
Eastbound		
1. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		
Direct	100	1048.2
2. **Latitude 40°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955.		
Westbound to Portland		
1. **Latitude 41°30′.0 N., longitude 47°00′.0 W.**		
Direct	277	1031.6
2. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		
Track C, Northern		
Eastbound		
1. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		
Direct	096	892.2
2. **Latitude 42°00′.0 N., longitude 50°00′.0 W.** Chart H.O. 0955.		
Westbound to Portland		
1. **Latitude 43°00′.0 N., longitude 50°00′.0 W.**		
Direct	271	680.7
2. **Cape Sable Light** bearing 325°, distant 10.0 miles; 43°15′.0 N., 65°30′.0 W.		
Direct	275	201.2
3. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		
Track D		
Same as Track C		
Track E		
Eastbound		
1. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		
Direct	095	201.2

Table 2.—From Portland—Continued

PORTLAND LIGHTSHIP BEARING 270°, DISTANT 1.0 MILE; 43°31′.6 N., 70°04′.2 W.

Position	True course	Distance
	Degrees	*Nautical miles*
2. Cape Sable Light bearing 325°, distant 10.0 miles; 43°15′.0 N., 65°30′.0 W.		
Direct	071½	251.5
3. Latitude 44°35′.0 N., longitude 60°00′.0 W.		
Direct	083	429.1
4. Latitude 45°25′.0 N., longitude 50°00′.0 W.		
Westbound to Portland		
1. Latitude 45°55′.0 N., longitude 50°00′.0 W.		
Direct	259	431.5
2. Latitude 44°35′.0 N., longitude 60°00′.0 W.		
Direct	251½	251.5
3. Cape Sable Light bearing 325°, distant 10.0 miles; 43°15′.0 N., 65°30′.0 W.		
Direct	275	201.2
4. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		
Track F		
Eastbound		
1. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		
Direct	095	201.2
2. Cape Sable Light bearing 325°, distant 10.0 miles; 43°15′.0 N., 65°30′.0 W.		
Direct	071½	559.6
3. Latitude 46°12′.0 N., 53°05′.0 W.		
Westbound to Portland		
1. Latitude 46°27′.0 N., longitude 53°05′.0 W.		
Direct	250	563.5
2. Cape Sable Light bearing 325°, distant 10.0 miles; 43°15′.0 N., 65°30′.0 W.		
Direct	275	201.2
3. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		

Coastwise Courses

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 off-lying dangers. For information concerning currents and fog see Chapter 2 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 in Chapter 2.

Coming from the vicinity of Cape Sable.—Vessels bound to Machias or ports eastward of it should make Machias Seal Island Light 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 Island or

between it and Grand Manan, due to the number of ledges on which the sea breaks in heavy weather, including Bull Rock, an unmarked danger with 2 feet over it.

If bound to ports in Penobscot Bay, vessels should steer so as to make either Mount Desert Light or Matinicus Rock Light. In the former case, on a clear day, Cadillac Mountain, the highest part of Mount Desert Island, may be sighted before the light. When steering for Matinicus Rock Light, Isle au Haut, 556 feet 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 lighted whistle buoy off Cape Ann and then shape the course for Manana Island lighted buoy and enter through Two Bush or Muscle Ridge Channels. In the winter and in bad weather the small class of vessels follow the coast, sighting the principal lights, 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 Light.

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 on the Georges Bank, and Jeffreys 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 light and to recognize the principal landmarks on shore. In thick weather they aim to make the fog signals or the whistle 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. Three good harbors for which a stranger standing along the coast in their vicinity can make in thick weather and enter with ordinary precautions are Machias Bay, Winter Harbor, and Boothbay Harbor.

Vessels should make free use of the radiobeacons. In addition, the Canadian Government maintains radiobeacon stations at Seal Island Light and Lurcher Lightship.

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. 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.

So far as the navigator is concerned, Browns 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 or less. Strong tide rips are encountered, however, these do not always indicate shoal water. For current information see Chapter 2.

Vessels passing south of the dangerous part of Georges Bank should not shoal the water to less than 25 fathoms. 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 of 20 fathoms or less. On the north side of Georges Bank, between longitude 66°00′ W. and 68°00′ W., the 100-fathom and 50-fathom curves are but a few miles apart, and when approaching the dangerous part of the bank from northward 50 fathoms may be taken as a good depth to avoid the shoals.

During the recent survey of Georges Bank, numerous large steamers were observed on tracks which lead dangerously close to the shoals on the bank.

Vessels equipped with echo sounding and following the 100-fathom curve along the south side of Georges Bank, can frequently verify their position when crossing the several submarine gorges.

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. It is a part of Cashes Ledge, which is about 6.5 miles long in a north-northeast direction, with depths less than 30 fathoms.

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 latitudes 42°00′ N. and 43°10′ N. If bound to Boston, they cross Browns Bank and shape the course for Boston Lightship.

Vessels approaching the Gulf of Maine from southwest sometimes endeavor to make the 50-fathom curve on the southern edge of Georges Bank, in latitude 40°20′ N. and longitude 68°50′ W., then stand 000° on soundings of over 30 and less than 50 fathoms for about 50 miles, and then shape a 323° course, taking care to keep in a greater depth than 20 fathoms until the course is laid to sight Cape Cod Light. This light, Nauset Beach Light, the skeleton radio towers, and the Pilgrim Monument at Provincetown are the most prominent marks on Cape Cod.

Great South Channel, the passage across Georges Bank between the easternmost of the Nantucket Shoals and the westernmost shoal of Georges Bank, is about 30 miles wide.

Vessels coming from Cape Hatteras, Chesapeake Bay, Delaware Bay, or New York make Nantucket Shoals Lightship. A great many vessels use the Cape Cod Canal.

Vessels of less than 24 feet 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.

Standing along the coast between Portland and Cape Cod.—The lights 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. 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 and radio direction finders should make use of the several radiobeacons along the coast.

Table 3.—Boston to St. Thomas, V. I. via Nantucket Shoals

CHARTS 1207, 1107, 904, H. O. 1411

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1207.	*Degrees*	*Nautical miles*
Direct	112	36.6
Reverse	*292*	*36.6*
2. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W.		
Direct	150	71.2
Reverse	*330*	*71.2*
3. **Nantucket Shoals outer lighted whistle buoy 10** bearing 270°, distant 1.0 mile; 41°04′.0 N., 69°13′.0 W. Chart 1107.		
Direct	171	1384.5
Change to Chart H. O. 1411 (*1107*) in 40°00′.0 N., 69°00′.0 W.		
Reverse	*351*	*1384.5*
4. **Sail Rock Light** bearing 018°, distant 1.0 mile; 18°16′.0 N., 65°06′.4 W. Chart 904.		
Direct	077	10.7
Reverse	*257*	*10.7*
5. **Muhlenfels Point Light** bearing 001°, distant 0.8 mile; 18°18′.5 N., 64°55′.4 W. To continue see *U. S. Coast Pilot, West Indies.*		

Table 4.—Boston to San Juan, P. R. via Nantucket Shoals

CHARTS 1207, 1107, H. O. 1411, 903

1. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1207.		
Direct	112	36.6
Reverse	*292*	*36.6*
2. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W.		
Direct	150	71.2
Reverse	*330*	*71.2*
3. **Nantucket Shoals outer lighted whistle buoy 10** bearing 270°, distant 1.0 mile; 41°04′.0 N., 69°13′.0 W. Chart 1107.		
Direct	173	1361.2
Change to Chart H. O. 1411 in 40°00′.0 N., 69°02′.0 W.		
Reverse	*353*	*1361.2*
4. **Port San Juan Light** bearing 184°, distant 4.0 miles; 18°32′.3 N., 66°07′.2 W. Chart 903. To continue see *U. S. Coast Pilot, West Indies.*		

Table 5.—Boston Lightship to New York and South via Nantucket Shoals

CHARTS 1207, 70, 1215, 1000, 1219, 1222

1. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1207.		
Direct	112	36.6
Reverse	*292*	*36.6*
2. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W.		
Direct	150	71.2

Table 5.—Boston Lightship to New York and South via Nantucket Shoals Continued

CHARTS 1207, 70, 1215, 1000, 1219, 1222

Position (Reverse directions in *italics*—read upward)	True course	Distance
Change to Chart 70 (*1207*) in 42°06′.1 N., 70°02′.0 W.	*Degrees*	*Nautical miles*
Reverse	*330*	*71.2*
3. Nantucket Shoals outer lighted whistle buoy 10 bearing 270°, distant 1.0 mile; 41°04′.0 N., 69°13′.0 W.		
Direct	180	19.6
Reverse	*000*	*19.6*
4. Latitude 40°44′.4 N., longitude 69°13′.0 W.		
Direct	236	22.0
Reverse	*056*	*22.0*
5. Nantucket Shoals Lightship bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W.		
To New York		
5. Nantucket Shoals Lightship bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W.		
Direct	269	163.0
Reverse	*089*	*163.0*
6. Fire Island lighted whistle buoy 2 FI close aboard; 40°28′.7 N., 73°11′.4 W. Chart 1215.		
Direct	270	32.2
Reverse	*090*	*32.2*
7. Gedney Channel lighted whistle buoy close aboard; 40°28′.8 N., 73°53′.7 W.		
To Delaware Bay		
5. Nantucket Shoals Lightship bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70.		
Direct	245	251.4
Change to Chart 1000 (*70*) in 40°00′.0 N., 71°08′.1 W.		
Change to Chart 1219 (*1000*) in 38°50′.6 N., 73°20′.0 W.		
Reverse	*065*	*251.4*
6A. Five Fathom Bank Lightship bearing 300°, distant 2.2 miles; 38°46′.2 N., 74°32′.2 W.		
Direct	274	23.0
Reverse	*094*	*23.0*
7A. Overfalls Lightship bearing 045°, distant 0.2 mile; 38°47′.8 N., 75°01′.6 W. To continue to ports on Delaware Bay or River, see *U. S. Coast Pilot, Section C, Sandy Hook to Cape Henry.*		
To Chesapeake Bay Entrance		
5. Nantucket Shoals Lightship bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70.		
Direct	233	356.6
Change to Chart 1000 (*70*) in 39°44′.0 N., 71°00′.0 W.		
Change to Chart 1222 (*1000*) in 37°05′.9 N., 75°30′.0 W.		
Reverse	*053*	*356.6*
6B. Chesapeake Lightship bearing 000°, distant 0.2 mile; 36°58′.5 N., 75°42′.2 W. To continue to ports in Chesapeake Bay, see *U. S. Coast Pilot, Section C, Sandy Hook to Cape Henry.*		

Table 5.—Boston Lightship to New York and South via Nantucket Shoals Continued

CHARTS 1207, 70, 1215, 1000, 1219, 1222

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Diamond Shoal Lightship		
5. **Nantucket Shoals Lightship** bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70.	*Degrees*	*Nautical miles*
Direct	219½	420.2
Change to Chart 1000 (*70*) in 39°43′.0 N., 70°30′.0 W. Change to Chart 1232 (*1000*) in 35°12′.2 N., 75°10′.0 W.		
Reverse	*039½*	*420.2*
6C. **Diamond Shoal Lightship** bearing 240°, distant 5.0 miles; 35°07′.8 N., 75°14′.5 W. To continue to ports south of Diamond Shoal see *U. S. Coast Pilot, Section D, Cape Henry to Key West.*		

Table 6.—Cape Cod Canal to Boston Lightship

CHARTS 1208, 1207

1. **Canal Breakwater Light** bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W. Chart 1208.		
Direct	026	2.3
Reverse	*206*	*2.3*
2. **Canal Approach lighted bell buoy** close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	354	20.8
Pass 0.7 mile eastward of Manomet lighted gong buoy 6A.		
Reverse	*174*	*20.8*
3. **Humarock Shoal lighted whistle buoy 4** bearing 263°, distant 2.0 miles; 42°09′.5 N., 70°30′.8 W. Change to Chart 1207 (*1208*).		
Direct	312	15.0
Reverse	*132*	*15.0*
4. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1207.		

Table 7.—Boston Lightship to Various Fishing Banks

CHART 71

To Cape Sable Light		
1. **Boston Lightship** bearing 270°, distant 1.0 mile; 42°20′.4 N., 70°44′.1 W.		
Direct	076	232.8
Reverse	*256*	*232.8*
2. **Cape Sable Light** bearing 000°, distant 5.0 miles; 43°18′.5 N., 65°37′.4 W.		

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Table 7.—Boston Lightship to Various Fishing Banks—Continued

CHART 71

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Platts Bank		
1. Boston Lightship bearing 270°, distant 1.0 mile; 42°20′.4 N., 70°44′.1 W.	*Degrees*	*Nautical miles*
Direct	045	68.8
Reverse	*225*	*68.8*
2A. Platts Bank; 43°09′.0 N., 69°38′.0 W.		
To Cashes Ledge		
1. Boston Lightship bearing 270°, distant 1.0 mile; 42°20′.4 N., 70°44′.1 W.		
Direct	068	86.8
Reverse	*248*	*86.8*
2B. Cashes Ledge Ammen Rock whistle buoy bearing 000°, distant 0.1 mile; 42°53′.5 N., 68°55′.5 W.		
To Fippennies Ledge		
1. Boston Lightship bearing 270°, distant 1.0 mile; 42°20′.4 N., 70°44′.1 W.		
Direct	067	69.1
Reverse	*247*	*69.1*
2C. Fippennies Ledge; 42°47′.0 N., 69°18′.0 W.		
To Georges Shoal		
1. Boston Lightship bearing 270°, distant 1.0 mile; 42°20′.4 N., 70°44′.1 W.		
Direct	105	135.4
Reverse	*285*	*135.4*
2D. Georges Shoal, north end of 5-fathom curve; 41°44′.0 N., 67°47′.0 W.		

Table 8.—Boston Lightship to Yarmouth Harbor, Nova Scotia

CHARTS 1106, H. O. 2134, 5441

1. Boston Lightship bearing 180°, distant 1.0 mile; 41°21′.4 N., 70°45′.5 W. Chart 1106.		
Direct	067	87.9
Reverse	*247*	*87.9*
2. Cashes Ledge whistle buoy CL bearing 180°, distant 1.5 miles; 42°55′.0 N., 68°55′.5 W.		
Direct	064	116.6
Reverse	*244*	*116.6*
3. Lurcher Shoal Lightship bearing 000°, distant 2.0 miles; 43°46′.6 N., 66°31′.9 W. Chart H. O. 2134.		
Direct	091	16.3
Reverse	*271*	*16.3*
4. Cape Fourchu Light bearing 000°, distant 1.2 miles; 43°46′.2 N., 66°09′.5 W.		
Direct	various	4.0
Reverse	*various*	*4.0*
5. Yarmouth Wharves; 43°50′.0 N., 66°07′.5 W. Chart H. O. 5441. See H. O. Pub. 99, *Sailing Directions for Nova Scotia.*		

Table 9.—Cape Cod Canal East Entrance to Plymouth

CHART 1208

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Canal Breakwater Light** bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W.	*Degrees*	*Nautical miles*
Direct	026	2.3
Reverse	*206*	*2.3*
2. **Canal Approach lighted bell buoy** close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	354	6.5
Reverse	*174*	*6.5*
3. **Manomet lighted gong buoy 6A** bearing 270°, distant 0.7 mile; 41°55′.3 N., 70°28′.6 W.		
Direct	314	6.7
Reverse	*134*	*6.7*
4. **Plymouth Light** bearing 286°, distant 0.8 mile; 42°00′.0 N., 70°35′.1 W.		

Table 10.—Cape Cod Canal Eastern Entrance to Salem and Beverly via Newcomb Ledge lighted whistle buoy 1

CHART 50

1. **Canal Breakwater Light** bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W.		
Direct	026	2.3
Reverse	*206*	*2.3*
2. **Canal Approach lighted bell buoy** close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	357	6.5
Reverse	*177*	*6.5*
3. **Manomet lighted gong buoy 6A** bearing 267°, distant 1.0 mile; 41°55′.4 N., 70°28′.1 W.		
Direct	348	14.2
Reverse	*168*	*14.2*
4. **Humarock Shoal lighted whistle buoy 4** bearing 267°, distant 1.0 mile; 42°09′.4 N., 70°32′.4 W.		
Direct	340	23.3
Reverse	*160*	*23.3*
5. **Newcomb Ledge lighted whistle buoy 1** bearing 230°, distant 1.0 mile; 42°31′.2 N., 70°43′.5 W.		

Table 11.—Cape Cod Canal East Entrance to Gloucester

CHARTS 50, 243

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. Canal Breakwater Light bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W. Chart 50.	*Degrees*	*Nautical miles*
Direct	026	2.3
Reverse	*206*	*2.3*
2. Canal Approach lighted bell buoy close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	355	6.4
Reverse	*175*	*6.4*
3. Manomet lighted gong buoy 6A bearing 265°, distant 1.0 mile; 41°55′.4 N., 70°28′.1 W.		
Direct	348	14.3
Reverse	*168*	*14.3*
4. Humarock Shoal lighted whistle buoy 4 bearing 265°, distant 1.0 mile; 42°09′.3 N., 70°32′.0 W.		
Direct	346	25.7
Reverse	*166*	*25.7*
5. Eastern Point lighted whistle buoy 2A bearing 090°, distant 0.5 mile; 42°34′.2 N., 70°39′.5 W. Chart 243.		

Table 12.—Cape Cod Canal East Entrance to Cape Ann

CHARTS 1208, 1207

1. Canal Breakwater Light bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W.		
Direct	026	2.3
Reverse	*206*	*2.3*
2. Canal Approach lighted bell buoy close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	357	49.0
Pass Fourth Cliff lighted bell buoy 1 distant 0.5 mile.		
Reverse	*177*	*49.0*
3. Cape Ann Light bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W.		

Table 13.—Cape Cod Canal East Entrance to Portland Lightship

CHART 50

1. Canal Breakwater Light bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W.		
Direct	026	2.3
Reverse	*206*	*2.3*
2. Canal approach lighted bell buoy close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	009½	104.2
Pass Humarock outer lighted bell buoy bearing westward, distant 4.3 miles.		
Reverse	*189½*	*104.2*
3. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		

Table 14.—Cape Cod Canal East Entrance to Bantam Rock lighted whistle buoy 16BR

CHARTS 1208, 70, 1204

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Canal Breakwater Light** bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W. Chart 1208.	*Degrees*	*Nautical miles*
Direct	026	2.3
Reverse	*206*	*2.3*
2. **Canal Approach lighted bell buoy** close aboard; 41°48′.9 N., 70°27′.7 W. Chart 70.		
Direct	018	119.0
Reverse	*198*	*119.0*
3. **Bantam Rock lighted whistle buoy 16BR** bearing 270°, distant 0.5 mile; 43°42′.0 N., 69°37′.4 W. Chart 1204.		

Table 15.—Cape Cod Canal East Entrance to Manana Island lighted whistle buoy 14M

CHARTS 1208, 70, 1204

1. **Canal Breakwater Light** bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W. Chart 1208.		
Direct	026	2.3
Reverse	*206*	*2.3*
2. **Canal Approach lighted bell buoy** close aboard; 41°48′.9 N., 70°27′.7 W. Chart 70.		
Direct	022	125.8
Reverse	*202*	*125.8*
3. **Manana Island lighted whistle buoy 14M** bearing 090°, distant 0.5 mile; 43°45′.4 N., 69°23′.4 W. Chart 1204.		

Table 16.—Cape Cod Canal East Entrance to Matinicus Rock Light

CHARTS 1208, 1000, 1203

1. **Canal Breakwater Light** bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W. Chart 1208.		
Direct	028	20.0
Reverse	*208*	*20.0*
2. **Race Point Light** bearing 123°, distant 1.4 miles; 42°04′.5 N., 70°16′.3 W. Chart 1000.		
Direct	032	118.6
Reverse	*212*	*118.6*
3. **Matinicus Rock Light** bearing 348°, distant 2.0 miles; 43°45′.1 N., 68°50′.8 W. Chart 1203.		

Table 17.—Cape Cod Canal East Entrance to West Quoddy Head

CHARTS 1208, 1207, 1206, 1205, 1204, 1203, 1202, 1201

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. Canal Breakwater Light bearing 262°, distant 700 yards; Canal Entrance lighted bell buoy 1 bearing 155°, distant 100 yards; 41°46′.8 N., 70°29′.0 W. Chart 1208.	*Degrees*	*Nautical miles*
Direct	026	2.3
Reverse	*206*	*2.3*
2. Canal approach lighted bell buoy close aboard; 41°48′.9 N., 70°27′.7 W.		
Direct	354	20.7
Reverse	*174*	*20.7*
3. Humarock Shoal lighted whistle buoy 4 bearing 263°, distant 2.0 miles; 42°09′.5 N., 70°30′.8 W. Chart 1207.		
Direct	316	15.1
Reverse	*136*	*15.1*
4. Boston Lightship bearing 270°, distant 0.5 mile; 42°20′.4 N., 70°44′.8 W. Chart 1207.		
Direct	030	20.3
Reverse	*210*	*20.3*
5. Cape Ann Light bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W. Chart 1206.		
Direct	020	57.2
Change to Chart 1205 (*1206*) in 43°08′.0 N., 70°16′.4 W.		
Reverse	*200*	*57.2*
6. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		
Direct	062	22.0
Reverse	*242*	*22.0*
7. Bantam Rock lighted whistle buoy 16BR bearing 270°, distant 0.5 mile; 43°42′.0 N., 69°37′.4 W.		
Direct	081	14.7
Reverse	*261*	*14.7*
8. Monhegan Island Light bearing 327°, distant 2.0 miles; 43°44′.2 N., 69°17′.5 W. Chart 1203.		
Direct	088	19.4
Reverse	*268*	*19.4*
9. Matinicus Rock Light bearing 348°, distant 2.0 miles; 43°45′.1 N., 68°50′.8 W.		
Direct	050	33.6
Change to Chart 1202 (*1203*) in 43°53′.3 N., 68°37′.0 W.		
Reverse	*230*	*33.6*
10. Great Duck Island Light bearing 000°, distant 2.0 miles; 44°06′.5 N., 68°14′.8 W.		
Direct	055	20.2
Reverse	*235*	*20.2*
11. Petit Manan Island Light bearing 000°, distant 4.0 miles; 44°18′.0 N., 67°51′.9 W. Chart 1201.		
Direct	070	3.2
Reverse	*250*	*3.2*
12. Southeast Rock lighted whistle buoy 6A bearing 314°, distant 1.0 mile; 44°19′.1 N., 67°47′.7 W.		
Direct	059	14.7
Reverse	*239*	*14.7*
13. Moose Peak Light bearing 321°, distant 2.2 miles; 44°26′.8 N., 67°30′.0 W.		
Direct	055	18.0
Pass about 1.0 mile northwestward of Moose Peak whistle buoy MP in range with light.		
Reverse	*235*	*18.0*
14. Little River Light bearing 323°, distant 2.5 miles; Little River lighted whistle buoy 2 LR bearing 323°, distant 0.5 mile; 44°37′.0 N., 67°09′.4 W.		
Direct	039	14.8
Reverse	*219*	*14.8*
15. West Quoddy Head Light bearing 311°, distant 0.7 mile; Sail Rock lighted whistle buoy 1 close aboard; 44°48′.5 N., 66°56′.4 W.		

Table 18.—Plymouth to Cape Ann

CHARTS 1208, 1207

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Plymouth Light** bearing 288°, distant 0.8 mile; Gurnet Point bell buoy close aboard; 42°00′.0 N., 70°35′.1 W. Chart 1208.	*Degrees*	*Nautical miles*
Direct	008	9.3
Reverse	*188*	*9.3*
2. **Humarock Shoal lighted whistle buoy 4** bearing 270°, close aboard; 42°09′.2 N., 70°33′.5 W.		
Direct	003	28.7
Change to Chart 1207 (*1208*) in 42°09′.2 N., 70°33′.5 W.		
Reverse	*183*	*28.7*
3. **Cape Ann Light** bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W.		

Table 19.—Cape Cod Light to Portland Lightship

CHARTS 50, 1204

1. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W. Chart 50.		
Direct	358	86.0
Reverse	*178*	*86.0*
2. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		

Table 20.—Cape Cod Light to Bantam Rock lighted whistle buoy

CHARTS 70, 1204

1. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W. Chart 70.		
Direct	010	98.0
Change to Chart 1204 (*70*) in 43°31′.0 N., 69°40′.1 W.		
Reverse	*190*	*98.0*
2. **Bantam Rock lighted whistle buoy 16BR** bearing 270°, distant 0.5 mile; 43°42′.0 N., 69°37′.4 W.		

Table 21.—Cape Cod Light to Matinicus Rock Light

CHARTS 70, 1203

1. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W. Chart 70.		
Direct	027	112.0
Change to Chart 1203 (*70*) in 43°44′.0 N., 68°51′.6 W.		
Reverse	*207*	*112.0*
2. **Matinicus Rock Light** bearing 348°, distant 2.0 miles; 43°45′.1 N., 68°50′.8 W.		

Table 22.—Boston North Channel Entrance to Plymouth

CHARTS 1207, 1208

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. North Channel lighted bell buoy 2 bearing 000°, distant 300 yards; 42°22′.0 N., 70°55′.2 W.	*Degrees*	*Nautical miles*
Direct	062	3.0
Reverse	*242*	*3.0*
2. The Graves lighted whistle buoy 5 bearing 180°, distant 0.5 mile; 42°23′.4 N., 70°51′.7 W.		
Direct	120	2.4
Reverse	*300*	*2.4*
3. Boston lighted bell buoy 1 bearing 180°, distant 0.5 mile; 42°22′.3 N., 70°48′.8 W.		
Direct	136	7.4
Reverse	*316*	*7.4*
4. Three-and-One-Half Fathom lighted whistle buoy 1 bearing 226°, distant 0.5 mile; 42°16′.9 N., 70°41′.9 W.		
Direct	158	12.0
Reverse	*338*	*12.0*
5. Farnham Rock lighted bell buoy 6 bearing 249°, distant 0.5 mile; 42°05′.8 N., 70°35′.8 W.		
Direct	174	5.8
Reverse	*354*	*5.8*
6. Plymouth Light bearing 287°, distant 0.8 mile; Gurnet Point bell buoy close aboard; 42°00′.0 N., 70°35′.1 W.		

Table 23.—Boston Harbor Narrows Entrance to Plymouth

CHARTS 1207, 1208

1. Boston Light bearing 325°, distant 0.6 mile; 42°19′.2 N., 70°53′.0 W.		
Direct	071	2.5
Reverse	*251*	*2.5*
2. Thieves Ledge lighted whistle buoy 1B bearing 180°, distant 0.5 mile; 42°20′.1 N., 70°49′.8 W.		
Direct	117	6.5
Reverse	*297*	*6.5*
3. Three-and-One-Half Fathom lighted whistle buoy 1 bearing 207°, distant 0.5 mile; 42°17′.0 N., 70°42′.0 W.		
Direct	158	12.0
Reverse	*338*	*12.0*
4. Farnham Rock lighted bell buoy 6 bearing 248°, distant 0.5 mile; 42°05′.8 N., 70°35′.8 W.		
Direct	174	5.8
Reverse	*354*	*5.8*
5. Plymouth Light bearing 287°, distant 0.8 mile; Gurnet Point bell buoy close aboard; 42°00′.0 N., 70°35′.1 W.		

Table 24.—Boston Lightship to Entrance Lynn Channel

CHARTS 246, 240

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Boston Lightship** bearing 180°, distant 0.5 mile; 42°20′.9 N., 70°45′.5 W.	*Degrees*	*Nautical miles*
Direct	296	5.0
Reverse	*116*	*5.0*
2. **The Graves lighted whistle buoy 5** bearing 202°, distant 0.2 mile with The Graves and Boston Lights on range with the buoy; 42°23′.1 N., 70°51′.5 W.		
Direct	286	3.1
Reverse	*106*	*3.1*
3. **Flip Rock gong buoy** bearing 015°, distant 0.3 mile; 42°23′.9 N., 70°55′.6 W. Change to Chart 240.		
Direct	313	1.7
Reverse	*133*	*1.7*
4. **Lynn Channel lighted bell buoy 2** bearing 025°, distant 0.1 mile; 42°25′.1 N., 70°57′.3 W.		

Table 25.—North Channel Broad Sound Entrance to Cape Ann

CHART 1207

1. **North Channel lighted bell buoy 2** bearing 000°, distant 275 yards; 42°22′.0 N., 70°55′.2 W.		
Direct	048	23.9
Reverse	*228*	*23.9*
2. **Cape Ann Light** bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W.		

Table 26.—North Channel Broad Sound Entrance to Beverly and Salem

CHARTS 1207, 240

1. **North Channel lighted bell buoy 2** bearing 000°, distant 275 yards; 42°22′.0 N., 70°55′.2 W. Chart 1207.		
Direct	044	11.6
Reverse	*224*	*11.6*
2. **Newcomb Ledge lighted whistle buoy 1** bearing 270°, distant 200 yards; 42°30′.4 N., 70°44′.3 W. Chart 240.		
Direct	338	2.0
Reverse	*158*	*2.0*
3. **Bakers Island Light** bearing 265°, distant 1.4 miles; 42°32′.3 N., 70°45′.3 W.		
Direct	276	3.8
Reverse	*096*	*3.8*
4. **Hospital Point Front Range Light** bearing 276°16′, distant 0.7 mile; 42°32′.7 N., 70°50′.4 W.		
Direct	230	0.8
Reverse	*050*	*0.8*
5. **Mann Rock buoy** bearing 161°, distant 150 yards; 42°32′.2 N., 70°51′.3 W.		

Table 26.—North Channel Broad Sound Entrance to Beverly and Salem Continued

CHARTS 1207, 240

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Beverly		
5. Mann Rock buoy bearing 161°, distant 150 yards; 42°32′.2 N., 70°51′.3 W.	*Degrees*	*Nautical miles*
Direct	296	0.65
Reverse	*116*	*0.65*
6. Beverly Channel buoy 2 bearing 044°, distant 50 yards.		
Direct	various	0.85
Reverse	*various*	*0.85*
7. Beverly Coal Wharf; 42°32′.4 N., 70°53′.1 W.		
To Salem		
5. Mann Rock buoy bearing 161°, distant 150 yards; 42°32′.2 N., 70°51′.3 W.		
Direct	214	1.1
Pass Salem Channel buoy 12 bearing 304°, close aboard.		
Reverse	*034*	*1.1*
6A. Terminal lighted buoy 1 bearing 253°, distant 0.25 mile.		
Direct	253	0.25
Reverse	*073*	*0.25*
7A. Terminal lighted buoy 1 bearing 180°, close aboard.		
Direct	290	0.25
Reverse	*110*	*0.25*
8A. Salem Terminal; 42°31′.4 N., 70°52′.7 W.		

Table 27.—Cape Ann to Portsmouth

CHART 1206

1. Cape Ann Light bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W. Chart 1206.		
Direct	343	25.9
Pass 1.4 miles westward of White Island.		
Reverse	*163*	*25.9*
2. Whaleback Light bearing 335°, distant 0.9 mile; 43°02′.7 N., 70°41′.3 W.		

Table 28.—Cape Ann to Bantam Rock lighted whistle buoy 16BR

CHARTS 50, 1204

1. Cape Ann Light bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W. Chart 50.		
Direct	031½	75.2
Change to Chart 1204 (*50*) in 43°31′.0 N., 69°46′.2 W.		
Reverse	*211½*	*75.2*
2. Bantam Rock lighted whistle buoy 16BR bearing 270°, distant 0.5 mile; 43°42′.0 N., 69°37′.4 W.		

Table 29.—Cape Ann Light to Manana Island lighted whistle buoy 14M

CHARTS 50, 1204

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Cape Ann Light** bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W. Chart 50.	*Degrees*	*Nautical miles*
Direct	036	83.6
Reverse	*216*	*83.6*
2. **Manana Island lighted whistle buoy 14M** bearing 090°, distant 0.5 mile; Monhegan Island Light bearing 080°, distant 3.2 miles; 43°45′.4 N., 69°23′.4 W. Chart 1204.		

Table 30.—Cape Ann to Matinicus Rock Light

CHARTS 1206, 1106, 1203

1. **Cape Ann Light** bearing 277°, distant 2.5 miles; Cape Ann lighted whistle buoy 2 close aboard; 42°37′.9 N., 70°31′.2 W. Chart 1206.		
Direct	047½	99.6
Change to Chart 1106 (*1206*) in 42°58′.7 N., 70°00′.0 W.		
Change to Chart 1203 (*1106*) in 43°44′.0 N., 68°52′.4 W.		
Reverse	*227½*	*99.6*
2. **Matinicus Rock Light** bearing 348°, distant 2.0 miles; 43°45′.1 N., 68°50′.8 W.		

Table 31.—Portsmouth to Portland Lightship

CHARTS 1205, 1206

1. **Whaleback Light** bearing 335°, distant 0.9 mile; Kitts Rocks lighted whistle buoy 2KR bearing 329°, distant 0.3 mile; 43°02′.7 N., 70°41′.3 W. Chart 1206.		
Direct	098	4.8
Reverse	*278*	*4.8*
2. **Whaleback Light** bearing 286°, distant 5.3 miles; 43°02′.1 N., 70°34′.8 W.		
Direct	014	2.4
Reverse	*194*	*2.4*
3. **York Ledge lighted whistle buoy 24 YL** bearing 270°, distant 0.3 mile; 43°04′.4 N., 70°34′.0 W.		
Direct	012	3.8
Reverse	*192*	*3.8*
4. **Boon Island Light** bearing 104°, distant 3.3 miles; 43°08′.1 N., 70°33′.0 W. Chart 1205.		
Direct	042	31.6
Reverse	*222*	*31.6*
5. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W.		

Table 32.—Portland Lightship to Bantam Rock lighted whistle buoy 16BR and Boothbay Harbor

CHARTS 1204, 314

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.	*Degrees*	*Nautical miles*
Direct	061	21.6
Reverse	*241*	*21.6*
2. Bantam Rock lighted whistle buoy 16BR bearing 090° close aboard; 43°42′.0 N., 69°38′.1 W. Chart 314.		
Direct	357	4.4
Reverse	*177*	*4.4*
3. The Cuckolds bell buoy 1C bearing 267°, distant 0.4 mile; Cuckolds Light bearing 312°, distant 0.6 mile; 43°46′.4 N., 69°38′.4 W.		
Direct	023	2.4
Reverse	*203*	*2.4*
4. Burnt Island Light bearing 312°, distant 1.3 miles; 43°48′.6 N., 69°37′.1 W.		
Direct	332	1.8
Pass Tumbler Island lighted buoy 8 close aboard.		
Reverse	*152*	*1.8*
5. Tumbler Island lighted buoy 8 bearing 152°, distant 275 yards; 43°50′.3 N., 69°38′.3 W.		
Direct	various	0.9
Reverse	*various*	*0.9*
6. Boothbay Harbor Wharves; 43°51′.0 N., 69°37′.6 W.		

Table 33.—Portland Lightship to Bath

CHARTS 1204, 238, 230

Least depth 26 feet		
1. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		
Direct	060	16.8
Reverse	*240*	*16.8*
2. Seguin Island Light bearing 338°, distant 2.6 miles; and Mile Ledge lighted bell buoy bearing 328°, distant 1.7 miles; 43°40′.0 N., 69°44′.1 W. Chart 238.		
Direct	353	3.9
Reverse	*173*	*3.9*
3. White Ledge lighted bell buoy 1 bearing 270°, close aboard; 43°43′.9 N., 69°44′.9 W.		
Direct	305	1.1
Reverse	*125*	*1.1*
4. Pond Island Light bearing 215°, distant 300 yards; 43°44′.5 N., 69°46′.1 W.		
Direct	318	0.7
Reverse	*138*	*0.7*
5. Fort Popham Light bearing 323°, distant 650 yards; 43°45′.0 N., 70°46′.8 W.		
Direct	340	0.85
Pass Kennebec River buoy 6 distant 80 yards.		
Reverse	*160*	*0.85*
6. Shag Rock Daybeacon bearing 072°, distant 260 yards; 43°45′.8 N., 69°47′.1 W.		
Direct	000	0.4
Pass Kennebec River buoy 10 distant 160 yards.		
Reverse	*180*	*0.4*

Table 33.—Portland Lightship to Bath—Continued

CHARTS 1204, 238, 230

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
7. **Perkins Island Light** bearing 000°, distant 1.0 mile; 43°46′.2 N., 69°47′.1 W.		
Direct	343	0.6
Pass Kennebec River buoy 11 bearing 253°, distant 120 yards.		
Reverse	*163*	*0.6*
8. **Perkins Island Light** bearing 020°, distant 0.5 mile; 43°46′.7 N., 69°47′.4 W.		
Direct	010	1.3
Pass Kennebec River buoy 13 distant 90 yards.		
Reverse	*190*	*1.3*
9. **Perkins Island Light** bearing 183°, distant 0.8 mile; 43°48′.0 N., 69°47′.1 W.		
Direct	318	1.3
Pass Kennebec River buoy 16 distant 100 yards.		
Reverse	*138*	*1.3*
10. **Squirrel Point Light** bearing 048°, distant 185 yards; 43°48′.9 N., 69°48′.3 W.		
Direct	003	0.5
Pass Kennebec River buoy 19 distant 200 yards.		
Reverse	*183*	*0.5*
11. **Pettis Rocks Daybeacon** bearing 026°, distant 810 yards; 43°49′.5 N., 69°48′.2 W.		
Direct	036	0.4
Reverse	*216*	*0.4*
12. **Ram Island Light** bearing 001°, distant 810 yards; 43°49′.8 N., 69°47′.9 W. Chart 230.		
Direct	010	0.6
Reverse	*190*	*0.6*
13. **Ram Island Light** bearing 208°, distant 400 yards; 43°50′.3 N., 69°47′.8 W.		
Direct	359	2.5
Pass Kennebec River buoy 25 distant 100 yards.		
Reverse	*179*	*2.5*
14. **Doubling Point Front Range Light** bearing 359°, distant 310 yards; 43°52′.8 N., 69°47′.8 W.		
Direct	276	0.6
Reverse	*096*	*0.6*
15. **Doubling Point Light** bearing 061°, distant 310 yards; 43°52′.9 N., 69°48′.6 W.		
Direct	000	2.1
Pass Kennebec River buoy 31 distant 140 yards. Pass between Kennebec River buoys 33 and 34.		
Reverse	*180*	*2.1*
16. **Bath Waterfront** northern extremity; 43°55′.0 N., 69°48′.6 W.		

Table 34.—Portland Lightship to Boothbay Harbor

CHARTS 1204, 314, 230

1. **Portland Lightship** bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 1204.		
Direct	060	16.8
Reverse	*240*	*16.8*
2. **Seguin Island Light** bearing 338°, distant 2.6 miles; and Mile Ledge lighted bell buoy bearing 328°, distant 1.7 miles; 43°40′.0 N., 69°44′.1 W. Chart 314.		
Direct	031	7.6
Pass Cuckolds bell buoy 1C distant 375 yards.		
Reverse	*211*	*7.6*

Table 34.—Portland Lightship to Boothbay Harbor—Continued

CHARTS 1204, 314, 230

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
3. The Cuckolds Light bearing 305°, distant 0.4 mile; 43°46′.5 N., 69°38′.6 W.		
Direct	000	2.5
Reverse	*180*	*2.5*
4. Whaleback Ledge Daybeacon bearing 270°, distant 250 yards; 43°49′.1 N., 69°38′.6 W.		
Direct	353	0.4
Reverse	*173*	*0.4*
5. Pig Island Ledge Daybeacon bearing 270°, distant 200 yards; 43°49′.4 N., 69°38′.6 W. Chart 230.		
Direct	339	0.6
Reverse	*159*	*0.6*
6. Burnt Island Light bearing 145°, distant 0.6 mile; 43°50′.0 N., 69°38′.9 W.		
Direct	054	0.6
Reverse	*234*	*0.6*
7. Tumbler Island lighted buoy 8 bearing 180°, distant 0.2 mile; 43°50′.4 N., 69°38′.2 W.		
Direct	various	0.8
Reverse	*various*	*0.8*
8. Boothbay Harbor Wharves; 43°51′.0 N., 69°37′.6 W.		

Table 35.—Bantam Rock lighted whistle buoy 16BR to Rockland and Searsport

CHARTS 1204, 1203, 320

1. Bantam Rock lighted whistle buoy 16BR bearing 270°, distant 0.5 mile; 43°42′.0 N., 69°37′.4 W. Chart 1204.		
Direct	060	15.4
Reverse	*240*	*15.4*
2. Old Man Ledge lighted whistle buoy 20M bearing 000°, distant 0.5 mile; 43°49′.7 N., 69°18′.9 W. Chart 1203.		
Direct	056	12.2
Pass Marshall Point lighted whistle buoy 1 distant 0.8 mile.		
Pass Metinic Island ledge buoy distant 650 yards.		
Reverse	*236*	*12.2*
3. Two Bush Ledge lighted gong buoy bearing 000°, close aboard; 43°56′.7 N., 69°05′.0 W.		
Direct	066	3.7
Reverse	*246*	*3.7*
4. Two Bush Island lighted whistle buoy TBI bearing 180°, close aboard; 43°58′.4 N., 69°00′.3 W.		
Direct	002	7.3
Reverse	*182*	*7.3*
5. Owls Head Light bearing 270°, distant 1.9 miles; 44°05′.5 N., 69°00′.0 W.		
Direct	283	2.0
Reverse	*103*	*2.0*
6. Owls Head Light bearing 180°, distant 0.5 mile; 44°06′.0 N., 69°02′.7 W. Chart 320.		
Direct	270	1.4
Reverse	*090*	*1.4*
7. Rockland Breakwater Light bearing 000°, distant 600 yards; 44°06′.0 N., 69°04′.7 W.		

Table 35.—Bantam Rock lighted whistle buoy 16 BR to Rockland and Searsport—Continued

CHARTS 1204, 1203, 320

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Searsport		
5. **Owls Head Light** bearing 270°, distant 1.9 miles; 44°05′.5 N., 69°00′.0 W. Chart 1203.	*Degrees*	*Nautical miles*
Direct	356	5.4
Reverse	*176*	*5.4*
6A. **The Graves Light** bearing 270°, distant 1.1 miles; 44°10′.9 N., 69°00′.6 W.		
Direct	017	12.4
Pass Spruce Head lighted bell buoy 9 distant 0.2 mile.		
Reverse	*197*	*12.4*
7A. **Long Island lighted bell buoy 8** bearing 090°, close aboard; 44°22′.7 N., 68°55′.4 W.		
Direct	015	4.1
Reverse	*195*	*4.1*
8A. **Sears Island buoy 4** bearing 090°, distant 400 yards; 44°26′.7 N., 68°54′.0 W.		
Direct	various	0.4
Reverse	*various*	*0.4*
9A. **Searsport wharves**; 44°27′.0 N., 68°53′.9 W.		

Table 36.—Portland to West Quoddy Head via Inside Passages

CHARTS 325, 315, 314, 313, 322, 310, 235, 309, 227
308, 306, 305, 1201, 304, 303

1. **State Pier**, 43°39′.4 N., 70°14′.8 W. Chart 325.		
Direct	066	0.5
Reverse	*246*	*0.5*
2. **Dredged Channel lighted buoy 5** bearing 156°, distant 200 yards; 43°39′.5 N., 70°14′.2 W.		
Direct	091	0.9
Reverse	*271*	*0.9*
3. **House Island Shoal lighted bell buoy 2** bearing 156°, distant 275 yards; 43°39′.5 N., 70°13′.0 W.		
Direct	008	1.6
Pass between Portland to Casco Channel lighted buoys 1 and 2.		
Reverse	*188*	*1.6*
4. **Portland to Casco Bay Channel lighted buoy 8** bearing 098°, distant 50 yards; 43°41′.1 N., 70°12′.7 W.		
Direct	050	0.7
Reverse	*230*	*0.7*
5. **Brimstone Point Ledge buoy 6** close aboard, 43°41′.5 N., 70°12′.0 W.		
Direct	064	0.6
Reverse	*244*	*0.6*
6. **Cow Island Ledge Light** bearing 353°, distant 0.4 mile; 43°41′.8 N., 70°11′.3 W. Chart 315		
Direct	086	1.5
Pass Little Chebeague Island Shoal buoy 6 distant 400 yards.		
Reverse	*266*	*1.5*
7. **Channel Rock buoy 12** bearing 048°, distant 500 yards; 43°42′.1 N., 70°09′.3 W.		
Direct	043	0.6
Reverse	*223*	*0.6*

Table 36.—Portland to West Quoddy Head via Inside Passages—Continued

CHARTS 325, 315, 314, 313, 312, 310, 235, 309, 227
308, 306, 305, 1201, 304, 303

Position (Reverse directions in *italics*—read upward)	True course	Distance
8. Little Chebeague Island Point buoy 10 bearing 272°, close aboard; 43°42′.5 N., 70°08′.7 W.	*Degrees*	*Nautical miles*
Direct	043	0.4
Reverse	*223*	*0.4*
9. Chimney on northeastern point of Little Chebeague Island bearing 290°, distant 580 yards; 43°42′.7 N., 70°08′.3 W.		
Direct	124	0.3
Pass Crow Island Ledge buoy 7 close aboard.		
Reverse	*304*	*0.3*
10. Deer Point bell buoy 4A bearing 136°, distant 400 yards; 43°42′.5 N., 70°07′.9 W.		
Direct	184	0.3
Reverse	*004*	*0.3*
11. Deer Point Rock buoy bearing 056°, distant 380 yards; 43°42′.3 N., 70°07′.9 W.		
Direct	055	1.5
Reverse	*235*	*1.5*
12. Sand Island Ledge buoy 7 bearing 091°, distant 200 yards; 43°43′.2 N., 70°06′.3 W.		
Direct	071	1.6
Reverse	*251*	*1.6*
13. Stave Island Ledge buoy 5 bearing 239°, distant 0.4 mile; 43°43′.6 N., 70°04′.3 W.		
Direct	117	1.6
Reverse	*297*	*1.6*
14. Haddock Rock buoy 3 bearing 065°, distant 160 yards; 43°42′.8 N., 70°02′.4 W.		
Direct	194	0.2
Reverse	*014*	*0.2*
15. Little Mark Island Light bearing 104°, distant 0.4 mile; 43°42′.6 N., 70°02′.4 W.		
Direct	140	1.1
Reverse	*320*	*1.1*
16. Little Mark Island Light bearing 339°, distant 0.7 mile; 43°41′.9 N., 70°01′.5 W.		
Direct	088	7.5
Reverse	*268*	*7.5*
17. Bald Head Ledge Daybeacon bearing 180°, distant 400 yards; 43°42′.1 N., 69°51′.2 W. Chart 314.		
Direct	104	0.9
Reverse	*284*	*0.9*
18. Fuller Rock Light bearing 180°, distant 300 yards; 43°41′.9 N., 69°50′.0 W.		
Direct	062	4.3
Pass 220 yards south of Jacknife Ledge buoy 1JK.		
Reverse	*242*	*4.3*
19. White Ledge lighted bell buoy 1 bearing 180°, distant 100 yards; 43°43′.9 N., 69°44′.9 W.		
Direct	054	1.4
Reverse	*234*	*1.4*
20. The Sisters Daybeacon bearing 180°, distant 500 yards; 43°44′.7 N., 69°43′.3 W.		
Direct	064	3.5
Reverse	*244*	*3.5*
21. Cuckolds bell buoy 1C bearing 000°, distant 300 yards; 43°46′.2 N., 69°39′.0 W.		
Direct	045	3.1
Reverse	*225*	*3.1*
22. Ram Island Light bearing 180°, distant 400 yards; 43°48′.4 N., 69°36′.0 W.		
Direct	089	3.5
Pass close aboard Ram Island Ledge bell buoy 1.		
Pass close aboard Hypocrite Ledge bell buoy HL. Change to Chart 313.		
Reverse	*269*	*3.5*

Table 36.—Portland to West Quoddy Head via Inside Passages—Continued

CHARTS 325, 315, 314, 322, 310, 235, 309, 227
308, 306, 305, 1201, 304, 303

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
23. **Pemaquid Ledge buoy** bearing 000°, distant 0.5 mile; 43°48′.5 N., 69°31′.2W.		
Direct	061	6.9
Reverse	*241*	*6.9*
24. **Egg Rock North Ledge buoy 1** close aboard; 43°51′.8 N., 69°22′.9 W.		
Direct	063	3.6
Pass 150 yards northward of Seal Ledges buoy 7.		
Reverse	*243*	*3.6*
25. **Griffin Ledge buoy 8** bearing 000°, close aboard; 43°53′.5 N., 69°18′.4 W. Chart 313.		
Direct	049	2.2
Pass Gig Rock bell buoy 7 close aboard.		
Pass The Sisters buoy 5 close aboard.		
Reverse	*229*	*2.2*
26. **Allen Ledge buoy 3** bearing 180°, distant 50 yards; 43°54′.9 N., 69°16′.1 W.		
Direct	100	0.4
Reverse	*280*	*0.4*
27. **Marshall Ledge buoy 4** bearing 000°, distant 100 yards; 43°54′.8 N., 69°15′.6 W.		
Direct	076	0.8
Reverse	*256*	*0.8*
28. **Mosquito Island Ledge buoy 2** bearing 000°, distant 200 yards; 43°55′.0 N., 69°14′.6 W.		
Direct	109	1.1
Reverse	*289*	*1.1*
29. **Mosquito Island bell buoy 2MI** bearing 000°, distant 200 yards; 43°54′.6 N., 69°13′.1 W.		
Direct	048	5.5
Reverse	*228*	*5.5*
30. **South Breaker bell buoy 2SB** bearing 180°, distant 150 yards; 43°58′.4 N., 69°07′.5 W. Chart 322.		
Direct	028	1.0
Reverse	*208*	*1.0*
31. **Lower Gangway Ledge buoy 4** bearing 090°, distant 100 yards; 43°59′.2 N., 69°06′.9 W.		
Direct	036	3.3
Reverse	*216*	*3.3*
32. **Upper Gangway Ledge buoy** bearing 090°, distant 200 yards; 44°01′.9 N., 69°04′.2 W. Chart 310.		
Direct	029	0.5
Reverse	*209*	*0.5*
33. **Ash Island bell buoy 11** bearing 270°, distant 150 yards; 44°02′.4 N., 69°03′.9 W.		
Direct	011	1.7
Reverse	*191*	*1.7*
34. **Sheep Island Bar buoy 2** bearing 090°, distant 50 yards; Sleepers Point buoy bearing 270°, distant 125 yards; 44°04′.0 N., 69°03′.5 W.		
Direct	029	1.7
Pass 200 yards eastward of Owls Head Ledge buoy 3.		
Reverse	*209*	*1.7*
35. **Owls Head Light** bearing 270°, distant 0.2 mile; 44°05′.5 N., 69°02′.4 W.		
Direct	086	4.3
Pass southward of Fiddler Ledge gong buoy 22, distant 125 yards.		
Reverse	*266*	*4.3*
To Casco Passage via Eggemoggin Reach see Table 36A		
36. **Fiddler Ledge Daybeacon** bearing 000°, distant 500 yards; 44°05′.8 N., 68°56′.4 W.		
Direct	052	1.4
Change to Chart 235 (*310*) in 44°05′.8 N., 68°56′.4 W.		
Reverse	*232*	*1.4*

892339°—51——9

Table 36.—Portland to West Quoddy Head via Inside Passages—Continued

CHARTS 325, 315, 314, 322, 310, 235, 309, 227
308, 306, 305, 1201, 304, 303

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
37. Browns Head Light bearing 090°, distant 400 yards; 44°06′.7 N., 68°54′.9 W.		
Direct	038	1.0
Reverse	*218*	*1.0*
38. Young Point Daybeacon bearing 100°, distant 200 yards; 44°07′.5 N., 68°54′.1 W.		
Direct	072	0.55
Reverse	*252*	*0.55*
39. Calf Point buoy 5 bearing 180°, distant 110 yards; 44°07′.7 N., 68°53′.2 W.		
Direct	112	0.6
Reverse	*292*	*0.6*
40. Post Office Ledge buoy 16 bearing 000°, distant 100 yards; 44°07′.4 N., 68°52′.5 W.		
Direct	099	0.55
Reverse	*279*	*0.55*
41. Grindstone Ledge buoy 12 bearing 035°, distant 250 yards; 44°07′.3 N., 68°51′.7 W.		
Direct	054	0.35
Reverse	*234*	*0.35*
42. Dobbin Rock buoy 10 bearing 000°, distant 50 yards; 44°07′.5 N., 68°51′.3 W.		
Direct	049	0.65
Reverse	*229*	*0.65*
43. Fish Point Ledge buoy 6 bearing 322°, distant 200 yards; 44°08′.0 N., 68°50′.7 W.		
Direct	085	0.6
Pass Birch Island buoy 3 bearing 180°, distant 75 yards.		
Reverse	*265*	*0.6*
44. Goose Rocks Light bearing 000°, distant 200 yards; 44°08′.0 N., 68°49′.9 W.		
Direct	111	1.1
Reverse	*291*	*1.1*
45. Channel Rock bell buoy 4 bearing 000°, distant 200 yards; 44°07′.7 N., 68°48′.5 W.		
Direct	084	4.5
Pass Babbidge Island Ledge buoy 2A bearing 000°, distant 125 yards.		
Pass West Mark Island Ledge buoy 2 bearing 000°, distant 150 yards.		
Change to Chart 309 (*235*) in 44°07′.7 N., 68°48′.5 W.		
Reverse	*264*	*4.5*
46. Deer Island Thorofare Light bearing 180°, distant 300 yards; 44°08′.2 N., 68°42′.2 W. Chart 227.		
Direct	061	1.6
Pass Field Ledge buoy 15 bearing 180°, distant 75 yards.		
Pass Moose Island Rock buoy 16 bearing 000°, distant 25 yards.		
Pass Crotch Island buoy 13 bearing 180°, distant 75 yards.		
Reverse	*241*	*1.6*
Merchant Row to Casco Passage see Table 36B		
47. Thurlow Knob Ledge buoy 11 bearing 180°, distant 75 yards; 44°09′.0 N., 68°40′.3 W.		
Direct	078	1.1
Pass southward of Staple Point buoy 14 and Dow Ledge buoy 12.		
Reverse	*258*	*1.1*
48. Russ Island Ledge buoy 9 bearing 180°, distant 50 yards; 44°09′.2 N., 68°38′.8 W.		
Direct	082	0.8
Reverse	*262*	*0.8*
49. Camp Island eastern extremity bearing 180°, distant 400 yards; Bold Island northern extremity bearing 079°, distant 0.6 mile; 44°09′.3 N., 68°37′.6 W.		
Direct	038	0.5
Reverse	*218*	*0.5*

Table 36.—Portland to West Quoddy Head via Inside Passages—Continued

CHARTS 325, 315, 314, 322, 310, 235, 309, 227
308, 306, 305, 1201, 304, 303

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
50. **Bold Island western ledge buoy 7** bearing 180°, distant 100 yards; 44°09′.7 N., 68°37′.2 W.		
Direct	070	0.5
Reverse	*250*	*0.5*
51. **Haskell Ledge buoy 8** bearing 000°, distant 100 yards; 44°09′.0 N., 68°36′.5 W.		
Direct	070	0.9
Pass White Rock buoy 6 marking One-Foot Shoal bearing 000°, distant 50 yards.		
Reverse	*250*	*0.9*
52. **Haycock Rock Daybeacon** bearing 180°, distant 200 yards; 44°10′.2 N., 68°35′.4 W.		
Direct	050	0.4
Reverse	*230*	*0.4*
53. **Eastern Mark Island Ledge buoy 3** bearing 210°, distant 250 yards; Boat Rock buoy bearing 318°, distant 0.4 mile; 44°10′.5 N., 68°34′.9 W.		
Direct	084	1.5
Reverse	*264*	*1.5*
54. **Long Ledge bell buoy 2** bearing 000°, distant 100 yards; 44°10′.6 N., 68°32′.8 W. Chart 308.		
Direct	077	1.6
Reverse	*257*	*1.6*
Casco Passage to Merchant Row see Table 36B		
55. **Egg Rock bell buoy 8** bearing 000°, distant 100 yards; 44°11′.0 N., 68°30′.6 W.		
Direct	058	1.3
Reverse	*238*	*1.3*
To Owls Head via Eggemoggin Reach see Table 36A		
56. **Long Ledge Northwest Point buoy 7** bearing 180°, distant 150 yards; 44°11′.7 N., 68°29′.1 W. Chart 227.		
Direct	090	1.6
Pass close aboard northward of Middle Ledge buoy 5.		
Pass close aboard New Rock buoy 2NR.		
Pass 100 yards southward of Block Island Ledge buoy 2.		
Reverse	*270*	*1.6*
57. **York Narrows bell buoy** bearing 000°, distant 300 yards; 44°11′.7 N., 68°26′.8 W. Chart 307.		
Direct	073	4.9
Reverse	*253*	*4.9*
58. **Bass Harbor Bar buoy** close aboard; 44°13′.2 N., 68°20′.3 W. Chart 306.		
Direct	088	1.7
Reverse	*268*	*1.7*
To Petit Manan via Western Way see Table 36C		
59. **Long Ledge lighted gong buoy 1** bearing 000°, distant 100 yards; 44°13′.3 N., 68°17′.8 W.		
Direct	086	5.0
Reverse	*266*	*5.0*
60. **Baker Island whistle buoy 8A** bearing 000°, close aboard; 44°13′.6 N., 68°10′.9 W.		
Direct	049	8.3
Reverse	*229*	*8.3*
61. **Schoodic whistle buoy 8S** bearing 000°, distant 200 yards; 44°19′.0 N., 68°02′.2 W. Chart 305.		
Direct	075	7.8
Reverse	*255*	*7.8*

Table 36.—Portland to West Quoddy Head via Inside Passages—Continued

CHARTS 325, 315, 314, 322, 310, 235, 309, 227
308, 306, 305, 1201, 304, 303

Position (Reverse directions in *italics*—read upward)	True course	Distance
Bass Harbor Bar via Western Way see Table 36C		
62. Petit Manan Light bearing 347°, distant 1.0 mile; Petit Manan bell buoy close aboard; 44°21′.1 N., 67°51′.6 W.	*Degrees*	*Nautical miles*
Direct	034	8.7
Pass Nash Island lighted whistle buoy distant 500 yards.		
Reverse	*214*	*8.7*
63. Nash Island Light bearing 190°, distant 0.5 mile; 44°28′.3 N., 67°44′.7 W. Chart 304.		
Direct	051	2.2
Reverse	*231*	*2.2*
64. Midway between Tabbott Ledge buoy 16 and Ram Ledge buoy 13; 44°29′.7 N., 67°42′.3 W.		
Direct	046	1.5
Reverse	*226*	*1.5*
65. Shabbit Island Ledge buoy 11 bearing 090°, distant 250 yards; 44°30′.8 N., 67°40′.7 W.		
Direct	064	0.5
Reverse	*244*	*0.5*
66. Fessenden Ledge buoy 14 bearing 000°, close aboard; 44°31′.0 N., 67°40′.0 W.		
Direct	077	1.0
Reverse	*257*	*1.0*
67. Pomp Island northern extremity bearing 180°, distant 0.2 mile; 44°31′.2 N., 67°38′.7 W.		
Direct	080	1.5
Reverse	*260*	*1.5*
68. Cummings Ledge buoy 12 bearing 000°, distant 150 yards; 44°31′.5 N., 67°36′.7 W.		
Direct	079	1.1
Reverse	*259*	*1.1*
69. Horse Ledge buoy 9 bearing 180°, close aboard; 44°31′.7 N., 67°35′.2 W.		
Direct	085	1.0
Note: Proceed through Narrows with caution, follow aids to navigation on approximately the following courses.		
Reverse	*265*	*1.0*
70. Moosabec Reach buoy 6 bearing 000°, close aboard; 44°31′.8 N., 67°33′.8 W.		
Direct	071	0.6
Reverse	*251*	*0.6*
71. Leighton Rock buoy 2A bearing 000°, close aboard; 44°32′.0 N., 67°33′.1 W.		
Direct	073	1.0
Reverse	*253*	*1.0*
72. Mark Island bell buoy 1 bearing 180°, close aboard; 44°32′.2 N., 67°31′.8 W.		
Direct	078	7.1
Pass Jumper Ledge buoy distant 400 yards.		
Reverse	*258*	*7.1*
73. Libby Island Light bearing 000°, distant 0.5 mile; 44°33′.6 N., 67°22′.1 W.		
Direct	064	4.9
Reverse	*244*	*4.9*
74. Tower of Cross Island Coast Guard Station bearing 334°, distant 1.1 miles; 44°35′.7 N., 67°15′.9 W. Chart 303.		
Direct	055	4.5
Reverse	*235*	*4.5*
75. Little River Light bearing 323°, distant 1.0 mile; 44°38′.2 N., 67°10′.7 W. Chart 1201.		
Direct	045	14.5
Pass Baileys Mistake lighted whistle buoy BM, distant 1.2 miles.		
Reverse	*225*	*14.5*
76. West Quoddy Head Light bearing 311°, distant 0.7 mile; Sail Rock lighted whistle buoy 1 bearing 311°, distant 200 yards; 44°48′.4 N., 66°56′.3 W.		

Table 36A.—Owls Head to Casco Passage via Eggemoggin Reach

CHARTS 310, 309, 308

Position (Reverse directions in *italics*—read upward)	True course	Distance
35. Owls Head Light bearing 270°, distant 500 yards; 44°05′.5 N., 69°02′.3 W. Chart 310.	*Degrees*	*Nautical miles*
Direct	042	5.2
Reverse	*222*	*5.2*
36A. McIntosh Ledge buoy 1 bearing 270°, distant 200 yards; 44°09′.3 W., 68°57′.6 W.		
Direct	030	7.3
Pass Mouse Island Reef buoy 1A bearing 270°, distant 300 yards.		
Reverse	*210*	*7.3*
37A. Resolution Island northern extremity bearing 090°, distant 0.6 mile; 44°15′.6 N., 68°52′.5 W.		
Direct	041	3.0
Reverse	*221*	*3.0*
38A. Green Ledge Light bearing 180°, distant 0.5 mile; 44°17′.9 N., 68°49′.7 W.		
Direct	087	2.3
Change to Chart 309 (*310*) in 44°18′.2 N., 68°49′.8 W.		
Reverse	*267*	*2.3*
39A. Eggemoggin Reach bell buoy bearing 000°, close aboard; 44°18′.0 N., 68°46′.5 W.		
Direct	052	1.3
Pass Eggemoggin Reach buoy 19 close aboard.		
Reverse	*232*	*1.3*
40A. Pumpkin Island Ledge buoy 15 bearing 180°, distant 200 yards; 44°18′.8 N., 68°45′.1 W.		
Direct	071	0.75
Reverse	*251*	*0.75*
41A. Triangle Ledges buoy 11 bearing 180°, distant 300 yards; 44°19′.0 N., 68°44′.1 W.		
Direct	125	2.7
Reverse	*305*	*2.7*
42A. Byard Point buoy 18 bearing 000°, distant 550 yards; 44°17′.4 N., 68°41′.0 W.		
Direct	107	1.2
Reverse	*287*	*1.2*
43A. Sixteen-Foot Spot buoy 7 bearing 180°, distant 400 yards; 44°17′.1 N., 68°39′.4 W.		
Direct	131	1.9
Reverse	*311*	*1.9*
44A. Bridges Point Shoal buoy 12 bearing 000°, distant 0.3 mile; 44°15′.9 N., 68°37′.5 W.		
Direct	139	1.3
Reverse	*319*	*1.3*
45A. Torry Castle Daybeacon bearing 045°, distant 400 yards; 44°15′.0 N., 68°36′.4 W.		
Direct	125	3.5
Reverse	*305*	*3.5*
46A. Devils Head Ledge buoy 6 bearing 000°, distant 300 yards; 44°12′.9 N., 68°32′.4 W. Chart 308.		
Direct	125	2.4
Reverse	*305*	*2.4*
47A. Casco Passage Ledge buoy 4 bearing 000°, distant 200 yards; 44°11′.5 N., 68°29′.7 W.		
Direct	076	0.4
Reverse	*256*	0.4
56. Long Ledge Northwest Point buoy 7 bearing 180°, distant 75 yards; 44°11′.6 N., 68°29′.1 W.		

Table 36B.—Merchant Row to Casco Passage

CHART 227

Position (Reverse directions in *italics*—read upward)	True course	Distance
46. Deer Island Thorofare Light bearing 045°, distant 650 yards; 44°07′.8 N., 68°42′.6 W.	*Degrees*	*Nautical miles*
Direct	127	1.0
Reverse	*307*	*1.0*
47B. Farrel Island western extremity bearing 027°, distant 550 yards; Sparrow Island eastern extremity bearing 205°, distant 550 yards; 44°07′.2 N., 68°41′.5 W.		
Direct	101	1.3
Reverse	*281*	*1.3*
48B. Mid-channel Ledge buoy 2 bearing 000°, distant 200 yards; 44°07′.0 N., 68°39′.7 W.		
Direct	090	1.2
Reverse	*270*	*1.2*
49B. Barter Island Ledges Daybeacon bearing 000°, distant 300 yards; 44°07′.0 N., 68°38′.2 W.		
Direct	087	1.8
Reverse	*267*	*1.8*
50B. Colby Pup buoy 1 bearing 180°, distant 250 yards; 44°07′.1 N., 68°35′.6 W.		
Direct	046	1.3
Pass 500 yards southeast of Colby Ledge Daybeacon.		
Reverse	*226*	*1.3*
51B. Southern Mark Island Ledge center bearing 270°, distant 600 yards; 44°07′.9 N., 68°34′.3 W.		
Direct	036	1.6
Reverse	*216*	*1.6*
52B. Whaleback Ledge buoy 5 bearing 270°, distant 400 yards; 44°09′.3 N., 68°33′.0 W.		
Direct	014	1.5
Reverse	*194*	*1.5*
54. Long Ledge bell buoy 2 bearing 270°, distant 500 yards; 44°10′.7 N., 68°32′.5 W.		

Table 36C.—Bass Harbor Bar to Petit Manan via Western Way

CHARTS 306, 305

58. Bass Harbor Bar buoy close aboard; 44°13′.2 N., 68°20′.3 W. Chart 306.		
Direct	088	1.7
Reverse	*268*	*1.7*
59C. Long Ledge lighted gong buoy 1 bearing 000°, distant 100 yards; 44°13′.2 N., 68°17′.8 W.		
Direct	026	1.1
Reverse	*206*	*1.1*
60C. Western Way lighted bell buoy WW bearing 090° close aboard; 44°14′.2 N., 68°17′.2 W.		
Direct	026	0.3
Pass 100 yards westward of Cranberry Island Ledge buoy 2.		
Reverse	*206*	*0.3*
61C. Flynns Ledge buoy 3 bearing 270°, close aboard; 44°14′.4 N., 68°17′.0 W.		
Direct	357	1.1
Reverse	*177*	*1.1*
62C. Boathouse Point buoy bearing 090° close aboard; 44°15′.5 N., 68°17′.1 W.		
Direct	024	1.3
Reverse	*204*	*1.3*

Table 36C.—Bass Harbor to Petit Manan via Western Way—Continued

CHARTS 306, 305

Position (Reverse directions in *italics*—read upward)	True course	Distance
63C. Bear Island Light bearing 024°, distant 600 yards; northwestern extremity of Sutton Island bearing 143°, distant 400 yards; 44°16′.7 N., 68°16′.4 W.	*Degrees*	*Nautical miles*
Direct	079	1.9
Keep southeast point of Greening Island astern (*ahead*) on course line.		
Reverse	*259*	*1.9*
64C. Seal Harbor lighted buoy 2 bearing 000°, distant 200 yards; 44°17′.1 N., 68°13′.8 W.		
Direct	077	8.6
Pass 200 yards north of Lewis Rock buoy 3A.		
Reverse	*257*	*8.6*
65C. Schoodic whistle buoy 8S bearing 000°, distant 200 yards; 44°19′.0 N., 68°02′.2 W.		
Direct	075	7.8
Change to Chart 305 (*306*) in 44°19′.0 N., 68°02′.2 W.		
Reverse	*255*	*7.8*
62. Petit Manan bell buoy close aboard; 44°21′.1 N., 67°51′.6 W.		

Port Courses

Table 37.—Plymouth Harbor Entrance to Wharves

CHART 245

1. Gurnet Point bell buoy close aboard; 42°00′.0 N., 70°35′.1 W.		
Direct	253	1.1
Pass 100 yards south of Bar Rock buoy 4.		
Reverse	*073*	*1.1*
2. Plymouth Main Channel lighted buoy 3 bearing 180°, close aboard; 41°59′.6 N., 70°36′.5 W.		
Direct	247	1.1
Reverse	*067*	*1.1*
3. Plymouth Main Channel buoy 6 bearing 317°, distant 310 yards; 41°59′.2 N., 70°37′.8 W.		
Direct	263	1.1
Reverse	*083*	*1.1*
4. Plymouth Channel lighted bell buoy 1 bearing 151°, distant 80 yards; 41°59′.1 N., 70°39′.3 W.		
Direct	various	2.4
Reverse	*various*	*2.4*
5. Plymouth Wharves bearing 270°, close aboard; 41°57′.7 N., 70°40′.1 W.		

Table 38.—Boston Lightship to Deer Island Light via Broad Sound North Channel

CHART 246

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
1. Boston Lightship bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W.		
Direct	323	3.5
Reverse	*143*	*3.5*
1A. Boston Lightship bearing 180°, distant 0.5 mile; 42°20′.9 N., 70°45′.5 W.		
Direct	300	2.8
Reverse	*120*	*2.8*
2. Boston lighted bell buoy 1 bearing 180°, distant 0.5 mile; 42°22′.3 N., 70°48′.8 W.		
Direct	300	2.2
Reverse	*120*	*2.2*
3. The Graves lighted whistle buoy 5 bearing 202°, distant 0.5 mile; with The Graves Light and Boston Light on range; 42°23′.4 N., 70°51′.4 W.		
Direct	248	2.4
Reverse	*068*	*2.4*
4. North Channel lighted gong buoy B close aboard; 42°22′.5 N., 70°54′.3 W.		
Direct	233	0.8
Reverse	*053*	*0.8*
5. North Channel lighted bell buoy 2 bearing 008°, distant 275 yards; 42°22′.0 N., 70°55′.2 W.		
Direct	210	1.7
Reverse	*030*	*1.7*
6. North Channel lighted bell buoy 10 bearing 270°, distant 300 yards; 42°20′.6 N., 70°56′.4 W.		
Direct	243	0.8
Reverse	*063*	*0.8*
7. Deer Island Light bearing 000°, distant 320 yards; 42°20′.2 N., 70°57′.3 W.		

Table 39.—Boston Lightship to Deer Island Light via Broad Sound South Channel

CHART 246

1. Boston Lightship bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W.		
Direct	321	3.3
Reverse	*141*	*3.3*
1A. Boston Lightship bearing 180°, distant 0.5 mile; 42°20′.9 N., 70°45′.5 W.		
Direct	295	2.7
Reverse	*115*	*2.7*
2. Boston lighted bell buoy 1 bearing 180° distant 600 years; 42°22′.0 N., 70°48′.8 W.		
Direct	295	2.3
Reverse	*115*	*2.3*
3. The Graves lighted whistle buoy 5 bearing 180°,distant 200 yeards; 42°23′.0 N., 70°51′.6 W.		
Direct	237	2.0
Reverse	*057*	*2.0*
4. South Channel entrance buoy 1 bearing 100°, distant 250 yards; 42°21′.9 N., 70°53′.9 W.		
Direct	217	1.6
Reverse	*037*	*1.6*
5. South Channel buoy 9 bearing 103°, distant 300 yards; 42°20′.6 N., 70°55′.3 W.		
Direct	252	1.6
Reverse	*072*	*1.6*
6. Deer Island Light bearing 000°, distant 500 yards; 42°20′.1 N., 70°57′.3 W.		

Table 40.—Boston Lightship to Deer Island Light via The Narrows

CHART 246

Position (Weverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
1. **Boston Lightship** bearing 180°, distant 0.5 mile; 42°20′.9 N., 70°45′.5 W.		
Direct	254	3.4
1A. **Boston Lightship** bearing 000°, distant 0.5 mile; 42°19′.9 N., 70°45′.5 W.		
Reverse	*091*	*3.2*
2. **Thieves Ledge lighted whistle buoy 1B** bearing 180°, distant 0.4 mile; 42°20′.0 N., 70°49′.8 W.		
Direct	254	2.8
Reverse	*074*	*2.8*
3. **Boston Light** bearing 000°, distant 0.5 mile; 42°19′.2 N., 70°53′.4 W.		
Direct	270	1.0
Reverse	*090*	*1.0*
4. **Kelly Rock bell buoy 10** bearing 020°, distant 100 yards; 42°19′.2 N., 70°54′.8 W.		
Direct	287	0.4
Reverse	*107*	*0.4*
5. **Midway between channel buoys 7 and 12** west of Narrows Light; 42°19′.3 N., 70°55′.4 W.		
Direct	308	0.5
Reverse	*128*	*0.5*
6. **Gallups Island Light** bearing 220°, distant 250 yards; 42°19′.6 N., 70°55′.9 W.		
Direct	311	0.7
Reverse	*131*	*0.7*
7. **Nixes Mate lighted gong buoy** bearing 225°, distant 170 yards; 42°20′.1 N., 70°56′.6 W.		
Direct	274	0.5
Reverse	*094*	*0.5*
8. **Deer Island Light** bearing 000°, distant 500 yards; 42°20′.1 N., 70°57′.3 W. **Note:** Due to strong currents and sharp turns it is necessary to con a ship by eye through the approaches and in The Narrows Channel.		

Table 41.—Deer Island Light to Boston Wharves

CHART 246

1. **Deer Island Light** bearing 000°, distant 320 yards; 42°20′.2 N., 70°57′.3 W.		
Direct	260	1.6
Reverse	*080*	*1.6*
2. **Boston Main Channel lighted bell buoy 2** bearing 009°, distant 200 yards; 42°19′.9 N., 70°59′.5 W.		
Direct	290	0.4
Reverse	*110*	*0.4*
3. **Boston Main Channel lighted buoy 4** bearing 026°, distant 200 yards; 42°20′.1 N., 71°00′.0 W.		
Direct	310	1.3
Reverse	*130*	*1.3*
4. **Boston Main Channel lighted buoy 10** bearing 000°, distant 210 yards; 42°20′.9 N., 71°01′.3 W.		
Direct	302	0.6
Reverse	*122*	*0.6*
5. **Boston Main Channel lighted buoy 11** bearing 249°, distant 280 yards; 42°21′.2 N., 71°02′.0 W.		
For anchorage grounds see §202.134 in Chapter 2.		

Table 42.—Deer Island Light to Dorchester Bay

CHART 246

Position (Reverse directions in *italics*—read upward	True course	Distance
	Degrees	*Nautical miles*
1. Deer Island Light bearing 000°, distant 500 yards; 42°20′.1 N., 70°57′.3 W.		
Direct	264	1.6
Reverse	*084*	*1.6*
2. Main Channel lighted bell buoy 2 bearing 010°, distant 200 yards; 42°20′.0 N., 70°59′.5 W.		
Direct	230	0.5
Reverse	*050*	*0.5*
3. Old Harbor Shoal buoy 2 bearing 270°, distant 100 yards; 42°19′.6 N., 71°00′.0 W.		
Direct	236	0.7
Reverse	*056*	*0.7*
4. Thompson Island Wharf bearing 128°, distant 300 yards; 42°19′.3 N., 71°00′.8 W.		
Direct	242	0.5
Reverse	*062*	*0.5*
5. Old Harbor buoy 4 close aboard; 42°19′.0 N., 71°01′.4 W.		
Direct	218	0.7
Reverse	*038*	*0.7*
6. Cow Pasture Flats lighted buoy 6 bearing 270°, distant 100 yards; 42°18′.5 N., 71°01′.9 W.		
Direct	251	0.3
Reverse	*071*	*0.3*
7. Farm Point Shoal buoy 5 close aboard; 42°18′.4 N., 71°02′.4 W.		
Direct	235	0.2
Reverse	*055*	*0.2*
8. Squantum Point buoy 7 bearing 154°, distant 100 yards; 42°18′.25 N., 71°02′.60 W.		
Direct	185	0.15
Reverse	*005*	*0.15*
9. Commercial Point docks bearing 270°, distant 40 yards; 42°18′.1 N., 70°02′.6 W.		
To proceed to docks or up the river follow aids to navigation and the chart.		

Table 43.—Boston Lightship to Quincy via Weymouth, Fore River

CHART 246

1. Boston Lightship bearing 180°, distant 0.5 mile; 42°20′.9 N., 70°45′.5 W.		
Direct	254	3.4
1A. Boston Lightship bearing 000°, distant 0.5 mile; 42°19′.9 N., 70°45′.5 W.		
Reverse	*091*	*3.2*
2. Thieves Ledge lighted whistle buoy 1B bearing 180°, distant 0.4 mile; 42°20′.0 N., 70°49′.8 W.		
Direct	254	2.8
Reverse	*074*	*2.8*
3. Boston Light bearing 000°, distant 0.5 mile; 42°19′.2 N., 70°53′.4 W.		
Direct	259	0.9
Pass 100 yards northwestward of Nantasket Roads lighted buoy 1.		
Reverse	*079*	*0.9*

Table 43.—Boston Lightship to Quincy via Weymouth, Fore River—Con.

CHART 246

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
4. **Nantasket Roads buoy 2** bearing 316°, distant 100 yards; 42°19′.0 N., 70°54′.7 W.		
Direct	241	1.8
Pass southward, close aboard Nantasket Roads lighted buoy 4.		
Reverse	*061*	*1.8*
5. **Peddocks Island Channel lighted buoy** bearing 000°, distant 100 yards; 42°18′.1 N., 70°56′.8 W.		
Direct	210	0.9
Reverse	*030*	*0.9*
6. **Peddocks Island Channel Light 2** bearing 348°, distant 510 yards; 42°17′.4 N., 70°57′.4 W.		
Direct	170	0.2
Reverse	*350*	*0.2*
7. **West Gut lighted buoy** bearing 270°, close aboard; 42°17′.2 N., 70°57′.3 W.		
Direct	126	0.5
Pass close aboard Peddocks Island lighted buoy 5.		
Reverse	*306*	*0.5*
8. **Peddocks Island buoy 6** bearing 180°, close aboard; 42°16′.9 N., 70°56′.8 W.		
Direct	092	0.6
Reverse	*272*	*0.6*
9. **Pig Rock Light** bearing 246°, distant 400 yards; 42°16′.9 N., 70°56′.0 W.		
Direct	149	0.2
Reverse	*329*	*0.2*
10. **Sheep Island lighted buoy 1** close aboard; 42°16′.7 N., 70°55′.9 W.		
Direct	180	0.4
Reverse	*000*	*0.4*
11. **Fore River Channel buoy 2A** bearing 270°, distant 100 yards; 42°16′.3 N., 70°55′.9 W.		
Direct	210	1.2
Reverse	*030*	*1.2*
12. **Fore River Channel Light 4** bearing 327°, distant 150 yards; 42°15′.3 N., 70°56′.7 W.		
Direct	241	1.1
Reverse	*061*	*1.1*
13. **Fore River Channel buoy 10** bearing 054°, distant 450 yards; 42°14′.7 N., 70°58′.0 W.		
Direct	204	0.4
Pass through highway drawbridge.		
Reverse	*024*	*0.4*
14. **Fore River Shipyard Wharves**; 42°14′.4 N., 70°58′.2 W.		

Table 44.—Boston Light to Quincy (Weymouth Fore River) via Nantasket Roads through Nantasket Gut and Hingham Bay

CHART 246

1. **Boston Light** bearing 054°, distant 0.8 mile; 42°19′.2 N., 70°54′.3 W.		
Direct	240	0.8
Pass 50 yards southeastward of Nantasket Roads buoy 2 and 100 yards southeastward of Nantasket Roads lighted buoy 4.		
Reverse	*060*	*0.8*
2. **Nantasket Roads buoy 6** bearing 000°, distant 200 yards.		
Direct	211	0.55
Reverse	*031*	*0.55*

Table 44.—Boston Light to Quincy (Weymouth Fore River) via Nantasket Roads through Nantasket Gut and Hingham Bay—Continued

CHART 246

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
3. Windmill Point Light bearing 128°, distant 525 yards.		
Direct	154	0.4
Pass 50 yards eastward of Nantasket Gut buoy 2.		
Reverse	*334*	*0.4*
4. Outer and Peddocks Island wharf bearing 255°, distant 325 yards.		
Direct	203	1.2
Pass 150 yards eastward of Harrys Rock Light 2.		
Reverse	*023*	*1.2*
5. Pig Rock Light bearing 246°, distant 400 yards.		
Direct	149	0.2
Reverse	*329*	*0.2*
6. Sheep Island lighted buoy 1 close aboard.		
Direct	180	0.4
Reverse	*000*	*0.4*
7. Fore River Channel buoy 2A bearing 270°, distant 100 yards.		
Direct	210	1.2
Reverse	*030*	*1.2*
8. Fore River Channel Light 4 bearing 327°, distant 150 yards.		
Direct	241	1.1
Reverse	*061*	*1.1*
9. Fore River Channel buoy 10 bearing 054°, distant 450 yards.		
Direct	204	0.4
Pass through highway drawbridge.		
Reverse	*024*	*0.4*
10. Fore River Shipyard Wharves; 42°14′.4 N., 70°58′.2 W.		

Table 45.—Lynn Channel Entrance to Lynn

CHART 240

1. Lynn Channel lighted bell buoy 2 bearing 025°, distant 0.1 mile; 42°25′.1 N., 70°57′.2 W.		
Direct	002	0.4
Reverse	*182*	*0.4*
2. White Rocks Light bearing 310°, distant 90 yards.		
Direct	031	0.5
Reverse	*211*	*0.5*
3. Black Rocks Light bearing 270°, distant 90 yards.		
Direct	023	0.6
Reverse	*203*	*0.6*
4. Sandy Point Light bearing 335°, distant 100 yards.		
Direct	various	0.3
Reverse	*various*	*0.3*
5. Black Marsh Channel Light bearing 270°, distant 80 yards.		
Direct	342	0.4
Reverse	*162*	*0.4*
6. In Basin; 42°27′.3 N., 70°56′.7 W.		

Table 46.—Eastern Point lighted whistle buoy 2A to Gloucester Inner Harbor

CHARTS 243, 233

Position (Reverse directions in *italics*—read upward)	True course	Distance
Maximum draft 22 feet		
1. Eastern Point lighted whistle buoy 2A bearing 090°, distant 0.5 mile; 42°34′.2 N., 70°40′.5 W. Chart 243.	*Degrees*	*Nautical miles*
Direct	341	0.8
Reverse	*161*	*0.8*
2. Round Rock Shoal lighted buoy 2 bearing 158°, distant 280 yards; 42°35′.0 N., 70°40′.9 W. Chart 233.		
Direct	025	1.2
Pass Tenpound Island Ledge buoy 6 distant 100 yards.		
Reverse	*205*	*1.2*
3. Tenpound Island Light bearing 090°, distant 400 yards; 42°36′.1 N., 70°40′.2 W.		
Direct	051	0.8
Pass Black Rock Daybeacon distant 35 yards.		
Reverse	*231*	*0.8*
4. Rocky Neck buoy 10 bearing 177°, distant 90 yards; 42°36′.6 N., 70°39′.4 W.		

Table 47.—Whaleback Reef to Portsmouth Harbor

CHART 329

1. Whaleback Light bearing 335°, distant 0.9 mile; 43°02′.7 N., 70°41′.3 W.		
Direct	309	0.8
Reverse	*129*	*0.8*
2. Whaleback Light bearing 041°, distant 0.4 mile; 43°03′.2 N., 70°42′.2 W.		
Direct	356	1.3
Reverse	*176*	*1.3*
3. Portsmouth Harbor Light bearing 218°, distant 0.3 mile; 43°04′.5 N., 70°42′.3 W.		
Direct	266	1.4
Pass 50 yards north of Goat Island Ledge lighted buoy 9.		
Reverse	*086*	*1.4*
4. Pierces Island Range Front Light bearing 266°, distant 200 yards; 43°04′.4 N., 70°44′.3 W.		
Direct	324	0.4
Reverse	*144*	*0.4*
5. South Beacon Shoal buoy 11 bearing 180°, distant 200 yards.		
Direct	271	0.4
Reverse	*091*	*0.4*
6. Portsmouth to Kittery Highway bridge, 43°04′.7 N., 70°45′.2 W.		

Table 48.—Portland Lightship to Portland

CHARTS 315, 325

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. Portland Lightship bearing 270°, distant 1.0 mile; 43°31′.6 N., 70°04′.2 W. Chart 315.	*Degrees*	*Nautical miles*
Direct	309	3.7
Reverse	*129*	*3.7*
2. West Cod Ledge Rock lighted buoy 2 bearing 039°, distant 0.5 mile; 43°33′.9 N., 70°08′.2 W.		
Direct	321	5.2
This course leads over a 36-foot spot between Willard Rock and Pine Tree Ledge.		
Reverse	*141*	*5.2*
3. Cushing Island lighted bell buoy 2CI bearing 051°, distant 200 yards; 43°37′.9 N., 70°12′.6 W. Chart 325.		
Direct	341	1.7
Reverse	*161*	*1.7*
4. Seventeen-Foot Shoal lighted buoy 3 bearing 250°, distant 500 yards; 43°39′.5 N., 70°13′.4 W.		
Direct	272	0.6
Reverse	*092*	*0.6*
5. Dredged Channel lighted buoy 5 bearing 156°, distant 200 yards.		
Direct	246	0.5
Reverse	*066*	*0.5*
6. State Pier; 43°39′.4 N., 70°14′.8 W.		

Table 49.—Pemaquid Point to Boothbay Harbor

CHART 314

1. Pemaquid Point gong buoy 2 bearing 000°, distant 0.2 mile; 43°49′.5 N., 69°30′.9 W.		
Direct	235	0.9
Reverse	*055*	*0.9*
2. Pemaquid Ledge buoy bearing 090°, distant 0.5 mile; 43°49′.0 N., 69°31′.9 W.		
Direct	259	2.2
Reverse	*079*	*2.2*
3. Hypocrite Ledge bell buoy HL bearing 180°, distant 400 yards; 43°48′.6 N., 69°34′.8 W.		
Direct	262	1.2
Reverse	*082*	*1.2*
4. Ram Island Light bearing 117°, distant 0.4 mile; 43°48′.4 N., 69°36′.4 W.		
Direct	297	0.6
Pass Dictator Ledge buoy 2A distant 125 yards.		
Reverse	*117*	*0.6*
5. Burnt Island Light bearing 312°, distant 1.3 miles; 43°48′.6 N., 69°37′.1 W.		
Direct	332	1.8
Reverse	*152*	*1.8*
6. Tumbler Island lighted buoy 8 bearing 150°, distant 275 yards; 43°50′.3 N., 69°38′.3 W.		
Direct	various	0.9
Reverse	*various*	*0.9*
7. Boothbay Harbor wharves; 43°51′.0 N., 69°37′.6 W.		

Table 50.—Roaring Bull lighted whistle buoy 10RB to Searsport via East Penobscot Bay

CHART 1203

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
1. **Roaring Bull lighted whistle buoy 10RB** close aboard; 43°59′.0 N., 69°37′.8 W.		
Direct	296	4.1
Pass Roaring Bull Ledge Daybeacon distant 0.4 mile.		
Reverse	*116*	*4.1*
2. **Saddleback Ledge Light** bearing 280°, distant 0.5 mile; Saddleback Ledge whistle buoy SL close aboard; 44°00′.8 N., 68°42′.9 W.		
Direct	353	11.8
Pass Brown Cow Ledge whistle buoy 2BC close aboard.		
Reverse	*173*	*11.8*
3. **Eagle Island Light** bearing 302°, distant 1.1 miles; 44°12′.5 N., 68°44′.9 W.		
Direct	322	6.3
Pass Middle Rock buoy distant 400 yards.		
Pass Green Ledge bell buoy 2 close aboard.		
Reverse	*142*	*6.3*
4. **Green Ledge Light** bearing 090°, distant 0.4 mile; 44°17′.4 N., 68°50′.3 W.		
Direct	002	5.5
Pass Long Island Ledge buoy distant 1.0 mile.		
Reverse	*182*	*5.5*
5. **Dice Head Light** bearing 090°, distant 0.6 mile; 44°22′.9 N., 68°50′.0 W.		
Direct	310	3.8
Reverse	*130*	*3.8*
6. **Sears Island Ledge bell buoy 2** bearing 090°, distant 0.4 mile; 44°25′.4 N., 68°54′.0 W.		
Direct	001	1.3
Reverse	*181*	*1.3*
7. **Sears Island buoy 4** bearing 090°, distant 400 yards; 44°26′.7 N., 68°54′.0 W.		
Direct	various	0.4
Reverse	*various*	*0.4*
8. **Searsport wharves**; 44°27′.0 N., 68°53′.9 W.		

Table 51.—Baker Island to Bar Harbor

CHARTS 306, 205

1. **Baker Island whistle buoy 8A** bearing 000°, distant 100 yards; 44°13′.6 N., 68°10′.9 W. Chart 306.		
Direct	009	6.6
Reverse	*189*	*6.6*
2. **Schooner Head lighted bell buoy 3** bearing 270°, distant 0.5 mile; 44°20′.1 N., 68°09′.4 W.		
Direct	352	3.5
Pass Big Egg Rock Light bearing 090°, distant 1.0 mile.		
Reverse	*172*	*3.5*
3. **Northern extremity of Bald Porcupine Island** bearing 250°, distant 0.7 mile; 44°23′.5 N., 68°10′.1 W. Chart 205.		
Direct	270	1.5
Reverse	*090*	*1.5*
4. **Municipal Wharf**; 44°23′.5 N., 68°12′.2 W.		

Table 52.—Baker Island to Winter Harbor

CHARTS 306, 204

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. Baker Island whistle buoy 8A bearing 000°, distant 100 yards; 44°13′.6 N., 68°10′.9 W. Chart 306.	*Degrees*	*Nautical miles*
Direct	028	9.0
Reverse	*208*	*9.0*
2. Winter Harbor lighted bell buoy 1A bearing 270°, distant 300 yards; 44°21′.5 N., 68°04′.9 W. Chart 204.		
Direct	358	1.6
Reverse	*178*	*1.6*
3. Harbor Point buoy 1 bearing 270°, distant 100 yards; 44°23′.1 N., 68°05′.0 W.		
Direct	331	0.1
Reverse	*151*	*0.1*
4. Guptill Point buoy 6 bearing 000°, close aboard; 44°23′.2 N., 68°05′.1 W.		

Table 53.—West Quoddy Head to Eastport via Lubec Channel

CHART 801

Note: Due to strong tidal currents with velocities of from 4 to 8 knots and controlling depths of 12 feet at mean low water, it is advisable to keep as close as possible to mid-channel when navigating this channel and the Narrows. Passage is not recommended without the aid of a pilot.		
1. West Quoddy Head Light bearing 311°, distant 0.7 mile; Sail Rock lighted whistle buoy 1 close aboard; 44°48′.4 N., 66°56′.3 W.		
Direct	334	0.9
Reverse	*154*	*0.9*
2. West Quoddy Head bell buoy 1 bearing 215°, close aboard; 44°49′.3 N., 66°56′.9 W.		
Direct	292	0.7
Reverse	*112*	*0.7*
3. Wormell Ledges buoy 1A bearing 200°, distant 200 yards; Quoddy Roads buoy 2 bearing 020°, distant 200 yards; 44°49′.6 N., 66°57′.9 W.		
Direct	various	1.1
Reverse	*various*	*1.1*
4. Lubec Channel Light bearing 270°, distant 100 yards; 44°50′.5 N., 66°58′.6 W.		
Direct	various	1.3
Reverse	*various*	*1.3*
5. Mulholland Point Light bearing 090°, distant 150 yards; 44°51′.8 N., 66°58′.9 W.		
Direct	various	2.1
Pass 100 yards east of Lubec Channel buoy 7 at northern entrance of Lubec Narrows and south of Popes Folly, thence swing to westward and then northward to pass south and west of Popes Folly.		
Reverse	*various*	*2.1*
6. Buckman Ledge buoy 2, bearing 270°, distant 400 yards; 44°53′.7 N., 66°59′.0 W.		
Direct	016	0.5
Reverse	*196*	*0.5*
7. Eastport off wharves; 44°54′.1 N., 66°58′.8 W.		
Continue to Calais and St. Stephens by Table 54		

Table 54.—West Quoddy Head to Eastport and Calais via Head Harbor Passage

CHART 801

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
1. **West Quoddy Head Light** bearing 311°, distant 0.7 mile; Sail Rock lighted whistle buoy 1 close aboard; 44°48′.4 N., 66°56′.3 W.		
Direct	032	1.9
Reverse	*212*	*1.9*
2. **Owen Head** bearing 302°, distant 500 yards; 44°50′.0 N., 66°55′.0 W.		
Direct	020	5.0
Reverse	*200*	*5.0*
3. **Scott Head** bearing 287°, distant 0.5 mile; 44°54′.7 N., 66°52′.7 W.		
Direct	350	2.8
Reverse	*170*	*2.8*
4. **Head Harbor Light** bearing 270°, distant 0.5 mile; 44°57′.5 N., 66°53′.3 W.		
Direct	315	0.7
Reverse	*135*	*0.7*
5. **Head Harbor Light** bearing 180°, distant 0.5 mile; 44°58′.0 N., 66°54′.0 W.		
Direct	230	2.6
Reverse	*050*	*2.6*
6. **Wilson Beach Light** bearing 140°, distant 0.5 mile; 44°56′.3 N., 66°56′.8 W.		
Direct	199	1.1
Reverse	*019*	*1.1*
7. **Northern extremity of Man of War Head** bearing 111°, distant 0.8 mile; southern extremity of Buckman Head bearing 220°, distant 2.0 miles; 44°55′.3 N., 66°57′.3 W.		
Direct	220	0.9
Reverse	*040*	*0.9*
8. **Indian Island** southwestern extremity bearing 339°, distant 0.8 mile; Dog Island Light bearing 297°, distant 1.0 mile; 44°54′.6 N., 66°58′.1 W. **Note:** Proceed to Eastport wharves from position No. 8, distant 0.7 mile.		
Direct	311	1.6
Reverse	*131*	*1.6*
9. **Dog Island Light** bearing 152°, distant 0.7 mile; Deer Island summit 300 feet on south center part, bearing 022°, distant 1.5 mile; 44°55′.7 N., 66°59′.9 W.		
Direct	330	2.8
Reverse	*150*	*2.8*
10. **Frost Ledge bell buoy 1** bearing 241°, distant 0.3 mile; Clam Cove Head bearing 040°, distant 0.5 mile; 44°58′.2 N., 67°01′.8 W.		
Direct	337	10.5
Pass Joes Point buoy bearing eastward, distant 250 yards; pass Lower Middle Ground buoy 2A bearing westward, distant 625 yards.		
Reverse	*157*	*10.5*
11. **Dochet Light** bearing 247°, distant 0.3 mile; 45°07′.8 N., 67°07′.7 W.		
Direct	321	2.6
Pass 200 yards south of red buoy.		
Reverse	*141*	*2.6*
12. **Red Spar buoy off Oak Point** bearing 060°, distant 200 yards; Summit of Warwig Hill, 559 feet, bearing 089°, distant 1.4 miles; 45°09′.9 N., 67°09′.9 W.		
Direct	273	0.9
Reverse	*093*	*0.9*
13. **Spruce Point Light** bearing 000°, distant 200 yards; 45°09′.9 N., 67°11′.2 W.		
Direct	various	4.8
Keep mid-channel and be guided by navigational aids.		
Reverse	*various*	*4.8*
14. **Calais wharves**; 45°11′.4 N., 67°16′.7 W.		

892339°—51——10

CHAPTER 4

Calais to West Quoddy Head

Chart 801

THE APPROACHES to St. Croix River include Quoddy Roads, Lubec Channel, Friar Roads, Head Harbor Passage, Western Passage, and Passamaquoddy Bay. The principal entrance is around the northern end of Campobello Island through Head Harbor Passage, and is deep and, in general, clear. The channel through Lubec Narrows is also frequently used, especially at high water. Tidal currents are strong, and sailing vessels can make no headway beating against them.

West Quoddy Head, easternmost point of the United States, is high and wooded. A light, 83 feet above the water and visible 15 miles, is shown from a red and white horizontally banded tower at the eastern end of the head. The fog signal is a diaphone which is synchronized with the radiobeacon for distance finding. The Coast Guard lookout tower on the high part of the ridge west of the light is prominent.

Between West Quoddy Head and Calais, the United States-Canada boundary is defined by ranges which are marked by white pyramidal-shaped beacons that should not be mistaken for navigational aids.

Quoddy Roads, between West Quoddy Head and Canada's Campobello Island, is the usual anchorage for vessels seeking shelter or waiting for a favorable tide to pass through Lubec Narrows. The entrance, between West Quoddy Head and Liberty Point Ledge, is about 0.8 mile wide and has a depth of 28 feet near the middle. The anchorage affords shelter from northerly and westerly winds in depths of 12 to 25 feet, but is open to winds from the east and south, and protection from northeast gales is reported poor. The northern and western parts of the roads between Quoddy Head and Lubec are full of shoals which are partly bare at low water.

Sail Rock and **Little Sail Rock** are two bare rocks on a ledge about 0.2 mile southeastward of West Quoddy Head Light. The ledge extends more than 100 yards east of the two rocks. As swirls form just southward and eastward of Sail Rock during the strength of the tidal current, the rock should be given a good berth. A lighted whistle buoy is moored 0.4 mile south-southeastward of Sail Rock, in line with the rock and West Quoddy Head Light.

Round Rock and **Liberty Point Ledge (Black Rock)** are 600 yards southwestward of **Liberty Point,** which is the southern end of Campobello Island. These rocks show above water, and vessels should stay at least 300 yards off the southernmost rock.

Wormell Ledges, partly bare at low water, are about 500 yards northward of West Quoddy Head, and are marked at their northern end by a buoy.

Middle Ground, with a least depth of 4 feet, is a shoal in the middle of Quoddy Roads. The shoal is 0.7 mile northward of West Quoddy Head, and is marked on its southwestern side by a buoy.

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

Lubec Channel and **Lubec Narrows,** between Quoddy Roads and Friar Roads, have been improved by dredging. A Federal project provides for a channel 12 feet deep and 500 feet wide from deep water in Quoddy Roads to **Cranberry Point,** thence the same depth over a width of 200 feet to deep water north of Lubec Narrows. In June 1949, the controlling depth was 12 feet.

Spring tides may lower the water level 3 or 4 feet below normal. Lubec Narrows has strong tidal currents and eddies. Sailing vessels must have a fair wind to pass through the dredged channel and the Narrows; the most favorable time is about 2 hours before high water.

Buoys and lights mark the dredged channel. A light, 53 feet above the water and visible 13 miles, is shown from a white conical tower on a black cylindrical pier on the west side of Lubec Channel; the fog signal is a bell. A light, 60 feet above the water and visible 4 miles, is shown from a white octagonal tower on **Mulholland Point,** on the east side of Lubec Narrows.

Shoals bare at low water on both sides of Lubec Narrows. A dangerous ledge makes off from the northeastern point of Lubec, opposite Mulholland Point Light. On the shore end of the ledge is a breakwater which shows out of water; the northern end of the ledge is marked by a buoy which also marks the western side of the north end of the dredged channel. The breakwater is reported to be covered by 2 feet of water at extreme high storm tides. A white pyramidal-shaped boundary monument on the outer end of the breakwater shows above extreme high water.

Lubec is a small town on the west side of Lubec Narrows. Prominent features are a standpipe 1 mile west of the town, a church spire in the town, and a stack on the water front. The town has a customs office. The several fish factories have wharves, some of which are dry at low water. The old steamboat wharf on the north side of the town has a depth of 18 feet alongside. Other wharves have depths alongside of 4 to 10 feet. Water, gasoline, and some supplies are available at some of the wharves. Minor machinery repairs can be made. Small boats are beached for repairs. A passenger ferry operates between Lubec and Eastport, and a good highway connects with the interior. Except for a short time in the winter, a small passenger and automobile ferry maintains regular service to Campobello Island.

Johnson Bay, on the northwest side of Lubec, is a well sheltered and frequently used anchorage. The approach from southward is through Quoddy Roads and Lubec Narrows, and the approach from northward is through Friar Roads. The best anchorage for deep-draft vessels is in depths of 42 to 54 feet just southward of a line from Mulholland Point Light to **Rodgers Island,** 0.8 mile northwest of Lubec. The southwestern part of Johnson Bay is shoal for a distance of 0.5 mile from its head. A shoal with a depth of 17 feet over it is near the middle of the bay and another shoal with a depth of 11 feet is 350 yards off the eastern shore. The wharves of two fish factories on the northwest side of Johnson Bay bare at low water.

Popes Folly is a thinly wooded islet 0.2 mile northward of the northern entrance to Lubec Narrows. The bar that extends southeastward from the islet to Campobello

Island has a depth of 18 feet, and vessels bound southward to Lubec, or through Lubec Narrows, cross it. The ledge that extends northeastward from the islet is marked at its outer end by a buoy.

Dudley Island, 0.5 mile northwestward of the northern entrance to Lubec Narrows, is high and mostly grass-covered. An earth dam connects Dudley Island with Treat Island, 0.2 mile to the northward.

Treat Island, largest of those between Lubec Narrows and Eastport, is high and grass-covered on the south end and wooded on the north end. **Burial Islet,** small and grass-covered, is 300 yards northwestward of Treat Island; and 400 yards westward of Treat Island is **Gull Rock,** which is bare at all times. The Government wharf on the west side of Treat Island near its north end has a depth of about 14 feet alongside.

Broad Cove, which makes into the south shore of **Moose Island** west of Eastport, is a good anchorage. Vessels anchored off Eastport get under way and anchor in Broad Cove, in Johnson Bay, or in Deep Cove to ride out a gale. The head of Broad Cove is shoal for a distance of 0.2 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 buoy.

Deep Cove is the first cove to the northwestward of Broad Cove. The wharf in Deep Cove has a depth of 26 feet alongside.

Snug Cove, to the southeastward of Treat Island and northeastward of Popes Folly, is of no importance except to small craft. Between Snug Cove and Dudley Island is a rock with a depth of 17 feet. Vessels entering Friar Roads from the southward pass on either side of the rock.

Friar Head, to the north of Snug Cove, is on the south side of the entrance to **Friar Bay,** on the western side of Campobello Island. Friar Bay is used as an anchorage, and on its northern side is the village of **Welshpool.** Small craft can find protection in westerly weather behind the wharf at the village.

For a distance of 1.3 miles from Welshpool, the west shore of Campobello Island continues northward to **Bald Head,** a point just south of which is a prominent circular hill about 100 feet high. From Bald Head the coast trends northeastward 0.6 mile to **Man of War Head,** which is on the south side of the entrance to Harbour de Loutre. The wharf in the bight just west of Man of War Head has a depth of 12 feet alongside.

Harbour de Loutre is used as an anchorage by small vessels, but those without local knowledge should not go beyond the 9-foot spot, known as **Racer Rock,** in the middle of the entrance to the inner harbor. The inner harbor is obstructed by fish weirs. Indenting the north side of Harbour de Loutre east of **Windmill Point,** which is on the north side of the entrance, are four coves that are of little importance except to the fishing industry.

Friar Roads (Eastport Harbor), which lies between Moose Island and Campobello Island, is approached from northward through Head Harbor Passage and from southward through Quoddy Roads and Lubec Narrows. Friar Roads is the principal approach to Passamaquoddy Bay and St. Croix River.

Eastport, on the southeastern end of Moose Island, has some commerce, principally in fish and general merchandise. Anchorage is available in Friar Roads off the town. The best anchorage is reported to be off the customhouse. The bottom is uneven and the currents have an average velocity of about 3 knots at strength. In unfavorable weather vessels anchor in Broad Cove on Johnson Bay.

Possible dangers off Eastport include **Page Rock,** with a depth of 16 feet, and **Margie Rock,** with a depth of 14 feet; both are east of the town and close to shore. **Clark Ledge,** about 200 yards from the wharves in the northern part of Eastport, is covered at high water and is marked by a daybeacon.

Dog Island, 0.3 mile northward of Clark Ledge, has a grassy top. A light, 32 feet above the water and visible 11 miles, is shown from a white pyramidal skeleton tower on the northeast side of the island. The red sector of the light covers Clark Ledge. The fog signal is a siren. A shelving ledge extends about 100 yards off the high-water line of the island.

Caution.—About midway between Margie Rock and the tall brick stack on the water front 300 yards to the southwestward is the outer end of the stone and concrete foundation of a former wharf. This unmarked obstruction is awash at low water, is 100 to 200 feet south-southeastward of the outer end of Wadsworth wharf, and extends about 40 feet farther seaward than the wharves on either side.

Whirlpools and eddies, that are dangerous at times for small boats, are encountered between Dog Island and **Deer Point,** 0.5 mile northeastward. They are reported to be worst about 3 hours after low water. Directions for Eastport are given in Chapter 3.

The mean range of tide at Eastport is about 18 feet. Daily predictions of the times and heights of high and low waters are given in the *Tide Tables.*

Storm warnings are displayed day and night at Eastport from a steel tower on the hill near the standpipe and from the customhouse.

Pilotage is not compulsory. A licensed pilot resides at West Quoddy Head, and vessels desiring his services should signal the Coast Guard station. Pilots for local inside waters can be found among the boatmen at Lubec or Eastport. Towboats are not available but small launches can be hired for light tows.

Eastport is a customs port of entry at which marine documents are issued. The town has an immigration and naturalization office. Quarantine is arranged through the collector of customs. A standard tide station and chart agency of the U. S. Coast and Geodetic Survey are in Eastport. A U. S. Weather Bureau station is in the customhouse on the water front.

Vessels discharging and loading at Eastport usually lie at the wharves, some of which are dry at low water, while others have depths of 5 to 18 feet at their ends. The steamer wharf has a depth of about 18 feet alongside and the Wadsworth wharf has a depth of about 10 feet at the outer end. The steamer and railroad wharves have rail sidings and transit sheds. Good water is piped to the steamer wharf. Vessels carrying coal usually discharge at a wharf in Deep Cove on the west side of Moose Island; the wharf has a depth of about 26 feet alongside.

Gasoline, Diesel oil, provisions, and ship chandlery are available at Eastport. Small vessels are hauled out on the beach for light repairs to hulls and machinery.

Eastport has no regular coastwise steamer service. A Canadian motor vessel carries mail, passengers, and freight between Eastport, Deer Island, Campobello Island, and St. Andrews. Regular passenger and freight ferry service is maintained with Lubec. Eastport has railway connections, and a good highway parallels the St. Croix River to Calais.

Western Passage is between Moose Island and **Deer Island,** the next large island

northwestward of Campobello Island, and connects Friar Roads with Passamaquoddy Bay.

Johnson Cove and **Kendall Head** are on the northeast side of Moose Island. An elevated tank just southward of Johnson Cove and another at the village of **Quoddy,** near the northern end of the island, are prominent.

Earth dams block the shallow passages north and south of **Carlow Island,** which is 0.2 mile north of Moose Island and 0.6 mile south of **Pleasant Point.** On the point are a prominent brick building and numerous houses of an Indian reservation.

Frost Island and **Frost Ledge** are at the northern end of Western Passage and between Pleasant Point and **Gleason Cove,** 0.9 mile to the northward. Frost Ledge extends nearly 0.4 mile offshore and is marked by a bell buoy. Between Carlow Island and Frost Island, foul ground extends as much as 400 yards from shore.

The northeastern, or Deer Island, shore of Western Passage is clear; indentations are **Cummings Cove** and **Clam Cove.**

The main route into Passamaquoddy Bay and St. Croix River is north of Campobello Island through Head Harbor Passage, Friar Roads, and Western Passage.

The east coast of **Campobello Island** is mostly clear and can be approached to within a reasonable distance without danger. Local magnetic attraction has been reported in this locality.

Herring Bay, near the south end of Campobello Island's eastern shore, is a good temporary anchorage for large vessels. **Schooner Cove,** midway along the eastern shore, and **Mill Cove,** near the northern end, afford temporary anchorage for small craft. An 18-foot spot in the middle of the entrance to Mill Cove is marked by a buoy.

East Quoddy Head is the northernmost point of Campobello Island. A light, 64 feet above the water and visible 13 miles, is shown from a white octagonal wooden tower, with a red cross, a red iron lantern, and an attached dwelling, on the outermost rock. The fog signal is a diaphone on a small building just north of the light.

Head Harbor, between East Quoddy Head and **Head Harbor Island,** 0.2 mile to the southeastward, affords good anchorage for small vessels.

Wilson Beach, on the northwest side of Campobello Island and about 2 miles southwest of East Quoddy Head, is just north of Windmill Point, which is on the north side of the entrance to Harbour de Loutre. The wharf 0.3 mile northeast of Windmill Point has a light on its southwest corner and a depth of 30 feet alongside.

Head Harbor Passage is a deep and clear fairway, about 4 miles long, that follows the northwestern side of Campobello Island from the sea to Friar Roads, opposite Eastport, where it joins Western Passage. The route through Head Harbor Passage and Western Passage is the one usually followed by vessels going to Passamaquoddy Bay and St. Croix River.

White Horse Island, bare, rocky, and 68 feet high, is about 2.5 miles northeastward of East Quoddy Head. The islet has a whitish appearance, is easily identified, and is a good mark for the approach to Head Harbor Passage.

East Rock, 300 yards northeastward of White Horse Island, is covered 1 foot. Another rock, with a depth of less than 6 feet, is 200 yards north of East Rock. **North Rock,** steep-to and covered 1 foot, is about 0.5 mile northwestward of White Horse Island.

White Island, 1.6 miles northward of East Quoddy Head, has fringing shoals that extend as much as 400 yards from shore. A group of islets and shoals 0.5 mile northwestward of the island includes **Nubble Island,** the **Spectacles,** and **Hospital Island.**

Spruce Island, 0.8 mile north of East Quoddy Head, is steep-to on its eastern side. Islets and shoals extend 0.8 mile westward of the island. The westernmost of these dangers, **Tinker Island Ledge,** is marked by a daybeacon.

Black Rock, small and bare, is 0.8 mile northwestward of East Quoddy Head and 0.6 mile southwest of Spruce Island.

Casco Island, 0.5 mile southwestward of Black Rock and 0.5 mile from the nearest part of Campobello Island, is 85 feet high. The eastern side of the island is fairly steep-to, but ledges extend 300 yards off its northern end. Several shoals and ledges are within 0.3 mile of the western side of the island. A daybeacon has been erected on one of these ledges.

Green Islet is 0.4 mile southwestward of Casco Island. A 27-foot shoal is 600 yards southeastward of Green Islet and 0.4 mile from the shore of Campobello Island. **Sandy Ledge,** 400 yards westward of Green Islet, is marked by a daybeacon.

Pope Islet is 0.5 mile southwestward of Green Islet. Shoals extend 300 yards southeastward of Pope Islet and a 28-foot spot is 700 yards southeastward of the islet. About 0.4 mile westward of Pope Islet is **Chocolate Shoal,** which has a depth of 9 feet.

Indian Island is 90 feet high near its northern end and is 0.4 mile eastward of Deer Point, the south end of Deer Island. The channel between Indian and Deer Islands is deep. A shallow bank, on which are three islets, extends about 500 yards off the southeastern part of Indian Island. **Cherry Islet,** at the southeastern end of this bank, has a white square wooden building, 47 feet high, from which a fog bell is sounded.

Passamaquoddy Bay is the large indentation in the shore of New Brunswick east of the mouth of St. Croix River. The principal entrance is by way of Western Passage which has deep water and is comparatively free from dangers. The bay has been swept with wire drag and all dangers are charted.

Letite Passage, the most northerly entrance to Passamaquoddy Bay, is the channel between **Macmaster Island** and the mainland. Although the channel has deep water, navigation is difficult because of unmarked dangers and strong tidal currents. Passage should not be attempted without local knowledge.

St. Andrews, a Canadian town on the east side of the entrance to St. Croix River, is a railroad terminus and has some commerce. A large hotel with a red roof and tower is prominent.

A dredged channel, with a depth of about 14 feet and marked by buoys, leads to St. Andrews from the southeastward. Another channel to the westward of the town has a depth of about 6 feet and is marked by buoys and spindles. The stone foundations of the spindles can be seen at low water. The anchorage, between the town and **St. Andrews (Navy) Island,** can be used only by light-draft vessels.

The two railroad wharves at **North Point,** on the south side of the town, are reported to have depths of 8 and 10 feet alongside. The Government crib wharf had a depth of about 12 feet at its face in 1949, but was being extended and improved. Gasoline and some supplies are available.

St. Croix River extends north-northwestward for 8 miles from the southern part of

Passamaquoddy Bay, then turns westward between **Devils Head** and **Oak Point.** The channel is deep and comparatively clear as far as the turn, then is narrow and winding, and has a controlling depth of about 12 feet for some 3 miles to **Hills Point.** A Federal project provides for a channel 12 feet deep and 200 feet wide from Hills Point to the Lower Steamboat Wharf at Calais, thence 9 feet deep and 150 feet wide to the Public Landing at St. Stephen, thence 9 feet deep and 100 feet wide to the Upper Steamboat Wharf at Calais. In August 1949, the controlling depth from Hills Point to Calais and St. Stephen was about 7 feet. The channel is marked by buoys and lights.

Small craft up to about 40 feet in length anchor off **The Ledge,** 2 miles above Oak Point, or off **Raven (Bluff) Head,** 0.7 mile above the point. Larger vessels should anchor below Oak Point. The scattered remains of an old breakwater, bare in spots at ⅓ tide, extend southeastward across the mud flats for about 300 yards from the daybeacon on the south side of the river opposite The Ledge.

Tides.—The mean range of the tide is about 19 feet at Robbinston and 20 feet at Calais.

Ice.—From January to March, St. Croix River is obstructed by ice, and usually is not navigable above Robbinston, but the channel to the oil wharves at Calais is sometimes kept open by Coast Guard ice breakers. Quoddy Roads and Eastport Harbor are never closed by ice.

Spring freshets sometimes 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.

South Robbinston is at the head of **Mill Cove,** an unimportant bight on the west side of the mouth of St. Croix River.

Liberty Point is 0.7 mile northward of Mill Cove. **Robbinston** is a village just above Liberty Point. There is a prominent brick stack of a former factory in the town. About 300 yards southward of this stack are a smaller stack and a fish factory. The wharf at the fish factory has a depth of about 4 feet at its end. Customs service for Robbinston is handled through the Calais office.

The Schoodic Yacht Club, of Calais, is at **Red Beach,** 3 miles north of Robbinston.

St. Croix (Dochet) Island is in mid-river off Red Beach. A light, 77 feet above the water and visible 12 miles, is shown from a white dwelling on the island. St. Croix Island was made a National Park in July 1949. Scattered shoals, sunken and awash, that fringe the island and extend southward 1.1 miles in mid-river, are marked by buoys. The deeper and broader channel is eastward of the island and the shoals. The channel between the shoals and **Little Dochet Island,** a wooded islet midway between the southern end of the shoals and the western shore, is used considerably by local vessels, but should be navigated with caution by strangers.

Calais is a small city on the south bank of St. Croix River about 14 miles above the river mouth and 23 miles above Eastport. The city has little water-borne commerce. Calais is a railroad terminus and has a few industrial plants. The fixed highway bridge between Calais and St. Stephen is the head of navigation on St. Croix River.

All the wharves at Calais are dry at low water. About 1 mile below the city are two oil docks at which tankers of 12-foot draft load or unload at high water.

Calais has a U. S. Public Health Service relief station and is a customs port of entry

at which marine documents are issued. Customs and immigration officers are stationed at each end of the highway bridge.

St. Stephen is the Canadian town on the opposite side of the river from Calais. A large fertilizer plant 0.8 mile east of the bridge has a wharf where vessels load and unload at high water. Gasoline, oil, and water are piped to the wharf. Provisions of all kinds and small amounts of deck and engineroom stores can be obtained. Minor repairs can be made by various machine shops in the town. St. Stephen has a large textile plant, a good hospital, a telegraph office, and rail and bus connections.

Cobscook Bay, extending westward from Moose Island, is large and irregular and has several arms. The approach channel is between Moose Island and **Seward Neck,** about 0.6 mile southwestward. Local knowledge is needed to navigate the arms of the bay because of the numerous rocks and dangerous currents. The deepest draft using the bay is 12 feet. Strangers seldom enter, but those that do take a pilot, usually from Eastport or West Quoddy Head. Good anchorage can be found in many of the arms and coves, but in most of the channel the currents are too strong and the bottom is too rocky. In the winter, ice obstructs navigation near Whiting and Dennysville, and in severe winters other parts of the bay also are affected.

Bar Harbor, northwest of Moose Island, can no longer be used as a shortcut between Cobscook Bay and Western Passage because the eastern passages north and south of Carlow Island have been closed by earth dams. A fixed highway bridge over the western entrance to the harbor has a vertical clearance of about 5 feet at high water.

Pennamaquan River empties into Cobscook Bay from northwestward about 4 miles west of Moose Island. The river has ample depth for about 1.7 miles above the entrance, and the principal dangers are marked by buoys. Low-water flats extend 0.8 mile downstream from **Pembroke,** a town 3 miles above the mouth of the river. The deepest draft using the river is about 12 feet, and that at high water; the usual draft does not exceed 6 feet. The channel is usually marked by perches in summer.

At **West Pembroke,** which is about 0.8 mile southwest of Pembroke and on the northwest prong of the Pennamaquan River, is a fish factory with a wharf to which it is reported that a draft of 12 feet can be carried at high water.

On the northeast, or **Hersey Neck,** side of the lower Pennamaquan River is an oil wharf that is reported to have a depth of 14 feet alongside. The wharf is 1 mile west of **Carnet Point,** which is the southeastern extremity of Hersey Neck.

Dennysville is a village at the head of **Dennys Bay,** which empties into the western end of Cobscook Bay from northwestward about 6 miles west of Moose Island. Low-water flats extend 0.5 mile below the town, which is about 4 miles from the mouth of the bay.

Whiting is a village at the head of **Whiting Bay,** which empties into the western end of Cobscook Bay from southward. Low-water flats extend 1 mile below the town.

With local knowledge, a draft of about 12 feet can be taken to Dennysville and Whiting at high water. The channels are unmarked and difficult to follow.

Currents.—In Grand Manan Channel, the flood current sets in a general northeast direction and attains a velocity of about 2¾ knots at strength. The ebb sets in a southwesterly direction with a velocity of about 2¼ knots at strength. Predicted times of

slack water and times and velocities of strength of flood and ebb for every day in the year are given in the *Current Tables*.

If less than 2 miles from the northern shore when approaching the entrance to Quoddy Roads, the set of the flood current is more northward, and about 1 mile southeastward of West Quoddy Head the flood sets directly into the Roads. For a distance of 0.5 mile southeastward of West Quoddy Head the currents are dangerous because of swirls and eddies which, in a light breeze, are apt to draw a vessel onto Sail Rock.

Along the eastern side of Campobello Island the flood current follows the trend of the shore in a northeasterly direction and the ebb sets in the opposite direction.

In Head Harbor Passage the tidal current is said to attain a velocity of 5 knots at times. The flood sets strongly westward toward the islands about 1 mile northward 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 current sets northward, following the general trend 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 local high water and 1½ hours before low water; the duration of slack is only 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 to Johnson Bay, meeting the flood from Friar Roads westward of Treat Island, and both setting into Cobscook Bay.

The flood current sets northward into Western 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 which can be readily followed between the whirlpools and eddies on either side. The ebb sets southward but is weaker than 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. The ebb sets southward with reduced velocity and disturbance off Deer Point, and the inshore reverse currents are less marked than on the flood. For predictions, the *Current Tables* should be consulted.

In the St. Croix River, the flood current 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. The tidal current normally attains a velocity of about 2 knots between the mouth of the river and Devils Head and 3 to 4 knots between Devils Head and Calais.

In Cobscook Bay and its tributaries, the tidal currents follow the general direction of the channels, but in the coves there are strong reverse eddy currents, and heavy overfalls form 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.

CHAPTER 5

Quoddy Roads to Petit Manan Island

Chart 1201

GRAND MANAN CHANNEL, the approach to Quoddy Roads, is discussed in Chapter 2. **Machias Seal Island,** 10 miles southwestward of **Southwest Head,** the southern extremity of Grand Manan Island, is about 500 yards long and 28 feet high. A light, 82 feet above the water and visible 14 miles, is shown from a white octagonal concrete tower on the summit of the island; the fog signal is a diaphone. The island is steep-to on its western side. A drying reef, on the outer end of which is an islet, extends 0.4 mile northeastward. Depths of 30 to 48 feet extend a mile eastward and northeastward of the island, and a 12-foot shoal marked by a tide rip is 0.3 mile southeastward of the island.

Southeast Shoal, 1.2 miles southeastward of Machias Seal Island, has a depth of only 7 feet over it; the shoal breaks in heavy weather and shows a rip during the strength of the tide. The tidal current in this vicinity reaches a velocity of 3 knots.

North Rock, 2 miles northward of Machias Seal Island, is about 4 feet high and is surrounded by shoal water to a distance of 400 yards.

North Shoal, 1.5 miles northward of Machias Seal Island, has a depth of 7 feet. The shoal shows a tide rip, and breaks in heavy weather. Rocks with depths of 42 and 48 feet are 0.3 and 0.6 mile northward of North Shoal and are marked by tide rips.

Middle Shoal, 5 miles northeastward of Machias Seal Island, has a depth of 18 feet over it, with deep water close-to. The shoal shows a tide rip, and breaks in heavy weather.

Bull Rock, 7 miles eastward of Machias Seal Island, has a depth of 2 feet, has deep water around it and usually breaks. A rocky patch with a depth of 42 feet, on which there is a tide rip, is about midway between Bull Rock and Machias Seal Island. Magnetic disturbance has been experienced in the areas northeastward of Bull Rock.

Southeast Ledge, nearly 6 miles southeastward of Machias Seal Island, has a depth of 30 feet, shows a tide rip, and breaks in heavy weather. A 36-foot patch, marked by tide rips, is 1.4 miles northwestward of the ledge.

Wallace Ledge, the northernmost of the Murr Ledges and 3.2 miles northeastward of Bull Rock, dries 8 feet.

Eastward of this area are numerous reefs and ledges which are shown on Chart 1106 and Hydrographic Office Chart 1057. These dangers are beyond the limits of Chart

1201 and are described in H.O. 99, *Sailing Directions for Nova Scotia*. Some of the dangers are **Murr Ledges, Halftide Rock, St. Mary Ledge, Yellow Ledge, Cross Jack Ledge, Long Ledge, West Ledge,** and Gannet Rock. **Gannet Rock,** in latitude 44° 31′ N., longitude 66° 47′ W., is about 15 feet high and is marked by a light, 106 feet above the water and visible 16 miles, and shown from a red lantern on an octagonal wooden tower with black and white stripes; the fog signal is a diaphone.

The coast between West Quoddy Head and Moose Cove is in general rocky, wooded, and steep-to, and is indented by several coves of slight importance.

Carryingplace Cove, just westward of West Quoddy Head, has a fish wharf and a few buildings at its head. **Wallace Cove,** 0.6 mile southwest of Carryingplace Cove, and **Hamilton Cove,** 1.8 miles southwest of Carryingplace Cove, have no distinguishing features. About halfway between Wallace and Hamilton Coves and 500 yards offshore is **Morton Ledge,** with a depth of 6 feet. The ledge is marked by a buoy. **Boot Cove,** 1 mile southwest of Hamilton Cove, has a few small fishermen's houses at its head.

Baileys Mistake, 5 miles southwest of West Quoddy Head, appears from offshore to be a good anchorage, but the holding ground is poor and it is not a good harbor, although a few fishing boats moor here. The village of **South Trescott** is at the head of the harbor. **Bailey Ledge,** bare at low water, obstructs the western half of the entrance. A buoy marks the southern side of the ledge. **Jims Head,** on the northeastern side of the entrance, is 160 feet high and prominent. A lighted whistle buoy is moored off the head.

The head of **Haycock Harbor,** which is known locally as **The Pool** and is just southwest of Baileys Mistake, is sometimes entered at high tide by small craft; the shelter is excellent. The depth inside is reported to be 7 feet at low water. **Sandy Cove** is an open bight just southwest of Haycock Harbor.

Chart 303.—Eastern Head, with a 200-foot hill behind it, is the eastern extremity of the north shore of **Moose Cove,** 7.5 miles southwest of West Quoddy Head. About 0.5 mile west of Eastern Head, **Mink Island** and **Eastern Head Ledges,** bare at low water, extend over 400 yards offshore. **Moose River** is at the head of Moose Cove. There is a small wharf on the south side of the river at its narrowest point. On the north side of the river a rocky spit makes out, forming a natural shelter for small boats.

From Moose Cove to Little River, a distance of about 6 miles, the coast has no features of importance. The several open, shallow coves include **Bog Brook, Holmes, Black Point,** and **Long Point Coves.** Just north of Little River are **Hughes Beach** and **Money (Schooner Brook) Cove.**

Little River is 14 miles southwestward of West Quoddy Head and about 8.5 miles northeastward of Libby Islands. In the middle of the entrance is **Little River Island,** which is wooded and has rocky sides. A light, 57 feet above the water and visible 13 miles, is shown from a white conical tower on the southeast end of the island; the fog signal is a bell.

Little River is small but is easy of access and is an excellent harbor of refuge, sheltered from all winds and with depths of 12 to 30 feet, good holding ground. The channel leads northward of the light and has a depth of about 28 feet. The anchorage, just inside of Little River Island, is about 0.5 mile long and 0.2 mile wide. The harbor is never obstructed by ice to such an extent as to prevent vessels from entering.

Eastern Knubble is the point on the northern side of the entrance to Little River.

Just south of Eastern Knubble and 100 yards offshore is **Little River (Eastern Head) Ledge** which bares at low water and is marked by a buoy. A ledge extends 100 yards from the south shore, just eastward of a prominent point 0.5 miles above Little River Island. With these exceptions, there are no dangers in the harbor if the shores are given a berth of 100 yards.

To enter Little River, pass northward of Little River Island, giving it a berth of 100 to 200 yards. Anchorage can be selected anywhere in mid-channel inside the island. Small local craft anchor off the wharves in depths of 6 to 18 feet. The passage southward of Little River Island has a rocky bar across it with a least found depth of 10 feet in mid-channel. This passage should not be used by strangers.

Cutler is a village on the north side of Little River. The village has a customs office. Many small fishing boats make headquarters at Cutler. There are several small wharves where gasoline can be obtained at high tide. At one wharf there is a lobster float with piles on the offshore side in a depth of 8 feet. Fishing boats sometimes moor to the piles. The village has telephone communication, and a highway leads to the railroad at East Machias.

Between Little River and Little Machias Bay there are no features of importance. **House Cove,** 0.6 mile west of **Western Head,** the point on the south side of the entrance to Little River, is a small, open bight extending somewhat behind **Great Head. Deer Island,** 1.7 miles west of Western Head, is a small island close to shore. About 0.3 mile offshore in this vicinity is a series of ledges on which depths as shoal as 13 feet are found.

Little Machias Bay, 2.5 miles west 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. Little Machias Bay is 0.6 mile wide at the entrance, wider inside, and about 2 miles long. **Black Ledges** are bare islets in the middle of the entrance to the bay with deep water close-to on both sides. **Long Ledge,** in the middle of the bay 1 mile inside the entrance, is covered at high water. Above Long Ledge the bay is much obstructed by shoals and ledges, two of which are **Upper Ledge** and **Widows Ledge.** Fish weirs are numerous in the bay. There are some houses on the shores of the bay but no wharves except for small craft at high water. **North Cutler** is a settlement on the north shore of the bay.

Old Man is a small but conspicuous rocky island, grassy on top, 1 mile off the entrance to Little Machias Bay. The island is a good mark and may be safely approached as close as 400 yards.

Cape Wash and **Cape Wash Islands** are on the western side of the entrance to Little Machias Bay. Reefs extend about 400 yards south of the islands. Just westward of Cape Wash are **Holly Cove** and **Little Holly (Bobs) Cove,** which are important only to small craft.

Machias Bay, about 21 miles southwestward of West Quoddy Head, is the approach to Machias River and the towns of Machiasport and Machias. The bay is about 6 miles long and 1 to 3 miles wide, is easily entered day or night, and affords well-sheltered anchorage for large vessels. The main entrance is between Cross Island on the east and Stone Island on the west and is about 2 miles wide. The principal guide to this entrance is the light on Libby Islands. The light on Avery Rock, in the middle of the bay 4 miles from the entrance, is the guide for vessels bound up the bay. The best anchorages are in Starboard Cove and in the head of the bay above Avery Rock Light. Directions

for entering the bay through the main entrance, and for the bay and river, are given under the discussion of Machias.

Cross Island is the large wooded island on the east side of the main entrance to Machias Bay. A few unpainted shacks on low, flat **Grassy Point,** the northern extremity of the island, are prominent when approaching Cross Island Narrows from westward. Cross Island Coast Guard Station is in a small cove southwestward of small thickly-wooded **Mink Island,** which is 0.2 mile off the northeast shore of the larger island. **Storm warnings** are displayed, daytime only, from the station. From seaward, the most conspicuous mark on Cross Island is a skeleton lookout tower on a hill at the eastern end.

Cross Island Narrows is a channel leading into Machias Bay northeast of Cross Island. **Thornton Point** and **Quaker Head** are on the northern side of the passage. The channel is much obstructed by rocks, sunken or awash at various stages of the tide, and should not be used 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 **274°** course, heading just south of Thornton Point Ledge Daybeacon and passing close north of Thornton Point Ledge lighted bell buoy 1A. When 75 yards southward of the daybeacon, steer **280°** for about 0.6 mile, passing close north of Seal Cove Ledge buoy 1. Give Quaker Head a berth of 200 yards and steer **313°** for the middle of Chance Island with the summit of Mink Island astern. This course passes 100 yards northeastward of Dogfish Rocks buoy 3. **Dogfish Rocks,** about 350 yards northward of Grassy Point, are bare only at low water.

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

Northwest Harbor, a bight in the northwestern shore of Cross Island, has depths of 21 to 54 feet, but is little used as an anchorage.

Libby Islands, in the middle of the main entrance to Machias Bay, are two flat, grassy islands connected by a bare ledge. Several vessels have been lost on the eastern side of the islands in thick weather. The light and buildings on the southwest end are the most prominent marks. The light, 91 feet above the water and visible 15 miles, is shown from a white granite conical tower on the southwest island. The light is obscured when bearing east-northeast. The fog signal is an air diaphone. Sunken ledges extend about 300 yards off the southern end of the southern island. The eastern shores of both islands have ledges extending off about 300 yards.

Ram Island and **Foster Island,** about 1.5 miles west of the Libby Islands, are grass-covered and surrounded by ledges.

Foster Channel, between Foster and Ram Islands, is a narrow passage between Englishman Bay and the western side of the entrance to Machias Bay. The buoyed channel has a depth of about 18 feet.

Starboard Island Ledge, 0.5 mile east of Foster Island, has a least found depth of 7 feet and is marked by a buoy.

Stone Island, 1.1 mile northwest of Libby Islands, is wooded and has a bare rocky face at the south end. **Stone Island Ledge,** 0.2 mile east of the island, is bare at low water and is marked by a daybeacon.

Starboard Island, 0.7 mile west of Stone Island, is grassy at the southwest end and sparsely wooded at the northeast end.

Starboard Cove, on the western side of Machias Bay 2.5 miles northward of Libby Island Light, is formed on the south by Starboard Island and **Starboard Island Bar,** bare at half tide, connecting the island with the shore. Excellent anchorage, except in easterly weather, is available in the cove in depths of 15 to 24 feet. The cove is much frequented by coasting vessels bound through Moosabec Reach making anchorage for the night. 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 depths of 18 to 21 feet. Small vessels can anchor closer to the bar, provided they take care not to shut out the north end of Stone Island by the north end of Starboard Island. The cove is entered eastward of Starboard Island, passing on either side of Stone Island.

Starboard, a small settlement with a post office, is on the western side of Starboard Cove. There are no wharves.

Howard Cove, northward of Starboard Cove, is not a good anchorage; the holding ground is poor and the cove is exposed to southeast winds. There are no wharves. Broken ground, including a rock bare at low water, extends 0.3 mile southward and 0.7 mile eastward from Howard Point, the eastern entrance point of the cove. The eastern extremity of this broken ground is **Seashore Ledge,** with a depth of 4 feet, marked by a buoy.

Bucks Harbor is a shallow cove in the west shore of Machias Bay 4 miles northward of Libby Island Light. **Bar Island** is on the northern side of the entrance to the harbor and **Bucks Head** is on the southern side. The small fishing village of **Bucks Harbor** is on the shore of the harbor. Small vessels can anchor 200 yards off the southern side of Bar Island in depths of 8 to 15 feet. A footbridge connects **Bucks Neck** (**Smalls Point**), on the east side of the harbor, with the settlement of Bucks Harbor. On the south side of Bucks Harbor, opposite Bucks Neck, is a small private wharf which bares at low water. West of Bar Island, and just south of **Mountain Head,** 0.3 mile northwestward of the island, is a wreck which bares at lower water. Local fishermen report a sunken rock about 200 yards from Bucks Head. Vessels should keep a mid-channel course in entering.

Colbeth Rock, 0.7 mile eastward of Bucks Head, has a depth of 31 feet and breaks in heavy weather.

All of the islands in Machias Bay above the entrance are high and wooded, with rocky shores. **Yellow Head** (**Yellow Island**), 0.5 mile east of Bar Island, is high, yellow in color, and a good landmark. **Chance Island,** 0.8 mile eastward of Yellow Head, is wooded on its northern part. **Bare Island** is 0.2 mile northward of Yellow Head and Bar Island. **Salt Island** is 0.8 mile north of Bare Island. **Round Island,** 100 feet high, is 300 yards eastward of Salt Island. **Hog Island** is 0.8 mile northeast of Round Island.

Avery Rock, in the middle of Machias Bay, 4 miles above the entrance, is marked by a light, 52 feet above the water and visible 13 miles, shown from a skeleton steel tower on a concrete foundation. A bell buoy is just southwest of the light.

Larrabee Cove, largely dry at low water, and **Indian Cove** are small indentations in the west shore of Machias Bay northwest of Avery Rock Light. These coves are of little importance. Good anchorage for vessels of 8 feet draft will be found on the flats between Salt Island and Bare Island, near the entrances to the coves. A fish house and small wharf, nearly bare at low water, are in Indian Cove. A rock, bare at low water, in the middle of the cove, is the principal danger. **Larrabee** is a village, with post office, at the head of Larrabee Cove.

Holmes Bay, a large bight in the northeastern part of Machias Bay and northeast of Hog Island, is shallow and has extensive reefs. A clam-packing factory and wharf are in the northeast part of Holmes Bay. The bay is seldom used except by small fishing boats.

Machias River, which empties into the northwestern part of Machias Bay, has a narrow, winding channel leading through flats that are mostly bare at low water. The least depth in the channel to the town of Machiasport is about 19 feet. Above Machiasport, a Federal project for the improvement of the river provides for the removal of ledges and shoals to provide a channel 6 feet deep and not less than 100 feet wide from deep water near the East Machias Bridge to the wharves at Machias. The controlling depth to Machias is about 2 feet.

The river is crossed about 2 miles below Machias by a highway drawbridge with a swingspan having a horizontal clearance of 45 feet and a closed vertical clearance of 4 feet at high water. During daylight hours the bridge will be opened upon a signal of three blasts of a whistle. The power plant dam crosses the river in Machias.

The mean range of the tide at Machiasport is about 13 feet. Currents follow the general direction of the channel and are weak except in the river. In severe winters, Machias River is closed to navigation by ice, and drift ice will sometimes fill the bay above Avery Rock. In ordinary winters the bay and river are open to Machiasport.

Machiasport is a village on the west bank of Machias River, 2.5 miles above the entrance. Prominent landmarks include a church spire and the cupola of the Town Hall northward of the spire. The village has a customs office which is attended by an officer from Jonesport. **Storm warnings** are shown, daytime only, from a skeleton tower on the hill, near the church spire. Two fish factories have wharves with depths of 4 and 5 feet alongside. Gasoline is available, and Diesel oil is delivered by tank-wagon from Machias.

East Machias River, which empties into Machias River from northeastward 1 mile above Machiasport, is practically bare at low water at **East Machias,** a village on the railroad 1.5 miles above the entrance. The channel is difficult, and is little used except by small craft. A wharf with a depth of 14 feet alongside at high water spring tides is on the north side of the channel north of **Newcomb Point,** the west entrance point. Another wharf, with 9 feet alongside at high water spring tides, is on the west side of the channel about 0.5 mile below East Machias.

Machias is a town on the highway and railroad at the head of navigation on the Machias River. There is a U. S. Public Health Service relief station in the town. Small tankers bring gasoline and fuel oil to the old coal wharf at high water. On the north side of the river is a good marine railway and machine shop where boats up to 75 feet in length and 9 feet in draft can be hauled out for repairs to hulls and machinery. The wharf at the machine shop has 9 feet of water alongside.

The following **directions** are for Machias Bay and River. Vessels approaching from the eastward must keep in mind that many vessels have been wrecked on the eastern side of Libby Islands in thick weather through failure to hear the fog signal. From the eastward, steer for Libby Island Light on any bearing northward of 251°, and when Avery Rock Light is open from the western end of Cross Island, bearing 342°, shape the course to pass about 0.5 mile eastward of the northern end of Libby Islands. Steer for Avery Rock Light on a course of **358°** until abeam of the north end of Yellow Head, then steer **342°** and pass 250 yards west of Avery Rock Light and about 150 yards west of the

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bell buoy off the light. Anchorage may be had anywhere between Avery Rock and Round Island, or eastward or northeastward of the latter at a distance not greater than 0.5 mile, in depths of 30 to 45 feet.

Approaching from the westward, steer for Libby Island Light on any bearing northward of 057° until about 0.5 mile from the light. Shape course to pass 0.5 mile northwestward of the light. Then steer **036°** until Avery Rock Light bears 358°. Then steer for the Avery Rock Light on a **358°** course, and follow the directions in the preceding paragraph.

Approaching from Cross Island Narrows, from a position 100 yards northeast of Dogfish Rocks buoy 3, steer **295°** for 2.0 miles until the north end of Yellow Head bears west, distant 0.4 mile. Then steer **342°** and follow directions given in the previous paragraphs.

The channel in Machias River is marked by buoys below Machiasport and is easily followed. The best time is at low water, when the flats are visible. From a position 250 yards west of Avery Rock Light, steer **000°** until about 0.3 mile northeastward of Round Island. Change course to **300°** for about 0.6 mile, passing 100 yards north of Round Island buoy 5, until about 0.2 mile eastward of Middle Ground buoy 7, then steer **269°** for 0.7 mile, passing 100 yards north of Middle Ground buoy 7; then steer **281°** for 0.4 mile to a position southward of Birch Point buoy 6. From this position a **310°** course for 0.3 mile will lead to a position 75 yards westward of Randall Point Flats buoy 8. After passing the buoy, the wharves at Machiasport should be kept a little on the starboard bow for about 0.2 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 0.5 mile southward of the wharves at Machiasport.

Above Machiasport, the channel leads between shoals bare at low water 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.

Chart 304.—Englishman and Chandler Bays form a large bight in the coast between Libby Islands and Head Harbor Island. **Roque Island,** 6 miles west of Libby Islands, and numerous smaller islands are in the middle of the bight. The bays join northward of Roque Island and form a good anchorage, with depths of 18 to 32 feet, good holding ground. Directions for the bays are given following the discussion of Chandler Bay.

Englishman Bay, northeastward of Roque Island, has numerous dangers in the approach to the anchorage northward of Roque Island, but the buoyed channel 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 channel 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 have been discussed previously.

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. A sunken rock is 400 yards north of Scabby

Islands. **Scabby Island Ledge,** awash at low water, is 250 yards southwestward of the islands.

Codhead Ledge, 1.5 miles northwestward of Scabby Islands, is awash at low water and marked by a buoy on its western side.

Shag Ledge, 0.9 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. A shoal with a depth of 5 feet is midway between Codhead and Shag Ledges.

Pierson Ledge, 0.4 mile northward of Shag Ledge and 350 yards west of **Point of Main,** is bare at low water.

Hickey Island, 0.7 mile northwestward of Shag Ledge and in the entrance to Little Kennebec Bay, is wooded on its northern end. A rock awash at low water is 250 yards eastward of the island and another rock is 200 yards southward of the island.

Little Kennebec Bay, which extends northward from the eastern part of Englishman Bay, is of little commercial importance and is frequented mostly by fishermen. Good, well-sheltered anchorage can be found in depths of 12 to 40 feet, soft bottom, inside of **Sea Wall Point,** 1 mile north of Hickey Island. However, this anchorage is seldom used, as nearby Machias Bay and Starboard Cove are much easier of access and are better anchorages. There are fish weirs in the upper part of the bay.

The Brothers, grassy islands with rocky shores, are on the southwestern side of the main entrance to Englishman Bay. A bell buoy is moored off the northeast end of The Brothers.

Green Island, 0.3 mile north of The Brothers, is grassy. **Green Island Ledge,** partly bare at low water, extends 0.3 mile eastward from the island and is marked by a buoy on its eastern side. A ledge, awash at high water, extends 200 yards westward from Green Island. **Brothers Passage** is between Green Island and The Brothers.

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

Jumper Ledge, 0.6 mile southward of Pulpit Rock, has a least depth of 5 feet and is marked by a buoy. A 28-foot spot is 0.7 mile southeast of the ledge, and **Misery Ledge,** with a depth of 14 feet, is 0.6 mile south.

Halifax Island, 0.8 mile northwestward of Green Island, is grass-covered on top, with rocky sides, and has a prominent mound at its western end. **Anguilla, Double Shot, Great Spruce,** and **Little Spruce Islands,** westward of Halifax Island, are wooded. A rock, bare at low water, is 300 yards southeastward of Halifax Island. A bar with depths of 18 to 25 feet extends from Halifax Island to Green Island. The current is reported to boil over the bar, and this passage should be used with caution.

A rock, well covered at high water, is 300 yards southward of Double Shot Island. **Shag Rock,** 500 yards 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. The harbor affords shelter from all winds and is used by small vessels, but the holding ground is not good except in spots. The best anchorage is in the western or northwestern parts of the harbor where the bottom is soft. The entrances to the harbor are mostly foul. The best entrance is from eastward, passing north of Halifax Island. There is a least found depth of 10 feet, rocky bottom, on the shoal 0.5 mile northwestward from Halifax Island. Kelp is reported to be visible at low water on this shoal. **Lakeman,**

Bar, and **Marsh Islands** are off the southeast side of Roque Island and on the northern side of the eastern entrance to the harbor.

To enter Roque Island Harbor, pass 700 yards northward of Halifax Island on a 255° 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°, with the western side of Shoppee Island in range with the western side of Pond Cove Island astern. This course leads clear between unmarked spots in Englishman Bay to the entrance of the harbor.

The principal dangers in Roque Island Harbor include a spot with 8 feet on it 0.2 mile off the middle of the north side of Great Spruce Island, and **Seal Ledge,** bare 3 feet at low water, located 300 yards westward of the southern point at the eastern end of Roque Island.

Lakeman Harbor, on the northeast side of Roque Island Harbor, is a good anchorage for small craft. Several boats winter here.

The **Thorofare,** connecting the southwest side of Roque Island Harbor with Chandler Bay, has a depth of 9 feet in a narrow, crooked channel. The bottom is visible in the shoaler parts of the channel. The Thorofare is used considerably by small vessels with local knowledge.

To pass through the Thorofare from Roque Island Harbor, 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 two points. The first is 300 yards inside the eastern entrance where the northwest side should be favored slightly to avoid a rock on the southeast side. The rock bares at half tide. The second is at the western entrance, where the wooded island on the north side should be favored to avoid a shoal extending 250 yards northward from Little Spruce Island.

Bunker Cove, situated between Great Spruce and Little Spruce Islands and the Thorofare, is a good harbor and is used for winter storage of small craft. Small craft often anchor in its entrance just off the Thorofare.

Shoppee Island, 2 miles northwest of Halifax Island, is flat and wooded except at the northwest end. A reef, known as **Boundary Ledge,** on the outer edge of which are rocks bare at low water only, extends northeastward from Roque Island to within 0.4 mile of Shoppee Island. A buoy marks the northeastern end of the reef.

Shoppee Point is on the mainland 0.3 mile north of Shoppee Island. A wharf with a depth of 7 feet at its end is on the point northward of Shoppee Point. **Roque Bluffs,** 0.6 mile eastward of Shoppee Point, is a village with a post office. The mouth of **Englishman River,** southeast of Roque Bluffs, is crossed by a fixed bridge with a horizontal clearance of 45 feet and a vertical clearance of 6 feet at high water. The yellow bluffs at the mouth of the river are prominent from the southward.

Shorey Cove, a bight in the north shore of Roque Island, has depths of 8 to 13 feet. The cove 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. There is a private landing on the east side of **Squire Point,** the northwest extremity of Roque Island.

Pond Cove, on the northeast side of Englishman Bay above Shoppee Point, has its entrance between **Pond Cove Island,** 1.2 miles northwestward of Shoppee Island, and **Little Ram Island,** 1 mile north of Roque Island. The entrance is clear of dangers with

the exception of a rock, bare at low water, 300 yards northeastward of Little Ram Island. Excellent anchorage may be had in depths of 12 to 18 feet, soft bottom, westward or northwestward of Pond Cove Island at a distance of not more than 0.6 mile. The part of the cove northward of Pond Cove Island is shoal. There are numerous fish weirs in the cove.

Chandler River, at the head of Englishman Bay, is very narrow and crooked to the head of navigation at **Jonesboro,** a village about 3.5 miles above the mouth. The river is bare at low water at Jonesboro. The channel is unmarked, and strangers should not attempt to enter without a pilot. Pilots may be had from among the local fishermen at the mouth of the river. Drafts of 14 feet have been taken to **Carlton Point,** about 1.5 miles above the mouth. The only traffic by water to Jonesboro consists of small boats engaged in fishing and clamming. On the northeast side of the river, 0.5 mile and 0.8 mile above Calton Point, are two quarry wharves not in repair. Just northward of the lower wharf is a clam-packing plant.

Ice closes Chandler River to Calton Point from about December to April. It is reported that the river seldom freezes below **Deep Hole Point,** 0.3 mile southeastward of Calton Point, but in extreme winters the bay is said to have been frozen as far as Roque Island.

Mason Bay, extending westward from the head of Englishman Bay, is practically bare at low water and has many rocks inside the entrance. An unmarked channel with a depth of 13 feet leads to the entrance from southward. The small settlement of **Mason Bay** is on the south side of the bay just inside the entrance. Fish traps are numerous in the vicinity.

Chandler Bay, on the west side of Roque Island, extends northward from Mark Island to Squire Point 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 are buoyed, and the channel can be followed readily by daytime in clear weather. The bay is the approach from westward to Chandler River and the anchorage in Englishman Bay, and is the one generally used by strangers. There are no good anchorages in the bay until north of Roque Island. Care should be taken to avoid the unmarked 17-foot spot in the southern entrance 0.7 mile westward of Little Spruce Island.

There are numerous dangers off Chandler Bay. **Black Ledge,** a pinnacle bare at low water, is on the western side of the approach from the sea, 0.2 mile eastward of Head Harbor Island. **Breaking Ledge,** with a depth of 9 feet over it, is 0.4 mile northeastward of Black Ledge. A buoy is moored 200 yards eastward of Breaking Ledge. **Eastern Ledges,** about 600 yards long, are 1.4 miles south of Great Spruce Island. At the easterly end of Eastern Ledges is a rock bare at low water, and at the westerly end are two sunken rocks nearly awash at low water. A rock, covered near high water, and nearly always marked by a breaker, is 0.7 mile northeastward of Eastern Ledges.

Fifth Rock, with a depth of 7 feet over it, is 400 yards southwest of Eastern Ledges. **Great Spruce Ledges** are 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, has a depth of about 1 foot. **Ballast Island,** on the western side of the main channel through Chandler Bay and 0.9 mile west of Roque Island, is grassy; a buoy marks the eastern end of **Ballast Island Ledge** which extends 200 yards eastward of the island. **Roque Island Ledge,** marked by a buoy at its western end, extends 700 yards off

the west side of Squire Point. Just above Squire Point, **Great Bar** extends from the western shore of Chandler Bay for 0.5 mile. The buoy off the end of the bar marks the western side of the channel.

The following **directions** are for drafts of 17 feet 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 there are many unmarked shoals. Accordingly, caution is necessary.

Approaching through Englishman Bay, pass about 0.3 mile eastward of The Brothers and 400 yards northeast of Brothers bell buoy 3. Steer **312°** for about 2.5 miles, heading for the east tangent of Shoppee Island until abeam of Halifax Island Reef buoy 1. Then change course to **297°** and pass about 300 yards southwest of Shoppee Island, selecting anchorage above the island as desired. If approaching through Foster Channel, from a position north of Ram Island buoy 1 steer **275°** for 1.8 miles to a position 150 yards south of Cod Head Ledge buoy 2. Then steer **291°**, passing 300 yards southwestward of Shoppee Island and 200 yards northeastward of Great Head Reef buoy 3.

Approaching through Chandler Bay, follow the directions for Moosabec Reach given in Chapter 3 until northward of Mark Island. Then bring the western end of Mark Island astern on a **348°** course, passing about 250 yards eastward of Ballast Island Ledge buoy 5 to a position about 250 yards westward of Roque Island Reef buoy 2. Thence, steer **030°** and pass about 150 yards southeastward of Great Bar buoy 7. 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.

Moosabec Reach 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. The passage is an important thoroughfare and is much used by vessels of 11 feet or less draft in daytime; a draft of 23 feet can be taken through at high water. **Mark Island,** heavily wooded, is the prominent guide to the eastern entrance, and Nash Island Light to the western entrance.

In the eastern entrance to Moosabec Reach a Federal project provides for a channel 14 feet deep and not less than 300 feet wide. The least depth in the passage is 11 feet at a point 0.5 mile westward of **Kelley Point,** the northeastern entrance point on the mainland 1.2 miles west of Mark Island. In the western part of Moosabec Reach, there is a depth of 13 feet between Hardwood Island, 3.2 miles westward of Kelley Point, and Fessenden Ledge.

The channel is well marked by a light, daybeacons, and buoys. Vessels can readily follow the channel in the daytime in clear weather, but strangers should not attempt passage at night. **Emms Rock Light,** 28 feet above water and visible 7 miles, is shown from a black skeleton tower on the south side of the channel about 400 yards south of Kelley Point. The stone jetty extending southeastward from the light to **Nova Rocks** bares about 3 feet at low water. A daybeacon is on **Gilchrist Rock,** 0.5 mile west of Mark Island, and another daybeacon is on **Snows Rock,** about 0.5 mile southwest of Kelley Point; the 11-foot spot is in the channel northwestward of Snows Rock.

Vessels caught by fog in the reach anchor anywhere in the channel where the bottom is soft. Directions from eastward and westward are given in Chapter 3. Approaching from the southward, steer for the eastern end of Mark Island on a **304°** course, which will lead between Breaking Ledge and the dangers near Eastern Ledges. Pass eastward and

northward of Mark Island, giving it a berth of over 200 yards. **Pilots** usually can be obtained from among local fishermen.

The mean range of the tide is about 11½ feet. The tidal currents have considerable velocity in the dredged channel, particularly at the light on the stone jetty. The current floods to the eastward and ebbs to the westward. Ice obstructs navigation during January and February.

Jonesport is a fishing town on the north shore of Moosabec Reach, about 2 miles west of Kelley Point. There is considerable trade in fish and lobsters. Approaching the town, a stack and twin water tanks of the largest fish factory and the stack of the factory to the eastward are prominent. The town is a customs port of entry at which marine documents are issued. The wharf of the largest fish factory has a depth of about 15 feet alongside. Diesel oil, fuel oil, gasoline, coal, and provisions are available. Fresh water may be had in small quantities. The boatyards have small marine railways for hauling out boats up to 60 feet in length; machine shops can make repairs to gasoline engines. There is no regular steamer service. The town has telephone and highway communication.

Beals is a village, with post office, on the northern end of **Beals Island,** which is on the south side of Moosabec Reach opposite Jonesport. The main wharf is at the northeast extremity of the island and has a depth of 8 feet at its end. Gasoline and oils are available. The fish wharves in the cove on the northwest side are bare at low water. A Federal project for this cove (**Beals Harbor**) provides for an anchorage 10 feet deep over an area about 600 feet long and varying in width from 1,000 feet at the 10-foot depth curve in Moosabec Reach to about 600 feet at the inner end. In June 1949, work had not begun on this project. There are several boatyards on Beals Island where fishing craft up to 65 feet in length are built.

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

A quarry, not in operation in 1949, and a loading wharf, bare at low water, are on the west side of **Bickford Point,** the western entrance point to West River. This quarry is prominent from the western approach to Moosabec Reach.

Wohoa Bay, 3 miles west of Jonesport, is the large bay east of **Moose Neck** and south of Bickford Point. Good anchorage is reported between **Carryingplace Island,** 300 yards northeast of Moose Neck, and Fessenden Ledge, in depths of 16 to 37 feet.

Several islands are adjacent to the usual route westward from Moosabec Reach through Tabbott Narrows. **Pomp Island,** 1.2 miles west of Beals Island, is grassy and has a single clump of trees. **Hardwood Island,** 0.7 mile west of Pomp Island, is wooded and has a house on the north end and a prominent quarry on the south end. A 13-foot shoal is in mid-channel between this island and **Fessenden Ledge,** 0.4 mile northwestward. **Shabbit Island Ledge,** 0.5 mile west of Hardwood Island, has a small spot bare at high water. **Shabbit Island,** 1.1 mile southwestward of Hardwood Island, is low and wooded in the center. **Sheep Island,** 2.4 miles southwestward of Hardwood Island and on the northwest side of **Tabbott Narrows,** is grassy. **Ram Island,** on the southeast side of the narrows, is wooded.

Cape Split Harbor, on the west side of Moose Neck and 2 miles northeastward of Nash Island Light, is a secure anchorage for small vessels. The buoyed entrance is easily navigated in daytime. The harbor has extensive flats and ledges, between which

is a channel 200 yards or more wide. The anchorage with the best swinging room is in depths of 18 to 22 feet about 0.4 mile inside **Wass Point,** which is on the western side of the entrance. Vessels of less than 9-foot draft can anchor in depths of 9 to 15 feet in the entrance to the cove making into Moose Neck 0.6 mile northeastward of Wass Point, or northwest of the wharf in depths of 16 feet. The flats are soft mud in places, and small vessels sometimes are beached on them. A reef which shows well at low water extends 400 yards southward and southwestward from the point on the east side of the entrance. This reef is marked on its western side by a buoy. A wharf with a depth of 2 feet alongside at low water and the small settlement of **Moose Neck** are on the eastern side of the harbor. Some motorboat supplies are available. There is a gasoline pump on the wharf.

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 daybeacon southward of Norton Island and Pot Rock. Enter the harbor midway between the buoys at the entrance on a **012°** course.

Between Chandler Bay and Pleasant Bay, and extending about 5 miles southward from Moosabec Reach, there are several islands which, though of little commercial importance, are prominent landmarks for vessels passing along the coast. The passages between these islands lead to several small and sheltered anchorages; however, because of numerous unmarked rocks and ledges, Mistake Harbor is the only one available for strangers.

Head Harbor is between **Head Harbor Island,** the easternmost island of the group, and **Steele Harbor Island.** The harbor affords sheltered anchorage in depths of 15 to 21 feet. It 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** and **Black Head,** the eastern side of the entrance, are dark, while those on the western side are light in color.

Mistake Harbor, westward of Steele Harbor Island, is small but affords secure anchorage in depths of 24 to 42 feet. The entrance from southward is through **Main Channel Way,** a deep but narrow channel leading between Steele Harbor Island on the east and **Mistake** and **Knight Islands** on the west. With care, the harbor may also be entered through Mud Hole Channel; vessels delayed by a head wind in Mistake Harbor sometimes beat out through Mud Hole Channel.

Moose Peak Light, 72 feet above the water and visible 14 miles, is shown from a white tower with covered way to dwelling on the southeast extremity of Mistake Island and on the southwest side of the entrance to Main Channel Way; the fog signal is an air diaphragm horn. There is a Coast Guard station at the light.

To enter Mistake Harbor through Main Channel Way, give the south end of Steele Harbor Island a berth of about 0.3 mile when southeastward of it and enter in mid-channel, about 350 yards northeastward of Moose Peak Light, on a **301°** course. When through the narrowest part of the channel, select anchorage in depths of 20 to 42 feet between the northwest end of Knight Island and the buoy 0.5 mile northwestward of it. The buoy in the middle of Mistake Harbor marks a rock bare only at low water.

Green Island is the largest of the islands and rocks extending northwestward along the south side of Mistake Harbor. Rocks bare at low water are 300 yards northward

and over 400 yards northwestward of the island. Two sunken rocks with a depth of 4 feet are 600 yards northwestward of the island.

Eastern Bay is between Head Harbor and Great Wass Islands northward of Mistake Harbor; a thorough local knowledge is required to navigate the bay.

Mud Hole Channel, 0.5 mile westward of Moose Peak Light, leads northwestward to the **Mud Hole,** which is a narrow cove in Great Wass Island, and to the western end of Mistake Harbor. Mud Hole is entered at high water, and boats are sometimes stored in the cove. Good anchorage is available for small vessels at the entrance to **Sand Cove** and Mud Hole, in depths of 14 to 30 feet, soft bottom.

Black Ledges, on the southwest side of Mud Hole Channel, and extending nearly 1 mile in a southeasterly direction from **Little Cape Point** on Great Wass Island, consist of a group of rocks and ledges, many of which are bare at half tide. **Channel Rock,** the southeasternmost of the Black Ledges, is awash at high water. **Freeman Rock,** 600 yards southwestward of Channel Rock, is a bare rock about 40 feet high.

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

The following directions are from Mistake Harbor to the sea through Mud Hole Channel. From the harbor steer **287°** with the southwest side of Mink Island in range with the high bluff on the south side of Sand Cove North, passing about midway between the outer bare rock northeastward of Green Island and the buoy northward of the island. Pass 200 to 400 yards southeastward of Mink Island and steer **181°** with the eastern end of Mink Island in range with the northwestern end of Head Harbor Island astern. When the outer bare rock northwestward of Green Island bears 083°, steer **123°**, passing about 400 yards southwestward of the rock, and about midway between Water Island and Channel Rock to sea.

Great Wass Island, 1.5 miles westward of Steele Harbor Island and southward of Jonesport, has a number of coves that are frequented by small craft. **Cummings Head,** on the southern side of Great Wass Island, appears reddish from offshore.

Western Bay, westward of Great Wass Island, has numerous groups of islands which lie mostly in a north and south direction. Between the groups are passages leading to the western end of Moosabec Reach that are used by vessels with local knowledge.

Crumple Island, 0.6 mile west of the south end of Great Wass Island, is a high, bare, rocky island with several nubbles. **Fisherman Island,** 0.2 mile northwestward of Crumple Island, and **Browney Island,** 1.2 miles northwestward of Crumple Island, have rocks and ledges between them. The passage between Great Wass Island and Crumple, Fisherman, and Browney Islands has numerous unmarked sunken rocks. A line of ledges and rocks extends from Browney Island to Great Wass Island. There is a narrow channel with a depth of about 10 feet through these ledges. Strangers should not attempt this passage.

Egg Rock, a bare, rocky islet, is 1.3 miles westward of Crumple Island. Between the two are numerous rocks and ledges, including **Curlew, Green,** and **Seal Rocks. Western Egg Rock** is a small, bare, rocky islet about 0.7 mile northward of Egg Rock. **Seahorse Rock,** bare at half tide, is 0.4 mile westward of Egg Rock and is marked by a bell buoy southwestward of it.

Outer Sand Island, 2.4 miles northwest of Egg Rock, and **Sand Island,** 0.6 mile

north of Outer Sand Island, are wooded. **Drisko, Little Drisko,** and **Stevens Islands,** northward of Sand Island, are wooded. **Flat Island,** 1.4 miles west of Outer Sand Island, and **Green Island,** 1.6 miles north of Flat Island, are comparatively low and covered with grass. **Plummer Island,** 0.4 mile east of Green Island, is wooded. The highest parts of **Stanley Ledge,** 0.3 mile southward of Outer Sand Island, and **Batson Ledges,** 0.4 mile eastward of Sand Island, show above high water. **Black Rock** is a low, bare rock 1.3 miles southward of Flat Island and 2.2 miles southeastward of Nash Island Light.

The passage between Seahorse Rock, Western Egg Rock, and Ram Island on the east, and the Sand and Drisko 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 Drisko Islands and Shabbit Island and eastward of Black Rock, Flat Island, and Plummer Island is comparatively clear. Another comparatively clear passage is westward of Black Rock, Flat Island, and Green Island and eastward of Big Nash Island. Both passages can be used in the daytime and in clear weather with the assistance of the chart.

Chart 305.—Pleasant, Narraguagus, and Pigeon Hill Bays, which indent the coast between Nash Island on the east and Petit Manan Island on the west, are the approaches to the villages of Addison, Harrington, Millbridge, and Cherryfield, all on tributaries of the bays. These waters are frequented mostly by local fishing boats. The bays are separated by islands and rocks, through which are several thoroughfares.

Good anchorage can be found in Pleasant and Narraguagus Bays, the latter being used much as a harbor of refuge.

The mean range of the **tide** is about 12 feet at Addison, 11 feet at Trafton Island, and 11½ feet at Millbridge.

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 usually is frozen to the mouth. In ordinary winters, the ice that forms in these bays goes out with the tides.

Pleasant Bay, 6.5 miles west of Jonesport, is a secure anchorage and is easily entered in the daytime. **Nash** and **Big Nash (Cone) Islands,** on the eastern side of the entrance to Pleasant Bay, are grassy. A light, 51 feet above the water and visible 11 miles, is shown from a white square tower on the west side of Nash Island. A lighted whistle buoy is about 0.5 mile west of the light. A ledge, the southern end of which bares, extends about 500 yards southward from Nash Island.

There are numerous islands and ledges in Pleasant Bay, but the important dangers are marked by buoys. A channel with a least width of 0.5 mile, and with depths of 36 feet or more, leads up the bay to the anchorages. Anchorage is available in depths of 30 to 38 feet westward of **Nightcap Island,** a grassy island with a few bushes on its north side 3.4 miles north of Nash Island, and southward of **Barton Ledge,** a buoyed danger bare at low water 0.4 mile northwest of Nightcap Island. A better anchorage, and the one used most frequently, is in depths of 14 to 18 feet southeastward and eastward of **Birch Islands,** wooded islands 0.7 mile north of Nightcap Island.

Approaching Pleasant Bay from the westward, from a position close to the bell

buoy 1 mile south of Petit Manan Island, steer **032°** for 8 miles to the lighted whistle buoy 0.5 mile west of Nash Island Light. Then steer **344°** for 1.9 miles to a point 0.3 mile 270° from Norton Ledge. At this position change course to **012°** and make good the range of the east tangent of the Birch Islands with the tangent to **Tumbledown Dick Head,** 1.7 miles northward of Nightcap Island. Pass Nightcap Island at a distance of about 250 yards and continue to anchorage southeastward or eastward of Birch Islands.

If coming from eastward through Tabbott Narrows, when west of Ram Island (Chart 304), steer **267°** with the south end of that island astern. This course will lead about 450 yards north of The Ladle and the same distance south of the daybeacon off the south side of Norton Island. When past this daybeacon, round Norton Ledge at a distance of about 0.3 mile, passing south and west of it. When 0.3 mile west of this ledge, continue as in the preceding paragraph.

The Ladle, 0.9 mile north of Big Nash Island and 0.7 mile southwestward of the entrance to Cape Split Harbor, has a bare symmetrical mound at its northern end. **Pot Rock** is a bare rock 0.6 mile southwestward of The Ladle.

Flint Island, on the west side of the entrance to Pleasant Bay and 1.8 miles northwest of Nash Island, is wooded. The southeastern side of Flint Island should be given a berth of at least 0.5 mile. **Coles Ledge,** 0.3 mile eastward of the island, is bare near low water and marked on its eastern side by a buoy.

Flint Island Narrows is a deep passage leading from Pleasant Bay to Narraguagus Bay between Flint Island and **Dyer Island,** 0.4 mile northward. The passage is used principally by fishing boats, and is not recommended for sailing vessels on account of ledges that make out from the southern shore of Dyer Island and contract the channel to a width of about 200 yards. A buoy on the northern edge of the ledges that make off from the northeastern side of Flint Island marks the eastern entrance to the narrows. The course through the narrows is about **240°**. Pass close to and northwestward of the buoy and about 300 yards off the northwest sides of Flint and Shipstern Islands, and more than 300 yards off the south end of Dyer Island.

Norton Island, on the east side of Pleasant Bay and 2 miles north of Nash Island, is grassy. **Norton Island Ledge,** 400 yards westward of Norton Island, is bare in spots at high water. The reef extending 400 yards southward from the island is partly bare at high water and is marked by a daybeacon at its outer end.

The channel between Norton Island and **Cape Split,** 0.4 mile eastward, is obstructed inside the entrance by a small, rocky, unmarked shoal, with a least depth of 9 feet at low water. Northward of Norton Island the channel is restricted by rocks and ledges.

Bay (Narrows Island) Ledge, 0.4 mile south of the islands in the northwestern part of Pleasant Bay, is bare at half tide.

Nightcap Ledge, extending southward from Nightcap Island, is bare at the inner end at half tide.

Bunker Ledge, 0.3 mile westward of the southern Birch Island, is bare at half tide and is marked on its eastern side by a buoy.

Raspberry and **Mink Islands,** northward of Birch Islands, are grassy. **Fort Island** is 0.5 mile north of Raspberry Island.

Pleasant River, emptying into the head of Pleasant Bay from northward, can be approached on either side of Birch Islands. The channels eastward and westward of the islands have depths of 16 and 17 feet, respectively. For a distance of about 2 miles above Birch Islands to **Wass Point,** the buoyed channel has a ruling depth of over 17

feet, narrows gradually from 400 to 200 yards, is easily followed with the aid of the chart, and affords good anchorage in depths of 18 to 36 feet. Above Wass Point to Addison, the channel is narrow and crooked, with a least depth of 5 or 6 feet. This section of the river is suitable only for small craft, except with local knowledge. From Wass Point to **Whites Point,** 1 mile northward, the buoyed channel is bordered by ledges, bare at various stages of the tide. Above Whites Point to Addison are shoals on either side bare at low water. The channel is reported to be shoaling gradually 1.1 miles north of Whites Point. Above Addison the river is navigable at high water to Columbia Falls, about 10 miles above its mouth, but the channel is unmarked and difficult to navigate. Ice obstructs navigation from December to April.

Addison is a village about 5 miles above the mouth of Pleasant River. The **West Branch,** closed at its mouth by a highway fill, joins Pleasant River at Addison. The village has no trade by water, and the old wharves are in ruins. Gasoline and some supplies can be obtained from a general store with a service station. On the west side of the river, 0.2 mile below the mouth of the West Branch, is a fish factory with a wharf that has a depth of 1 or 2 feet alongside. Just above Addison a highway bridge over the river has a swingspan with a horizontal clearance of 36 feet and a closed vertical clearance of 5½ feet at high water. There is no bridge tender, and the key to the bridge is kept by one of the local residents. In 1949, it was reported that the bridge had not been opened for several years.

The river channel above Addison is dangerous and not used much. **Columbia Falls,** a village 5 miles above Addison, has railroad connections and a large saw mill.

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.** Harrington Bay extends about 2.5 miles in a northerly direction. Good anchorage may be found in Harrington Bay in depths of 30 to 47 feet; the channel has a depth of 27 feet. The bay and anchorage are seldom used except by local vessels. **Ripley** is a small village on the southwest side of Ripley Neck.

Strout Island, in the middle of the entrance to Harrington Bay from Pleasant Bay, is sparsely wooded. **Strout Island Ledges,** southeastward of Strout Island, are covered at high water; the south end of the ledges is bare at low water and marked by a buoy. A rock awash at low water and marked by a buoy is 0.5 mile southeastward of Strout Island. **Shag Islet,** 0.3 mile northward of the island, is a low, bare rock. The channel between Strout Island and **Otter Island,** 0.2 mile southward, is called **Strout Island Narrows.**

Approaching Harrington Bay from the westward, follow the directions given for Pleasant Bay from off Petit Manan Island until 0.8 mile north of the lighted whistle buoy off Nash Island, then steer **319°** with Nash Island Light astern and pass midway between Otter and Strout Islands. Follow the western shore of Strout Island at a distance of about 200 yards until about 100 yards east of the danger buoy. Then steer about **000°** and pass 125 yards west of Shag Island, after which follow the shore of Ripley Neck at a distance of about 300 to 400 yards and anchor on the eastern side of the bay below **Ripley Islands.** If entering from Tabbott Narrows, follow the directions for Pleasant Bay until Nash Island Light bears 319°.

Dyer Island Narrows, the passage between Dyer Island and Foster Island that connects Harrington Bay and Narraguagus Bay, has a depth of 9 feet. This passage is buoyed, but is not suitable for sailing vessels because of sharp turns and the narrowness

of the channel. There are numerous dangers close to the channel, and the buoys must be followed closely. Local pilots report dangers in this channel and that a boat drawing 3 feet has struck boulders.

To pass through Dyer Island Narrows to Narraguagus Bay, from a position about 50 yards southwestward of the danger buoy 300 yards westward of Strout Island, steer **321°** and pass 50 yards northward of Flats North Point buoy 3. Haul sharply southwestward around this buoy, leaving it about 50 yards on the port hand, and steer **218°** to a position 100 yards westward of Dyers Halftide Ledge buoy 5. Then steer **235°** and pass close northward of Dyer Island Ledge buoy 7 at the western end.

Chamberly Island, 2.5 miles north of Strout Island, is at the head of Harrington Bay.

Flat Bay and **Mill River,** extending northwestward from the head of Harrington Bay, are mostly bare at low water and are seldom used except by boats engaged in clamming.

Harrington River, which empties into the head of Harrington Bay from northward, has a narrow, crooked, unmarked channel. The river shoals to a depth of 1 foot near the town of **Harrington,** at the head of navigation about 4 miles above the mouth. The channel above **Nash Point,** 2.4 miles north of Chamberly Island, is narrow and tortuous. Motorboats run to the town of Harrington, but there are no arrangements for supplying them with gasoline or water. The town has rail and highway connections, but there is little water traffic. Ice forms in the river and bay between December and April as far down as Ripley Neck.

Narraguagus Bay is northward of Petit Manan Island and northwestward of Nash Island. The principal dangers in the channel are buoyed. The lights on Nash Island and Petit Manan Island and the lighted bell buoy just eastward of Pond Island are guides for the entrance. The bay is connected with Pleasant Bay by Flint Island Narrows, and with Harrington Bay by Dyer Island Narrows, both of which have been described previously.

The lower part of Narraguagus Bay is a well-sheltered anchorage, much used as a harbor of refuge in all seasons by vessels up to 18-foot draft. The usual anchorage for vessels seeking shelter in the bay is between Trafton Island and Lower Middle Ground buoy in depths of 21 feet, soft bottom. Vessels of 10-foot draft or less sometimes anchor in depths of 14 to 17 feet north of Trafton Island, about midway between it and the daybeacon on Trafton Halftide Ledge. Vessels bound up to Millbridge anchor in depths of 14 to 16 feet about 0.5 mile east of Wyman, with the wharf bearing about 274°. Good anchorage in depths of 24 feet, soft bottom, will be found about 0.4 mile northeastward of the daybeacon on Trafton Halftide Ledge.

Approaching Narraguagus Bay from eastward, pass 0.6 mile south of Nash Island Light and steer **290°**. This course clears the south end of Trafton Island by 300 yards. If entering east of Trafton Island, when on the course **290°** and just past Western Reef with the end of the ledge extending southeast from Tommy Island abeam, swing to course **353°** and pass about midway between Tommy and Trafton Islands. When the hill on the north end of Trafton Island is abeam, change course to **336°** and proceed to anchorage eastward of Trafton Halftide Ledge. If entering west of Trafton Island, continue on course **290°** until about 300 yards off the south end of that island. Round the southwest end of the island at about the same distance and proceed up the bay for 0.8 mile to anchorage on course **356°**.

Approaching from the westward, from a position close to the bell buoy 1 mile south

of Petit Manan Island, steer **013°** for about 6.5 miles to a position about 100 yards west of the lighted bell buoy off Pond Island. If passing east of Trafton Island, continue this course until the southern points of Shipstern and Flint Islands are on range, then head for the center of the channel east of Trafton Island and continue as in the preceding paragraph. If passing west of Trafton Island, when off the lighted bell buoy change course to **336°**, heading to clear Trafton Island by not less than 300 yards, and continue as in preceding paragraph.

Bois Bubert Island, 5 miles west-southwestward of Nash Island, is on the western side of the approach to Narraguagus Bay. **Jerry Ledge,** off the southeast end of Bois Bubert Island, is bare at low water. A 15-foot spot just south of this ledge is marked by a buoy on its southern side.

Jordans Delight Ledge, in the middle of the entrance to Narraguagus Bay and 1.6 miles east of Bois Bubert Island, has a rock at its southwest end that is bare at low water and marked by a daybeacon. **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.

Mackerel Rock, unmarked and with a depth of 10 feet, is 0.6 mile north-northeastward from Black Ledge. The rock is slightly west of the range made by Black Ledge and Petit Manan Light.

Jordans Delight, 3.5 miles west-southwest of Nash Island, is a rocky island, sparsely wooded on top.

Pond Island, 3.7 miles west of Nash Island, shows from southward as a bare conical hill 160 feet high. Narraguagus abandoned lighthouse tower is on the eastern side of the island. This tower, white in color and connected with a dwelling, is 54 feet above water and is a conspicuous landmark. A lighted bell buoy is 0.3 mile eastward of the tower.

Douglas Islands, between Pond Island and Bois Bubert Island, are wooded. **Douglas Island Harbor** is north of the Douglas Islands and west of Pond Island. The harbor has anchorage in depths of 24 to 36 feet, but is seldom used, since better anchorage is available above Trafton Island. Considerable sea makes into the harbor in heavy southerly weather. The harbor is clear except at its southwest end where **Douglas Island Ledge,** partly bare at low water, extends 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 094°.

Entering Douglas Island Harbor northward of Pond Island, pass northward and at least 0.3 mile westward of the buoy 0.3 mile north of the island. The harbor may also be entered from southward between the islands; the best channel is between the wooded island near the southwest end of Pond Island on the east, and the easternmost 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 are 125 yards southwestward of the wooded islet 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 at low water, leads from Douglas Island Harbor into the head of Pigeon Hill Bay. This channel is bordered on both sides by rocks sunken and awash. The best water leads about 75 yards northward of **Currant Island,** which is wooded in the center and 0.3 mile north of Bois Bubert Island. After passing northeastward of Currant Island, steer about **283°**, with the highest point of Pond Island astern, until in the main channel of Pigeon Hill Bay.

While this channel is much used by local fishermen who follow the fish weirs as guides during the summer, it is not recommended for strangers.

Shipstern Island, 0.5 mile west of Flint Island and on the eastern side at the entrance of Narraguagus Bay, is high, round, and wooded, and has rocky bluffs on its south side.

Tommy Island, 0.8 mile northwest of Shipstern Island, is low and sparsely wooded. **Western Reef (Yellow Ledge),** extending 0.4 mile southward from Tommy Island, has a bare rock on its southern end and is marked by a buoy.

Trafton Island, 0.5 mile west of Tommy Island, is wooded. There is a good channel on either side of Trafton Island. **Trafton Island Ledge,** in the middle of the entrance to the cove on the north side of Trafton Island, is a bare rock. **Trafton Halftide Ledge,** 0.6 mile northward of Trafton Island, is partly bare at low water and is marked by a daybeacon near its northern end.

Wyman is a village on the western side of Narraguagus Bay 1.8 miles northwestward of Trafton Island. The brick chimney of a destroyed fish plant is prominent. There are several small fish wharves in the cove northwestward of **Mitchell Point.** Gasoline is obtainable. The village has a general store, and a paved highway connects with Millbridge.

Narraguagus River, emptying into Narraguagus Bay from northward, has a least depth of about 4 feet to Millbridge. The channel is marked but is narrow and crooked, and leads between flats that bare at low water. Strangers should navigate the river on a rising tide.

Millbridge is a small town on the west side of Narraguagus River 2 miles northwest of Wyman. In 1949 there was no shipping, and the two old wharves were in ruins. Fishing boats use the remains of the lower wharf which has a depth of 4 feet at its outer end. Two fish factories are in the vicinity. The southernmost factory, in the cove 0.6 mile south of the bridge, has a wharf where fishing craft unload at high water.

The highway crosses the river at Millbridge on a fill and two bridges. The bridge over the west channel has a swingspan with a horizontal clearance of 26 feet and a closed vertical clearance of 5 feet at high water. The fixed bridge over the east channel has a horizontal clearance of 117 feet and vertical clearance of 5 feet at high water.

The Narraguagus River between Millbridge and **Cherryfield,** a distance of about 4 miles, is mostly bare at low water, and the deepest draft using it is about 5 feet at high water and with local knowledge. Pilots for this locality can be obtained from among the fishermen at Wyman. Cherryfield has railroad communication.

Pigeon Hill Bay, about 6 miles southwestward of Nash Island, is entered eastward of Petit Manan Bar and northward of Petit Manan Island. The bay is easy of access by day and affords good anchorage in depths of 12 to 24 feet, but is seldom used except by local fishermen. The channel is unmarked except at the entrance. The small settlement of **Pigeon Hill** is on the west side of the bay.

To enter Pigeon Hill Bay from the southward, from a position 0.3 mile west of Whale Ledge buoy 2, steer 348° with Pigeon Hill ahead and Petit Manan Light astern. This course will lead clear of all dangers inside the bay. Follow a mid-channel course in the bay, and anchor above Gull Rocks in depths of 18 to 24 feet, soft bottom. Small vessels anchor on the west side off the village.

Whale Ledge, 1.4 miles south of Bois Bubert Island and on the east side of the entrance to Pigeon Hill Bay, is bare at half tide. A buoy marks a 13-foot spot 300 yards southward of the ledge.

Egg Rock, 1 mile south of Bois Bubert Island, shows at low water as a large ledge of dark boulders, with several high parts that are always out of water. There is a narrow channel between Egg Rock and Bois Bubert Island, but a stranger should not attempt passage.

Gull Rocks consist of a large ledge, bare at half tide, making off 0.2 mile from the shore of Bois Bubert Island about 1.4 miles northward of Egg Rock. These rocks can be 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 for some distance at sea.

The thoroughfare connecting the head of Pigeon Hill Bay with Douglas Island Harbor has been described previously.

Petit Manan Island, 7.7 miles southwestward of Nash Island, is low and bare, and marked by a light and several buildings. The light, 123 feet above water and visible 17 miles, is shown from a gray granite tower on the eastern side of the island. The fog signal is an air-diaphragm horn.

Petit Manan Bar extends from Petit Manan Island to **Petit Manan Point** on the mainland. The bar consists of ledges and large boulders, between which is a channel, marked by two fairway buoys, that can be used by vessels of 8-foot draft at low water when the sea is smooth. The channel is 1.3 miles northwestward of Petit Manan Light and 0.9 mile southeastward of Petit Manan Point. The buoys can be left close-to on either side. Another channel across the bar is 0.4 mile southeastward of Petit Manan Point; it 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. 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 and the ebb southwestward; sailing vessels are cautioned not to approach the bar in a light breeze.

Green Island is 0.4 mile northwest of Petit Manan Island. **Petit Manan Pool,** on the southeast side of Green Island and north of Petit Manan Island, is a small-boat harbor. The pool is bare at low water, but the bottom is soft and boats ground out at low tide.

Simms Rock, 1.7 miles south-southeastward of Petit Manan Light, has a least found depth of 6 feet. A danger buoy is between Simms Rock and a sunken rock 0.2 mile southeastward.

Southeast Rock, 3.2 miles southeastward of Petit Manan Light, has a least found depth of 5 feet, and is marked by a lighted whistle buoy.

Jackson Ledge, an unmarked danger 2.6 miles east of Petit Manan Light, has a least found depth of 23 feet.

Tibbett Rock, 3.6 miles east-northeastward of Petit Manan Island, has a least found depth of 12 feet and is marked by a danger buoy. Another rock, with a depth of 10 feet and marked by a danger buoy, is about 0.8 mile southeastward of Tibbett Rock.

Jo Leighton Ground, an unmarked danger with a least depth of 15 feet, is 2.1 miles northeastward from Petit Manan Light.

CHAPTER 6

Petit Manan Island to Jericho Bay

Chart 1202

THE COAST between Petit Manan and Jericho Bay is indented by Frenchman Bay, Blue Hill Bay, and numerous smaller bays and harbors. **Mount Desert Island,** between Frenchman and Blue Hill Bays, is mountainous and is the highest land feature on the coast of Maine. The summits are rounded and several of them are nearly the same height, making it difficult to identify individual peaks at a distance. Much of the forest on the eastern half of the island was destroyed by the great fire of 1947. Acadia National Park comprises the greater part of the eastern half of Mount Desert Island.

Mount Desert Rock, 17.5 miles southward of Mount Desert Island and 11.5 miles outside the nearest island, is a rocky islet about 20 feet high, with a light tower on top. The light, 75 feet above water and visible 14 miles, is shown from a conical gray granite tower on the rock. The fog signal is an air-diaphragm horn; the radiobeacon is synchronized with the fog signal for distance finding. **Columbia Ledge,** 0.7 mile southward of the rock, has a depth of 24 feet.

Chart 305.—The bight between Petit Manan Bar and Schoodic Peninsula is the approach to Dyer Bay, Gouldsboro Bay, and Prospect Harbor. Local fishermen are the principal users of these waters. Many rocks in the approach and tributaries have not been closely examined, and therefore, vessels should use caution when crossing broken areas where the charted depth does not considerably exceed the vessel's draft. The most important village is Prospect Harbor, although Gouldsboro and Steuben can be reached by small craft at high water.

Moulton Ledge, off the entrance to Dyer and Gouldsboro Bays and 3 miles westward of Petit Manan Light, is bare at low water. A horizontally banded buoy is west of the ledge. Broken ground and several unmarked ledges are in the vicinity of Moulton Ledge, and vessels should avoid this area. An 18-foot spot is 0.6 mile southward of the ledge; **Stone Horse Ledge,** with a depth of 11 feet, is about 0.8 mile to the northward.

Dyer Bay, westward of Petit Manan Point, has excellent anchorage in depths of 24 to 42 feet. The entrance, 3 miles northwestward of Petit Manan Light, and the bay are unmarked and seldom used except by small local vessels. A group of islands and rocks with narrow and deep passages between them extends from the westward across the

entrance of Gouldsboro Bay and part way across Dyer Bay entrance. A good passage nearly 0.5 mile wide is between Petit Manan Point and **The Castle,** the easternmost bare ledge. One mile above The Castle the channel narrows to a width of 250 yards because of rocks and ledges which extend out from both shores and have depths of 9 to 11 feet over them. Above this the channel widens to 0.5 mile, and then narrows gradually to 400 yards, westward of **Sheep Island,** 3.3 miles north of The Castle. The least depth in the channel is about 18 feet, but a stranger should not attempt to enter at low water with a vessel of more than 9-foot draft. There are no commercial wharves in Dyer Bay.

To enter Dyer Bay from eastward, from a position close aboard the vertically striped bell buoy southward of Petit Manan Light, steer **315°** for 3.2 miles until the south end of Petit Manan Point is 0.6 mile distant and in range with Egg Rock, bearing 060°. Then steer **351°** and pass 250 to 300 yards eastward of The Castle. When past The Castle bring it astern on a **359°** course until halfway up the bay, off **Yeaton Point.** Change course a few degrees to the right, heading to pass in mid-channel westward of Sheep Island. Select anchorage in depths of 24 to 42 feet near the middle of the bay when over 1.3 miles above The Castle, but do not go over 400 yards above Sheep Island.

Approaching Dyer Bay from the westward, from the whistle buoy off Schoodic Island, steer **046°** for 7 miles, passing 0.4 mile southeastward of Little Black Ledge, 0.5 mile northwestward of Stone Horse Ledge, and to a position 0.4 mile southward of The Castle. Pass 250 to 300 yards eastward of The Castle and continue as in the preceding paragraph.

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

The Castle, **Bonny Chess Ledge,** 300 yards west of The Castle, and **Little Ledge,** 0.5 mile west of The Castle, are bare ledges without distinguishing marks. **Yellow Birch Head,** on the east side of Dyer Bay near the entrance and 0.7 mile northeastward of The Castle, is a high, bare bluff.

Carrying Place Cove extends southeastward from Dyer Bay north of Sheep Island. The head of the cove, 300 yards from Pigeon Hill Bay, is nearly all soft mud and dry at low water.

Pinkham Bay, at the head of Dyer Bay, has numerous rocks and ledges. A narrow, crooked channel with a depth of 8 feet leads for some distance toward the head of the bay; the head of the bay is dry at low water.

Dyer Harbor, a shallow bight the upper part of which is dry at low water, is northwestward of Sheep Island and west of **Goods Point,** 0.6 mile northwest of Sheep Island.

Gouldsboro Bay, separated from Dyer Bay by **Dyer Neck,** is 4 miles northwestward of Petit Manan Light and 6 miles northeastward of Schoodic Island. An excellent anchorage may be had in depths of 12 to 54 feet. The bay is the approach to the villages of Gouldsboro and Steuben, 6.5 and 7 miles, respectively, above the entrance. However, the approaches to the villages are unmarked, can be navigated only by small craft at high water, and are seldom 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 to Gouldsboro Bay. Included in the Sally Islands are **Eastern Island,** wooded on top and 0.5 mile southward of Dyer Neck; **Bald Rock,** a bare rock 700 yards westward of Eastern Island; **Sally Island,** rocky with grass on top just southwestward of Bald Rock;

and **Sheep Island,** thickly wooded in the center and 0.4 mile southwestward of Sally Island. Through the islands are two navigable channels, Eastern Way and Western Passage. When approaching from westward, care must be taken not to mistake the passages as the islands are difficult to recognize. The bay inside the islands is free from outlying dangers, and the water shoals gradually toward the head of the bay.

Eastern Way (**Ship Channel**) leads into Gouldsboro Bay between Eastern Island and Bald Rock. The passageway is about 350 yards wide between the 18-foot curves, and has a spot with a depth of 24 feet over it about 200 yards west of Eastern Island. The channel has strong tidal currents and when the current is ebbing, sailing vessels can enter only with a strong favorable breeze. The currents set diagonally across the channel.

Western Passage, with a least depth in the channel of 20 feet, leads into the bay between Sally Island and Sheep Island. The passage is about 200 yards wide between the 12-foot curves and is close along the eastern side of Sheep Island and westward of ledges bare at half tide which extend about 400 yards west of Sally Island. The tidal currents run true with the channel and have a velocity of 2 to 3 knots at strength.

A passage from Dyer Bay to Gouldsboro Bay north of Sally Islands is obstructed by rocks, partly bare at low water. The rocks extend 300 yards southward and southwestward from the southern end of Dyer Neck and a shelving ledge extends 250 yards northeastward from Eastern Island. The narrowest part of the channel, abreast Eastern Island, is about 250 yards wide. The range of the northwest sides of Bald Rock and Sheep Island, bearing 240°, leads through the middle of the narrow part of the channel.

To enter Gouldsboro Bay, a depth of over 24 feet can be carried into the bay through the Eastern Way, and 20 feet 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.

Approaching from eastward and entering through Eastern Way from off the vertically striped bell buoy southward of Petit Manan Light, steer **312°** for a little over 4 miles. The tidal currents set across this course with considerable velocity, the flood northeastward and ebb southwestward. Change course as necessary to 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.

Approaching from westward and entering through Eastern Way, from the whistle buoy off Schoodic Island, steer **046°** for 4.4 miles, passing 0.4 mile southeastward of Little Black Ledge to a position where Cranberry Point is in line with Prospect Harbor Light. Then steer **028°** for the eastern end of Eastern Island until about 500 yards from the island. Then steer about **342°** and pass about midway between Eastern Island and Bald Rock. Then steer more northwestward to avoid the rocks, bare at low water only, 300 yards off the southwest side of Dyer Neck, and then stand up the middle of the bay.

Point Francis, on the western shore of Gouldsboro Bay 3.2 miles above Sally Islands, is high and wooded, and is prominent from the lower end of the bay. Small barges load pulpwood at high water at the point.

Joy Bay, a shallow body of water 1.5 miles long, extends northward from Gouldsboro Bay at **Rogers Point,** 1.5 miles north of Point Francis. Two coves are at the head

of Joy Bay; **Steuben Harbor,** the head of which is the village of **Steuben,** extends northeasterly and **Joy Cove** extends westerly. The narrow, crooked, unmarked channel through Joy Bay and Steuben Harbor is nearly bare at low water and seldom used. Steuben can be reached at high water by vessels of 7 to 8 feet draft.

Gouldsboro Harbor, a large shallow arm of Gouldsboro Bay, extends northwestward from the bay for about 2.5 miles. The village of **Gouldsboro,** on the western side of the harbor near its head, is of little commercial importance. The entrance to the harbor has numerous ledges and rocks. The narrow, crooked, unmarked channel in the harbor is nearly dry at low water and is seldom used.

Corea Harbor is a small cove between Gouldsboro Bay and Prospect Harbor. A number of grassy islands, including **Bar, Outer Bar,** and **Western Islands,** are off the entrance to Corea Harbor. A Federal project for improvement of Corea Harbor provides for an anchorage basin 8 feet deep, 600 feet long, and 400 feet wide. The harbor has a depth of 8 feet in the entrance and 7 feet in the basin. To enter, the best water is westward of Western Island, and then along the northeast side of Corea Harbor. A vertically striped whistle buoy is off this entrance about 0.5 mile southward of Western Island. Small craft enter from Gouldsboro Bay, inside of the islands, but strangers should not attempt this passage.

Corea is a post village of lobster fishermen at the head of Corea Harbor. A church and a group of houses are prominent for considerable distance offshore. Supplies in limited quantities are available. On the northern shore of the harbor are several small wharves which are nearly bare at low water. A wharf on the eastern side of the channel has a depth of 6 feet alongside. A gasoline pump is on the wharf.

Prospect Harbor, 3 miles northeastward of Schoodic Island and 6 miles northwestward of Petit Manan Light, is the approach to the village of Prospect Harbor. The outer harbor has ample depth and offers anchorage for the largest vessels, but is exposed to southerly winds. The harbor is easily entered but seldom used. A light, 42 feet above water and visible 12 miles, is shown from a white conical tower with covered way to dwelling at the head of Prospect Harbor and on the east side of the entrance to Inner Harbor. The light has two white sectors which show on the fairways on either side of the ledges off Prospect Harbor entrance. A vertically striped bell buoy is 0.3 mile southward of the light.

Little Black Ledge and **Big Black Ledge** showing above high water, and **Old Man** and **Old Woman,** partly bare at low water, are the ledges off the entrance to Prospect Harbor. A gong buoy is on the southwest end of Old Woman. These ledges divide the approach to the harbor into two channels. Both channels are clear and deep if the ledges between them are avoided.

Entering Prospect Harbor from eastward, from a position midway between the vertically striped bell buoy southward of Petit Manan Light and the buoy 0.6 mile northward, a 285° course for 5.5 miles will lead about midway between Moulton Ledge buoy and Stone Horse Ledge, and to the bell buoy off **Cranberry Point,** the eastern point at the entrance to Prospect Harbor. Pass south of and close to the bell buoy and continue the course until 0.2 mile northwestward of the bell buoy, thence steer for Prospect Harbor Light on a 322° course until off the entrance to Inner Harbor. Steer 286° into the inner harbor, passing 150 yards northward of the daybeacon north of Clark Ledges. Anchorage can be selected eastward or northeastward of the fish factory.

Entering from westward, vessels can pass 0.4 mile eastward of Schoodic Island and

then steer **010°** for about 3 miles, passing midway between Bunker Harbor Ledges buoy 1 and Old Woman Ledge gong buoy 2 until Cranberry Point is abeam; then steer **346°** heading for Prospect Harbor Light, passing eastward of the buoy and the daybeacon off Clark Ledges. The course into the inner harbor is then **286°** as described in the preceding paragraph.

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 of Prospect Harbor, is extensively used by small local vessels. The village of **Prospect Harbor** is on the shore of Inner Harbor. The harbor has depths of 12 to 38 feet just inside the entrance. **Clark Point,** on the southern side of the harbor near the entrance, has a fish factory on it. **Clark Ledges** extend about 500 yards eastward of the point. A buoy is on the eastern side and a daybeacon, a black wheel and pendants on an iron spindle, is on the northeastern side of the ledges. The entrance to Inner Harbor is between the daybeacon and Prospect Harbor Light. The anchorage, soft bottom, is on the southwest side of the harbor about 200 yards northward of a line between the daybeacon off the ledges and the fish factory on Clark Point. A depth of 15 feet is off the fish wharf on Clark Point and a depth of 5 feet is off the wharf just inside the point. Diesel oil, gasoline, water, and provisions are available.

Birch Harbor, on the western side of Prospect Harbor about 1 mile south of Inner Harbor entrance, has a depth of 6 feet for 0.5 mile and then shoals rapidly above this point. There is a small settlement of fishermen near the head of the harbor. 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 off the entrance.

Bunker Harbor, on the west side of Prospect Harbor 0.8 mile south of Birch Harbor, has a small settlement of fishermen at the head. The landings are bare at low water. The entrance is obstructed by ledges. The outer ledge is **Bunker Ledge,** partly bare at low water only; a buoy is off the eastern side. Inside of Bunker Ledge are ledges awash at high water. The channels into the harbor are unmarked, and the one northward of the ledges in the entrance is said to be the best.

Schoodic Harbor, between Prospect Harbor and Frenchman Bay, has ample depth but is exposed to the sea and never used as an anchorage. A small fish wharf is at the head of **Wonsqueak Harbor,** the northeastern part of Schoodic Harbor. Several islands and ledges are in the entrance to Schoodic Harbor.

Schoodic Island, 7.5 miles west-southwestward of Petit Manan Island, is low and partly wooded on the south end, and grassy on the north end. The island is bordered by extensive ledges. **Schoodic (Abbots) Ledge,** 0.4 mile northward of Schoodic Island, is covered near high water and breakers are always visible on it. 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 motorboats bound along the coast.

Middle Ledge, 0.8 mile north of Schoodic Island, is bare at about half tide. **Roland Island** in Schoodic Harbor northward of Schoodic Ledge is wooded.

Chart 306.—Frenchman Bay, westward of Schoodic Peninsula and eastward of Mount Desert Island, is the approach to the towns and important summer resorts of Bar Harbor, Winter Harbor, Southwest Harbor, Northeast Harbor, and many smaller

villages. The bay is frequented by yachts, small pleasure craft, fishing vessels, and a few cargo vessels. The bay proper is about 10 miles long and has an average width of about 4 miles. Near the center of the bay, a group of islands extends across the bay; between the islands are two good channels. Vessels of the largest size and deepest draft can find an anchorage and navigation is not difficult for strangers.

The principal guides to the entrance of Frenchman Bay from the sea are the lights on Mount Desert Rock, Great Duck Island, Baker Island, and Egg Rock. A brief description of Mount Desert Island and Mount Desert Rock is given in the first part of this chapter.

Cadillac Mountain, 1,532 feet high, is the highest point on Mount Desert Island and the highest point along the east coastline of the United States. On a clear day the mountain is visible from 35 to 45 miles seaward. An excellent scenic highway leads from Bar Harbor to the summit of Cadillac Mountain.

Schoodic Head, across the bay from Mount Desert Island on **Schoodic Peninsula,** is 437 feet high, and is the most prominent land feature at the eastern entrance to the bay.

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

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. Southwest Harbor is a well sheltered and frequently used anchorage.

Frenchman Bay is rocky, but the water is deep and in general free from dangers except near the shores. The main part of the bay, from a little southward of Egg Rock Light to the entrances of Skillings River, Sullivan River, and Eastern Bay, including the channels between Jordan and Long Porcupine Islands, and between Burnt Porcupine and Sheep Porcupine Islands, have 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 the tributaries 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 with the description of the tributaries.

Approaching from the eastward, from a position 100 yards south of Schoodic whistle buoy 8S, steer **296°** for 3.3 miles with Egg Rock Light ahead until Winter Harbor abandoned lighthouse tower is in line with the southern end of Turtle Island and Turtle Island Ledge gong buoy 2 is about 700 yards north-northeastward. Thence steer **314°** for 4.2 miles, heading just clear of the east side of Sheep Porcupine Island and passing 0.5 mile northeastward of Egg Rock Light to a position 400 yards east-northeastward of Bald Porcupine Island.

Or, from a position 100 yards south of Schoodic whistle buoy 8S, steer **284°** for 6.1 miles passing 100 yards south of Egg Rock whistle buoy 2 ER until Egg Rock Light

bears 032°, distant 1.1 miles. Thence steer **342°** to a position 400 yards east-northeastward of Bald Porcupine Island.

From the position 400 yards east-northeastward of Bald Porcupine Island, steer **328°** for about 2.5 miles passing midway between Burnt Porcupine and Sheep Porcupine Islands, to a point abeam Bald Rock buoy 5, distant 500 yards. Then steer **300°** for about 2.3 miles, passing 450 yards northeastward of Sunken Ledge buoy 9 until Sand Point bears 252°. Steer **266°**, passing about 400 yards northward of Sand Point and southward of Googins Ledge buoy 6, giving it a berth of over 100 yards.

Approaching Frenchman Bay from the westward, from a position 100 yards east of Baker Island whistle buoy 8A, steer **007°** for about 7.8 miles, until Egg Rock Light is abeam, distant 0.85 mile. Then steer **340°** for 2.2 miles, with the western part of Burnt Porcupine Island ahead, to the position 400 yards east-northeastward of Bald Porcupine Island. To continue follow the directions in the preceding paragraph.

Or, having come from westward through the passage northward of Sutton Island, as described under the directions for Southwest Harbor, pass about 200 yards southward of Seal Harbor lighted buoy 2 and steer **058°** for about 2.6 miles, following the shore of Mount Desert Island at a distance of 500 yards. When 200 yards southeastward of Otter Cliff Ledge bell buoy 1, steer **021°** for 1.8 miles, passing about 400 yards southeastward of Great Head, to a position 200 yards eastward of Schooner Head lighted bell buoy 3. Then steer **353°** for 3.4 miles to a position 400 yards east-northeastward of Bald Porcupine Island. From this position follow the directions in the preceding paragraphs.

The mean range of the tide is about 10½ feet. Between Bar Harbor and Ironbound Island the average flood current velocity is less than ¼ knot. The average ebb velocity at strength is about ¾ knot and sets southeastward. For current predictions see the *Current Tables*.

During mild winters Frenchman Bay is usually clear of ice to Skillings River, but the bays and rivers connected to the northern part of the bay are frozen over. Winter Harbor is reported to be clear always. It is reported that during foggy weather Frenchman Bay usually clears during the day although the fog remains heavy outside Schooner Head and Ironbound Island. No licensed pilots are available and none are needed to enter. Local fishermen usually can be engaged as pilots for the tributaries.

Chart 204.—Winter Harbor, on the eastern side of Frenchman Bay just inside the entrance, is a frequently used harbor of refuge. The principal entrance from southward is deep and free of dangers. The entrance from the northward is used only by local vessels of 12-foot draft or less. The aids in the northern approach are colored and numbered for vessels bound north. Good anchorage in depths of 5 to 9 fathoms, good holding ground, will be found in Winter Harbor. The harbor is comparatively free of danger and although open to the southward, a heavy sea never enters; ice seldom interferes with navigation. The directions for the harbor are given following the discussion of the town of Winter Harbor.

Turtle Island, wooded, is on the western side of the main entrance to Winter Harbor and 0.8 mile west of Schoodic Peninsula. **Turtle Island Ledge,** bare at half tide, extends 500 yards off the southwest side of the island; a gong buoy is southward of the ledge.

Mark Island, 0.5 mile west of Schoodic Peninsula and on the west side of the entrance to Winter Harbor, is grassy and marked by Winter Harbor abandoned lighthouse.

The abandoned lighthouse, a white tower 19 feet high and connected with dwelling, is prominent. A lighted bell buoy is 0.2 mile south-southeast of the tower. Depths of 12 to 16 feet are up to 300 yards south-southeast of the tower.

Of the islands northward of Turtle and Mark Islands, **Ned Island,** 0.1 mile north of Mark Island, and **Heron Island,** 0.5 mile northwestward of Turtle Island, are partly wooded. **Spectacle Island,** just north of Turtle Island, has a house and a few trees. The other islets, including **Flat** and **Crow Islands,** are grassy or bare rocks. All the islands are surrounded by extensive ledges bare at various stages of the tide. The channel between Turtle Island and Mark and Ned Islands is not recommended. A 16-foot spot is in mid-channel, 300 yards northwest of the north end of Mark Island. **Roaring Bull,** a shoal 200 yards northwest of Ned Island, has minimum depths of 3 feet and breaks during southerly and easterly weather; a buoy is off the northwest side.

Grindstone Neck, forming the west side of Winter Harbor, is wooded and has many cottages and a hotel. A standpipe and the hotel on the highest point are conspicuous. **Grindstone Ledge** extends 400 yards southward from Grindstone Neck. A daybeacon, a black spherical cage on an iron spindle, is on the ledge which bares at half tide. A buoy is 150 yards south-southeast of the daybeacon, and a small detached shoal of 12-foot depth is 235 yards south of the daybeacon. A narrow channel with a depth of about 16 feet is midway between the daybeacon and **Grindstone Point,** the southeastern extremity of Grindstone Neck, but this channel should not be used without local knowledge. The channel south of the ledge and buoy is the recommended passage. **Pulpit Ledge,** about 150 yards west of Grindstone Neck, has a buoy on its eastern side and a daybeacon, a white slatted cylinder on a black iron spindle, on it. Vessels should always pass eastward of Pulpit Ledge.

The eastern shore of Winter Harbor from **Frazer Point,** 0.6 mile northeastward and on the opposite side of the harbor from Grindstone Point, to Abijah Ledge, 0.5 mile northward, should be given a berth of more than 150 yards. **Abijah Ledge,** near the head of Winter Harbor, is about 300 yards off the eastern shore. A buoy is westward of the ledge. Shoal water extends from the ledge to the small cove northeastward.

Sand Cove, on the northwest side at the head of Winter Harbor, affords the best anchorage with an excellent holding bottom of black mud. Shoal water extends 100 yards off **Harbor Point,** the eastern entrance point of the cove. A buoy is southeastward of the point. A piling that bares 3 feet at low water is in the middle of Sand Cove northeast of an abandoned coal wharf on the western shore. A pole is nailed to the piling. A yacht club with a landing and float is on the west side of Sand Cove.

Winter Harbor Cove, northeastward of Sand Cove, is entered between Harbor Point and **Guptill Point,** 300 yards northward. The cove is the most frequently used anchorage for local fishing boats and in general is fully occupied. A buoy and a daybeacon, a red wheel on an iron spindle, are off **Guptill Ledge** on the northern side of the entrance; the mid-channel is clear inside.

Henry Cove, at the head of Winter Harbor eastward of Guptill Point, is wider than Winter Harbor Cove, but is used somewhat less as an anchorage for local fishing boats. Reefs and shoal water extend about 60 yards offshore at both sides of the entrance; the northern end of the cove is extremely shoal with a large area bare at low tide.

Winter Harbor is a town on Winter Harbor and Henry Coves at the head of Winter Harbor. The customs duties are handled by an officer from Bar Harbor. A public pier and float landing with a depth of 5 feet alongside are on the north side of the entrance

to Winter Harbor Cove. Gasoline and provisions are obtainable. A yacht club with a landing and float is on the west side of Sand Cove. Two small marine railways are at the head of Henry Cove, but they can be approached only at high water.

Winter Harbor is deep and clear from the entrance to the recommended anchorage in Sand Cove, but the following directions should be observed.

To enter from the south and southeast, lay courses to pass 300 yards or more off the general trend of the eastern shoreline until abeam of Frazer Point; then steer a mid-channel course into Sand Cove until proper anchorage depth is obtained.

To enter from the west, pass south of Turtle Island Ledge gong buoy on course **090°**, holding this course until the southeastern end of Turtle Island is abeam; then lay courses to pass east of Winter Harbor lighted bell buoy 1A, and 300 yards or more east of the abandoned lighthouse on Mark Island and the east side of Grindstone Point, until a mid-channel course can be steered into Sand Cove.

To enter from the north, westward of Grindstone Neck, the recommended course is west of Turtle Island to Turtle Island Ledge gong buoy 2, and then by courses for entering from the west. Vessels of less than 12 feet draft may enter from the northward, with caution, by the following route. Pass midway between Crow Island buoy 5 and Grindstone Neck and follow the western shore of the neck at a distance of 150 yards on a course of about 148° with Pulpit Ledge Daybeacon ahead. When about 350 yards northwestward of the daybeacon, swing gradually closer to Grindstone Neck until 75 yards from the neck. Pass close to and eastward of Pulpit Ledge buoy 3 and steer **160°** for 250 yards. Thence steer **123°** passing 50 to 75 yards abeam Grindstone Ledge buoy 2. When well past the buoy haul northward in Winter Harbor keeping at least 300 yards off the western shore.

To enter Winter Harbor Cove and Henry Cove, enter on mid-channel courses, avoiding the reef extending south of Guptill Point which is marked by a buoy and a daybeacon. Only small craft should enter these coves.

Chart 306.—Egg Rock, about 2 miles west of the entrance to Winter Harbor, is low and mostly bare. The most prominent leading mark for this section of the bay is a light on the rock. The light, 64 feet above water and visible 14 miles, is shown from a white square tower on a dwelling. The fog signal is an air-diaphragm horn. **Handiron Ledge** extends about 200 yards northeast of Egg Rock, and another ledge extends southwestward from the rock for about 500 yards. Parts of both ledges bare at low water. A whistle buoy is 1 mile south-southwestward from Egg Rock.

Ironbound Island, 1.5 miles northward of Egg Rock Light, is the largest of the islands in Frenchman Bay, is thickly wooded, and has high vertical cliffs. **Cod Ledges,** eastward of Ironbound Island, have two critical spots with depths of 10 and 11 feet. Vessels should pass to the eastward of the buoy on the eastern side of the ledge. A shoal with a depth of 12 feet is about 250 yards off the east shore of Ironbound Island at a point 0.6 mile northeast of **Seal Cove,** a bight in the southeastern side of the island. Shoal water extends 100 yards north of **Fish Point,** on the west side of the island, and along the cove eastward from the point. A ledge extending northward from the north end of the island has depths of 6 feet at a distance of 180 yards off shore; a buoy is northward of this ledge.

Halibut Hole is the passage between the north end of Ironbound Island and **Jordan Island,** 0.2 mile northeastward. The passage is deep and clear with the excep-

tion of a rock with a least found depth of 13 feet on the northeast side of the passage, 180 yards off the south shore of Jordan Island. The ledge shoals rapidly northward to the beach. The channel is southward of the rock. The buoy north of the 6-foot spot north of Ironbound Island is off the south side of the western entrance to Halibut Hole.

Stave Island Harbor is an excellent harbor of refuge on the eastern shore of Frenchman Bay. The mainland is on the east, Jordan Island is on the south, and **Stave Island,** 1.4 miles north of Ironbound Island, is on the north. The anchorage has a depth of 21 to 37 feet, soft bottom, and is sheltered from all winds; it is used considerably as an anchorage.

The main entrance to Stave Island Harbor is between Stave and Jordan Islands. A rock covered by 25½ feet is nearly midway between Jordan and Stave Islands, the deeper channel being southward of it. **Yellow Island,** 200 yards westward from the north end of Jordan Island, is so named from the color of its rocks. The island is wooded. A ledge with spots that bare at low tide is 150 yards south of Yellow Island.

To enter Stave Island Harbor, pass 200 to 300 yards northward of Yellow Island on a **072°** course. Approaching Stave Island Harbor from southward, the mariner will find a broad, clear channel between Ironbound and Long Porcupine Islands, and the approach northward of the Porcupines is also clear. The passage from Stave Island Harbor to Flanders Bay east of Stave Island is not navigable except for small craft at high water. 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,** between Jordan Island and the mainland. The channel which is used only by small local craft has a depth of about 3 feet and is 100 yards off Jordan Island.

Summer Harbor is a small settlement on **Hammond Cove,** in the southeastern part of Stave Island Harbor. The cove is clear with the exception of a rock with a depth of 7 feet, 200 to 400 yards from shore; a buoy is to the northward of the rock.

South Gouldsboro is a village on the northeastern shore of Stave Island Harbor. A wharf and fish cannery are in this village, and the stack of the cannery is prominent.

Calf Island, 0.7 mile northwestward of Stave Island, is wooded except on the south where it is low and bare. A house and barn on the southeast side are visible from southward. **Little Calf Island** and **Thrumcap** are partly wooded islands on the extensive shoal extending southward from Calf Island.

Flanders Bay, on the northeast side of Frenchman Bay, is protected by Stave and Calf Islands. An excellent anchorage may be found but the bay is seldom used except by small craft. The villages of West Gouldsboro and East Sullivan are on the eastern shore. The bay can be entered through a narrow channel across Calf Island Bar between Calf and Stave Islands, or around the north end of Calf Island. The channel north of Calf Island has the best water, but the channel south of the island is more direct and is more often used. **Calf Island Bar,** between Calf and Stave Islands, is shoal and has a depth of 8 to 11 feet in a buoyed channel.

An extensive chain of bare and sunken ledges extends through the middle of Flanders Bay from the north end to near the south end. **Halftide Ledge,** the southerly ledge, is bare at half tide; a buoy is off its south end. The channel through the bay is southward of the buoy. **Long Ledge,** 0.4 mile northwest of Halftide Ledge, is partly bare at high water. The ledge southward of Long Ledge has a depth of 5 feet. Between the 5-foot ledge and Long Ledge is an opening having a least found depth of 19 feet.

Soward Island, at the northwest side of Flanders Bay, is connected to **Waukeag**

Neck by a fixed bridge having a horizontal clearance of 30 feet and a vertical clearance of 4 feet at high water. The area between Soward Island and Long Ledge is foul. **Junk of Pork,** a small dirt cone of unusual appearance, **Sheldrake Island,** and **Ash Island** are in the area. A buoy is on the southeastern side of the foul area.

Hall Point, marked by prominent white residences, is on the south side of **Ash Neck,** on the east shore of the bay.

West Gouldsboro is a village at the head of **Jones Cove,** the southeasterly tributary of Flanders Bay. There is a depth of 4 feet to within 500 yards of the village, above this point the channel is bare at low water. 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 at the village is in ruins.

To enter Flanders Bay across Calf Island Bar, give the western shore of Stave Island a berth of over 500 yards and steer **019°** for the bar buoys, passing 0.3 mile southeastward of the Thrumcap. Pass Calf Island Point buoy 1 and Calf Island Point buoy 2 close-to, and from Calf Island Point buoy 2 steer **061°** to a point 100 yards eastward of Halftide Ledge buoy 3. Then steer **344°** for the prominent houses on Hall Point until about 0.3 mile from them. Then steer **308°,** passing midway between Hall Point and the buoy northeastward of Long Ledge, and follow the shore of Ash Neck at a distance of 300 yards. Anchor in depths of 18 to 24 feet 0.2 mile to 0.5 mile northwestward of **Ash Point,** the northwestern extremity of Ash Neck.

The entrance to Flanders Bay between Preble and Calf Islands is clear and deep. Enter in mid-channel, and follow the north shore of Calf Island, giving it a berth of 200 yards. When northeastward of the island, steer **111°** and pass 100 yards southward of Halftide Ledge buoy 3. Round the buoy at this distance and proceed as directed in the preceding paragraph.

Eastern Point Harbor is a sheltered anchorage for small craft between Waukeag Neck and the eastern end of **Preble Island,** 0.3 mile west of Calf 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 Island and **Dram Island,** 0.2 mile west of Preble Island. In bad easterly weather the excursion launches from Bar Harbor sometimes anchor here. The entrance from southward favors Dram Island slightly, and is narrowed by reefs bare at low water extending 100 yards from Preble Island and 50 yards from Dram Island. A vertically striped bell buoy is off this entrance. The entrance from westward is narrowed by a reef, partly showing at high water, which extends 175 yards from the north side of the entrance. The best water in this entrance is found 100 yards north of Dram Island on a **091°** course. A buoy is off **Dram Island Ledge,** 0.2 mile west of Dram Island, and another buoy is off the northwest point of Dram Island. A small ledge, nearly bare at low water, has been reported about 100 yards north of the western end of Preble Island.

Sorrento, a summer resort on the north side of Sorrento Harbor, is frequented by small yachts. The customs duties are handled by an officer from Bar Harbor. Some piling of the former steamer wharf are submerged and above water off the north shore opposite the west end of Preble Island. A town wharf and float having about 6 feet alongside is on the point east of the old steamer wharf ruins. The yacht club uses the town wharf. Gasoline and water are available.

Sullivan Harbor is an arm of Frenchman Bay making northward from the north end. It is the approach to the villages of Hancock Point, Mount Desert Ferry, Sullivan, and Franklin. The least depth to the falls just above Sullivan is about 25 feet. The channel to Sullivan is marked by a daybeacon and buoys.

Bean Island, in the middle of the entrance to Sullivan Harbor, is partly wooded. The channel used most frequently is westward of the island. **Bean Ledge,** 0.2 mile eastward of Bean Island, shows at high water.

Crabtree Ledge, on the west side at the entrance to Sullivan Harbor and 0.4 mile west of Bean Island, is marked by the black foundation pier of a former lighthouse. Although the tower has been removed the foundation pier makes a good daymark. A bell buoy is just east of the pier.

Hancock Point is a village and post office near **Crabtree Point,** the western entrance point. There is a wharf and float landing with 11 feet alongside.

Mount Desert Ferry, the former terminus of the rail steamer service to Bar Harbor, is a settlement on **McNeil Point,** 2 miles north of Crabtree Point. Several tanks and an oil dock with 17 feet at low water are in this settlement. Coastwise tankers call here.

Sullivan is a small village on the north side of Sullivan Harbor, 3.5 miles above the entrance. The customs duties are handled by an officer from Bar Harbor. A privately owned wharf bares at extreme low tides.

Sullivan Falls, the contracted section of the river, 0.5 mile above Sullivan, is said to have a depth of about 7 feet 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.

The main entrance to Sullivan Harbor is between Bean Island and Crabtree Ledge unused lighthouse foundation pier. Vessels also can 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°** for 4.7 miles and pass between Crabtree Ledge unused lighthouse foundation pier and Bean Island; the pier should be given a berth of at least 100 yards, and the western end of Bean Island a berth of over 200 yards. Then steer **015°** with the foundation pier astern, and pass westward of Ingalls Ledge buoy 6 and to a mid-channel position between Low Water Rock Daybeacon and Halftide Rock buoy 3A. Then steer **021°** to a position 125 yards eastward from Moon Ledge buoy 5. Then steer more northward and anchor, favoring the northern shore, in depths of 21 to 42 feet off the town of Sullivan. The water shoals abruptly on both sides of the channel throughout the harbor.

Navigation through Sullivan Falls is safe at slack water only. Small boats sometimes go in on the flood but always come out at high water slack. The channel is unmarked above Sullivan, has dangerous ledges on both sides, and is unsafe except with local knowledge.

The mean range of tide is about 10½ feet below Sullivan Falls, and about 6½ feet above. The tidal currents through the falls are dangerous at strength. High water slack is 1⅓ hours, and low water slack 1¾ hours later in the falls than below them. Ice obstructs navigation in Sullivan River during January, February, and March.

West Sullivan, on the north side of the river just above Sullivan Falls, has several quarries at which vessels formerly loaded. A highway bridge across the river about 0.5

mile above the falls has a swing span with a horizontal clearance of 83 feet and a vertical clearance, closed, of 13 feet at high water. The bridge connects West Sullivan with the town of **Hancock** and the railroad terminus of **Waukeag,** where there are gasoline tanks and a freight office. The customs duties for Hancock are handled by an officer from Bar Harbor.

Chart 1202.—Taunton Bay, an expanded section of Sullivan River, is about 6 miles above Bean Island. An unmarked channel with a depth of about 8 feet leads through the bay to near the head. The bay outside of this channel is bare, or nearly so, at low water. The granite quarries along the east side of the bay have been abandoned. **Franklin** is a town on the railroad at the head of Taunton Bay.

Chart 306.—Skillings River is an arm of the northern part of Frenchman Bay westward of Sullivan Harbor. The entrance is 1.7 miles wide between Crabtree Point on the east and **Meadow Point** on the west, but it contracts rapidly to a width of 400 yards at **Pecks Point,** about 2 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 above Pecks Point is narrow and crooked and has numerous rocks and ledges, making navigation difficult. Strangers wishing to enter the river should anchor 1.5 miles above Crabtree Point in depths of 30 to 42 feet and get a pilot from among local boatmen. The river is unmarked, and is seldom used except by local fishing craft. The wharves usually are small and bare at low water. Strangers in small craft can enter with the aid of the chart.

Raccoon Cove is a large shallow cove on the west side of Skillings River, near the entrance. The cove is obstructed by **Shooting Ledge** and other ledges as well as by many fish weirs.

There is a small pier and float with 12 feet alongside on the west side of the river about 0.6 mile above **Old Point,** 0.7 mile north of Meadow Point.

Large commercial lobster pounds have been formed by damming the two bights immediately south of **Youngs Point,** 3 miles above Crabtree Point.

A small marine railway is on the **Mill Stream** 1.3 miles northwest of Youngs Point and east of **Great Ledge** on the Skillings River. Craft up to 65 feet in length and 4 feet in draft can be hauled out.

Hancock and North Hancock are villages along the main road, and have no business by water.

Eastern Bay, together with Mount Desert Narrows, forms a thoroughfare from the head of Frenchman Bay to Blue Hill Bay, north of Mount Desert Island. **Googins Ledge,** nearly 0.5 mile long and bare in the center at low water, is near the center of the bay. A buoy is on the southwest side of the ledge. The channel leads southward of the buoy. Except for Googins Ledge the bay is mostly deep and clear in mid-channel to the entrance of Mount Desert Narrows.

Good anchorage for deep-draft vessels is available between Googins Ledge and a position northwestward of the old coaling station in depths of 36 to 54 feet. There is also good anchorage about 0.3 mile from shore off the entrance of Salsbury and Emery Coves in depths of 42 or 48 feet.

The north shore of the bay for 0.7 mile west of Meadow Point is foul; a rock baring 9 feet at low water is 0.2 mile off shore. A covered boat storage with a railway is at

Lamoine Beach about 0.6 mile west of Meadow Point. The old naval coaling plant on the north shore of Eastern Bay about 1.3 miles west of Meadow Point has been abandoned and the superstructure has been removed. The wharf is in poor condition, with a depth of about 26 feet alongside. The University of Maine Marine Laboratory is near the old coaling station.

Sand Point is on the south shore of Eastern Bay at the entrance. **Salsbury** and **Emery Coves** are 0.8 mile and 1.1 miles westward of Sand Point. On the point between these two coves is a Biological Experimental Station with a float landing.

At **Hadley Point,** 2.2 miles west of Sand Point, Eastern Bay merges into Mount Desert Narrows. **Berry Cove** makes into the northern shore opposite Hadley Point. Good anchorage can be had in 18 to 24 feet off the entrance to this cove which is shallow at its head.

Chart 307.—Mount Desert Narrows, northward of Mount Desert Island, connects the head of Frenchman Bay with the head of Blue Hill Bay. The passage is crossed by an overhead transmission line with a vertical clearance of over 135 feet, and a highway drawbridge, 2.2 miles westward of Hadley Point. The swing span has a horizontal clearance in the north span of 40 feet and a vertical clearance, closed, of 7½ feet at high water. The tender is on duty for about 3 hours before and 3 hours after high tide. The signal for the bridge is the sounding of a whistle or horn on approaching.

The channel is nearly bare at low water with scattered boulders and ledges of rock, and is used at high water by boats up to 9-foot draft. It is narrow and difficult, and fringed with reefs. Strangers should not attempt passage with drafts greater than 4 or 5 feet, and should go through on a rising tide. The mean range of tide is about 10½ feet and high water occurs about 10 minutes earlier than at Portland. The current sets westward on the flood, eastward on the ebb.

The following information is intended to help strangers in going through the Narrows. Having passed through Eastern Bay, pass at least 250 yards northward of Hadley Point and steer west-southwestward for 1.2 miles with the steel tower at the north end of the bridge ahead, until 250 yards northward of the north end of **Thomas Island,** which is wooded. Then swing a little northward and head for **Trap Rock,** a low, bare islet which will show a little to the right of the northerly steel tower. Steer for Trap Rock for over 0.3 mile until 400 yards from the 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. After passing through the draw, give the shore on the south side a berth of 150 yards to avoid ledges making off it, until 0.3 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.

Jordan River, making northward from Mount Desert Narrows just west of Berry Cove, has a narrow, crooked channel with 5 feet at low water up to **Lamoine.** Local knowledge is necessary for its navigation. The few wharves are in ruins. Seaplanes moor off the airport on the west side of the entrance to the river.

Chart 306.—Cape Levi is on the northeastern shore of Mount Desert Island 1.2 miles east-southeastward of Sand Point. **Sunken Ledge** with a depth of 5 feet is 0.5 mile northward of the cape. From Cape Levi to **Lookout Point,** 0.6 mile southward and

at the entrance to Hulls Cove, a triangle-shaped shoal with numerous scattered boulders makes out from the shore about 0.6 mile to Halftide Ledge buoy 7. An extremely narrow unmarked channel with a depth of about 12 feet cuts this shoal midway between the buoy and the shoreline. This passage is unsafe even with local knowledge and all craft, including small boats, should avoid it.

Chart 205.—Hulls Cove is a broad, open bight on the northeast side of Mount Desert Island. Several dangers are off the cove, but they are marked by buoys. A marine railway capable of hauling out craft 65 feet in length and 7 feet in draft is in the cove. There is no machine shop at the marine railway. Hulls Cove shoals rapidly from the entrance to its head, and the low-water line extends approximately 200 yards from its head. Piling of an old fish weir extend about 350 yards eastward from the prominent rocky ledge on the gravel beach. Boats using the marine railway should approach it only on a flood or high tide.

Bald Rock, 20 feet high, is 1.4 mile east of Lookout Point. A buoy is northward of the rock just northward of Bald Rock. **Bald Rock Ledge,** about 0.5 mile in width, is 0.3 mile southwest of Bald Rock. The high part of the ledge bares at low water. A buoy is on the southwest side of the ledge. The passage between the rock and the ledge is dangerous without complete local knowledge. A shoal with a least depth of 2 feet is just off the entrance to Hulls Cove 0.4 mile southward of Lookout Point. A buoy is south of the shoal. Passage into the cove is on either side of the shoal.

The entrance to Hulls Cove may be safely approached from the north on a line passing 400 yards east of Halftide Ledge buoy 7 and 400 yards east of Lookout Point. From the east vessels should pass at least 400 yards southeast of Bald Rock Ledge buoy 2 or 400 yards off the shoreline of Mount Desert Island until southward of the buoy off **Canoe Point,** 0.7 mile south of Lookout Point. Then remain approximately 175 yards from the shoreline to the entrance of the cove. An alternate approach from the east is from a point 200 yards south of Bald Rock Ledge buoy 2 to a point 500 yards southeast of Lookout Point, then south-southwest to the entrance.

The shoreline from Hulls Cove to Bar Harbor is backed by many lavish summer residences, several of which were destroyed in the 1947 fire. The area between Bald Rock Ledge and Bar Island is used as a yacht anchorage, it being much safer anchorage than Bar Harbor.

Bar Harbor is an anchorage on the eastern side of Mount Desert Island, 3.5 miles above Egg Rock Light. The east shore of Mount Desert Island is on the west, **Bar Island** and **Sheep Porcupine Island** are on the north, and a breakwater extending southwesterly from **Bald Porcupine Island** across **Porcupine Dry Ledge** to within 250 yards of the shore is on the south. The breakwater is awash on the higher tides. A mound at its western end always shows. All the islands surrounding Bar Harbor are high and wooded, and have no prominent marks. When approaching from southward, Bald Porcupine Island is distinguishable because of its bare rocky slopes. The bar extending between Bar Island and the town consists of scattered boulders on soft bottom. Autos occasionally drive between Bar Island and the town at low water.

The principal entrance is from eastward between Bald Porcupine and Sheep Porcupine Islands, and is clear. Passing about 300 yards northeastward of Bald Porcupine Island, a 289° 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 13 feet in mid-channel. A deep channel 150 yards wide extends into the harbor from southward between the end of the breakwater extending southwestward from Bald Porcupine Island and the western shore. This passage sometimes is used by local vessels.

Some shelter from southerly winds is afforded by the breakwater. A swell makes in during southeast winds and vessels should not attempt to ride out a gale from that direction in Bar Harbor. The usual anchorage is southward and southeastward of the eastern end of Bar Island in depths of 6 to 78 feet, 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. Large vessels sometimes anchor northward or northwestward of Bar Island, in 42 to 60 feet, soft bottom. The western shore is fairly bold, with the exception of a rock, bare at low water, 0.6 mile westward of Bar Island and 250 yards from the shore at the entrance of **Duck Brook.** Vessels should keep over 0.4 mile southward of a line joining Bald Rock Ledge buoy and Bald Rock, a bare rocky islet. The mean range of the tide is about 10½ feet.

The town of **Bar Harbor** on the shore of Bar Harbor is an important summer resort and yachting center. It has good highway connections, and during the summer many sightseeing cruises and fishing trips are scheduled daily for the vicinity of Frenchman Bay and Mount Desert Island. The town is a customs port of entry and marine documents are issued. On the pier are a Chamber of Commerce Information Bureau and a U. S. Coast and Geodetic Survey standard tide station. A chart sales agency of the Coast and Geodetic Survey is in the town.

Bar Harbor has a harbor master. The municipal pier has a depth of 10 feet at its end, and there are floats for small boats on each side of it. Other wharves have depths of 4 feet and less alongside. Oil barges drawing 8 feet discharge fuel at high water. In 1949 several free moorings with 3- to 5-ton anchors were maintained east of the municipal pier for use of visiting yachts. Diesel oil, gasoline, and water can be obtained from the wharves. There are facilities for minor repairs only, and boats up to about 65 feet in length can be hauled out at Hulls Cove and Skillings River.

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

Chart 306.—Burnt Porcupine Island is about 0.5 mile eastward of Sheep Porcupine Island. A deep clear channel to the upper part of Frenchman Bay is between the islands. Another deep channel is between **Long Porcupine Island,** 0.4 mile east of Burnt Porcupine Island, and Iron Bound Island. **Rum Key** is between Burnt Porcupine and Long Porcupine Islands. **The Hop** is off the northeast side of Long Porcupine Island.

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

Thrumcap Island, 1.4 miles southward of Bald Porcupine Island, is a round, rocky island with a clump of trees in its center. It is reported that there are down-draft wind currents around Thrumcap Island, and accordingly, small sailboats should keep off shore.

Caution.—An 8-foot spot is 0.2 mile north-northwest from Thrumcap Island. It

is unmarked and has been struck by several yachts navigating along the coast at this point.

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

Schooner Head, 1.2 miles south of Thrumcap Island, and **Great Head,** 2.1 miles southward of the island, are prominent rocky headlands on the eastern side of Mount Desert Island. On the summit of the eastern hill at Great Head is a small, round, flat-topped granite building which is conspicuous.

Old Whale Ledge (Schooner Ledge), 350 yards from shore, midway between Schooner Head and Great Head, is bare 4 feet at low water. A lighted bell buoy is 300 yards eastward of the ledge.

Newport Cove, a small cove westward of Great Head, is exposed southward, has poor holding ground, and is never used as an anchorage. A bare rock is off the entrance. Because of a prominent sand beach at the head of the cove, the area is known locally as **The Sand Beach.**

Otter Cliff Ledge, bare at half tide, is 400 yards eastward of **Otter Point,** 1.5 miles southward of Great Head. A bell buoy is eastward of the ledge.

Otter Cove, a long cove making northward of the west side of Otter Point, has deep water in the entrance and is bare for 0.4 mile from the head. The cove is exposed southward, but is used by local fishermen who lay to moorings. A fixed bridge across the cove 0.8 mile above the entrance has a horizontal clearance of 15 feet in the center span and a vertical clearance of 7½ feet in the center of the arch, at high water.

Southwest Harbor, Somes Sound, Northeast Harbor, Seal Harbor, and several other coves are 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 many pleasure craft and fishing boats. Southwest Harbor is used also extensively as a harbor of refuge. The harbors can be approached through the channels on either side of Sutton Island or through Western Way.

Baker Island, 3.7 miles south of Otter Point and the most southeasterly of the group of islands in this vicinity, is mostly wooded but grassy on its northwest end. A light, 105 feet above water and visible 16 miles, is shown from a white tower connected to a dwelling in the center of the island and southwest of the entrance to Frenchman Bay. The island is surrounded by ledges, bare and submerged, and should be given a berth of at least 0.4 mile. **The Thumper** is a ledge, bare at low water, 300 yards southward of the island. Another ledge, partly bare at low water, is 400 to 700 yards off the southwest side. A small Coast Guard boathouse and runway are on the northwest side of the island.

Little Cranberry Island, about 1 mile northwest of Baker Island, is low and wooded. A large white abandoned Coast Guard building with lookout tower is prominent on the southeast point of the island. **Islesford** is a village with a post office on the west side of the island. Three small wharves and several fish houses are on **Hadlock Cove,** a bight off Isleford. 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. Small passenger and mail boats maintain service between the Cranberry Islands and Southwest Harbor the year around, and between the islands and Seal Harbor during the summer months.

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Cranberry Harbor, southward of Sutton Island and between Little Cranberry and Great Cranberry Islands, is frequented by small local vessels. Sometimes small coasting vessels anchor in the harbor, but Southwest Harbor offers much better anchorage. The usual anchorage in Cranberry Harbor is in depths of 14 to 20 feet in the middle of the harbor with the wharves at Isleford bearing about 050°. Care must be taken to keep well clear of the buoy on the end of the ledge which extends 350 yards westward from the east side at the entrance.

The Pool is a large shallow cove on the east side of Great Cranberry Island southwest of Cranberry Harbor. A rock awash is nearly in the mid-entrance. Several small wharves and marine railways for small craft will be found inside. There are facilities for storing yachts.

Great Cranberry Island, about 2 miles west of Baker Island, is wooded and has no prominent marks visible from southward. **Cranberry Isles** is a village with a post office on the island. **Spurling Cove,** on the north side of the island, has a small wharf. **Long Point** is the northeast end of the island. **Crow Island,** northeast of **Deadman Point,** the southeast point of Great Cranberry Island, is low and grassy with prominent reefs to the east and southeast.

South Bunker Ledge, 0.7 mile southwest of Great Cranberry Island and in the southern approach to Western Way, is bare 4 feet at low water. A daybeacon, a red cylindrical cage on an iron spindle, is on the ledge.

Long Ledge is a dangerous reef extending 0.5 mile southeastward from Mount Desert Island, on the western side of the southern approach to Western Way. The ledge is mostly bare at low water and has a few rocks which bare at high water. A lighted gong buoy is off the southeastern side.

Western Way, between the western side of Great Cranberry Island and Mount Desert Island, is a passage frequently used by vessels bound to Southwest Harbor and vicinity. Also, small vessels bound between points westward and any point in Frenchman Bay use it, except in rough weather. The channel is buoyed, and the least depth is 14 feet 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 drawing more than 10 feet. Directions for Western Way are included in the directions for Southwest Harbor.

Southwest Harbor, an important harbor in the south side of Mount Desert Island, is the approach to the villages of Southwest Harbor and Manset. The harbor affords an excellent, well-sheltered anchorage and can be entered from the eastward by deep-draft vessels. **Greening Island,** on the north side of the entrance to the harbor, is low and wooded. Several houses are visible on the island and a large house at the eastern end is prominent. Shoals border the island on all sides. A small islet is about 400 yards from the head of Southwest Harbor. A daybeacon, a red triangular daymark on an iron spindle, is on the islet.

The well marked channel approaching Southwest Harbor northward of Sutton Island is deep and has been examined by means of a wire drag. This passage is used by all vessels entering Southwest Harbor from the northward in Frenchman Bay and by most vessels entering from the eastward and southeastward. The channel southward of Sutton Island has unmarked rocks with least found depths of 16 and 17 feet. This passage has been examined by means of a wire drag. With the aid of the chart it is easy to navigate in the daytime. The approach to Southwest Harbor from the southward

and westward for vessels of 14-foot draft or less is through Western Way. This passage is not recommended during rough weather or for strangers drawing more than 10 feet.

Excellent, well-sheltered anchorage may be found in Southwest Harbor in depths of 12 to 54 feet. Deep-draft vessels can anchor midway between Greening Island and the southern shore in depths of 42 to 54 feet. Smaller vessels can anchor farther in the harbor, the depths shoal gradually to 12 feet at a point 150 yards eastward of the islet near the head of the harbor.

Vessels approaching Southwest Harbor from eastward, northward of Sutton Island, pass 200 yards southward of Seal Harbor lighted buoy 2 and steer **259°** for the southeast end of Greening Island, until midway between Bear Island and the western end of Sutton Island. Then steer **249°** and pass 100 to 200 yards southward of Greening Island buoy 6, then steer **269°** and select anchorage according to draft.

Approaching from westward through Western Way cross Bass Harbor Bar close to the fairway buoy about 350 yards southward of Bass Harbor Head Light and steer **089°** to a position about 100 yards southward of Long Ledge lighted gong buoy. Round the buoy at this distance and steer **025°** for a little over 1 mile to Western Way lighted bell buoy WW. Thence steer northeastward about 500 yards and pass between Cranberry Island Ledge buoy 2 and Flynn Ledge buoy 3. When off Flynns Ledge buoy 3, steer **356°** for the fairway buoy at the northern end of Western Way. When off the fairway buoy steer **323°** and follow the western shore at a distance of about 400 yards into Southwest Harbor.

Normally navigation in Southwest Harbor and approaches is not restricted by ice. In very severe winters ice is reported to have formed as far out as the Cranberry Islands, but is carried to sea at the first ebb tide by the current out of Somes Sound.

A pilot is not required if entering from eastward in daytime with clear weather. Strangers coming from westward and crossing Bass Harbor and Cranberry Island Bars usually can obtain a pilot at Bass Harbor if desired.

The village of **Southwest Harbor** is on the north side of the harbor. There are public and private landings off the village. The Coast Guard wharf on **Clark Point,** on the north side of the harbor, has a depth of 15 feet alongside. Northwest of the Coast Guard wharf are several wharves and floats where supplies may be obtained. Diesel oil, gasoline, coal, ship's chandlery, water, and ice are available. A boatyard has a marine railway capable of hauling out vessels up to 100 feet in length and 12 feet in draft. At the head of the harbor is a large fish cannery and wharf with a depth of 5 feet at low water.

Manset, on the south side of Southwest Harbor, has a boatyard which builds yachts. A repair shop here has a marine railway capable of hauling out craft up to 45 feet in length and 4 feet in draft. The wharf at the boatyard has 1 foot alongside at low water. Gasoline and water are available. A large fish wharf has a depth of 12 feet alongside. Diesel oil and gasoline are piped onto this wharf. There are also public and private landings. Several float landings are on Greening Island.

The passage between Greening Island and Clark Point has a least found depth of 15 feet and is extensively used. A buoy on the east side of this channel is off the shoal extending southwestward of Greening Island. A daybeacon, a black cask on end on an iron spindle, is on the west side of the channel off Clark Point, and a buoy, colored and numbered for the channel northeast of Greening Island, is off the shoal northwest of the

island. The best water from southward leads 100 to 150 yards westward of the buoy at the south end and 100 yards eastward of the daybeacon.

Somes Sound is a narrow body of water, about 4.5 miles long and 0.2 to 0.7 mile wide, making into the south shore of Mount Desert Island. The sound is between steep, rocky shores, and has a narrow entrance with few dangers. Greening Island is in the middle of the approach, with a channel on each side of it. With the aid of the chart good anchorage can be selected in the sound in 54 to 72 feet. Small sailing vessels should be prepared for down-draft winds from the hills.

Norwood Cove, on the west side of the entrance to Somes Sound, is not navigable, and has a bridge across its entrance. Several private float landings are on the east side of the sound above **Manchester Point,** 0.7 mile north of Greening Island.

Hall Quarry is a post office and small settlement on the west side of Somes Sound 3 miles above the entrance. The quarry was not operating in 1949. **Somes Harbor** is a small cove at the head of Somes Sound. The entrance is narrow and marked by buoys. Several float landings for pleasure craft are in the harbor. **Mount Desert (Somesville)** is a village on Somes Harbor. A boatyard in the northeast corner of Somes Sound has storage sheds, float landings, a small repair shop, and a railway that can haul out boats up to 50 feet in length and 8 feet in draft. Gasoline is available.

Gilpatrick Cove, eastward of the entrance to Somes Sound, is small and shoal. A small retractile drawbridge is across the entrance. Many small yachts moor in the cove in summertime. Float landings make out from the bridge. Gasoline and water are available. An old coal wharf and shed are 0.3 mile northwest of Gilpatrick Cove.

Gilpatrick Ledge, just east of the entrance to the cove, consists of several ledges. Three daybeacons are on the ledges. Vessels should keep south of the daybeacons.

Northeast Harbor, 0.6 mile eastward of Gilpatrick Cove, is 300 yards wide at its entrance and extends into the south shore of Mount Desert Island about 0.8 mile. The harbor is an important yachting center and there are two large summer hotels on the shores. The upper part of the harbor is shoal, but anchorage for very small vessels is available in depths of 18 to 24 feet in the lower part of the harbor. This anchorage is about 200 yards wide and favors the western shore. A Federal project for improving the harbor provides for a channel 10 feet deep to a proposed town landing and two anchorage areas 7 feet deep. To 1949 no work had been done on the project.

In the middle of the entrance to Northeast Harbor is a rock bare at low water. A buoy is on each side of the rock. The best passage into the harbor is westward of the rock. In average winters the harbor is reported to be clear of ice except at its head, but in severe winters it is reported to freeze as far out as Bear Island.

The summer resort of **Northeast Harbor** is on the western shore of the harbor. A chart agency of the U. S. Coast and Geodetic Survey is here.

The Clifton Dock is on the west side of Northwest Harbor near the entrance. There is a pier and float with 14 feet alongside at low water. Diesel oil, gasoline, and water are piped onto the dock. The town landing has 4 feet alongside at low water. The dredged channel to the pier has 5 feet at low water. Gasoline and water are piped to the landing. The harbor master's office is on the landing. A crane lift and boat works are about 100 yards north of the town landing. Small boats up to 5 feet in draft can be lifted out.

Bear Island, on the eastern side of the entrance to Northeast Harbor, is high and partly wooded. A light, 100 feet above water and visible 12 miles, is shown from a white cylindrical tower on the western side of the island. The fog signal is a bell. The pas-

sage north of the island is blocked by reefs. A Coast Guard buoy storage wharf is on the northwest side of the island.

Sutton Island, about 1 mile long and wooded, is in the middle of the passage, **Eastern Way,** between the south shore of Mount Desert Island and Cranberry Islands. The channel north of Sutton Island has a depth of about 48 feet, and is generally used. On the northern side of this channel opposite Sutton Island and eastward of Bear Island are **Long Pond Shoal** with a least depth of 5 feet, and **Bowden Ledge,** with a depth of 2 feet. Buoys are south of these dangers. The channel south of Sutton Island, **Gilley Thorofare,** has a depth of about 16 feet and is contracted by rocks. Buoys are off the principal dangers and navigation of the channel is not difficult in the daytime with the aid of the chart. **Sutton,** a post office and summer resort, is on the western part of Sutton Island. There are several float landings on the island.

Bracy Cove, 0.5 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 1 mile east of Bear Island. Anchorage for small vessels may be had in the middle of the harbor in depths of 16 to 18 feet. This anchorage, about 400 yards in diameter, is exposed to southeasterly winds. The approach is between the buoy off Bowden Ledge on the west and a lighted buoy on the east. A ledge extends halfway across the entrance from **Crowninshield Point,** the western entrance point. A buoy is off the eastern side of the ledge. The head of harbor must be given a berth of over 300 yards.

The village of **Seal Harbor,** on the shore of the harbor, has a large hotel and numerous summer residences. The old steamer wharf on the eastern side of the harbor near the entrance has a depth of about 9 feet alongside, but is seldom used. Just north of the old steamer wharf is a town wharf and float landing with a depth of about 9 feet alongside. A yacht club and float landing with a depth of 6 feet alongside is a short distance north of the town landing. Gasoline and water can be obtained at the landings. The former coal wharf on the west side of the harbor is now privately owned and has facilities for hauling out and storing yachts. A wharf for local fishermen is on the west side of the harbor.

East Bunker Ledge, 1 mile eastward of Sutton Island, is 0.3 mile long and has two sections bare at high water. A white, square, stone daybeacon is near its southwestern end; a buoy is north of **Lewis Rock,** a submerged danger with a depth of 6 feet is 200 yards northwestward of the ledge. A gong buoy is about 0.5 mile southeastward of the ledge.

Chart 308.—Of the many islands off the entrance to Blue Hill Bay, those southward of Bass Harbor Bar and Casco Passage, and westward from Duck Islands to Swans and Marshall Islands are discussed in this chapter. The islands in this area are in general wooded and have few conspicuous marks. The only ones having settlements are Swans, Long, and Great Gott Islands. 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, while the passages through the islands southward are seldom used except by local fishermen and yachtsmen. The broad channel between Black and Placentia Islands on the east and Long and Swans Islands on the west has been examined by means of a wire drag. The remainder of the

area, however, has not been closely examined and strangers should use extreme caution and avoid crossing broken areas.

Great Duck Island, about 5 miles south of Great Cranberry Island, is the most southeasterly of the islands off Blue Hill Bay. The island is partly wooded, and from a distance eastward or westward appears as two islands. The light at the south end of the island and the buildings around it are prominent. The light, 67 feet above the water and visible 14 miles, is shown from a white cylindrical tower. The light is partially obscured by trees to the northward. The fog signal is a diaphone air horn; if disabled, a bell is sounded.

Little Duck Island, 0.7 mile northward of Great Duck Island, is partly wooded and has no distinguishing marks.

The Drums, a dangerous ledge 2.5 miles west of Great Duck Island and 2 miles northeastward of Long Island, is bare at low water. A buoy is at the southeast end of the ledge. The range formed by the western ends of Green and Placentia Islands leads well westward of this ledge.

Horseshoe Ledge, 1 mile north of The Drums, is bare at low water. A daybeacon, a black cask on bilge on an iron spindle, is on the ledge.

Green Islands, 4 miles northwestward of Great Duck Island Light and 0.7 mile southward of Black Island, are two rocky islets with grass on top.

Black Island, 4.5 miles northwestward of Great Duck Island Light, is wooded. Three ledges are off the east side of the island; **Inner Dawes Ledge,** bare at high water; **Outer Dawes Ledge,** awash at high water; and **Grindstone Ledge,** bare at about half tide. A daybeacon, a red cask on end on an iron spindle is on Grindstone Ledge. **Little Black Island,** off the southwest side of Black Island, is wooded in the center.

Placentia Island, 0.4 mile northwest of Black Island, is wooded except on its eastern end which is grassy.

Little Gott and **Great Gott Islands,** 0.4 and 1 mile northeastward of Black Island, are mostly wooded. **Gott Island** is a small settlement on the west side of Great Gott Island. The approach to the settlement is by the passage between Little Gott and Great Gott Islands. This passage can be entered from southward at low water, but a bar, bare at low water, obstructs the passage at the northwest end. The houses of the settlement are the most prominent marks in this vicinity. There are no wharves.

Bass Harbor Bar and Bass Harbor, northward of Great Gott Island, are described later in this chapter.

Staple Ledge, between Placentia Island and the northeast end of Swans Island, is bare at low water only. A buoy is off the northeast side of the ledge.

Long Island, 4.3 miles west-southwestward of Great Duck Island, is the most southerly of the large islands off Blue Hill Bay. The island is wooded and has no conspicuous marks visible from seaward.

Lunt Harbor is a cove in the north side of Long Island. **Frenchboro** is a village of fishermen on the shore of the cove. 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. A crib wharf on the northeast side of the harbor has a depth of 6 to 7 feet alongside. A large fish packing wharf has a depth of 1 to 2 feet alongside. The other wharves are bare before low water. Gasoline and provisions are available. Mail comes by small boat from Swans Island.

Northward of Long Island are numerous small islands and ledges. **Harbor Island**

just off Lunt Harbor, is wooded and a reef bare at low water extends west of the island. A bell buoy is off a 12-foot spot 600 yards west of the island. **Crow Island,** 0.4 mile north of Long Island, is wooded except at its eastern end which is bare rock. **Dry Money Ledge,** 400 yards west of Crow Island, is a white rock islet about 10 feet high. **Sunken Money Ledge,** 400 yards southwest of Dry Money Ledge, is bare at low water. **Northeast Ledge,** 0.5 mile northeast of Long Island, has a depth of 13 feet. **Crow Island Ledge,** 0.3 mile north of Crow Island, has a depth of 9 feet. A vertically striped lighted gong buoy is northward of Northeast Ledge and eastward of Crow Island Ledge. **Beaumont Ledge,** 0.6 mile north of Crow Island, has a depth of 7 feet. **Otter Ledge,** about 0.8 mile north of Crow Island, is awash at low water. **Sister Islands,** 0.5 mile northwestward of Crow Island, are two wooded islands. **Sister Ledge,** awash at low water, extends 300 yards southward of the westerly of the Sister Islands. **Ram Island,** 0.5 mile north of Sister Islands and 0.2 mile off Swans Island, is marked by a single tree. A 14-foot spot is 400 yards off **East Point,** the eastern extremity of Swans Island, and 500 yards northeast of Ram Island.

Westward of Long Island is a deep passage. **Beach Ledge,** about 0.4 mile westward of Long Island, has a depth of 14 feet. A bell buoy is west of the ledge. **John Island,** 1.1 miles west of Long Island, is grassy and has many dead trees. **John Island Dry Ledge,** 0.5 mile southwest of John Island, is 0.2 mile in diameter and has rocks showing at high water. **John Island Sunken Ledge,** 0.6 mile south of John Island, has a depth of 6 feet; a buoy is south of the ledge.

The passage between Long and Swans Islands has deep water but there are many unmarked ledges. The best channel is between John Island and the bell buoy off Beach Ledge, thence between the westerly of the Sister Islands and Ram Island. **Red Point,** on the southeast side of Swans Island 0.4 mile west of Sister Island, has a low bare reddish bluff. Any of the passages can be used by small craft with the aid of the chart.

Swans Island, about 2 miles northwest of Long Island, is the largest of the islands off Blue Hill Bay. The three villages with post offices on the island are Atlantic, Swans Island, and Minturn. The island has several sheltered coves, but all except Mackerel Cove and Burnt Coat Harbor are mostly foul and little used. There is no piped water supply on the island.

Mackerel Cove is a good anchorage on the north side of Swans Island south of the eastern entrance to Casco Passage. There are islets and numerous ledges in the cove, but the entrance from northward is easy of access in the daytime. **North Point,** the northernmost point of Swans Island, is on the east side of the northern entrance to the cove. A buoy is off a rock, with a depth of 1 foot, northward of the point. **Crow Island,** about 0.6 mile west of North Point, is on the western side of the northern entrance. A buoy is eastward of a ledge, awash at low water, 400 yards east of the island. A buoy is off a shoal, with a least depth of 11 feet, near the center of the harbor. A narrow channel into Mackerel Cove from York Narrows follows close to the shore of Swans Island, and passes southward of Orono and Round Islands.

The common anchorage in Mackerel Cove is westward of the buoy off the 11-foot spot. Anchorage can be had between this buoy and the buoy off Crow Island in depths of 24 to 32 feet. Care must be taken to give the eastern shore a berth of 300 yards. Another good berth is between the buoy off the 11-foot spot and a bare ledge 0.3 mile southwestward. This ledge is about 0.3 mile northwestward of the wharf at Atlantic.

A 4-foot spot is 0.3 mile northwest of the ledge and another 4-foot spot is 500 yards east of the ledge and off the village.

The dangers in the entrance to Mackerel Cove are buoyed and, although there are many dangers inside, it should not be difficult even for a stranger to enter and anchor safely by daylight, with the aid of the chart. Enter between the buoy off North Point and the buoy off Crow Island and steer about 181° so as to pass westward of the buoy marking the 11-foot spot.

Atlantic is a village on the southeast side of Mackerel Cove. The church spire and several houses are prominent from eastward. A dangerous 4-foot spot off the village must be carefully avoided. The wharves are nearly bare at low water. Gasoline and some stores are available.

Seal Cove, on the northwest side of Swans Island just south of **Buckle Island** and York Narrows, and **Toothacher Cove,** on the southwest side of Swans Island, have many unmarked dangers and are of importance only to fishermen. A shoal with a depth of 4 feet is in the middle of the approach to Toothacher Cove.

Burnt Coat Harbor is a small, well-sheltered anchorage on the southwestern side of Swans Island. The harbor is much used by fishermen and yachtsmen. A light, 75 feet above the water and visible 13 miles, is shown from a white tower, connected with a dwelling on **Hockamock Head,** on the west side of the harbor entrance. The fog signal is a bell. The anchorage eastward of the light is about 500 yards wide, with depths of 21 to 34 feet, soft bottom. A good anchorage for small craft is in the channel northward of the light, in depths of 13 to 24 feet. A crib wharf where mail and supplies are brought from Stonington is on the north side of **Long Cove,** on the east side of the harbor near the entrance.

Swans Island is a village on the west side of Burnt Coat Harbor. The steamer wharf has a depth of 10 feet alongside; the fish wharves have less depth. Gasoline and provisions are available. In 1949 there was daily communication by boat with Stonington and Frenchboro.

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. There are several fish wharves. Pilots can be obtained from among the local fishermen if desired.

Off the entrance and approach to Burnt Coat Harbor are several islands and reefs. **Harbor Island,** in the middle of the entrance, is wooded except for its southwest and southeast sides. **Baker Islands,** 0.3 mile southeast of Harbor Island, are wooded. **Scrag Island,** 0.5 mile south of Harbor Island; **Green Island,** 0.3 mile southwest of Scrag Island; and **Gooseberry Island,** 0.6 mile west of Harbor Island, are bare and grassy. **Gooseberry Island Ledge,** 0.2 mile southeastward of Gooseberry Island and on the northwestern side of the approach to the harbor, is bare at low water only; a buoy is off the ledge. **High Sheriff,** bare at high water, and **Sheriff Ledge,** bare at low water, are westward of Gooseberry Island. A buoy is 0.4 mile southwestward of High Sheriff. A rocky shoal with a depth of 18 feet is 0.6 mile southwest of Gooseberry Island.

The main entrance to Burnt Coat Harbor is from southwestward, between Harbor Island and Burnt Coat Harbor Light. A daybeacon, a red wheel on an iron spindle, is off a rock bare at low water on the south side of the entrance. Vessels approaching from southward from a position 100 yards west of the vertically striped whistle buoy 3 miles westward of Long Island, steer 342° for 2.7 miles, passing 500 yards westward of Green Island, to the vertically striped bell buoy off the entrance. From southeastward, vessels

may pass 0.3 mile southward of the southwest point of Long Island and steer **267°** for 1.7 miles to a position 0.3 mile southward of John Island Ledge buoy 2, thence steer **304°** for 2.4 miles to a position about 500 yards westward of Green Island, and then steer **342°** to the bell buoy off the entrance. From Jericho Bay, vessels may pass midway between the two buoys marking the passage between Hat Island and Marshall Island, and steer **108°** to the bell buoy. This course passes about 100 yards south of Sheriff Ledge buoy 4 and over 300 yards north of an unmarked 18-foot shoal.

From a position about 100 yards north of the vertically striped bell buoy, off the entrance to Burnt Coat Harbor, steer about **048°**, which course will lead through the entrance, passing a little closer to the daybeacon on the south side of the channel than to the light. Anchorage may be had eastward or northeastward from the light, or in the channel northward.

The passage inside Baker and Harbor Islands is available for small craft entering Burnt Coat Harbor from eastward. It is extensively used by local boats, but is narrow and difficult, and strangers are advised to use it only on a rising tide. In entering, pass between the northerly of the Baker Islands and the south shore of Swans Island, favoring Baker Islands slightly to avoid two reefs bare at low water on the north side of the passage. Then steer **292°** for about 0.3 mile. Pass northward of Baker Island Ledges bouy 1, off a reef awash at low water on the south side, and then draw 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 the two thickly wooded islets, and the same distance northeastward of Harbor Island Ledges buoy 3, off a ledge bare at half tide and opposite the islets. Then haul northwestward into the main channel.

Marshall Island, 2 miles westward of Harbor Island, is the largest of the group of islands southward of the western end of Swans Island; the island is wooded. A rocky shoal with a depth of 7 feet near its end extends 0.4 mile north of Marshall Island; a buoy is off the end of the shoal. **Hat Island,** 0.9 mile north of Marshall Island and just south of the western end of Swans Island, is bare and grassy. A buoy is southwestward of **Hat Island Ledge,** which extends 0.4 mile westward of the island. **Ringtown Island,** just off the northeast side of Marshall Island, is wooded. **Yellow Ledge,** southeastward of Ringtown Island, has a rock bare at high water and a considerable area bare at low water. **Brimstone Island,** 1 mile east of Marshall Island, is bare and grassy. **Heron Island,** 0.5 mile south of Brimstone Island, is grassy with trees in the middle.

Many bare and submerged rocks and ledges are southward of Brimstone and Heron Islands and southeastward of Marshall Island. Extreme caution must be used in navigating in this area as most of the dangers are not marked. Two small ledges bare at low water are between Brimstone and Heron Island. **Heron Island Point Ledge,** 0.2 mile south of Heron Island, **Mason Ledge,** 0.4 mile west of Heron Island, and **Black Ledge,** 1.2 mile southwest of Heron Island, are bare at high water. **Seal Ledge,** 0.9 mile south of Heron Island, has a least depth of 12 feet; a buoy is east of the ledge. **Cod Ledge,** 0.3 mile southwest of Mason Ledge, has a depth of 3 feet; a depth of 4 feet is 300 yards southward of the ledge. **Jobs Ledge,** 0.6 mile south of Marshall Island, and **Sprague Ledge,** 0.3 mile south, have depths of 11 and 6 feet.

Spirit Ledge, 0.7 to 1.2 miles southwestward of Marshall Island, is in two sections. The northeastern section is bare at high water and the southwestern bares at about half tide. **Boxam Ledge,** off the southwest side of Marshall Island, is bare at low water.

These ledges, together with numerous other ledges and islands, extend across Jericho Bay and southwest across the entrance of that bay to Isle au Haut. The other ledges and islands are discussed in the next chapter.

Jericho Bay is between Swans and Marshall Islands on the east, and Isle au Haut and Deer Isle and adjoining islands on the west. The inside routes from Casco Passage and York Narrows to Deer Island Thorofare and Merchant Row, and the passage north of Pond Island to Eggemoggin Reach, lead across the head of Jericho Bay. This section of the bay is used by many vessels. The part of the bay southward of these thoroughfares has deep water, but there are many ledges, rocks, and islets. This area is little used except by local fishermen and yachts. The dangers in the bay are described in the next chapter.

The following directions for Jericho Bay are for approaching from the southward. It is advisable to pass between Marshall and Swans Islands, where the dangers are marked. The entrance between Marshall Island and Isle au Haut is obstructed by a number of unmarked submerged ledges, and is little used. From a position 0.3 mile southward of the southwest point of Long Island, steer **267°** for 1.7 miles to a position 0.3 mile southward of John Island Ledge buoy 2, then steer **301°** for 5.5 miles, passing about midway between Green and Brimstone Islands, 350 yards northeastward of Ringtown Island, 200 yards northeastward of the buoy northward of Marshall Island, and to a position 200 yards southwestward of Hat Island Ledge buoy 2. Or, from off the whistle buoy 1.8 miles southeastward of Heron Island, a **337°** course for 2 miles will lead to a position about midway between Green and Brimstone Islands, and thence the **301°** course then can be followed to a position 200 yards southwestward of Hat Island Ledge buoy 2.

If bound to Merchant Row from the position 200 yards southwestward of Hat Island Ledge buoy 2, steer **261°**, passing 150 yards northward of Halibut Rocks bell buoy 1 and at least 300 yards northward of Western Halibut buoy 2, to a position 0.5 mile west-northwestward of West Halibut rock, then follow directions for Merchant Row in Chapter 3.

If bound to Deer Island Thorofare from the position 200 yards southwestward of Hat Island Ledge buoy 2, steer **309°** for 2.5 miles, passing 0.3 mile northeastward of Whaleback Ledge buoy 5, and to a position 200 yards southwestward of Shabby Island, marked by a few trees. Continue on this course for 0.6 mile and then bring Shabby Island astern on a **293°** course, with Sheep Island a little on the port bow, and pass 100 yards northeastward of Eastern Mark Island Ledge buoy 3, then haul westward and follow the directions for Deer Island Thorofare in Chapter 3.

If bound to Eggemoggin Reach come to a position 200 yards westward of Hat Island Ledge buoy 2 and steer **000°** for 2.7 miles to a point 0.4 mile west of Egg Rock Daybeacon. Then steer **330°**, heading for Devils Head, until midway between Hay Island Ledge buoy 4 and Channel Rock buoy 3, passing on either side of the vertically striped bell buoy south of Hay Island Ledge. Thence haul northwestward and follow the directions for Eggemoggin Reach in Chapter 3.

Chart 227.—Casco Passage and **York Narrows,** northward of Swans Island and between Swans Island and Black and Johns Islands, form a part of the different inland passages between Mount Desert and Whitehead Island. The narrow passage separates into two branches in its western part. The eastern end and northern branch form Casco

Passage; the southern branch is York Narrows. **Johns Island,** 1.3 miles northwestward of the northern extremity of Swans Island, and **Orono, Phinney,** and **Round Islands** just north of Swans Island and on the south side of the passage, are in general low and wooded and have no prominent marks. **The Triangles,** at the eastern end of Casco Passage, is a bare ledge from which a reef covered at half tide extends 400 yards northward. **Long** and **Hawley Ledges,** westward of Orono Island, are between the western part of Casco Passage and York Narrows. **Egg Rock,** off the western entrance, is marked by a bell buoy and daybeacon, a red slatted tripod. The passages through Casco Passage and York Narrows are well marked by buoys and a daybeacon, black slatted tripod north of Orono Island.

Casco Passage is the straighter and better channel, and has a depth of 18 feet and a width of about 100 yards. A rock bare at low water is 125 yards off the south side of Black Island. There are rocks with little depth on each side. Vessels of 16-foot draft have been taken through the passage. *Directions are given in Chapter 3.* The current through Casco Passage floods eastward and ebbs westward. The velocity of flood or ebb is about 1 knot. The velocity is influenced greatly by strong winds. For current predictions the *Current Tables* should be consulted.

York Narrows has a width of not much over 100 yards, and has dangerous ledges on both sides. It is not recommended for vessels of a greater draft than 9 feet, except with local knowledge. The following directions will lead through the Narrows: Pass about 50 yards northwestward of the buoy northward of Orono Island Daybeacon and steer **222°** for the western edge of the trees on Buckle Island. On this course, pass southeastward of Long Ledge buoys 2 and 4 and when the Long Ledge buoy 4 is abeam, change to **267°** and pass between Hawley Ledge and Long Ledge and about 50 yards south of Long Ledge buoy 6. Or, instead of the 267° course, follow the buoyed passage and pass southward of Ten-Foot Shoal buoy 4A.

Chart 307.—Blue Hill Bay, west of Mount Desert Island, is about 14 miles long. In the bay are several large islands and some small ones, between which are good channels with deep water. The dangers are comparatively few, the most prominent are marked by buoys. There are numerous coves on both sides of the bay. The head of the bay 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 Falls, Blue Hill, East Blue Hill, and Surry, and the city of Ellsworth. The bay is frequented by a few coasting vessels, fishing craft, and yachts. Gasoline and provisions are obtainable at the villages. Repair yards for small vessels are at Ellsworth, Webber Cove, and East Blue Hill. Directions for Blue Hill Bay are given at the end of this chapter.

The mean range of tide in Blue Hill Bay is about 10 feet. The current floods northward and ebbs southward. Velocities of 2 knots have been observed near Staple Ledge buoy 1A at the south end of the bay. Current information for locations in Blue Hill Bay and vicinity is contained in the *Current Tables.*

Bass Harbor Bar connects Great Gott Island with **Bass Harbor Head,** the southwestern point of Mount Desert Island. A light, 56 feet above the water and visible 9 miles, is shown from a white tower connected to a dwelling on the head. The fog signal s a bell. A Federal project provides for a channel depth of 14 feet for a width of 250 eet across the bar. In 1949 a least depth of 11 feet was found. Caution should be

used in navigating this channel which is 350 yards southward of Bass Harbor Head Light. A vertically striped buoy in the channel may be passed close-to on either side. The channel is on the through route used by most vessels of 12 feet draft or less, and is sometimes used by vessels drawing 18 feet proceeding at high water and with a smooth sea. In heavy weather breakers occasionally form entirely across the bar.

Bass Harbor, in the southwest end of Mount Desert Island just westward of Bass Harbor Head, is an important fishing port. The harbor is sometimes used as an anchorage by vessels bound through the inside passage, but the outer harbor is exposed southward. The outer harbor is clear with the exception of **Weaver Ledge,** in the middle, and bare about 2 feet at low water. A buoy is on the southeast side of the ledge and another buoy is on the northwest side. Vessels can enter on either side of Weaver Ledge and anchor between the ledge and the entrance to the inner harbor, in depths of 30 to 46 feet, bottom soft in places.

The inner harbor is a crooked channel, 100 yards wide, with depths of 13 to 24 feet, and provides a secure anchorage for small craft. Two buoys are on the western side of the entrance. The channel inside is unmarked and there are shoals close to it on either side.

McKinley, a village on the east side of Bass Harbor, has fish factories and is the headquarters of many fishing vessels. A stack and twin water tanks are conspicuous from southward. The wharf of the large fish cannery has a depth of 9 feet alongside. Gasoline and provisions are available, but there are no special facilities for taking fresh water. A boat works where boats up to 65 feet in length and 9 feet in draft are built is on the east side of the harbor 400 yards south of the cannery stack.

Bernard is a village on the west side of the harbor. There are fish wharves with depths of 2 and 3 feet alongside.

Mitchell Cove and **Duck Cove,** 0.5 mile and 1.5 miles northwestward of Bass Harbor, are shoal and foul, and have no landings.

Goose Cove, on the eastern side of Blue Hill Bay 2 miles northwestward of Bass Harbor, is frequented by fishing boats. The cove has good holding ground and offers excellent anchorage for small boats, except in heavy southwesterly weather. A shoal in mid-harbor is marked by a buoy. **West Tremont** is a village at the head of the cove. A church spire at the village is prominent from seaward.

Goose Cove Rock, 0.6 mile northwest of Goose Cove and 0.2 mile offshore, is a rocky islet with grass on top and a small wooden lookout on its summit. **Rumell Island,** 0.6 mile northwestward of Goose Cove Rock, is another rocky islet with grass on top. There are fish weirs between the island and mainland. **Latty Cove,** an indentation between Goose Cove Rock and Rumell Island, has a pier and float landing.

Seal Cove, 4 miles northwestward of Bass Harbor, is a sheltered anchorage for small vessels, except in westerly winds. A rock awash at high water is 300 yards offshore just inside **Reed Point,** the northern entrance point, and a ledge partly showing at high water is off the shoal bight just inside **Dodge Point,** on the south side of the entrance. Entering midway between the rock and ledge, anchorage will be found near the middle of the cove, in depths of 11 to 37 feet. There are no wharves.

Moose Island, north of the entrance to Seal Cove, is grassy. A bar, bare at low water, connects the island to a point 0.3 mile northward of Reed Point. The point has a few buildings, a wharf, and a prominent flagpole with cross-arm. Small craft anchor

northward of the bar. A rocky ledge, awash at low water, is reported to be 125 yards north of Moose Island.

Hardwood Island, 0.7 mile northwest of Moose Island, is wooded at the north end, and grassy, with scattered trees southward. A bar extends 0.3 mile southwestward from the island; a buoy is off the end of the bar.

Sawyer Cove, on the eastern shore of Blue Hill Bay eastward from the north end of Hardwood Island, is an anchorage for small craft. A ledge awash at high water is on the north side of the cove at the entrance. Several float landings are in the cove.

Pretty Marsh Harbor makes into the eastern shore of Blue Hill Bay northeastward of Hardwood Island. There is good anchorage in depths of 32 to 37 feet, 300 to 500 yards from the eastern shore eastward of **Folly Island,** a grassy island with a few trees. The northern and western sides of the harbor are shoal inside **West Point** on the western side of the harbor 0.6 mile northeast of Folly Island. A shoal extends 350 yards southeastward from West Point. A shoal extends 150 yards southeastward from Folly Island, and a ledge with 3 feet over it is 200 to 300 yards eastward from the island; otherwise, there are no dangers away from the shores. Several float landings are on the east side of the harbor.

John Island, an islet 0.4 mile northward of Folly Island, and a lower islet 400 yards northwestward are grassy. **Birch Island,** 0.4 mile northwestward of John Island, is wooded.

Bartlett Island, 0.7 mile northward of Hardwood Island, is mostly wooded, and has a few houses. A pier and float landing are on the east side. A grass-covered islet is close to the northeast end of the island.

Bartlett Narrows is between Mount Desert Island and Bartlett Island. The channel is narrow, but has deep water and 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 400 yards, and give the south end of John Island a berth of 200 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 extending 200 yards southward from a group of bare rocks. A submerged cable crosses Bartlett Narrows from a point 0.6 mile north of West Point on Mount Desert Island to a point on Bartlett Island 300 yards northward of Birch Island. Avoid anchoring at the crossing.

A ledge with 2 to 3 feet over it is 400 to 600 yards from the eastern shore 0.4 mile northward of Bartlett Narrows. It will be avoided by keeping westward of a range formed by the northwest tangents of Black and Alley Islands.

Western Bay, northeastward of Bartlett Island, is a part of the waters which separate Mount Desert Island from the mainland northward. Mount Desert Narrows, described previously, is at the head of Western Bay. **Black Island,** 1 mile eastward of the north end of Bartlett Island, is thickly wooded. **Green Island,** close to the southern shore of the bay, is 0.5 mile east of Black Island. **Alley Island,** the largest island in Western Bay, is 1.2 mile north of Green Island. Vessels of any size can select anchorage in the bay southwestward of Alley Island, in depths of 44 to 64 feet; the broken ground with depths of 34 to 36 feet extending 0.4 mile off the southeast side of **Oak Point,** 1.5 mile westward of Alley Island, should be avoided. With the aid of the chart, good anchorage can be selected also in depths of 21 to 38 feet southeastward and eastward of Alley Island.

The range formed by the summit of Bartlett Island and the middle of Black Island clears the shoal extending 500 yards southeastward from Alley Island.

Foul ground extends about 500 yards from the south shore of Western Bay between Green Island and **Indian Point,** 1 mile northeastward. **Northwest Cove,** eastward of Indian Point, has an anchorage in depths of 10 to 20 feet, but a ledge with little water over it extends 500 yards from its southeast shore 600 yards eastward from Indian Point. **Clark Cove,** 1 mile northeast of Indian Point, has a wharf and landing for small boats.

Goose Cove is a large shallow bight on the north side of Western Bay above Alley Island. The village of **Trenton** is on the northern shore. The head of the cove is dry at low water for a distance of 0.5 mile and thence it deepens gradually to 7 feet 0.5 mile farther down. There are no wharves in the cove.

Mahoney Island, on the west side of Blue Hill Bay 7.5 miles west of Bass Harbor Head and just eastward of the entrance to Eggemoggin Reach, has some scattered trees. **Smutty Nose Island,** 0.5 mile northwestward of Mahoney Island, is grassy. **Mahoney Ledge,** southwestward of Mahoney Island, is partly bare at low water. A buoy is southward of the ledge and another buoy is off the shoal water southeast of Mahoney Island.

Pond Island, 1.3 miles eastward of Mahoney Island, is wooded on its eastern side. The western side is grassy and is marked by a house on the summit. **Lamp Islet,** 0.2 mile northward of Pond Island, is grassy. The passage north of Pond Island is used by vessels entering Blue Hill Bay from westward and sometimes by vessels following the inside route eastward or westward. The passage has a least depth of 19 feet in the buoyed channel, but there are dangers close to the sailing lines. The buoys are colored and numbered for vessels bound westward.

Between Pond Island and Casco Passage, 1.5 miles southward, are several islands. They are **Opechee Island,** wooded; Johns Island, previously discussed; **Black Island,** wooded; **Sheep Island,** grassy; and **Eagle Island,** wooded. A reef bare at low water is 500 yards eastward of Eagle Island. The passages between these islands are obstructed by reefs.

Channel Rock, 1 mile northward of Pond Island, has a whitish top about 5 feet above high water. A submerged ledge extends 0.4 mile east-southeastward of the rock.

Green Island is grassy and marked by an abandoned lighthouse tower, white with dwelling, and by **Blue Hill Bay Light.** The light, 25 feet above the water and visible 8 miles, is shown from a black skeleton tower. The shoal of which Green Island is a part is bare at low water from the island to the shore 1.1 miles northwestward and for a distance of nearly 0.3 mile southward of the island. Other islands on the shoal include **Flye, Goose,** and **Gander Islands.** A buoy is off the south end of the shoal. **Sand Islet,** 0.3 mile northeastward of the light, is bare and nearly covered at high water. A buoy is westward of the islet and a vertically striped bell buoy is in the channel between Green Island and Sand Islet.

Flye Island Ledge, having rocks with depths of 7 to 15 feet, extends to a point 1 mile south-southwestward of Blue Hill Bay Light.

Herrick Bay is a shallow and unimportant bight on the western side of Blue Hill bay northwestward of Blue Hill Bay Light. **Naskeag Point,** 0.8 mile northwest of Mahoney Island, is on the western side of the approach. The bay is dry at low water for nearly 1 mile from its head. There is good anchorage in the approach to the bay 0.5

mile from the western shore northward of Naskeag Point, in depths of 24 to 45 feet. In approaching the anchorage the range formed by the western ends of Flye and Long Islands leads westward of Flye Island Ledge.

Ship, Trumpet, Bar, and **Tinker Islands** are a chain of islands 4 miles long in the middle of Blue Hill Bay, eastward of Blue Hill Bay Light. The islands are joined by shoals bare at low water, except for a channel between Trumpet and Bar Islands; the channel has a depth of 17 feet near a vertically striped buoy. Ship and Bar Islands are high and grassy, and Bar Island has a shack at the north end. Trumpet Island is low and grassy. Tinker Island, partly wooded, has a shack at its southeast end.

Ship and Barges Ledge, 0.6 mile southeastward of Ship Island, is 350 yards long and bare at half tide. The ledge is marked by a daybeacon, black slatted tripod, on the south end; a daybeacon, a black cask on end on an iron spindle, on the north end; and a bell buoy 200 yards off the east side.

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.

Cow and Calf Ledge, extending 0.4 mile westward and northward from Tinker Island, has several rocks with little water, and one rock bare at half tide; two buoys are off the ledge.

Allen Cove, on the west side of **Herriman Point** 3.5 miles northwestward of Blue Hill Bay Light, is used as an anchorage. The cove is open northward and the shores are foul. Vessels may anchor in the middle of the cove in depths of 12 to 30 feet.

Long Island, a large island in Blue Hill Bay 1.5 miles west of Bartlett Island, is in general wooded, with many clear sections. **Long Island Hub,** off the south end of Long Island, is conspicuous because of high trees covering it.

Sand Point is on the west shore of Blue Hill Bay 3.3 miles northward of Herriman Point. **South Blue Hill,** a village on the western side of Blue Hill Bay just south of Sand Point, has a wharf with about 50-foot face and a depth of 5 feet alongside.

Salt Pond, entered 1.2 miles northwestward of Sand Point and just south of the entrance to Blue Hill Harbor, has falls at the entrance. The entrance is crossed by a fixed bridge having a horrizontal clearance of 160 feet and a vertical clearance of 10 feet at high water. Salt Pond is entered by local motorboats except for about 3 hours before, and 3 hours after, low water.

Blue Hill Harbor, northwestward of Long Island, is a large bight in the northwestern part of Blue Hill Bay. **Parker Point,** on the western shore of the harbor 3 miles north of Sand Point, and **Sculpin Point,** on the northern shore of the harbor 0.3 mile northeast of Parker Point, divide the harbor into an inner and outer harbor. The village of **Blue Hill** is at the head of the inner harbor.

Ledges extend 200 to 700 yards from the western shore of the outer harbor, and at a point 1 mile southward of Sculpin Point they extend 0.5 mile from shore. Anchorage, sheltered from northerly and westerly winds, will be found in the outer harbor in depths of 23 to 47 feet. Eastward of the entrance to the inner harbor is a detached shoal 350 yards long, with a depth of 4 feet over it; two buoys are on the eastern end of the shoal. Vessels can enter the inner harbor on either side of the shoal, but the northern channel is easier and much safer.

The channel in the inner harbor is narrow and crooked. The entrance has a depth of about 18 feet, but is so narrow that a stranger should not depend on carrying a depth

greater than 8 feet, at low water. Secure anchorage for small vessels is just inside the entrance, in depths of 19 to 28 feet. The entrance is 50 yards wide between **Sculpin Ledge,** which is bare at three quarters tide, and a ledge southwestward, which has 8 feet on its northern end and extends to the shore southwestward. A buoy is off Sculpin Ledge. Many of the rocks in the inner harbor show except at high water, and buoys are off the principal dangers. **The Triangles** are three rocks, bare at low water only; a buoy is off the rocks.

To enter the inner harbor pass 50 yards eastward and about 50 yards northward of the buoys on the ledge east of the entrance and steer **279°** to clear for Sculpin Point buoy 2. Leave Sculpin Point buoy 2 about 20 yards on the starboard hand and steer **320°.** Select anchorage near mid-channel 200 to 500 yards above Sculpin Ledge, in depths of 19 to 28 feet, bottom soft in places.

Caution.—It is reported that some small craft have attempted to pass between the two buoys marking the end of the detached shoal east of the inner harbor entrance. It is necessary to pass east and north of both buoys if using the northern entrance channel.

Ice usually closes the harbor from December to April. A yacht club is on the east side of the inner harbor 700 yards northwestward of Sculpin Point. The float landing has a depth of 8 feet alongside.

Darling Island, covered with bushes, is just eastward of the entrance to Blue Hill Harbor. **Darling Ledge,** the top of which shows at low water, extends 0.3 mile southward of the island. The ground is foul between the ledge and the shore. A buoy is on the southeast side of the ledge. There is a granite wharf with a float landing, now used for pleasure craft, on the mainland westward of Darling Island.

McHeard Cove is 0.7 mile north of Darling Island. **Mink Island** and a reef bare at high water are in the center of the cove. A crib wharf, nearly bare at low water, is at **East Blue Hill,** a village near the head of the cove. A marine railway capable of hauling out boats up to 75 feet in length and 10 feet in draft is in the cove.

Morgan Bay, northeastward of Long Island and on the west side of **Newbury Neck,** is about 3 miles long. The bay is much used by yachts. A yacht club with a pier and float landing is on the west side of the bay, northwesterly of Jed Islands.

The entrance to Morgan Bay 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. **Conary Nub,** 0.2 mile off the western shore at the entrance, is a rock with a clump of scrub. **Seal Ledge,** 0.3 mile northeast of Conary Nub, is awash at high water. **Black Rock,** bare 3 feet at low tide, is on a shoal with depths of 7 to 10 feet extending 0.4 mile northeastward of Seal Ledge. **Bird Rock,** westward of Jed Islands, is about 3 feet high. **South Ledge,** 0.2 mile southward of Jed Islands, is covered at half flood. A rock with a depth of 4 feet over it is 0.2 mile southwestward of South Ledge; a buoy is west of the rock. Danger will be avoided by keeping westward of a line from Conary Nub to the southwest end of Newbury Neck. Some of the dangers are privately marked; information regarding these can be obtained at the yacht club.

To enter Morgan Bay pass in mid-channel westward of Conary Nub on a **038°** course, and keep the western shore aboard distant 200 yards until abreast Seal Ledge. Or pass 125 yards eastward of Conary Nub on a **002°** course, and pass midway between Seal Ledge and the western shore. Good anchorage can be selected in the bay in depths of 8 to 36 feet, using the chart as the guide.

Webber Cove, on the west side of Morgan Bay about 1.3 miles above Conary Nub,

is used as an anchorage by small craft. A large white house and flagpole on the north side of the entrance are prominent. At the head of the cove is a boatyard with a marine railway capable of hauling out craft up to 50 feet in length and 6 feet in draft for repairs. Winter storage for a considerable number of boats is available in the boatshed. There is a crib wharf, bare at low water, to which gasoline and water are piped. A pier with float landing on the point at the north side of the entrance to the cove has a depth of 15 feet alongside.

Union River Bay, at the head of Blue Hill Bay, is large and extends about 5 miles in a northerly direction between Oak Point on the east and Newbury Neck on the west. The bay is free from dangers, except near its northern end. The head of the bay is separated into two arms; Union River, the eastern arm, leads to the city of Ellsworth; and Patten Bay, the western arm, leads 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, but the channel up to the town bares at low water. Good anchorage is at the entrance near mid-channel, and as far as 1.5 miles above the entrance, in depths of 20 to 38 feet. A ledge partly bare at half tide extends 400 yards from the northern shore 0.7 mile westward of **Weymouth Point,** the head of Union River Bay. A buoy is south of the ledge. Between this buoy and a point 1 mile above, the northern shore of Patten Bay is fairly bold, while the opposite shore should be given a berth of 300 yards. Ice closes the upper end of the bay during January, February, and March.

The Patten Bay Yacht Club is on the north side of the bay about 1.6 miles west of Weymouth Point. A pier and float landing have a depth of about 5 feet alongside. A wharf bare at low water is at the town of Surry.

Union 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. The river is about 1 mile wide at the entrance but contracts to 100 yards 1.3 miles above. A Federal project for the improvement of Union River provides for a channel 6 feet deep and 100 to 150 feet wide from the head of Union Bay to the foot of the rapids at Ellsworth. In 1949 there was a reported controlling depth of about 4 feet in the river channel to Ellsworth. Freshets occur in the spring occasionally. Ice usually closes the river from December to April.

Mill Cove, on the eastern side of Union River at the entrance, is small and shoal. Off the entrance are several rocks, the most prominent of which are buoyed. **Tupper Ledge,** with a rock baring at low water and from which broken bottom extends northward, is off the river entrance. A buoy is off the west side and another buoy is off the south side of the ledge. **Lord Rock,** with 9 feet over it, is close to the eastern shore off the entrance. A buoy is on the west side of the rock.

The channel in Union River is narrow and difficult. Strangers should not enter without a pilot. Pilotage is not compulsory, but pilots can be obtained from among local boatmen if desired. With the aid of the chart and by following directions, small craft should be able to go up to Ellsworth, but should do so on a rising tide. Pass between Lord Rock buoy 10 and Tupper Ledge buoy 7 and steer northeastward to the 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 buoy at the entrance steer **031°** for about 300 yards, then **009°** for about 0.4 mile, keeping about 150 yards off the eastern shore, and then **341°** for about 0.6 mile

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to a position close westward of a daybeacon, red cage on an iron 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. Three buoys are on the western side of the channel. The chart is the guide.

Ellsworth is a city on the railroad and highway at the head of navigation on Union River. The maximum draft brought to the city at high water is about 10 feet. At this point the river is obstructed by a dam. The customs duties are handled by an officer from Bar Harbor. There are two small wharves with but little water alongside. A boatyard has a marine railway capable of hauling out vessels of up to about 80 feet in length and 9 feet in draft. A yacht storage shed is available. Machine shop repairs may be had. Diesel oil, gasoline, water, and supplies can be obtained. The river is fresh at low water.

Charts 307, 308.—The following are the directions for Blue Hill Bay. Blue Hill Bay is approached from eastward across Bass Harbor Bar, from southward between Placentia Island and Swans 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 boats can also enter the head of Blue Hill Bay from Frenchman Bay through Mount Desert Narrows, which has been previously described.

The inside route across Bass Harbor Bar and through Casco Passage, used most frequently and particularly by vessels of 12 feet draft or less, leads across the south end of Blue Hill Bay. Directions for this passage are given in Chapter 3. The vessels bound to points in Blue Hill Bay seldom exceed 12 feet draft, and usually follow the inside passage. In general, they enter from eastward across Bass Harbor Bar, and from westward by the passage between Pond Island and Blue Hill Bay Light. Vessels of drafts too deep for that route 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 drafts greater than 15 feet. This passage also is desirable for vessels of 12-foot draft or less when there is too much easterly or southeasterly swell on Bass Harbor Bar. Vessels of the deepest draft can enter by the main channel between Black and Placentia Islands on the east and Long and Swans Islands on the west. Above the entrance, Blue Hill Bay is deep and generally free from dangers, and several channels are available.

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. Bound to Blue Hill Harbor 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. This passage is deep and clear and the chart is the guide.

Entering between Black and Placentia Islands, this passage has a rock with a least depth of 18 feet, not closely examined, 250 yards off the southwest end of Little Gott Island. Vessels of 15 feet draft or less 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 then can be shaped northward into Blue Hill Bay, or if bound to Casco Passage, north-northwestward to pass northeastward of Staple Ledge buoy and North Point of Swans Island.

Entering from southward, pass 0.7 mile eastward of Long Island Head, and steer **334°** to clear the western end of Green Islands. When about 0.5 mile south of the Green Islands, change course to **315°** to clear both the Green Islands and Placentia Island by about 500 yards. Off Placentia Island shape course as desired. Or, passing 0.4 mile or more southward of Great Duck Island Light, bring it astern on a **282°** course, heading for the western end of Green Islands, and pass about 0.4 mile northeastward of The Drums buoy 1. When this buoy is abeam, change course to **273°** and round the Green Islands at a distance of about 500 yards. When 500 yards southwestward of the Green Islands, steer **315°** for 2.3 miles to a position 500 yards westward of Placentia Island. The course then can be shaped as desired.

Entering from westward, vessels usually come through Eggemoggin Reach or Deer Island Thorofare, and enter Blue Hill Bay by the passage between Pond Island and Blue Hill Bay Light. The deeper channel, with a depth of about 19 feet, leads through the buoyed channel 0.5 mile northward of Pond Island. Vessels entering Blue Hill Bay from Eggemoggin Reach and from Deer Island Thorofare, can use the directions in Chapter 3 to Egg Rock Daybeacon in Jericho Bay. From a position 0.3 mile west of Egg Rock Daybeacon, steer **019°** for 3.2 miles, passing over 0.3 mile east-southeastward of Mahoney Island, to a position 50 yards northwestward of Fifteen-Foot Rock buoy 3 and then steer about **069°** changing slightly as necessary to pass 50 yards southward of Twelve-Foot buoy 2, and 100 yards northward of Pond Island Point buoy 1, into Blue Hill Bay. The course then can be shaped as desired.

CHAPTER 7

Jericho Bay to East Penobscot Bay

Chart 309

BETWEEN Jericho Bay and East Penobscot Bay are numerous islands; **Deer Isle,** 10 miles westward of Mount Desert Island, is the largest. Eggemoggin Reach, Deer Island Thorofare, and Merchant Row are the three principal passages between the bays. **Eggemoggin Reach,** between Deer Isle and the mainland, connects Blue Hill Bay and the head of Jericho Bay with Penobscot Bay near its head. The reach is 11 miles long and has a least width of about 0.4 mile at Byard Point. There are several villages along its shores.

The eastern entrance is well marked by **Devils Head,** a prominent, high rocky bluff on the south end of **Hog Island,** 2.8 miles west of Pond Island. Off the western entrance are **Cape Rosier,** high and thickly wooded; a light on Green Ledge, 1.3 miles south of Cape Rosier; and an abandoned lighthouse tower on **Pumpkin Island,** 3.6 miles east of Cape Rosier.

The main channel through Eggemoggin Reach has been examined by means of a wire drag. The depth is sufficient for deep-draft vessels, but the channel is narrow and the bottom is irregular in places. The principal dangers are buoyed and can be easily avoided in the daytime and in clear weather.

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 off the reach. Directions for Eggemoggin Reach are given in Chapter 3. The mean range of the tide is about 10 feet.

Devils Head Ledge, extending 0.3 mile southeastward from Devils Head at the eastern end of Eggemoggin Reach, is partly bare at high water; a buoy is off the end of the ledge. **Hay Island Ledge,** 0.5 mile southeastward of Devils Head, has a depth of 7 feet; a buoy is off its western side. **Channel Rock,** 900 yards south of Devils Head, is bare at extreme low water and marked by a buoy. **The Boulders,** 400 yards northwestward of Channel Rock, are bare at low water. A fairway bell buoy is off the eastern entrance between Devils Head Ledge and Hay Island Ledge on the north and Channel Rock and The Boulders on the south.

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 village near the head of the cove. The landing is nearly bare at low water. **White, Bear,** and **Conary Islands** are off the entrance to Greenlaw Cove and on the southern side of the passage through Eggemoggin Reach. **Conary Ledge,** 0.4 mile north of Conary Island, is awash at low water. A buoy is north of the ledge.

Naskeag Harbor is north of Hog Island and **Harbor Island,** which is 0.3 mile east of Hog Island. The village of **Naskeag** is 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. At the eastern approach to the harbor, the bar from the northern shore extends two-thirds of the way across. Between the end of this bar and Harbor Island is a rock bare at half tide with deep water on either side. At half tide the bar is distinguishable by ripples. At the western entrance a submerged rock has been reported about 60 yards north of Hog Island. Between Naskeag and Centre Harbors are several private float landings.

Centre Harbor, an anchorage for small craft only, is a small cove on the eastern side of the reach northeastward of **Torry Islands,** 2.2 miles northwest of Hog Island. The town of **Brooklin** is at the head of the harbor. A rock marked by a daybeacon is in the middle of the entrance northward of **Chatto Island,** 0.6 mile northeast of Torry Islands. The channel is close southward of the rock. Between the daybeacon and the fish factory on the north side of the cove, the channel has depths of 6 to 10 feet; above this is mostly dry at low water. Good anchorage is available off the entrance in depths of 22 to 24 feet, 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 of the islands. This passage should not be attempted by strangers. The fish factory wharf has a depth of 2 feet at the outer end. The old boatyard and marine railway, just west of the fish factory, was not in operation in 1949. The Centre Harbor Yacht Club, on the north side near the daybeacon, has a float landing with a depth of 7 feet alongside.

Benjamin River, the approach to the town of **Sedgwick,** makes into the eastern shore 2 miles northward of Centre Harbor. The channel at the entrance, northward of **Cape Carter,** has a least depth of 19 feet, but is restricted on both sides, leaving a passage only 100 yards wide at its narrowest part. A rock bare at low water is at the outer end of the ledge and sand shoal extending into the harbor from the east side 0.6 mile north of Cape Carter; it is marked by local interests in the summer. The town of Sedgwick can be reached only at high water, as the river runs dry some distance below. There is a boatyard with a marine railway capable of hauling out small craft up to 60 feet in length and 10 feet in draft at **West Brooklin,** a village on the east side of the river near the entrance. The boatyard has a shed for winter storage of pleasure craft.

North Deer Isle is a village with post office at the north end of Deer Isle. The old ferry wharf 0.4 mile westward of **Tinker Ledges** is in ruins. There is a rock crib breakwater just east of the old wharf, and the enclosed space between the two is sometimes used for beaching local small craft.

A highway fill, extending from the northwest corner of Deer Isle to the eastern side of **Little Deer Isle,** 0.4 mile northwestward, closes this passage to all boats. **Stave Island** is just northward of the eastern end of Little Deer Isle.

Billings Cove is on the northern shore of the reach 2.3 miles northwestward of

Benjamin River and east of **Byard Point.** Anchorage can be had in the middle of the cove just inside the entrance in depths of about 25 feet. **Sargentville,** a village with post office near the eastern shore of the cove, has a wharf in good condition. Diesel oil, gasoline, and water are piped to the wharf. A clam factory is on the inner half of the wharf.

The **Deer Isle—Sedgwick Bridge,** a suspension type, crosses Eggemoggin Reach between Byard Point and Little Deer Isle. The bridge has a horizontal clearance of 1,030 feet and a vertical clearance at high water of 87 feet at the center, 85 feet for 100 feet each side of the center, and 80 feet for 200 feet each side of the center.

Eggemoggin is a summer resort with a float landing at the north end of Little Deer Isle southeastward of Pumpkin Island. Several small boatyards are on the north shore of Little Deer Isle just east of Eggemoggin and west of **Howard Ledges,** buoyed dangers 1.3 miles westward of the bridge. Small craft up to about 40 feet in length are hauled out on skids and stored. Limited repairs can be made.

Buck Harbor, on the north side of the reach opposite Pumpkin Island, 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 buoy. The channel between the ledge and the north end of Harbor Island has a depth of 12 feet. Small craft can anchor in the bight on the northeast side of Harbor Island. The best anchorage is westward and northwestward of Harbor Island in depths of 28 to 37 feet. **South Brooksville,** a village with post office and landings at the head of the harbor, has a steamer wharf with a depth of 10 feet alongside. A yacht club has a pier and float landing with a depth of 15 feet alongside. There are several private float landings. Gasoline and water are piped to a good stone wharf with a depth of 12 feet alongside. Provisions, ice, and supplies are available.

Orcutt Harbor, just westward of Buck Harbor, is about 1.3 miles long and 500 yards wide. Good anchorage is available in depths of 20 to 52 feet in the middle of the harbor just above a small wooded islet on the western side near the entrance. A reef, bare at low water, extends 300 yards southward from **Condon Point,** on the east side of the entrance. When inside this reef, favor the eastern side of the entrance to avoid a sunken rock nearly 200 yards from the western shore and the same distance southward of the wooded islet. In the slight expansion 0.5 mile above the islet, care must be taken to avoid two sunken rocks, one of which is 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 is 0.6 mile southwestward of Orcutt Harbor. The cove is navigable only for small craft with local knowledge. There are no wharves.

Thrumcap Island, 1 mile northwestward of Pumpkin Island, is grassy and low. **Thrumcap Ledge,** southwestward of Thrumcap Island, is partly bare at high water. **Spectacle Island Ledge,** 0.8 mile southwestward of Thrumcap Island, has a least depth of 6 feet; a buoy is south of the ledge. **Two Bush Ledge,** 1.2 miles south of Thrumcap Island, has a depth of 2 feet; a buoy is off its west side. **Merriman Ledge,** bare only at low water, is 0.4 mile westward of Pumpkin Island; a buoy is on its north side. About midway between Merriman Ledge and Spectacle Island Ledge is a 13-foot spot marked

by a buoy. **Pumpkin Island Ledge,** 0.4 mile northwestward of Pumpkin Island, has a least depth of 12 feet; a buoy is on its west side. A daybeacon is on the shoal just north of Pumpkin Island. **The Triangles,** 0.4 mile northeastward of Pumpkin Island, has a least depth of 2 feet and is marked by buoys on its north and west sides.

Of the islands near the western entrance to Eggemoggin Reach, **Spectacle Islands,** 1.7 miles westward of Pumpkin Island, are grassy; **Two Bush Island,** 1.8 miles southwestward of Pumpkin Island, is bare; **Hog Island,** 2.5 miles southwest of Pumpkin Island, has scattered trees and a house and barn in the center; **Pond Island,** 0.4 mile northwest of Hog Island, is grassy and has a small clump of trees on the northeast side and a shanty at the south end; and **Western Island,** 0.5 mile west of Pond Island, is grassy on its eastern end and has a thick clump of trees on its western end. **Green Ledge,** west of Western Island, is grassy. A light, 31 feet above the water and visible 9 miles, is shown from a white skeleton tower on the ledge. A bell buoy is 600 yards southwestward of the light.

Chart 227.—Deer Island Thorofare is a narrow passage leading along the south side of Deer Isle, between it and the numerous islands southward. The passage joins Jericho Bay on the east and Penobscot Bay on the west, and is a link in the chain of inland passages. Stonington is the principal town on the passage. The thorofare is used occasionally by steamers and extensively by 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 in a dredged channel 300 feet wide through the bar between Moose and Crotch Islands. Vessels up to 18 feet in draft are reported to use the passage, but there are unmarked rocks with depths of 9 to 14 feet close to the channel, and local knowledge is required to carry a greater draft than 9 feet at low water. The more important dangers for vessels of this draft are marked, and the channel is easily followed in the daytime and with clear weather.

The standpipe at Stonington, the high brick stack on the north end of Crotch Island, and the derricks on Crotch Island are prominent from all directions.

The best anchorage for vessels bound through the thorofare and overtaken by night or bad weather is in Southeast Harbor. When overtaken by fog, they may anchor anywhere near the channel where the bottom is soft and the depth suitable. Small vessels anchor on the north side of the channel abreast Stonington, the anchorage most used being north of **Round Island** and between the wharves off Staple Point and the buoy 800 yards eastward.

The mean range of the **tide** at Stonington is about 9½ feet. 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.

Ice closes Deer Island Thorofare and Southeast Harbor for about a month each winter. During severe winters, solid ice has existed from Stonington to Isle au Haut.

There are two well-marked channels into Deer Island Thorofare from the eastward. The northern channel passes east and south of the buoys marking the ledges off **Green Ledge,** 1.9 miles south of Devils Head, and enters the thorofare between **Long Ledge,**

0.5 mile south of Green Ledge, and **Potato Ledge,** which extends 0.6 mile northeastward from **Shabby Island.** A red slatted tripod daybeacon is on Long Ledge and a bell buoy is south of the ledge. A buoy is north of Potato Ledge. The channel then leads westward, passing **Lazygut Ledge,** 0.6 mile west of Long Ledge; **Eastern Mark Island Ledge,** 1.4 mile west of Potato Ledge; **Haycock Rock,** 0.6 mile southwest of Eastern Mark Island Ledge; **Haskell Ledge,** 0.8 mile west of Haycock Rock, and several other dangers, most of which are buoyed. The northern channel then joins the other channel in the thorofare west of **Bold Island Ledges,** 3 miles west-southwestward of Potato Ledge. The southern entrance channel passes south of **Whaleback Ledge,** about 0.8 mile southward of Shabby Island, and runs nearly due west, between **Shingle Island,** 1.1 miles southwest of Shabby Island, and **Saddleback Island,** 0.5 mile south of Shingle Island. The channel then swings northwestward and passes between **Bold Island,** 1.3 miles west of Shingle Island, and Bold Island Ledges. This channel is well marked by buoys to its juncture with the other channels.

Entering from the westward, the principal leading mark is **Deer Island Thorofare Light,** on **Mark Island,** 1.3 miles southwestward of Deer Isle. The light, 52 feet above the water and visible 13 miles, is shown from a white square tower attached to a dwelling on the west side of the island. The fog signal is a bell. Local magnetic attraction has been reported in a small area south of Mark Island. Westward of the light care must be taken to avoid **The Brown Cow,** a rock awash at high water 1.3 miles west-southwestward from the light, and **West Mark Island Ledge,** with a depth of 4 feet over it, about 0.7 mile northwestward of the light; a buoy is south of the ledge. Passing north of the light and south of **Western Deer Island Ledge** and **Bay Ledge,** 0.4 mile north of Mark Island, there will be no difficulty in following the aids marking the thorofare. For courses and distances, see Chapter 3.

Southeast Harbor is northwestward of the eastern end of Deer Island Thorofare, between **Stinson Neck** on the east and **Whitmore Neck** on the west. The entire harbor is shown on Chart 309, but the entrance and eastern part are shown on Chart 227. The harbor 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 village with post office on the south side of the harbor. The stone wharf at the village is in ruins.

Webb Cove, on the north side of Deer Island Thorofare, has rocks in the entrance but good anchorage inside in depths of 8 to 12 feet. The best water favors the west side of the entrance. A stone quarry, not operating in 1949, and a wharf with a reported depth of about 8 feet alongside are on the cove.

Stonington, the principal town on the north shore of Deer Island Thorofare, is the headquarters for the large granite quarries on the adjacent islands. A chart agency of the U. S. Coast and Geodetic Survey is in the town. A towboat that hauls rock barges from the quarries is available at Stonington.

There is a harbor master in Stonington. Float landings are available. Barters Dock, with a depth of 8 feet at the outer end and 7 feet at the lobster car and float landing, has a gasoline pump. Diesel oil, provisions, and some ship chandlery are available. The fish factory wharf off **Staple Point,** on the east side of the bight off the town, has a depth of about 4 feet at the outer end. The quarry wharf, 200 yards east of the fish factory, has depths of 8 feet and less. A ledge off this wharf has very little water over

it. In the cove just east of **Greens Head,** on the west side of the bight off the town, are several fish wharves, the outer one having a depth of 3 feet alongside. On the north side of the thorofare between Greens Head and Allen Cove, a wharf was being built out to deep water in 1949. There are highway, telephone, and telegraph connections with the mainland. A small motor vessel carries mail and passengers to Swans Island and Isle au Haut the year around.

Allen Cove, just west of Stonington and east of **Moose Island,** is protected by a pier and breakwater built out from the southeast end of Moose Island. It is known locally as **Yacht Basin.** Sheds on the southeast end of Moose Island are prominent from westward. A fill and roadway connect Moose Island with the mainland. Large lobster pounds occupy the heads of the coves on either side of the fill. There is a good boat works with several marine railways, the largest of which is capable of hauling out boats up to 125 feet in length, 12 feet in draft, and about 300 tons in weight. Marine supplies are obtainable.

Crotch Island, on the south side of Deer Island Thorofare opposite Moose Island, is the site of extensive granite quarries. A wharf on the east side of the island is near the entrance to **Mill Pond,** a bight in the east side of the island. This wharf is used to load granite at high water. The large red buildings at the wharf are prominent from southward and eastward. A large wharf on the north side of the island is reported to have a depth of 12 feet alongside at low water.

On the northern side of the western entrance to the thorofare is **Andrews Island,** 60 feet high. Northward of Andrews Island and extending 0.5 mile south of **Fifield Point,** are **Fort** and **Second Islands,** surrounded by off-lying reefs. The 9-foot spot 700 yards westward and the 15-foot spot 700 yards southwestward of Second Island should be avoided.

Burnt Cove and **Crockett Cove** are two small coves lying between Fifield Point and **Barred Island,** on the southwestern side of Deer Isle. The coves are of no importance as anchorages and are foul. **West Deer Isle** is a village on Burnt Cove.

South of Deer Island Thorofare and north of Merchant Row are many small islands, the more important of which are mentioned below. Navigation among these islands must be considered dangerous for there are many ledges and the channels are unmarked.

Halibut Rocks, in Jericho Bay, 0.8 mile northwest of Marshall Island, are two in number. On the northerly rock is an unwatched light on a red skeleton tower. A bell buoy is northward of the rocks.

West Halibut Rock, 1 mile westward of Halibut Rocks, has a depth of 2 feet over it; a buoy is off the rock. A rock with a depth of 9 feet is 400 yards northeastward of the buoy. Local magnetic attraction is reported on the broken ground 0.5 mile east-northeastward of Southern Mark Island.

Southern Mark Island Ledge, 2.3 miles west of Halibut Rocks, has a rock bare at high water.

Colby Ledge, 0.8 mile southwest of Southern Mark Island Ledge, is bare at half tide. A daybeacon is on the ledge. A ledge with 15 feet over it is 400 yards southward of the daybeacon. **Colby Pup,** with a depth of 3 feet over it and marked by a buoy, is 0.5 mile south of the daybeacon.

McGlathery Island, 2.5 miles southeast of Stonington, is the largest island on the

north side of Merchant Row. A rock awash at low water is about midway between the east end of the island and **Gooseberry Island,** 0.3 mile southeastward. The passage between these islands has several other dangers and should be avoided by strangers.

Barter Island Ledges, 0.5 mile west of McGlathery Island, are covered at high water; a daybeacon is on the ledges.

Harbor Island Ledge, is 0.8 mile southward of **George Head Island,** a wooded island 1.4 mile west of McGlathery Island. A buoy is north of the ledge, which has a depth of 3 feet. A 14-foot spot in mid-channel 0.5 mile southwest of George Head Island has a buoy off its south side.

Farrel Island, 2.6 miles west of McGlathery Island, and **Scraggy Island,** 0.8 mile west of Farrel Island, are wooded. There are several grassy rocks off the south side of Scraggy Island. **Sparrow Island,** 0.5 mile southwest of Farrel Island, is grass covered. **Sparrow Island Ledges** extend 0.5 mile west of the island.

Of the remaining islands in this area, **Bare** and **Round Islands** are grassy. **Buckle, Little Camp,** and **Potato Islands** are bare. **No Mans Island** is wooded on the western end and grassy elsewhere. **Enchanted Island** has scattered trees. **Camp, Rock,** and **Russ Islands** are partly wooded. **Phoebe, Millet, Spruce, Coot, Wreck, St. Helena, Green, Sand,** and **John Islands** are wooded.

Chart 309.—Merchant Row is a passage from Jericho Bay to East Penobscot Bay between the islands and ledges between Deer Isle and Isle au Haut. This passage is used by vessels in winter when Deer Island Thorofare is closed by ice, and by deep-draft vessels at all times. It is not quite as direct as Deer Island Thorofare, but the channel is wider and much deeper. There are numerous ledges and rocks on both sides of the passage, but the principal dangers are marked by buoys or daybeacons, and the channel can be readily followed in clear weather and daylight.

Directions for Merchant Row are given in Chapter 3. Deep-draft vessels can enter through the passage between Marshall and Swans Islands and Jericho Bay by directions in the previous chapter. Directions for entering Merchant Row from southwestward in Isle au Haut Bay are given in the next chapter.

The islands and reefs on the north side of Merchant Row, including many of those in the channel, have been previously described under Chart 227. In fact, Merchant Row could be navigated on that chart for the greater part, but it is better to use Chart 309 which, although on a smaller scale, shows the islands and reefs on both sides of the channel, as well as the approaches.

There are two entrances to Merchant Row from the eastward which are separated by the islands and reefs in Jericho Bay. South of Halibut Rocks and west of Marshall Island, a series of islands and reefs extends to the eastern entrance to the passage. **Southern Mark Island,** 2.1 miles southwest of Halibut Rocks, is about 30 feet high and grassy. About 1 mile south of Southern Mark Island is **Fog Island,** which is wooded. The numerous ledges east of Fog Island, and between it and Marshall Island, are all bare. The more important of these, since they are closest to the channels, are **North Popplestone Ledge** and **Saddleback** on the north, and **Green, White,** and **Drunkard Ledges** to the south.

Of the islands and ledges on the south side of Merchant Row, **Burnt, Pell, Bills, Merchant,** and Ewe Islands are wooded. **Harbor Island** is grassy. **Hardwood Island** is round and heavily wooded. **Ram Island,** 0.3 mile southwestward of Hardwood Is-

land, has a clump of trees on its north side. **Channel Rock,** 0.5 mile westward of Ram Island, is covered at high water. **Ram Island Ledge,** bare at low water, is 400 yards southeastward of Channel Rock. **Scraggy Ledge** is a bare ledge 700 yards westward of Channel Rock. There is foul ground between Scraggy Ledge and **West Halibut Ledges,** bare ledges 0.3 mile northward. **Outer Scrag Ledge,** 1 mile northwestward of Scraggy Ledge, is partly bare at high water. The **Brown Cow,** 1 mile northwestward of Outer Scrag Ledge, is awash at high water and is the westernmost danger at the western end of Merchant Row.

Isle au Haut, a large wooded island about 3.5 miles southward of Deer Isle, is one of the principal landmarks of the locality, its maximum elevation being over 550 feet. It is quite isolated, and has few inhabitants. The coast is mostly foul and must be approached with caution.

York Island is about 0.3 mile off the eastern side of Isle au Haut near its northern end. A ridge of shoals and reef extends about 1 mile northward from York Island, ending in **Airy Ledge,** which has a buoy off its eastern side. The channel between York Island and Isle au Haut is almost blocked by a group of rocks. Between **Richs Point,** the northeastern end of Isle au Haut, and York Island are numerous reefs and rocks, most of which are marked by heavy growths of kelp. This area should be avoided by all except those having local knowledge. Foul ground also extends southward of York Island; **Turnip Yard, Halfway Rock,** and **Horseman Ledge,** parts of which bare at low water, extend about a mile south of the island.

Little Spoon Island, Great Spoon Island, White Horse, and **Black Horse** comprise a group of grass-covered islands about 1.5 miles south-southeast of York Island. **Great Spoon Ledge,** awash at low water, is 0.3 mile northeast of Great Spoon Island. **Colt Ledge,** 0.6 mile south of White Horse, has a depth of 7 feet. The chart should be carefully followed in this locality.

Eastern Ear Ledge, with a depth of 1 foot, is 0.6 mile southward of **Eastern Ear,** a small island close to the southeast corner of Isle au Haut. A buoy is to the southward of the ledge.

Head Harbor is a small bight in the south shore of Isle au Haut, just west of **Eastern Head,** the southeast point of the island. The harbor is used mostly by lobstermen and affords good protection for small boats except in southwest weather. In normal weather, the off-lying ledges break up the swell, causing the water in the northeastern part of the harbor to be fairly calm. The bottom is rocky in general, but some parts are clay. Depths are 9 to 21 feet in the northeastern semi-protected part, and 60 feet and more outside. There are a few houses on the shore in the northeastern part and two docks which are dry at low tide. The harbor should not be entered without local knowledge, except in periods of good visibility.

Roaring Bull Ledge, 1 mile south-southwestward of Head Harbor, is bare at low tide. A daybeacon is on the ledge, and a lighted whistle buoy is 0.6 mile southward of the ledge.

Western Ear is a wooded island at the southwest end of Isle au Haut. **Western Ear Ledge,** 0.2 mile southward of Western Ear, is bare at low water.

The western side of Isle au Haut is fringed with many rocks and shoals, bare and submerged. The westernmost ones visible at high water include one of the three bare rocks of **The Brandies,** 1 mile westward of the southern part of Isle au Haut, and **Kimball Rock,** awash at high water 0.6 mile westward of **Kimball Island,** off the northwest side

of Isle au Haut. Several rocky spots with depths of 18 to 30 feet are outside the line joining these rocks.

Moore Harbor is a cove on the western side of Isle au Haut about 2.5 miles north of 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 northwestern side of Isle au Haut, between Isle au Haut and Kimball Island. Though called a thorofare, it has a bar, which goes dry at low water, near the eastern entrance. A Federal project provides for a channel 6 feet deep, 75 feet wide, and 1,200 feet long over the bar but, to 1949, no work had been done on this project.

The thorofare has a width of 100 to 500 yards, being widest at the western end. Secure anchorage for small craft or very small vessels can be had in depths of 33 feet near the town. A light, 48 feet above the water and visible 7 miles, is shown from a tower with its lower part conical, gray in color, and the upper part cylindrical, white in color, at **Robinson Point** on the south side of the western entrance. There is a white bridge to the shore. The white sector of the light from 034° to 060° covers the fairway to the thorofare. A buoy and daybeacon are off the two principal dangers on the north side near the western entrance. Opposite the town of Isle au Haut and near the southeast end of **Moxie Island,** the channel is narrowed by a ledge with a depth of only 2 to 4 feet at low water. The ledge is so close to the charted 16-foot depth that boats either run on it unawares or come to anchor and are set aground by the falling tide.

Enter Isle au Haut Thorofare between Isle au Haut Light and Sawyer Ledge buoy, and pass southward of Inner Ledge Daybeacon, 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 only at low water, which is 90 yards from the northwest side of the anchorage.

Isle au Haut, the village on the south side of Isle au Haut Thorofare, has landings bare at low water. A white church with a steeple is prominent. Gasoline and provisions are obtainable. There is no piped water on Isle au Haut. A small gas boat carrys mail and passengers between the village and Stonington and Lookout.

Lookout is a village and summer resort at the eastern end of Isle au Haut Thorofare. A buoyed channel to the wharf from Merchant Row leads between Merchant and Hardwood Islands. A private spindle marks the eastern extremity of the ledge extending eastward from **Flake Island,** a grassy island off the village. The wharf has a reported depth of 7 feet alongside.

CHAPTER 8

Penobscot Bay and Approaches

Chart 1203

PENOBSCOT BAY, the largest and most important of the many indentations on the coast of Maine, is about 20 miles wide from Isle au Haut on the east to Whitehead Island on the west and 28 miles long from its entrance to the mouth of Penobscot River. A chain of large and small islands divides the bay into two parts, **East** and **West Penobscot Bays.** The southern part of East Penobscot Bay is Isle au Haut Bay. **Vinalhaven** and **North Haven Islands** are large islands dividing the southern part of the bay. Long Island divides the bay near its head. Numerous harbors indent the shores of Penobscot Bay, the most important being Rockland, Rockport, Camden, Belfast, and Searsport on the western shore, Castine and Stonington on the eastern shore, and Vinalhaven and North Haven in the center of the bay. The bay is the approach to Penobscot River, on which are several towns and the city of Bangor at the head of navigation.

The sea approaches to the bay are well marked by the lights on Monhegan Island and Matinicus Rock; the entrances by Saddleback Ledge Light on the east and Whitehead and Two Bush Island Lights on the west sides of the bay. The harbors are well lighted and the more important dangers are indicated by buoys or daybeacons. Some coasting vessels enter the bay, especially in summer. In winter many of the harbors are obstructed by ice, and the Penobscot River sometimes is entirely closed by it. The thorofares are only occasionally obstructed by ice and are much used by vessels bound along the coast.

Penobscot Bay, a region of rocks and ledges, requires extreme caution 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 Two Bush Channel.

The mean range of the tide varies from about 9 feet near the entrance to about 10 feet in Eggemoggin Reach and near the head of Penobscot Bay. The rise and fall increases in passing up Penobscot River, the mean range at Bangor being about 13 feet.

Pilotage is not compulsory for vessels entering Penobscot Bay, and vessels seldom take pilots. Pilots for the bay and river can be obtained at Bucksport and Rockland. By prearrangement, these pilots will meet a vessel at any designated point. Penobscot River pilots live on the south end of Verona Island 4 miles south of Bucksport and board vessels from there when signaled. There are towboats at Belfast and Bucksport.

Chart 322.—There is no secure harbor for vessels at any of the islands southward off Penobscot Bay, 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; deep passages exist between the islands, as shown on the chart. Because of the broken nature of the bottom, however, vessels, particularly deep-draft ones, should avoid all broken ground having depths less than 60 feet. These waters are frequented mostly by local fishermen. The only settlements are on Matinicus and Ragged Islands, to which there is communication by launch from Rockland.

Seal Island, the easternmost of the islands off Penobscot Bay, is bare, rocky, about 60 feet high, and 1 mile long. Near its eastern end are a few houses occupied by fishermen during the summer. **Eastern Ledge,** on which the sea usually breaks, extends 350 yards off the east end of the island. **Three Fathom Ledge,** 1.4 miles northeastward of Seal Island, has been cleared by a wire drag set at 16 feet.

Malcolm Ledge, midway between Seal Island and Wooden Ball Island, is 0.4 mile long. The north end of the ledge is awash at high water; the south end is bare at half tide.

Wooden Ball Island, 3 miles southwest of Seal Island, is bare, rocky, about 60 feet high, and 1 mile long. The eastern point of the island is a prominent knob about 80 feet high. There are a few small abandoned houses at the low place in the western part of the island.

Matinicus Rock, the southernmost islet in the approach to Penobscot Bay, is about 40 feet high, and is marked near its south end by a light. The light, 90 feet above the water and visible 15 miles, is shown from the southernmost of the two cylindrical granite towers. The fog signal is an air diaphone; the radiobeacon has been synchronized with the fog signal for distance finding.

About 2.3 miles northwest of Matinicus Rock, a group of islands and rocks extends about 5 miles northward. Ragged, Tenpound, and Matinicus Islands and No Mans Land are the principal islands of the group. **Ragged Island,** the southernmost of the group, is partly wooded. There are numerous high bare rocks, including **Green** and **Brig Ledges,** on the east and south sides of Ragged Island. Broken ground extends 0.8 mile southward from the island to **Inner Breaker,** which has a depth of 3 feet and is marked by a buoy. **South Breaker** is on a small rock, awash at lowest tides, 1.7 miles southward of Ragged Island and 1.6 miles northwestward of Matinicus Rock Light. A horizontally banded buoy is south of the rock. A buoy is west of **Southwest Ledge,** 0.4 mile southwest of Ragged Island.

Criehaven is a village of fishermen on **Criehaven Harbor,** in the western side of Ragged Island. A breakwater extends northward from the southern entrance point; it has a light at its end. A buoy is 700 yards off the harbor entrance. Shoals are on the south side just outside the entrance to the harbor, and the best water favors the north side until inside. The fish wharf has a depth of about 7 feet. Gasoline and provisions are available. The harbor is a poor shelter in westerly weather. At such times the tri-weekly mail launch from Rockland lands at a wharf in **Seal (Marsh) Cove,** on the southeast side of Ragged Island. Anchorage can be had in this cove. The wharf is nearly bare at low water.

Shag Ledge, close to the northeast end of Ragged Island, is high, bare, and rocky. **The Hogshead,** 0.2 mile northward of Shag Ledge, is a small bare rock.

Tenpound Island, 0.4 mile north of Ragged Island and 0.3 mile off the southeast side of Matinicus Island, is grasssy with a few trees.

Matinicus Island, 0.8 mile northward of Ragged Island, is partly wooded, and is the largest of the group. **Western** and **Eastern Black Ledges** are bare rocks 0.6 and 0.9 mile eastward of Matinicus Island. **Tuckanuck Ledge,** 200 yards eastward of Eastern Black Ledge, is covered at high water. **Mackerel Ledge,** 700 yards north-northeastward of Eastern Black Ledge, is bare at half tide. A buoy is north of the ledge. A rock with a depth of 10 feet is 0.2 mile southward of Western Black Ledge, and a rock with a depth of 13 feet is 0.2 mile southward of Eastern Black Ledge.

Wheaton Island is just off the east side of Matinicus Island. The passage between the islands 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.

Matinicus Harbor 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 of the cove south-southwestward of Indian Ledge, in depths of 21 feet. This anchorage is 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, protected from all winds. This anchorage usually is 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 the usual entrance is 125 feet southwestward of the highest part of the ledge.

Matinicus is a town on Matinicus Harbor. It has tri-weekly mail launch communication with Rockland. The principal wharf, on the northwest side, has a depth of about 2 feet at low water, and the other wharves are bare. Gasoline, provisions, and some motorboat supplies are obtainable. There is no piped water on the island.

Harbor Ledge is a rock with a depth of 4 feet, 300 yards northeastward of the entrance of Matinicus Harbor. An obstruction buoy is south of the rock. **The Barrel,** 300 yards northeastward of Harbor Ledge, is a rock bare at half tide at the south end of a sunken ledge 300 yards long.

No Mans Land, the largest of the rocks and islets northeastward of Matinicus Island, is grassy and has a shanty on its west side. **Two Bush Islet** is grassy on top and is joined to the northeast end of Matinicus Island by a sunken ledge. **Two Bush Ledge,** high and bare, is 0.2 mile 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 Two Bush Ledge and Matinicus Island. **Whaleback** is a rock, bare at low water, 0.3 mile westward of No Mans Land. A buoy is on the northwest side of the rock. **Zephyr Ledges** are two rocks, bare at low water, 0.3 mile northeastward of No Mans Land. **Zephyr Rock,** the northeast end of the group, is a rock with a depth of 5 feet over it, 0.6 mile northeastward of No Mans Land. A buoy is on the northerly side of the rock. A lighted bell buoy is 0.5 mile north of Matinicus Island and westward of the dangers northeastward of the island.

Local boats bound to Matinicus Harbor from northward carry a draft of 6 feet at low water through the channel between Matinicus Island on the west and Two Bush Island and Beach Ledges on the east. Strangers should use this passage only in small boats and with a smooth sea, and be careful to avoid the various ledges.

Black Rocks, several rocks covered at high water, are 0.3 mile westward of Matinicus Island.

Bantam Ledge, a rock bare at half tide surrounded by deep water, is 2.5 miles westward of Ragged Island. A horizontally banded buoy is southeastward of the ledge.

Foster Ledges, 2 miles westward of Matinicus Island, are rocks with depths of 6 and 13 feet over them; the southwestern and shoalest rock has a buoy off its west side.

Bay Ledge, with a least depth of 3 feet, is about 5 miles north-northeast of No Mans Land. A lighted bell buoy is off the west side of the ledge.

Pigeon Ground, 3.5 miles west of Matinicus Island and 2 miles southward of Large Green Island, is broken ground about 2 miles long in an east-northeasterly direction. A least depth of 15 feet is on the western part of the broken ground and a least depth of 21 feet on the eastern part.

Large Green Island, 5 miles northwestward of Matinicus Island, is low and grassy, and has some houses on its northern part. **Herring Ledge,** partly bare at low water, extends 0.3 mile southward from the island. **Green Island Seal Ledges** are 0.6 to 0.9 mile south-southeastward of Large Green Island, with broken ground between. The southern part of the ledges is awash at high water; the north end is covered at half tide. A vertically striped whistle buoy is about 0.8 mile east of the ledge.

Collins Rock, about 1 mile north of Large Green Island, has a depth of 5 feet on it. **Junken Ledge,** with a depth of 18 feet and marked by a horizontally banded buoy on its south side, is about 5 miles north-northeastward of Large Green Island. A vertically striped lighted whistle buoy is 1.3 miles southwest of Junken Ledge.

Little Green Island, about 1 mile northwestward of Large Green Island, is low and grassy, and is uninhabited.

Northern Triangles, 1 mile northward of Little Green Island, is a reef about 1 mile long in an east-southeasterly direction. In the western half of the reef are some ledges bare at low water. A buoy is about 0.7 mile northward of the eastern end of the reef. A ledge with a depth of 15 feet is 2 miles northward of Little Green Island and 2 miles southeastward of Two Bush Island Light; the ledge is marked by an obstruction buoy.

Alden Rock, with a depth of 4 feet over it and marked by an obstruction buoy, is 1.4 miles northwestward of Little Green Island. An unmarked rock with a depth of 14 feet is 0.8 mile west-northwestward of Alden Rock. The 14-foot rock is at the eastern end of broken ground nearly 1 mile long and having depths of 25 to 28 feet.

Southern Triangles are three rocks, awash at low water, located midway between Little Green and Metinic Islands. The southwestern rock is 0.6 mile from the other two. A buoy is 75 yards southeastward of the easternmost rock.

Metinic Island, 5 miles west-southwestward of Large Green Island, is nearly 2 miles long, 70 feet high near its northern end, and partly wooded. The island is occupied during the summer by fishermen. There are no wharves. No supplies are available, nor mail service. **Metinic Green Island,** low and grassy, is 0.4 mile southward of Metinic Island, with foul ground between. There is a passage for small craft drawing about 7 feet, between Metinic and Metinic Green Islands. A rock with a depth of 2 feet is 300 yards southwestward of Metinic Green Island. **Wheeler Rock,** with a depth of 5 feet, is 0.3 mile northward of Metinic Island, and **Wheeler Big Rock,** awash at high water, is 300 yards northward. **Green Point Shoal,** with a depth of 17 feet, is 0.8 mile eastward of Metinic Island.

Chart 313.—Broken ground extends 2 to 3 miles westward and southwestward from Metinic Island. **Black Rock,** covered at high water, is 0.7 mile westward of Metinic Island. A rock with a depth of 14 feet is 0.3 mile southwestward of Black Rock.

Metinic Island Ledge, with a depth of 8 feet over it and marked by an obstruction buoy at its southwest end, is 1.8 miles westward of Metinic Island, on the range of the north end of Metinic Island and the middle of Large Green Island. Kelp is reported on Metinic Island Ledge. A rock with a depth of 26 feet is 0.6 mile northeastward of the ledge. **Hooper Shoal,** with a depth of 17 feet over it, is 0.6 mile southwestward from the ledge.

Roaring Bull, awash at low water and generally marked by breakers, is 2.8 miles westward of Metinic Green Island. A buoy is off the northwest side. A ledge with a least depth of 27 feet is 0.6 mile northwestward of Roaring Bull.

Southeast Breaker is on a ledge about 0.5 mile long in a northeast direction, the higher part of which is bare at half tide. The ledge is 2 miles southwestward of Metinic Green Island, on the range of the south end of Metinic Green Island and the north end of Large Green Island.

Haddock Ledge, with a least depth of 11 feet, is 1.3 miles southward of Southeast Breaker and 2.5 miles southwestward of Metinic Green Island.

Monhegan Island, 9 miles off the mainland and 20 miles westward of Matinicus Rock, is one of the important landmarks for vessels bound along the coast. The island is 1.4 miles long, 160 feet high, and presents a rocky shore with high bluffs in places. A light, 178 feet above the water and visible 20 miles, is shown from a gray conical tower connected with a white dwelling, on the middle of the island. Within 3 miles of the island the light is obscured between west and southwest.

Manana Island, a smaller island close westward of Monhegan Island, is about 110 feet high and rocky, and has a fog signal and radiobeacon on its summit. The fog signal is an air-diaphragm horn; the radiobeacon is synchronized for distance finding. A bell will be struck by hand if the horn is disabled.

Monhegan Harbor, between Monhegan and Manana Islands, is an anchorage, exposed southward, for small craft. The harbor is used principally by local fishermen, and has depths of 15 to 25 feet with poor holding ground and scant room at the anchorage for a small vessel to swing. The deeper water in the harbor favors Manana Island. A depth of 6 feet 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. In entering, the best water leads close to the end of the wharf. Even small craft should not attempt to ride out bad weather in this roadstead. During heavy weather the daily mail boat frequently is unable to land at the wharf.

Monhegan is a village of fishermen and summer residents on the east side of Monhegan Harbor. The principal wharf has a depth of about 12 feet at the end. The village has telephone communication with the mainland, and communication by a launch carrying mail, freight, and passengers with Boothbay and Port Clyde. Gasoline and provisions are obtainable.

Eastern Duck Rock, 400 yards off the north end of Monhegan Island, is a large, bare rock with some grass on top; the narrow channel between the rock and the island is near the rock. A gong buoy is about 250 yards northwest of the rock.

Ducks Rocks, 0.6 mile off the northwest side of Monhegan Island, are two large,

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bare rocks; on the western rock is a daybeacon, a large black tripod. A bell buoy is 0.3 mile north-northwestward of the daybeacon. **Sunken Duck Rock,** with a depth of 5 feet, is 350 yards north-northeastward of the daybeacon; a buoy is north of the sunken rock.

Allen Shoal, 1.9 miles northeastward of Monhegan Island Light, has a least found depth of 18 feet.

Gull Rock Ledge, with a depth of 23 feet, is 1 mile south-southeastward of Monhegan Island Light. Kelp has been reported on this shoal. A bell buoy is on the ledge.

Chart 309.—The section of East Penobscot Bay from the entrance to Cape Rosier is that part of Penobscot Bay located eastward of Vinalhaven, North Haven, and Long Islands. The southern end of East Penobscot Bay, between Isle au Haut and Vinalhaven Island, is **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 depths and others because 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 Light is the guide to the southern entrance. Numerous unmarked ledges are westward of Isle au Haut and off the western entrance to Merchant Row and Deer Island Thorofare. Northeastward of North Haven Island are numerous islands and ledges. Directions for East Penobscot Bay are given following the description of the western shore.

The channel through East Penobscot Bay to the head of Penobscot Bay leads eastward of Eagle Island, marked by a light and bell fog signal, and passes between the islands in a north-northwesterly direction to Cape Rosier. A depth of over 30 feet can be carried up the bay by closely following the directions.

Saddleback Ledge Light, 54 feet above the water and visible 13 miles, is shown from a gray conical tower with white dwelling attached, on a rocky islet in the middle of the southerly entrance to East Penobscot Bay. There is broken ground between the light and Vinalhaven, and deep-draft vessels should enter eastward of the light. A vertically striped gong buoy is 0.9 mile southwestward of the light and a vertically striped whistle buoy is 0.5 mile eastward of the light.

The islands and dangers on the east side of East Penobscot Bay from the entrance to Barred Island, off the southwestern side of Deer Isle, are nearly all described in the preceding chapter under the discussion of Deer Island Thorofare, Merchant Row, and Isle au Haut. Between Deer Island Thorofare and Eggemoggin Reach, the eastern side of the bay is formed by the western shores of Deer Isle and Little Deer Isle.

The only off-lying dangers from Barred Island to Southwest Harbor are **Sellers Rock,** part of which bares at low water, and which is marked by a buoy, and the 18-foot spot 700 yards west of it.

Southwest Harbor is on the western side of Deer Isle, about 4 miles north of Deer Island Thorofare Light. The harbor is about 0.3 mile wide at the entrance and 1 mile long. The anchorage in depths of 18 to 28 feet is not used much, being open southward. The village of **Sunset** is on the eastern shore of the harbor; there are no wharves. The western side of the harbor is formed by **Sheephead Island,** from which **Sheephead Ledges** extend 0.3 mile southward.

Northward of Southwest Harbor is **Mill Pond,** of little importance, and **Sylvester Cove,** in which is the Deer Isle Yacht Club. On the north side of Sylvester Cove is a float landing and a fish wharf. A private pier is on the south side. The anchorage in the cove is partly sheltered by a long reef on the south side of the entrance; the reef bares at about half tide. A buoy is on the northern side of the reef. Caution should be used in rounding this reef, by passing northward of the buoy; it is reported that several small craft have grounded on the reef.

Dunham Point, 0.8 mile northwest of Sylvester Cove, is the westernmost point on Deer Isle. **Dunham Point Ledge** extends 300 yards offshore from the point.

A ledge, part of which bares at low water, extends 500 yards northwestward from the southern entrance point to Northwest Harbor, 1.4 miles northeast of Dunham Point. Its outer limit is marked by a buoy. **Gull Ledge,** partly bare at high water, is 0.4 mile northwest of the southern entrance point to Northwest Harbor. Between Gull Ledge and the buoy off the shoal extending from the point is a narrow channel. Westward of Gull Ledge is a reef which must be avoided even by small boats if using this channel. Its southwest end is marked by a buoy, about 0.5 mile from Gull Ledge and 0.4 mile off the main shore.

Northwest Harbor, on the northwestern side of Deer Isle, is about 0.3 mile wide and over 1 mile long. A large part of the upper half of the harbor is bare at low water. Good anchorage will be found for small vessels in mid-harbor in depths of 13 to 17 feet, soft bottom. The harbor is sheltered from all but northwesterly winds. Good anchorage also is off the entrance of the harbor, between Gull Ledge and Heart Island, in depths of 19 to 30 feet. During January and February the harbor is closed by ice. The village of **Deer Isle** is near the head of the harbor. There are two small wharves which bare at low tide.

Approaching Northwest Harbor from southward, pass 300 to 400 yards westward of Dunham Point Ledge and steer **033°** for the eastern end of Little Deer Isle, passing 300 to 400 yards northwestward of a buoy which marks the southwest end of a ledge bare at half tide. When well past the buoy, steer **067°** for **Heart Island,** which is a high, grassy, and partly wooded knoll near Deer Isle, and pass 300 to 400 yards northward of Gull Ledge. When past Gull Ledge, steer **124°** for the middle of the entrance of Northwest Harbor.

Approaching Northwest Harbor from northwestward, pass from 150 to not over 250 yards southwestward of the southwest point of Pickering Island and from this position a **124°** course for 2.8 miles will lead to the middle of the entrance.

North of Northwest Harbor, the western shore of Deer Isle extends in a northeasterly direction to Eggemoggin Reach. It was formerly possible for small boats to follow this shore and pass between Little Deer Isle and Deer Isle directly into Eggemoggin Reach. This passage now is closed by the highway fill.

The islands off the western end of Eggemoggin Reach are described in the preceding chapter. Between Little Deer Isle and North Haven Island, there is a chain of islands through which are many passes; these passes must be used with care because of the many reefs between the islands. **Pickering Island,** 1 mile southwest of Little Deer Isle and about 90 feet high, and **Bradbury Island,** 2.5 miles southwest of Little Deer Isle and about 170 feet high, are both wooded, and are the two principal islands north of the main ship channel through East Penobscot Bay. **Hardhead Island,** a bare islet about 90

feet high, is 1 mile southward of Bradbury Island. About 0.7 mile south of Bradbury Island and 0.4 mile northwest of Hardhead Island, is **Middle Rock,** a 10-foot spot on the north side of the main ship channel. A buoy is off the southwest side of the rock.

Southwest of the main ship channel, and between it and North Haven Island, the passes between the islands are nearly obstructed by reefs in many cases. Navigation between these islands, even by small craft, must be done with caution. A few of the reefs are buoyed. Most of the islands are wooded and, with the exception of Eagle Island, have no prominent marks. The more important of these islands are as follows.

Eagle Island, 1.5 miles west of Dunham Point, is wooded. A light, 106 feet above the water and visible 13 miles, is shown from a white tower attached to a dwelling on the northeast end of the island. The fog signal is a bell. **Eagle,** a small settlement, is on the island. There is a wharf at which vessels sometimes land at high water.

Great Spruce Head Island, 2.1 miles northwest of Eagle Island, is the highest island in the group, having an elevation of about 220 feet at the north end. **Bear Island,** just south of Great Spruce Head Island, has a protected anchorage in a cove at its north end in depths of 12 to 30 feet, rocky bottom. A wharf and float in the cove have a depth of about 9 feet alongside. **Butter Island,** 0.5 mile northwest of Eagle Island, is partly wooded, and uninhabited. The passage between Butter Island and the northeast **Barred Island,** 300 yards westward, is reported to bare at two-thirds tide. **Oak Island,** 1.5 miles southwestward of Eagle Island, is grassy and uninhabited. **Burnt Island,** just south of Oak Island, is wooded except for its northeast end which is grass covered.

There is a passage northward of North Haven 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°** for **Spoon Ledge,** high with grass on top, about 0.5 mile northwest of Oak Island. On this course pass 400 yards northward of **Grass Ledge,** high and grass-covered, 0.9 mile east of Oak Island, to a position about 400 yards northward of Oak Island. Then, pass midway between Oak Island and Spoon Ledge and steer **242°** for 12.5 miles to off Rockland Breakwater Light.

The western side of the southern part of East Penobscot Bay is very foul. **Saddleback Ledge Shoal,** with a depth of 2 feet and marked by an obstruction buoy, is 0.8 mile northwest of Saddleback Ledge Light. The mile-wide channel west of this shoal and east of **Diamond Rock** and **Diamond Rock Ledge** has several shoal spots with depths ranging from 14 to 28 feet. Diamond Rock Ledge, with a depth of 2 feet, is marked by a buoy. Between this channel and the southeast shore of Vinalhaven Island are many islands and reefs dangerous to navigation. A channel is buoyed through these reefs and islands, enabling vessels of moderate size to run roughly parallel to this shore at distances of from about 0.5 to 1 mile, in daylight and with good visibility. This is a section of the partially protected inside route around the south end of Vinalhaven Island. Directions for passage through this channel are given under the discussion of Carvers Harbor.

Arey Cove and **Roberts Harbor,** on the southeast side of Vinalhaven Island, are much obstructed by rocks and ledges, and are unsafe for strangers. The coast northward to Bluff Head and the eastern entrance to Fox Islands Thorofare has many off-lying islands and reefs, extending in some places nearly a mile offshore. The coves are small and foul, and of no value as harbors. **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 not safe for a stranger to enter, and are of little commercial importance.

Fox Islands Thorofare and Little Thorofare are described following the directions for East Penobscot Bay. Carver Cove and Kent Cove are two excellent anchorages, easily entered by strangers, in Fox Islands Thorofare near its eastern entrance.

Charts 1203, 322, 313, 309, 310, 311 and 227.—The following are the directions for East Penobscot Bay. This region is an area of rocks and ledges, many of which are unmarked, and extreme care is required to navigate it. The main part of East Penobscot Bay, from a little southward of Saddleback Ledge Light 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 thoroughfares 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 are in a depth of over 30 feet to the entrance of Penobscot River. For directions through the thoroughfares, see their descriptions.

Approaching from eastward or southeastward, shape the course for Roaring Bull Ledge whistle buoy 10 RB, 1.8 miles southward of Isle au Haut, and from a position 150 yards south of the buoy steer **295°** for Saddleback Ledge Light. Or, steer for Saddleback Ledge Light on any bearing between 295° and 343°; the latter bearing leads 1 mile eastward of Three Fathom Ledge. When northward of Seal, Wooden Ball, and Matinicus Islands, steer for Saddleback Ledge Light on any bearing northward of 059°. This bearing leads 0.6 mile southeastward of Bay Ledge lighted bell buoy 2. Pass about 0.5 mile eastward of Saddleback Ledge Light close to Saddleback Ledge whistle buoy SL.

Approaching from southwestward, the passages between the islands eastward and westward of Matinicus Island may be used with the assistance of the chart. One of the best is as follows. Steer for Matinicus Rock Light, passing southward of Matinicus South Breaker buoy. Then pass 0.5 mile northwestward of the light, and steer **017°** for 4.6 miles to a position 0.7 mile off the northwest side of Wooden Ball Island. Then steer **027°** for Saddleback Ledge Light, the distance to which is 10.2 miles. The last course leads about 0.3 mile westward of **Snippershan Ledge** which has a least depth of 36 feet, as determined by means of a wire drag, and is 4 miles southwestward of Saddleback Ledge Light.

Or, pass 1.5 to 2 miles southward of Monhegan Island and steer **064°** for about 18.5 miles, heading for the north end of Matinicus Island. When about 1.5 miles from the island, and its southwest end is closed on the northeast end of Ragged Island, the position should be about 0.7 mile southeastward of Foster Ledges buoy 6. Then steer **047°** for about 13 miles, passing over 0.5 mile northward of Matinicus Island and over 0.5 mile southward and eastward of Saddleback Ledge Light.

From Saddleback Ledge to Fort Point, pass about 0.5 mile eastward of Saddleback Ledge Light and close to Saddleback Ledge whistle buoy SL and steer **351°** for 12.4 miles, passing 0.5 mile westward of The Brown Cow, and 0.2 mile eastward of Porcupine Ledge bell buoy 3, 0.7 mile southward of Eagle Island Light, to a position 0.3 mile east of Eagle Island Light. Then steer **322°** for 5.5 miles to a position 0.5 mile west of Green Ledge Light and 0.3 mile beyond Green Ledge bell buoy 2. Then steer about **002°** for about 8 miles, passing about 0.5 mile westward of Cap Rosier, and off the points on the eastern shore a distance of about 0.5 mile. When Fort Point Light bears 019°, steer for

it. Pass over 200 yards westward of Fort Point Ledge Daybeacon and change course to pass midway between the daybeacon and the light. Pass 500 yards eastward of Fort Point and follow the directions for Penobscot River given later in this chapter.

From Saddleback Ledge to Merchant Row or Stonington, the directions are good for a depth of 28 feet to Merchant Row, and are good for vessels of 12-foot draft or less 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 the passage with drafts greater than 10 feet. Bring Saddleback Ledge Light astern on a **015°** 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 0.5 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 **011°**, which will lead nearly 200 yards eastward of the rock with a depth of 11 feet, 400 yards southward of Scraggy Ledge, and pass midway between Scraggy Ledge and Channel Rock. From a position 300 yards northwestward of Channel Rock, steer **031°** for the northwestern part of Green Island and pass 300 to 400 yards southeastward of John Island to a position about 300 yards southeast of Sand Island. Then steer **348°**, passing 150 to 200 yards eastward of Sand Island, following the shore of Crotch Island at a distance of about 150 yards, and passing westward of Rock Island buoy 2 and Crotch Island buoy 4. When a little past the latter buoy, steer **045°**, with the entrance of Mill Cove astern, and pass about 100 yards eastward of Two Bush Island Point buoy 1, into Deer Island Thorofare. Select anchorage in the channel off Stonington.

If bound eastward through Merchant Row, steer the **031°** course of the preceding paragraph until Harbor Island, the grassy island with a few trees off the northeast side of Merchant Island, opens northward of Ewe Island. Then stand eastward, passing about 400 yards northward of Ewe Island and 100 yards southward of the buoy marking the 14-foot ledge located 0.3 mile northeast of Ewe Island. When 100 yards south of this buoy, change course to **096°** and follow the directions for Merchant Row in Chapter 3.

Chart 235.—Fox Islands Thorofare, 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. Fox Islands Thorofare is about 7 miles long, and the channel, with a depth of 19 feet or more, has a least width of about 150 yards in several places. The principal dangers are marked by buoys or daybeacons which can be easily followed in the daytime with clear weather. Although the least depth in the channel is 19 feet, the thorofare is seldom used by vessels of over 14 feet draft at low water. The main channel has been examined by means of a wire drag.

Prominent features.—Widow Island, inside the eastern entrance to Fox Islands Thorofare, is marked by a small cottage. **Goose Rocks Light,** on the north side of the channel, 550 yards north of Widow Island, is the guide for the eastern entrance of the Thorofare and for the anchorage in Kent Cove. The light, 51 feet above the water and visible 13 miles, is shown from a white conical tower on a black cylindrical foundation. The light has a white sector from 291° to 307°. The fog signal is a bell. **Browns Head Light** marks the entrance to the thorofare from westward. The light, 39 feet above the water and visible 11 miles, is shown from a white cylindrical tower connected with a dwell-

ing. The light shows a red sector on both sides of the approach fairway. The fog signal is an air-diaphragm horn. **Sugar Loaves** are a ledge of prominent high rocks 600 yards northwestward of Browns Head Light. **Fiddler Ledge Daybeacon,** a gray, square stone shaft with a pyramidal top, 1.4 miles westward of Browns Head Light, is a conspicuous mark when approaching from westward. A daybeacon, a red spherical cage on an iron spindle, is on **Drunkard Ledge,** 0.5 mile westward of the Fiddler Ledge Daybeacon. Broken ground, which should be avoided, extends 0.2 mile southward of the line joining the daybeacons. A gong buoy is on the southern extremity of the broken ground. A large standpipe on the high ground just back of North Haven shows up prominently in approaching from either direction.

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 range of the tide is about 9½ feet.

For directions through Fox Islands Thorofare, see Chapter 3. The thorofare is often closed by ice in the winter season.

On the north side of the eastern entrance to Fox Islands Thorofare are **Babbidge, Calderwood,** and **Stimpsons Islands.** North of these islands is **Little Thorofare** which can be used by small craft with local knowledge. Ledges extend for over 0.3 mile south and southeast of these islands. A buoy, 0.6 mile off Babbidge Island, is on the north side of the east entrance to Fox Islands Thorofare. Of the several reefs south of these islands, the most important are **Black Ledge, Sunken Black Ledge,** and **Channel Rock.** A buoy is just south of Sunken Black Ledge. Channel Rock is marked by a bell buoy and a prominent daybeacon, a red cask on bilge on an iron spindle.

Carver Cove, in the south shore of Fox Islands 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, in depths of 16 to 20 feet, good holding ground, is about 0.5 mile from the head of the cove and 197° from the cottage on Widow Island. The entrance on either side of Widow Island is clear, if the shores be given a berth of about 200 yards; 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 depths of 15 to 24 feet, good holding ground. Goose Rocks Light is the prominent guide for entering either in the daytime or at night, the entrance being westward of the light. **Kent Ledge,** the only outlying danger, has a depth of 5 feet over it and is 500 yards from the northwest shore of the cove off the entrance.

Waterman Cove, in the north shore of the thorofare west of Kent Cove, is a good anchorage for small vessels. The water shoals gradually from a depth of 18 feet at the entrance to 4 feet near the head, where a narrow channel leads into the **Cubby Hole,** a shallow cove. **Waterman Ledge,** with a depth of 4 feet and marked by a buoy, is in the mouth of Waterman Cove 500 yards from the western shore. **Fish Point Ledge,** partly bare at half tide and marked at its southeast end by a buoy, is 400 to 600 yards southeastward of **Fish Point,** on the eastern side of the cove. Foul ground is between the point and the ledge. The better entrance to the cove is between the buoys off Fish Point Ledge and Waterman Ledge.

Seal Cove is a large arm extending 1.5 miles southward from Fox Islands Thorofare southeastward and on the opposite side of the channel from the village of North Haven. Large areas in the cove have depths of 8 to 12 feet, bottom soft in places. Good an-

chorage 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 depths of 23 to 33 feet, soft bottom.

Perry Creek, a long narrow arm making westward on the west shore of Seal Cove, 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. Good anchorage in depths of 19 to 23 feet, soft bottom, is in the middle of the harbor. The water shoals gradually toward the head.

Good anchorage for vessels of any draft, in depths of 32 to 42 feet, soft bottom, is in the western entrance of Fox Islands Thorofare, westward or northward of Sugar Loaves, and between Amesbury Point and **Crabtree Point Ledge,** 1.7 miles southwestward.

North Haven is an important yacht center on the north shore of Fox Islands Thorofare. Small craft can anchor on the north side of the channel, taking care to leave a clear channel to the town wharf. Two ledges off the town, both marked by buoys, must be avoided. The town wharf has a depth of about 12 feet, and the other wharves less. The yacht club and several wharves have float landings. Diesel oil, gasoline, coal, fresh water, and provisions are available. There is a marine railway capable of hauling out boats up to 50 feet in length and 7 feet in draft. Mail and passenger service to Rockland is maintained the year around, and an auto ferry plies between North Haven and Vinalhaven Island. Telephone and telegraph communication are available with the mainland.

The north shore of Vinalhaven Island, across the thorofare from North Haven, has numerous summer residences with private landing floats.

In the western approach to Fox Islands Thorofare, on the south side, are **Dogfish Ledges,** marked by a daybeacon, a black spherical cage and 4 horizontal iron arms on an iron spindle; **Seal Ledge,** the north end of which is marked by a buoy; and **Inner Bay Ledges,** forming the westernmost danger in the western approach and marked by several buoys. The main entrance channel is north of these ledges and is well buoyed. The channel southeast, between these ledges, is also well buoyed for the guidance of those vessels going to Hurricane Sound and the southern part of Vinalhaven Island.

Crockett Cove is just eastward of **Crockett Point,** the southeastern point at the western entrance to Fox Islands Thorofare. The cove is about 1 mile long and 200 yards wide near the entrance, is obstructed by ledges, and is suitable only for small craft with local knowledge.

Dogfish Island, 0.4 mile south of Crockett Point and northwestward of Leadbetter Narrows, has a stone wharf at its eastern end.

Leadbetter Narrows is a narrow passage, between Vinalhaven Island on the north and **Leadbetter Island,** 0.3 mile southeast of Dogfish Island, on the south. Continuing south of the eastern side of Leadbetter Island, a passage leads in the northern end of Hurricane Sound. When passing through the narrows, the northern shore or Vinalhaven Island shore should be favored. A small stone wharf is on Leadbetter Island at the narrows. There is also a quarry and wharf on the shore of Vinalhaven Island eastward from the narrows. The quarries were not in operation in 1949. Leadbetter Narrows should not be attempted by strangers except in the case of launches or small craft.

Laireys Narrows, between Leadbetter Island on the north and Laireys Island on the south, is a part of the route between Carvers Harbor and Rockland. The principal dangers are buoyed.

The Basin is a large irregular bight in the west side of Vinalhaven Island, about 2 miles southeast of Crockett Cove. **Barton Island** is in the middle of the entrance, leaving a narrow, crooked, and shallow channel north of it. The depth of water in the basin varies from 10 to 111 feet.

Chart 310.—Carvers Harbor is a secure anchorage for small vessels on the southwest side of Vinalhaven Island. The anchorage, about 500 yards long and 250 yards wide, has been dredged to a depth of 16 feet, and an additional area on the south side to a depth of 10 feet. In 1949 these depths were reported shoaled to about 14 and 8 feet, respectively. A bar was reported formed across the channel at the harbor entrance, with a least depth of 13 feet. Ice closes the harbor during January and February, but a channel is kept open to the steamboat wharf. Pilots can be obtained by showing a flag off the whistle buoy to the light keeper at Heron Neck. Directions for Carvers Harbor are given following the description of Hurricane Sound.

Vinalhaven, a village at the head of the harbor, is of some importance for its shipment of frozen fish. A standpipe back of the town is prominent. The deepest draft of vessels entering is 13 feet; the depths at the wharves vary from 6 to 10 feet. Diesel oil, gasoline, water, and provisions are obtainable. Fishing boats up to 40 feet in length are hauled out for winter storage in the old boat shed at the head of the harbor, but facilities for hauling out were not in good repair in 1949. There is communication by telephone and steamer with Rockland.

Sand Cove, making northward from Carvers Harbor, is foul. There are several wharves at the head at which vessels lie aground at low water while loading pulpwood.

Indian Creek, just eastward of Carvers Harbor, has an entrance from sea and also from Carvers Harbor. The passage from the harbor is crossed by a drawbridge, the draw not being used in 1949, and the channel is not safe for strangers. The island forming the west side of Indian Creek is known locally as **Lane Island.** The island is grassy with two prominent white houses visible from the southward.

Heron Neck Light, 92 feet above the water and visible 15 miles, is shown from a white tower connected to a dwelling on the southern extremity of **Green Island,** on the eastern side of the entrance to West Penobscot Bay. The light is obscured close-to between 312° and 318°; it has a white sector from 030° to 063°. The fog signal is an electric siren.

The Reach is a narrow, much-obstructed channel leading northwestward from the entrance of Carvers Harbor, between Green Island and Vinalhaven Island. The passage is buoyed and used by vessels bound between Carvers Harbor and Rockland.

Old Harbor is a small cove at the northern end of The Reach and on the opposite side of the channel from the northern end of Green Island. Caution is necessary in using this harbor because of the many old fish stakes.

Hurricane Sound is bounded on the east by Vinalhaven and Green Islands and on the west by **Hurricane Island,** 0.7 mile west of Green Island, and **White Islands,** a group of islands about 1.5 miles northwest of Green Island. The sound has deep water. Several passages lead into the sound, but there are no good anchorages.

Along this part of West Penobscot Bay, numerous rocks and reefs extend over 2 miles offshore from Vinalhaven Island and the bottom of the bay is irregular with many spots of 10 to 18 feet for about 2 miles farther offshore. The better passes among the islands are buoyed. Great care must be used to avoid the numerous reefs.

Charts 309, 310.—The following directions for Carvers Harbor are good for vessels of 12-foot draft or less in daytime and with clear weather, but lead close to unmarked dangers and should be used with extreme caution by strangers.

Approaching from Merchant Row or Deer Island Thorofare, from a position near The Brown Cow or the whistle buoy about 0.5 mile south of it, head to clear the buoy marking **Triangle Ledge,** a danger 2.9 miles northwest of Saddleback Ledge Light, on a course between **196°** and **201°.** This course should head a little west of **Brimstone Island,** a high island 1.8 miles west of Saddleback Ledge Light. Pass 400 to 500 yards east of Triangle Ledge buoy 5 and head for the northwest tangent to **Carvers Island,** 1.2 miles northwest of Brimstone Island, on a **226°** course. This course will lead about 200 yards southeast of the buoys marking **Halibut Ledge** and **Crosby Ledge.** Steer this course for about 2 miles until the buoy marking the southwestern extremity of **Sheep Island Ledge,** 0.3 mile northeast of Carvers Island, is about 300 yards on the port beam, then change course to **253°,** heading to pass south of the buoy marking **Bunker Ledge,** 0.3 mile south of Vinalhaven Island. If the previous 226° course is carried beyond the Sheep Island Ledge buoy 2, care must be taken to avoid the bank with 8-foot spot off the northwest side of Carvers Island. When a little over 100 yards south of Bunker Ledge buoy 4, steer **279°** with either Saddleback Ledge Light or Diamond Rock in range with the south extremity of Carvers Island astern, until about 300 yards southwestward of **Point Ledge Daybeacon,** four red vanes on an iron spindle. Then steer **298°** and pass between **Folly Ledge,** bare at high water, and **Green Ledge,** grassy top, slightly favoring Green Ledge. Round Green Ledge to a position about midway between Green Ledge and **Green Island Knob,** awash at high water, and steer about **037°** for the entrance of Carvers Harbor, passing between two buoys, the northern one of which 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 mid-channel. Anchor about 150 yards from the western shore, abreast or a little above the steamboat wharf, in a depth of 16 feet.

Approaching Carvers Harbor from eastward, give Saddleback Ledge Light a berth of about 0.3 mile and then bring it astern on a **285°** course, heading for the two prominent white houses on the knoll on the west side at the entrance of Indian Creek. On this course pass 300 yards northward of Diamond Rock, about 500 yards southward of the buoy marking the north end of Diamond Rock Ledge, and pass between Carvers Island and the buoy marking the south end of Sheep Island Ledge, partly bare at low water. From a position 250 yards northward of Carvers Island, steer **256°** and pass 100 yards southward of the buoy off Bunker Ledge. Then follow the directions in the preceding paragraph.

Approaching from southward, steer for the standpipe at Vinalhaven on a **004°** course, passing westward of the buoy marking the southwest end of **Colt Ledge,** and between the buoy marking the eastern end of **The Breakers,** bare at low water, and the buoy marking the southwest end of **Arey Ledges,** higher parts bare rocks. Continue the course for the standpipe until Folly Ledge is a little abaft the port beam, then steer **298°** and continue as in the preceding paragraphs.

Or, from Heron Neck whistle buoy, steer **041°** for Heron Neck Light until about 350 yards from the light. Then steer **075°** and pass midway between Heron Neck and **Heron Neck Ledge,** a bare rock. Continue the course, passing about 300 yards southward of the southeast point of Green Island, until the standpipe at Vinalhaven bears 000° and is in range with the west tangent of Lane Island. Then change course quickly

to **298°** and hold this until 300 yards southwest of Green Ledge. Then swing right, keeping about 300 yards off the high point of Green Ledge, until midway between that ledge and Green Island Knob, then steer **037°** for the entrance to Carvers Harbor and enter as directed in the preceding paragraphs.

Approaching from Rockland through Laireys Narrows and The Reach, pass 200 yards southward of Rockland Breakwater Light and steer **099°** for 5.3 miles to a position 250 yards northwestward of Fox Islands Thorofare bell buoy. Then steer **125°** for a position 200 yards westward of the vertically striped bell buoy westward of **Green Islet,** passing northward of the buoys marking the northeastern end of Inner Bay Ledges, and northern end of Seal Ledge. From the position off the bell buoy, steer **107°** for the north end of **Laireys Island** to a position 25 to 50 yards southward of White Rocks buoy 2A. Then steer about **101°**, pass midway between the north end of Laireys Island and the south end of the bare rocks northward, and pass about 50 to 100 yards northward and eastward of a buoy marking the 9-foot spot east of Laireys Island. Then stand southward to a mid-channel position between the eastern side of **Cedar Island,** wooded, and the grassy islet opposite.

Then steer **135°** for about 1.1 miles to a position 50 yards southwestward of Dog Point Ledge buoy 6. Then steer about **118°**, passing midway between the northeast point of Green Island and the rock awash at high water southward of the island in the entrance of Old Harbor, and close to and north of the buoy marking the south side of the channel off the northeast end of Green Island. 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 The Reach buoy 4 and steer **113°** to a position about 50 yards northeastward of Little Island buoy. Then pass 100 yards eastward of the daybeacon on the end of the ledge extending eastward from a grassy island. A rock with 3 feet over it is 200 feet northeastward of the daybeacon, 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 daybeacon. Great care is required in passing this point. Pass about 100 yards southwestward of The Reach Rock buoy 2 at the south end of The Reach and steer **092°**, heading a little northward of Channel Rock buoy 4. When nearly up with this buoy, steer **037°**, and continue as in the preceding paragraphs.

Chart 310.—The western entrance to Fox Islands Thorofare and the offlying dangers are described under the discussion of the thorofare.

Bartlett Harbor is a small cove with deep water and good anchorage sheltered from all but westerly and northerly winds. The harbor on the western shore of North Haven Island is about 2 miles above **Stand-in Point,** the southwestern point of North Haven Island. A rock with a depth of 9 feet over it is in the middle of the entrance; deep water is close-to around the rock.

Pulpit Harbor, on the northwest side of North Haven Island, is 4 miles northeastward of Stand-in Point and 2.5 miles southwestward of **Webster Head,** the high and partly wooded head at the north end of the island. The entrance has a clear width of over 100 yards, and the harbor is a secure anchorage for small vessels of about 13-foot or less draft. **Pulpit Rock,** high and pointed, is near the end of the reef extending 250 yards northeastward from the western point at the entrance. The rock 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° course. Keep in mid-harbor and anchor in its broad part in depths of 18 to 33 feet. The village of **Pulpit Harbor** is on the northeast side of the harbor. Limited supplies and fuel are available.

Pilots for these waters usually can be obtained at Rockland, North Haven, or Vinalhaven, or from local fishing boats.

North of North Haven Island are numerous islands and reefs, extending to Cape Rosier. Most of these have been described previously. The most westerly of the islands and reefs is **Egg Rock,** which is small and grass-covered, and 2 miles north of Pulpit Harbor. **Egg Rock Ledge,** 0.3 mile southwest of Egg Rock, has a least depth of 2 feet. An obstruction buoy is on the northeast side of the ledge.

Compass Island Ledge, 1.4 miles northeastward of Egg Rock, has a depth of 8 feet; a horizontally banded buoy is off the ledge.

Resolution Island, the northwesterly island of the group of islands between North Haven Island and Cape Rosier, is about 60 feet high, and wooded.

The passage through these islands, just north of North Haven Island, has been described previously.

Chart 1203.—Long Island (Islesboro) and the adjacent islands and shoals are about 15 miles long, and separate East and West Penobscot Bays near their heads. Long Island is nearly divided in the middle. The island is an important summer resort, and is frequented by many pleasure boats in summer. Dark Harbor, Islesboro, North Islesboro, and Pripet are villages on the island. An automobile ferry is operated between Lincolnville, on the mainland, and Grindel Point. A launch carries mail, passengers, and freight between Pripet, Belfast, and Castine.

Chart 310.—A chain of islands and rocks, through which are several channels, extends for 5 miles southward from Long Island. **McIntosh Ledge,** the most southerly of the dangers and about 0.7 mile southeastward of Robinson Rock, is awash at low water. A buoy is on the southeast side of the ledge.

Robinson Rock, the most southerly visible danger, is a grassy rock with several smaller bare rocks around it. Ledges extend for 0.6 mile north-northeast and south-southwest of the rock. There is a whistle buoy south of the southern end of these ledges.

Mark Island, the most southerly wooded island, is high, rounded, and prominent. A daybeacon, black spherical cage on a spindle, is on the reef which extends southward from the island.

Goose Rock, 0.5 mile northward of Mark Island, is about 15 feet high and grassy. **Saddle Island,** 0.7 mile east-northeastward of Mark Island, is thickly wooded. **Lasell Island,** 1.2 miles northeast of Mark 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. Several bare and submerged rocks are between Goose and Mouse Islands. A daybeacon, black cask on bilge on an iron spindle, is on the ledge northeastward of Mouse Island and a buoy is eastward of the rocks east of Goose Island.

Lime Island, 0.2 mile northeastward of Lasell Island, is low and generally wooded. A bare rock is 0.2 mile northeastward of Lime Island. **Job Island,** 0.7 mile northeastward of Lime Island, is thickly wooded. The southerly of the **Ensign Islands,** 0.7 mile

west of Job Island, is wooded, and the northerly is wooded in the center with a house on the west side. A landing is 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 some vessels bound from Rockland or westward to Eggemoggin Reach or points in the northern part of East Penobscot Bay. The least found depth is 29 feet, and the principal dangers are marked.

Dark Harbor is a summer resort in the southern part of Long Island. A large hotel is conspicuous. The cove of **Dark Harbor,** on the eastern side of the island, is crossed by a dam just inside the entrance, and is seldom used. Small craft frequenting the resort tie up at the numerous float landings on Gilkey Harbor, on the west side of the island. The old steamer wharf on the eastern side of the island was not in good repair in 1949, but was used occasionally to land gasoline and Diesel oil.

Gilkey Harbor, on the western side of the southern part of Long Island, is between Long Island and **Seven Hundred Acre, Warren,** and **Spruce Islands.** The harbor is a secure anchorage with good holding ground, and is frequented by many yachts in summer. There are numerous wharves for small craft in the southern part, but no commercial wharves. The harbor frequently is closed by ice in winter. The Tarritine Yacht Club is on the east side of **Ames Cove,** near Dark Harbor; the clubhouse has a float landing with a depth of 5 feet alongside. Water is piped onto the float. Supplies are delivered from Dark Harbor. On the north side of Ames Cove there is a float landing, bare at low water, where gasoline, fuel oil, fresh water, and supplies are available.

Cradle Cove is a shallow indentation on the northeast side of Seven Hundred Acre Island. A small boatyard, near the head of the cove, has a machine shop, and a marine railway capable of hauling out boats up to 50 feet in length and 6 feet in draft. Water and gasoline are available.

The main entrance to Gilkey Harbor is from southwestward, between Job Island and Ensign Islands, and has a least depth of about 27 feet in mid-channel. Unmarked rocks of less depth are near the sides. The channel is partially buoyed and easily entered. The entrance from northward is marked by a light on **Grindel Point,** the westernmost point of Long Island. The light, 21 feet above the water and visible 7 miles, is shown from a black skeleton tower close to an abandoned lighthouse on the north side of the entrance. A bell buoy is west of the entrance, and the channel into Gilkey Harbor is partially marked by buoys.

Small craft can enter Gilkey Harbor by a narrow crooked channel, **Bracketts Channel,** westward of the south end of Long Island and eastward of Job Island and **Minot Island.** The channel is said to be good for a depth of about 6 feet at low water with local knowledge. The best water favors the east side of the thorofare. In 1949 the yacht club maintained private buoys during the summer.

The following courses lead through Gilkey Harbor, entering by the main channel from southward and leaving through the northern channels. Pass about 0.5 mile northwestward of Mark Island and steer **028°** for 4.6 miles with the eastern end of Seven Hundred Acre Island ahead to a position about 100 yards northwestward of the buoy west of **Minot Ledge.** This course passes nearly 0.5 mile westward of Job Island and about 0.2 mile eastward of the lighted bell buoy south of Ensign Islands. Then steer **039°** to a position 300 yards eastward of the eastern end of Seven Hundred Acre Island. Then steer **006°** and pass 100 to 200 yards westward of the buoy southwestward of

Thrumcap and 200 to 300 yards eastward of Spruce Island. When the north end of Warren Island opens northward of Spruce Island, steer **327°** to a position 100 yards northeastward of the Gilkey Harbor buoy 6, across the channel from **Lobster Rock.** Then steer **273°** and pass about 25 yards northward of Spruce Island Point buoy 4, 250 yards northward of the north end of Spruce Island. From this buoy, steer **288°** to pass northward of the bell buoy at the entrance.

Gooseberry Point, 0.6 mile northeastward of Grindel Point, is low and flat, with a clump of trees at its outer end. **Crow Cove,** 2.4 miles northeast of Grindel Point, is an anchorage for small craft only.

Seal Harbor, on the western side of Long Island about 3 miles northeastward of Grindel Point, offers good anchorage sheltered from all but southwest winds. This harbor, easy of access, is used by vessels bound up or down the bay as an anchorage for the night. Some yachts go to a pier inside the harbor. Vessels of any size can anchor with ample swinging room about 0.5 mile eastward of Flat Island, in depths of 54 to 66 feet. Anchorage can be had nearer the head of the harbor, keeping the southern shore aboard distant about 500 yards, in depths of 48 to 57 feet. The northern side of the harbor is foul. The wreck of a schooner, covered by a depth of 5 feet at low water, is about 0.2 mile from the head of the harbor. The entrance to Seal Harbor from the southward is deep and clear. The entrance from northwestward is 400 yards wide, with depths of 18 to 29 feet, between Seal Island and a shelving ledge which extends 500 yards northward from Flat Island.

Flat Island, on the western side of the southern entrance to Seal Harbor, is grassy. **Seal Island,** 0.6 mile north of Flat Island, is wooded and has a white summer residence with red roof on its western side. **Hog Island,** 0.2 mile northward of Seal Island, is wooded. The ledge extending 0.3 mile northward from Hog Island has three rocks bare at half tide.

Islesboro Harbor is an open bight in the east side of Long Island, 2.7 miles westward and on the opposite side of East Penobscot Bay from Cape Rosier. The harbor affords good shelter in westerly winds, and has a depth of about 42 feet. **Hewes Ledge,** off the southern point at the entrance, is partly bare at half tide and is marked by two buoys. Vessels can pass on either side of the ledge, being guided by the buoys. Foul ground extending over 0.2 mile from the western shore will be avoided by keeping the knoll northward of the harbor open from the north point of the harbor. The village of **Islesboro** is on the south side of the harbor; the wharf is in ruins.

Sabbathday Harbor is a small cove in the eastern side of Long Island and a little over 2 miles northward of **Hewes Point,** the high point on the south side at the entrance to Islesboro Harbor. Sabbathday Harbor is open southward, and provides anchorage for small vessels in depths of 6 to 20 feet. The village of **North Islesboro** is on the west side of the harbor. There is a private wharf which was not in use in 1949.

Chart 311.—Sprague Ledge, 0.5 mile north-northeastward of Hog Island and about 0.5 mile off the west shore of Long Island, has a least depth of 2 feet. **Barley Ledge,** 0.3 mile northeastward of Sprague Ledge, is bare at low water.

Marshall Point, near the north end of Long Island, is marked by prominent yellowish bluffs.

Turtle Head Cove, a broad bight in the north end of Long Island, is sheltered from

southerly and easterly winds, and has good anchorage in depths of 18 to 37 feet, soft bottom. The anchorage has a clear width of about 700 yards 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 a depth of 9 feet near its north edge, extends 600 yards from shore. The north end of Turtle Head bearing anything eastward of 062° clears the shoal. **Turtle Head,** the north end of Long Island, is a prominent wooded head joined to Long Island by a long, narrow, wooded neck. The village of **Pripet** is southward of Turtle Head.

Parker Cove, on the east side of Long Island 2.2 miles south of Turtle Head, 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 awash at about half tide. A buoy is on the southeast side of the ledge. A submarine power cable is between **Coombs Point,** north of Parker Cove, and Dice Head.

Chart 322.—Two Bush Channel and Muscle Ridge Channel are entrances to West Penobscot Bay from westward, the former leading southward and the latter northward of an extensive group of islands and shoals.

Two Bush Channel is broad and deep, and the principal dangers are buoyed. This channel 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.

Two Bush Island, the southeastern island of the group between the two channels, is marked by a light. The light, 65 feet above the water and visible 14 miles, is shown from a white square tower on the north side of Two Bush Channel. The light is the principal guide to the channel. The light is obscured northward of 061° and westward of 196° and has a red sector from 196° to 247°. The fog signal is an air-diaphragm horn.

Halibut Rock, bare at half tide and marked by a buoy, is 1.6 miles northeastward of Two Bush Island Light. **Northeast Pond Ledge,** 0.6 mile northeastward of **Andrews Island** and 1.8 miles northward of Halibut Rock, is bare at half tide.

The larger islands between Two Bush Channel and Muscle Ridge Channel are mostly wooded, and of little importance. The smaller islands are bare and grassy, and there are many bare and submerged rocks. **Dix Island,** 2.7 miles north of Two Bush Island, is wooded. **High Island,** 0.2 mile northeastward of Dix Island, has an abandoned quarry on it. **Birch Island,** just east of Dix Island and south of High Island, is about 20 feet high. **Fisherman Island,** about 5 miles north-northeast of Two Bush Island, is grassy. **Marblehead Island,** 0.3 mile south of Fisherman Island, is bare.

Muscle Ridge Channel is much used in daylight and clear weather because it is sheltered, and affords anchorage in case of bad weather. The channel is good for a depth of 22 feet, but it is narrow in places, especially to the westward of Sheep Island. From the entrance at Whitehead Island, the channel extends in a northeasterly direction about 6 miles to Sheep Island, passing between numerous rocks and ledges. These dangers are well marked, and in daylight and clear weather no difficulty should be experienced.

Whitehead Island is on the west side of the southern entrance to Muscle Ridge Channel. A light, 75 feet above the water and visible 14 miles, is shown from a gray tower attached to a red brick house on the southeast end of Whitehead Island. The light is the principal guide to the entrance of Muscle Ridge Channel. The fog signal is an air-diaphragm horn. **Storm warnings,** day and night, are displayed near the light.

A Coast Guard station is on the southwest side of the island. A small wharf is in the cove on the northeast side of the island 300 yards northward from the light. The narrow channel between Whitehead Island and **Norton Island,** 500 yards westward, is blocked by a reef with a depth of only 3 feet of water over it at high tide.

The following information concerning the dangers close to the sailing line through Muscle Ridge Channel is given to identify the dangers. **South Breaker,** 0.4 mile southward and on the opposite side of the channel from Whitehead Light, is awash at low water and marked at the southwest end by a buoy. **Yellow Ledge,** about 0.5 mile east and on the opposite side of the channel from Whitehead Light, is awash at high water, and marked by a daybeacon, a red cylinder on end on an iron spindle. **Lower Gangway Ledge,** 0.4 mile north of Yellow Ledge, has a depth of 6 feet; a buoy is west of the ledge. **Hurricane Ledge,** 1 mile northeastward of Yellow Ledge, is bare at lowest tides and marked on its northwest side by a buoy. **Garden Island,** about 2 miles northeastward of Whitehead Island, is bare except for a little grass on top. **Garden Island Ledge,** 0.3 mile east-northeastward of Garden Island, is bare at half tide; a daybeacon, a black cylinder on end on an iron spindle, is on the ledge. **High Clam Ledge,** 0.8 mile northeast of Hurricane Ledge, is bare and grassy at its south end and bare at low water at its north end. **Channel Rock,** 0.4 mile north of the bare part of High Clam Ledge, is awash at high water and unmarked. **Otter Island,** 0.5 mile north of Dix Island, is wooded; a daybeacon, a red slatted tripod, is on the northwest end of the island. **Otter Island Ledge,** 0.3 mile northwestward and on the opposite side of the channel from Otter Island, is bare at half tide; a daybeacon, a black spherical cage on an iron spindle, is on the ledge. **Upper Gangway Ledge,** 0.6 mile north of Otter Island, has a depth of 5 feet and is marked by an obstruction buoy. **Inner Grindstone Ledge,** bare at low water, is 0.3 mile east of Upper Gangway Ledge; a buoy is north of the ledge.

Seal Harbor, an anchorage much used by coasters, is on the western side of Muscle Ridge Channel, between Whitehead Island and **Sprucehead Island,** 0.8 mile northward. The harbor has depths of 18 to 39 feet, with soft bottom. **Spruce Head,** a village with a post office, is on the north side of Seal Harbor. The harbor is easy of access in the daytime and the principal dangers are buoyed. **Long Ledge,** 0.2 to 0.5 mile north of Whitehead Island, shows in two places at high water. **Burnt Island Ledge,** marked by a buoy, has a depth of 4 feet. There is a wharf on the south side of Sprucehead Island, northwest of **Burnt Island,** off the northern entrance to Seal Harbor.

To enter Seal Harbor, pass between Burnt Island Ledge buoy 3 and Seal Island Ledge buoy 1A which are about 250 yards southward of Burnt Island. When well past the buoys, steer **304°,** passing between Sprucehead Island Ledge buoy 2 and Long Ledge buoy 1, and anchor in depths of 18 to 21 feet, 300 to 400 yards westward of Sprucehead Island Ledge buoy 2, or anchor in depths of 19 to 39 feet southwest of Burnt Island. Avoid a 16-foot spot which is northward of Seal Island Ledge buoy 1A.

Dix Island Harbor is an anchorage on the south side of Muscle Ridge Channel between Andrews, Birch, and Dix Islands. The harbor is entered from southwestward through a narrow and crooked channel leading between the ledges north of **Hewell Island,** 1.5 mile north of Two Bush Island. The channel and harbor are unsafe for strangers to enter. On the west side of **The Neck,** just westward of Andrews Island, is a wharf with a depth of 2 feet alongside. Gasoline and some stores are available.

Weskeag River empties into the western side of Muscle Ridge Channel at the head

of the bight westward of **Ash Island,** about 3 miles northeast of Sprucehead Island. The river has a narrow and crooked channel, unmarked, which is not safe 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 9 feet at high water. Vessels seldom enter.

Fisherman Island Passage leads from Muscle Ridge Channel to Penobscot Bay, between Fisherman Island and Sheep Island. Several dangers are in this passage, but the principal ones are marked by buoys and can be easily avoided in the daytime in clear weather.

Chart 320.—Owls Head Bay is between **Sheep** and **Monroe Islands,** about 6.5 miles north-northeastward of Two Bush Island, on the east and the mainland on the west. The bay is a continuation of Muscle Ridge Channel northward of Fisherman Island Passage. The channel through Owls Head 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 depths of 42 to 69 feet. Small vessels can anchor in the entrance to **Owls Head Harbor,** on the west side of the bay, between **Dodge Point** and the bare ledge southwestward, in depths of 9 to 24 feet. A fish wharf in the harbor bares at low water. Gasoline is available.

Owls Head is a prominent hill at the northwest entrance to Owls Head Bay and the south side of the entrance to Rockland Harbor. A light, 100 feet above the water and visible 16 miles, is shown from a white tower on the head. The light is obscured from 324° to 354° by Monroe Island. The fog signal is a bell.

Emery Island is a small islet 0.8 mile west and on the opposite side of the channel from Sheep Island. A rock 350 yards eastward of Emery Island is bare at low water; a daybeacon, a black cask on end on an iron spindle, marks the rock. **Dodge Point Ledge,** eastward of Dodge Point, is bare at half tide; a daybeacon, a black cylindrical cage on an iron spindle, is on the ledge. **Owls Head Ledge,** southeastward of Owls Head, is bare at low water and marked by a buoy.

A light, 32 feet above the water and visible 9 miles, is shown from a white skeleton tower on the east side of Monroe Island. In West Penobscot Bay, eastward of Monroe Island, the tidal current has a velocity of about ½ knot at strength. See the *Current Tables* for predictions.

A **measured mile** has been established by the Navy eastward of Monroe Island. The targets marking the one-mile course are shown on Charts 320, 310, and 1203. The front targets are on the north end of Monroe and Sheep Islands, the rear on the mainland. The entire course is about 7 miles long and marked by a line of buoys. The two middle buoys are 1 nautical mile apart and placed opposite and in line with prominent daybeacons on shore. The course to be steered is **000½°** or **180½°.** Vessels must keep clear of the course while trials are in progress.

Rockland Harbor, one of the most important harbors in Penobscot Bay, is on the west shore of West Penobscot Bay between Owls Head on the south and **Jameson Point,** 2.1 miles northwestward, on the north. The harbor offers anchorage for the largest vessels, but is somewhat exposed to easterly winds. Northeasterly winds raise a heavy sea, in the southwestern part of the harbor, but shelter may be found behind the breakwater. The breakwater, about 4 feet above high water, extends 0.7 mile in a southerly direction from Jameson Point. A light, 39 feet high and visible 11 miles, is shown from a

892339°—51——16

white square tower on the corner of a fog-signal house which is on a granite pier at the southern end of the breakwater. The fog signal is an air-diaphragm horn. The principal dangers in the harbor are marked and the harbor is easy of access both day and night.

Rockland, the city on the western shore of the harbor, has some trade by water in lime, coal, fish, and petroleum products. Diesel-powered mail, freight, and passenger boats leave McLoons Wharf, 200 yards south of Tilsons Wharf, for North Haven, Vinalhaven, Matinicus, and Criehaven. Seaplanes can be chartered for trips to the several towns in the bay. The town is a terminus of a branch of the Maine Central Railroad which connects with the main line at Brunswick.

The most prominent features in approaching Rockland Harbor are the high elevated tank and the large yellow hotel on Jameson Point. The light on Owls Head and the light at the end of the breakwater are also conspicuous. The two high cement chimneys of the cement works between Rockland and Thomaston are very prominent from off Rockland Harbor.

Vessels anchor anywhere in the harbor where the depth and bottom are suitable, taking care to keep 300 yards from the end of Tilsons Wharf, and leaving a clear channel for boats landing at this wharf. Deep-draft vessels entering for the night usually anchor just inside the breakwater and 0.5 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 in the harbor eastward of Tilsons Wharf, and less water in the bight in the northern part of the harbor between Tilsons Wharf and Jameson Point; only small vessels or small craft anchor in this part of the harbor. Three anchorage areas have been prescribed by Federal regulation for Rockland Harbor. For description and regulations see Chapter 2.

Several rocks and ledges are in the harbor. The visible ones are **Shag Rock,** a cluster of bare rocks near Owls Head which have a daybeacon, a black slatted tripod, on them; **Lowell Ledge,** a cluster of rocks bare at low water on the south shore of the harbor opposite Jameson Point; and **Seal Ledge,** bare at half tide in the southwest end of the bay and marked by a daybeacon, a black cast on end on an iron spindle. A buoy, marking **Spears Rock** which has a depth of 3 feet, is 400 yards northeastward of Lowell Ledge. A wreck, bare at mean low water, is about 200 yards southwest of Seal Ledge.

Approaching Rockland Harbor, Rockland Breakwater Light may be steered for on any course between 287° through west to 205°. A **287°** course leads 500 yards northward of Owls Head Light and a **205°** course about 0.3 mile eastward of The Graves Light. Enter the harbor southward of the breakwater light, giving it a berth of 100 yards or more.

The mean range of the tide is about 9½ feet. Pilots for Rockland Harbor are not necessary. Pilots for Penobscot Bay may be obtained at Rockland. Towboats are stationed at Belfast and Bucksport.

Rockland is a port of entry and marine documents are issued. The customs office is in the Federal Building. A chart sales agency of the U. S. Coast and Geodetic Survey is in the city. The harbor master may be reached through the Snow Marine Basin.

A public landing at the Rockland Community Yacht Club has a depth of 7 feet alongside. A locally maintained lighted range leads to the landing; its lights are visible about 1 mile. There are depths of 15 to 18 feet at Tilsons (Coast Guard) Wharf, and less at the other wharves, many of which are nearly dry at low water. The bottom is soft mud and vessels frequently lie aground at low water while loading and unloading.

Landings are available near Tilsons Wharf, and gasoline is piped to them. The following depths were reported in 1949 at mean low tide: Oil dock with prominent tanks, 14 feet; coal wharf with prominent tower, 13 feet; shipyard, 14 feet; railroad wharf, which was not in repair in 1949, 10 to 15 feet. A channel dredged to a depth of 14 feet and marked by buoys leads to the lime works and coal dock in the northwestern part of the harbor. This channel was reported in 1949 to have shoaled to a depth of about 12 feet.

Coal can be obtained alongside the wharves and water at the principal wharves. Provisions, fuel, Diesel oil, gasoline, and some ship chandlery can be obtained in the city. There is a shipyard which can make ordinary repairs to coasting and fishing vessels. The marine railway has a capacity of 2,000 tons and can handle vessels up to 200 feet in length and 14 feet in draft. The wharf at the yard has a depth of 14 feet alongside. Several boatyards can haul out and repair small craft. The nearest place where large vessels can be dry-docked is Boston. Lighters and some wrecking equipment are available.

Clam Cove, on the west side of West Penobscot Bay about 2 miles northward of Rockland Harbor, is shoal at the head, and is not good anchorage. A private pier with float landing is on the north side of **Brewster Point,** 1.2 miles north of Jameson Point. **Brewster Point Ledge,** extending over 700 yards southeastward from Brewster Point on the south side at the entrance, is covered at its highest point at high water; a buoy is southeastward of the ledge. **Ram Islet** is a grass-covered rock 400 yards northeastward of Brewster Point. The shoal extending northeastward from the silet is marked by a buoy.

Chart 321.—Rockport Harbor, 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 depths of 42 to 63 feet, soft bottom. Small vessels and motorboats 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, but considerable shoaling off the mouth of the river was reported in 1949. A public landing is maintained by the town of **Rockport** at the east side of the entrance to **Goose River,** at the head of the harbor. The float has a depth of 2 feet alongside at low water. A fish factory is on the west side of the river entrance. No facilities for supplies are available at the landings. There are a few private piers and float landings.

Porterfield Ledge, in the middle of the entrance to Rockport Harbor, is bare several feet at low water. A daybeacon, a black barrel on end on a mast on a square stone pyramid, is on the ledge. **Indian Island,** on the eastern side of the entrance to Rockport Harbor, is grassy and marked at its south end by an abandoned lighthouse. **Lowell Rock,** 200 yards south of Indian Island, is bare. A light, shown from a red spindle, is on the south end of the rock.

Vessels can enter Rockport Harbor on either side of Porterfield Ledge Daybeacon, giving the daybeacon a berth of at least 150 yards. A vertically striped bell buoy is off the entrance between Porterfield Ledge and Lowell Rock. When in the harbor stand northward in mid-harbor until 0.3 mile from the head, then slightly favor the eastern side.

The Graves, about 1 mile off shore, 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. A light, 26 feet above the water and visible 9 miles, is shown from a white skeleton tower on the rocks. A daybeacon, a red and black cask on end on an iron spindle, is south of the light. A bell buoy is just eastward of The Graves.

Camden Harbor, on the west side of West Penobscot Bay about 6 miles north of Rockland Harbor, is the approach to the town of Camden. The harbor is frequented by many yachts and small craft. The outer harbor is easy of access and affords good anchorage in depths of 13 to 33 feet, soft bottom. The anchorage is eastward of a line from the steamboat wharf on **Eaton Point** in the eastern part of the inner harbor, to the buoy northward of Curtis Island. The depths in the outer harbor shoal gradually northward to a depth of 12 feet about 500 yards from the head of **Sherman Cove,** in the northern part of Camden Harbor. Above the 12-foot curve the cove is shoal.

The greater part of the inner harbor has been dredged and is occupied as an anchorage by small pleasure craft in summer. The entrance is through a dredged channel. In 1949 the depths in general were reported to be about 8 feet at low water. A shoal extends 80 yards from the north shore between the steamboat wharf and the shipyard at the entrance of the inner harbor.

The most conspicuous feature seen in entering Camden Harbor is **Mount Battie,** 800 feet in elevation. A small stone memorial tower has been erected on the summit which shows as a long ridge from off the harbor. **Curtis Island,** on the southern side of the entrance, is also prominent. A light, 52 feet above the water and visible 13 miles, is shown from a white tower on the southeast end of Curtis Island. The fog signal is a bell. **Northeast Point,** on the northeast side of the entrance, is marked off its south side by a light. The light, 20 feet above the water and visible 7 miles, is shown from a red skeleton tower.

Northeast Ledge, consisting of **Inner** and **Outer Ledges,** is southward of Northeast Point, and constricts the main entrance to Camden Harbor to a width of about 400 yards. The higher parts of Inner and Outer Ledges are bare at half tide. A buoy off the south end of Outer Ledges, and another buoy off the southwest end of Inner Ledges, mark the main entrance southward of the ledges. A buoy northward of Outer Ledges and a daybeacon, a black cylinder on end on an iron spindle, on Inner Ledges mark the passage north of the ledges. **Dillingham Ledge,** having a buoy off its east side, is 0.5 mile off shore and 1.3 miles northeast of Camden Harbor.

Northeast Passage is a narrow channel, with depths of 12 to 19 feet, leading into Camden Harbor between Northeast Point and Inner Ledges. The deeper water favors the light off Northeast Point. A vertically striped bell buoy is 0.3 mile northeastward of the entrance. This channel is used by local vessels but should be used with great caution by strangers.

Entering Camden Harbor by the main channel, vessels can steer for Curtis Island Light on any course between 234° and 354°, taking care to avoid The Graves. Pass 200 to 300 yards eastward of Curtis Island and steer 320° and select anchorage in the outer harbor, eastward of a line joining the steamboat wharf and the buoy northward of Curtis Island. If going to the inner harbor, pass 100 yards northeastward of the buoy and steer 285° 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 vertically striped bell buoy steer **230°** for the north end of Curtis Island until close to the buoy at the northerly end of Outer Ledges. Pass northward of this buoy and steer westward between Northeast Point Light and Inner Ledge Daybeacon, favoring the light.

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 if it is broken up.

Camden, the town on the inner harbor, is an important yachting center. A chart sales agent of the U. S. Coast and Geodetic Survey is in the town. The nearest railway point is Rockland. The steamer wharf on Eaton Point is now used for winter storage of small boats and has a depth of 10 feet alongside. The wharves on the inner harbor have depths of 7 feet and less. Several excursion schooners operate from Camden during the summer months. The Camden Yacht Club, with wharf and float landings, is on the western side of the inner harbor. The yacht club wharf has a depth of 6 feet alongside. The harbor master can be reached through the yacht club.

Diesel oil, gasoline, coal in limited quantities, and water are available on the wharves. Provisions and marine supplies may be obtained in the town. There are several float landings with 5 to 6 feet depths at low water at which supplies may be received.

A shipyard has a marine railway which can haul out vessels up to 150 feet in length and 9-foot draft. Ordinary repairs to machinery can be made. Several small boatyards here can haul out craft up to about 50 feet in length for repairs.

Chart 310.—Mount Megunticook, 1,380 feet in elevation, is 2 miles northward from Camden. The mountain shows as a flat-topped peak with a steep shoulder on its southern side.

Duck Trap Harbor is a broad, open bight in the west shore of West Penobscot Bay, 5 miles northeastward of Camden Harbor. Good anchorage, sheltered from northerly and westerly winds, will be found about 600 yards from the north shore of the harbor, in depths of 31 to 43 feet, bottom soft in places. **Haddock Ledge,** the only outlying danger, is a rock with 4 feet over it about 0.6 mile from the western shore and the same distance southwestward of **Spruce Head,** the northeast point of the harbor. A buoy is on the southwest side of the ledge. With this exception, danger will be avoided by giving the shore of the harbor a berth of about 500 yards.

Lincolnville is a village at the southwest end of Duck Trap Harbor. There is a crib shelter for small boats, but this is available only at high tide. An automobile ferry operates between Lincolnville and Grindel Point, Gilkey Harbor. The ferry wharf and shed are prominent from offshore. A church with a white spire, 0.5 mile northward of Lincolnville, is conspicuous from the bay.

Great Spruce Head, 2 miles northward of Spruce Head, is bold. A large whitewash mark painted just above the high-water mark may help identify this in fog, although in 1949 the whitewash was partially worn away.

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 of the cove. Private float landings are usually maintained near the entrance.

Charts 1203, 1204, 310, 311, 313, and 322.—The following are the directions for West Penobscot Bay. Large vessels and the larger tows approaching Penobscot Bay from

southward, either from Boston to Cape Cod Canal or passing eastward of Cape Cod, usually make the whistle buoy off Cape Ann, and then shape the course for Manana Island lighted whistle buoy, and then enter through Two Bush or Muscle Ridge Channels. Approaching from westward along the coast, they usually make Bantam Rock lighted whistle buoy. Two Bush Channel is used by most large vessels and tows, and by all except small local vessels when the visibility is not good. Muscle Ridge Channel is good for a depth of 24 feet, but it is narrow in places and is not recommended for a draft greater than 15 feet, at low water, except with local knowledge. Directions through the channel are given in Chapter 3.

Entering from eastward, deep-draft vessels should pass southward of Bay Ledge. From a position southward of Roaring Bull Ledge lighted whistle buoy 10 RB, 1.8 miles southward of Isle au Haut, steer **260°** for 10.3 miles to a position 1 mile southward of Bay Ledge lighted bell buoy 2. Pass 1 mile southwestward of the bell buoy and steer **307°** for about 5.7 miles, passing 1.1 miles northeastward of Junken Ledge buoy and to a position about 0.6 mile southwestward of a Guide buoy 2 GB; this course leads 0.5 mile southwestward of rocky shoals with depths of 31 feet. From a position about 0.6 mile southwestward of Guide buoy 2 GB, steer **339°** for 4.7 miles to a position 0.3 mile eastward of Monroe Island bell buoy 3.

Entering from eastward and passing northward of Bay Ledge, the following directions are good for vessels of 18 feet in draft or less. From a position southward of Roaring Bull Ledge lighted whistle buoy 10 RB, 1.8 miles southward of Isle au Haut, steer **274°** for 11.5 miles, passing 1.8 miles southward of Saddleback Ledge Light and nearly 1 mile southward of the islands and rocks westward. When 0.5 mile southward of Heron Neck whistle buoy, change course to **286°** and continue for about 4 miles to a position 0.5 mile westward of Guide buoy 2 GB. Then steer **339°** to a position 0.3 mile east of Monroe Island bell buoy 3.

Entering from westward through Two Bush Channel, from a position 0.5 mile southward of Bantam Rock lighted whistle buoy 16 BR, steer **059°** for 16.3 miles to a position about 0.3 mile southward of Old Man Ledge lighted whistle buoy 2 OM. Then steer **048°** for 6 miles to a position 300 yards northwest of Marshall Point lighted whistle buoy 1. Then steer **062°** for 6.5 miles to a position 0.2 mile south of the Twenty-two Foot Rock buoy 2, 0.7 mile southwestward of Two Bush Island Light. This course passes over 0.2 mile northward of a horizontally striped lighted gong buoy. Then steer **049°** for 2.9 miles to a position 0.5 mile northwestward of Thirty-one Foot Shoal buoy 2A. From this position steer **016°** for 2.8 miles to a position 0.4 mile eastward of Twenty-five Foot Rock buoy 1A. A **355°** course then leads to a position 0.3 mile east of Monroe Island bell buoy 3.

Continuing from Monroe Island to Fort Point, from a position 0.3 mile eastward of Monroe Island bell buoy 3, steer **010°** for 11 miles, passing 0.5 mile westward of Mark Island, and to a position 0.5 mile westward of the knoll near the middle of the northwest side of Seven Hundred Acre Island. Then steer **016°** for 7.4 miles, passing the western shore at Great Spruce Head at a distance of about 0.3 mile. When Turtle Head bears 067°, and Long Island lighted bell buoy 8 is on the starboard beam, steer **047°** for 3.2 miles to a position 200 yards southward of Twenty-five Foot Shoal buoy 3, 0.6 mile south of Sears Island. From this position steer **042°** for 4.2 miles, passing midway between Fort Point and Fort Point Ledge Daybeacon, to a position about 400 yards eastward of Fort Point, and then follow the directions for Penobscot River given later in this chapter.

If bound from Monroe Island to Cape Rosier, from a position 0.3 mile eastward of Monroe Island bell buoy 3 steer **035°** for 5 miles to a position 0.5 mile southeastward of McIntosh Ledge buoy 1. Then steer **027°** for 10.8 miles, passing 0.5 mile westward of Resolution Island to a position about 0.5 mile westward of Cape Rosier. Then, if bound up Penobscot River, steer **002°** and follow the directions given for East Penobscot Bay. If bound to Eggemoggin Reach, see directions in Chapter 3.

Chart 311.—Temple Heights is a small summer settlement on the western shore of the northern end of Penobscot Bay, about 0.5 mile north of Saturday Cove.

Northport Camp Ground (**Bayside post office**) is a summer settlement on the west side of West Penobscot Bay 2.5 miles northward of Temple Heights. A water tank on the hill back of the village is prominent. The wharf was rebuilt in 1947 and two float landings were maintained by the Northport Yacht Club.

Chart 208.—Belfast Bay and **Passagasawakeag River** empty into the head of Penobscot Bay from northwestward and form the approach to the town of Belfast and 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 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 at high water. This channel is little used except by small craft.

Good anchorage can be had off the entrance to the river westward of Steels Ledge, in depths of 19 to 28 feet; also in the river below the old steamboat wharf, in mid-channel, or favoring the western shore, in depths of 11 to 16 feet, soft bottom. Above this 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 depths of 10 to 22 feet.

Steels Ledge, on the north side of Belfast Bay, is an extensive ledge with a least depth of 1 foot. A light, 20 feet above the water and visible 9 miles, is shown from a white lantern on a gray, square stone structure on the southern end of the ledge. The light is most brilliant on the bearing 332°, diminishing around the remainder of the horizon. A bell buoy is southward of the light. The deep water between the ledge and the north shore should not be used as a channel because of shoal obstructions to the eastward.

Two highway bridges cross Passagasawakeag River near Belfast. The lower one, a swing drawbridge on U. S. Highway Route 1 at the upper end of Belfast, has a horizontal clearance of 58 feet in the east draw and a closed vertical clearance of 7 feet at high water. The mid-channel depth through the bridge is 9½ feet at low water. Arrangements for opening to permit passage through can be made by contacting the city manager at Belfast. The second bridge, Nickerson Bridge, is a fixed bridge with an opening 29 feet wide and a vertical clearance at mid-channel of 9 feet at high water. About 3 miles above its mouth, Passagasawakeag River is crossed by two fixed bridges having minimum horizontal clearance of 40 feet and minimum vertical clearances of 7 feet at high water.

Vessels entering Belfast Bay can shape the course to pass anywhere between the bell buoy southward of Steels Ledge and the western shore, then head north-northwestward in mid-channel. From a mid-channel point east of Oak Hill Granite Company wharf,

head westward to pass close by Marshall wharf and enter the small-boat anchorage area between Marshall wharf and the bridge.

The mean range of the tide at Belfast is about 10 feet. Ice obstructs navigation throughout the river and bay in severe winters. The bay has been frozen over to Long Island. During an average winter the harbor is frozen during February.

Belfast, on the southwest side of Passagasawakeag River, at the mouth, has several factories and some trade by water. Mail and passenger service is maintained between Belfast, Pripet, and Castine. Belfast is a customs port of entry, and marine documents are issued. An office is maintained in the Post Office Building.

The old Eastern Steamship Wharf, in fair condition and with a depth of 8 to 13 feet alongside, is now an amusement pier. Gasoline and water are available and power boats can be rented. Consumer Fuel Company wharf has a depth of 8 feet at low water across the channel end and along the northwest side as far as the outer end of the warehouse. Oak Hill Granite Company wharf is in poor condition and has no flooring. The depth along its face is from 9 feet at the southeast end to 12½ feet at the northwest end. Marshall wharf, rebuilt, has depths from 9 feet at the east end to 15 feet at the west end. It is the principal wharf used for loading supplies, water, and fuel via tank wagon. Eaton Coal Company wharf is in poor condition. Low-water depths range from 11 feet at the east end to 14 feet at the west end. Belfast Packing Company wharf has depths of 7½ to 8½ feet across its northern end, and shoals to 1½ feet on its eastern side. The T-shaped pier just above the first bridge, formerly used for loading fertilizer, is in ruins.

Minor repairs to machinery can be made at Belfast, and a towboat is available. The Belfast & Moosehead Lake Railroad Company has a terminal at Belfast.

Chart 311.—Searsport Harbor, at the head of Penobscot Bay about 4 miles east of Belfast, is a broad bight open to the southward. The town of **Searsport** is at the head of the harbor. The commercial development of the harbor is at **Mack Point,** 1 mile east of Searsport. There is considerable traffic in coal, sulphur, potatoes, fertilizer materials, and some granite. Good anchorage, used by all classes of vessels, may be had in depths of 18 to 32 feet, soft bottom, sheltered from northerly winds.

Dangers.—Long Cove Ledge, awash near its southern end at lowest tides, is 400 to 800 yards south of the west end of Mack Point. A buoy is off the southwest and southeast sides of the ledge. The approach to Mack Point is between Sears Island and the buoy off the southeast side of the ledge. Ledges make off 0.3 mile from the western shore of the southern half of Sears Island; one of these ledges, **Sears Island Ledge,** is bare at low water. A bell buoy is nearly 0.5 mile southwest of Sears Island and at the south end of the ledge. Two other buoys mark the limit of the ledge westward of the island.

Pilotage is not compulsory, but pilots may be obtained at Rockland or Bucksport. Towboats may be obtained from Belfast or Bucksport.

Quarantine, Customs, and Immigration.—There is a quarantine station at Searsport. The port of entry is Belfast, but a local officer is maintained at Searsport. The immigration office is at Bangor.

Terminal facilities.—There are four wharves on Mack Point. The two westerly wharves are built out from the fertilizer factories. The easterly wharf is the railroad wharf and the other wharf is a coal wharf. The approach and berths at the railroad wharf were dredged to a depth of 32 feet, and in 1949 the reported depths alongside were 30 to 32 feet. Close to the westward of the railroad wharf is the coal wharf. On the

east side of the coal wharf a berth was dredged to a depth of 30 feet and on the west side to a depth of 20 feet. The maximum draft coming to this wharf is 26 feet while the usual draft is 22 feet. There is a modern coal-discharging plant with three towers and good rail connections. In 1949 facilities for receiving and storing fuel oil were being constructed. The depths at the two fertilizer wharves vary, the maximum depth alongside being about 22 feet at both wharves. At Searsport there is a float landing with a depth of 5 feet alongside.

Supplies.—Coal in large quantities is available. There are no facilities for obtaining other supplies.

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 depths of 10 to 24 feet, sheltered from all but southwesterly winds.

Sears Island, eastward of Searsport Harbor and on the western side of Stockton Harbor, at the entrance, is high and thickly wooded. A small clearing is on the south end of the island.

Cape Jellison is 0.5 mile east of Sears Island and forms the eastern shore of Stockton Harbor. A ledge, the outer part bare at half tide, extends 0.4 mile southward from **Squaw Point,** the southern extremity of Cape Jellison and on the eastern side of Stockton Harbor at the entrance. The ledge has a wooded islet in the middle and is marked by a buoy off its southern end. A buoy is off the shoal making westward from Cape Jellison.

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 draft or less, and is easy of access. The depths shoal gradually from about 22 feet at its southern end to 9 feet about 0.3 mile above the old wharves on the east side. Above this the harbor is shoal. The lead is a good guide.

Stockton Springs is a village at the head of the harbor. The old wharf is in ruins. The extensive wharves on the western side of Cape Jellison are in ruins.

On **Kidder Point,** on the western side of the harbor, is a chemical plant and wharf. Shipments to and from the plant were by rail in 1949, and the wharf was not in repair. There was a depth of 15 feet at low water at the middle on the southwest side of the wharf. Some red buildings are prominent here.

To enter Stockton Harbor, pass 300 yards eastward of the buoy off the southeast side of Sears Island and steer **354°**, passing in mid-channel through the entrance and westward of the buoys off Cape Jellison. When inside the harbor the course can be shaped as desired.

Bagaduce River empties into the eastern side of East Penobscot Bay near its head. The river 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, **Castine Harbor,** has ample depth and is easily entered; there is some commerce by water and much yachting. A light, 27 feet above the water and visible 10 miles, is shown from a white skeleton steel tower on **Dice Head** on the north side at the entrance.

The channel in the river for 5 miles above Castine Harbor is buoyed and is used by small craft and local vessels of 6 to 8 feet in draft, carrying wood products. However, the channel is narrow and so contracted by rocks in places that navigation is possible at slack water only, on account of the current. It is unsafe for strangers.

The best anchorage for vessels is in **Smith Cove,** southeastward of Castine Harbor.

The cove has depths of 20 to 58 feet, soft bottom, and is sheltered from all winds. **Henry Point** is on the east side of the approach to Smith Cove. Dangers to be avoided in the cove are the middle-ground ledge, bare at low water, 0.5 mile south of Henry Point, and a sunken rock with a depth of 3 feet over it, 300 yards west of **Sheep Island,** near the southern part of the cove. The holding ground abreast Castine is not good, and the general depth is about 72 feet.

In entering Castine Harbor, the eastern shore northward and southward of the entrance is bold, and can be followed at a distance of 0.3 mile. There is a vertically striped bell buoy in the entrance. Pass close to this buoy on either side, and steer **057°** into the harbor to abreast the wharves at Castine, passing at least 100 yards southward of Otter Rock Shoal buoy 1. If going to an anchorage, from the wharves steer **101°** for Henry Point and anchor in depths of 24 to 55 feet, 200 to 500 yards southward of the point. There is also good anchorage for small craft south of Sheep Island near the head of the cove.

The mean range of the tide is about 10 feet from Castine to the head. The river is usually free from ice at Castine and for some distance above, but in very severe winters the river is entirely closed.

Castine is an important summer resort situated 1 mile eastward of Dice Head Light. The locality is of historical interest, and there are many tablets about the town marking spots of special interest. Numerous hotels are kept open during the summer season only. Mail and passenger service is maintained by launch to Pripet, on Long Island, and to Belfast.

The Maine Maritime Academy is at Castine. The academy maintains an excellent wharf with a depth of 25 feet alongside which is the moorage for a large training steamer.

Gasoline and water are piped onto a wharf with a float landing which has a depth of 10 feet alongside. Yacht supplies are available. There is a public landing with a depth of 10 feet alongside.

West Brooksville is a village on the south side of the river 1.5 miles above Castine Harbor and **North Castine** is a village on the north side 2 miles above the harbor.

North Brooksville is a village on the southern branch of Bagaduce River, about 6 miles above Castine. At high water, small boats sometimes go to the bridge crossing the river at the village, but the channel is unmarked and unsafe for strangers.

Penobscot is a village on **Northern Bay** at the head of navigation on the north branch of Bagaduce River, 6.5 miles above Castine. The approach to the village is bare at low water. A small brick factory is in the village.

Penobscot River, emptying into the head of Penobscot Bay, forms the approach to the towns of Bucksport, Winterport, and the city of Bangor, the latter situated at the head of navigation about 24 miles above Fort Point Light at the entrance. The deepest draft ordinarily trading to Bangor is about 18 feet.

A Federal project provides for the dredging to a depth of 22 feet between Winterport and Bucksport; for the straightening, widening, and deepening of the channel to a depth of 15 feet near Stearns Mill and Crosbys Narrows, about 4 miles below Bangor; and for deepening the harbor at Bangor to a depth of 14 feet. The controlling depths were about 14 feet between Bucksport and Winterport, 14 feet being off Lawrence Cove and 21 feet in the channel off Frankfort Flats in 1947; thence 15 feet to Stearns Mill, and thence 14 feet to Bangor in 1937. The most difficult sections for steamers are off

Lawrence and Luce Coves where it is difficult to mark the best water and off Frankfort Flats where large steamers experience difficulty with the sharp turns.

The usual anchorage for vessels waiting at the river entrance 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, often anchor off Winterport. On account of the strong ebb current, it is better for vessels going to Bangor, particularly large ones, to anchor off Fort Point and start up the river about 3 hours after low water. The directions for the river are given following the description of Bangor.

The mean range of the tide varies from about 10½ feet at the entrance to 13 feet at Bangor. Freshets occur in the river during March and April; at times they are dangerous to vessels. Ice obstructs navigation above Winterport for nearly 5 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 Knox, where ice jams occur. If vessels can pass this point they usually can go to Winterport. The river is usually opened up in March by an ice breaker which prevents much of the damage that might otherwise be caused by ice and freshets.

Pilotage is not compulsory. Pilots for Penobscot River may be had off the south end of Verona Island, just above the mouth of the river, by making a flag signal. Penobscot Bay pilots can be obtained at Rockland.

Towboats are customarily taken by large vessels bound up the river. There is one at Bucksport, and another at Belfast which can be obtained by telephone from Fort Point or any part of Penobscot Bay. A smaller tug used for towing pulpwood barges and similar craft is stationed at Bangor.

Fort Point, on the west side at the entrance to Penobscot River, is partly wooded. A light, 88 feet above the water and visible 15 miles, is shown from a white square tower connected to a dwelling on the point. The fog signal is a bell. There are several houses farther back on the north side of the point.

Fort Point Ledge, 0.3 to 0.6 mile southward of Fort Point Light, is bare at half tide. A daybeacon, a red keg on bilge on a red mast which is on a gray, pyramidal stone pier, is near the north end of the ledge.

Morse Cove, on the east side at the entrance to the river, is sometimes used by pleasure boats for temporary anchorage in depths of 8 to 18 feet, soft bottom. Between the highway and the east side of the cove there is a landing field and airport for small private planes.

Fort Point Cove, on the west side of the river northward of Fort Point, is used frequently as an anchorage. The depths are from 23 to 5 feet, shoaling gradually westward.

About 2.5 miles above Fort Point Light, Penobscot River is divided by **Verona Island** into two channels. The principal channel is on the west side of the island and the **Eastern Channel** (**Eastern River**) is on the east side. The channels unite north of Verona Island, near the town of Bucksport. **Orland River,** flowing into Eastern Channel from a northeasterly direction, is a shallow stream navigable for small boats and fishermen at high water to the village of **Orland,** about 2.2 miles above the mouth. The channel is crooked, unmarked, and bare at low water a little below Orland. Some pulpwood is hauled by boats drawing as much as 8 feet.

Sandypoint is a village on the west bank of the river about 1 mile above **Sandy Point,** the northern entrance point of Fort Point Cove. About 0.5 mile northward of

Sandy Point there is a large fertilizer plant with a wharf built out to deep water. The face of the wharf has a depth of 17 feet. The wharf is equipped with an overhead conveyor.

Odom Ledge, in the middle of the main channel 2.7 miles above Fort Point, is marked by a daybeacon, a red mast with keg on end on a square stone base, on the highest point of the ledge, and by a buoy off the southwest side.

Verona Park is a small summer settlement on the west side of Verona Island about 1 mile below Bucksport.

The river is crossed by a fixed highway bridge, about 0.8 mile below the town of Bucksport. The bridge has a horizontal clearance of 750 feet between piers and a vertical clearance of 135 feet above high water for a 400-foot width. An overhead cable crosses the river just above Bucksport. The cable has a vertical clearance of approximately 90 feet at high water. A fixed highway bridge crosses Eastern Channel eastward of the wharves at Bucksport. The center span has a horizontal clearance of 65 feet and a vertical clearance of 17 feet at high water. Only small-boat traffic operates in Eastern Channel.

Bucksport, a town on the east bank of the river 6.5 miles above Fort Point, is the terminus of a branch line of the Maine Central Railroad. The principal industry is a large pulp and paper works located on the point just northwest of the town. Pilotage is not compulsory. Pilots live on the south end of Verona Island and board vessels between the island and Sandy Point when the flag signal is shown. A towboat may be had at Bucksport.

The paper-loading wharf at Bucksport has a depth of 24 feet at its southeast side. Between this wharf and the old Maine Central wharf is a berth for vessels discharging pulpwood into a pond behind a boom. A string of 5-dolphin clusters parallel to and 100 feet off the outer face of the old Maine Central wharf provides a berth in a depth of 35 feet for ocean-going tankers. The old steamship wharf, with a reported depth of 16 to 20 feet at the outer face, is used only occasionally. Several smaller wharves were not in repair in 1949. Gasoline and supplies of all kinds may be obtained at Bucksport but there are no water front facilities for supplying boats. There is no marine railway.

Fort Knox is an abandoned fort of imposing appearance across the river from Bucksport. **Prospect Ferry,** just above Fort Knox, has a wharf with a gasoline pump where small boats can obtain fuel.

It is difficult to mark the best water in the channel off **Lawrence Cove,** 0.7 mile above Bucksport.

Harriman Cove is on the east side of the river, 1.3 miles above Bucksport. A coal wharf with a depth of 18 feet is just south of the cove. It has a prominent high crane and a conveyor up the hill to the coal piles and a white cylindrical sulphur-storage tank.

Frankfort Flats, marked by buoys, are 3 miles above Bucksport. The channel crosses from the east side of the river to the west side at this point, and it is difficult to carry the best water. Frequent changes occur here and large steamers experience difficulty making the sharp turns.

Marsh River is a shallow stream flowing into Penobscot River from a southerly direction. A depth of about 2 feet can be carried to a large granite works on the west bank of the river about 1 mile from the entrance. A wharf here has a depth of about 5 feet at low water. **Frankfort** is a small village on the north fork of the river. The channel is bare at low water a little below the village.

Winterport is a town on the west bank of the river, about 12 miles above Fort Point; it is at the head of winter navigation, as ice closes the river 10 to 12 miles below Bangor. Potatoes are shipped by small steamers and barges during the fall and winter months. The wharves have depths of 16 and 14 feet at their outer ends.

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. **East Hampden,** on the west bank 2 miles below Bangor, has facilities for small tankers discharging oil.

A large pulp works at **South Brewer,** on the east bank opposite East Hampden, has a wharf with depths alongside from 17 feet at the upper end to 9 feet at the lower end. Two high brick stacks are prominent from down river. About 0.5 mile south of South Brewer is an oil wharf with a depth of 26 feet alongside. Shoals are reported in the river below this point.

Brewer is a town on the east side of Penobscot River opposite Bangor. It is connected with Bangor by a fixed highway bridge. An oil dock at Brewer has a depth of 15 feet alongside.

Bangor is an important city on the west bank of Penobscot River at the head of navigation. A highway bridge and railway bridge cross the river at Bangor. In 1949, the river was not used above the railroad bridge. A dam crosses the river 1 mile above the railroad bridge. The principal traffic is in coal, oil, and pulpwood. Most of the river in front of the city has been dredged where necessary to obtain a depth of 14 feet. The bottom is rocky and there are a few rocks with a little less than 14 feet. Some shoaling is on the Brewer side where the least depth was 4½ feet.

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. A drawbridge across the river at the entrance has a swingspan with a horizontal clearance of 40 feet and a closed vertical clearance of 6 feet at high water. Just above it is a fixed highway bridge. There is no navigation above the bridges.

The quarantine station is at Searsport. The U. S. Public Health Service maintains a relief station at Bangor, at 217 State Street. Bangor is a customs port of entry and marine documents are issued. The customs office is in the Federal Building. Immigration and Naturalization Offices are in the Federal Building.

The oil wharves have depths of 14 and 16 feet alongside. The coal wharves, damaged by fire and under repair in 1949, have a depth of 14 feet. The railroad coal wharves, at the south end of the water front, have a depth of about 20 feet, but in 1949 were not used and not in repair. Other wharves have various depths alongside. The public float landing at the western side of the entrance to Kenduskeag River has a depth of 3 feet at low water. The Penobscot Yacht Club has a float landing with gasoline and water piped on it a little south of the highway bridge. There is a depth of about 8 feet alongside.

Coal, water, and petroleum products can be had alongside the wharves at Bangor. Provisions and ship's chandlery stores can be obtained in the town. There are no large marine railways in operation on the river. Bangor is the only place on the river at which repairs to the machinery of steamers can be made. A boatyard can make repairs to small craft.

The following are the directions for Penobscot River. The directions to the entrance of the river through East Penobscot Bay and West Penobscot Bay have been given previously in this chapter. The channel in Penobscot River is crooked and nar-

row in places, and strangers should not attempt to carry drafts greater than 10 feet to Bangor; care and use of the lead are necessary in any case. With a deeper draft a pilot or towboat should be used. The safest time is on a rising tide. The river is not safe for strangers to run at night.

From a position 600 yards eastward of Fort Point steer **006°** for 2.8 miles, passing about 100 yards eastward of Penobscot River buoy 3 to a position about 200 yards eastward of Penobscot River buoy 5. Then steer **345°** for 0.7 mile to a position close westward of Penobscot River buoy 6; then steer **000°** for about 1 mile to mid-river and then follow a mid-river course until westward of Bucksport. This course leads under the fixed bridge which has a vertical clearance of 135 feet above high water.

Above Bucksport, give the western side of the point, marked by the paper works northwestward of Bucksport, a berth of over 200 yards in rounding it, steer about **355°** to pass about 50 yards east of Penobscot River buoy 7, northwest of **Indian Point.** Then steer **345°** to pass 50 yards east of Penobscot River buoy 9, off **Luce Cove;** care is necessary on this course which leads through a dredged channel and has unmarked shoals on either side. Pass over 150 yards westward of the south point of Luce Cove and steer **331°** for 1 mile, heading about for this tangent to **Drachm Point.** Then haul westward and pass about 50 yards southward of Penobscot River buoy 10. Frequent changes occur at this cross-over, and caution is required. The chart and buoys must be carefully followed.

When the wharves of Winterport are open just clear of Drachm Point, steer about **337°** and pass 50 yards westward of Penobscot River buoy 14. From this buoy steer **355°** with the summit of **Mount Heagan** astern for 0.6 mile, until about 250 yards from the western shore. Then steer about **028°** in mid-channel past Winterport.

Above Winterport, follow a mid-river course for 2 miles to **Oak Point.** Pass southward and eastward of the point, 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, passing about 75 yards south and east of Penobscot River buoy 15, and when about 0.7 mile above Oak Point, pass westward of a ledge, covered at high water and marked by a daybeacon, 125 yards from the eastern bank. Round the point on the western bank above the daybeacon at a distance of about 150 yards, and follow the southern bank at this distance until southward of Penobscot River buoy 16, 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 **000°** for 0.3 mile to a position 150 yards eastward of the next point on the western shore. Then steer **341°** for 0.5 mile, following the western bank and giving it a berth of 100 yards. Then keep in mid-river for 2.8 miles to **Crosby Narrows.** About 0.5 mile below **Orrington,** favor the west shore to avoid a 10-foot spot nearly in mid-channel, 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.

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 Pine Point,** marked by the ruins of some cribs off the point, pass westward of a shoal in mid-channel. Follow the west bank at a distance of 75 yards until abreast the ruins of a crib wharf on the west side of the river opposite and north of Seven Pine Point, and then

keep in mid-channel to abreast the old sawmill on the northwest side 0.3 mile above the ruins. The best water then favors the southeast side, 75 to 100 yards off, for 0.5 mile to the point where the river bends northward, then crosses over and follows the west side, 75 to 100 yards off, for 0.4 mile, to abreast a crib landing in ruins. The channel then follows the southeast bank at a distance of 75 to 100 yards for 0.4 mile, and then is in mid-river or slightly favoring the northwestern side to the bridge at Bangor.

Chart 313.—The following is a description of the coast from Muscle Ridge Channel to Georges Islands. Muscle Ridge Channel and Seal Harbor have been described previously in this chapter.

Norton Island Ledges are 0.6 to 1.2 miles westward of Whitehead Island. A bare rock is near the middle of the south side of the ledge, and rocks bare at low water are 600 yards southeastward and southwestward of the bare rock.

Seavey Ledges, westward of Norton Island Ledges, have two rocks awash at high water; there is a depth of 5 feet at the southern end of the ledges, 300 yards southwestward of the southern one of the two bare rocks.

Wheeler Bay and **Clark Cove,** northward of Seavey Ledges, are foul. There are several granite quarries in these coves, but the only one operating in 1949 was in Wheeler Bay. Depths at their wharves generally vary from 5 to 8 feet. **Clark Island** is a village with post office on the northwest side of Clark Cove.

Tenants Harbor, 3 miles westward of Whitehead Light, is an excellent anchorage frequently used as a harbor of refuge by small vessels, and is easy of access. **Southern Island,** on the southern side of the entrance, is marked on its east side by an abandoned lighthouse, a white tower connected to a dwelling. A lighted bell buoy is east of the island. **Northern Island** is on the north side of the entrance.

A Federal project for improvement of Tenants Harbor provided for a channel 15 feet deep extending from the 15-foot curve a distance of about 1,100 feet to a point near the head of the harbor.

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 depths of 4 to 9 feet. The south side of the harbor abreast the western point of Long Cove should be given a berth of 250 yards. The harbor 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 obstructs the harbor often during February; during extremely cold weather it is sometimes frozen to Southern Island.

Vessels entering Tenants Harbor can pass midway between Southern and Northern Islands, and steer 268° into the harbor, slightly favoring the northern side.

Tenants Harbor, the village, is on the northern shore near the head of the harbor. The public wharf, on the north side of the harbor, bares at low water. The fish wharf, just east of the public wharf, has a depth of 3 feet at low water. About 300 yards eastward of the fish wharf is a prominent stone pier which has a depth of 1 foot alongside. There are several private wharves and float landings on the south side of the harbor.

Long Cove, making northward from the entrance to Tenants Harbor, has several stone quarries, not in operation in 1949. 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.

Hart Ledge extends nearly 500 yards from shore 0.7 mile southward of Southern Island. A rock covered at high water is near the northeast end of the ledge and another rock, bare at low water, is near its southwest end. A buoy is off the northeast side of the ledge.

Mosquito Harbor, 2.5 miles southwest of Southern Island and 1.8 miles eastward of Marshall Point Light, is shoal and used by a few fishing boats. The landings bare at low water. **Martinsville** is a settlement at the head of the harbor. **Mosquito Head,** on the eastern side of the entrance, is high and wooded and looks like an island from a distance.

Mosquito Island, off the entrance to Mosquito Harbor, is wooded. The islets westward of Mosquito Island, including **Hay Ledge, The Brothers,** and **Gunning Rocks,** are rocky with grass on top. **Black Rock,** 0.6 mile southwest of Gunning Rocks, is bare. **Hart Bar,** extending 0.5 mile northward of **Hart Island,** 1.8 miles west of Mosquito 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 rocks and islands is part of the inside route used by many vessels drawing 12 feet or less. The principal dangers are buoyed, but there are unmarked rocks with depths of 18 and 19 feet. Directions through the passage are given in Chapter 3.

Old Cilley Ledge, 1 mile southward of Hart Island, is about 0.5 mile long. The eastern end of the ledge is awash at extreme low water and its western end is awash at high water. A bell buoy is 0.3 mile eastward of the eastern end.

Marshall Point is 2.2 miles southwestward of Mosquito Head and on the east side of the southern entrance to Port Clyde. A light, 30 feet above the water and visible 11 miles, is shown from a white tower on the point. The fog signal is a bell. **Storm warnings** day and night are displayed from a skeleton tower near the light.

Port Clyde (**Herring Gut**) is a small but excellent harbor and anchorage between Marshall Point and **Hooper Island,** about 9 miles north-northeastward of Monhegan Island. Fishermen and coasters use it as a harbor of refuge. A bar, covered with boulders and with a depth of about 8 feet, obstructs the northern entrance. Vessels of 15-foot draft have been taken over this bar at high water by local pilots, but strangers should not attempt it. The anchorage is anywhere in the channel inside of Marshall Point, in depths of 23 to 35 feet, good holding ground, and has a clear width of 200 to 250 yards. Ice usually does not interfere with navigation. In very severe winters the harbor may be frozen over for a short time.

Vessels can approach the southern entrance to Port Clyde from eastward, between Mosquito Island and The Brothers, or from westward, through Davis Strait. Directions through these passages are given in Chapter 3. Entering from southward, vessels should pass close eastward of Old Cilley Ledge bell buoy 2 OC and steer for Marshall Point Light on a **336°** course, passing 0.3 mile eastward of Black Rock to a position over 200 yards westward of Gunning Rocks. Then steer **321°** for the horizontally striped buoy off Marshall Point. Pass 200 to 300 yards westward of Marshall Point Light, leaving the horizontally striped buoy to starboard, and enter the harbor in mid-channel, passing westward of a buoy off Marshall Point and eastward of a buoy off Hooper Island. Anchorage may be had 125 yards off the wharves at Port Clyde, in depths of 21 to 35 feet, soft bottom.

There are entrances from northward on either side of **Raspberry Island,** a small islet about 20 feet high in the middle of the northern entrance. The passages on both sides of the island have depths of about 8 feet, but they are narrow and difficult and should not be used by strangers except in small craft. The easterly channel is 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.

The village of **Port Clyde,** on the eastern side of the harbor, has no rail connection, but a highway runs to Thomaston. The village is the headquarters of many fishing boats and has a fish wharf with depths of 12 to 15 feet. A fish cannery, with a depth of 6 feet at its wharf, is on the northwest side of Marshall Point. There are two wharves with a depth of about 8 feet alongside where gasoline, water, and some marine supplies can be obtained. Numerous other landings are bare, or nearly bare, at low water. A depth of about 9 feet is at the old steamer wharf. Mail, passenger, and freight service is maintained to Monhegan Island. There is a general store, and ice is available. A small boatyard with machine shop has a marine railway capable of hauling out craft up to 40 feet in length and 6 feet in draft.

St. George River entrance is about 9 miles southwestward of Whitehead Island and north-northeastward of Monhegan Island. Marshall Point Light marks the eastern approach, and Franklin Island Light the western. The Georges Islands extend 6 miles south-southwestward from the middle of the entrance which also is obstructed by numerous ledges and rocks, the most prominent of which are marked by buoys or daybeacons. Several deep-water channels lead into the river between these islands and ledges. St. George River extends 10 miles in a northeasterly direction to the town of Thomaston, above which it is shallow and of no commercial importance.

The channel depth in the river up to Broad Cove is 59 feet or more; above this the depth gradually decreases and the channel narrows to a small stream through extensive flats that bare at low water. From a point about 1 mile below Thomaston, a narrow channel, subject to shoaling, was dredged to a depth of 16 feet. The channel in the upper river is marked by buoys, and the sharp bend in the dredged channel near Thomaston is marked by a daybeacon. In 1949 the sides of the channel were reported to have shoaled at the sharp turn near the daybeacon, and local knowledge is required to carry the best water.

Good anchorage for vessels of deepest draft is found eastward of Caldwell Island in depths of 33 to 53 feet, soft bottom; above this vessels anchor anywhere in the channel where the depth is not too great or in Turkey, Maple Juice, or Otis Coves. Directions for the river are given following the discussion of Thomaston.

The mean range of the tide at Thomaston is about 9½ feet. Ice closes the river to navigation from December to March in severe winters. In ordinary winters it is not entirely closed, usually, more than 1 month, although ice sufficient to interfere with navigation may be encountered at any time for a period of 3 months.

Georges Islands are a group of islands and rocks extending about 6.5 miles south-southwestward from the middle of the entrance to St. George River. The larger islands are in general wooded, and the smaller ones grassy or rocky; there are few prominent landmarks. Several channels lead between the islands; the most important are Davis Strait, 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 daybeacon, a red

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wheel and pendants on an iron spindle. A lighted whistle buoy is about 0.3 mile south of the daybeacon. **Old Woman Ledge,** 0.6 mile northward of Old Man Ledge, is bare at half tide.

Burnt Island, the eastern large island at the south end of Georges Islands, is about 160 feet high, wooded, and marked on its summit by a conspicuous Coast Guard lookout tower. There is a Coast Guard station on the northwest side of the island. The wharf and marine railway are on the west side of a small peninsula near the Coast Guard station. At low tide there is no passage between Burnt Island and **Little Burnt Island,** just north of the peninsula.

Georges Harbor is between **Allen Island,** 0.5 mile west of Burnt Island, and **Benner Island,** off the northwest side of Allen Island. There is a small settlement of fishermen, and small craft sometimes anchor here. The best water is in mid-channel, in entering the thoroughfare from northeastward. Entering from southwestward, the south side should be favored.

Davis Island, 0.9 mile northwestward of Burnt Island, is grassy, and has two knolls with a saddle between. **Davis Strait** is the passage between Davis Island on the south, and **Thompson Island** and other small islands on the north. The two southernmost islets on the north side of Davis Strait are grassy and the others are wooded. The passage is part of the through route, used by many vessels of 12-foot draft or less. It is reported that barges drawing 16 feet use this strait. The passage has ample depth, but **Griffin Ledge,** in mid-channel, has a depth of 10 feet over it. On the south side of the ledge is a buoy,and the channel, which is south of this buoy, is only 75 yards wide.

Between Thompson and Hooper Islands the bottom is very broken, and there are numerous dangers, most of which are marked or visible at some stage of the tide. **The Sisters,** 1.3 miles east of Thompson Island, are two small ledges awash at low water; a buoy is on the northwest side of the ledges. **Old Horse Ledge,** 0.4 mile northwestward of The Sisters, is bare at low water and marked by a daybeacon, a red cylindrical cage on an iron spindle. **Outer Shag Ledge,** 0.3 mile westward of Old Horse Ledge, is bare at half tide and **Inner Shag Ledge,** 0.3 mile west of Outer Shag Ledge, is awash at high water. **Kelp Ledges,** 300 yards west of Hooper Island, have a small part bare at low water. **Gig Rock,** 0.6 mile southwest of The Sisters, has a depth of 7 feet over it; a bell buoy is off the northwest side of the rock.

Bar Island, 0.7 mile west of Hooper Island, is low and grassy with one small but conspicuous tree. **Seavey Island,** 0.4 mile northwest of Bar Island, is grassy, and has a house in the center. There is ample depth in the channel between Bar and Seavey Islands on the east and **McGee Island** on the west. Some of the dangers are buoyed, but there are unmarked dangers close to the channel. The passage is used by small boats. **Jenks Ledge,** the most westerly danger off the passage, is bare at low water and marked by a buoy.

Port Clyde is on the eastern side of the entrance to the river. There is good anchorage in the middle of the northern entrance of the port, northward of Hooper Island, in depths of 21 to 24 feet. This entrance is clear northward of **Blubber Island,** just north of Hooper Island.

Deep Cove, on the eastern shore just north of the northern entrance to Port Clyde, has good anchorage in depths of 21 to 43 feet, soft bottom. **Caldwell Island** is at the northern end of the Georges Islands, and the middle of the entrance to St. George River.

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. A village of fishermen is along the shore of the mainland. There are several fish wharves, one of which has a depth of 4 feet alongside; the others are bare or have depths of less than 3 feet alongside. A private wharf with a float landing is on the south side. Gasoline is available at a wharf which nearly bares at low water. A well-equipped machine shop where marine work is done is at the entrance to the harbor.

Turkey Cove, on the eastern shore of the river about 1.5 miles above Caldwell Island, has good anchorage in depths of 15 to 27 feet, soft bottom, about midway between the points at the entrance.

Maple Juice Cove is a long, shallow cove on the west shore about 2 miles above Caldwell Island. Good anchorage is found at the entrance in depths of 13 to 24 feet.

Otis Cove, a broad cove shallow at its head, is on the eastern shore about 1.7 miles above Turkey Cove. There is good anchorage off the entrance in depths of 20 to 27 feet. There are no wharves.

Broad Cove, on the western shore about 4.5 miles above Caldwell Island, is shallow. The village of **Cushing** is near the northern shore. There is a wharf which bares at low water. **Bailey Ledge,** off the southern entrance, is bare at low water and marked on the southeast side by a buoy.

Watts Cove is a shallow cove on the eastern shore opposite Broad Cove. The village of **St. George** is at the head of the cove.

Two high radio towers are on the west side of the river opposite **Fort St. George,** an abandoned fort. Red lights are shown from the tower tops as well as from points one-third and two-thirds of their heights.

Thomaston is a town on the railroad near the head of navigation on the St. George River. There is only a small amount of water-borne trade with the town. The deepest draft using the river to the town in 1949 was 14 feet. Shipyards at the town build small wooden vessels.

A pilot for Thomaston usually can be obtained at Port Clyde. The harbor master generally will be found at the commercial wharf at the drawbridge. The commercial wharf has a depth of 15 feet alongside. Diesel oil, gasoline, coal in limited quantities, water, ice, provisions, and some marine hardware are available.

The St. George River is crossed at Thomaston, above the wharves, by a drawbridge with a bascule span having a horizontal clearance of 42½ feet and a closed vertical clearance of 6 feet at high water. A short distance above Thomaston there are three bridges with fixed spans. A fixed railroad bridge across the mouth of **Mill River,** east of the town, has a horizontal clearance of 28 feet and a vertical clearance of 25 feet at high water.

The approach to the entrance of St. George River has very broken and irregular bottom, with numerous ledges bare and submerged. Strangers should proceed with caution and avoid crossing broken areas where the charted depth does not greatly exceed the draft.

Approaching from eastward, follow the directions in Chapter 3 to a position 50 yards north of Allen Ledge buoy 3. Then steer **241°** to a position 150 yards southward of Hooper Rocks buoy 6. Round this buoy at a distance of 150 yards and steer **326°**

for the western end of **Teal Island.** When 500 yards northeastward of the northern end of Bar Island, steer **037°** for 1 mile, heading for **Hooper Point.** Pass midway between Hooper Point and Channel Rock buoy, and then steer **340°** for the buoy off Pleasant Point Gut, passing 500 yards westward of **Howard Point,** and 200 yards westward of a buoy off the point.

Pass 150 yards eastward of the buoy off Pleasant Point Gut and steer **036°** for 2.5 miles, passing through the middle of the **Narrows.** Above the Narrows there is excellent anchorage near the middle of the river off Otis Cove in depths of 20 to 27 feet. Above the Narrows be guided by the chart and the buoys. The safest time is at low water when the flats are bare, or on a rising tide.

Approaching from westward, when Franklin Island Light is distant 4 miles or more, steer for it on any bearing between 028° and 051°. Pass about 300 yards northwestward of Franklin Island and steer **051°**, heading just clear of the northern end of Caldwell Island. On this course pass about 0.3 mile northwestward of **Gangway Ledge,** a bare rock; 200 yards northwestward of Jenks Ledge buoy 2 JL; and midway between **Goose Rock,** high and rugged, and Goose Rock Ledge buoy 1. Keep the northwest side of Caldwell Island aboard, distant 200 to 250 yards, steer **036°**, and pass over 200 yards eastward of Gay Cove Ledge buoy 3 and 150 yards east of the buoy off Pleasant Point Gut. Continue the course and follow the directions in the preceding paragraph.

CHAPTER 9

Muscongus Bay to Cape Elizabeth

Chart 1204

CONTAINED within the limits of this chapter are the descriptions of Muscongus, Booth, Sheepscot, and Casco Bays; Medomak, Damariscotta, Sheepscot, Kennebec, and New Meadows Rivers; and the ports of Portland and Bath. This area has many islands, rocks, and long peninsulas. Many of the islands have been joined by fixed highway bridges thus, so far as masted vessels are concerned, whole groups become additional long peninsulas. In general, the outer islands and rocks rise from deep water and the lower parts of the rivers are deep.

Chart 313.—Muscongus Bay, between the Georges Islands on the east and Pemaquid Neck on the west, 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 much foul ground, 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 yachts and fishing boats.

Meduncook River is an 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 in 24 to 30 feet. 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 is unimportant, has a narrow, crooked channel, and is obstructed by numerous unmarked rocks and ledges, so that local knowledge is necessary for its navigation.

Friendship Harbor is west of Meduncook River, from which it is separated by **Friendship** and **Garrison Islands;** between these islands a channel leads from the anchorage in Meduncook River into the harbor. The harbor is about 1 mile long and has good anchorage in 24 to 36 feet. It is used by fishermen and yachtsmen. **Ice** may close 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 daybeacon, red cask on end on

iron 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 daybeacon, black cask on bilge on iron spindle, 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 buoy.

Friendship is a town on the north shore of the harbor. Depths of 9 feet are at the two principal wharves, and the wharf at the clam factory has a depth of 8 feet alongside. Gasoline and water are piped to several of the wharves. The town landing has a depth of 1 foot at low water. Provisions are available. There are two boatyards with machine shops having railways capable of hauling out small craft 40 feet in length and 5 feet in draft. Another boatyard with machine shop for small craft is in the cove on the northeast side of Friendship Island.

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 leads northeastward into the cove near the western point at its entrance. It is unimportant as an anchorage and the landings are bare at low water. A boatyard at the head of the cove builds fishing boats up to 70 feet in length.

Gull Rock, in the western entrance to Friendship Harbor, includes two rocks bare at high water.

Medomak 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 local 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; these have three narrow and crooked channels by which entrance is made to the river proper. The approaches to these channels are through Muscongus Bay or Muscongus Sound. The eastern approach is 0.5 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 are narrow, having rocky shoals near their middles and on their sides which, together with the strong tidal currents, make them difficult to navigate. **Hockomock Channel,** the western entrance, has much better water and is the preferred channel despite the fact that it is narrow in places and has strong tidal currents.

The channel in Medomak River has ample depth for 5 miles above the entrance. Some of its dangers are marked but there are unmarked ones close to the channel. For the next 2.5 miles to within 1.6 miles of Waldoboro, the channel leads between flats bare at low water, or nearly so, and shoals gradually to 5 feet.

The Federal project for the river provides for a depth of 5 feet and a width of 75 feet from the 5-foot contour to the town of Waldoboro. In 1949 the controlling depth was 5 feet.

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 above The Narrows.

Currents in **The Narrows,** between **Locust Island** and **Havener Ledge,** are reported to be very strong.

Medomak is a village with post office on the western side of Hockomock Channel. There is a town wharf and float landing with 2 feet alongside at low water and a fish wharf with a depth of 5 feet 0.5 mile southwestward of the village.

Broad Cove, on the west side of Medomak River, is used by a few fishermen. The channels are unmarked.

Waldoboro is a town on the railroad at the head of navigation on Medomak River. At present there is very little traffic by water. The old steamer wharf on the east bank and the fish wharf on the west bank both have about 4 feet alongside at low water.

Pemaquid Neck, a wooded peninsula, is on the west side of Muscongus Bay. **Pemaquid Point,** the south end, is marked by Pemaquid Point Light, 79 feet above the water and visible 14 miles. The light is shown from a white pyramidal tower.

A gong buoy is 500 yards south of Pemaquid Point and **Pemaquid Ledge,** nearly 1 mile south of the point, is marked by a horizontally banded buoy on its southeast side. It is covered by about 12 feet.

Pumpkin Cove Ledge, 1 mile east-northeastward of Pemaquid Point Light, is unmarked and has a least depth of about 19 feet. The sea breaks on it in heavy weather.

Moser Ledge, 4 miles southeast of Pemaquid Point, has 15 feet over it, and is marked by a buoy.

New Harbor Dry Ledges are 2 miles northeastward of Pemaquid Point Light and extend 0.3 mile from the shore. The ledges are 0.3 mile long, with a bare rock near each end, and no safe passage for strangers between them and the shore. **Little Island,** showing a clump of trees, is 200 yards from the shore 0.2 mile southward of New Harbor. It is the highest part of a ledge about 0.3 mile long.

New Harbor is a cove on the western shore of Muscongus Bay, about 2.5 miles northeastward of Pemaquid Point Light. It offers anchorage to small craft only and is open eastward. 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 buoy. The channel, about 150 feet wide, then leads northward of a daybeacon, black cask on bilge on iron spindle. It is reported that a rock with 6 feet over it is in mid-channel a third of the way from the daybeacon to the old steamer wharf. In entering pass close to the steamer wharf.

The Federal project for the harbor provides for dredging to a depth of 12 feet over an area of about 4½ acres in the lower part of the harbor, and to 6 feet over an area of about 4½ acres in the upper part. In 1937 the controlling depths were 7 feet in the upper part, and 8 to 16 feet in the lower harbor. No maintenance dredging has been done in recent years. It is reported that ice does not prevent navigation in the winter.

The old steamer wharf has a depth of about 6 feet, and the other wharves have 4 to 9 feet. There are several fish plants. The harbor has a large fleet of fishing boats. Gasoline and water are piped to two of the fish wharves.

Islands and ledges extend 3 miles southward from **Louds (Muscongus) Island. Haddock Island** is wooded and **Ross Island** is grassy. **Haddock Island Kelp Ledge** is marked on its south side by a horizontal-banded buoy. **Webber Dry Ledge** is awash at high water. **Browns Head Ledge,** with 13 feet on it, is marked by a buoy. **Bar Island Ledge** is 0.2 mile long and bare in one place at low water; it is marked on the south end by a buoy. **Bar Island** is grassy and has a cottage in the center. The most southerly of these ledges are **New Harbor Sunken Ledges,** marked at their southern end by a buoy. The reef extending 0.3 mile eastward of **Western Egg Rock** is marked by a buoy.

Marsh Harbor, on the southeast side of Louds Island between it and **Marsh Island,** is seldom used as an anchorage.

Muscongus Sound is on the western side of Muscongus Bay, between Louds (Muscongus) and Hog Islands on the east and the mainland on the west. It is about 0.5 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 48 to 24 feet, and anchorage can be selected by reference to the chart.

Poland South Ledge has a depth of 9 feet, but **Poland North Ledge** bares at low water. Both are marked on the east side by buoys. The better channel leads eastward of them.

Round Pond is a small landlocked harbor with 12 to 18 feet in its middle on the west shore of Muscongus Sound, about 2 miles above the southern end of Louds Island. It affords good anchorage for small vessels. An abandoned granite quarry is on the north side of the entrance. **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 buoy marking the end of a reef making northward from the point on the south side of the entrance. At the village is a float landing with about 4 feet alongside at low water. Gasoline, ice, and some stores are available.

Tides.—The mean range of tide is about 9 feet.

Currents.—Off the entrance to Round Pond there is practically no flood current; the ebb has a velocity of about ½ knot at strength.

Directions, Muscongus Bay.—This region is an area of rocks and ledges and very broken bottom. It has not been examined by means of a wire drag. The existing surveys, moreover, are far from being complete. Consequently, vessels should 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.

Directions through the bay from Davis Strait to Pemaquid Point are given in Chapter 3. The following directions lead into the bay from seaward.

From eastward.—Passing southward of Old Man Ledge lighted whistle buoy, steer about **276°** for 3.7 miles, passing 0.3 mile southward of Shark Island, and to a position 1.3 miles southwestward of Eastern Egg Rock and with Franklin Island Light bearing 020°. Then steer **005°** for Jones Garden Island, passing 0.7 mile westward of Eastern Egg Rock Daybeacon, black slatted tripod, 0.5 mile eastward of Western Egg Rock Breakers buoy, 0.8 mile westward of Franklin Island Light, and to a position 100 yards westward of Harbor Island Rock buoy. Then steer **034°** 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 rock 0.3 mile eastward of Wreck Island.

Change course to pass 300 to 400 yards westward of Black Island and when northwest of that island change course to **023°** and pass about 300 yards northwestward of the southwest end of Friendship Island. When Gull Rock bears 262°, steer **057°** and select anchorage near the middle of Friendship Harbor below the buoy, in 24 to 36 feet.

Bound to Medomak River, follow the directions preceding to a position 300 to 400 yards westward of Black Island. Then steer **003°** and pass over 300 yards westward of Gull Rock. Anchor near mid-channel, about 1.8 miles above Gull Rock, and 0.4 mile below Hungry Island. Above Gull Rock dangers 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 Light is distant 4 miles or more, bring it on any bearing between **028°** and **051°** and steer for it. When Jones Garden Island bears **006°**, steer for it and proceed as directed in the preceding paragraph.

Or, from a position 0.3 mile northward of Pemaquid Ledge buoy, steer **061°** for 3.7 miles, passing 0.5 mile southward of Pemaquid Point Light and to a position 0.3 mile southward of New Harbor Sunken Ledges buoy. Then steer **051°** for 2.7 miles, heading for Franklin Island Light, and pass 0.2 mile southeastward of the buoy eastward of Western Egg Rock. When Jones Garden Island bears **006°**, steer for it and proceed as directed above.

Muscongus Harbor is a small cove and village on the west shore of the sound about 1.5 miles above Round Pond. There are no public landings. During the summer a few fishing boats anchor just inside the entrance in from 5 to 8 feet of water.

Greenland Cove is the extreme northern end of the sound. It is shallow and of no importance. **Bremen** is a small village at the head of the cove.

Lower Narrows, leading into the head of Muscongus Sound north of Hog Island, has a depth of about 13 feet. The principal dangers are marked but local knowledge is necessary to carry the best water.

The Audubon Society of America maintains a camp on the northeast point of Hog Island. The society maintains several buildings and a landing.

Directions, Muscongus Sound, from eastward.—Having come from Davis Strait as directed in Chapter 3, pass 200 yards northward of Eastern Egg Rock Daybeacon and steer **284°**, passing 0.4 mile southward of Western Egg Rock and to a position 0.5 mile westward of Haddock Island Kelp Ledge horizontal-banded buoy. Then steer **329°** and pass about 0.4 mile southwestward of Webber Sunken Ledge buoy.

When about 600 yards from the western shore, steer **018°**, pass midway between Browns Head Ledge buoy and the western shore, about 300 yards off Browns Head, and to a position 100 to 200 yards eastward of Poland South Ledge buoy. Then steer **355°** and pass about 250 yards eastward of Poland North Ledge buoy. When Round Pond is opened, pass close northward of the buoy on a **253°** course, and keep the north point at the entrance aboard distant about 75 yards. Anchor in the middle of Round Pond in 14 to 18 feet.

From southward or westward.—Follow the eastern shore of Pemaquid Neck at a distance of about 0.7 mile or more, passing 0.4 mile eastward of New Harbor Dry Ledges on a **017°** course until abreast Long Cove. Continue the course, pass midway between Browns Head Ledge buoy and the western shore, and proceed as directed in the previous paragraph.

Chart 314.—Johns Bay is westward of Pemaquid Neck, between it and **Rutherford Island.** Its entrance is about 1.4 miles wide, and the length of the bay is 2 miles to Johnson Island, above which the Pemaquid River empties into the northeastern end and Johns River into the northwestern part. Depths in the bay are very irregular and there are several ledges and rocks.

Though not commercially important, the bay has many summer resorts on its shores and is used as an anchorage by fishermen and yachtsmen. The holding ground is poor except in a few spots 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 Johns 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 36 feet. The preferred anchorage for small craft is said to be north of the fort where the bottom is soft in places. **Pemaquid River** extends northeastward about 2 miles to the village of **Pemaquid.** The river is dry at low water near its head and has a narrow, crooked, and unmarked channel. On the point marking the southern entrance to Pemaquid River there is a prominent stone tower marking the position of the former **Fort William Henry.**

Pemaquid Beach is a village with post office on the south side of Pemaquid River at the entrance. At the fort is a fish wharf with float and another is a short distance to the northeastward. Depths at the wharves are about 10 feet. Gasoline is available at both places. A reef bare at low water extends offshore between the two wharves; its outer edge is marked by a buoy. There is a fish wharf between Fish Point and the fort, at which some marine hardware may be obtained.

Care should be taken to avoid the piling of an old wharf on the western side of the inner harbor.

Thurston Ledges are mostly bare rocks extending 300 yards southward from the north side at the entrance of Pemaquid Harbor, their south edge being 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 rounded islet with some trees located 300 yards northward of Johns Island. Or, when 0.5 mile or more southward of Johns Island, steer **355°** so as to pass 150 yards eastward of Johns 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 **Johns Island.**

McFarlands Cove is in the northwestern side of the bay northward and northwestward of **Davis Island;** a steep hill about 150 feet 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 24 to 36 feet. In entering the cove, take care to avoid the rock, awash at low water, lying about 200 feet off the northwest point of Davis Island.

McFarlands Ledges are 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 buoy marks the south end.

The Gut is a thoroughfare connecting McFarlands Cove with Damariscotta River. There is a depth of 2 feet at low water in The Gut. About 1.2 miles above the mouth of Damariscotta River The Gut is crossed by a drawbridge having a swingspan with a horizontal clearance of 31 feet and a closed vertical clearance of 4 feet at high water. See South Bristol on the Damariscotta River for additional description.

Johns River extends northward about 2 miles above McFarlands Cove, and separates into two branches. **Foster Cove** is the eastern branch, and **Western Branch** is the westtern. **Robinson Cove** makes into the western shore of Johns River above **High Island.** Good anchorage is available in the river southeastward and eastward of **Clarke Point** in 18 to 24 feet. The river is little used.

Directions, Johns Bay.—Stand up the middle of the bay on a **349°** course, heading for the eastern shoulder of High Island, and pass 300 yards westward of Johns 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 buoy. Anchor near mid-river, about 400 yards northward of the buoy, in 18 to 24 feet.

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 Johns Bay from westward, or from Damariscotta River. **Thrumcap Island** is partly wooded in its northern part and has a prominent house. **Thread of Life Ledges** are bare or grassy islets; **Turnip Island,** partly wooded, has a house on it; 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** which has some trees on its south end. A ledge with 1 foot of water over it is off the south end of Hay Island.

To pass through Thread of Life from westward, steer **061°** for the north end of Thrumcap Island with Ram Island Light astern and pass 400 yards southward of The Bulldog, bare at half tide, and 500 yards southward of the rock covered at high water 300 yards eastward of the south end of Inner Heron Island. When about 400 yards from Thrumcap Island, steer **015°** 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 Johns Bay about 100 yards westward and northward of a buoy lying about 200 yards northward of Crow Island, between it and a buoy northward of it.

The entrance to **Damariscotta River** is about 3 miles westward of Pemaquid Point Light and 1 mile northeastward of Ram Island Light. 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 has been navigable to these towns for vessels of 18-foot draft at high water, but the tidal currents are strong and, though 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. In many places it is very narrow, because of the constricting islands and ledges. For a distance of 11 miles above the mouth of the river a least depth of 30 feet may be carried in the channel. Above this point the water shoals gradually to 9 feet at low water just below the town of Damariscotta.

The channel just below the town has a controlling depth of 6 feet. The channel for 2 miles south of the Damariscotta-Newcastle Bridge is noted for the mud flats on both sides; care should be exercised in piloting. Above the bridge, navigation is impossible except at slack water and with local knowledge.

The islands and shoals southwestward of the entrance are described in connection with Booth Bay.

The **White Islands,** about 1.5 miles south of the entrance to Damariscotta River, are prominent. The northern island is grassy with standing trunks of dead trees which are conspicuous. The southern island is heavily wooded on the northern two-thirds and is bare rock on the southern third. There is one cottage. Southward and southwestward of the White Islands, **Outer Heron Island,** wooded, and **Pumpkin Island,** together with their offlying ledges, extend about 2.5 miles.

Anchorages.—Vessels bound into the river usually go as far as Meadow Cove, just above East Boothbay, where good anchorage is available in 30 to 48 feet, keeping 150 yards offshore. This is as far as a stranger should attempt to go. Above The Narrows vessels can anchor anywhere in the channel where the bottom and depth are suitable.

Directions.—Extreme caution is necessary in this region which has many rocks and ledges and very broken bottom and has not been examined by means of a wire drag.

Directions for approaching from eastward are given in connection with Johns Bay.

Approaching from southward, pass eastward of Pumpkin Island and the islands off the entrance, giving them a berth of 1.3 miles. Pass 0.3 mile southwestward of Thrumcap Island, steer **299°** and pass about 400 yards southward and westward of Inner Heron Island Ledge buoy. Or, coming from Fisherman Island Passage, steer **051°** for the south end of Inner Heron Island, with Ram Island Light astern, and pass about 400 yards southward and eastward of the buoy off Little River.

Enter the river about midway between the buoy south of Reeds Island and Inner Heron Island Ledge buoy steering **006°** in mid-river for 1.5 miles above Inner Heron Island. Pass westward of the 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°**, keeping about the middle of the river. Pass eastward of **Montgomery Point** buoy and haul in for the western side of the channel off **Meadow Cove**; anchor in 30 to 48 feet. Small craft should have no trouble in going to the head of navigation with the aid of the chart. The best time is on a rising tide. It is reported that the buoy at the entrance to The Narrows tows under during strength of the current.

Tides.—The mean range of tide is about 9 feet.

Currents.—The tidal current in the constricted sections attains an estimated velocity of 5 knots. The ebb lasts about 2 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. Off Cavis Point the average velocity at strength of current is about 1 knot. See *Current Tables* for predictions.

Ice closes the river for a distance of 4 miles below Damariscotta during January, February, and March.

Pilots.—Fishermen at South Bristol or East Boothbay may be engaged as pilots.

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. There is a fish wharf with float landing, with about 9 feet alongside at low water, on the west side at the entrance. No supplies are available. A fairway gong buoy is at the mouth of the river about 300 yards southwestward of **Reeds Island.**

Inner Heron Island, on the eastern side of the entrance to Damariscotta River, is thickly wooded. Two private float landings are on the northeast side; depths of about 12 feet are at their ends. Boats going to the landing must avoid the reef, bare at half tide, extending northward from the island to a buoy.

Inner Heron Island Ledge, 0.2 mile southwestward of the south end of Inner Heron Island, is bare at low water, and marked on the southwest side by a buoy. **The Bulldog,** 300 yards southward of the island, is bare at half tide. The rock 350 yards eastward of the island is bare a little after high water. Other unmarked dangers exist 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, 0.7 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 red triangle on white tripod daybeacon. A black daybeacon, cask on end on iron spindle, marks the north side of the channel and a red daybeacon, cask on bilge on iron spindle, marks the point of a ledge near the south side westward

of the wharf. The anchorage with best swinging room is in the middle of the cove off the landing in 24 feet.

About a mile north-northeast of Christmas Cove is a high, square, gray observatory tower which is conspicuous. Two hotel buildings in Christmas Cove west of the center of Hay Island are very prominent from the southeast.

To enter Christmas Cove, enter in mid-harbor, pass midway between the tripod daybeacon and the outer spindle and northward of the inner spindle.

Christmas Cove is a summer resort with post office on the eastern side of the cove. The village maintains two landings on the point east of the red spindle; one has a depth of 12 feet alongside and the other has 3 feet. Gasoline is piped to a wharf and float landing which has a depth of 5 feet alongside. There are several private landings and limited supplies are available at the general store. During the season there is launch service with neighboring localities.

South Bristol is a summer resort on the east side of Damariscotta River 2.5 miles above the entrance. There are several landings with 8 to 12 feet alongside. Gasoline, fresh water, and supplies are available.

Boats up to 50 feet in length can be hauled out for repairs at the boatyard and machine shop on the north side of The Gut. The boatyard has a well equipped shed and launching ways where wooden boats up to 100 feet in length are built. The wharf at the yard has a depth of 12 feet alongside.

The Gut is a thoroughfare connecting Damariscotta River at South Bristol with McFarlands Cove and Johns Bay. The channel has been improved by dredging to a width of 25 feet and depth of 2 feet near the drawbridge, where the channel has its least depth. The bridge has a swing span with a horizontal clearance of 31 feet and a closed vertical clearance of 4 feet at high water. After passing through from eastward, boats must haul southward to avoid a ledge on the north side just westward of the bridge. The Gut east of the bridge is thickly congested with moorings and lobster pot buoys.

East Boothbay is a village on the west bank of the river, about 3 miles above the 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 large buildings of several boatworks are prominent. Two wharves are for general use. One has a float landing with 3 feet alongside and has gasoline and fresh water piped to it. Railways are available for hauling out and storing yachts up to 140 feet in length and 12 feet in draft. **Kelp Ledge,** just south of the approach to the wharves and 150 yards from the eastern shore, is bare at low water, and is marked by a buoy just east of the ledge. Gasoline, water, and supplies are obtainable. Steel and wooden vessels up to 300 feet in length are built at the iron works. The controlling depth in the harbor was 8 feet in 1949.

At **The Narrows,** 1.3 miles above East Boothbay, the channel is contracted to a width of 100 to 150 yards, and the tidal currents are strong with swirls. **Western Ledge,** a rock awash 550 yards south of **Fort Point,** in mid-channel, is marked by a buoy to the southeast; the buoy tows under at full current strength. **Eastern Ledge,** extending 100 yards from the eastern shore, is a rock with 2 feet over it. A buoy marks its west side. This buoy almost tows under during full strength of the current. 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.

At the **Back Narrows** the channel is foul with rocks and is crossed by an overhead power line having a vertical clearance of 46 feet at high water.

Seal Cove and **Long Cove,** on the east side just above The Narrows, have many unmarked dangers, and are seldom entered. An overhead power line having a vertical clearance of 46 feet above high water is suspended across Seal Cove about 400 yards south of **Plummer Island.**

Clark Cove, on the east side, 2.5 miles above The Narrows, is a broad bight, shoal near the shores.

Pleasant Cove is on the western shore of the river opposite Clark Cove, and makes in nearly 1.5 miles southwestward. Good anchorage can be had in the mouth of this cove just northwestward of **Carlisle Point,** in 15 to 30 feet, soft bottom. **Pleasant Cove Ledges,** northward of the cove, are covered at high water and are marked by a buoy just northward of them. There are no wharves in the cove.

Damariscotta, on the east bank, and **Newcastle,** on the west bank of the river about 12 miles above the mouth, are connected by a fixed bridge having a horizontal clearance of 156 feet and a vertical clearance of 11½ feet at high water. The two towns are on a branch of the Maine Central Railroad.

There is very little traffic by water. The old wharves are mostly in ruins, and there are no facilities for supplying vessels. Small wooden craft are built at Damariscotta and Newcastle, but there are no facilities for hauling out and repairing boats. On the point just west of the highway bridge there is a yacht club wharf with 9 feet alongside at low water. A few small boats moor in the shallow bight southwestward of the club wharf.

Booth and **Linekin Bays** are included between **Linekin Neck** and Fisherman Island 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 and pleasure craft in summer.

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. Only the important areas have been examined by means of a wire drag. Accordingly, vessels should avoid crossing this area. A lighted whistle buoy is 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 1.4 miles southwestward of the south end of Damariscove Island. The wreck of the S. S. *Hartwelson,* broken in two parts, is on Bantam Rock. The forward part is on the rock and the stern is sunk. The rock bares at low water; it is marked on the southwest side by a buoy.

Damariscove Island is 1.7 miles long, bare, and nearly divided in the middle. **Damariscove Harbor,** at the south end, is used as a small-boat harbor by local fishermen. A Coast Guard station is on the west side of the harbor and a small lookout tower is on the highest part of the southerly section of the island. A fairway gong buoy is 0.5 mile south of the entrance to the harbor. **The Motions,** extending 0.3 mile south-southwestward of the southwest end of Damariscove Island, bares at low water.

Fisherman Island, northeastward of Damariscove Island, is bare. A stone house on the highest part of the north end of the island shows up prominently from all directions.

Ram Island, on the south side of Fisherman Island Passage, is a grassy island marked on the northwest side by Ram Island Light, 36 feet above the water and visible 9 miles.

The light is shown from a tower with the bottom 20 feet gray and the upper part white, connected to the shore by a bridge. The fog signal is a bell. The light has two white sectors which cover the fairways, 256° to 263° and 027° to 049°.

The Hypocrites are two low, bare rocks eastward of Fisherman Island. **Smedrick Ledge,** extending 0.3 mile south-southwestward from The Hypocrites is marked by a red daybeacon, spherical cage on iron spindle, near its southern end.

The Cuckolds are two bare islets off **Cape Newagen,** the southern extremity of Southport Island, on the west side of the entrance to Booth Bay. The easterly islet is marked by The Cuckolds Light, 59 feet above the water and visible 13 miles. It is shown from a white octagonal tower on a dwelling. The fog signal is a horn.

Cape Harbor, between Cape Island and Cape Newagen, accommodates small craft; yachts and fishermen use it mostly. **Cape Island** is wooded in the center. **Newagen** is a village with post office on the harbor. There are landings for small craft. Two entrances serve the harbor; the easterly one, leading between **The Ark** and Cape Newagen, is reported to have a depth of about 3 feet at low water, and the main entrance from westward has a depth of about 10 feet. Pass north of **Hunting Island** because the passage between it and Cape Island is foul. Depths inside are 6 to 16 feet. Gasoline is available.

Squirrel Island, in the middle of the entrance of Booth Bay, is an important summer resort. It is wooded and has many large homes. Submerged pipes and cables carry fresh water, power, and telephone lines to the north end of the island from the southern tip of Spruce Point. The old steamer landing, in the northerly of two coves on the west side, is not in repair. The ferry from Boothbay Harbor lands passengers, mail, and freight at a float near the head of the northerly cove.

Squirrel Cove, the southerly of the two coves on the west side, is sometimes used as an anchorage by small craft. A float landing in the cove has 8 to 10 feet alongside at low water. A daybeacon, red cask on bilge on iron spindle, marks the ledge at the south side of the entrance.

Linekin Bay is northeastward of Squirrel Island, between Linekin Neck and Spruce Point. The principal dangers are buoyed. Good anchorage can be found, the depths being 60 to 72 feet in the lower part of the bay, and 30 to 36 feet in the upper portion. There are several private float landings. **Spruce Point Ledges,** bare at low water, are on the northern side of the entrance; they are marked by two buoys at the south and north ends. The better entrance is between the southern buoy and **Negro Island.** In the narrow entrance between the northern buoy and Spruce Point, give the point a berth of over 150 yards. A **024°** course with the southeast point of Squirrel Island astern will lead to the head of Linekin Bay.

Ocean Point, at the southern entrance to Linekin Bay, is marked by many summer homes and hotels. A public wharf and float landing with 10 feet alongside is maintained in **Card Cove** 700 yards north of this point. A rock with 2 feet over it at mean low water is about 50 yards southwestward of the float. South and southwest of the point, **Card Ledge, Dictator Ledge,** and **Gangway Ledge,** the main dangers in **Fisherman Island Passage,** are buoyed. The broken bottom extending southwest of Dictator Ledge to **Wylie Rock** should be avoided.

The principal dangers of Linekin Bay inside Spruce Point Ledges include: **Independence Island,** wooded and with a house in the center; **Holbrook Ledge,** bare at one third tide and marked on its west side by a buoy; a rock with 12 feet over it 200 yards westward of the south end of Holbrook Ledge. **Seal Rocks,** bare at half tide and

marked on the east by a buoy. A depth of 19 feet is about 150 yards east of the buoy. A rock awash has been reported 120 yards 032° from Seal Rock; several boats have reported striking this rock in recent years. A ledge on the east side surrounding **Perch Island** is marked by a buoy at the southwest end. **Fishhawk Islet,** having several trees and a ledge bare at half tide, extends 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. Spruce Point** is wooded.

East of **Tibbits Ledge** is a small boatyard where boats up to 40 feet in length and 8 feet in draft can be hauled out for repairs and for winter storage. Yachts up to 45 feet in length are built here. The wharf has 11 feet alongside at low water.

Capitol Island, on the west side of Booth Bay, is a summer resort with a post office; the post office name of the resort is **Capitol.** Many cottages are visible. The steamer wharf at the north end has a depth of about 10 feet.

Burnt Island is partly wooded and marked on the southeast side by a light. Burnt Island Light, 61 feet above the water and visible 13 miles, is shown from a white conical tower with covered way to a dwelling. The fog signal is a bell. The white sectors cover the fairways, 307° to 316° and 355° to 008°.

Mouse Island, northward of Burnt Island, is wooded; it has a private float landing on the north side with a depth of about 12 feet.

Chart 230.—Boothbay Harbor is the inner basin of Booth Bay and the site of the town of Boothbay Harbor. In September 1949, the wharves had various depths up to 17 feet. The deepest draft using this port was 15 feet. The cold storage twin wharves on the east side of the harbor have depths of 17 feet at their outer ends. There are several wharves and float landings, with gasoline and fresh water piped to them, on the northwest side. One of these service landings has a depth of 15 feet alongside at low water. There are two town landings; one with a depth of 4 feet alongside and the other with depths of 4 to 7 feet. A seaplane is available for charter during the summer. The U. S. Fish and Wildlife Service has a fish hatchery and aquarium on **McKown Point.**

The usual and best anchorage is northward of **Tumbler Island** and to the head of the harbor; there are 24 to 42 feet depths, good holding ground, anywhere in the channel above the island, with depths shoaling gradually toward the head of the harbor. The passage east of Tumbler Island should not be used by strangers. The anchorage in the inner harbor off the town has depths of 24 to 30 feet, but is limited in area and usually occupied by small craft and fishermen. The motorboat anchorage on the northwest side of the inner harbor has a depth of 11 feet.

The anchorage for small craft is on the northwest side inside of **McFarland Island;** this is in the portion dredged to a depth of about 10 feet. McFarland Island has float landings and a prominent circular building resembling a lighthouse.

A footbridge with a small draw crosses the head of the harbor. The horizontal clearance is 32 feet and closed vertical clearance is 4½ feet at high water.

Directions.—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, therefore, should proceed with caution and should avoid crossing broken ground where the charted depths do not greatly exceed the draft. The harbor is much used as a harbor of refuge by all classes of vessels.

From eastward through Fisherman Island Passage, Charts 313, 314, and 230.—

Directions from Davis Strait to Fisherman Island Passage are given in Chapter 3. Coming from any other point eastward the course can be shaped to a position 0.5 mile southward of Thrumcap Island, taking care to avoid Moser Ledge and Pemaquid Ledge.

Passing 0.5 mile southward of Thrumcap Island, steer **268°**, pass northward of the bell buoy marking The Hypocrites and the buoy northeastward of Ram Island Light and about 350 yards northward of Ram Island Light, and pass southward of the buoys marking Gangway and Dictator Ledges.

Pass about 200 yards southward and westward of Dictator Ledge buoy and steer **321°** for 1.6 miles to a position 200 yards westward of the buoy 0.5 mile eastward of Burnt Island Light. Then steer **332°** and pass about 150 yards westward of Tumbler Island lighted buoy. Then steer **017°** and anchor in the middle of the harbor in 30 to 42 feet.

From westward, Charts 314 and 230.—The directions in Chapter 3 will lead northward of Seguin Island and to The Cuckolds bell buoy. Pass eastward of the buoy and about 0.3 mile eastward of The Cuckolds Light and steer **002°** for Burnt Island Light, passing about 500 yards westward of Squirrel Island. When about 0.5 mile from the light and 300 yards westward of Squirrel Island Ledge buoy, steer **050°** for 0.4 mile and then **345°** to a point about 300 yards westward of Tumbler Island. Next steer about **017°** and anchor in the middle of the harbor in from 30 to 42 feet. These courses lead close to depths of 20 and 21 feet between Burnt and Squirrel Islands.

From southward.—Pass about 0.5 mile westward of Bantam Rock lighted whistle buoy and steer **002°** for Burnt Island Light and follow the directions in the preceding paragraph. This course passes 1 mile westward of Bantam Rock and 0.6 mile westward of an unmarked 9-foot rock.

From westward, eastward of Squirrel Island.—Pass eastward of The Cuckolds bell buoy and about 0.3 mile southeastward of the light and steer **033°**. Follow the eastern side of Squirrel Island, giving it a berth of about 500 yards and when its northeast corner bears about **270°**, change course to **332°** and pass about 200 yards westward of Tumbler Ledge lighted buoy. Then steer **017°** and anchor in the middle of the harbor in 30 to 42 feet.

To enter the inner harbor off the town, Chart 230.—Pass about 200 yards northwestward of Tumbler Island and steer **029°** for McFarland Island until Clam Rock, a large bare ledge near the eastern shore, is abeam distant about 250 yards. Then steer about **062°** into the inner harbor, passing southeastward of the buoy southward of McFarland Island and another buoy eastward of the island. The course then can be shaped to the wharves, or small craft may select anchorage on the northwest side northward of the inner buoy in 10 to 13 feet. A 1943 survey found a depth of 14 feet 330 yards 214° from McFarland Island.

Tidal currents have little velocity in the harbor. The mean range of tide is about 9 feet.

Ice.—In severe winters, ice occasionally obstructs navigation above Tumbler Island during February and March. In normal winters the harbor is free of ice to the footbridge.

Storm warnings, day and night, are displayed from a steel tower on the hill on the north side of the town.

The **harbor master** can be reached through the harbor police boat.

The Boothbay Harbor Yacht Club has a pier and float landing on the northwest

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side of the harbor, with 10 feet alongside at low water. An important yachting center, Boothbay Harbor, is one of the best anchorages on the coast of Maine. During the summer season there is daily boat service with Monhegan and Squirrel Islands, and several excursion boats make daily trips.

Supplies.—Water and gasoline can be taken alongside the wharves. Diesel oil, coal, provisions, and some ship chandlery can be obtained in the town. A chart sales agency of the U. S. Coast and Geodetic Survey is here.

Repairs.—A marine railway here has a capacity of 600 tons. The cradle has a length of 200 feet, and the maximum draft it can accommodate is about 12 feet aft. There are facilities for repairing wooden vessels and ordinary repairs to machinery can be made. Several other boatyards can repair small craft.

The **Inside Passage** from Boothbay Harbor to Bath is about 11 miles long and leads between the islands located between Boothbay Harbor and the Kennebec River, forming an inland passage from Boothbay Harbor to Bath. The passage is used by excursion boats, yachts, and fishing boats.

The channel is very narrow in places, has strong tidal currents, is much obstructed by rocks and shoals. Though most dangers are marked, strangers drawing 8 feet or more should not attempt it. 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 southern part of Hockomock Bay and then continues through the Sasanoa River, coming out in the Kennebec River opposite the city of Bath. In 1943 least depth in Sasanoa River was 8 feet at the southern end of Hanson Bay and at the northern entrance to the river. In the spring logs and driftwood may be present.

Two bridges cross the thoroughfare. The one at Townsend Gut has a swing-span with a horizontal clearance of 52 feet and a closed vertical clearance of 10 feet at high water. The fixed bridge over Sasanoa River near its junction with Kennebec River has a vertical clearance of 50 feet at high water over a channel width of 200 feet.

Regulations governing the opening of the Townsend Gut bridge are given in Chapter 2, §203.5.

Direction.—This passage is narrow and crooked, has strong tidal currents, and requires local knowledge to carry the best water. Strangers in larger vessels or yachts should pick up a pilot at Boothbay Harbor or Bath. With the aid of Chart 230, strangers in small craft drawing 8 feet or less should be able to go through. The best time is on a rising tide. The channel is well marked but careful navigation is required.

Caution.—At strength of current in the narrow places the buoys are often run under for short periods.

The thoroughfare is usually closed by ice for about 2 months but in mild winters has been known to remain open all winter. Several summer resorts and other landings are along this throughfare.

Townsend Gut is a narrow, crooked thoroughfare connecting Boothbay Harbor with Sheepscot River. There are unmarked rocks with little depth close to the channel.

Deckers (Thompsons) Cove is crossed by a fixed bridge; the horizontal clearance is 40 feet and the vertical clearance is 7 feet. East of the north end of the bridge is a fish wharf with a depth of 17 feet alongside. There are small boatyards in the cove.

Southport is a village and summer resort on the west side of the gut. Gasoline is

piped to a small wharf 750 yards northwestward of the bridge and just eastward of the ruins of the old steamer wharf.

Off **Cameron Point** the ledge extending north from the point is marked by a daybeacon, white slatted tripod, and the drying ledge extending south from **Indiantown Island** is marked by a buoy.

Isle of Springs is a summer resort on Isle of Springs, at the north end of Townsend Gut. A landing on the northeast side has a depth of about 10 feet. Isle of Springs is wooded and has an elevated tank at its summit. The ledge extending off the north end of the island is marked by a daybeacon, black cask on bilge on iron spindle.

Sawyer Island is connected to the mainland by a fixed highway bridge at its southeast corner; the horizontal clearance is 17 feet and vertical clearance is about 2 feet at high water. The current is strong in this locality.

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; principal dangers are marked.

Little Sheepscot River is a narrow passage westward of MacMahan Island leading from Sheepscot River into Sasanoa River. The channel leads between the buoy and the rock. A wharf on the east side of the channel at MacMahan has a depth of about 10 feet alongside. There are two rocks bare at 3 and 6 feet at low water about 200 yards southwest of the buoy marking the end of a ledge. MacMahan is a summer resort on the west side of MacMahan Island. Communication is available with Robinhood by small boat.

Sasanoa River, an estuary leading from Sheepscot River to Kennebec River, north of Georgetown and Arrowsic Islands, has numerous coves and bays, none of which are of commercial importance, making off northward and southward. The general trend of this river is northwest and southeast. The principal coves and bays making southward are **Robinhood Cove, Riggs Cove,** and **Hall Bay.** Northward is **Heal Cove** and **Hockomock Bay. Montsweag** and **Brooking Bays** lead northward from Hockomock Bay. Montsweag Bay 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 **Knubble,** before entering Hockomock Bay when coming from eastward. **Lower (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, the narrowest part, is only about 60 yards wide.

The fixed bridge at the western end of Sasanoa River has been discussed in connection with the Inside Passage from Boothbay Harbor to Bath.

Robinhood (Riggsville) is a village with post office on the south side of Riggs Cove. The wharf 100 feet long is kept in good condition. There is a depth of 11 feet along the outer half of the north side, while the inner half shoals gradually to 6 feet. Visiting yachts may use float landings off the wharf, as well as several moorings in from 20 to 30 feet of water. Limited amounts of gasoline, water, and supplies are available. There is telephone connection to Bath and communication with MacMahan by small boat carrying passengers and mail.

Back River which also connects Sheepscot River to Kennebec River crosses Sasanoa River at Hockomock Bay. This river has a general north and south direction. South of Hockomock Bay the river separates **Arrowsic** and **Georgetown Islands,** is unmarked, and is crossed by a fixed bridge with a horizontal clearance of 206 feet and a vertical

clearance of 6½ feet. Between the bridge and Hockomock Bay the river is shoal. North of the bay the channel through Montsweag Bay and the river is narrow and seldom used except by local small craft. It is marked by daybeacons and buoys during the summer months. The red daybeacons are a keg on end on pole while the black daybeacons are a keg on bilge on pole. It is reported that the incoming tide up Montsweag Bay meets the tide of Back River in the vicinity of **Young Point.**

In 1949 an auto ferry was operating across Back River about 0.5 mile south of **Berry Island.** The ferry is held against the action of the current by a wire stretched across the river as the ferry is being propelled by a small motorboat secured alongside. When not under stress, the wire rests on the bottom, but is brought to the surface by the tension of the ferry when operating. Currents are generally strong through the river, and the ledges and shoals just north of the ferry crossing make the channel quite narrow at this point.

In 1949 plans were completed and work was scheduled to start on a highway bridge with a 65-foot opening about 400 yards northward of Berry Island.

Chart 314.—Sheepscot River is the approach to several small villages in the lower end and to the town of Wiscasset, 14 miles above the entrance. The entrance is about 5 miles northeastward of Seguin Island, between The Cuckolds and Griffith Head. The channel has a depth of about 30 feet to Wiscasset and is navigable for small vessels at high water for about 4 miles above Wiscasset to the village of Sheepscot. Large tankers drawing up to 30 feet carry oil to the power plant 0.6 mile below Wiscasset.

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 usually 72 feet or less. **Colby Cove,** in the west bank about 2.2 miles above Cross River, affords anchorage in 48 to 60 feet; Merrill Ledge Daybeacon is northeastward of the anchorage. The anchorage at Wiscasset is below the bridge near the town wharves.

Directions.—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 the area has not been examined by means of wire drag. There are several unmarked rocky shoals with depths of 19½ to 30 feet in the middle of the river from Bull Ledge southward. Other ledges with less depth than charted have been reported, and undoubtedly exist. Consequently, the river should be navigated with extreme caution.

1. From eastward: Chart 314.—Having come from Boothbay Harbor on Fisherman Island Passage, pass close to Cuckolds bell buoy and steer **265°** for 1 mile until Lower Mark Island is abeam, distant 1.3 miles. Then steer **331°** for 2 miles and pass 0.5 mile westward of Lower Mark Island and about 100 yards westward of Cat Ledges lighted bell buoy. When about 200 yards northwestward of this buoy, steer **002°** for nearly 1.5 miles and pass 350 yards westward of Hendricks Head.

Or, coming from southward, from a position about 0.5 mile westward of Bantam Rock lighted whistle buoy, steer **339°** for a little over 6 miles until Lower Mark Island bears 090° and is distant about 0.9 mile. Then change course to **002°** and pass 100 to 200 yards west of Cat Ledges lighted bell buoy and continue the course to a position westward of Hendricks Head former lighthouse tower. Then follow the directions given in Section 2.

From westward.—Pass 1.5 miles southward of Seguin Light, 0.5 mile southward of

Mile Ledge lighted bell buoy, and steer **037°** for The Cuckolds Light to a position 0.5 mile southeastward of Tom Rock buoy. Then steer **006°** for 3.3 miles, heading for Hendricks Head abandoned lighthouse tower until The Cuckolds Light is abeam, distant 2 miles. Then steer **002°** for nearly 2.4 miles, and pass 100 to 200 yards westward of Cat Ledges lighted bell buoy, and 350 yards westward of Hendricks Head.

2. Hendricks Head to Wiscasset: Charts 230 and 314.—Passing 350 yards westward of Hendricks Head former lighthouse tower, steer **002°** for 4.5 miles.

From a mid-river position 0.8 mile above Stover Ledge buoy, steer **020°** 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 daybeacon and buoy marking the southerly and northerly ends of Merrill Ledge, and when about 0.7 mile above the buoy, favor slightly the eastern bank to avoid the shoal on the western side above Hilton Point and another shoal 500 yards south of Clough Point.

Pass about 200 yards eastward and 100 yards northeastward of Clough Point buoy, and steer **299°**, 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 buoy and steer about **344°** for the wharf. Anchorage may be had about midway between the buoy and the wharf in 30 to 42 feet.

Tides.—The mean range of tide varies from about 8½ feet at the entrance to 9½ feet 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. On the falling tide a strong set to westward is felt near Bull Ledge, and a strong set to the eastward near Middle Ledge. These sets are not noticeable on a rising tide. There is a strong ebb current near the entrance to Cross River. Off Barter Island the tidal current has an average velocity at strength of about 1 knot. See *Current Tables* for predictions.

Ice usually does not interfere with navigation below Wiscasset. The river above Wiscasset is usually closed in winter.

Pilots can be obtained from among the local fishermen at Five Islands or Boothbay Harbor.

The Cuckolds Light and Cape Harbor, on the east side at the entrance, are described in the previous section. Rocks, bare and sunken, extend 0.5 mile westward of the point in this vicinity.

The Sisters, 1.5 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 daybeacon, black slatted tripod.

Tom Rock, 0.6 mile south of The Sisters, is bare at low water and marked by a buoy on the southwest side.

The Black Rocks, 1 mile from the northwestern side of the entrance to **Sheepscot Bay,** are several bare and sunken rocks that extend over a distance of about 0.7 mile. The highest bare rock is in the middle of the group and has an elevation of 15 feet. The channel between The Black Rocks and the buoy marking **Sloop Ledge,** 0.4 mile northwestward, should be used with caution. The area between the 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. **Outer Head,** a bare rocky island, is 200 yards eastward. A horizontal-banded buoy 0.4 mile off the island marks **Griffith Head Ledge.**

Lower Mark Island, on the eastern side just inside the entrance, is wooded, and is a good landmark. A ledge bare at low water is 150 to 350 yards eastward of the island. Broken ground with 22- and 23-foot spots extends about 0.8 mile northwestward of the island, and is marked at its western end by a buoy and a lighted bell buoy is 500 yards farther to the northwest.

Cat Ledges are rocks in a group, the higher ones bare, located 0.5 to 1 mile northward of Lower Mark Island. The outer ones are 0.4 mile from the eastern shore. The coves eastward of the ledges are foul and of no importance.

Harmon Harbor is a long, narrow cove making northward on the western side of the river about 1.5 miles above Griffith Head. It has good anchorage, except during southerly gales, in 24 to 36 feet, but has a very narrow entrance between a bare ledge near the west shore and a dangerous reef, bare at low water, extending 275 yards southwestward from the wooded island on the eastern side of the entrance. In southerly gales the seas enter with force during the times of high water. There is a prominent hotel on the west side near the middle of the harbor, and a small settlement 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, close-to and westward of the buoy.

Five Islands Harbor, a narrow passage between Five Islands and the western shore, forms a secure harbor for small craft, with depths of 18 to 30 feet at low water. The main entrance is northward of **Malden Island,** the largest wooded island, and between it and a bare rock. In the middle of the entrance is a rock covered by 10 feet and marked by a horizontal-banded buoy. In entering, the buoy can be passed close-to on either side. Boats also can enter the harbor from the northwestward, following the western shore and passing inside of all islands and shoals. **Crow Island Ledge,** extending west from Crow Island at the northern entrance, is marked by a daybeacon, white cask on end on red iron spindle. The southern entrance is nearly blocked by rocks and ledges that bare at about half-tide, and should not be used without local knowledge.

Five Islands is a village with post office on the western side of the harbor. It has launch communication with Boothbay Harbor and Bath. The wharf has a depth of about 16 feet. There is a general store and gasoline is piped to the wharf.

Hendricks Harbor is a cove on the eastern side of Sheepscot River, the entrance being 0.4 mile southward of **Hendricks Head** former lighthouse tower. A Federal project provides for an entrance channel 30 feet wide and 9 feet deep, but no work has been done on this project up to 1949. The harbor is used by small craft only. The well-marked entrance has a depth of about 10 feet between ledges on either side, and depths inside are 4 to 9 feet. **West Southport** is a village with post office on the east side of the harbor. There are landings for small craft. A fixed bridge connects **Pratts Island** to Southport Island. The horizontal clearance is 23 feet and the vertical clearance is 6 feet.

The Southport Yacht Club is located at Hendricks Harbor which is known locally as **Cozy Harbor.** The club has a pier and float landing with 4 feet alongside at low water. There are several fish wharves and water and gasoline are piped to one of them. The general store has limited supplies.

Chart 230.—About 6 miles of Sheepscot River is shown on this chart which is a large-scale of the inside passage from Boothbay Harbor to Bath. Chart 314 also shows this section, but its scale is smaller and Chart 230 should be used if going into Ebenecook Harbor or any of the channels except the main river.

Ebenecook Harbor is an excellent anchorage for vessels up to 20-foot draft. Its entrance, about 1 mile above Hendricks Head on the eastern bank of the river, 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. The entrance is narrow; large sailing vessels must have a fair wind when leaving the anchorage. The village of West Southport is near the southern end of the harbor. That end of the harbor should be avoided by strangers. There are boat storage sheds.

Directions, Ebenecook Harbor, give the eastern shore of Sheepscot River a berth of over 300 yards for 1 mile above Hendricks Head 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 **096°** 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 150 yards, and steer **074°** with the south point of the islands astern. Anchor on this course near mid-harbor, or favoring the eastern shore, in 24 to 36 feet, 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. The channel is a part of the Inside Passage used by local vessels between Boothbay Harbor and Bath. Navigation of its northern part, as well as the passages between the islands and ledges on its western side, requires some local knowledge. The principal islands and rocks are: **Green Islands** are wooded; a rock bare at low water is 200 yards northeastward of them and is marked by a buoy on its southeast side. A bare ledge is between Green Islands and Boston Island, and a rock with 6 feet over it is 250 yards westward of the ledge. **Boston Island** is high and partly wooded, and has several houses and a boat landing. **Spectacle Islands** are partly wooded. A rock bare at low water is 150 yards westward of their southwest end.

Townsend Gut, Isle of Springs, and Sawyer Island, on the eastern side of Sheepscot River, and Little Sheepscot River and Goose Rock Passage on the western side, are described under the Inside Passage.

Bull Ledge, 1 mile northward of Hendricks Head, is bare in one place at low water, and is marked at the south end by a horizontal-banded buoy.

Middle Mark Island, a small, round, bare islet, is in the middle of a ledge 0.3 mile long located 0.3 mile from the western shore and 1.5 miles above Hendricks Head. **Mark Island Ledge,** with 7 feet on it, is 250 yards southwestward of the island. The main channel leads eastward of the island.

Middle Ledge, 600 yards eastward of the southern side of the entrance to Goose Rock Passage, has a least-found depth of 8 feet, but less depth has been reported on this ledge. A buoy marks its northern side.

Clous Ledge, 0.2 mile eastward from **Whittum Island,** wooded, at the entrance to Goose Rock Passage, is awash at half tide and marked by a black daybeacon, spherical cage on iron spindle, on the middle of the ledge and a bell buoy off its northern end.

Powderhorn Island, low and grassy, is on the eastern side of the river 2 miles above

Hendricks Head. **Powderhorn South Ledge,** awash in places at low water, extends 0.3 mile southward from the island, and is marked at its south end by a buoy. A narrow channel is between the buoy and the north end of **Harding Ledge,** sunken and marked at its south end by a buoy.

Powderhorn Ledge, with 3 feet on it, is 200 to 350 yards northward of Powderhorn Island, and is marked on its north side by a buoy.

Fourfoot Rock, on the west side of the channel about 0.2 mile northward of Clous Ledge Daybeacon, is marked on its southern side by a horizontal-banded buoy.

Ram Island Ledge, awash in spots at half tide, is on the east side of the channel and extends 0.3 mile in a north-northeasterly direction from **Ram Island** to the entrance to Back River. It is marked on its eastern side by a daybeacon, white cask on end on black iron spindle, and a buoy, which are guides to the narrow channel leading northward from Ebenecook Harbor.

Upper Mark Island is a low grassy ledge from which a shoal extends 600 yards northward toward Hodgdon Ledge.

Jewett and **Long Coves** are unimportant coves on the west side of Sheepscot River westward of the entrance to Back River.

Back River is a shallow, narrow, and unmarked stream between **Barter Island** and the mainland. Its southern entrance is on the eastern side, about 3 miles northward of Hendricks Head; its northern entrance is from Cross River. Only small craft use it; local knowledge is required for its navigation. The entrance to Back River is marked by a buoy 350 yards westward from the southern end of Barter Island. There are several private float landings on the south end of Barter Island, just inside the entrance. A drawbridge across the river between **Hodgdon Island** and the south end of Barter Island has a horizontal clearance of 40 feet and closed vertical clearance of 6 feet at high water.

Trevett is a small village, with post office, on Hodgdon Island at the end of the drawbridge. It has a general store. A fixed bridge connects Hodgdon Island with the mainland. The horizontal clearance is 14 feet and the vertical clearance is 4 feet.

Tarbox Landing is a small settlement just north of **Tarbox Cove** on the west side of the Sheepscot River. **Hodgdon Ledge,** 250 yards eastward of Tarbox Cove, is bare at half tide and marked on the southeast side by a buoy.

Greenleaf Ledge, on the west side of Sheepscot River just south of the entrance to Cross River, is bare at half tide and marked by a buoy. Shoals fill the bight from the buoy to the western shore.

Chart 314.—Cross River empties into the east side of Sheepscot River about 6 miles above Hendricks Head. It has a deep channel for over 1 mile to **Oven Mouth** where the river is confined to a narrow channel between high cliffs. **Oven Mouth River,** southeast of the Oven Mouth, requires local knowledge to navigate.

Merrill Ledge, 2.4 miles above the entrance to Cross River, is bare at half tide in the middle. At the south end it is marked by a daybeacon, red cask on end on wooden spindle, and at the north end by a buoy. The channel leads westward of it.

A rock with 13 feet over it is about 500 yards southward of **Clough Point,** the north end of Westport Island. The rock is on the west side of the river, a little eastward of a line connecting the buoy off Clough Point and the buoy just above **Hilton Point. Seal Rock,** 550 yards westward of Clough Point, is bare at half tide and marked on the north by a buoy. During times of strong currents the buoy is reported to tow under. Monts-

weag Bay and Back River form a thoroughfare from Sasanoa River and Hockomock Bay to Sheepscot River near Wiscasset. They are described under the Inside Passage.

Wiscasset is a town on the west side of Sheepscot River 14 miles above the entrance. It is on U. S. Highway No. 1 and on a branch of the Maine Central Railroad.

The wharves are in ruins and there is virtually no commerce by water. The hulks of two four-masted vessels rest on the bottom alongside the wharf ruins. Depths of 15 feet are alongside the town float landing at the south end of town, and alongside a privately-operated float 200 yards southwestward. There are no facilities for taking supplies on board.

The Central Maine Power Company operates a large electric plant and a good pier with coal crane on **Birch Point** 0.7 mile southwestward of the bridge at Wiscasset. The pier has a depth of 33 feet alongside at low water. Large colliers and tankers unload at the pier.

The highway bridge over Sheepscot River at Wiscasset has a swing span with a horizontal clearance of 40 feet and a closed vertical clearance of 10 feet at high water. The railroad bridge 1 mile above Wiscasset has a bascule span with a horizontal clearance of 36 feet and a closed vertical clearance of 8 feet at high water.

The depth above Wiscasset is reported to be about 10 feet for 4 miles above Wiscasset to rapids in the river. Boats of about 4-foot 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 required for its navigation.

The mouth of the **Kennebec River** is northward of Seguin Island and 20 miles eastward of the entrance of Portland Harbor. It is the approach to Bath, Augusta, Richmond, Gardiner, and smaller places. The river has considerable trade by vessels, and the deepest draft going to Bath is 28 feet, and 12 feet to Hallowell, 2 miles below Augusta. In 1949 there was no regular traffic by water to Augusta, the head of navigation.

The Federal project for improvement of Kennebec River provides for a channel 27 feet deep and not less than 500 feet wide from the mouth to a point about 0.6 mile above the bridge at Bath; thence to Gardiner a channel 50 feet wide and 17 feet deep at Beef Rock Shoal at the foot of Swan Island; thence 18 feet through rock at Lovejoy Narrows, decreasing to 16 feet at Gardiner; a channel west of Swan Island 100 feet wide, 12 feet deep, except at the upper shoal where the depth was to be 15 feet; and a channel from Gardiner to Augusta 125 feet wide and 11 feet deep.

Controlling depths were 19 feet from mouth to Bath, in 1946; 13 feet Abagadasset Point to Gardiner-Randolph Bridge, and thence 8 feet to Augusta in 1942.

Anchorages.—The holding ground is poor at the entrance below Fort Popham; vessels should not anchor here unless forced to do so. If obliged to anchor when inside Pond Island, it is advisable to come to with a long scope of chain in the channel abreast the wharf in ruins just above the Coast Guard station. If the wind is not blowing strong a moderate-sized vessel may ride here if care is taken to keep the anchor clear. Strong tidal currents will be experienced.

Anchorage can be had on the eastern side of the channel southward of Kennebec River buoy 12 in 36 to 48 feet. On the eastern edge of the channel at the anchorage the depths shoal abruptly from 30 feet to a few feet. Drift ice coming down the river generally follows the western shore.

The best anchorage, and the one most frequently used, is on the western side of the channel off Parker Flats in 24 to 36 feet. Large vessels sometimes anchor on the eastern side in this area. Above Parker Flats, vessels anchor wherever they find good holding ground and suitable depth, keeping out of the strength of the current.

Federal regulations defining anchorage grounds at Bath are given in Chapter 3, §202.131.

Directions.—This area is a region of rock and very broken ground, and has not been examined by means of a wire drag. Therefore, strangers should proceed with extreme caution and avoid crossing broken ground where the charted depths do not substantially 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 gong buoy and the shoals eastward. The eastern channel has a least found depth of about 27 feet on a small spot easily avoided, and the western a least found depth of 24 to 30 feet on the sailing lines. Both are used, but vessels of more than 18 feet in draft usually 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 which is at times dangerous for small craft.

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 about 100 yards wide. The sections of the dredged channel between the south end of Swan Island and Augusta are not marked well enough to help strangers keep in them.

From eastward to southward.—Having come from Boothbay Harbor or Fisherman Island Passage, pass about 200 yards south of The Cuckolds bell buoy and steer **246°** to pass midway between the Black Rocks and The Sisters. When the daybeacon marking The Sisters is abeam, change course to **230°**, heading to pass just northwestward of the lighted bell buoy marking White Ledge. When about 200 yards northward of this lighted buoy, change course to **300°**, heading to pass about 100 yards south of the buoy marking the end of the reef extending southward from Stage Island. From this buoy proceed as directed by table in Chapter 3.

If coming from the eastward and outside the islands, pass about 0.2 mile south of the lighted whistle buoy 2 miles southward of Bantam Rock, and steer **295°** to pass about 200 yards northward of White Ledge lighted bell buoy. When northward of this bell buoy, change course to **300°** and proceed as in the preceding paragraph.

If approaching from the westward or from the southward, proceed to a position about 700 yards westward of Seguin Island Light, from which position steer **009°** until Pond Island Light is abeam, then change course to **300°** to pass about 100 yards south of the bell buoy off Stage Island.

No directions are given for the river above Bath. With the aid of Charts 314, 288, and 289, small craft should have no trouble reaching Augusta. Vessels with a draft approaching the depth of the channel should employ a pilot. The channel above Bath is reported to be subject to considerable changes annually caused by freshets.

The main and deeper channel leads eastward of Swan Island. Just northward of Swan Island is the Richmond-Dresden State highway bridge with a draw.

Tide.—The mean range of tide is about 8½ feet at the entrance, 6½ feet at Bath, 5 feet at Gardiner, and 4 feet at Augusta.

Tidal currents between the entrance and Bath have average velocities at strength of from 2 to 3 knots. Ebb velocities up to 4 knots have been observed and consider-

ably larger velocities may be expected during freshets. Above Bath similar velocities are believed to occur but no definite information is available. The direction of the current at the entrance is influenced by strong winds, especially easterly gales. Current predictions for a number of locations may be obtained from the *Current Tables*.

Freshets occur in March and April, and also after heavy rains in the fall, but are not dangerous to shipping unless accompanied by ice. A height of 9 feet above 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. Steamers are rarely delayed by ice below Bath.

Pilots.—A pilot for the river may be had at Bath and another at Popham Beach. Vessels desiring a pilot should make advance arrangements for the pilot to meet them at the entrance. Pilots may also be obtained by signaling the Coast Guard station at Popham. Pilotage is not compulsory, but strangers of deep draft should take a pilot.

Towboats.—A towboat is stationed at Bath.

The U. S. Public Health Service maintains a **relief station** at Bath.

Bath is a **port of entry** and marine documents are issued.

Kennebec River formerly had a large trade in ice, and the ruins of the old ice wharves can be seen at numerous places along the river banks. Log booms are found in the river between Gardiner and Augusta. At present there is considerable traffic in coal, fuel oil, and oil products.

Cape Small is the wooded point about 4 miles westward of the mouth of the river. The distinguishing marks are an elevated tank 1.4 miles from the end and visible from eastward or westward; **Fuller Rock,** a low, bare islet 0.3 mile southward of the point and marked by an unwatched light—white skeleton tower; **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 daybeacon—red wheel on iron spindle—and a bell buoy. There are submerged rocks and very broken ground, which has not been closely examined, in the vicinity of the cape.

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.

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 4.5 miles from the entrance. The most southerly known danger is **Seguin SSW Ledge,** which has a least found depth of 33 feet; it is 0.5 mile southeastward of Seguin Island whistle buoy. The other dangers outside of Seguin Island are **Mile Ledge,** with a least found depth of 20 feet and marked by a lighted bell buoy, and **Camel Ground,** 1 mile west-southwestward of Seguin Island Light, which has been wire-dragged to a depth of 23 feet. Camel Ground is unmarked and the sea breaks on it in heavy weather.

Chart 238.—Seguin Island, 145 feet high, is grassy, and marked on top by a light; it is the most prominent mark in this vicinity. The light, 180 feet above the water and visible 20 miles, is shown from a white cylindrical tower connected to a dwelling. The fog signal is a diaphone air horn.

Ellingwood Rock, 400 yards northward of the north end of Seguin Island, is a bare islet about 6 feet high.

Seguin Ledges, 0.5 mile northeastward of Ellingwood Rock, are about 5 feet high, and have submerged ledges extending 300 yards northeastward and southward from the bare ledge.

Pond Island, about 30 feet high, is a grassy island on the west side of the entrance to Kennebec River, and marked on top by a light. The light, 52 feet above the water and visible 12 miles, is shown from a white tower connected to a dwelling. The fog signal is a bell.

Pond Island Shoal is the rocky shoal southward and southwestward of Pond Island. It has depths of from 5 to 21 feet over it, and in heavy gales is covered with breakers. A black gong buoy marks the southeastern end of the shoal and is 0.7 mile southward of Pond Island Light. Vessels should not pass between this buoy and Pond Island.

Wood Island, 0.3 mile westward of Pond Island, is high and wooded. The channel between Wood and Pond Islands should not be used by strangers.

Whaleback Rock is a bare rock about 8 feet high on the eastern side of the entrance to the river and 0.5 mile eastward of Pond Island. A shoal extends about 100 yards southward from it. **Salter Island,** northward of Whaleback, is wooded. **Stage Island** 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.

North and **South 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,** near the end of a ledge extending 125 yards northeastward from South Sugarloaf, is bare at low water and marked by a daybeacon, black spherical cage on iron spindle. A rock baring 1 foot at low water is 125 yards 140° from the daybeacon. A 5-foot spot is 100 yards 260° from the daybeacon. Ledges marked by a buoy extend for 175 yards southward and another 125 yards northwestward from North Sugarloaf.

Popham Beach is a summer resort on the west side of Kennebec River just inside the entrance, the landing being westward of Fort Popham. Kennebec River Coast Guard Station is located here. The wharf near the Coast Guard station is in ruins, but some offshore piling remained in 1949.

Fort Popham is an unfinished and abandoned stone fort on **Hunniwell Point.** A small quantity of gasoline and stores may be obtained southwest of the fort. Fort Popham Light is shown from a 6-foot cylindrical iron stand on the parapet of the old fort. The light is most brilliant on the bearings 323° and 172° and diminishing around the remainder of the horizon. The fog signal is a bell.

Bay Point is a village on the east side of Kennebec River, eastward of Fort Popham. The wharf has a depth of about 13 feet. There is a general store and gasoline is available.

Gilbert Head, the southern extremity of **Long Island,** is high and wooded except near the end, where there is a large white house.

Shag Rock, on the eastern side of the channel between Gilbert Head and Cox Head, is bare 3 feet at high water and marked by a daybeacon, red slatted tripod.

Cox Head is high and wooded. Todd Bay, on the east side of Kennebec River northeastward of Cox Head, is almost entirely bare at low water. An abandoned quarry is 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 Light, on the west

side, 41 feet above the water, is shown from a white octagonal tower. The fog signal is a bell.

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. The channel is sometimes marked by bush stakes and there are several old piling along its sides southeast of the former mill dam.

Back River is a narrow, crooked, and unmarked thoroughfare connecting Kennebec River with Sasanoa River and Hockomock Bay. It is described with the Inside Passage. **West Georgetown** is a village on the east side of Back River, just inside its southern entrance.

Seal Rock, on the west side of the channel at the upper end of **Parker Flats,** is bare at half tide. A buoy is northeastward of it.

Phippsburg is a village on the west side of Kennebec River 5.5 miles above the entrance. A white church spire in Phippsburg is prominent from the river.

Squirrel Point, the southwestern extremity of Arrowsic Island, is marked by a light. It is shown from a white octagonal tower and is 25 feet above the water. A sector between 322° and 332° covers the fairway.

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 6.5 miles above the entrance, are awash in the highest part at extreme high water and marked at the south end by a daybeacon, black cask on bilge on iron spindle. **Ram Island,** just northward of Pettis Rocks, is low and bushy, and marked by Ram Island Light. It is shown from a white skeleton tower. A reef bare at low water extends nearly 200 yards northwestward of the island. Vessels passing westward of the island sometimes ground on this reef.

Chart 230.—At **Bluff Head,** 1 mile above Ram Island, the river narrows. The upper part of this section is marked by Doubling Point Lighted Range. The lights are shown from white octagonal towers. The range is 359°. This range passes very close to and eastward of **Lithgow Rock** and **Fiddler Ledge,** both of which are unmarked. It will be better to steer a little eastward of the range rather than take any chance of the vessel getting to the westward of it.

Just north of Fiddler Ledge the channel takes a sharp turn to the west through **Fiddler Reach.** On the north side of the reach and 300 yards west of the range line is a fog bell sounded from a white pyramidal building. **Doubling Point** at the right angle turn from Fiddler Reach to **Long Reach** is marked by a light. It is shown from a white octagonal tower on a square gray pier with a footbridge to the shore. The light is 23 feet above the water.

Winnegance is a village on **Winnegance Creek,** 0.5 mile from the main channel of Kennebec River. The channel is shoal, and navigable only by small craft. Old piling extend across the creek northeast of the highway bridge and are partly covered at high water.

Bath, a city on the west bank of the Kennebec 12 miles above the entrance, has water-borne trade consisting mostly of coal and petroleum products. Depths up to 27 feet are at the wharves, the deepest being at a coal wharf. The maximum draft going to Bath is about 28 feet. A fish cannery with wharf having 12 to 15 feet alongside at low water is on the west bank of the river 1 mile north of the bridge.

A combination highway and railway drawbridge crosses the Kennebec River at Bath. The vertical lift span has a horizontal clearance of 200 feet and a closed vertical clearance of 10½ feet, and open vertical clearance of 135 feet, at high water. The signal for opening the draw is three blasts of the whistle.

Two public float landings are provided, one at the foot of Broad Street, and another at the old ferry slip. The city marshal acts as harbor master.

Coal and gasoline are available at Bath. There are no facilities for fuel oil. Diesel oil is delivered by tank wagon.

An important shipbuilding plant at Bath has facilities for making above-water repairs. There are no drydocks or marine railways for large vessels. Boats up to 50 feet in length can be hauled out at the boatyard 1.3 miles below the highway railroad bridge. This yard has several marine railways and a float landing with a depth of 10 feet alongside. Gasoline is piped to the landing.

The Sasanoa River entering the Kennebec River between **Preble Point,** the northern extremity of Arrowsic Island, and **Sasanoa Point,** the southern extremity of **Towesic Neck,** is described under the Inside Passage.

Woolwich is a village on Towesic Neck opposite Bath. The oil wharf has 14 feet alongside. A boat building shop is in the town. The coal wharf and the old ferry landing are in ruins.

Chart 314.—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 in draft, at low water, but the channel is narrow and unmarked. It leads between reefs on each side, and is not safe for strangers. **West Branch** is deep and clear, and is generally used. A rock bare at low water is 50 yards off the west side of the island.

Chops is the narrow passage between two headlands 0.7 mile above Lines Island. Two steel towers supporting a power line across the channel are prominent. The vertical clearance of the power line is 145 feet.

Merrymeeting Bay is a shoal bay making westward from Kennebec River 17 miles above the entrance. The bay is the approach to the towns of **Brunswick** and **Topsham** on the **Androscoggin River,** and **Bowdoinham** on the **Cathance River,** 8 and 4 miles, respectively, above Kennebec River. Boats of 6-foot draft can go to Brunswick and 12 feet to Bowdoinham at high water, but there was very little traffic in 1949. The channels are narrow and unmarked, and local knowledge is necessary for their navigation. The mean range of tide is about 4 feet. A fixed railroad bridge with vertical clearance of 20 feet at high water crosses Androscoggin River just below Brunswick.

It is reported that heavy storms and winter ice change the shoals and depths in Androscoggin River.

A Federal project provides for a channel 200 feet wide and 10 feet deep from the outlet of Cathance River into Merrymeeting Bay to the channel of Kennebec River near the Chops, a distance of about 2 miles. In 1946 the controlling depth was 9½ feet.

Chart 288.—A day range is on the eastern shore to indicate the best water to pass the shoals extending northeastward from **Abagadasset Point.** The front daybeacon is a white triangular daymark on post and the rear daymark is a white square daymark with

black vertical stripe on post. **Ames Ledge,** on the eastern side of the river and northward of **Twing Point,** is marked by a daybeacon, white cask on bilge on red spindle.

Swan Island divides the river into two channels. The western channel has been dredged to a depth of 12 feet over a width of 125 feet but it is not marked nor maintained. The main channel is east of Swan Island. This channel is marked by buoys and a daybeacon on **Beef Rock,** red cask on end on wooden spindle which is removed in the winter. East of the main channel rip rap training walls extend from off **Carney Point** to **Green Point.**

Eastern River enters the Kennebec River between Carney Point and the training wall. The river follows the eastern shore to **South Dresden.** It is unmarked and is crossed by two fixed bridges. The bridge at the mouth has clearances of horizontal 38 feet and vertical 5 feet in the south span and horizontal 40 feet and vertical 4 feet in the north span. The second bridge about 2 miles upstream has a horizontal clearance of 221 feet and a vertical clearance of 20 feet.

Richmond is a town on the west bank of the river 23 miles above the entrance. There is a small float landing used by the boat carrying supplies to Swan Island, a State game preserve. Gas and water are available in town.

At a point just north of Swan Island, the river is crossed by a State highway drawbridge with a swing span having horizontal clearances of 63 feet in the east side and 58 in the west, and a closed vertical clearance of 15½ feet. The signal for opening is three blasts.

Chart 289.—Dresden Landing (**Cedar Grove**) is a small settlement on the east side 2 miles above the north end of Swan Island and 0.7 mile above **Courthouse Point.**

South Gardiner is a village on the west side of the river 30 miles above the entrance. The tall brick stack of a former pulp mill stands close to the river. There is a lumber mill but the wharves are in ruins.

In 1942 there was a depth of 13 feet above the east opening in the draw of the Gardiner-Randolph Bridge. The west opening in the draw had a depth of 5 feet. There was a depth of 11 feet, 250 yards 172° from the outer end of the wharf at Goodwin Point; a depth of 5 feet, 150 yards 015° from the north end of Browns Island; a depth of 9 feet, 750 yards 335½° from the wharf at Shepard Point. The controlling depths in the improved channels were: Shepard Point Channel, 11 feet; Oil Cloth Point Channel, 9 feet; Youngs Point Channel, 10 feet.

Gardiner is a town on the west side of Kennebec River, 33.5 miles above the entrance. The deepest draft coming here is 12 feet. The wharves are in good condition, have depths up to 15 feet. Coal and gasoline are shipped here in vessels drawing 11½ feet. The coal wharf is used by vessels desiring to take on gasoline, water, and supplies from the town. **Farmingdale,** adjoining Gardiner on the north, is the site of a power plant with a tall white stack. **Randolph** is a village on the east side, opposite Gardiner.

At Gardiner the river is crossed by a highway bridge having a swingspan with a horizontal clearance of 65½ feet and a closed vertical clearance of 20 feet at high water. The eastern opening should be used.

About 1.5 miles above Gardiner, at **Browns Island,** the river is crossed by two transmission lines supported by high towers. Log booms extend southwestward and northwestward from Browns Island. The booms are kept in repair, but there was no logging on the river in 1949.

Hallowell is a town on the west side of the river 37 miles above the entrance. The coal wharf is in good condition. Tankers drawing 11 feet deliver oil to wharves at storage tanks on **Oil Cloth Point,** about 0.5 mile above Hallowell.

A pinnacle rock with a depth of 5 feet over it at low water is located on the east side of the channel about 450 yards southwestward of the wharf on Oil Cloth Point.

Augusta, the capital of the State of Maine, is at the head of navigation on Kennebec River, 39 miles above the entrance. The principal wharves are on the western side just below the bridges. In 1949 there was no traffic by water. The river is obstructed by a dam above the three fixed bridges.

Chart 315.—Casco Bay is a very extensive area between Cape Small and Cape Elizabeth, a distance of 17.8 miles. Between these two capes the bay extends up into the land an average distance of about 12 miles. The whole number of islands in Casco Bay is one hundred and thirty-six, and very many are fertile and under cultivation and nearly all are inhabited. Nearly every island lies northeast and southwest, which is the general course of the bay and of all the rivers and coves contained within its limits.

Anchorages.—In the eastern part of Casco Bay the best anchorage for strangers is in New Meadows River. Local fishermen and yachtsmen frequently use Sebasco and Cundy Harbors. Potts Harbor, Harpswell Harbor, and Mackerel Cove are good anchorages in the middle of the bay for small vessels and yachts. Merriconeag Sound and Harpswell Sound and the whole 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 used mostly by vessels.

Directions.—This area is an area of rocks and ledges and, except in the approaches to Portland Harbor, Hussey Sound, and the bay bounded on the east by Little Chebeague Island, on the north by Lower Basket Ledge and on the west by Clapboard Island, has not been examined by means of a wire drag. Consequently, vessels should 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 in Chapter 3. 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.

Tides.—The mean range of the tide in the bay is about 9 feet.

Currents.—The average velocity of the tidal current at strength is about 1 knot in the entrance to Portland Harbor and in Hussey and Broad Sounds. In the open waters of the bay it is generally ½ knot or less. Current predictions for a number of locations may be obtained from the *Atlantic Coast Current Tables.*

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.

The part of Casco Bay between Cape Small on the east and Halfway Rock Light and Harpswell Neck on the west is full of small islands, ledges, and rocks. Between them narrow but deep channels lead to the bays and sounds at the head. These arms afford good anchorages for small vessels, but are used only by local fishing 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 Orrs Island.

Spoonbowl Ledge, with 5 feet over it, is 0.3 mile southward from Gooseberry Island Ledge buoy. Vessels bound from Cape Small to Small Point Harbor should be careful to avoid this ledge.

East Brown Cow, 1.6 miles west-northwestward of Bald Head, is bare and about 12 feet high. **Mark Island,** 0.8 mile northward of East Brown Cow, is high and thickly wooded. **Mark Island Ledge,** 0.3 mile southwestward of Mark Island, is bare at low water.

White Bull, 1 mile westward of Mark Island, is high, round, and bare. A gong buoy is located about 0.4 mile south of it. **Bold Dick,** 0.7 mile west-southwestward of White Bull, is a bare rock covered by extreme high tides.

Small Point Harbor, on the east side of Casco Bay, 1.5 miles northward of Bald Head, is used considerably as an anchorage by local fishermen and yachts. The principal dangers are marked but the holding ground is poor.

Small Point is a village, with post office, on the eastern side of Cape Small Harbor. It has telephone communication and an improved highway to Bath, the nearest city.

Cape Small Harbor affords good anchorage for small craft. It may be entered by passing either northward or southward of **Goose Rock,** but those passages are shoal, having no more than about 4 feet at low water. It is reported that only local fishermen use the channel south of Goose Rock, and that larger vessels and strangers use the channel north of that rock.

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 partly wooded, and **Little Wood Island** is thickly wooded. A rocky shoal covered by about 5 feet is about 0.3 mile off the south point of Wood Island. It is marked by a buoy. **Gooseberry Island Ledge,** on the south side of the southern entrance, is awash at low water and marked by a buoy.

Carrying Place Cove is a thoroughfare on the north side of Small Point Harbor eastward of **Carrying Place Head.** It is navigable only at high water. It is reported that 5 feet of water can be carried through Carrying Place Cove at high water.

West Point is a fishing village on the eastern side of the thoroughfare. There are wharves for small craft, and gasoline and some provisions are obtainable. The town has a post office and highway connections to Bath.

The thoroughfare leading eastward of **Burnt Coat Island** is marked by buoys. Strangers in small craft should have no trouble navigating it.

Jamison Ledge, 0.5 mile westward of Burnt Coat Island, is 0.4 mile long, bare at low water, and marked at its south end by a daybeacon, black spherical cage on iron 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,** 0.4 mile northwestward of Flag Island, is grassy. **Goudy Ledge,** 0.6 mile northward of Flag Island, is bare at half tide and marked by a daybeacon, red and black spherical cage on iron spindle. Rogue Island, in the west side at the entrance to New Meadows River, is low, with scattered trees. The bottom in this vicinity is very broken.

Sebasco Harbor is a good anchorage for small vessels eastward and southward of Harbor Island and 3.5 miles northward of Bald Head. **Dry Ledges** (**North Blacksnake**) form a large, bare ledge in the entrance; the northern end should be given a berth of over

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100 yards, and the broken ground extending 300 yards eastward from the ledge should be avoided. The entrance is between Dry Ledges and the buoy about 200 yards southward of Harbor Island. Rocky ledges extending about 150 yards from both shores restrict the entrance to Sebasco Harbor. On the western side numerous bare rocks extend shoreward along the ledge in a northwesterly direction. Anchorage can be selected in 30 to 36 feet, 250 to 300 yards off the cove on the eastern side, and also in mid-channel off the landing inside Harbor Island in 24 feet. The thoroughfare leading northward from Sebasco Harbor, inside Harbor Island, is bare at low water.

Sebasco Estates is a summer resort on the east side of Sebasco Harbor. A pier with a float landing has a depth of 8 feet at low water. No supplies are available.

The thoroughfare 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 used considerably as an anchorage by small fishing craft. **Sebasco** is a village of fishermen on the east side. A ledge covered at high water extends 350 yards north-northeastward from Bear Island and is marked at its end by a buoy.

New Meadows River, at the northeastern end of Casco Bay, is about 8.5 miles long from **Bear Island** at the entrance to a highway and a railway fixed bridge at the head of navigation. It has a deep-water channel for the first 6 miles and a least depth of about 12 feet can be carried to within 0.5 mile of the head. The principal dangers are buoyed. Above that point the channel is crooked and unmarked and has a depth of about 7 or 8 feet 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 Gurnet Strait.

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 24 to 36 feet. A buoy marks the south end of the bare ledges on the northeast side of the harbor. Cundys Harbor is a village, with post office, on the western side. There are three fish factories with wharves and float landings. The principal wharf has a depth of 7 feet at the end, at low water. Gasoline is piped to one of the wharves, and supplies are available. A reef baring at about half tide is 75 yards south of the most northerly wharf.

Dingley Island, on the west side of the river about 1 mile above Cundy Harbor, has a wharf on its southeast side. The wharf was not in repair in 1949.

The Basin, a cove on the east shore about 1.3 miles above Cundy Harbor, has a narrow entrance. It 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 18 to 24 feet. There are a few private landings. 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 500 yards westward from the south islet. The north side of the bay is clear. There is considerable yachting activity in this bay and good anchorage is available in **Brighams Cove** at the head of the bay.

New Meadows and **Harding** are small villages at the fixed bridges crossing New Meadows River at the head.

Directions.—Entering from eastward, vessels should pass southward of Fuller Rock and Bill Wallace Ground, and westward of Bald Head Ledge Daybeacon. Passing

about 0.4 mile westward of the daybeacon, steer **340°** for the eastern edge of Flag Island for 2.4 miles. When the north end of Little Wood Island opens from the north end of Wood Island, steer **008°** for the western edge of Harbor Island, and pass 250 yards eastward of Jamison Ledge Daybeacon. Pass about 300 yards westward of Dry Ledges and, when the north end of the ledge is abeam, steer **335°** for the entrance of New Meadows River, and pass 350 yards westward of Bear Island.

Entering from westward, vessels can enter from southwestward, passing close to the gong buoy 800 yards south of White Bull, then between White Bull and Mark Island, then between Long Ledge and Flag Island, and then between Goudy Ledge Daybeacon and the buoy northward.

A more protected route, suitable for small craft, leads 100 yards east of the bell buoy southward of Jaquish Island, then on a **019°** course for 2.9 miles, following the eastern side of Bailey Island and passing westward of the buoys marking Middle Ground and Littlejohn Rock. When the latter buoy and the north end of Ram Island are on range bearing about 095°, steer **061°** for 1.3 miles to a position close westward of the buoy southward of Oak Island, marked by a few pines; take care to avoid the 4-foot rock which is southwestward of the buoy. Then steer **091°** for 1.2 miles, passing close southward of all three buoys to a position 100 yards south of the third buoy which marks the end of the reefs extending southward from Ballaststone Ledge. From this position the course is **077°** to a position 100 yards south of North Jenny Ledge buoy, and then **048°** to a position 100 yards southeast of **Rogue Island** buoy. From this position head up the river on a course of about **021°**.

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 **029°** to a mid-channel position southeastward of **Sheep Island Ledge** buoy. Then steer **007°** for the end of **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 well aboard, distant 500 yards or less. If 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 daybeacon, red cask on end on iron spindle, 0.2 mile eastward, and steer north-northwestward in mid-channel for 1.3 miles to the south end of Middle Ground. From this point the chart can be followed for another 1.5 miles, above which point a pilot should be used by strangers.

Ridley Cove is eastward of **Yarmouth Island** and just westward of the entrance to New Meadows River. The cove has good anchorage in 30 to 42 feet, but is exposed to southerly and southwesterly winds. It should be avoided by strangers because of the numerous unmarked ledges and rocks off the entrance. From its northern end a narrow, deep channel leads close northward of **George Island** into Hen Cove and another narrow channel, obstructed and suitable only for small craft in the absence of local knowledge, leads to Quahog Bay. **Hen Cove** has extensive shoals but is good anchorage for small craft.

Dangers off the entrance to Ridley Cove include **Jenny Island,** 10 feet high and grassy; **North Jenny Ledge,** bare at lowest tides and marked by a buoy at the south end; **Jenny Ledge,** bare 5 feet at low water; **Ballaststone Ledge,** 5 feet high and grassy, and numerous bare spots on Yarmouth Ledges.

Quahog Bay is a narrow arm extending about 4 miles in a northeasterly direction.

It offers good anchorage for small vessels. Numerous unmarked ledges and many small islands are 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 Orrs and Bailey Islands leads across the entrance. There is also a good channel between Saddleback Ledge, Ragged Island, Blacksnake Ledge, Yellow Rock and Twobush Island on the east, and Round Rock, **Middle Ground Rock,** and Cedar Ledges on the west. **Saddleback Ledge** has rocks awash, **Ragged Island** is high and scantily wooded on top, **Blacksnake Ledge** bares at low water, **Yellow Rock** and **Twobush Island** are grassy; **Round Rock** is covered at high water, and **Cedar Ledges** are bare. Several unmarked ledges and sunken rocks are in Quahog Bay. **South Ledges,** covered at high water, and **North Ledge,** covered at halftide, extend 0.4 mile southwestward and northeastward, respectively, from **Pole Island. Card Cove,** on the west side of the bay and west of Pole Island, is used by small fishing boats, but the entrance is only 50 yards wide between ledges off **Pinkham Point** and the point on the south side.

Gun Point Cove is a narrow arm of no importance making northward on the east side of **Orrs Island.** There are no wharves. The point on the east side is wooded and has a house on the end. A passage with a depth of 4 feet extends from the north end of Gun Point Cove into Harpswell Sound. This passage is crossed by a fixed bridge having a horizontal clearance of 45 feet and a vertical clearance of 14 feet at high water.

Lowell Cove, in the south end of Orrs Island, is used as an anchorage by local fishermen. There are several wharves, bare at low water, and a post office, at the head. Gasoline, water, and some supplies are available. **Water 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 0.6 mile southwestward of Pond Island, have many spots bare at low water.

Halfway Rock, about in the middle of the southern part of Casco Bay, is a low, rocky islet marked by a light. Ledges extend 0.2 mile southwestward and northward from it. **Webster Rock** at the end of the ledge extending northward is marked by a buoy.

Halfway Rock Light, 76 feet above the water and visible 14 miles, is shown from a white granite tower attached to a dwelling. The fog signal is an air-diaphragm horn. The radiobeacon is synchronized with the fog signal for distance finding.

Drunkers Ledges, 20 miles north-northeastward of Halfway Rock, consist of two ledges 0.3 mile apart. The southeast one has 4 feet over it and is marked on its southwest end by a buoy. The northwest one is bare at half tide and is marked near its western end by a daybeacon, red spherical cage on iron spindle. Between Drunkers Ledges and Jaquish Island is **Mark Island Ledge** with 4 feet over it and marked at its north end by a buoy. A broken ground with depths of 16 to 24 feet extends 0.5 mile south-southwestward from this ledge. In heavy weather the sea breaks on the shoaler places.

Little Mark Island, on the west side of Merriconeag Sound at the entrance, is grassy and marked by a black and white stone pyramidal monument from which a light is shown. The light is 74 feet above the water and visible 7 miles. **Great Mark Island** is bare and grassy.

Whale Rock, a bare ledge nearly awash at high water, is 0.4 mile southwestward of Little Mark Island.

Merriconeag and **Harpswell Sounds** are of little commercial importance, but they

form the approach to a good and convenient anchorage. Vessels of the deepest draft can enter and find anchorage in 21 to 60 feet, good holding ground.

The entrance is 3.5 miles north-northeastward of Halfway Rock Light, and is marked on its western side by a lighted stone monument on Little Mark Island. The two sounds extend in a northeasterly direction 10 miles, and for the first 4 miles the prominent dangers are marked. Above 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 Merriconeag Sound from eastward and westward are given in Chapter 3.

The Casco Bay steamers, drawing 7 to 11 feet, call at Mackerel Cove and at Orrs Island, at the west side of Wills Gut. The channel from Harpswell Sound, northeast of New Meadows River, also is used by yachts and fishermen. The wharf at **Gurnet** is in ruins, but there is a float landing with 3 feet alongside at low water. Gasoline and a limited quantity of stores are available.

Jaquish Island, on the east side of the entrance to Merriconeag Sound, and **Turnip Island,** westward of it and marked by a pillar of stones, are low and grassy. There is reported to be a controll ng depth of 7 feet at low water in **Jaquish Gut.**

Charity Ledge, eastward of Jaquish Island, has a charted depth of 11 feet and is marked by a buoy.

Mackerel Cove, in the southwestern shore of Bailey Island, is a good anchorage in 30 to 48 feet for small craft which use it frequently; it is open southwestward, but a heavy sea never enters. Bailey Island is the eastern point at the entrance to Merriconeag Sound. **Bailey Island,** a village with post office on the cove, is connected with Portland by steamer. There are no dangers; the water shoals gradually toward its head. The steamer wharf with about 14 feet alongside, and the post office, are on the east side of the cove. Gasoline is piped to the wharf and limited supplies are available. Ice seldom obstructs the cove.

The southwestern point of Bailey Island is marked by a house and an observation tower. A windmill is prominent on the narrow part of the island abreast the head of Mackerel Cove.

Orrs Island is a summer resort on the southwest end of the island of that name. It is connected with Portland by steamer. The steamer wharf has a depth of 10 feet. Just southwestward of the wharf is a shoal marked by a private daybeacon, spindle. Gasoline is piped to a float landing having a depth of 4 feet alongside at low water. Provisions are available. Pilots may be engaged here for any part of Casco Bay. The approach to the wharves is northward of a buoy and daybeacon marking the end of **Cox Ledge** which bares at low water, and extends from Bailey Island. Cox Ledge Daybeacon is a red cask on end on iron spindle.

Wills (Gut) Strait is a thoroughfare between the south end of Orrs Island and the north end of Bailey Island. It is used by local fishing boats, but the channel is very narrow and difficult. Strangers using the channel should await low tide, when the flats bare enough on each side to indicate the channel course. A fixed stone bridge over the gut has a horizontal clearance of 50 feet and a vertical clearance of 10 feet at high water. The ruling depth through the gut is reported to be 5 feet.

Ram Island, on the west side of Merriconeag Sound northward of the thoroughfare leading into Potts Harbor, has one house and is bare and grassy. Ledges, bare and sub-

merged, extend 500 yards southward of the island to a buoy. A channel northwestward of the island has a depth of at least 8 feet at low water. It leads between shoals on each side and should not be used by strangers.

A submerged cable crosses Merriconeag Sound at the north end of Bailey Island. Both ends of the cable are marked by signs.

Harpswell Harbor, on the west side of Harpswell Sound more than 3 miles above Little Mark Island, is a good anchorage in from 18 to 36 feet, shoaling gradually to the head. There are private float landings for small craft on the west side and a small settlement is on the main road back of the landing.

Special anchorage areas for vessels not more than 65 feet in length have been prescribed by Federal Regulation for **Beals Cove** and Harpswell Harbor, and are described in Chapter 2, §202.5.

Reed Cove, on the west side of Orrs Island, has a boatyard on the north side. Small boats are hauled out for repairs or storage.

There is a thoroughfare from the north end of Harpswell Sound through **Ewin Narrows, Prince Gurnet,** and **Gurnet Strait** (**Simon Gurnet**) to New Meadows River. It is occasionally used by local boats. The channel is narrow and has many dangers; the tidal currents are strong; and the thoroughfare should not be used by strangers. It is marked by bush stakes. Gurnet Strait is crossed by a fixed bridge with a horizontal clearance of 36 feet and vertical clearance of 7 feet at high water The depth at the bridge opening is about 6 feet, and is reported the shoalest place on the route. The current through Gurnet Strait 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 in the level of the water on either side of the bridge. The flood currents meet in the reach between Prince Gurnet and Gurnet Strait.

The part of Casco Bay westward of **Harpswell Neck** 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. Many summer resorts and landings are on the islands and shores of the bay, and small steamers from Portland run as far east as Orrs Island and call 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. The bay is frequented by many yachts and small pleasure craft, and some fishing boats. The steamers running to the landings are of 7 to 11 feet in draft, and most of the wharves on the islands are built for vessels of about this draft.

Through **Hussey Sound** 42 feet can be taken on either side of **Soldier Ledge.** The inland channel extends from Peak Island along the north shore of Long Island. From the bell buoy in the entrance to Broad Sound, 42 feet can be carried to good anchorages in upper **Broad Sound** to Middle Bay, and to the area of French Island and the north end of Great Chebeague Island. Also, 42 feet can be taken through **Luckse Sound** to the vicinity of Little Bangs Island. There is a minimum effective dragged depth of 27 feet through the channel eastward of Little Bangs Island to off the north point of Great Chebeague Island. An inland channel used by inter-island ferry steamers, yachts, and fishing craft extends from the south point of Chebeague Island around either side of

Little Bangs Island, across Broad Sound and through Potts Harbor to Merriconeag Sound.

Provided care is taken to keep off the ledges and other charted dangers, excellent anchorage is available in the area inside of Hussey Sound, in the upper part of Broad Sound, in the southern part of Middle Bay, and in the areas east of French Island and north of Chebeague Island.

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. The harbor affords good anchorage in depths of 24 to 33 feet. **South Harpswell** is a village with post office, on the east side of Potts Harbor, and has a steamer landing with 16 feet at low water. A small wharf with gasoline piped to it has a depth of 4 feet at low water. Limited supplies are available at the general store. There are two entrances to the harbor. The eastern one, from Merriconeag Sound is buoyed but 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. **Basin Cove** has been made a special anchorage area, see Chapter 2, §202.5.

Outer Green Island, 4 miles westward of Halfway Rock Light, is grassy. **Junk of Pork,** a high rock with surrounding bare ledges, is 250 yards southward of it. **Johnson Rock,** 0.2 mile northeastward of Outer Green Island, with foul ground between, has 8 feet over it, and is marked on its north side by a buoy. **Green Island Reef** is about 0.2 mile long and bare at low water; it is 0.4 mile southwestward of Inner Green Island, with foul ground between. It is marked on its southwest side by a buoy. **Green Island Passage,** leading between the buoys, has a width of 400 yards, and is used by small vessels. **Inner Green Island** is low and grassy.

Jewell Island and **Cliff (Crotch) Island** are partly wooded. Numerous houses and landings are on the northwest side of Cliff Island. The steamer landing on the west side of Cliff Island has about 22 feet alongside. A float landing, post office, and general store which handles gasoline, are here. At a fish wharf on the south central side of the island is a float landing with 6 feet of water. Gasoline is available. A ledge with 3 feet over it in places extends 0.4 mile southwestward from the southern end of Cliff Island. **Johns Ledge,** at its end, covered by 16 feet, is marked by a 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. A landing for small craft is at the head of the cove. A prominent stone tower is on the south end of Jewell Island, and two old wharves and a house are on the west side.

Broken Cove is formed by a group of bare rocks and small islets connected by ledges, extending 0.6 mile northeastward from **West Brown Cow,** a grass-covered islet. The daybeacon 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, is 300 yards southeastward of the southern end of Eagle Island. Ledges with 8 to 10 feet 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. They are surrounded by extensive ledges. **Stave Island** is sparsely wooded. **Stave Island Ledge** is bare at low water. It is marked by a buoy at its northeast end.

Hope Island, in Luckse Sound, is wooded except on the southwest end, which is marked by a large house and flagpole. **Rogues** and **Sand Islands**, northeastward of Hope Island, are low and grassy. The channel between them is marked by buoys. **Crow Island** has one house in the center and is low and grassy. **Little Bangs** and **Stockman Islands** are bare and grassy, and Stockman Island has a daybeacon, red slatted tripod, at the southwest end. **Goose Nest** is a grassy islet about 4 feet high, and **Goose Nest Ledge** is bare at a little below high water.

Whaleboat Island is wooded on the north end and on the highest part, and grassy elsewhere. **Little Whaleboat Island** is wooded.

Middle Bay makes northeastward on the west side of Harpswell Neck. **Harpswell Center** is a village with post office on the main road. The bay has good anchorage, but is seldom used. **Lower Goose** and **Upper Goose Islands**, on the west side, are wooded and the former is marked by a flagpole on the north end.

Merepoint Bay, shallow and obstructed by flats, is between **Birch** and **White Islands** on the east, and **Merepoint Neck** on the west. On the south side of **Mere Point** are the pier and float landing of the Mere Point Yacht Club, a post office, general store, and public float landing. The landings have depths of 4 to 5 feet alongside.

Maquoit Bay makes northeastward on the westward side of Merepoint Neck; the entrance is north of Goose Islands, and is obstructed by flats covered by 1 to 4 feet. Through the flats a channel with 19 to 24 feet leads for a distance of 2 miles from its entrance.

The chain of islands between **Sister** and **Bustins 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. Bustins Island has numerous cottages. On its southwestern end is a steamer landing with about 11 feet at low water. A public landing is on the southeast side of the island, with a post office and store nearby. Rocks covered at high water are 50 yards southeastward and 75 yards southwestward from the landing. Eastward of the landing is a house on a ledge about 100 yards offshore. **Little Bustins Island** is marked by a house and a clump of trees in the center.

Bustins Ledge, southward of Bustins Island, is bare about 4 feet at high water. **French Island** is wooded and **Little French Island**, also wooded, is on its north side.

During the summer months, a steamer from Portland stops at Cousins, Littlejohn, and Bustins Islands, Mere Point and Birch Island, carrying mail, passengers, and freight.

Harraseeket (Freeport) River is west of Maquoit Bay. The approach is between Bustins Island on the east and **Moshier Island**, 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 23 feet. From the entrance the channel leads between flats, mostly dry at low water, in a northerly direction to **Weston Point**. Thence a shoal unmarked channel leads to **Porter Landing**, to which small craft of drafts of 6 feet or less are reported to go at high water.

South Freeport, on the west side 0.7 mile above the entrance, has a town wharf with a depth of 10 feet at low water at the end. Gasoline and water are piped to a wharf and

float landing with 8 feet alongside. Supplies are available, and there are several moorings off the wharves. There is a boatyard with a storage shed and marine railway where boats up to 60 feet in length and 6 feet in draft are hauled out for repairs or storage. A small passenger ferry operates to Bustins Island during the summer season.

Prominent landmarks include a large stone tower at South Freeport, a standpipe at Yarmouth, and a tank at Falmouth.

Littlejohn and **Cousins Islands,** northward of Great Chebeague Island, are connected by a trestle and have numerous cottages. There are steamer landings on the southeast sides of both islands. Both landings have about 11 feet alongside at low water. Each of the two islands has a post office and a store. On Littlejohn Island, gasoline and supplies may be obtained at the wharf. Cousins Island Light, 24 feet above the water, is shown from a white skeleton wooden tower and tankhouse on **Spruce Point.**

Royal River is a narrow, crooked stream westward of Harraseeket River. Its approach is westward of Cousins Island, in the northwestern part of Casco Bay. The river, with a controlling depth of about 4 feet at low water, leads to the town of **Yarmouth.** The very crooked channel leads between flats bare at low water, and is usually marked by bush stakes. The best time for strangers to enter is on a rising tide. At Yarmouth is a small boatyard and marine railway, but no machine shop. Limited supplies are available. A fish cannery is on the south side of the river 600 yards below the highway bridge at Yarmouth. The cannery wharf has a depth of 4 feet at low water at the outer end. **Cousins River,** a narrow shallow stream, empties into the mouth of Royal River from northward.

Great Chebeague Island is the largest island in Casco Bay. **Indian Point,** on the west side, is a sandspit marked by a house and a tree. During the summer, there is small-boat passenger and auto ferry service between Falmouth Foreside and the stone wharf on the west side of the north end. Passenger and freight steamers from Portland call at the steamer wharf on the west side of the south end of the island. The steamer wharf has a depth of about 16 feet alongside. Chebeague Island, the village with post office, is located in the north central part of the island.

Chandler Cove is formed by a bight in the southwestern end of Great Chebeague Island and by Little Chebeague Island; it is good anchorage with 30 to 60 feet, but is little used.

Little Chebeague Island has a patch of woods in its center and a few houses. The old landing is on the east side; in 1949 no supplies were available.

Long Island, southwestward of Great Chebeague Island, has several landings on its northwest side. **Mariner** and **Long Island** are villages with post offices near the northern and western ends, respectively. Passenger steamers from Portland call at **Ponce Landing** and **Cleaves Landing** on the northwest side. Just northeastward of Ponce Landing are Government piers extending out 350 yards to deep water. The passage between **Crow Island** and the north point of Long Island is closed by scuttled vessels, with hulls showing above high water. The islands southward are described with Portland Harbor.

Broad Cove, in the northwestern part of Casco Bay, is shallow. Good anchorage is available in the middle of the cove, southwest of **Prince Point,** in 15 to 17 feet. It is open southward and eastward.

Falmouth Foreside, a yachting center 3 miles north of Presumpscot River, has a repair yard and marine railway capable of hauling out boats up to 50 feet in length and

8 feet in draft for repairs or covered storage. Gasoline and water are piped to the service landing which has 7 feet alongside. There is communication to Cousins, Littlejohn, and Great Chebeague Islands during the summer months.

The Portland Yacht Club, located in Falmouth Foreside, maintains a pier and float landing with a depth of 7 feet alongside. See Chapter 2, §202.5 for special anchorage area.

Sturdivant Island is covered with grass and bushes. **Sturdivant Island Ledges** are bare in several places at low water. **Basket Island** is wooded. **Upper Basket Ledge** bares at low water, **Lower Basket Ledge** bares at half tide, and both are marked by daybeacons, both are a black spherical cage on iron spindle. **Clapboard Island** is wooded and has a private landing on the west side. The island is surrounded by ledges, bare and submerged. **Cow Island Ledge Light,** 29½ feet above the water and visible 9 miles, is shown from a steel tower, black and red horizontal bands on a red cylindrical foundation; the light marks the ledge between Clapboard Island and Diamond Island.

Waites Landing is 1.5 miles southward of Falmouth Foreside. **The Brothers Islands** are two low, flat islets.

Mackworth Island is connected to **Mackworth Point,** the eastern entrance point of Presumpscot River, by a wooden causeway. This is a fixed bridge, having a horizontal clearance of 11 feet and vertical clearance of 5 feet at high water.

Portland Lightship is moored in 160 feet 5.3 miles 117½° from Cape Elizabeth Light. The lightship has a red hull with the word PORTLAND on each side, and two masts with circular gratings at the mastheads. The light is 70 feet above the water and visible 14 miles; a riding light is exhibited from the forestay. The fog signal is an air-diaphragm horn; a bell is operated by hand if the horn is disabled. The code flag signal is NNBT. A radiobeacon is operated at the lightship; the radiobeacon is synchronized with the fog signal for distance finding. **Storm warnings** are displayed during daytime, and only when the lightship is on station.

Cape Elizabeth, the southern entrance point of Casco Bay, is marked by Cape Elizabeth Light, 129 feet above the water, visible 17 miles, and shown from a white conical tower with covered way to dwelling. The fog signal is an air diaphone. Another tower, no longer used, is about 300 yards to the southwest. A Coast Guard station and numerous houses are near the light. **Storm warnings,** day and night, are shown from the Coast Guard station.

Chart 325.—Portland Harbor, at the western end of Casco Bay, is the most important harbor on the coast of Maine. It has a large coastwise trade as well as some foreign commerce, and is open to shipping throughout the year.

Portland is on the north side of the inner harbor. It is served by several railroads and is a terminus of the Canadian National Railroad. Small steamers maintain mail, passenger, and freight service with several of the islands in Casco Bay. Depths of 35 feet are maintained at the State pier and the Canadian National Railroad wharves near the eastern end of the water front. The other wharves have less depth. There are several public float landings.

South Portland is a city on the south side of the inner harbor opposite Portland. A shipyard here has a marine railway with a capacity of 1,000 tons. A boatyard has a marine railway capable of hauling out boats up to 70 feet in length for repairs or storage.

Depths of 35 feet are maintained at the oil unloading dock of the Portland Pipe Line Company. The U. S. Coast Guard has a buoy depot about 0.5 mile northeast of the Portland Bridge. A channel dredged to 15 feet leads to the two mole-type piers. Because it is a cable area, anchorage is prohibited in the area between the southwestern end of House Island and South Portland shore at a point about 800 yards 200° from Spring Point Ledge Light.

The approach to Portland Harbor from southward is marked by Portland Lightship and Cape Elizabeth Light, and from eastward by Halfway Rock Light. Portland Head Light marks the harbor entrance on the western side, and Ram Island Ledge Light marks it on the eastern side.

Portland Head Light, 101 feet above the water and visible 16 miles, is shown from a white conical tower connected to dwelling. The fog signal is an air-diaphragm horn.

Ram Island Ledge Light, 77 feet above the water and visible 14 miles, is shown from a light gray, conical, granite tower on the ledge, bare at low water, 400 yards south of Ram Island. The fog signal is a bell.

Channels.—The main entrance is from southward, westward of Cushing Island, and has a depth of 36 feet or more from the entrance well into the harbor. Several ledges are off the entrance. Although most of them are marked, the approach is dangerous in thick weather for deep-draft vessels. In clear weather, however, 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. These are seldom used except by local vessels familiar with them, or by small craft.

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 chart.

The Federal project provides for an anchorage area 35 feet deep, approximately 170 acres in area, northwest of House Island; an anchorage area 30 feet deep off the eastern end of the city; a channel 35 feet deep of varying width from the sea to the Portland Bridge, thence 400 feet wide in Fore River to the Vaughan Bridge, thence 300 feet wide to the Boston and Maine Railroad Bridge; a turning basin 35 feet deep easterly of Vaughan Bridge; a channel 30 feet deep 300 feet wide from the 30-foot anchorage to the Grand Trunk Railroad Bridge; a channel 14 feet deep between the Grand Trunk Railroad and Tukey Bridges; a channel 12 feet deep and 300 feet wide from Tukey Bridge to the head of Back Cove; removal of ledges in the main ship channel to a depth of 40 feet, and other improvements, and the maintenance of Soldier Ledge Channel in Hussey Sound, Casco Bay, at a depth of 40 feet. These channels are maintained.

Fore River is the name given to the part of Portland Inner Harbor above the first bridge. There are several wharves and the river is used by many vessels. The flats on each side are bare at low water, which is the best time for strangers to enter. The river above Portland Terminal Bridge is used only by small boats with local knowledge.

Cushing Island, on the east side just inside the entrance to Portland Harbor, is mostly grass covered. **White Head** is a high bluff at its northeastern end. Steamers from Portland land at a wharf on the west side, and a U. S. Army wharf is in a cove on the northeast side.

Whitehead Passage, between Cushing and Peaks Islands, has a depth of about 24

feet. It is used occasionally by vessels drawing up to about 14 feet, entering from eastward. The principal dangers are marked, but the channel is narrow, and strangers in vessels are advised to use the main channel.

House Island, on the east side of the main channel northward of Cushing Island, is the site of the abandoned quarantine station. An old fort on the southwest end is visible, and the summit of the northeastern part is marked by a building and flagpole. A light is on each end of the island.

Peaks Island is the large island northeastward of Cushing Island. It has communication with Portland by automobile ferry, and by steamers. Several wharves are on the west side. **Peaks Island** at **Forest City Landing** is a village with post office on the south end, and **Trefethen,** on the north end, also has a post office.

A black skeleton tower on concrete base, off the eastern side of the island, is the former Peaks Island Light. **Pumpkin Nob** is about 150 yards north of the northern extremity of Peaks Island.

Great and **Little Diamond Islands,** northward of Peaks Island, are connected by a sand bar covered at high water. Little Diamond Island has many houses visible. Steamers from Portland make landings at wharves at the south end of Little Diamond Island and the south end of Great Diamond Island. Wharves of the U. S. Army are located in **Diamond Cove.** The southeast corner of the U. S. Coast Guard Buoy Pier, on the east side of Little Diamond Island, is marked by a light. The buoy pier was not in use in 1949.

The channel between Peaks Island and Little and Great Diamond Islands has a depth of 15 feet and is used by many small vessels and motorboats bound to points in Casco Bay. The principal dangers are marked. To carry the most water, pass 50 yards off the old buoy pier on Little Diamond Island and 50 yards off the steamer landing at the south end of Big Diamond Island.

Diamond Island Roads, between Peaks, House, and Little Diamond Islands, is a good anchorage for vessels.

Spring Point Ledge Light, 54 feet above the water and visible 13 miles, is shown from a white conical tower on a black cylindrical pier, on the outer end of the ledge on the west side of the main channel. A sector from 330° to 337° covers the fairway entrance. The fog signal is a bell.

Fort Gorges, 0.65 mile north-northeastward of Spring Point Ledge Light, is a prominent gray stone structure on the southeast end of **Diamond Island Ledge.** The ledge has a large area bare at low water and a few spots bare at high water. It is marked by a light on the west end and a buoy placed just south of the ledge. West of Great Diamond Island is a channel 450 feet wide and 22 feet deep which connects the deeper water northwest of the island with the deeper water south of the middle of the island.

The wreck of a six-masted schooner is visible at low water about 700 yards 018° from Fort Gorges.

Back Cove is on the north side of Portland. A channel with a least depth of about 20 feet leads to the Canadian National Railroad Bridge, and 14 feet can be taken to the Tukey Bridge. Above this, a channel dredged to 12 feet leads to the southern end of the cove. The channel is unmarked above the bridges and leads between flats bare at low water.

Presumpscot River, northward of the entrance to Back Cove, has a narrow, crooked channel with a depth of 13 feet to **Martin Point** at the entrance and 6 feet for a mile

above. The channel is unmarked and leads between flats bare at low water. There is little commerce by water. On Martin Point, at the west side at the entrance, are a marine hospital and stack which are conspicuous.

Anchorages.—Secure anchorage for any vessel is available at all times in the harbor. Anchorage areas have been defined and regulations provided governing them; these are in Chapter 2, §203.132. The Captain of the Port, a U. S. Coast Guard officer, is charged with enforcement of the regulations.

Bridges.—There are three bridges over Fore River; the Portland Bridge has a bascule span with a horizontal clearance of 100 feet and a closed vertical clearance of 31 feet at high water; the Vaughan Bridge has a swing span with a horizontal clearance of 60 feet and a closed vertical clearance of 5½ feet; the Portland Terminal Bridge has a fixed span with a horizontal clearance of 40 feet and a vertical clearance of 5 feet. Two swing bridges cross Back Cove; the railway span has a horizontal clearance of 88 feet and a closed vertical clearance of 5½ feet at high water, and the Tukey Bridge has a horizontal clearance of 67 feet and a closed vertical clearance of 5 feet. The Martin Point Bridge over Presumpscot River has a bascule span with a horizontal clearance of 75 feet and a closed vertical clearance of 13 feet at high water.

Federal Regulations governing openings and signals for these bridges are in Chapter 2, §§ 203.15, 203.20, 203.25.

In 1949 the gage to indicate vertical clearance on the northwest side of the Portland Bridge was not in operation.

Directions.—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 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 0.5 to 1 mile of the shore.

The broken ground off the entrance to Portland Harbor renders the entrance by vessels dangerous in thick weather unless sure of the position. The following courses, if made good, are available for vessels up to 30-foot draft, but they 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 draft entering Portland Harbor from eastward inside the islands in Casco Bay are given in Chapter 3. Local vessels up to 12-feet draft sometimes enter through Whitehead Passage. Deep-draft vessels usually make Halfway Rock whistle buoy and steer a westward course for 7 miles to a position 200 yards southward of Witch Rock lighted bell buoy. This course leads close northward of an unmarked ledge with a least depth of 34 feet. Then steer **291°** for 1.6 miles to a position 200 yards southwestward of the bell buoy off the southwest end of Cushing Island.

From southward.—Vessels entering Portland Harbor from southward usually make Portland Lightship. Vessels of not too great draft may round the lightship and bring it astern on a bearing of 141°. Then steer **321°** with the lightship astern for nearly 8 miles, until about 200 yards southwest of the lighted buoy off the south end of Cushing Island. This course leads over a 36-foot spot between **Willard Rock** and **Pine Tree Ledge,** where there may be considerable swell, and also passes over the edge of a 31-foot spot southeast of Portland Head.

Deeper-draft vessels may carry somewhat better water by clearing Portland Lightship at about 0.5 mile, then heading halfway between the lighted buoys marking **West**

Cod Ledge Rock and **Corwin Rock,** on a course between **310°** and **328°**. When halfway between these lighted buoys, change course to **343°**, heading for the east tangent to Peaks Island. Continue this course for just over 3 miles, which will bring you to within about 1 mile of the lighted bell buoy marking **Witch Rock.** Then change course to **296°** and pass 400 yards southwestward of the buoy and continue course for about 1.6 miles beyond that buoy to a position 200 yards southwest of the lighted buoy off the south end of Cushing Island.

Cushing Island to Portland.—Pass 200 yards southwestward of the lighted buoy at the southwest end of Cushing Island and steer **337°**, passing 400 to 500 yards westward of House Island and at least 200 yards eastward of Spring Point Ledge Light. If going to the anchorage northwestward of Fort Gorges, continue about the same course, pass 250 yards westward of the buoy southwestward of Fort Gorges, and at least 200 yards westward of Diamond Island Ledge Light, and anchor northwestward or north-northwestward of Fort Gorges. If bound to Portland, continue the **337°** course for 0.4 mile past Spring Point Ledge Light to a position 250 yards southwestward of the buoy southwestward of Fort Gorges. Then steer **271°** and pass 150 yards northward of the lighted buoy just northeastward of the outer end of the Maritime Commission Pier, lighted. The course then can be shaped to the wharves, or they can be followed, 150 to 100 yards off, to the first bridge.

Tides.—The mean range of the tide is about 9 feet. Daily predictions of the times and heights of high and low waters for Portland are given in the *Tide Tables, East Coast, North and South America.*

Currents.—The average velocity at strength of the tidal current in the channel is about 1 knot southwest of Cushing Island and southwest of Diamond Island Ledge; within the harbor it is about ½ knot. See *Atlantic Coast Current Tables* for current predictions.

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.

During August and September it is occasionally foggy or smoky in the harbor in early morning when it is clear outside.

For hours of operation of fog signals during different months at Portland Lightship and Portland Head, see table in the Appendix.

Ice seldom obstructs navigation; when it does it is only for a limited time. The towboats keep a clear channel to the wharves.

Pilots.—Pilotage is compulsory for all vessels in foreign trade drawing 9 feet or more except coasting or fishing vessels. The pilot boat meets incoming vessels at the Portland Lightship. Vessels desiring a pilot should telegraph ahead to Portland Pilots, Portland, Maine, stating time of arrival at the lightship. The customary signals are used when off the lightship.

Towboats are available and are used by most large vessels when docking either above or below the bridges, and when passing through the bridges. They meet vessels at the

anchorage as required, and are tied up at the Central Wharf just northeastward of Customhouse Wharf. There are several small wrecking pumps on the tugs.

Quarantine is enforced in accordance with the regulations of the U. S. Public Health Service. Quarantine anchorage is known as Anchorage B, lying between House Island and Diamond Island Ledge. The quarantine station is at the U. S. Marine Hospital, on Martin Point about 2.5 miles northward of House Island. Quarantine officials usually board vessels at the dock.

The out-patient office of the U. S. Public Health Service is at the Marine Hospital.

Customs and immigration.—Portland is a port of entry and marine documents are issued. Customs and immigration officers usually board vessels at the dock.

The **Weather Bureau** office is at the Portland Municipal Airport, 4 miles eastward of the city. **Storm warnings** are displayed day and night from the U. S. Coast Guard Buoy Depot in South Portland.

A **Marine Inspection Office** is maintained at the Federal Building.

The Port of Portland is under the jurisdiction of the Harbor Commission of the Port of Portland, but an independent body known as the Directors of the **Port of Portland Authority,** State of Maine, has charge of the State's affairs, particularly those involving the State Pier. The **harbor master** usually can be found at the Portland Pier.

Supplies.—Coal can be had in any quantity either from alongside piers or by lighters. Fuel oil is available at the wharves and also by barge service handling gasoline and Diesel oil. Water may be obtained from water boats or from the wharves. The city water is considered suitable for drinking and boiler uses. Gasoline, provisions, and ship chandlery are available in the city.

A Coast and Geodetic Survey Sales Agency is situated near the water front.

Repairs.—There are several marine railways and machine shops available for making repairs to small vessels. The largest marine railway, the one having a 1,000-ton capacity, has a cradle 135 feet in length and will take vessels up to 15-foot draft.

CHAPTER 10

Cape Elizabeth to Portsmouth

Chart 1205

THE COAST from Cape Elizabeth to Portsmouth extends about 37 miles in a general southwesterly direction. Few harbors indent the coast and those which do are the resorts 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. A water tank on a tall skeleton tower about 2.5 miles west-southwestward of Wood Island Light is the most prominent object between Portland and Portsmouth.

Chart 231.—Cape Elizabeth Light and Portland Lightship are described in the previous chapter.

Seal Cove, on the southeast side of Cape Elizabeth and northeastward of Richmond Island, has numerous rocks and ledges. **The Sisters** and **Seal Rocks,** dangers near the center of the cove, bare at about half tide. The eastern extremity of Seal Rocks is marked by a buoy which facilitates entrance to the anchorage north of the rocks. The holding ground in the cove is sand and poor, but some shelter is afforded in easterly weather. There are no wharves in the cove.

Richmond Island, about 0.5 mile south of Cape Elizabeth and connected to it by a breakwater, is grassy with a prominent house and barn on it. The breakwater is awash at extreme high water. **Richmond Island Harbor,** westward of Richmond Island and the breakwater, is sheltered from northerly and westerly winds, but is exposed to southwesterly and southerly winds. Foul ground extends 0.4 mile from the northern side of the harbor. The depths shoal gradually from 48 feet at the entrance to 18 feet 300 yards from the breakwater at the head. The holding ground is good, sand and mud. The anchorage is used considerably by yachts and small craft.

Chimney Rock, 0.3 mile from the north shore of Richmond Island Harbor, is awash at low water and is marked on its southeast side by a buoy. Vessels must pass southward of the buoy. A rock with a depth of 16 feet on it is 0.2 mile east-southeastward of Chimney Rock. **Ram Island,** low and grassy, is 0.2 mile northwestward of Chimney Rock. **The Brothers,** three small rocks, are 300 yards north-northeastward of Chimney Rock.

Spurwink River, 1.6 miles northwestward of Richmond Island, can be entered only by small craft at half tide or higher with a smooth sea. **Higgins Beach,** on the west side at the entrance, has many cottages visible.

Old Proprietor, a ledge bare at low water, is 0.9 mile from shore and 1.8 miles west-

ward of Richmond Island. The ledge is marked on its south side by a buoy. A ledge with 11 feet over it is nearly 0.5 mile north-northeastward of Old Proprietor.

Between Richmond Island and Wood Island Light, a distance of about 6 miles, the shore forms a large open bight, the southern part of which is **Saco Bay.**

Prouts Neck, a conspicuous point, 3 miles westward of Richmond Island, is the northern point of Saco Bay. The neck is partly wooded and has many houses. A standpipe is visible from eastward. On the west side of the neck is a yacht club with pier and float landing.

Scarboro River, on the west side of Prouts Neck, is used by local craft at half tide or higher. The channel, which leads across a shifting bar, is marked by buoys and a day-beacon. Boats should not enter the river except with local knowledge.

Along the shore of Saco Bay from northward to southward are **Grand Beach, Old Orchard Beach,** and **Ferry Beach.** The large hotels, the pier, and the standpipe at Old Orchard Beach are prominent. **Bar Ledge,** with a depth of 11 feet, is 0.9 mile from shore off Grand Beach, and is marked on its southern side by a buoy. About 0.6 mile westward of the buoy and 0.7 mile northeastward of the pier at Old Orchard Beach, is **Little River Rock** with a depth of 2 feet over it extending 0.5 mile from shore.

Stratten and **Bluff Islands,** grass covered, are off the northern part of Saco Bay, 1 mile southward of Prouts Neck. Deep water is between the islands and Prouts Neck, but between the islands are numerous ledges. Ledges, awash at low water, are 0.3 mile off the eastern side of Stratten Island and 0.2 mile off the southwestern side. One house is on Stratten Island.

Islands and ledges in the southern end of Saco Bay extend up to 1.5 miles from the shore. Inside of the islands are Wood Island Harbor and the entrance to Saco River.

Eagle Island, 2.5 miles southwest of Stratten Island, and **Ram Island,** 0.7 mile south of Eagle Island, are rocky and grass covered; vessels should pass eastward of these islands, giving them a berth of at least 0.5 mile. **Ram Island Ledge,** extending 0.5 mile east of Ram Island, has a least depth of 7 feet, and is marked by a buoy on its eastern side.

Wood Island, 8.7 miles southwestward of Cape Elizabeth Light and eastward of the entrance to Saco River, is grassy except for a few dead trees. A light, 71 feet above the water and visible 14 miles, is shown from a white conical tower connected to a dwelling on the east end of Wood Island. The fog signal is a bell. **Negro Island Ledge,** 0.2 mile north of Wood Island, has a least depth of 9 feet and is marked on its north side by a buoy.

Negro Island, low and grassy on top, is just westward of Wood Island. Ledges extend nearly 200 yards northwestward and 300 yards southwestward from Negro Island; a buoy marks the southwest end of the ledge.

Stage Island, 0.6 mile west of Wood Island, is marked by a prominent white stone monument. **Stage Island Shoal,** partly bare at low water, extends 300 yards east-northeastward from the island and is marked at its end by a buoy. Wood Island Harbor, southeastward of the island, is described following the discussion of Saco River. **Basket Island,** 0.3 mile west of Stage Island, is grassy and has several cottages.

Saco River, with its entrance in the south end of Saco Bay west-northwestward of Wood Island, is the approach to the cities of **Biddeford,** on the south bank, and **Saco,** on the north bank. The cities are at the head of navigation 5 miles above the mouth of the river. In 1949 there was no commercial traffic on the Saco River. A small passenger

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ferry operates in the summer between **Camp Ellis,** a settlement on the north bank of the river at its mouth, and Biddeford Pool.

The entrance to the river is between two jetties. The southerly jetty, submerged at high water, is marked by a buoy off its eastern end and by piers about 260 yards apart and about 10 feet above high water on the jetty. The outer 0.4 mile of the northerly jetty is partly covered at high water. A Federal project provides for a channel 8 feet deep to Saco and Biddeford. In 1949 the channel had shoaled to a least depth of about 3 feet. The bar at the entrance is subject to frequent changes. In 1949 a sand shoal which bares 1 foot at low water was about 250 yards east of the south jetty. The deepest water in the entrance was between the east end of the southern jetty and the shoal which was marked by a buoy on its south side. Small craft can enter the river with a smooth sea and on a rising tide by passing between Ram Island Ledge and Negro Ledge and following the buoyed channel over the bar. When inside the jetties, the southerly jetty should be favored until inside the entrance. The channel in the river is narrow and crooked and strangers should obtain a pilot.

The mean range of the tide is about 8½ feet. From March to May the channel depths are liable to be changed by heavy floods as much as 8 feet above high water at Saco; this condition also causes dangerous currents. Ice closes the river from January to April. A pilot for the river can be obtained from Biddeford Pool southward of the entrance.

Depths of 6 to 8 feet are at the wharves at Saco and Biddeford. At Saco is a public float landing and a yacht club which has a float landing with a depth of 8 feet alongside. Water is piped to the coal wharf; supplies are available. A boatyard on the south side of the river about 2 miles below Biddeford is equipped for building small wooden craft up to about 60 feet in length. Two wharves at Camp Ellis have a depth of 4 feet at their ends. The westerly wharf is in good repair and has a gasoline pump at its end.

Wood Island Harbor, south of Wood and Stage Islands, is an anchorage for small and moderate-sized vessels. Anchorage in depths of 18 to 36 feet is available south of Wood Island. Between Negro Island and Stage Island are depths of 17 feet or more in an area about 400 yards across; it is reported that the larger yachts and coal barges anchor in this anchorage. Small yachts can proceed to the southwest part of the harbor and anchor in depths of 6 to 20 feet off **Halftide Rock,** 0.3 mile south of Stage Island. The bottom in this inner anchorage is reported to be soft mud.

The Pool is a shallow bay making southwestward from Wood Island Harbor inside of **Fletcher Neck,** the south shore of Wood Island Harbor. The entrance is about 50 yards wide. The tidal currents have considerable velocity. Small craft can anchor just inside the entrance if all the anchorage area is not occupied. **Biddeford Pool** is a village with post office, on the south side of Wood Island Harbor, extending from The Pool nearly to the eastern point of Fletcher Neck. There are small wharves on each side of the entrance to The Pool. The yacht club is on the east side. Gasoline, water, and some provisions are available. A pilot for the river may be obtained at Biddeford Pool.

To enter Wood Island Harbor from the northeast, keep about 0.5 mile north of Wood Island, until near the vertically striped bell buoy eastward of Ram Island Ledge. Pass about 100 yards southeastward of this buoy, heading for the monument on Stage Island, on course 232° until Negro Island is abeam. If proceeding to the southwest part of the harbor, change course to 211° and pass about 100 yards east of the buoy northeast of Stage Island and anchor northwest of Halftide Rock Daybeacon. This course heads for

the eastern side of the passage into The Pool. If desiring anchorage between Negro Island and Stage Island, when Negro Island is abeam change course to **193°** and continue for about 500 yards to the anchorage in depths of about 20 feet. Note that while on this course the colors of the buoys are reversed between Wood and Stage Islands. If desiring to proceed to the anchorage south of Wood Island, continue the **193°** course until the buoy southwest of Negro Island is just past the beam, then change to **098°** course and proceed to anchorage east of the cable area.

To enter Wood Island Harbor from the south, bring Wood Island Light to bear **343°** and steer for it on that bearing. Continue until about 300 yards south-southwest of Dansbury Reef buoy and with the daybeacon on Washman Rock bearing 295°, change course to **325°**, passing halfway between Washman Rock Daybeacon and the buoy off Dansbury Reef. Continue course and pass about 250 yards east of **Gooseberry Island,** the island about midway between Wood Island and Fletcher Neck. When Gooseberry Island is abeam, change course to **277°** and either anchor south of Wood Island or continue that course, passing about 50 yards south of the buoy southwest of Negro Island and enter the inner harbor.

Washman Rock, bare at half tide, is near the end of a reef which extends 600 yards southeastward from the eastern point of Fletcher Neck; a daybeacon, black cask on bilge on iron spindle, marks the reef.

Dansbury Reef, 0.5 mile southward of Wood Island Light, is a small ledge with shallow water over it and is marked on its southeast side by a buoy. There are several shoal spots between the reef and Wood Island and strangers should not pass between them.

Numerous rocks and ledges extend 0.6 mile southeastward of Fletcher Neck. A Coast Guard station is on the east side of Fletcher Neck; its cupola is conspicuous.

Chart 1205.—Goosefare Bay, 5.4 miles southwestward of Wood Island Light, is a shallow cove, full of rocks and ledges.

Stage Island Harbor, 6.7 miles southwestward of Wood Island, is a small slough used by small local craft. The entrance is about 50 yards wide between the reefs making northward from **Cape Island** and southward from **Little Stage Island;** it is not safe for strangers.

Cape Porpoise Harbor, 7.2 miles southwestward of Wood Island Light, is the approach to the village of **Cape Porpoise,** and affords an anchorage between the islands and rocks northwest of Goat Island. Vessels of over 100 tons should not attempt to enter the harbor for refuge because of the small area of the anchorage; it is better for strangers to run either for Portland or Portsmouth if caught in a blow. **Goat Island,** on the northeast side of the harbor entrance, is marked by a light. The light, 38 feet above the water and visible 11 miles, is shown from a white cylindrical tower with a covered way to a dwelling on the southwest end of the island. The fog signal is a bell. A lighted whistle buoy is about 1.9 miles southeastward of the light.

A Federal project for improvement of Cape Porpoise Harbor provides for an entrance channel 16 to 18 feet deep, for a combined channel and anchorage 15 feet deep and about 600 feet wide to the town wharf, and a channel 6 feet deep and 100 feet wide for about 2,000 feet above the town wharf. The depth in the combined anchorage and channel was reported in 1949 to have shoaled to about 10 feet. No dredging had been done on the channel north of the town wharf.

The Old Prince is a ledge with 4 feet over it, 400 to 500 yards southeastward of Goat Island Light. The ledge is marked by a bell buoy 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,** on the southwest side of the harbor entrance, is grassy. A daybeacon, a large white tripod, is on the partly bare ledge extending eastward from Folly Island. This daybeacon is 180 feet from the westerly edge of the dredged channel.

A daybeacon, red wheel with pendants on an iron spindle, is on a ledge bare at low water 370 feet west-southwestward of Goat Island Light and 30 feet from the easterly edge of the channel. About 300 yards above the light, the west side of the channel is marked by a buoy on the northeast side of **Lobster Rock,** which has a depth of 4 feet. Abreast the buoy on the opposite side of the channel is an islet, nearly awash at high water and marked by a pile of stones, 275 feet northeastward of the easterly edge of the channel.

The following directions for Cape Porpoise Harbor should be used with caution. Give the islands northeastward of the entrance a berth of 0.5 mile and the shore southwestward of the entrance a berth of 1.5 miles. Steer for Goat Island Light on a **330°** course until up with The Old Prince bell buoy, 800 yards from the light. Pass close westward of the bell buoy and the buoy between the bell buoy and the light, steering about **315°** and pass between the two daybeacons abreast the light, favoring the Goat Island Daybeacon. Pass 50 to 60 feet eastward of the buoy 300 yards above the light. From the buoy steer about **340°** for the wharf on the west side of Bickford Island. Anchor on this line, keeping 200 yards or more southward of the wharf.

There is a wharf with 6 feet of water alongside on **Bickford Island,** an island connected to the village by a road. Water is piped onto the wharf. Gasoline is available and provisions can be had at the village of Cape Porpoise.

Southwestward of Goat Island Light is an area of broken ground, with depths of 17 to 33 feet, extending as much as 2 miles offshore in places. The area has not been closely examined. The light bearing 350° leads eastward of the broken ground.

Kennebunk River, about 2.5 miles westward of Goat Island Light, is the approach to the summer resort of **Kennebunkport,** just inside its entrance. The river is frequented mostly by small pleasure craft and fishing boats. The beach for 0.8 mile eastward and 1.7 miles westward of the entrance is lined with hotels and summer houses. The entrance to the river is between two stone jetties; the easterly and longer one has a light on its end.

A Federal project for improvement of Kennebunk River provides for a depth of 4 feet for a width of 100 feet to Kennebunkport. In 1949 there was a reported depth of 3 feet at low water across the bar at the entrance, and 2 feet in a narrow channel inside to the wharves just below the bridge. Local knowledge is necessary to carry the best water across the bar and inside.

Small craft can anchor off the yacht club just inside the river entrance, but because of the current and the limited swinging room, it is better to lay alongside one of the club floats if permission can be obtained. In 1949 the floats had from 2 to 4 feet alongside.

A swing bridge with a horizontal clearance of 39 feet and a vertical clearance, closed, of 5½ feet at high water, crosses the river about 1 mile above the mouth. Gasoline and water are piped to several of the wharves near the bridge. In 1949 there was 5 to 7 feet

alongside some of the wharves and floats. Several boatyards are in the vicinity, and small craft up to 50 feet in length and 7-foot draft can be hauled out.

Fishing Rock, bare at half tide and marked by a daybeacon—red spherical cage on iron spindle, is 0.7 mile south-southwestward of the entrance of Kennebunk River. About 0.3 mile eastward of the daybeacon is a buoy off the east side of rocks that are awash at lowest tides. A reef with 9-foot and 14-foot spots on it is 0.5 to 0.7 mile southward of Fishing Rock Daybeacon; a buoy is off the southeast side of the reef.

Oak Reef extends 0.5 mile south-southwestward from the shore west of Kennebunk River entrance. Near the south end of the reef and about 0.5 mile west-northwestward of Fishing Rock Daybeacon is a daybeacon, black spherical cage on iron spindle.

Kennebunk Beach is a village with post office extending 1 mile westward of Kennebunk River entrance. Ledges extend 0.8 mile from shore southward of the village. A prominent yellow bluff is at the western end of Kennebunk Beach.

Wells Beach extends 4 miles southwestward from Kennebunk Beach to **Webhannet River** and Ogunquit Beach. There is an inlet abreast the village of **Wells,** with a reported depth of 1 foot across the bar. This inlet is said to be used by small local boats at high tide but it is unsafe for strangers. **Ogunquit Beach,** southward of Webhannet River, has numerous cottages and hotels, and extends to the village of **Ogunquit,** 5 miles southward of Wells. The principal outlying dangers off these beaches are **Fishing Rocks,** off Wells Beach, and covered at low water, and **Bibb Rock,** bare 6 feet at low water and 0.8 mile off Ogunquit Beach; a horizontally banded buoy is eastward of Bibb Rock.

The principal landmarks along this section of the coast are a standpipe at Kennebunk, the cupola of the town hall and church spire at Wells, a church spire 1.3 miles southwestward of Wells, and a standpipe at Ogunquit.

The mouth of **Josias River** is at **Perkins Cove,** 1 mile southeastward of Ogunquit. The cove and **Flat Pond** at the river's mouth have been dredged, providing good anchorage in depths of 3 to 4 feet, soft bottom, for small yachts and fishing boats. A Federal project provides for a channel 5 feet deep and 40 feet wide to an anchorage in Flat Pond. In 1949 the controlling depth was about 3 feet in the approach channel from Perkins Cove to the anchorage in Flat Pond. The entrance to Perkins Cove is marked by two buoys. A bell buoy is 0.7 mile eastward of the entrance. The channel is crossed by a footbridge with a hand-operated lift. The horizontal clearance is about 40 feet and the vertical clearance, closed, is 12 feet at low water. Gasoline and water are available at a wharf having a depth of 4 feet alongside. A marine railway hauls out small craft.

Bald Head Cliff, 11 miles southwestward of Cape Porpoise, is a prominent high point with a conspicuous white hotel and out buildings. An aviation light is about 1.5 miles west of Bald Head Cliff.

Mount Agamenticus, 673 feet in height, is the highest and southernmost of three peaks on a ridge 5 miles westward of Bald Head Cliff. The mountain is a prominent landmark for vessels cruising along this section of the coast.

Chart 228.—Weare Point, 2.3 miles southward of Bald Head Cliff, is a headland with several large houses on it.

Cape Neddick Harbor is a foul bight southward of Weare Point and less than a mile

northward of Cape Neddick. The harbor is 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 not marked.

Cape Neddick, 14.2 miles southwestward of Cape Porpoise, is a prominent brush-covered headland extending out about 1 mile from the main shore. Off the eastern end of the cape is **Cape Neddick Nubble,** a high grassy islet on which is a light. The light, 88 feet above the water and visible 15 miles, is shown from a white conical tower connected with dwelling and pyramidal bell house. The fog signal is a bell.

York Beach is a large village and much-frequented summer resort in the bights northward and southward of the cape. There are no wharves.

York Harbor, 2.5 miles southwestward of Cape Neddick and 5.5 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 and the **York River,** flowing into the harbor from the westward. The harbor is used by many fishing boats and pleasure craft.

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,** 1 mile inland, is also prominent.

Stage Neck is the peninsula 0.3 mile long on the north side of the harbor just inside the entrance. A leading light on the bearing of 270° is on the neck. **Western Point,** on the south side of the entrance, is bare and rocky, while **East Point,** on the north side, has houses built out to its end.

The entrance to York Harbor is crooked and narrow, and leads between rocks, bare and submerged, on both sides. There is a reported depth of 12 feet in the channel through the entrance for nearly 2 miles above. The width of the channel, with a depth of 12 feet, is only 100 feet in several places in the entrance. The channel is buoyed and easily entered by small craft in clear weather with the aid of the chart. Currents are strong and buoys sometimes are towed under. Boats drawing 10 feet are said to enter about 1½ hours after low water. Craft drawing up to 4 feet can navigate at low tide for 5 miles above the entrance, and at high water for several miles farther.

There is a limited anchorage off the wharves of the town in depths of 10 to 20 feet, and a number of moorings are maintained there. Boats also find anchorage in the river for 2 miles above the harbor.

Black Rocks are two bare rocks on the north side of York Harbor at the entrance. A rock with a depth of 5 feet is about 100 yards southwest of Black Rocks. When the water is clear the rock is plainly visible. A buoy is southward of the rock. A rock, with a depth of 3 feet and marked by a buoy is 100 yards southward of **Fort Point** which is the eastern end of Stage Neck. **Rocks Nose** is a bare ledge extending 150 yards northeastward from the shore on the south side of the channel southward of Stage Neck.

A fixed bridge over the river 1.1 miles above the harbor entrance has a horizontal clearance of 32 feet and a vertical clearance of 5½ feet at high water. A second fixed bridge, 1.8 miles above the harbor entrance, has a horizontal clearance of 28 feet and a vertical clearance of 4 feet at high water. Two highway bridges cross the river about 3 miles above York Harbor.

Vessels approaching York Harbor entrance should give the shore northward or southward a berth of at least 0.3 mile. From a position close aboard the vertically striped bell buoy 1 mile off the entrance, steer 299° for 1 mile to a position midway be-

tween York Harbor buoys 3 and 4 and with York Harbor Entrance Leading Light bearing 270°. Steer for the light on a 270° course and follow the channel with the assistance of the chart and the buoys. Care must be exercised in making the sharp turn at the west end of Stage Neck.

Depths of 8 to 13 feet are alongside the wharves and floats in the bend northward of the western end of Stage Neck. A float landing and several moorings are available for visiting yachts. The hotel and yacht club landing on the northwest side of Stage Neck has a depth of about 12 feet alongside. Gasoline, water, and provisions are available.

Chart 1205.—Vessels must observe caution to avoid the offshore dangers in the northern approach to Portsmouth. **Boon Island,** 5.7 miles southeastward of Cape Neddick, is a small, low, rocky islet with an important offshore light. The light, 133 feet above the water and visible 18 miles, is shown from a gray granite conical tower connected to a dwelling. The fog signal is a bell, sounded by hand in answer to signals. A daybeacon, black cask on end on an iron spindle, is 250 yards westward of the light.

Boon Island is surrounded by deep water, but there are numerous detached ledges in the vicinity. The easternmost is **Boon Island Ledge,** 2.8 miles eastward of the light; it is bare at extreme low water and has a lighted whistle buoy on its southern end. Vessels should not pass between this buoy and the light. If passing westward of the light, the light should be given a berth of 2 miles or more to assure staying in a depth of more than 30 feet. Depths of less than 30 feet are up to 1.3 miles southward of the light.

Caution.—U. S. Naval vessels may be operating with submarines in the area lying between latitudes 43°07′.0 N., and 43°27′.0 N., and longitudes 69°39′.5 W., and 70°05′.0 W. Naval surface vessels display the international signal **HP** meaning, *Submarines are exercising in this vicinity; you should navigate with great caution.* Fishermen and others should keep well clear of vessels displaying this signal and should obey promptly any orders that may be given by commanding officers of Navy vessels.

Between Cape Neddick and the entrance to Portsmouth Harbor, a distance of 8 miles, the shore has no marked indentations except York River. Two dangerous ledges are 2.5 miles offshore: **York Ledge,** the northernmost, is 2.9 miles southeastward of York River and marked by a daybeacon, a red and black spherical iron cage on an iron spindle; and **Murray Rock,** 1.5 miles south-southwestward of York Ledge, has a least depth of 6 feet. Murray Rock has a buoy off its southern side and a lighted whistle buoy is 1.5 miles eastward. Between these ledges and the shore, the bottom is very broken and vessels are advised to pass outside of the lighted whistle buoy. Broken ground with depths of 32 to 39 feet extends 2 miles south-southeastward of Murray Rock buoy.

CHAPTER 11

Portsmouth to Cape Ann

Chart 1206

THE COAST of New Hampshire, the Isles of Shoals, the ports of Portsmouth, the Piscataqua River, the extreme northern portion of the coast of Massachusetts, the Merrimack River, and the northern and eastern portions of Cape Ann are all described in this chapter. This coast is mostly sand dunes, except for Cape Ann, with the mouth of the Merrimack River as the only marked indentation.

Submarine Operating Areas.—These extensive areas, in which submarines operate from time to time, are outlined on Chart 1206. Accordingly, vessels should proceed with caution. A prior notice of such operations is given by hydrographic broadcast, usually. See Chapter 1 for distress signals for submarines.

Caution aerial gunnery area.—Mariners proceeding through the following area are informed that aircraft of the U. S. Navy and the U. S. Air Force may be conducting aerial gunnery exercises in the airspace above these waters during daylight hours. The area is bounded on the north by latitude 43°05′ N., on the south by latitude 42°45′ N., on the east by longitude 70°15′ W., and on the west by longitude 70°30′ W.

Chart 329.—Portsmouth Harbor, 37 miles southwestward of Cape Elizabeth and about 25 miles northward of Cape Ann Light, is the only harbor of refuge for deep-draft vessels between Portland and Gloucester. The entrance is marked by Whaleback and Portsmouth Harbor (Newcastle) Lights, 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, Newmarket, Durham, and Exeter. The United States Naval Establishment is on the north side of the harbor opposite Portsmouth.

Portsmouth, a city on the south bank of Piscataqua River about 4 miles above the entrance to the harbor, has wharves having depths of 20 to 30 feet. There is no regular passenger service by water, but there is coastwise trade and some foreign arrivals, principally bringing gypsum. Summer passenger ferry service operates to the Isles of Shoals.

Portsmouth has trade in large coasting vessels and barges, principally coal and oil. Gypsum is imported. The harbor has sufficient depth to accommodate the largest ships and is open throughout the year. The maximum draft entering is about 31 feet, but the U.S.S. *Squalus,* with a draft of as much as 42 feet, has been towed into the port.

Newcastle, a village on the south side of the harbor and the northern part of **Newcastle Island,** is reached from Portsmouth by a highway connecting the islands on the south side of the harbor.

Kittery is a town on the north bank of Piscataqua River opposite Portsmouth. South of the town are landings for small craft and several wharves with depths of 8 to 10 feet. The approach to the wharves is between Badgers and Squash Islands on the northwest and a reef off Seavey Island on the southeast, and requires local knowledge for anything except small craft.

The United States Naval Establishment is on **Seavey 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 Seavey Island has several dangers and is seldom used except by fishermen. The eastern part of the channel is marked by buoys.

In approaching Portsmouth, the large hotel at the west end of Newcastle Island is prominent. Other landmarks are the stone building of Naval Prison on Seavey Island, the light, the white buildings on Wood Island, the four towers of the two Portsmouth-Kittery lift bridges, and the tall chimney and tank of the gypsum plant 2 miles up the river.

Whaleback Light, 59 feet above the water and visible 13 miles, is shown from a gray conical tower connected to the red fog signal tower on **Whaleback Reef** at the northeast side of the outer entrance. The fog signal is an air-diaphragm horn.

Several rocks and ledges, some of which bare at low water, extend about 1.5 miles eastward of Whaleback Light and to a distance of 0.8 mile from the shore. They are marked to the southeastward by a buoy outside of **West Sister** and **Phillips Rocks,** and to the southward by a whistle buoy south of **Kitts Rocks.**

Portsmouth Harbor (Newcastle) Light, 52 feet above the water and visible 13 miles, is shown from a white conical tower, fog signal house attached, on **Fort Point,** the northeast end of Newcastle Island. The fog signal is a bell. **Storm warnings** are displayed, day and night, from the light. A Coast Guard station and lookout tower are just north of the light.

Pierces Island Lighted Range marks the main channel to Portsmouth. The front light is shown from a conical tower with white slatted daymark 18 feet high, and the rear light from a conical tower with black triangular slatted daymark. Both lights are 50 feet above the water and visible only along the range. The course of the range is 266°.

Anchorages.—The anchorage for large vessels is anywhere on the east and north sides of the channel between Wood Island, north of Whaleback Light, and Clark Island, the small island on the north side about 0.8 mile above Fort Point, in 48 to 66 feet. With a southerly wind, the best anchorage is above Fort Point on the south side of the channel, in 48 to 60 feet, bottom generally clay. There is no anchorage above Clark Island. Yachts and small coasting vessels generally anchor in Pepperell Cove.

An anchorage area for Portsmouth, for vessels not more than 65 feet in length, has been prescribed by Federal Regulation, and is given in Chapter 2, § 202.10.

A submarine cable extends across the channel in a westerly direction from Wood Island. Vessels should not anchor in the vicinity of the cable.

Portsmouth and Kittery are connected by two vertical lift bridges. The eastern one, from Portsmouth across the Piscataqua River to **Badgers Island,** has a horizontal clearance of 260 feet and a closed vertical clearance of 19 feet, and 150 feet when raised. The western one, serving the highway and railroad, extends from **Nobles Island** on the

south to Kittery on the north, and has a horizontal clearance of 200 feet and closed vertical clearance of 10 feet, and raised clearance of 135 feet. Gages at both bridges, visible from either upstream or downstream, indicate vertical clearance under the lower chords of the draw spans at all stages of the tide. The regulations governing openings and signals for these bridges are given in Chapter 2, § 203.35.

Directions.—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 wire drag. The outer limit of the dragged area off the entrance is about 1.5 miles eastward of Boon Island Ledge lighted whistle buoy and 4 miles eastward of the Isles of Shoals. This area is a part of the dragged section extending from a point about 6.5 miles southwestward of Isles of Shoals northward to Cape Elizabeth. The dangers close along the shore were not covered by wire drag. For tabulated courses and distances see Chapter 3.

Tides.—The mean range of the tide is about 8 feet at Portsmouth and about 6½ feet at Dover Point.

Currents.—The tidal currents are strong and special care is required. The predicted times of slack water and the times and velocities of strength of flood and ebb at Portsmouth Harbor entrance, off Wood Island, for every day in the year are given in the *Atlantic Coast Current Tables*. Similar predictions for a number of other locations in Portsmouth Harbor may be obtained through differences and ratios contained in Table 2 of the *Current Tables*.

Pilotage into Portsmouth Harbor is compulsory for all vessels engaged in foreign trade, but not for vessels in domestic trade. There is a licensed pilot for Portsmouth Harbor and Piscataqua River. Large vessels, if bound to the wharves at Portsmouth or any of the towns on the Piscataqua River or its branches, usually take a towboat from the anchorage on account of the strong currents. A pilot to the anchorage is not necessary in clear weather when the aids can be seen. The towboat captain is a licensed pilot. Vessels desiring a pilot telegraph the Portsmouth Navigation Company, or signal the Coast Guard station at Fort Point, where continuous lookout and radio watches are maintained.

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 Light 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 Seavey Island.

Quarantine.—There is no quarantine station. Vessels subject to quarantine will be inspected by officials of the Public Health Service at Boston.

Hospitals.—Portsmouth has no marine hospital. It is, however, a fourth class emergency relief station and hospitalization or treatment may be arranged through the Deputy Collector of Customs.

Customs.—Portsmouth is a port of entry and marine documents are issued. The customhouse is located on the northwest corner of the junction of State and Pleasant Streets, about one-half mile from the principal wharves.

Immigration.—The local customs officers handle immigration matters pertaining to alien seamen; other immigration matters are handled by the Boston immigration office.

Harbor master.—The operator of the towboat is the harbor master and also a licensed pilot.

Supplies.—Coal, gasoline, provisions and a limited quantity of chandlery stores are

obtainable at Portsmouth. Water of good quality but high in lime and magnesia may be obtained from towboats or alongside the wharves. Fuel oil can be obtained by prior arrangement.

Chart Agency.—The U. S. Coast and Geodetic Survey maintains a chart sales agency at Portsmouth.

Repairs.—There are no facilities for dry docking vessels in Portsmouth, except at the Naval Establishment, where a large graving dock is maintained. Vessels requiring repairs usually go to Portland or Boston. The machine shops in Portsmouth can make minor repairs to machinery. The several small boatyards are capable of hauling out boats up to 60 feet in length and 6 feet in draft.

Little Harbor is on the west side of the entrance to Portsmouth Harbor 0.8 mile westward of Whaleback Light. Vessels should not attempt to enter in bad southeasterly weather when the sea breaks across the entrance. The entrance is between two breakwaters, the northern of which is marked by a light at the south end. 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. In June 1950 the controlling depth was 6 feet. It is marked by buoys on its north side. A limited anchorage only for very small craft is in the channel above the inner buoy. A highway bridge across Little Harbor has a bascule span with a horizontal clearance of 29 feet and a closed vertical clearance of 13 feet at high water. The Wentworth is a large and conspicuous white hotel on the north side of the harbor. The hotel maintains a wharf and float landing near the bridge.

A narrow thoroughfare, bare at low water, connects the northwestern end of Little Harbor with Portsmouth Harbor. The thoroughfare between **Marvin** and **Goat Islands** is crossed by a fixed bridge with a horizontal clearance of 26 feet and a vertical clearance of 10 feet at high water.

Pepperell Cove is on the eastern side of the harbor, northeastward of Portsmouth Harbor Light, and on the north side of **Fishing Island** which is grassy and has two shanties on it. The cove has been dredged to a depth of 12 feet for an anchorage, and is used by many small coasting vessels and yachts. A buoy marks the south side of the entrance and the Navy maintains a large mooring buoy off the cove. **Kittery Point** is a village at the head of the cove. A wharf with about 12 feet alongside is on the northeast side of the cove abreast the village. The wharf has gas and water piped onto it and is mostly used by yachts.

Chart 229.—The **Piscataqua River,** above Portsmouth, forms the approach to Cocheco, Bellamy, Oyster, Lamprey, and Exeter Rivers. It is also the approach to the towns of Durham, Newmarket, and Exeter and the city of Dover, all on the railroad. It has ample depth for 3.5 miles above the highway and railroad bridge at Portsmouth to the fork, and the principal dangers are buoyed to this point except **Boiling Rock,** off the east bank of the river 1.1 miles above the bridge. There is ample water in the channel west of the rock, but large vessels approaching or leaving the wharves of the electric plant on the opposite side of the river must exercise extreme caution. The channels in the several branches are narrow and crooked and shoal at the heads, and local knowledge is necessary to keep in them. Large tankers visit the wharves of the oil companies and power plants on the west bank of the river between Portsmouth and Dover Point. The tidal currents are very strong. Current predictions for a number of locations in the

river may be obtained from the *Atlantic Coast Current Tables*. Pilots or towboats can be obtained at Portsmouth. The traffic above Dover Point consists of small motorboats whose operators have local knowledge.

A large steamer equipped as a floating powerhouse is moored on the west side of the river about 1 mile above the highway and railroad bridge. A high transmission line across the river at this point has an estimated vertical clearance of 200 feet above the water.

Cocheco River has a depth of about 3 feet in a narrow, crooked, unmarked channel to the city of **Dover,** 10 miles above Portsmouth. There is no commercial traffic to Dover, but small craft with local knowledge occasionally run to that town.

The western branch of Piscataqua River is crossed at **Dover Point** by a fixed bridge having a horizontal clearance of 200 feet and a vertical clearance of 33½ feet, but for 100 feet of the middle of the span the vertical clearance is 46½ feet.

Bellamy River has a reported depth of less than 4 feet in a narrow, crooked, and unmarked channel to within 0.3 mile of a wooden mill 1 mile south of Dover. Above this the river is shoal to the mill. Local knowledge is necessary to keep in the channel which is seldom used. At its mouth this river is crossed by a highway drawbridge having a horizontal clearance of 40 feet and a closed vertical clearance of 9½ feet. At least four hours' advance notice is required to open this bridge. See Chapter 2, § 203.40.

The narrow **Oyster River** has a crooked and unmarked channel, bare at low water, to the village of **Durham,** 8.5 miles above Portsmouth. It is seldom used.

Lamprey River has a depth of about 4 feet in a narrow, crooked, and unmarked channel to the village of **Newmarket,** 12 miles above Portsmouth. Local motorboats navigate in this river.

Exeter River has a depth of about 4 feet in a narrow, crooked channel to the town of **Exeter,** 16.5 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. Local knowledge is necessary to keep in the channel through these bays and the river above.

Two bridges cross Exeter River. The first, a railroad bridge near the mouth, has a swing span with a horizontal clearance of 30 feet and a closed vertical clearance of 2½ feet at high water. The highway bridge, about 1.2 miles above the mouth, has a horizontal clearance of 50 feet and closed vertical clearance of 9½ feet. See Chapter 2, § 203.45.

Chart 330.—Isles of Shoals consist of a group of islets 5 to 6 miles offshore southeastward of Portsmouth Harbor entrance. Seven islets, several rocks, and ledges comprise the group which extends about 3 miles in length in a northeasterly direction, and is marked at the southwest end by Isles of Shoals Light. Several channels between the islands are used only by local fishermen and yachtsmen who occasionally seek shelter from easterly winds.

Isles of Shoals are frequented mostly by summer visitors, a few fishermen, and Coast Guard personnel. In the summer of 1949 a small steamer was making daily trips from Portsmouth to the Isles of Shoals. Hotel accommodations are available during the season.

On a clear day the Isles of Shoals can be seen for 10 miles. The houses and a tower on Appledore Island are the most prominent. Vessels passing westward can avoid all dangers by giving the islands a berth of 0.5 mile. Passing eastward, care should be taken

to avoid Cedar Island and Anderson Ledges; giving the islands a berth of 1.5 miles leads well clear of these two ledges. Isles of Shoals Light covers the entire horizon, but is blanked out by houses on the islands northward for vessels approaching from that direction. Strangers desiring to land on the islands should be guided by Chart 330.

White Island is the southernmost of the group and is marked by Isles of Shoals Light. Ledges covered at low water extend 0.2 mile southwestward and westward from the island. The light, 82 feet above the water and visible 15 miles, is shown from a white conical tower with a covered way extending nearly to a dwelling. The fog signal is an air horn.

Duck Island, the northernmost of the group, is low, rocky, and surrounded by ledges, and should be given a berth of 0.5 mile.

A bombing target area has been established off Duck Island with its center on Shag Rocks. The Federal Regulations defining it are given in Chapter 2, § 204.2.

Mingo Rock is the southernmost of the reefs making off from Duck Island and 550 yards southeast of it is **Old Henry,** a 28-foot spot, which breaks in heavy weather.

Appledore Island, the largest of the group, is about 1 mile southwestward of Duck Island. It is high and has a few cottages and a very tall tower near the middle of the island. The channel between Duck and Appledore Islands has depths of 27 to 90 feet, irregular bottom. A small 7-foot spot northwestward of the island is marked by a buoy. The former Coast Guard station on this island was inactive in 1949.

Smuttynose Island is southeastward of Appledore Island, with a narrow channel between them having a depth of 20 feet. There is a house near the western end of this island and a small cove, **Haley Cove,** where boats lie aground at low water.

Cedar Island is connected with Smuttynose and Star Islands by breakwaters. Westward of Cedar Island and the breakwaters is **Gosport Harbor,** a small anchorage used by fishermen and others during easterly winds. 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. A bell buoy is off the entrance to this harbor.

Star Island, westward of Cedar Island, has on its northern side the village of **Gosport** consisting of a hotel, several houses, a small church, and a steamboat landing with a depth of about 18 feet. A 40-foot obelisk memorial is about midway of the island on the western side.

Lunging Island is a low, bare, rocky islet surrounded by ledges. It is 0.3 mile westward of Star Island. The channel between these islands is obstructed by Halfway Rocks, marked by a buoy, and also by a 6-foot shoal.

Cedar Island Ledge, bare at half tide and 0.4 mile southeastward from Cedar Island, is about 300 yards in length, east and west.

Anderson Ledge, bare at half tide and marked by a daybeacon, red wheel and pendants on an iron spindle, is 1 mile east-southeastward of Isles of Shoals Light and is the farthest outlying danger. The ledge is about 200 yards in diameter and has good water around it.

Chart 1206.—From Portsmouth Harbor entrance to Hampton Harbor, a distance of about 10 miles, the coast has a general southwesterly trend, with no marked indentation. It presents the appearance of a succession of sand beaches separated by ledges extending out about 0.5 mile, with occasional hotels and many summer houses back of the high-water line.

Concord Point, about 3 miles southwestward of Whaleback Reef, may be identified by a large hotel building with cupola. **Foss Ledges,** partly bare at low water, extend 0.5 mile offshore from the point and are marked by a buoy at the outer end.

Rye Harbor is a small cove used by pleasure and fishing boats. A stone breakwater is built southward from **Ragged Neck Point** and another breakwater extends northeastward from the point at the south side of the entrance to Rye Harbor. These breakwaters are about 6 feet above high water. The channel at the entrance between the breakwaters has a depth of 7 feet, and the anchorage in the cove has 4 to 6 feet. Local boats favor the northern breakwater slightly when passing through the entrance. Three small piers are on the south shore of the harbor. The piers are bare, or nearly so, at low water. Gasoline is available, but in 1949 there were no supplies.

Straw Point is marked by a prominent white flagpole. **Rye Ledge** is 1.2 miles southward of Straw Point. The ledge is partly bare at high water and extends 0.4 mile from shore.

Little Boars Head is a yellow bluff 7 miles southwestward of Whaleback Light. A summer resort of the same name extends over 0.5 mile northeastward from the bluff. A ledge which covers about 3 feet at high water is 0.4 mile from the bluff.

Great Boars Head is a bluff point making out 0.3 mile at the southern end of Hampton Beach and 9.5 miles southwestward of Whaleback Light. Standing on Great Boars Head is a prominent tall standpipe which is the most conspicuous mark on this section of the coast. The summer resort of **Hampton Beach** extends northward and southward from the point. A Coast Guard station is about midway between the Boars Heads.

Hampton Harbor, or **Hampton River,** a shallow stream used only by small local craft, is 1.5 miles southwestward of Great Boars Head. Though buoyed, the entrance is dangerous for strangers because of continual changes in the bar. In 1949 it was reported that the depth was 2½ feet on the bar. The entrance to the harbor is marked by a lighted bell buoy and several buoys which are not charted as they are frequently shifted in position. The harbor entrance is also marked by two daybeacons. The northern is a red triangular daymark on iron spindle and the southern is a black circular daymark on iron spindle.

Ledges and a bar make out from the river to **Old Cellar Rock,** a reef 0.7 mile long and partly awash at high water, the northeast end of which is 0.9 mile from shore. A gong buoy is eastward of the northern part of the ledge. **Hampton Shoal Ledge,** with 19 feet over it, is 2.4 to 2.8 miles from shore off Hampton River and 131° from Great Boars Head. This ledge is unmarked.

The river is crossed at the mouth by a new drawbridge having a horizontal clearance of 42½ feet and a closed vertical clearance of 19 feet. Remains of the former trestle crossing, 100 feet westward of the new span, still were in place in October 1949. See Chapter 2, § 203.50. It is reported that the flood velocity under the bridge is from 1½ to 2¼ knots and the ebb velocity is from 2 to 3¼ knots. Several float landings are inside the river and gasoline is piped to one having 4 feet alongside at low water. During the summer excursion boats come and go through the mouth of the river for short trips along the coast.

From Hampton Harbor the coast, **Salisbury Beach,** extends 4.3 miles in a southerly direction to the entrance of Merrimack River. **Breaking Rocks,** a ledge with a depth of 3 feet over it, is 0.7 mile offshore and nearly 2 miles south of Hampton River. It is marked at its northeast end by a buoy.

Chart 331.—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 6-foot draft at high water up to Haverhill and about 12-foot draft at high water to Newburyport. The head of all navigation is the dam at Broadway in **Lawrence,** 25.7 miles above the mouth. The river is seldom entered for refuge, and there is little commercial traffic above Newburyport. The river is charted to a point 2 miles above Newburyport.

The entrance is obstructed by a shifting bar, with 4 to 15 feet over it, and depending on conditions, the bar is dangerous to cross in heavy weather. U. S. Coast Guard vessels with drafts of 12 feet cross the bar at high water. The whole entrance breaks in easterly gales.

It is marked by Newburyport Light on its southern side and an entrance leading light on its northern side in addition to the buoys. Jetties with an opening 1,000 feet wide between the ends have been built from both points at the entrance out to the bar.

Newburyport is a city on the south bank of the river 3 miles above the entrance. It has very little trade by water. The deepest draft going to the town is about 12 feet. Vessels always enter from half tide to high water. Depths of 12 to 15 feet are alongside the Boston & Maine Railroad wharves. A tall yellow chimney and a water tank are prominent.

In approaching the entrance of Merrimack River the most prominent objects are the cottages on the south side at the entrance; the large hotels and roller coaster at **Cushing,** 1.5 miles north of the entrance; a water tank; a yellow brick stack; and several church spires at Newburyport. The jetties also are distinguishing marks when close in, but care should be taken as the outer ends are sometimes difficult to see at high tide. The Coast Guard lookout station and steel signal tower near the inner end of the south jetty are conspicuous.

Newburyport Harbor Light, 50 feet above the water and visible 12 miles, is shown from a white conical tower on the south side of Merrimack River entrance. The light is obscured by shore structures between the following bearings: 133° to 192°, 273° to 275½°, 313° to 344°.

Merrimack River Entrance Leading Light, shown from a skeleton tower with a white daymark on the north side of the mouth of the river, is 56 feet above the water and visible 13 miles.

The Federal project provides for jetties at the entrance to create at the bar a permanent channel 1,000 feet wide and at least 17 feet deep; and a channel from the sea to the wharves at Newburyport 15 feet deep and 400 feet wide through the bar, thence 12 feet deep and 200 feet wide to and including a widened turning basin in front of the wharves. At the present, 1949, an improvement to provide a channel 12 feet deep and 400 feet wide through the bar, thence 9 feet deep and 200 feet wide to and including a widened turning basin in front of the wharves only is being maintained.

In 1946 the controlling depth was about 9 feet to the wharves at Newburyport and 16 feet over the bar. In the vicinity of Newburyport entrance bell buoy 1, the reported depth over the bar in 1949 was about 11 feet.

From Newburyport to Haverhill, about 18 miles above the entrance, the river has been improved by dredging a channel 150 feet wide and 7 feet deep. In 1949 the controlling depth to Haverhill was reported about 6 feet.

The usual and best anchorage in the river is in the channel about 400 yards east of the bridges on the north side of the channel. The current is reported to run strongest along the south shore here and the holding ground is good. South and southwest of Halftide Rock are several private yacht moorings. It is best for visiting yachtsmen to anchor in one of these if possible because of strong currents.

Anchorage areas for Newburyport Harbor are defined and governed by Federal Regulations given in Chapter 2, § 202.15.

Bridges.—Merrimack River is crossed by eight bridges between Newburyport and Haverhill. All except the three upper have draw openings. Details of these bridges are as follows:

Newburyport highway swing bridge has a horizontal clearance of 76 feet and closed vertical clearance of 13 feet. Boston & Maine Railroad swing bridge has a horizontal clearance of 69 feet and closed vertical clearance of 13 feet. The suspension highway bridge has a horizontal clearance of 220 feet and a vertical clearance of 28 feet. The Amesbury highway swing bridge has a horizontal clearance of 56 feet and closed vertical clearance of 7½ feet. Rocks Village swing bridge has a horizontal clearance of 54 feet and a closed vertical clearance of 17 feet. Groveland highway swing bridge has a horizontal clearance of 64 feet and a closed vertical clearance of 14½ feet. The Haverhill fixed highway bridge has a horizontal clearance of 75 feet and a vertical clearance of 29½ feet. The Boston & Maine Railroad fixed bridge at Haverhill has a horizontal clearance of 123 feet and a vertical clearance of 36 feet. The county highway bridge, fixed, has a horizontal clearance of 139 feet and a vertical clearance of 30½ feet. An overhead cable across the river at Newburyport has a vertical clearance of 115 feet at high water.

Times of opening and closing of certain of these drawbridges are governed by Federal Regulations given in Chapter 2, § 203.55.

Directions, Merrimack River.—The river for a distance of 5.5 miles above the entrance is shown on Chart 331. Above that point no chart is available. A whistle buoy is outside the bar, and the channel across the bar is marked by an entrance leading light, and by buoys, but is subject to some change. Strangers are advised to engage a pilot. Buoys usually are shifted to conform to changes in the channels. Small craft may enter when the sea is smooth and on a rising tide, following the buoys. The river cannot be entered during a heavy sea. The outer ends of the jetties are awash at high water.

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 8 feet just before reaching the wharves at Newburyport. The channel on the range leads between a spindle daybeacon marking North Pier and a buoy marking South Pier, which bares at half tide. The range shows about 50 yards to the right of a high yellow chimney. When inwardbound, stay south of the range until abeam of North Pier.

The channel between Newburyport and Haverhill is marked by buoys at the most difficult points, but is narrow and crooked, and leads close to rocks in places. Local knowledge is required to keep in it.

Merrimack River can also be entered by small craft from Plum Island Sound through Plum Island River.

Tides.—The mean range of the tide is about 8 feet at the entrance.

Currents.—Currents are strong in the river and yachts sometimes drag when anchored off the American Yacht Club. Strangers should use a mooring if available.

Freshets occur in the spring but do not interfere with navigation as a rule.

Ice seldom obstructs navigation as far as Newburyport; drift ice may sometimes interfere with vessels under sail, but steamers and vessels assisted by towboats usually can work their way through. Westerly winds carry the drift ice out to sea and, 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.

Above the lower bridges the river is liable to be closed by ice from January to March.

Storm warnings are displayed day and night from the Merrimack River Coast Guard Station on the north end of Plum Island.

Pilots.—Strangers entering the river should engage a pilot, and it is advisable for all vessels drawing 9 feet or more to take one, as the channel over the bar is changed by heavy easterly seas, and buoys may be missing or temporarily out of place. Vessels bound up the river above Newburyport should take a pilot or towboat. Pilotage is compulsory only for vessels engaged in foreign trade. A pilot sometimes can be obtained at Portsmouth, and some of the local boatmen at Newburyport, although not licensed, are competent pilots for this bar.

Towboats.—No towboats are available at Newburyport. The nearest place where a towboat can be had is at Portsmouth. The master of this towboat is a licensed pilot.

Supplies.—Coal can be obtained in Newburyport alongside the wharf. The water in the river is fresh for about 7 months in the year. Water and some ship's chandlery can be had at Newburyport. Gasoline and provisions are obtainable at any of the towns on the river.

Repairs.—There are several boatyards and marine railways capable of hauling out boats up to 65 feet in length and 8 feet in draft.

The following towns and places are not shown on the charts:

Amesbury, on the **Powwow River,** is 1 mile above Merrimack River and 7.5 miles above the entrance of the latter river. There are several float landings. Gasoline and water can be obtained. The town has a repair shop and a marine railway capable of hauling out craft up to 48 feet in length and 6 feet in draft.

Merrimacport is a village on the north side of Merrimack River about 10 miles above the entrance. The village has a repair shop and a marine railway capable of hauling out craft up to 50 feet in length and 6 feet in draft. A float landing and water are available at the boatyard.

Groveland is a town on the south side of the river 15 miles above the entrance.

Haverhill is a city on the north bank, at the usual head of navigation of the Merrimack River, 18 miles above the entrance. Some wharves have depths of 10 feet or more, but there has been no commerce by water for many years. Gas, water, and supplies are available at a float landing and repairs can be made to small boats.

Bradford, a town on the south bank of the river, is connected by a highway bridge with Haverhill. Water is available at the yacht club float. Small boats anchor just below the bridge on the south side of the river.

Plum Island River forms a thoroughfare 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 feet at high water but the deepest draft that has gone through it at high water with local knowledge is about 4 feet. The channel is narrow and unmarked, does not always lead in mid-channel, and local knowledge is necessary for its navigation. It

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is crossed by a swing drawbridge having a horizontal clearance of 30 feet and a vertical clearance of 7½ feet. Regulations governing its hours of opening and closing are given in Chapter 2, § 203.60. The approach to the north end of the thoroughfare is between the east side of **Woodbridge Island** and the west end of a dike covered at high water and unmarked.

Chart 1206.—From Merrimack River entrance the coast, formed by **Plum Island,** 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 are Plum Island Sound and several tributaries forming the approach to villages at their heads.

Chart 243.—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 Plum Island Sound, Essex, and Annisquam Rivers, and has depths of 4 to 15 fathoms, 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.

Ipswich Light, shown from a skeleton tower with a white rectangular daymark, is on **Castle Neck** at the south side of the entrance to Plum Island Sound. The light is 50 feet above the water and visible 12 miles.

Chart 1206.—Plum Island Sound, the approach to several small rivers and villages, is frequented by many small craft. In 1949 it had a depth of 3 to 5 feet across the bar. Chart 243 shows the bar. The channel is marked by buoys to the Parker River and is subject to change.

Ipswich River, emptying into the south end of Plum Island Sound from westward, has been improved by dredging. The Federal project provides for a channel 4 feet deep and 60 feet wide through sand bars in the river called **The Shoals** and **Labor in Vain** and extending it to the **Deep Hole** opposite the town wharves. In 1949 the bar was reported to have shoaled to about 2 feet. Once past the entrance a depth of about 4 feet can be taken to the town of Ipswich on the railroad 2.5 miles above the entrance.

The channel above the entrance is usually marked by bush stakes. The river is used by many pleasure and fishing craft. Gasoline, water, and provisions are available 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 and some supplies are available.

The pier and float landing of the Ipswich Bay Yacht Club is on the northeast side of **Great Neck.** Gasoline and water are piped to the landing which has a depth of 4 feet alongside. During the summer many yachts moor off the landing in 10 to 15 feet, sand and mud bottom.

Rowley River, which empties into Plum Island Sound near its middle, has a depth of about 2 feet 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. The channel is reported to be marked by bush stakes during the summer.

Parker River, emptying into the north end of Plum Island Sound from westward,

has a depth of about 4 feet in a very narrow channel to a fixed bridge at Newbury Old Town, 1.6 miles above the entrance. The channel is marked by buoys but is difficult without local information. The limits of the anchorage area in the river are given in Chapter 2, § 202.20. The first bridge has a horizontal clearance of 60 feet and a vertical clearance of 11½ feet. **Newbury Old Town** is a summer settlement having a wharf just below the bridge and several float landings. A boatyard at Newbury Old Town can haul out small craft up to 40 feet in length and 5 feet in draft.

The river is navigable by small craft for several miles above Newbury Old Town but is little used. Both of the bridges are fixed. The first, at mile 2.6, has a horizontal clearance of 25 feet and a vertical clearance of 7¾ feet. The second, at mile 4.0, has the same clearances.

Chart 243.—**Essex Bay** and **River** are midway between Ipswich and Annisquam Harbor Lights. The entrance is over a shifting bar, over which a depth of about 3 or 4 feet can be carried, usually, 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 4 feet deep. The channel through the bay is buoyed and the river channel is usually marked by bush stakes in the summer. Local knowledge is necessary to follow the channel across the bar and in the river. Houses on the east side at the entrance are prominent. The fixed highway bridge in Essex has a horizontal clearance of 30 feet and a vertical clearance of 5½ feet. Shipyards at Essex build wooden vessels; otherwise there is no traffic except by local fishermen and launches. Gasoline and some supplies can be procured at a general store. A yacht club with pier and float landing is at **Conomo Point.**

Chart 233.—The **Annisquam River** and **Canal** comprise a thoroughfare leading from the eastern part of Ipswich Bay, northwest of Cape Ann, to Gloucester Harbor, on the south side of the cape. It has a depth of 10 feet on a bar at the north end, and from inside the bar has been dredged where necessary to a depth of 8 feet through to Gloucester Harbor. In 1944 the controlling depth was 7 feet. Some shoaling has occurred. This thoroughfare is narrow and crooked, but is marked by buoys and daybeacons, and is extensively used by many small craft. Strangers should have no trouble getting through with a smooth sea and by using Chart 233. The bar at the north end cannot be crossed in a heavy sea. The best time is on a rising tide. The mean range of the tide is about 9 feet.

Annisquam Harbor Light, 45 feet above the water and visible 12 miles, is shown from a white cylindrical tower with elevated walk to dwelling on **Wigwam Point** at the east side at the northern entrance to Annisquam River. The fog signal is an electric siren, operated between May 15 and October 15 during periods of low visibility in daylight hours. The red sector is from 180° to 217°. A lighted bell buoy marks the west side of the northern entrance of the channel.

A little over halfway from Ipswich Bay to Gloucester Harbor a fixed highway bridge crosses the thoroughfare; the minimum vertical clearance over the channel is 65 feet. The railroad bridge midway between the fixed bridge and Gloucester Harbor has a bascule span with a horizontal clearance of 40 feet and a closed vertical clear-

ance of 16 feet at high water. The highway bridge at the entrance from Gloucester Harbor is the most prominent landmark in the vicinity; the double-leaf bascule span has a horizontal clearance of 40 feet and a closed vertical clearance of 7½ feet at high water.

Vessels approaching from northward and desiring a pilot or a towboat should signal the Annisquam Harbor Light. Vessels approaching from the southward can signal for a pilot at Gloucester Coast Guard Station on Dolliver Neck or at Eastern Point Light.

No special directions are necessary. Chart 233 is the best guide. Care should be taken to avoid the sunken rock marked by a buoy and located close to the channel about 140 yards northwestward of Light 11.

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 4 to 7 feet in **Lobster Cove,** on the southeast side of the town, below the bridge. This cove is frequented by numerous small craft in summer. A channel 6 feet deep and 50 feet wide has been dredged into Lobster Cove to near the bridge. In 1949 the channel had shoaled to a reported depth of 4 feet. It is marked by locally-maintained buoys during the summer. A yacht club with a float landing is on the point at the western entrance to Lobster Cove.

Mill River is a tributary of Annisquam River, on the east side, 0.4 mile southward of Annisquam. A channel 6 feet deep and 60 feet wide, with an anchorage basin of the same depth, has been dredged into the river for a distance of 0.7 mile from the entrance. Some shoaling has occurred. There are numerous summer houses and float landings on the river which is used by many small craft in summer.

Chart 243.—Bay View is a village on **Hodgkins Cove,** 0.8 mile northeastward of Annisquam Harbor Light. A lobster plant is on a long stone pier having a depth of 15 feet 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 at the entrance and 3 or 4 feet inside. Unmarked rocks are at the entrance. The locality is marked by old derricks used in the adjacent abandoned quarries.

Cape Ann is very rocky and broken, 235 feet high at **Pool Hill,** its highest point, with numerous summer homes, and has several abandoned granite quarries. Communication is by railroad to Gloucester and Rockport, and by highway entirely around the cape.

Lanes Cove, 1.4 miles northeastward of Annisquam Harbor Light, is a small cove protected by stone breakwaters at the entrance, forming a harbor for small craft. It has a depth of 12 feet at the entrance and 10 feet in the middle inside. **Lanesville** is a village on the cove. The wharf forming the southwest side of the harbor has a depth of 6 feet at its outer end.

Folly Cove, on the north side of Cape Ann, 2.4 miles northeastward of Annisquam Harbor Light, has a stone wharf on the east side with about 16 feet alongside.

Ocean View is a summer settlement on **Andrews Point** at the north end of Sandy Bay. The settlement has no wharves. A dome on a stone house is prominent. A lighted gong buoy is 0.5 mile off shore north of the cape.

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. The bay is 2 miles wide between these points, and about 1.5 miles long to its head, Rockport Harbor. A break-

water 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 1949 it was awash at low water except for a distance of about 300 yards near the middle where it was above high water. A lighted buoy is off the northwest end and a bell buoy is off the south end. About 400 yards of each end of the breakwater are covered at low water. It is reported that several boats have grounded on the breakwater. This can be avoided by keeping on the correct sides of the buoys marking the ends. Sandy Bay and approaches, and an area 2.5 to 10 miles wide, northeastward, eastward, and southeastward of Cape Ann, have been examined by means of a wire drag. Depths inside the breakwater are 42 to 84 feet, with several rocky spots of less depths in the southern part. A 12-foot rock on the south side is marked by a buoy. The bay is sometimes used as an anchorage, but is exposed to north and northeasterly weather, and at such times Gloucester or Salem Harbors are generally used.

The entrance to Sandy Bay between Straitsmouth Island and the bell buoy marking **Avery Ledge** has broken bottom and a rocky spot with a depth of 22 feet in the middle. Strangers may be unable to avoid this, and should not use this channel when drawing more than 18 feet. A ledge baring at places at low water and having depths of 16 and 11 feet near the end, extends 300 yards northeastward from the northeast end of Straitsmouth Island. The northern entrance to the bay westward of the lighted buoy at the northwest end of the breakwater is deep and clear.

Pigeon Cove, 0.8 mile south of Andrews Point, is a small cove protected by a breakwater and having depths of 3 to 10 feet inside. The most prominent features of Pigeon Cove are the high concrete stack of the foundry and the tank on **Pigeon Hill.** There are bulkhead wharves around the harbor, and a public float landing. The best water is on the northeast side. A foundry is at the head of the cove. **Pigeon Rock,** 50 yards off the east point outside the jetty, is nearly bare at extreme low water.

Two stone piers, abandoned and in poor condition, are built out from the shore 0.3 and 0.5 mile southward of Pigeon Cove.

Dodge, Bartlett, and **Mitchell Rocks** are in a cluster about 300 yards 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 daybeacon, red cage on iron shaft. The western end of the rocks is 100 yards eastward of the south pier. The southern rock with 14 feet over it is 250 yards southeastward of the daybeacon. Mitchell Rock, with 4 feet over it, and another rock, covered by 18 feet, are 280 and 400 yards, respectively, northward of the daybeacon 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 stone pier.

Harbor Rock, with 2 feet over it, is 150 yards northeastward of the end of the north breakwater at the entrance of Rockport Harbor and is marked on its north side by a buoy. Inside the rock a shelving ledge extends 75 yards northeastward from the end of the north breakwater.

Rockport Harbor, at the southwest end of Sandy Bay, is used as a harbor by small craft. The entrance is about 200 feet wide between two breakwaters. A channel 12 feet deep and 100 to 200 feet wide has been dredged from the entrance to the public wharf at the west end. The channel leads south of a buoy just outside the entrance and 75 feet southward of the end of the breakwater on the north side, heading for the south

edge of the northerly wharf until inside, and then for the northern part of the southerly wharf. The northern breakwater is marked by a light at its outer end. The light, shown from a red pyramidal skeleton tower on white tank house, is 26 feet above the water. In 1949 areas on both the north and south sides of the public wharf were reported to have depths of 6 to 8 feet.

Near the shores are ledges particularly on the north side between the end of the breakwater and the first wharf on that side. Boats should not go northward of a line from the end of the north breakwater to the end of the first wharf on the north side, nor south of a line from the end of the south breakwater to the south edge of the wharf at the head. The first wharf has a depth of 7 feet. In 1949 the public wharf had a depth of 7 feet along the outer face, and the yacht club floats, on the southern side of the public wharf, had depths of 5 to 7 feet. There are facilities for lifting small craft to the wharf for repairs. Gasoline and provisions are obtainable. Water is piped on the wharves. The houses and church spires at the town of Rockport are conspicuous from outside. Rockport has communication by railroad and highway. A basin suitable for small craft and protected by stone walls just westward from Rockport Harbor proper was nearly bare at low water in 1949.

Straitsmouth Island is low and grassy. A light and a few buildings mark its eastern end. Straitsmouth Light, 46 feet above the water and visible 9 miles, is shown from a white cylindrical tower.

A Coast Guard station is south of **Gap Head** westward of Straitsmouth Island. **Storm warnings** are displayed day and night at the Coast Guard station.

Flat Ground, a dangerous ledge 0.5 mile long, with 2 to 12 feet over it, is 1 to 1.5 miles north-northeastward of Straitsmouth Light. The ledge is marked by two buoys, one at its south end and the other at the north end. The wreck of the Liberty Ship *Charles S. Haight* is broken in two on the ledge. The larger portion, completely submerged at high water, is north of Flat Ground Southern Rock buoy 2. The smaller portion, showing 10 feet at high water, is westward of that buoy in about 30 feet of water.

Dry Salvages is a bare ledge about 15 feet above high water near the middle of a reef about 500 yards long in a northerly direction. A lighted bell buoy is 0.5 mile northeastward of the ledge.

Little Salvages is a ledge showing well bare at low water and with parts awash at high water. It is about 500 yards 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 is between it and Dry Salvages.

Cape Ann Light, 166 feet above the water and visible 19 miles, is shown from the southerly of two identical gray stone towers on the east side of **Thacher Island,** 1.3 miles south-southeast of Straitsmouth Island. The northerly tower is not lighted. The fog signal is an air-diaphone horn. Cape Ann lighted whistle buoy is 2.5 miles 097° from Cape Ann Light.

Londoner, a ledge about 0.4 mile long in a northeasterly direction, with depths of 7 to 11 feet over it, is 0.5 mile east-southeastward of Cape Ann Light. Near the center of the ledge, on a cluster of rocks that bare at low water, is a daybeacon, black cylindrical cage on iron spindle. Between Londoner and Thacher Island is a passage with 12- to 26-foot depths. This passage should not be attempted by a stranger.

Milk Island, about 0.4 mile southward of **Emerson Point,** is connected with that

point and Thacher Island by two bars having depths of 3 to 7 feet. Salt Island Ledge bares at extreme low water.

There are numerous reddish brown, bare bluffs along the coast between **Cape Hedge** and Eastern Point. The most prominent of these are on Cape Hedge, **Salt Island,** the points to the north and west of Salt Island, the points on both sides of the entrance to **Brace Cove,** and on the southern part of Eastern Point.

CHAPTER 12

Gloucester to Plymouth

Chart 1207

MASSACHUSETTS BAY is contained between the coast of Massachusetts on the north and west with Cape Ann the northern point and Gurnet Point the southern, Cape Cod Bay on the south, and Stellwagen Bank on the east. Between these limits the width of the Bay is about 20 miles, east and west, and its length is about 40 miles, north and south. The shores of Massachusetts Bay from Cape Ann to Gurnet Point are rocky, generally bold-to, with numerous islands, dry rocks and sunken ledges lying near to, but detached from, the shore, with deep channels running between. Within the limits of Massachusetts Bay are several harbors: Gloucester, Beverly, Salem, Marblehead, Lynn, Boston, Cohasset, and Scituate.

Stellwagen Bank is described in Chapter 2.

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 the northern approach to Boston Harbor at its south end. It has depths of 3 to 8 fathoms in the entrance, but is shoal near the shores.

Chart 233.—Gloucester Harbor is one of the most important fishing ports in the United States and an important harbor of refuge. It is 5 miles southwestward of Emerson Point, the easternmost point of Cape Ann. The entrance is marked on its eastern side by Eastern Point Light. There is an outer and an inner harbor, the former having depths generally of 24 to 36 feet, and the latter depths of 15 to 24 feet.

Eastern Point Light, 57 feet above the water and visible 13 miles, is shown from a white conical tower with a covered way to a dwelling. The fog signal is a bell. A radiobeacon on a skeleton steel tower 125 feet high is about 50 yards north of the light.

A breakwater extends 750 yards northwestward from the shore near Eastern Point Light, and is marked at its end by Gloucester Breakwater Light, which has a bell fog signal. The light, 45 feet above the water and visible 11 miles, is shown from a white on brown skeleton tower. The entrance westward of the breakwater is about 0.6 mile in width, but **Round Rock Shoal** extends from 0.15 to 0.3 mile westward of the end of the breakwater, leaving a channel 150 yards wide and about 18 feet deep eastward of the shoal, and nearly 0.4 mile wide and 26½ to 54 feet 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 where a reported space is known to be not breaking.

Normans Woe, on the west side at the entrance to Gloucester Harbor, is a rocky

headland marked by a round house. **Normans Woe Rock,** 0.3 mile northeastward of Normans Woe and over 0.1 mile offshore, is a dark rocky islet 45 feet high, surrounded by extensive ledges. A bell buoy is 0.2 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, soft mud and clay bottom, in about 24 to 30 feet, and is used in general by vessels seeking shelter. On the northeast side of the harbor is a yacht club which maintains a pier and float landings. Water is piped to the floats.

Western Harbor is the semicircular cove in the northern part of Gloucester Harbor northwestward of Tenpound Island. It has good anchorage, soft mud and clay bottom, in from 24 to 30 feet, taking care to give the shore a berth of 300 yards. There are no wharves. The city of Gloucester maintains a parkway along the shore of Western Harbor. The statue, *Gloucester Fisherman,* faces the harbor from this parkway.

The southern entrance to **Blynman Canal** and Annisquam River is through Blynman Bridge at the head of Western Harbor. This is the inside route to Ipswich Bay on the north side of Cape Ann and is described in Chapter 11. The school tower about 500 yards north of the bridge is prominent.

Tenpound Island is marked by a light on the west side. The light, 44 feet above the water and visible 12 miles, is shown from a brown conical tower. The fog signal is a bell. **Storm warning** signals are displayed. A house and wharf of the U. S. Fish and Wildlife Service are on the north end. **Green Rock,** 175 yards eastward of the island, is marked by a daybeacon, red circular cage on iron spindle.

Rocky Neck is a high and partly wooded island 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 is marked by a daybeacon, red oblong cage on iron spindle.

Inner Harbor is 0.8 mile in length, and has depths of 12 to 24 feet. A rocky patch with a depth of 17 feet is in the middle of the entrance halfway between Rocky Neck and **Fort Point. Harbor Cove,** on the northwest side just inside the entrance to Inner Harbor, has been dredged to a depth of 15 feet for the entire 50 feet outside the harbor lines. A 16-foot channel has been dredged along the wharves to abreast the west side of the Community Fish Pier. The northwest side of the Community Fish Pier, at the head of the inner harbor, has been dredged to 22 feet at low water along the face and out for a distance of 250 feet from the face of the pier. A large rock with a depth of 12 feet over it has been reported about 20 yards off the north end of the pier.

The Federal project provides for dredging to 15 feet the ledges and boulders obstructing the approach to wharves between Harbor Cove and Pews Wharf, and dredging to the same depth the channel leading past the wharves, and dredging Harbor Cove to a depth of 10 feet.

Anchorage.—The best anchorage in the outer harbor for vessels coming in for shelter or bound to Gloucester is in Southeast Harbor, known locally as **Pancake Ground.** This is the one most frequently used. Yachts anchor off the Yacht Club landing on the northeast side of the harbor. Anchorage in Western Harbor is good, and is used often. This is the quarantine anchorage.

Anchorage in the Inner Harbor is permitted only in a small area between Rocky Neck and Community Fish Pier, and also in Smith Cove.

Smith Cove provides good anchorage for small boats in depths up to about 18 feet.

Directions.—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 or less draft to an anchorage in Southeast Harbor, and for 18-foot or less draft into the inner harbor, are marked. Strangers are advised not to try to bring in greater drafts.

Deep-draft vessels entering the inner harbor should use caution to avoid the 17-foot rocky shoal nearly in mid-channel between Rocky Neck and Fort Point.

Strangers 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 into Round Rock Shoal, and at times breaks nearly the whole distance across to Normans Woe Rock.

No special directions are necessary. Charts 243 and 233 are the guide for approaching and entering Gloucester Harbor.

Local magnetic attraction.—Land observations indicate that differences as much as 3° greater than the normal west variations may be encountered within the area embraced by Chart 233.

Tides.—The mean range of the tide is about 8½ feet.

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.

Ice seldom extends outside Tenpound Island at the entrance to the inner harbor. The movement of boats generally keeps the inner harbor open.

Storm signals are displayed, day and night, from Tenpound Island Light.

Pilotage is compulsory for all vessels over 7-foot draft, except fishing vessels engaged in foreign trade but not for vessels engaged in coastwise trade. There are no licensed pilots in Gloucester, but arrangements for pilotage can be made through the harbor master or the Coast Guard.

Towboats.—The nearest towboats are stationed at Boston.

Quarantine.—Vessels subject to quarantine anchor in Western Harbor, where they are boarded by a Public Health officer.

Public Health Service.—There is no Public Health hospital, but this service maintains a relief station in the customhouse.

Customs.—The Customs Office is in the Post Office Building. Gloucester is a port of entry and marine documents are issued.

Immigration.—The Immigration Office is in the Post Office Building.

The Gloucester **Coast Guard Station** is on the west side of Gloucester Harbor in **Oldhouse Cove** on **Dolliver Neck.**

Harbor master.—The harbor master can be contacted through the City Hall.

Wharves.—Gloucester has a great many wharves, most of which are used in connection with the fishing industry. Depths vary up to 22 feet. Dockage and wharfage are not usually charged. A public wharf and float landing for small craft at the extreme head of Harbor Cove has a depth of about 6 feet alongside. There is no railroad connection to the wharves.

Supplies.—Fuel oil is not available in bunker quantities, but Diesel oil can be had as desired. Coal is available at the wharves or from lighters. Ship's chandlery and all

other supplies also are obtainable. Fresh water of good quality can be had at the wharves.

Chart Agency.—A Chart Sales Agency of the U. S. Coast and Geodetic Survey is maintained at Gloucester.

Repairs.—Gloucester has marine railways for hauling out the class of vessels ordinarily operating here. The largest railway hauls craft 125 feet in length, 200 tons in weight, and 16 feet in draft. Machine shops can make ordinary repairs to machinery, but Boston is the nearest place for extensive repairs to large vessels or machinery.

Communications.—Gloucester has rail and highway connection, but no regular steamer service.

Chart 243.—**Magnolia Harbor** is a cove about 1.5 miles westward of the entrance to Gloucester Harbor and just north of **Kettle Island.** The summer resort of **Magnolia** is conspicuous on the eastern side. It has a public pier and float with about 4 feet alongside. The harbor is used by many small craft, but the holding ground is not very good and the cove is exposed to southerly weather.

Chart 240.—Off the shore eastward of Manchester Harbor entrance, between Gloucester entrance and House Island, are many islands, rocks, and ledges extending about 0.8 mile offshore. The farthest outlying ones, named in order from eastward, are: **Great Egg Rock,** high and bare; **Boohoo Ledge,** bare at low water; **Salt Rock,** showing at high water; **Pickett Ledge,** bare at low water; **Gales Ledge,** and Pilgrim Ledge. Of the several coves, only Manchester Harbor is of interest to navigation.

The shoreline of this section of the coast is lined with summer homes and hotels.

Manchester Harbor, about 5 miles westward of Gloucester Harbor, is formed by an arm of the bay extending west of **Gales Point** in a northeasterly direction for 1 mile to the town of **Manchester** (**Manchester-by-the-sea**). The entrance to the outer harbor is northward of Bakers Island Light, between **House Island,** partly wooded, on the east, and Great Misery Island on the west. A dredged channel leads into the harbor. The depth alongside the coal wharf at the head of the harbor is about 6 feet. A railroad drawbridge across the head of the harbor has a bascule span with a horizontal clearance of 50 feet and a closed vertical clearance of 6½ feet. The harbor is frequented by many small craft. The entrance channel is marked by buoys.

The Federal project provides for an entrance channel 200 feet wide and 10 feet deep from that depth in Massachusetts Bay to **Proctor Point,** and dredged anchorage areas in the harbor between Proctor Point and the Boston and Maine Railroad bridge, affording depths of 10, 8, and 6 feet, respectively; a channel 75 feet wide and 6 feet deep from the railroad bridge to the town wharf, and a 6-foot turning basin at the town wharf.

No work has been done on this project. The controlling depths were 4 feet in the 10-foot channel in 1939; 9 feet in the 6-foot channel in 1940; 6 feet in the 10-foot anchorage in 1939; 5 feet in the 8-foot anchorage in 1939; 2 feet bare in the 6-foot anchorage in 1939; and 9 feet in the 6-foot turning basin in 1940; with the exception of a depth of 5 feet over rock shoal about 120 feet south of the Knight Coal Company wharf.

On the west side of the harbor is a yacht club with a float landing. At another wharf with a float landing on the same side is a marine railway capable of hauling out vessels up to 80 feet in length and 9 feet in draft. Gasoline and water are available at the float landings, and supplies can be procured in the town.

The mean range of the tide is about 9 feet.

The anchorage is in the outer harbor northward between Great Misery and House Islands. Vessels desiring to anchor for the night or in head winds may find fair holding ground and good shelter except in southerly gales. The anchorage is 0.8 mile wide, and has depths of from 18 to 36 feet.

Whaleback, a dangerous ledge in the entrance of the outer harbor of Manchester, 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, marked by a daybeacon, red cage on iron spindle. Between the ledge and House Island is a clear channel 250 yards wide. The channel westward of the ledge is 500 yards wide.

Sauli Rock bares 4½ feet at low tide, is 300 to 400 yards eastward of the northeast end of Great Misery Island, and is marked on its south side by a buoy.

White Ledge, bare at low water, is 300 yards northwestward of House Island, and is marked by a buoy on its west side. A rock covered at half tide is 250 yards northward of White Ledge and is marked by a buoy off its northwest side.

Chubb Islet, bare and rocky, is 300 yards from the north shore of the outer harbor of Manchester, and should be given a berth of more than 200 yards.

Salem, Beverly, and Marblehead Harbors 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 are several channels leading into the harbors.

The most conspicuous landmarks approaching from eastward are Bakers Island, with its light on the northern end and numerous houses on the south end of the island, and Great Misery Island, the high and grassy island northward of Bakers Island. A large water tank is about 0.5 mile northward of West Manchester.

From southward, Halfway Rock, a bare rock about 15 feet high, will be seen about 2 miles south of Bakers Island. Southward of Bakers Island are North and South Gooseberry Islands, and about a mile southwestward of these is Cat Island, long and narrow with some houses near the northern end. Marblehead Neck is high and rocky, and has many summer houses and several yacht clubs, and the light on its northern point. Landmarks in Marblehead include the red brick tower of Abbott Hall, two standpipes, and a radio tower near Naugus Head.

Salem Harbor is used considerably as a harbor of refuge. Salem and Beverly have coasting trade, mostly in vessels carrying coal and oil. The deepest draft entering is about 28 feet. Marblehead Harbor is frequented by many yachts and small craft.

Restricted areas in Salem Harbor and approaches are defined by Federal Regulations in Chapter 2, § 207.7.

Three main channels leading through the islands and rocks at the entrance are known as Main Ship Channel, Cat Island Channel, and Marblehead Channel. Several other channels of less importance are used only by local boats. These channels have been swept by wire drag, and all dangers found are shown on the chart.

Main Ship Channel, the most northerly, leads between Bakers and Great Misery Islands, and northward of Great and Little Haste. It is marked by Hospital Point

Lighted Range. The front light, shown from a white pyramidal tower on **Hospital Point,** is 70 feet above the water and visible 14 miles. The light is more brilliant in the channel than on either side. The rear light, shown from the tallest spire in Beverly, is 183 feet above the water. The azimuth of the range is 276°16′. The channel has depths of about 33 feet until up to Smith Point if the range is closely followed. Several buoyed dangers are close to the sailing line. This channel is used by most deep-draft vessels.

Cat Island Channel, the middle one, has its entrance near Halfway Rock. It leads in a northwesterly direction, between Cat Island on the south and Satan Rock, the Brimbles, and Eagle Island on the north. The least depth in Cat Island Channel, about 26 feet, is between Eagle and Cat Islands.

Marblehead Channel, the westerly one, leads in a northerly direction between Cat Island and Marblehead Neck. Several marked shoals with depths of 10 to 24 feet are close to the channel and the sea breaks on them in easterly gales. Other shoals with depths of 19 feet or more are unmarked. This channel is not recommended for strangers drawing more than 12 feet.

South Channel is a branch of Marblehead Channel leading 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, but has not been closely examined and should not be used by strangers except in small craft.

Bakers Island, on the south side of the entrance to Main Ship Channel, has several houses. Bakers Island Light at the northern end, 111 feet above the water and visible 16 miles, is shown from a white conical tower. The fog signal is a siren. A boat landing is on the west side of the island.

An extensive area of rocky patches and reefs extends for 2 miles southeastward of Bakers Island. A lighted whistle buoy marks the southeast end and vessels should pass outside of it. **Middle** and **Inner Breakers** are partly bare at low water.

Great Misery Island, on the north side of Main Ship Channel at the entrance, has several houses and a landing at its north side.

Hardy Rocks, 0.6 mile westward of Bakers Island Light, are bare 4½ feet at low water. They are marked by a daybeacon, two black triangles on a spar, and a buoy on the northeast side.

Bowditch Ledge, 1.2 miles west-northwestward of Bakers Island Light and 300 yards southward of the Main Ship Channel Range, is marked by a conical granite monument daybeacon.

Great Haste, on the south side of the main channel and 2.4 miles westward of Bakers Island, is a bare rock surrounded by ledges. **Little Haste,** close northwestward of Great Haste, is bare at low water and marked by a daybeacon, black cask on wooden spar. **Haste Shoal,** a 17-foot spot about 650 yards northward of Little Haste Daybeacon, is marked on the east side by a horizontal-banded lighted buoy.

Halfway Rock, 2 miles southward of Bakers Island, is about 15 feet high and is surrounded by deep water.

North and **South Gooseberry Islands** are high, rocky islets on the western end of the extensive ledges southward of Bakers Island. **Dry Breakers,** the southerly part of the ledges, shows 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 buoy marks the western side of the ledges.

Satan Rock, 0.5 mile east-southeastward of Cat Island, is a small bare rock marked by a daybeacon, round black cage on red iron shaft. The rock should be given a berth of over 200 yards.

Brimbles is a rock awash at low water 0.3 mile south-southeastward of Eagle Island. It is marked by a daybeacon, black spindle with four arms; the two arms toward Cat Island Channel have red faces. The daybeacon should be given a berth of over 200 yards.

Eagle Island, 0.7 mile north-northeastward of the north end of Cat Island, is small, grassy, and rocky.

Grays Rock, 0.7 mile northwestward of Cat Island, is about 10 feet high.

Coney Island is a low, grassy islet with a small stone house near its middle. **Coney Ledge,** an extensive ledge extending southeastward and southward from Coney Island, is marked at its easterly end by a buoy.

Islands and rocks, sunken and bare, extend 2 miles southward and southwestward from the south end of Marblehead Neck. Many of these dangers are marked by buoys, and the channels between them are used by local boats, but the area should be avoided by strangers. A lighted bell buoy marks the southeastern end of the broken ground. Dangers 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 red daybeacon, cross on iron spindle; and **Tinkers Island,** marked by several houses. A bar with little depth connects Tinkers Island with **Flying Point,** the southern end of Marblehead Neck.

Tom Moore Rock, at the eastern end of a reef extending 500 yards eastward from the middle of Marblehead Neck, is bare at one-third ebb, and marked by a black daybeacon, cask on iron spindle.

Marblehead Rock, 500 yards eastward of the northern part of Marblehead Neck, is a high bare rock with a daybeacon on top. Marblehead Rock Daybeacon is a round granite and wood structure with a conical top and painted black and white.

Cat Island, 0.8 mile northeastward of Marblehead Neck, is more than 0.3 mile long, is bare, and has a large building on the north end. A wharf is on the southwest side. The island is surrounded by extensive ledges, bare and submerged. A water tank is on a small hill near the center of the island. A daybeacon, red cask on spar, marks the high bare rock at the south end.

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 at all times. Strangers should not attempt to enter or leave in thick weather. Wire drag examination has been made of all of the channels in the harbors and their approaches, except the channels between the black buoy and the horizontal-striped buoy northward of Little Haste, through South Channel and through Marblehead Harbor. Strangers should exercise great caution in navigating through areas not examined by means of a wire drag. See Chapter 3 for courses and distances.

Tides.—The mean range of the tide is about 9 feet.

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.

Ice.—The head of Salem Harbor on the flats usually is 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 formation both in the harbor and its approaches.

Ice rarely obstructs Marblehead Harbor 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 is entirely local and it remains only a short time.

Beverly is a city on the north side of Beverly Harbor, just inside the entrance. Depths of about 28 feet are at one of the oil wharves, and various lesser depths at the other wharves. The city has several yacht clubs and boatyards. It has some trade in oil and lumber, carried in barges and vessels up to 28-foot draft. Gasoline and water are piped to some of the floats. The largest marine railway can haul out craft 40 feet in length, 6½ feet in draft, and 12 tons in weight.

Beverly Harbor is north of Salem Neck, at the west end of Salem outer harbor, and is formed by the confluence of Danvers River, Bass River (Beverly Creek), and North River. It forms the approach to the city of Beverly.

The Federal project for Beverly Harbor provides for a channel 24 feet deep and 200 feet wide, increased at the entrance and curves, from deep water to the rock shoal near Essex Bridge. In July 1950 the controlling depth was 22 feet.

Danvers River, the continuation of Beverly Harbor northwestward, has a depth of about 7 feet for 2 miles above Beverly to the village of **Danversport.** Lumber vessels go to Danversport at high water. The channel is narrow and marked by buoys for 1.5 miles above Beverly. It leads between flats bare at low water and is difficult without local knowledge.

North River, a tributary of Beverly Harbor from southward just above the bridges, is nearly bare at low water in a narrow, unmarked channel which is seldom used.

Bass River (Beverly Creek), a tributary of Beverly Harbor from northward just above the bridges, has a dredged channel 9 feet deep for about 1 mile above the entrance to near the head. A lumber wharf is on the east side of the creek. The channel leads between flats bare at low water, and is most easily followed at that stage. It is marked by buoys to the bridge. The bridge has a swingspan with a horizontal clearance of 40 feet and a closed vertical clearance of 5 feet.

Anchorage.—Anchorage areas in Beverly Harbor are defined by Federal Regulations, see Chapter 2, § 202.25.

In Beverly Harbor, the best anchorage is between Rams Horn Rock and Lobster Rocks Daybeacons, a little south of the line joining them, in 18 to 24 feet. Small vessels and motorboats usually anchor on the south side of the channel between Lobster Rocks Daybeacon and the bridge, in 12 to 15 feet.

Monument Bar and **Lobster Rocks,** both on the south side of the channel, are marked by daybeacons. Monument Bar Daybeacon is a black square cage surmounting a wooden staff on pyramidal granite cribwork. Lobster Rocks Daybeacon is a black keg surmounting a staff on a square granite crib work. **Rams Horn Rock,** on the east side of the channel leading to **Collins Cove,** is marked by a daybeacon, black cone surmounting a wooden staff on square granite crib work.

Bridges.—Just above the principal wharves, two drawbridges cross the harbor. The lower, a highway swingspan, has a horizontal clearance of 40 feet and a closed vertical clearance of 10 feet. The second one, a railroad bridge 100 yards above the highway bridge, has a horizontal clearance of 40 feet and a closed vertical clearance of 4 feet. The signal for each bridge is three blasts. About 0.5 mile above these bridges is a drawbridge with a swingspan having a horizontal clearance of 50 feet and a closed vertical clearance of 8 feet. This bridge opens upon signal during daylight from 3 hours before to 3 hours after high water, daily except Sunday.

Pilotage.—Arrangements for pilotage are made through Boston. Pilotage for coastwise vessels is not compulsory. Vessels in foreign trade are required to take pilots. Deep-draft vessels bound for Beverly should take a pilot.

Towage.—Towboats can be obtained from Boston. Powerboats are available at Beverly for towing small barges up the Danvers River.

Quarantine, customs, and **immigration** are all handled through the customs office at Salem.

Salem is an industrial city on the western side of Salem Harbor. The city has many historical points of interest including two museums devoted to maritime subjects.

Salem Harbor is about 1.5 miles in length in a southwesterly direction. The channel favors the eastern side of the harbor and has depths of 21 to 24 feet in the outer part and about 15 feet to the entrance of the dredged channel leading to South Salem and South River.

The entrance to Salem Harbor is between **Abbott Rock Daybeacon,** red square cage on staff on pyramidal granite base, and Fort Pickering Light on the west, and **Great Aquavitae Daybeacon,** black cage on iron staff with pyramidal granite base, on the east.

Fort Pickering Light, 28 feet above the water and visible 8 miles, is shown from a brown conical tower, white base, on the southeast point of **Winter Island.**

The Federal project provides for a channel about 0.5 mile long and 10 feet deep from this depth in the harbor to about opposite the outer end of Derby Wharf, 300 feet wide at the entrance, gradually narrowing to 200 feet, and a channel 25 feet deep, 300 feet wide and about 1,500 feet long, including the removal to the same depth of a shoal near Abbott Rock Daybeacon, and a channel in South River 10 feet deep, approximately 90 feet wide to the bend near Central Wharf, thence 50 feet wide to the upstream end of Pickering Wharf, and for a branch channel on the east side of Derby Wharf 8 feet deep, 100 feet wide, and approximately 700 feet long, widening to a basin of the same depth 500 feet long and 200 feet wide.

In June 1949 the controlling depth was 7 feet in the 10-foot channel, and 25 feet in the 25-foot channel.

A channel dredged to 10 feet but reported shoaled to 6 and 7 feet and marked by buoys, leads just west of Derby Wharf to South River. **Derby Wharf,** with only 2 or 3 feet alongside, is no longer used.

South River, a short estuary extending into the city of Salem, has its entrance on

the west side of Derby Wharf which is a long stone jetty with a light on a white square tower at its outer end. South River has been dredged to a depth of 10 feet and a width of 200 to 300 feet to the outer end of Derby Wharf. In 1949 it was reported shoaled to 8 feet. The dredged depth of 8 feet inside to near the head in 1949 was reported to have shoaled to 4 feet. There is a large mill and a conspicuous brick stack on the west side just inside the entrance. A drawbridge across the river about 0.2 mile above Derby Wharf has a horizontal clearance of 43 feet and a closed vertical clearance of 4 feet. There is no traffic above the bridge, but oil barges drawing 8 feet call at the wharf 200 yards below the bridge. A public float landing for small craft is on the southeast 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.

The dredged channel leading to **South Salem** had a controlling depth of 8 feet in May 1947.

Anchorage.—Salem Harbor is mostly used as a harbor of refuge, especially during the autumn. Also, good anchorage is available in what is known as the outer harbor westward of Bowditch Ledge and northward or eastward of Little Haste, in 30 to 42 feet. The anchorage most often used is eastward of the entrance to Beverly Harbor and northward of **Middle Ground,** in 21 to 36 feet. Small vessels, particularly sailing vessels, also anchor on the east side of Salem Harbor just westward of **Naugus Head,** in 21 to 24 feet. See Chapter 2, § 202.25 for small boat anchorage.

Mann Rock, with 20 feet over it, is 0.5 mile 076° from Juniper Point. It is nearly in the track of vessels approaching Salem Harbor, and is marked by a buoy.

Pilotage.—Arrangements for pilotage are made through Boston. Pilotage for coastwise vessels is not compulsory. Vessels in foreign trade are required to take pilots. Deep-draft vessels bound for Salem should take a pilot.

Towage.—Towboats can be obtained from Boston. Rates for small vessels going into South River are determined by agreement.

Customs, quarantine and immigration.—These are all handled by the customs officer located in an office in the Post Office Building. Salem has a relief station.

A large wharf and coal terminal is on the northwest side of the harbor. The overhead conveyors show prominently in approaching. A channel 25 feet deep has been dredged to this terminal and it is used by steamers drawing up to 28 feet. A depth of 30 feet is maintained alongside the terminal. The channel is marked by a privately maintained directional light. It shows white when on the center line of the channel bearing 287°30′, red when on the right side of white center beam and green when on the left side of the white center beam entering from seaward.

Supplies.—Diesel oil, gasoline, coal, water, provisions, and motorboat supplies can be procured at Salem.

Repairs.—A marine railway at Salem can haul out craft of about 80 tons. Machine shops can make ordinary repairs to machinery.

Marblehead Harbor is about 1 mile long and 700 yards wide. It is formed on the east and south by Marblehead Neck and **Marblehead Beach,** a narrow strip of land connecting the south end of the neck with the mainland. Marblehead Light, at the north end of the neck, marks the easterly point at the entrance. The light, 130 feet above the water and visible 13 miles, is shown from a square skeleton tower, brown to gallery, black above, with elevated walk to dwelling.

Marblehead Harbor is an excellent anchorage and is mostly used by yachts during

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the summer. The anchorage is reported uncomfortable for small yachts when the wind is northeast. The depths in the harbor up to **Skinner Head** are 24 to 30 feet, and vessels up to about 20 feet in draft can enter. The greater part of the head of the harbor southward of Skinner Head and **Boden Point** is shoal.

Marblehead, on the west side, and **Marblehead Neck** on the east side of the harbor, are important summer resorts. Several prominent yacht clubs have headquarters here. Small excursion boats operate out of Marblehead, and light-draft oil and coal barges call occasionally. Piers and float landings are on the east and west sides of the harbor. Several boatyards are in operation, the largest has a marine railway capable of hauling out craft 125 feet in length, 16 feet in draft, and 250 tons in weight. Diesel oil, gasoline, water, ship's chandlery, and supplies are available. The U. S. Coast and Geodetic Survey has a Chart Sales Agency at Marblehead.

The Federal project provides for repair of the sea wall and an anchorage on the east side of the harbor, 13 acres in area, 20 feet deep, and an anchorage at the southwest end of the harbor, 16 acres in area, 9 feet deep. The repairs to the sea wall were completed in 1903. The dredging of the 20-foot and 9-foot anchorage areas has not been done.

Storm warnings are displayed, day and night, by the Weather Bureau from a steel tower at **Fort Sewall,** the first point west of the entrance to Marblehead Harbor.

The **harbor master** can be contacted through the yacht clubs.

Directions, from northeastward.—Follow the directions for Salem Harbor to a position 300 yards northwestward of the buoy off the north side of Bakers Island. Then steer **216°** for the northwest end of Cat Island, with the east side of Gales Point astern, and pass 300 yards southeastward of Hardy Rock buoy and daybeacon. When about 0.3 mile east of Eagle Island, steer **236°** with Baker Island Light astern, pass 200 yards southward of Eagle Island. When about 350 yards southward of Chappel Ledge buoy with the eastern end of Grays Rock abeam, steer **225°** for the middle of the entrance to Marblehead Harbor, and anchor off the town, favoring if anything the westerly side of the harbor, in 24 to 30 feet, soft bottom.

From eastward.—Unmarked detached rocks and ledges with depths of 15 to 25 feet are off the eastern entrance to Marblehead Harbor, and strangers may have trouble avoiding them. The following course is recommended for vessels of 12-foot draft or less. Bring Halfway Rock astern on a **278°** course, heading a little north of the flag tower at Fort Sewall, and pass 300 yards southward of Cat Island Daybeacon, 500 yards northward of Marblehead Rock Daybeacon, and 100 yards northward of the buoys off the north end of Marblehead Neck. Vessels then can haul southwestward into the harbor.

From southward.—The entrance through Marblehead Channel is suitable for vessels not exceeding 15 feet in draft. There are numerous unmarked spots with depths of 17 to 25 feet. Chart 240 is the guide.

Phillips Point (Littles Point) is high and rocky, and its western and higher part is wooded. A rock with 12 feet over it is 600 yards eastward of **Grass Head,** the eastern end of the point. A reef with bare heads extends 350 yards southward from Phillips Point. **Dread Ledge** is bare at half tide and marked by a daybeacon, red cask on iron spindle. It is 500 yards southward of the point.

Nahant Bay is 2 miles wide between Phillips Point and Nahant. Temporary anchorage, exposed to easterly and southerly winds, can be had in the bay in 18 to 36 feet, but it is seldom used. The usual anchorage is off Swampscott, southwestward or west-

ward of the southern end of Fishing Point. Small craft can anchor westward of the point in 8 to 15 feet. The bay is clear and 18 feet is found about 0.5 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. A rock with 3 feet over it is just about 125 yards south of the end of Fishing Point. A buoy marks the south side of the rock.

The town of **Swampscott** is on the northern shore of Nahant Bay. A large standpipe, the high school cupola, and the Oceanhouse Hotel are conspicuous.

Lynn Beach is a narrow strip of sand about 1 mile long in a southerly direction separating Nahant Bay from Lynn Harbor. **Little Nahant,** a high grassy head with many houses, is joined to Nahant by **Little Nahant Beach,** a strip of beach 0.4 mile long. The Coast Guard station on Little Nahant Beach is just southward of Little Nahant. The white buildings and a steel signal tower are conspicuous.

Egg Rock, 60 feet high, is on the southern side of the entrance to Nahant Bay. It is a bird sanctuary.

Nahant is a high peninsula about 1.5 miles long, with bluff seaward faces. The town of Nahant is connected to Lynn by a highway. A standpipe is the most conspicuous mark. Two church spires, a stone house, and a square tower on **East Point** are also prominent.

Nahant Harbor is the bight on the south side of Nahant. On entering between **Joe Beach Ledge** buoy and **Bass Rock** Daybeacon, red cage on iron spindle, temporary anchorage can be selected off the wharf in 18 to 24 feet, hard bottom. The town wharf has about 5 feet depth alongside.

Shag Rocks are 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. A buoy is south of the ledge.

Lynn Harbor, the northerly end of Broad Sound, is full of shoals, largely bare at low water through which a channel has been dredged to the city of Lynn. **Lynn** has considerable trade in coal and oil, and some trade in lumber and building materials. Depths at the wharves of Lynn vary from 8 to 28 feet.

Landmarks in approaching Lynn Harbor are the standpipes at Nahant and Winthrop, the large gas tanks and several stacks at the head of the harbor, twin brick stacks at the General Electric plant on Saugus River, and twin towers on a beach house at the north end of Lynn Beach.

The easterly, or main channel, is dredged to 22 feet deep and 300 feet wide. A turning basin at the head of the harbor is 550 feet wide. The channel is marked by buoys at the outer end and lights to the town of Lynn, and leads between mud flats bare at low water. Just eastward of the turning basin is an anchorage for small craft. Some local knowledge is necessary to carry the best water, but strangers in small craft should have no trouble, with the aid of the chart.

The Federal project provides for a channel 25 feet deep and 300 feet wide from deep water west of **Bass Point,** Nahant, to and including a turning basin 550 feet wide at the head of the harbor, a channel (Western Channel) leading to the mouth of the Saugus River, 8 feet deep, 150 feet wide, generally through the bar in the outer harbor.

No work has been done on this project. A 22-foot channel was completed in 1935 and in 1940 had a controlling depth of 21 feet with depths of 19 and 20 feet in the turning basin. Western Channel was dredged to 12 feet in 1916, in 1940 it had a controlling depth of 11 feet to the first highway bridge.

Black Rock Channel, a branch of the easterly channel leading along the western side of Nahant, is unmarked and suitable only for small craft. Shoals nearly bare at low water are on each side.

Western Channel of Lynn Harbor leads into **Saugus River.** The controlling depth to the General Electric Company wharf, 0.5 mile above the bridges at the entrance is reported to be 7 feet. The most of the channel has 11 feet or more, but a 7-foot spot is reported about north by west of the end of Point of Pines. The berth at the General Electric wharf was dredged to 18 feet in 1943. The river has been dredged to a depth of 6 feet for 0.75 mile above this wharf to a lumber wharf. Western Channel is marked by buoys as far as the first bridge at the mouth of Saugus River, and from there on it is unmarked, and local information is essential.

The only anchorage is for yachts. It is east of the turning basin. See Chapter 2, § 202.30(a).

The only dangers in the approach to Lynn Harbor are Flip Rock and Nahant Rock. **Flip Rock,** with 12 feet over it and marked by a horizontal-banded gong buoy, is 0.6 mile south of Bass Rock. **Nahant Rock,** with 18 feet over it and marked by a horizontal-banded buoy, is 0.8 mile south-southwest of Bass Point.

Bridges.—No bridges cross the main channels to Lynn Harbor. Three drawbridges cross the Saugus River between its mouth and the General Electric wharf, and one between that wharf and the lumber wharf. The first, **General Edwards Bridge,** has a horizontal clearance of 100 feet and a closed vertical clearance of 27 feet. It opens at any time. The next bridge, no longer operated, was for a narrow gage railroad. The drawspan has been removed. Its horizontal clearance is 50 feet. The third bridge, operated by the Boston and Maine Railroad, has a horizontal clearance of 50 feet and a closed vertical clearance of 7½ feet. A watchman is on duty for 8 hours during the daytime, and the bridge will be opened at night if advance notice is given. The **Foxhall Bascule Bridge** crossing the river between the General Electric wharf and the lumber wharf, has a horizontal clearance of 40 feet and a closed vertical clearance of 6½ feet.

Tides.—The mean range of the tide is about 9 feet at Lynn.

Pilotage is compulsory for foreign vessels only. A pilot may be obtained from the Boston Pilot Boat.

Towage is done by towboats from Boston.

Quarantine.—There is no quarantine station. Medical inspection is performed by Public Health Service officials from Boston station, upon notification from Salem.

Customs.—Business is transacted through the United States Customs at Salem.

Immigration.—The immigration service at Boston is notified by ship's agents if required, through the Salem customs.

Harbor master.—The harbor master has an office in the Broad Street Fire House; he also operates the fireboat at Lynn.

The principal wharf at Lynn is a coal wharf at the gas works. Several large gas tanks are just back of the wharf. A 22-foot channel leads from the turning basin to the coal wharf which has depths of about 28 feet. In 1949 steamers drawing 26 feet were docking there.

Two yacht clubs maintain piers with float landings which have depths of about 7 feet of water. Gasoline and water and available at the floats. A yacht club is on the north side of **Point of Pines.**

Supplies.—Coal, water, and provisions can be obtained in Lynn. There are no facilities at Lynn for bunkering large vessels.

Repairs.—There are marine railways in Saugus River, the largest of which can haul out yachts up to 100 feet in length and 8 feet in draft. There is one boatyard on the **Pines River.** Repairs to machinery can be made.

Revere is a city and summer beach resort on the west side of Broad Sound. At the southern end of **Revere Beach** a breakwater extends out from the shore on **Cherry Island Bar,** forming an anchorage for small craft, with depths of 4 to 6 feet. Parts of the breakwater are covered at high tide. A stone pier 6 feet above high water is at its northeast end. Westward of the breakwater are the ruins of a long wharf which stands out to a depth of about 1 or 2 feet.

Chart 246.—Boston Lightship, off the entrance to Boston Harbor 6 miles eastward of Boston Light, has a red hull with BOSTON on each side and two masts with a gallery and lantern at each masthead. A riding light is shown from the forestay. The fog signal is sounded on a two-tone air-diaphone horn. If the horn is disabled, the signal is sounded on a bell operated by hand. The radiobeacon is synchronized for distance finding. The code flag signal is NNBC. **Storm warnings,** daytime only, are shown only when the vessel is on station.

In approaching Boston Lightship from the southward, the coast of Cohasset, Minots Ledge Light, and Scituate should be given a berth of 4 miles to avoid the broken ground known as Stellwagen Ledges, which extend nearly that distance offshore, and are marked at their outer end by a lighted whistle buoy.

All of **Boston Harbor** is shown on Chart 246, and the inner harbor is shown on the larger scale chart, No. 248. The entrance between the southern end of Deer Island on the north, and Point Allerton on the south, is more than 3.5 miles wide. Several islands and shoals are in, and off, the entrance, and between them lead several navigable channels.

Landmarks.—From the northward, **Winthrop Head,** a hill 103 feet high covered by houses and marked by a tall gray standpipe, is the most conspicuous object. From eastward, the most prominent island in the entrance is **Great Brewster,** 103 feet high, with a bluff at the north end. On the south side of the entrance a turreted tower on **Nantasket Hill** is one of the most conspicuous landmarks. The tank and standpipe on **Strawberry Hill** are very prominent. Two miles south of Point Allerton are two radio towers, illuminated at night. The outstanding landmarks in the city are the John Hancock Building, the new bridge over the Mystic River, the tower of the Customhouse, and a large gas tank in Chelsea. The grain elevator in East Boston is conspicuous, as is the Federal Office Building in Boston, a gas tank on Commercial Point in Dorchester, a water tank at Squantum, and other objects. All are charted.

At **Winthrop Beach,** about 400 yards off and parallel to the shore, is a breakwater 700 yards long. It is bare several feet at the highest tides, and is fairly prominent.

Channels.—Three main dredged channels lead between the shoals at the entrance to President Roads. Several other channels of less importance are 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 to 40 feet over a width of 900 feet except at the outer end where it is 1,100 feet wide. The channel is well marked by lighted buoys. The eastern entrance to this channel is marked by a lighted gong fairway buoy.

Finns Ledge, with depths of 25 to 29 feet, is on the northern edge of the outer end of North Channel. The ledge is marked by a lighted bell buoy. The buoy has a radar reflector. Careful navigation is required here, especially in the case of an incoming vessel passing an outgoing one at the channel entrance.

Broad Sound South Channel leads from Broad Sound in a southwesterly and westerly direction to President Roads. It has been dredged 30 feet deep and 1,200 feet wide, and is well marked by buoys. When last ascertained, the controlling depth in the middle half of the channel was 28 feet.

The North Channel is almost invariably used by vessels being piloted by members of the Boston Pilots Association. On the contrary, the South Channel is rarely, if ever, used because deep-draft vessels have a tendency to feel the bottom, making steering difficult.

The Narrows is the channel leading into Boston Harbor from southeastward, between the Narrows Light and Lovell Island on the northeast and Point Allerton, Georges Island, and Gallups Island on the southwest. It has been dredged 27 feet deep and 1,000 feet wide, and is well marked. When last ascertained, the controlling depth was 25 feet. Shoals with depths of 18 to 23 feet are in the southeastern approach, which may be avoided in the daytime and with clear weather.

Because of the sharp turns in the approach to and departure from The Narrows, and because of the strong currents near times of maximum ebb and flood, vessels must be conned by eye to make good the prescribed courses. The navigator must take precautions to prevent being set off course by cross-currents sweeping in or out of Black Rock Channel and the channel between Gallups Island and Georges Island.

Hypocrite Channel, a natural channel leading between Green Island on the north and Little Calf Island on the south, has ample depth, but has several unmarked dangers. It is not recommended for strangers or for large vessels.

Black Rock Channel, leading into The Narrows from eastward between Great Brewster Spit and Lovell Island, has an unmarked ledge, **Whitings Ledge,** with a least-found depth of 8 feet nearly in mid-channel, which strangers may be unable to avoid. The channel is used only by small local craft and is not recommended for strangers.

A channel 250 yards wide leads into The Narrows from westward, between Georges Island and Gallups Island. A light is near the end of the shoal off the southeast end of Gallups 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 Nixes Mate and Long Island, has been dredged 15 feet deep and 300 feet wide. It is marked by buoys. The course through the channel is 335°, heading about 100 yards to the west of Deer Island Light and following the buoys.

Sculpin Ledge Channel, leading between Long Island and Spectacle Island, is good for vessels of about 8-foot draft to Hingham Bay by the passage southward of Peddocks Island. The deeper water favors Long Island, and in coming from President Roads the Island should be followed at a distance of about 400 yards until up with the 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 300 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 draft with the aid of the chart.

President Roads extends between and southward of Deer Island Light and the easterly end of Governors Island Flats. Shoals on the northwest side of the roads are marked by buoys. Depths in the roads vary from 30 to 60 feet. The quarantine anchorage, the most commonly used general anchorage in Boston Harbor, is on the north side of the roads. The Main Ship Channel leads along the southern side of the roads.

The **Main Channel** extends from President Roads to the mouth of the Mystic River. The Federal project provides for dredging a channel 40 feet deep for a width of 600 feet from President Roads to Commonwealth Pier No. 1 in East Boston, thence 600 to 900 feet wide to a point 550 feet northerly of Mystic Piers Nos. 46 and 47, and a channel 35 feet deep from President Roads 1,200 feet wide along the same line as the 40-foot channel to the Navy Yard at Charlestown and the Chelsea North, Meridian Street, and Charlestown Bridges.

Anchorages.—Descriptions and regulations for designated anchorage areas in Boston Harbor are given in Chapter 2.

Nantasket Roads, westward of the southern entrance to The Narrows, is good anchorage with depths up to 60 feet. Two 30-foot shoals must be avoided by deep-draft vessels. On the westerly side of Georges Island the depths range from 21 to 36 feet, and better bottom and shelter will be found here in easterly winds. This anchorage is frequently used by vessels seeking shelter in easterly gales.

The Graves are bare rocks and ledges about 0.5 mile long in a northeasterly direction, and are marked near the southwest end by The Graves Light. **Northeast Grave** is a rock bare at low water 700 yards northeastward of the light. A lighted whistle buoy is about 0.5 mile northeastward of the ledge and 1.1 miles northeastward of the light.

The Graves Light, 98 feet above the water and visible 16 miles, is shown from a light gray, conical, granite tower on the ledge. The fog signal is a horn.

An obstruction with 13 feet of water over it is 0.6 mile 041° from The Graves Light. It is marked by a buoy about 100 yards to the northeast.

Roaring Bulls, an unmarked ledge 0.5 to 0.9 mile southwestward of The Graves Light, is bare in the highest parts at about half tide.

Green Island, 1.2 miles southwestward of The Graves Light, is 44 feet high and surrounded by several smaller islets and bare and submerged ledges.

Devils Back, 0.6 mile westward of Green Island, has 1 foot over the northeast end at low water.

Deer Island, connected to the mainland by a fill, is on the north side of President Roads and separates Broad Sound from Boston Harbor. It is mostly grassy. A prison is on the north side and a sewage pumping station which shows a prominent stack is on the southwest side.

Deer Island Light, 53 feet above the water and visible 13 miles, is shown from a brown conical tower on black cylindrical pier, at the end of a ledge extending 500 yards southward from the island. The fog signal is a bell. A sewer outlet is just southwest of the light. The Deer Island Directional Light on the main gallery of Deer Island Light marks Nubble Channel. The light shows red from 328°18′ to 336°48′, white from 336°48′ to 339°12′, green from 339°12′ to 347°42′.

Great Faun Bar and **Little Faun Bar** extend eastward from Deer Island to Broad Sound North Channel. A daybeacon, red cage on spindle on conical base on pyramidal sub-base, is 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 bares at low water.

Thieves Ledge, with 27 to 36 feet of water over it, is 0.7 mile long and about 0.2 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 lighted whistle buoy 2.6 miles east-southeastward of Boston Light. Spots with 32 feet and 34 feet over them are 0.5 mile eastward and 1.1 miles southeastward, respectively, of the buoy, upon which the sea sometimes breaks in heavy easterly gales.

Harding Ledge, 2.3 miles southeastward of Boston Light and 1.5 miles from the shore, is an extensive ledge bare before low water and marked by a daybeacon, black horizontal wheel on iron spindle, on its shoalest part. A lighted bell buoy is 0.3 mile northeastward of the daybeacon. A rock bare before low water is 350 yards southwestward of the daybeacon. Very broken ground, not closely examined, extends between the ledge and the shore westward. Vessels should keep outside the lighted bell buoy.

Point Allerton is a grassy hill 100 feet high, covered with houses. A sea wall protects the base of the seaward face of the hill. The Coast Guard station is 0.8 mile west of the point. Shoals extend eastward and northward from the point. A lighted bell buoy 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 15 to 22 feet extending 1.2 miles eastward of the point.

Boston Light, 102 feet above the water and visible 16 miles, is shown from a white conical tower on the southeast side of **Lighthouse Island,** on the north side of the entrance to Boston Harbor from southward. The fog signal is an air siren. An auxiliary light, 34 feet above the water, is 13 yards 234° from the light. It shows a fixed white light with two fixed red sectors covering dangers in Nantasket Roads.

Shag Rocks are bare, rugged ledges 0.3 to more than 0.5 mile eastward of Boston Light. They are surrounded by extensive submerged ledges.

Great Brewster, **Middle Brewster, Outer Brewster,** and **Calf Islands** are the larger of the islands northward and northeastward of Boston Light. 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 Light,** red skeleton tower with white tank house and fog bell. A daybeacon, granite pyramid, is near the light. **False Spit** Daybeacon, red cylindrical cask on end of iron spindle on granite base, is on the south side 0.3 mile eastward of the light.

Lovell Island, on the northeast side of The Narrows and south side of South Channel, has several buildings. **Ram Head Flats** and **Ram Head,** the latter bare at low water, extend to a greatest distance of 0.7 mile northeastward of the island. One good wharf is on the west side of the island, near the southern end, and another wharf is in ruins.

Georges Island, southward of Lovell Island and on the north side of Nantasket Roads, is the site of historic **Fort Warren.** In addition to the fort are several houses. A wharf is on the west side. A fog signal sounded on an electric siren is on the wharfinger shed.

Gallups Island, westward of Lovell Island, is high and grassy on the north side. The island is marked by a red brick building. A wharf protected by a breakwater is at the southwest end of the island. All of the buildings, except the red brick one, are in the process of being torn down.

Nixes Mate is an extensive reef on the south side of the eastern end of President

Roads. Near the center is a low islet marked by Nixes Mate Daybeacon, black octagonal pyramid with a white band midway of height on square granite base.

Long Island, on the south side of President Roads, is 1.5 miles long and marked at the north end by Long Island Head Light, 120 feet above the water and visible 17 miles. It is shown from a white brick tower. The island is the site of a large hospital building with a conspicuous gilded dome. A tall brick chimney near its highest part is prominent. On the island are three wharves.

North and west of President Roads is an area of flats, much of which bares at low water. Between **Governors Island Flats** and **Deer Island Flats,** a buoyed channel having a least depth of 9 feet leads to **Winthrop,** where dredged channels branch off to several yacht clubs. The easterly channel leading to Winthrop Head in 1942 had a depth of 10 feet. A light marks the west side of the entrance. **Snake Island** is 10 feet high and barren. The westerly channel leading to **Belle Isle Inlet** has been dredged to provide fill for the airport. In 1949 the channel had a least depth of 19 feet. Two yacht clubs are near the basin at the north end of this channel. See Chapter 2, § 202.30 (b) for anchorage area. The fixed highway bridge over the mouth of Belle Isle Inlet has a horizontal clearance of 20 feet and a vertical clearance of 4 feet.

Spectacle Island, southwest of President Roads, consists of two hills between which is a low valley. It is marked on the northeast end by the Spectacle Island Range Lights on white conical towers. On the west side, a concrete chimney is prominent. A garbage wharf is in the bight on the west shore. The rear range light is 70 feet above the water and visible 14 miles. The front light is 53 feet above the water and has a white sector from 249°08′ to 250°52′, a red sector from 246°44′ to 249°08′, and a green sector from 250°52′ to 253°16′. The bearing of the range is 250°19′.

Approaching Boston from Cape Ann.—The soundings in the vicinity of Cape Ann are very irregular and cannot be depended on to locate even approximately the vessel's position. The southern end of Jeffreys Ledge, with depths of 19 to 30 fathoms, extends 15 miles eastward from Cape Ann, and depths of more than 50 fathoms are found a few miles eastward and a short distance southward from the edge of the bank. A **229°** course from 0.2 mile off the lighted whistle buoy 2.5 miles eastward of Cape Ann Light clears the offshore dangers between Cape Ann and Nahant, and leads close to the lighted gong buoy marking the entrance to Broad Sound North Channel.

At night the lighted aids are sufficiently numerous to locate the position by cross-bearings. In clear weather the course should be shaped to pass well northward of The Graves Light and enter through the Broad Sound North Channel.

Approaching Boston from Cape Cod.—Approaching the easterly side of the cape, soundings of 20 fathoms indicate a distance of 2 to 3½ miles from 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 to clear Boston Lightship on a course of **295°** from the locality of Peaked Hill Bar lighted whistle buoy will cross the southwesterly end of Stellwagen Bank in depths of 12 to 15 fathoms. Soundings in Stellwagen Bank cannot be depended on to locate a position on the bank, except in the case of soundings in a depth of 9½ fathoms, the shoalest water, which is found near its extreme southwest end.

In clear weather the Pilgrim Monument at Provincetown forms a splendid landmark visible for many miles.

As the entrance to Boston Harbor is approached, after crossing Stellwagen Bank,

soundings of 20 fathoms 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 the soundings are very irregular and cannot be depended upon to keep a vessel out of danger, as a rule. Northeast of Nahant the 20-fathom curve runs closer inshore and some of the dangers extend offshore nearly to the curve.

Entering Boston Harbor in fog.—In thick weather a course should be laid to clear Boston Lightship by a safe distance when approaching from either Cape Ann or Cape Cod, and the water should not be shoaled to less than 20 fathoms unless the fog signal of the lightship is heard and the vessel located by radar or other means. From the lightship a course may be laid to pass about midway between Boston Light and the lighted bell buoy north of Point Allerton. The fog signal of Boston Light, and by frequent use of the lead, radar, and other instruments, will enable a vessel to reach an anchorage northwestward of Point Allerton. Unless the lightship is located, no attempt should be made to enter the harbor.

If a vessel in the vicinity of Cape Cod is overtaken by fog or thick easterly weather, she 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 the holding ground is in 7 to 12 fathoms.

Vessels equipped with radio compasses should avail themselves of the clear-weather transmission to test the accuracy of the apparatus.

Sailing directions, Boston Harbor and vicinity.—Boston Harbor and approaches have very broken, rocky bottom, and caution is required. All the main channels in Boston Harbor and the approaches to the harbor have been examined by means of a wire drag. The approaches to Boston Harbor from Cape Ann to the northeast and from Cape Cod Canal to the southeast have also been examined by wire drag, the outer limit usually being from 4.5 to 7 miles offshore. For courses and distances see Chapter 3.

Tides.—The mean range of the tide is about 9 feet at the entrance to Boston Harbor and about 9½ feet at Boston and Charlestown. Daily predictions of the times and heights of high and low water for Boston, Commonwealth Pier No. 5, are given in the *Tide Tables, East Coast, North and South America.*

Tidal currents.—For some distance northwestward of Cape Cod the tidal currents have a slight set onto Cape Cod Bay on the flood and out of the bay on the ebb. Along the north shore of Massachusetts Bay the flood sets in a general southwesterly direction and the ebb in a northeasterly 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 the ebb eastward, increasing slightly in velocity as the entrance is approached.

Currents.—The time of current from the Boston Lightship to the Navy yard generally does not differ by more than ½ hour. Predictions of the times of slack water and the times and velocities of strengths of flood and ebb off Deer Island Light for every day in the year are included in the *Atlantic Coast Current Tables.*

Tidal Current Charts for Boston Harbor are published by the Coast and Geodetic Survey. These charts, good for any year, show the direction and velocity of the tidal current for each hour of the current at Boston Harbor (Deer Island Light), daily predictions for which are included in the *Atlantic Coast Current Tables.* They present a comprehensive view of the tidal current movement for the harbor as a whole and also supply

a means of readily determining for any time the direction and velocity of the current at various localities throughout the harbor.

The currents at Boston Lightship are described in Chapter 2.

In Broad Sound the velocity of the current at strength in most places is less than ¾ knot. This increases to about 1 knot or more 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 Light 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 ½ hour 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 about 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 Gallups Island, the velocity at strength is over 1 knot. The flood sets westward and the ebb eastward.

Between Gallups 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 directions.

Between Moon Head and Long Island, the current is rotary, turning counterclockwise. The average velocity at strength is about ¼ knot. Usually strength of flood sets southwestward and strength of ebb eastward. Between Thompson Island and Spectacle Island, the velocity at strength is about ½ knot. The flood sets northwestward and the ebb southeastward.

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 tables in the Appendix. Winds from the east to southwest bring fog while westerly and northerly winds clear it away.

Storm warnings.—Night signals are displayed from the Customhouse tower. Day signals are displayed by Boston Lightship. Between April 1 and November 1, day signals are displayed by the floating Coast Guard station in Dorchester Bay, South Boston.

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 sometimes are frozen during severe winters. They are almost invariably kept open, however, by tugboat traffic. When ice is prevalent, the buoys may be displaced or even carried away. Local towboats can be employed for the purpose of breaking ice.

Pilotage.—This port is within Pilotage District No. 1 as defined by State laws.

The district embraces the port of Boston and the coastal area from Egg Rock on the north to Point Allerton on the south.

Pilotage is compulsory into Boston Harbor for all vessels engaged in foreign trade, with a few exceptions. It is not compulsory for vessels engaged in the coasting trade.

A pilot boat will be found within sight of Boston Lightship. Pilot boats are marked by their numbers painted on their sails or stacks in black figures 4 feet high.

A Boston-bound vessel liable to pilotage, arriving within a line drawn from Harding Ledge to The Graves and thence to Nahant Head without being offered the services of a pilot, is exempt from the payment of pilotage fees unless such services are requested. A pilot boat being on its station and displaying the signals required by law constitutes an offer of pilotage service. Such compliance will entitle the pilot to the regular fee for pilotage from vessels otherwise liable therefor. A vessel under 350 tons register bound into the port of Boston declining the services of a pilot is liable to one-half the pilotage fees. A vessel under 350 tons register bound out of the port of Boston is not liable for pilotage unless such services are requested. Vessels in the coastwise trade are exempt from the compulsory payment of pilotage.

The office of the Boston Pilots is at No. 69 Long Wharf.

Towboats.—Towboats are available at Boston. Lighters, fireboats, and wrecking tugs also are available. Deep-draft vessels customarily are moved to and from berths in Boston Inner Harbor at or near the times of high tide.

Customs.—The Customhouse is open for business during regular office hours except on holidays. The same office hours are kept at the Appraisers Stores Building.

Quarantine.—The quarantine anchorage is on the north side of President Roads. Quarantine is enforced in accordance with the rules of the U. S. Public Health Service. The call for the quarantine officer is two long blasts of the whistle followed by two short blasts and one long one. The quarantine station and the boarding station are at 61 Summer Street, East Boston. Vessels generally are boarded in the vicinity of President Roads, but vessels having no known contagious diseases aboard are usually permitted to proceed directly to the Bird Island anchorage before being boarded for inspection.

Marine hospital.—A marine hospital is at Brighton. The service also maintains an office and dispensary at the Customhouse, Boston, where out-patients are treated. Application for admission to the hospital should be made to the Customhouse office. The call for the port physician is the same as for quarantine.

Immigration.—The immigration station is in East Boston.

Fire in harbor.—In the event of fire occurring on board any vessel in Boston Harbor, except on a vessel under way, such vessel may sound five prolonged blasts of the whistle or siren as an alarm indicating fire on board or at the dock to which the vessel is moored. Such signal may be repeated at intervals to attract attention, and is not a substitute for but may be used in addition to other means of reporting a fire. The words prolonged blast used in this rule shall mean a blast of from four to six seconds' duration. This does not apply to ships in the Outer Harbor.

Special signals.—The call for the harbor master or police steamer is three short and one long blast of the whistle.

Chart 248.—East Boston, on the northeastern side of the harbor, is separated from the city of Chelsea by Chelsea River. The water front has modern piers 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 Fort Point Channel.

Governors Island, on the northeast side of the Main Ship Channel and at the southerly end of General Logan International Airport, is a low, grass-covered peninsula.

General Logan International Airport is between Governors Island Flats and East Boston. The airport area, almost entirely filled land, is low, flat, and quite extensive.

Castle Island, on the southwest side of Main Ship Channel, 1 mile northwestward of Spectacle Island, is marked by **Fort Independence** and is connected to the shore westward by filled land. Several boulders bare at low water are a short distance southeastward of Castle Island. Four radio towers are on the island. On the northeast corner of the island is the 52-foot granite **Donald McKay Monument.** It was erected in 1933 to commemorate the famous East Boston clipper ship builder.

Pleasure Bay extends immediately westward of Castle Island. Depths of 16 to 24 feet are inside, and the bay is used as an anchorage for pleasure boats.

Reserved Channel has been dredged to 30 feet as far as the drawbridge, but in 1949 the controlling depth was about 28 feet. A modern and extensive freight terminal on the north side of the channel has a berthing space of over 4,500 feet, with depths of 30 feet or more alongside. Several rock outcrops with depths of 25 to 27 feet are off the entrance to Reserved Channel. The bridge has a retractile span with a horizontal clearance of 39½ feet and a vertical clearance of 6½ feet. Regulations are given in Chapter 2, § 203.75.

On the south side of Reserved Channel, a wharf projects east and southward to Castle Island. The berths alongside this wharf have been dredged to a depth of 29 feet. A wreck with 26 feet over it is along the face of this wharf.

Above this bridge the channel has been dredged to 12 feet to its head, but in 1949 the controlling depth was about 7 feet.

Fort Point Channel separates Boston proper from South Boston. In a distance of 1 mile from its entrance in Boston Harbor, Fort Point Channel is crossed by seven bridges. A dredged channel with a controlling depth of 19 feet in 1948 leads from the entrance to Dorchester Avenue Bridge, a distance of 0.7 mile. From that bridge to the head, the depth was 11 feet in 1938. In 1950 city authorities were considering a proposal to fill in the channel from the Dover Street Bridge to the head. Steamers bound into Fort Point Channel require the assistance of towboats.

The deeper portion of the channel is crossed by three bridges. Northern Avenue swing bridge has a horizontal clearance of 76 feet and a vertical clearance of 7½ feet. Deeper water is found in the east draw. The Congress Street bascule bridge has a horizontal clearance of 75 feet and a vertical clearance of 6½ feet. The Summer Street retractile bridge has a horizontal clearance of 51 feet and a vertical clearance of 4½ feet. Four bridges cross the shoaler portion of the channel. The minimum clearances are horizontal 40½ feet and vertical 4½ feet. For regulations see Chapter 2, § 203.75.

Charles River, on the western side of the harbor between Boston proper and Charlestown, is the approach by water to **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. Thence

to the Charles River Dam, a distance of 0.5 mile, the depth is about 15 feet. 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 at low water on the lower sill. The upper sill has 21 feet over it at the level of the river above the dam. Charles River above the dam is maintained at a height of 7.4 feet above mean low water; a depth of 14 feet can be taken 3 miles above the dam to Western Avenue Bridge, thence 2.2 miles to Arsenal Street Bridge 13 feet, thence 2 miles to the head of navigation at **Watertown,** 9 feet. Charles River above the dam is used by many yachts and small craft. No toll is charged for passage through the lock.

The controlling depth in the Charles River from the entrance to the first bridge is about 33 feet.

Below the dam the river is crossed by five drawbridges. The Charlestown Bridge has a swing span with a horizontal clearance of 50 feet and a vertical clearance of 23 feet. Use the south span as the center pier is connected with the north side of the next bridge opening. The Warren Bridge has a retractile span with a horizontal clearance of 36½ feet and a vertical clearance of 6 feet. The Boston and Maine Railroad bascule bridges, four in number but raised as a unit, have a horizontal clearance of 65 feet and a vertical clearance of 3 feet. The Massachusetts Transit Authority bascule bridge has a horizontal clearance of 50 feet and a vertical clearance of 33 feet. The highway bridge at the dam has a horizontal clearance of 50 feet and a vertical clearance of 5½ feet. These bridges remained closed between 6:15 a.m. and 9:10 a.m. and between 4:15 p.m. and 7:40 p.m. on week days, except for 10-minute intervals during certain stages of tide.

Above the dam the river is crossed by eleven fixed bridges. The Longfellow Bridge just above Broad Canal has a horizontal clearance of 187 feet and a vertical clearance of 30 feet above permanent water level. Above this bridge the horizontal clearance is at least 45 feet and the vertical clearance is 12 feet above permanent water level except at the Galen Street bridge in Watertown-Newton where the vertical clearance is 11 feet.

Lechmere Canal, adjacent and northwestward of the dam, is crossed near the mouth by a bascule bridge with a horizontal clearance of 40 feet and a vertical clearance of 7 feet above permanent water level.

Broad Canal, extending westward from just downstream of the Cambridge end of the Longfellow Bridge, is crossed by four bridges. The first three are bascule highway bridges with horizontal clearances of 40, 36, and 32½ feet and vertical clearances of 7½, 7¾, and 6½ feet, respectively. The fourth is a railroad swing bridge, 0.5 mile above the mouth, with a horizontal clearance of 32¼ feet and a vertical clearance of 2¾ feet.

Little Mystic (South) Channel is a slip about 0.6 mile long just northward of the Navy yard. It has mid-channel depths of 18 to 20 feet 600 yards westward of the bridge and 28 feet at the entrance. The bascule bridge near the entrance has a horizontal clearance of 75 feet and a vertical clearance of 25 feet.

Chelsea River, emptying into Boston Harbor from eastward between East Boston and Chelsea, is the approach to important wharves and facilities, and to the city of Revere at the head, 2.6 miles above the entrance.

The Federal project provides for a channel 30 feet deep and generally 200 feet wide from the mouth of the river, at the head of the 35-foot channel in Boston Harbor, to a point opposite the Hartol Oil Company terminal.

In 1947 the channel from the Meridian Street drawbridge to the head of the im-

provement, 1.7 miles above, had a controlling depth of 30 feet. From this point to the head of navigation at Revere the controlling depth in 1936 was 7 feet.

Three drawbridges cross the river. The first, Meridian Street, has a swing span with a horizontal clearance of 100 feet in the south draw and 30 feet in the north draw; the vertical clearance is 5 feet. The dredged channel goes through the south draw. The other two bridges have bascule spans and are adjacent with continuous fenders. The horizontal clearance is 70 feet and the vertical clearance is 3 feet.

The river has a heavy traffic of deep-draft oil tankers. The tankers berth at the oil company terminals and storage areas on both banks of the river.

The channel in **Mystic River** has been dredged 30 feet deep for a distance of 0.8 mile above the Chelsea swing bridge at the entrance. For a farther distance of 0.4 mile upstream, the channel has a depth of 20 feet to a point above Malden bascule bridge. Above this a channel has been dredged 6 feet deep to about 2,500 feet above the Wellington Bridge, thence 4 feet deep to the head of commercial navigation at Medford.

The Federal project provides for a channel 30 feet deep downstream from the mouth of Island End River, through the Chelsea (North) Bridge to the 35-foot channel of Boston Harbor, 600 feet wide at the upper end, and gradually narrowing to 300 feet wide at the lower end, and widening of the entrance channel leading to Mystic Wharf; a channel 30 feet deep and 500 feet wide upstream from the mouth of Island End River to the city playground at Charlestown; a channel 20 feet deep from the head of the existing 30-foot channel to a point 800 feet above Malden Bridge, widths decreasing from 270 feet at the lower end to 75 feet through the drawspan, thence increasing to approximately 340 feet to form a turning basin above the bridge; a channel 6 feet deep, 100 feet wide, from the Boston and Maine Railroad bridge to the first turn above Dennings Wharf, and thence 4 feet deep, gradually narrowing from 100 feet to 50 feet wide, to Craddock Bridge.

The controlling depths when last ascertained are as follows: 29½ feet in the 30-foot channel, 1946; 20 feet in the 20-foot channel, 1946; 6 feet in the 6-foot channel, 3 feet in the 4-foot channel, but narrowed in width, 1946.

Some shoaling has occurred in the upper reaches of Mystic River. The mean range of the tide is about 9½ feet. The **Craddock Lock** at Medford is 15 feet wide and 60 feet long. The river has a navigable depth of 4 to 7 feet for 2 miles above the lock to **Lower Mystic Lake.**

At the mouth of the Mystic River are two highway bridges. One is a swing span with a horizontal clearance of 125 feet and a vertical clearance of 14 feet. This bridge is scheduled to be removed in the near future. The other is a high level fixed bridge with a horizontal clearance of 700 feet and a vertical clearance of 135 feet. The Malden Bridges, 1.2 miles above the mouth, have bascule spans with 50-foot horizontal clearances. The highway bridge has a vertical clearance of 6½ feet and the elevated railway bridge has a vertical clearance of 29 feet. Two railroad bridges 1.5 miles above the mouth, have swing spans with horizontal clearances of 42½ feet and vertical clearances of 3½ feet. These bridges operate as a unit. The railroad bridge, just upstream from the Malden River entrance, has a horizontal clearance of 44 feet and a vertical clearance of 3 feet. The Wellington Bridge has a horizontal clearance of 50 feet and a vertical clearance of 10¼ feet at the spring line on the south end and 12¾ feet at the north end. The Harvard Street Bridge has a horizontal clearance of 50 feet and a vertical clearance of 5 feet. The Craddock Bridge is fixed with a horizontal clearance of 25 feet and a

vertical clearance of 10 feet above pool level of the dam. Above Craddock Bridge the bridges are all fixed with minimum clearances of 19½ feet horizontal and 5 feet vertical.

Island End River is a tributary of Mystic River from northward 0.5 mile above the entrance. A large wharf is at the western side of the entrance with a channel privately dredged to 30 feet leading to it. In 1940 there was a least depth of 26 feet alongside the coke and coal wharf on the west bank of the river and 13 feet alongside the wharf 350 yards above the coke and coal wharf. Above this the river gradually shoals from 4 to 1½ feet at its head. There is considerable business at the wharves near the entrance, principally vessels carrying coal and oil. A rocky shoal on the east side of the entrance, and the current of Mystic River running across the entrance, make navigation difficult for large vessels. A towboat usually is employed to assist such vessels.

Malden River, a tributary of the Mystic from northward, has a dredged channel 6 feet deep for a distance of 1.6 miles upstream. In 1945 the controlling depth to the General Electric Company wharf at Everett was 4½ feet. Two bascule highway bridges cross the river. The first, 0.2 mile above the mouth, has a horizontal clearance of 50 feet and a vertical clearance of 7½ feet. The second, 1.1 miles above the mouth, has clearances of 52 feet horizontal and 3 feet vertical.

A **Coast and Geodetic Survey District Office** is on the tenth floor of the Customhouse, 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 District Office also is a sales agency for these charts and publications.

A **United States Branch Hydrographic Office** is on the tenth floor of the Customhouse. Bulletins are posted here giving information of value to mariners, who also are enabled to avail themselves of publications pertaining to navigation and to correct their charts from standards. No charge is made for this service.

A **Coast Guard Office** is in the Customhouse. This is the Coast Guard District Headquarters and the office of the Captain of the Port.

The **Harbor Master's Office** is at 521 Commercial Street.

Other Federal activities are listed in the Appendix.

The U. S. Port Series cover the port of Boston.

Maritime Association, Boston Chamber of Commerce, publishes a valuable handbook of the port facilities. The address is 80 Federal Street, Boston, Mass.

Harbor regulations.—There are many rules and regulations of the Commonwealth of Massachusetts and the City of Boston affecting the handling of petroleum products, rafting of lumber, speed of vessels, control of motorboats, pollution and disposal of refuse, handling of lines, movements of vessels as directed, anchorage areas, and the like. It is recommended that the navigator obtain from the harbor master copies of the rules affecting his particular interests.

Terminal facilities.—The port of Boston has 226 piers, wharves, and docks, most of which are located on the main ship channel at East Boston, Boston proper, Charlestown, and South Boston, and on the Chelsea River and Chelsea water front. The piers and wharves are generally of open pile, timber deck construction, extending from stone or timber bulkheads with solid fill. Many of the piers have direct connections with one or more of the rail lines serving the port and nearly all of them are accessible by wide paved streets. A number of dry and/or cold storage warehouses are located in close

proximity to the water front and the general cargo terminals are provided with transit sheds and cargo-handling facilities so that freight can be handled efficiently and expeditiously. Depths of water in the berthing areas at the cargo-handling facilities generally do not exceed 35 feet although a depth of 40 feet is available at Commonwealth Pier No. 5 on the South Boston water front.

Public float landings for small craft are at several places, including Summer Street, Northern Avenue, and Warren Street Bridges, and at Commonwealth Pier No. 5.

Hoisting facilities on the various piers have capacities up to 70 tons and floating cranes up to 75 tons are available. The three grain elevators at the port have a total storage capacity of 2,420,000 bushels.

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 good quality and suitable for either drinking or boiler purposes. Gasoline can be procured from floats anchored off Governors Island.

Repairs.—Several drydocks and marine railways are available for vessels of all sizes. 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 just northward of the Reserved Channel, is capable of drydocking the largest vessel in the world.

Yacht Clubs.—A list of the larger yacht clubs between Cape Cod and the Canadian Boundary is given in the Appendix.

Chart 246.—Dorchester Bay extends southwestward from President Roads between Spectacle and Thompson Islands on the east and South Boston on the west. The bay is filled with extensive flats, large areas of which are nearly bare at low water and rise abruptly from the edge of the channel. A red brick stack in the southeast part of Boston is prominent on approaching Dorchester Bay.

A **measured course** is laid out between **Thompson** and **Spectacle Islands.** The distance between the ranges is 1.00 nautical mile, and the course is 242°42′.

Old Harbor, on the south side of South Boston, is filled with flats having little water over them. An anchorage basin for yachts has been dredged on the north side of the harbor. The eastern part has a depth of 6 feet and the western part, 5 feet. A marine park pier, now in ruins, is on the north side at the entrance. A channel with a least depth of about 5 feet leads to the yacht clubs and the public float. The yacht anchorage most commonly used is the Castle Island anchorage south and east of City Point, clear of the cable area.

In the southern part of Dorchester Bay a channel 14 feet deep has been dredged up to Commercial Point. Subsequent shoaling has reduced this depth to about 12 feet just north of Commercial Point. The principal traffic is in oil and building material. Tankers berth at Commercial Point. Barges and schooners are towed to Neponset and North Quincy. Vessels can select anchorage in the Castle Island anchorage northwestward of Thompson Island. Between Commercial Point and **Fox Point** is an anchorage basin used by yachts.

A channel 18 feet deep from the 18-foot channel northward of **Squantum Point** to a Naval reservation situated east of the point in October 1945 had a controlling depth of 16 feet in the improved channel and 15 feet in the basin at the shore end of the channel.

892339°—51——23

Commercial Point, on the west side of the entrance to Neponset River, can be identified by a large gas tank and tall stack. A 12-foot channel has been dredged to **Dorchester Bay Basin,** northwestward of the point. In 1945 the controlling depth into the basin was 9 feet, but in 1949 this had shoaled to about 8 feet. Two yacht repair yards and a yacht club are in this inner harbor. Small craft up to about 90 feet in length can be hauled out. The entrance to the basin is crossed by a highway drawbridge having a bascule span with a horizontal clearance of 65 feet and a closed vertical clearance of 13 feet.

The anchorage areas in Dorchester Bay are defined in Federal Regulations given in Chapter 2, §§ 202.30, 202.134.

The **Neponset River** enters Dorchester Bay from the south between Commercial and Squantum Points. The Federal project provides for a channel 15 feet deep and 100 feet wide to the Neponset Highway Bridge. Above this point a 6-foot channel has been dredged to the head of navigation, at the dam at **Milton Mills,** 3.0 miles above the mouth. In 1945 the controlling depths were 11 feet to Neponset Highway Bridge, 6 feet to Granite Avenue Bridge, and 1 foot to Milton Mills.

Three drawbridges with bascule spans cross the river below Milton. The railroad bridge has a horizontal clearance of 49 feet and a vertical clearance of 6 feet. Neponset Highway Bridge has clearances of 78 feet horizontal and 11 feet vertical. The Granite Avenue Bridge has a horizontal clearance of 50 feet and a vertical clearance of 6½ feet. The signal for these bridges is two long blasts followed immediately by two short blasts.

Pilots are generally taken by strangers with deep draft. Pilotage is not compulsory.

On Neponset River lumber schooners and power barges are taken as far as the Granite Avenue Bridge. Several yacht clubs are on the river.

The largest of the several marine railways at the repair yards on the river, where yachts are constructed or repaired, can handle vessels up to 350 tons, with a length of 145 feet and draft of 17 feet.

Quincy Bay indents the southerly shore of Boston Harbor between the peninsulas of Squantum and Houghs Neck. Depths in the bay are in general 8 to 10 feet, but shoals partly bare at low water extend 0.5 to 0.7 mile from its southerly side. **Hangman Islet,** small and rocky, is near the middle of the entrance to the bay. The reef which extends 0.2 mile southwestward from the islet is marked near its end by a daybeacon, black cask on end on iron spindle. A ledge with a depth of 2 feet over it is 0.4 mile northward of Hangman Islet, with foul ground between. Sunken Ledge, dry at low water, is 0.6 mile northeastward of Hangman Islet and is marked by a daybeacon, black cage on staff on open-work granite cribwork, near its northern end and a light on its southeast edge. A buoy marks the channel west of Sunken Ledge.

Squantum, on the west side of the bay, is marked by an elevated tank.

Two lighted radio towers in the southern part of **Atlantic** are visible from the bay.

Eastward of Squantum and connected with it by a causeway is **Moon Head,** which can be 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 8 to 12 feet at low water. From here, the **Western (West) Way** leads in a northerly direction between Spectacle Island and Thompson 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.

Rainsford Island is nearly 1 mile westward of Georges Island. The wharf south of the island is in ruins. **Quarantine Rocks** are southward of Rainsford Island.

A **measured course** is in the western portion of Nantasket Roads. The range beacons are on the northwest side of **Peddocks Island.** The course is 1.00 nautical mile long on the bearings 225°–045°.

Wollaston Channel, near the westerly end of the bay, has about 8 feet in its outer portion and about 4 feet near its inner end. In 1945 the portion near the inner end had a depth of 1 foot. It is marked by two sets of buoys. Two yacht clubs are at the head of this channel.

Two anchorage areas in the vicinity of Wollaston and Squantum Yacht Clubs and also in the vicinity of Merrymount Yacht Club are defined by Federal Regulations given in Chapter 2, § 202.30 (h) (i).

Houghs Neck is marked at its northeasterly end by **Quincy Great Hill,** 100 feet high, which is mostly settled. An elevated tank on the hill is very conspicuous. **Nut Islet,** marked by a power station and stack, is connected by a causeway 300 yards northward of Quincy Great Hill. **West Gut** is a channel into Hingham Bay between Nut Islet and Peddocks Island.

The Quincy Yacht Club is on the eastern side of Houghs Neck. The club during the summer season maintains range lights leading through the channel to the club wharf. The anchorage area is defined in Chapter 2, § 202.30 (j).

Hingham Bay is that part of Boston Harbor southeastward of Peddocks 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 another entrance is southward of Peddocks Island that is frequently used by vessels bound into Weymouth Fore or Back Rivers.

Pig Rock is about 0.6 mile eastward of Nut Islet. A pile of rocks visible at all stages of the tide and formerly used as a foundation for a light is on the shoal area.

Nantasket (Hull) Gut, a narrow channel between Peddocks Island and Windmill Point, leads into the bay from Nantasket Roads. The tidal currents have an average velocity of about 2½ knots at strength and generally follow the direction of the channel; the flood sets southward and the ebb northward. An unmarked 16-foot spot is near mid-channel. A 13-foot spot is 480 yards 162° from Windmill Point Light.

Windmill Point, on the east side of Nantasket Gut, is marked on its southerly side by a light and fog bell. A large hotel with a steamer landing at **Pemberton** is prominent on Windmill Point. Eastward on the slopes of the hill are the town of **Hull** and the Hull Yacht Club. **Nantasket Hill** is marked by a stone tower and a skeleton tower from which **storm warnings** are displayed, day and night. Hull is connected with Boston by steamer during the summer season.

A dredged channel 13 feet deep leads to a wharf on **Hog Island,** eastward of Hull. The channel starts just southward of **Inner Seal Rock** and has a general direction of 064°.

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 several landings. A large shipyard, an electric power plant, and several other industries are on this river which has been improved by dredging.

Upon entering the river, the large twin stacks of the Boston Edison Power plant on

the east side of the river just above the bridge are prominent. The two tall radio towers near **Quincy Center** are also conspicuous. A red neon sign lighted at night on the Cities Service Company stack, and a pole-type radio mast above **Germantown** on the west side of the river, are also prominent.

The Federal project provides for a channel 27 feet deep, with a general width of 300 feet from a point in Hingham Bay between Nut and Peddocks Islands to the Weymouth Fore River Bridge, a channel in Nantasket Gut 27 feet deep and 400 feet wide extending from deep water in Nantasket Roads to Hingham Bay, thence through Hingham Bay 27 feet deep and 300 feet wide to deep water in Weymouth Fore River west of **Sheep Island** and extension of the 27-foot channel to include the present 27-foot State channel through and above the bridge, providing a combined channel and maneuvering basin of the same depth 2,500 feet long and 470 to 900 feet wide.

In 1949 oil tankers drawing up to 28 feet were reported to have used this channel. Oil is the major cargo. The controlling depth from Hingham Bay to Weymouth Fore River Bridge was 26 feet in 1949. Some of the docks have 32 feet alongside.

Above the oil terminal a channel dredged to 6 feet deep leads to Weymouth which is the head of navigation.

An anchorage area in Weymouth Fore River is defined by Federal Regulations in Chapter 2, § 202.50 (k).

Two drawbridges with bascule spans cross Weymouth Fore River. The first, at Quincy Point, has a horizontal clearance of 175 feet and a vertical clearance of 33 feet. The second has a horizontal clearance of 50 feet and a vertical clearance of 12 feet. The bridge signal is two long blasts followed by two short blasts. An overhead cable with a vertical clearance of 150 feet crosses the 6-foot channel twice.

Weymouth Back River is just eastward of Weymouth Fore River and southward of **Grape Island.** The channel is buoyed from Weymouth Fore River to the wharf of the fertilizer works on **Eastern Neck,** a distance of 1.3 miles, and has a depth of 15 feet. A channel dredged to a depth of 15 feet extends above the fertilizer works to the Hingham Bridge. The channel from that bridge to the wharf above has a controlling depth of 12 feet. The channel is buoyed, but strangers desiring to enter the river in vessels should take a pilot or towboat. A good anchorage at the entrance is 0.2 to 0.3 mile westward of Grape Island. Hingham Bridge has a fixed span with a horizontal clearance of 70 feet and a vertical clearance of 36 feet. Above the bridge the river is closed to navigation except on permit.

An anchorage area in Weymouth Back River defined by Federal Regulations is given in Chapter 2, § 202.30 (1).

Town River Bay is a branch of Weymouth Fore River north of Quincy Point. Three oil terminals, a lumber wharf, a yacht club, and several yards for the repair and storage of yachts are on Town River Bay. A shipyard has a marine railway capable of hauling out vessels up to 1,000 tons in weight.

The Federal project provides for a channel 24 feet deep and generally 150 feet wide from deep water in Weymouth Fore River to a point opposite the upstream end of the Quincy Oil Company terminal, with a turning basin at the inner end 18 feet deep, 400 feet wide, and roughly 1,000 feet long; and a channel 15 feet deep, 100 feet wide, continuing from the end of the 24-foot channel to a point just below the Quincy Electric Light and Power Company plant. In 1947 the controlling depth was 22 feet from deep

water in Weymouth Fore River to the Quincy Oil Company terminal; thence 14½ feet to the Quincy Electric Light and Power Company plant, and 17½ feet in the turning basin.

Hingham Harbor and Weir River in the southeasterly end of Hingham Bay are shallow. Their common entrance is close westward of Bumkin Island. The channel, 250 yards wide and over 18 feet deep, leads for 0.5 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 up to the harbor entrance off **Crow Point.** The Hingham Yacht Club has a clubhouse, dock, and floats at Crow Point.

The channel is marked by buoys from Hingham Bay to about 0.3 mile southeast of Crow Point. The yacht club maintains a range on Crow Point from May 1 to November 1; the range leads in mid-channel from Bumkin Island to the club pier. It is reported that considerable shoaling has occurred along the face of the pier and the northern half cannot be approached by deep-draft vessels, except at half tide or higher. Gasoline and fresh water are available at the yacht club pier.

Hingham Harbor is a cove 1 mile in length, with an average width of about 0.6 mile. At low water it is a dry flat through which a narrow and tortuous channel winds to the town of **Hingham.** In 1948 a depth of 5 feet could be carried through this channel to a small-boat basin at the south end of the harbor. Dredged depths of 4 to 6 feet exist in the basin. Sometimes the channel is marked by bush stakes in summer.

Weir River leads to the wharf at **Nantasket Beach.** It has a controlling depth of 14 feet with extensive flats, mostly bare at low water, on both sides of the channel. This channel is used by passenger steamers running from Boston to Nantasket Beach. A channel 14 feet deep has been dredged by private interests through an extensive shoal in the river, cutting off a sharp bend in the original channel. Nantasket Beach has a large steamer wharf with 16 to 18 feet alongside, and a public float landing for small craft north of it.

Eastward of Hingham Bay and the Weir River, a long narrow peninsula extends 3 miles northward from the mainland to Point Allerton. The Nantasket Beach section of the town of Hull is on this peninsula. Three grassy hills are on this beach, the most prominent of which is Strawberry Hill, about 1 mile southward of Point Allerton, which is marked by a prominent standpipe and tank at its summit. Two hills southward of this are **White Head,** with a low brick stack near it, and **Sagamore Head.**

The mean range of the tide is about 9½ feet.

From Nantasket Beach the coast presents a general hilly appearance, and trends 3 miles east-southeastward to Cohasset Harbor. Rocks and sunken ledges extend 0.5 mile from shore in places.

Chart 242.—Cohasset Harbor is a large, shallow cove southwestward of Minots Ledge Light and 5 miles southeastward of Point Allerton. Numerous yachts and fishing craft frequent it. Anchorage in 6 to 10 feet can be had in the so-called outer harbor. A channel, 60 to 90 feet wide and 6 feet deep, has been dredged to the inner harbor, but in 1949 it was reported to have shoaled to a controlling depth of about 2 feet. It is marked by buoys and lights.

Cohasset Cove, the inner harbor, is sheltered by a breakwater extending about 250

yards northward from near the westerly end of **Bassing Beach** at the entrance. The breakwater is partly covered at high water but the outer end is marked by a rock rising 5 feet above high water. An anchorage basin has been dredged 6 feet deep in the inner harbor. The fish wharves at the extreme head of the harbor are bare at low water. Gasoline, fresh water, and provisions are obtainable. A boatyard has a marine railway capable of hauling out craft up to 72 feet in length and 7 feet in draft. A small machine shop is available. The yacht club has a pier and float, with about 8 feet alongside. Fresh water is available on the float. The town float has about 4 feet alongside at low tide, and is near an oil wharf where gasoline and water are available. In a normal winter the inner harbor usually is closed by ice for about a month.

Numerous rocks and ledges are in Cohasset Harbor and extend off to Minots Ledge Light. The most prominent southwestward of the light are **East** and **West Shag Rocks,** which show at high water. Shifting boulders are reported on the shoal just east of **Barrell Rock** which is marked by a daybeacon, black cask on iron spindle. The entrance to the inner harbor, south of **Sutton Hole Light** and to a point just east of **White Head,** is reported shoaled to 2 feet. This area is reported to be changing every year.

A prominent lookout tower is on **The Glades,** on the east side of the harbor.

Three channels lead to the entrance of Cohasset Harbor: **Western (Brush Island) Channel,** which enters between **Brush Ledge** and **Chittenden Rock; Gangway Passage,** which leads between **West Hogshead Rock** and **The Grampuses;** and **Eastern Channel,** which leads between **Enos Ledge** and **West Willies.** Although all three channels are marked by buoys, there are numerous dangers. The least depth crossed in entering is about 5 feet. Gangway Passage is the widest and best entrance for strangers, but should be used only in clear weather and with a smooth sea, even in small craft. The best time is on a rising tide. The dredged channel leading into the harbor is between flats that bare at low water.

Minots Ledge Light, 85 feet above the water and visible 15 miles, is shown from a dark gray conical tower on **Outer Minot.** The light 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, extend more than 1 mile northeastward and 2.5 miles eastward of the light. The outer limit of the broken ground is marked by a lighted whistle buoy 2.4 miles eastward of the light.

Chart 1207.—Stellwagen Ledges consisting of rocks awash and sunken extend from Davis Ledge 3.8 miles south-southeast to Tar Pouch. Some of these sunken ledges lie over 1 mile from the shore and have from 7 to 14 feet over them in surrounding depths of 4 to 9 fathoms. When in this vicinity strangers should keep over 3 miles from the shore. **Davis Ledge** with 13 feet over it and 0.4 mile eastward of Minots Ledge Light is marked by a bell buoy. **Tobias Ledge** is 500 yards eastward of **Strawberry Point,** northeastern extremity of The Glades, and is marked by a daybeacon, black cross on iron spindle. **Tar Pouch** with 14 feet over it and marked by a buoy is 0.1 mile north-northeastward of Cedar Point.

Chart 232.—Scituate Harbor is a cove mostly bare at low water except where dredged. It is partially protected by breakwaters built out from the points at the entrance. There is a depth of about 12 feet in the entrance channel to a point abreast of

the south jetty. The harbor channel and adjoining anchorage basin are about 10 feet deep. The channel to the town wharf is about 6 feet deep, which depth can be carried as far as the Scituate Boatyard. The yacht anchorage basin, northward of the town wharf, also has about 6 feet depth.

Cedar Point, on the north side of the harbor, is marked by a white unused lighthouse tower which is maintained by the Town of Scituate.

On the high land about 2 miles 267° from the entrance to Scituate Harbor there is a conspicuous high tower with pointed top which is visible many miles from seaward. About 1 mile northwestward of the entrance to Scituate Harbor is a group of tall radio masts which are very conspicuous when approaching the harbor.

The breakwater extends about 300 feet eastward from the southeast extremity on Cedar Point. A light is shown from a skeleton tower on the end of it.

It is reported that the bar at the entrance breaks entirely across the channel at low tide and in heavy weather. The most unfavorable weather is from the northeast. The harbor is free of ice most of the winters.

At the Town Pier and at the adjoining wharf are floats with 5 feet alongside where gasoline, water, and supplies are obtainable. A yacht club maintains a pier and float with 6 feet alongside. Gasoline and water are available on the float. A boatyard has a marine railway capable of hauling out craft up to 75 feet in length and 8 feet in draft. The Scituate Coast Guard Station is on the point at the southern side of the harbor entrance.

The harbor is used mostly by yachts and also by fishermen and draggers who come in seeking refuge.

Just southward of the entrance to Scituate Harbor is a high yellow bluff known as **First Cliff.** A similar formation, known as **Second Cliff,** is about 0.5 mile south of the entrance.

Chart 1207.—New Inlet, on the north side of Fourth Cliff and 2 miles southward of Scituate, is the approach to North River and South River. **Fourth Cliff** is marked by a rectangular, slightly elevated structure. The inlet had a reported depth of 5 to 6 feet on the bar in 1949. Tugs towing barges drawing up to 10 feet cross the bar at high tide. It is marked by a bell buoy off the entrance and by several channel buoys, but is subject to change and is never entered except by craft with local knowledge. The bar consists of boulders some of which are very large. A strong current flows out of the inlet during the falling tide. Sand and gravel are shipped from a plant located on **Herring River,** a tributary of North River from the north. A channel 5 to 6 feet deep has been dredged to the wharf at the plant.

North River formerly emptied into the sea near **Rexhame,** but its present outlet dates from the great storm of 1898. The river has been partly cleared of boulders to **Hanover** about 10 miles above the entrance. The depth to this point is about 3 feet at low water. The river is not used much. The two bascule highway bridges over it are rarely opened. The first bridge, 1.4 miles above the mouth, has a horizontal clearance of 32 feet and a vertical clearance of 12 feet. The second bridge, 3.5 miles above the mouth, has a horizontal clearance of 30 feet and a vertical clearance of 7 feet.

South River, emptying through New Inlet from southward, is used by fishermen and yachtsmen. **Humarock** is a small village on the beach between South River and the

ocean and about 1.5 miles southward of New Inlet. Local knowledge of the river channel is required to navigate to the town. A reported depth of 1½ feet exists opposite Humarock. At a float landing gasoline and some supplies are available. Two boatyards build and repair small craft. Two small fixed highway bridges span South River at
5 Humarock; the first has a horizontal clearance of 12½ feet and a vertical clearance of 7 feet.

CHAPTER 13

Cape Cod Bay

Chart 1208

CAPE COD BAY 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, 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. 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 in an easterly direction for 31 miles, thence extends northward for over 20 miles. The northern trend of Cape Cod, forming what is sometimes termed the **Hook of the Cape,** is known as the *Lower Cape.* This section is well settled and composed almost entirely of sandy lands, with high, bare, sand hills and low, nearly level plains. The portion of Cape Cod between Chatham and Cape Cod Canal is known as the *Upper Cape.* This region is wooded and is well settled by numerous towns and villages.

Deep-draft vessels entering Cape Cod Bay from the northward should pass eastward of the lighted whistle buoy which is about 5 miles northeastward of Brant Rock and well east of the extremity of the broken bottom extending over 4 miles offshore in this direction. Although this broken ground has been examined by means of the wire drag, the depths are such as to require deep-draft vessels to follow that course.

Shallow harbors of Cape Cod Bay, such as Plymouth, Barnstable, and Wellfleet, usually are closed to navigation a part of each winter. This ice, together with the ice that forms in the shallower parts of Cape Cod Bay in severe winters, is driven by the winds out into the bay. There it masses into heavy fields or windrows, sometimes as much as 10 feet or more thick, making navigation of parts of the bay unsafe or impracticable. 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.

Chart 245.—About 5 miles southward of Fourth Cliff is the village of **Brant Rock.** The red and white checkered elevated water tank and a square concrete tower near the village are very prominent. For about 1 mile south of Brant Rock, to the entrance of Green Harbor River, foul ground extends offshore for nearly 1.5 miles to the eastward, to **Farnham Rock.** A lighted bell buoy and a marker buoy are just eastward of the rock.

Green Harbor River has its entrance on the south side of **Green Harbor Point.** A small jetty, covered at high water, is on each side of the entrance. The channel is almost bare at low water and the river is only used by small fishing boats which can usually enter or leave about 2 hours after low water. Strangers should not attempt it.

Green Harbor is a small village on the west side of the river. Three high, steel radio towers, prominent for many miles, are just southwest of the village and 5 miles northward of the entrance to Plymouth Bay.

High Pine Ledge, bare at lowest tides, is marked on its easterly side by a buoy about 0.8 mile from shore, and **Duxbury Beach,** 2 miles northward of Plymouth (Gurnet) Light. The ledge extends from the buoy nearly to the shore, and vessels should not attempt to pass westward of the buoy.

Plymouth (Gurnet) Light, 102 feet above the water and visible 16 miles, is shown from a white octagonal pyramidal tower on **Gurnet Point** at the north side of the entrance to Plymouth Bay and Harbor. The fog signal is an air-diaphragm horn. Coast Guard Station No. 30 is on the inner side of the point.

Rocky Point is about 3 miles south of Gurnet Point. Between the two points and extending about 2 miles westward to **Plymouth (Long) Beach** is **Plymouth Bay.** The southern part of the bay, known as **Warren Cove,** is sometimes used as a temporary anchorage.

Captains Hill, on the peninsula between Duxbury and Kingston Bays, is about 200 feet high and on its top is **Standish Monument** which can be seen from all directiont when approaching the harbor. **Manomet Hill,** about 5 miles southward of Gurnes Point, is more than 390 feet high, heavily wooded, and is conspicuous in approaching the entrance. A fire control lookout tower is on this hill. On Manomet Point a hotel building is prominent. A tank is conspicuous at the prison farm 1 mile southeast of Plymouth, and the buildings and brick chimney of the Plymouth Cordage Company at **North Plymouth** are prominent. From eastward and northeastward the buildings at Plymouth also are conspicuous.

Browns Bank is in the central part of Plymouth Bay. Northward of Browns Bank, and between it and **Saquish Neck** and **Head,** is the entrance channel to Plymouth Harbor and Duxbury Bay.

The controlling depth through the entrance channel, from off Gurnet Point to the intersection of the three channels at the south end of the Cowyard, is about 20 feet. A 16-foot spot north of the channel, bearing 232°, distant 0.85 mile from Plymouth Light, can be avoided when inbound by steering the range Duxbury Pier Light and North Plymouth tall chimney. The channel is well marked and easily navigated in clear weather. The channels into the tributaries are described under their headings.

Large vessels waiting for the tide or weather may anchor on the north side of the entrance channel southeast of Saquish Head and northeastward of the buoy marking the extremity of the shoal making southward from that head; or they may proceed to the intersection of the bay channels and anchor where the swinging room is greatest, which is about 500 yards west-northwestward of Duxbury Pier Light.

Duxbury Pier Light, 35 feet above the water and visible 11 miles, is shown from a brown conical tower. It marks the north side of the channel and the south end of the shoal between the main channel and the Cowyard. The fog signal is a bell.

Duxbury Bay is between Duxbury Beach on the east, Saquish Neck on the southeast, and the mainland on the west. It is about 3 miles long, with an average width of 2 miles. The bay is full of flats, mostly bare at low water, through which are several narrow and crooked channels. Shoals covered in spots by little water rise abruptly on both sides of these channels, and at low water the shoal edges are revealed by discolored water.

Where the different bay channels come together in the locality westward of Duxbury Pier Light, a channel extends northward up Duxbury Bay until west of **Clark Island.** This channel, **Cowyard,** about 200 yards wide and with depths of 20 to 40 feet offers good anchorage for small craft. The channel splits at a point westward of Clark Island. The eastern branch continues up to the easterly side of Duxbury Bay, but is difficult to follow and is not used much. A ruling depth of about 8 feet can be taken to the bridge at the mouth of **Back River** and a somewhat shallower depth for about 0.5 mile above the fixed bridge. Above this point the channel is virtually bare at low water. The eastern branch is unmarked.

The western branch has a deep natural channel for about 1.5 miles from the locality of Clark Island northward of the fork in the channel. To this point the channel is buoyed by the Coast Guard and easily followed. Above this, the channel trends westward and then northward to the village of **Duxbury.** The upper end of this channel was last dredged to a depth of 8 feet in 1940. Shoaling has been reported. It is planned to redredge it to a depth of 8 feet over a width of 100 feet in the near future. The portion of the channel above the point to which it is buoyed by the Coast Guard is privately buoyed. A yacht club is at Duxbury.

Kingston Bay, between the mainland and the western point of Duxbury Bay, is about 1.5 miles wide. However, because of its numerous flats it is unfit for navigation except at high water and with a pilot. The village of **Kingston** is nearly 1 mile back from its western shore on **Jones River.** This bay is of negligible importance either as a harbor or port. Between the flats are several narrow and crooked channels, the northernmost and deepest of which is **Miles (South) Channel.** A depth of 6 feet can be taken through this channel at low water to within 0.7 mile of the mouth of Jones River, and 3 feet to the mouth itself. The river is bare at low water.

A channel has been dredged from the southerly end of the Cowyard westward of Duxbury Pier Light to the Plymouth Cordage Company wharf, 1.7 miles northwestward of Plymouth. The channel, marked by buoys, was dredged 250 feet wide and 20 feet deep through the bar at the entrance from the Cowyard to **The Nummet.** The inshore portion of the channel for a distance of 0.6 mile from the wharf has been dredged 150 feet wide and 18 feet deep.

The bar at the entrance shoals rapidly after each dredging to a depth of 11 feet. In 1949 this was the reported depth. The channel between The Nummet and the wharf had a reported depth of 14 feet in 1949. The section of the channel approaching the wharf is marked by privately maintained drum buoys. The outer face of the wharf has a depth of 18 feet. A basin 240 feet wide and 18 feet deep has been dredged on the north side of the Cordage Company's dock. On the south side of this dock there is a reported

depth of 13 feet. The small dredged channel leading for about 100 yards in a southeasterly direction from the turning basin has been dredged to 8 feet.

Plymouth Harbor is about 1 mile wide at its northern end, gradually narrowing to its southern end. Most of the harbor is dry at low water.

Plymouth is a town on the southwest side of Plymouth Harbor. The principal channel leading to Plymouth had a controlling depth of 13 feet in 1949. It is marked by buoys. From the State Pier a channel has been dredged to the Town Wharf about 500 yards northwestward. There is some water-borne commerce at Plymouth, most of it being shipments to and from the cordage firm. At the Town Wharf fishing craft unload fish, scallops, and lobsters for shipment to New York markets. Diesel oil, gasoline, marine supplies, ice, and fresh water are available at the Town Wharf.

The best anchorage is in the Cowyard, but small light-draft vessels often find good anchorage under the lee of Plymouth Beach, in 18 to 24 feet. Yachts and small craft anchor in the anchorage basins off the wharves at Plymouth.

An anchorage area in Plymouth Harbor is defined by Federal Regulations given in Chapter 2, § 202.35.

Directions.—The western side of Cape Cod Bay out to a distance of 4.5 to 7 miles from shore, from Boston Harbor to Cape Cod Canal entrance, has been examined by means of a wire drag. The dangers within a distance of 0.5 to 1 mile of the shore were not in general covered with the drag. The channels in Plymouth Harbor and tributaries usually have soft bottoms. The channel through the entrance is well marked and easily followed in clear weather. Above the Cowyard, the narrow and crooked channels lead between flats bare or nearly so at low water, and local knowledge is required 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.

For courses and distances to and in Plymouth Harbor see Chapter 3.

Tides.—The mean range of the tide is about 9 feet at the entrance and about 9½ feet at Plymouth.

Currents.—In the channel between Gurnet Point and Duxbury Pier the tidal current at strength has a velocity of about 1¼ knots. Slacks and strengths occur about ½ hour later than at Boston Harbor (Deer Island Light). The set is generally in the direction of the channel; but the ebb sets southward and eastward across Browns Bank, while the flood sets northward and westward above Saquish Head, and sweeps strongly around Duxbury Pier Light northward into the Cowyard.

Ice often closes this harbor from about the first of January to the first of March. 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. Normally the channel to the Plymouth Cordage Company dock is open to traffic all winter. In extreme cold weather it freezes over.

Pilotage is compulsory for foreign vessels only. A pilot can be obtained by signaling the Coast Guard station at Gurnet Point and waiting off that point until boarded.

Customs, quarantine.—Plymouth is a customs port of entry and marine documents are issued. Arrangements for quarantine inspection are made through the collector of customs. The customs office is in the Post Office on Main Street.

The **harbor master's** office is at the State Pier.

Terminal facilities.—Duxbury has several wharves and float landings and numerous moorings in the anchorage basin. Gasoline and some supplies are available.

At Plymouth vessels with a maximum draft of 12 feet berth at the State Pier. Craft drawing a maximum of 10 feet berth at the Town Wharf. A yacht club and several wharves and floats are along the water front. Gasoline, water, and supplies can be obtained.

Repairs.—Several boatyards at Plymouth have marine railways, the largest of which can haul out craft 50 feet in length and 6 feet in draft, for storage and repairs. Some boat building is done.

At Duxbury a small boatyard has a marine railway capable of hauling out craft up to 56 feet in length and 6½ feet in draft.

Chart 1208.—Between Rocky Point and Manomet Point, a distance of 2.5 miles, there are several outlying rocks which will be avoided by giving the shore a berth of 1 mile. The shore is backed by high wooded hills, the most conspicuous of which is Manomet Hill, 390 feet high. **Manomet Point** is a bluff marked by a prominent hotel and the Coast Guard station. In 1949 the station was inactive.

White Horse Beach is a summer resort, with post office, northwest of Manomet Point.

Mary Ann Rocks, two rocks that bare at half tide, are 0.7 and 0.9 mile southeastward of the northerly end of Manomet Point, and are marked by a whistle buoy and a lighted gong buoy 0.8 mile and 1.4 miles, eastward respectively, from the outer rock. **Stone Horse Rocks,** bare at low water, are southwestward of Mary Ann Rocks and form a part of a reef extending 0.7 mile southeastward from Manomet Point.

Stellwagen Rock, with 6 feet over it and unmarked, is 1.7 miles southward of Manomet Point and 0.8 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. Shoals with little water in places extend 0.6 mile from shore just southward of **Center Hill Point.**

Ellisville Harbor is a small boat harbor about 0.4 mile northward from **Lookout Point.** The entrance which is almost bare is protected by a jetty on the northern side. The basin is shoal, and available for small craft only, at half tide or better.

From Peaked Cliff the shore is low and trends southeastward. There are houses on the shore at Sagamore Beach, 2 miles northwestward of Cape Cod Canal. Cape Cod Canal is described in Chapter 14.

Sandwich Harbor, 1 mile southeastward of the jetties at the entrance of Cape Cod Canal, is the approach to the town of **Sandwich.** The shore in front of the town is low marsh, faced by a sand beach. In June 1949 the channel to the town was bare at low water. The harbor is suitable only for small craft.

Spring Hill Beach extends 2.3 miles southeastward from Sandwich Harbor to Scorton Harbor. The latter harbor is surrounded by sand dunes backed by cultivated and settled lowlands.

Scorton Harbor, 3.5 miles southeastward of the entrance of Cape Cod Canal, has a narrow entrance, bare at low water. Small local fishing boats sometimes enter the harbor at half tide or higher. At high water boats can go as far as the highway bridge about 1 mile above the entrance. The harbor has no wharves. **Scorton Ledge,** an unmarked 12-foot ledge, is 0.7 mile north-northeastward of the entrance.

Chart 339.—Barnstable Harbor, 10 miles southeastward of Cape Cod Canal entrance, is the approach to the town of **Barnstable** and the village of **Yarmouth Port.** It is used mostly by local fishing boats and yachts. The entrance is obstructed by a shifting bar with about 5 feet 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 light. The channel is partially marked by buoys but the bar channel is subject to changes and strangers should obtain local information before entering. With northerly winds a heavy sea makes on the bar, and vessels bound to Barnstable should take shelter in the eastern entrance to the canal or anchor in Plymouth or Provincetown until the weather moderates. Ice generally obstructs the harbor during a part of the winter.

Sandy Neck Light, 45 feet above the water and visible 10 miles, is shown from a white skeleton tower on **Beach Point.** Prominent objects include a standpipe and a lighted radio tower at Barnstable, a tall stack at the Yarmouth wharf, and a tank and spire in Yarmouth.

In 1949 a channel reported to have a depth of 6 feet led to a fish factory and wharf on **Maraspin Creek.** The channel is marked by local fishermen.

The dredged channel leading to **Yarmouth** is subject to shoaling. In 1949 it had a controlling depth of about 1 foot near its entrance.

Vessels should avoid anchoring in the cable area between Sandy Neck Light and the southern shore of Barnstable Harbor about 0.8 mile 180° from the light. Gasoline and some supplies are available at Barnstable.

North Dennis is a village 3.5 miles eastward of Sandy Neck Light. **Scargo Hill,** 170 feet high and the highest hill in the vicinity, is southeastward of North Dennis. A prominent stone lookout tower is on the hill.

Nobscusset Point, 4.5 miles eastward from Sandy Neck Light, has a small breakwater which formerly provided a limited anchorage for small craft, but in 1949 the area inside the breakwater was bare at low water.

Chart 581.—Between Barnstable and Wellfleet are several creeks which are used by local boats and launches at high water, but all of them are dry at low water. The 18-foot curve is from 0.2 to 0.3 mile from shore between North Dennis and Sesuit Harbor, but eastward of the latter it is 0.5 to 1.5 miles from shore.

Sesuit Harbor, about 5 miles eastward of the entrance to Barnstable Harbor, has a jetty on its east side. The entrance is bare before low water. The channel is narrow and the entrance should not be attempted except with local knowledge. A small area inside has been dredged to a reported depth of 10 feet and provides a mooring place for a few fishing boats. **East Dennis** is a village 0.5 mile inland.

Rock Harbor on the south side of **Rock Creek** is about 9.5 miles eastward of Sesuit Harbor. The entrance channel had a depth of about 1 foot in 1940 and was marked along the south side by bush stakes. A lighted buoy with an unlighted bell buoy alongside are moored about 2.5 miles westward of the harbor entrance. The lighted buoy is maintained from April 1 to December 31, annually. A basin has been dredged in the creek. A wharf about 250 feet in length is on the south bank. Boats usually pass in and out within 2 hours of high water. Gasoline is available. A light on the south side of the entrance is maintained locally.

The Liberty Ship *James Longstreet* with much of her hull showing at high water has

been scuttled in 14 feet of water 2.5 miles northwestward of Rock Harbor. It is used as a bombing target. The target area is defined by Federal Regulations given in Chapter 2, § 204.4.

Wellfleet Harbor is on the western side of the hook of Cape Cod, near its southern end. Extensive shoals are in the entrance and extend about 5.5 miles westward of **Billingsgate Island** marking the western side of the entrance to the harbor. The island is covered at high water. **Mayo Beach** is at the head of the harbor. The channel into the harbor leads between the shoals and is narrow in places, but is marked by buoys and easily followed in the daytime in clear weather. It has a least depth of 13 feet until a mile above **Smalley Bar,** where a 6-foot channel 100 feet wide leads to a position 300 yards off the old fish wharf ruins. The 6-foot channel should not be used without local information.

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 usually is closed by ice for a part of each winter. A marine railway capable of hauling out small pleasure and fishing craft and several repair shops are at Wellfleet Harbor. Gasoline and limited small boat chandlery are available.

The inner harbor with depths ranging from 9 to 13 feet offers the best anchorage. In the outer harbor, northeast of Smalley Bar, the anchorage in depths of from 12 to 21 feet is somewhat exposed in westerly winds. In northerly gales vessels sometimes anchor on the lee side of **Billingsgate Shoal** in 18 to 42 feet, the shoal breaking the sea so that vessels with good ground tackle can ride out a heavy gale from northward.

The mean range of the tide is about 10 feet. The tidal currents are weak.

Chart 580.—Pamet River, about 10 miles north of the end of Billingsgate Shoal, leads to the town of **Truro** and is used only by small boats. The river is bare 2 hours before low water. A shoal extends 1 mile off the entrance. Two small jetties have been constructed at the entrance.

Provincetown Harbor, formed by a turn in the northern end of the Hook of Cape Cod, has a diameter of about 2 miles. It is one of the best harbors on the Atlantic Coast, having a sizable anchorage area in depths of 18 to 50 feet with excellent holding ground. Coasters and fishermen find protection here in gales from any direction. The historical town of **Provincetown** is on the northwestern side of the harbor. It is the home port of many vessels engaged in cod, mackerel, and other fishing. Coal, lumber, and some petroleum products make up the remainder of the shipping.

The approach and entrance to the harbor are free from dangers and are marked by three lights and by Pilgrim Monument. **Race Point Light,** 41 feet above the water and visible 12 miles, is shown from a white tower on the northwest point of Cape Cod. The fog signal is an air whistle. **Wood End Light,** 45 feet above the water and visible 12 miles, is shown from a white square tower on the southern end of the hook. The fog signal is a siren. A Coast Guard station is near the light. **Long Point Light,** 36 feet above the water and visible 11 miles, is shown from a white square tower at the western point of the harbor entrance. The fog signal is a bell. At night Cape Cod Light will show over the land westward of it when approaching the entrance on certain bearings. **Pilgrim Monument,** a slim stone structure about 350 feet above the water, rises 252½ feet above **High Pole Hill** in Provincetown.

The tower and buildings of Race Point Coast Guard Station and the tower and buildings of a former station, 4 miles eastward of Race Point Light, are prominent from the north.

Excellent anchorage may be had in Provincetown Harbor. In addition, small craft sometimes anchor in **Herring Cove,** 0.8 mile south of Race Point Light. A temporary lee from easterly winds is found well inshore in depths of 10 to 24 feet.

The two **measured trial courses** between Race Point and Long Point Lights are the outer and inner Naval standardization courses for submarines which may be operating submerged while making trials in the Provincetown area. Accordingly, shipping should keep good lookout for periscopes and avoid as far as possible navigation along or across the measured mile courses. Buoys mark the trial courses.

Shank Painter Bar extends to a maximum distance of 0.6 mile off the shore between Race Point and Wood End Lights. It rises abruptly from deep water, and is marked by a buoy 1.1 miles southeastward from Race Point Light. **Wood End Bar** is the continuation of the shoal which makes sharply into Wood End. A bell buoy is about 0.5 mile southward of Wood End Light.

The mean range of the tide in Provincetown Harbor is about 9 feet.

About 1 mile west of Race Point the tidal current has a velocity of about 1 knot at strength. The flood sets southwestward and the ebb northeastward. Tide rips occur during heavy weather when the wind is against the current. Westward of the stretch of coast between Wood End and Race Point, the velocity at strength is about 1 knot. In this locality the ebb current sets northwesterly and the flood sets southeasterly. At the entrance and in the harbor the tidal currents have little velocity. The *Current Tables* should be consulted for current predictions.

Ice forms only in severe winters in the harbor, and then only for short periods. There are recorded cases of fields of ice being driven northward from the shallow harbors of Cape Cod Bay into the harbor so as to close it briefly, but such cases are rare.

Storm warnings are shown day and night from a skeleton tower on the hill near the Pilgrim Monument, and are visible from all directions. They also are displayed at Race Point and Cape Cod Lights.

The principal wharf is owned by the town and has a depth of 13 feet off its face and 12 feet at its east side. Extending out from a fish freezing plant 0.4 miles southward of Pilgrim Monument is a long wharf with about 8 feet depth at its outer end. There are numerous other wharves, all of which bare at low water. The harbor has ample depths for deep-draft vessels to within 0.4 mile of the wharves, thence the water shoals to the piers. Diesel oil, gasoline, and water are available at the town wharf. Supplies can be obtained in town. Two float landings are alongside the town wharf. Wharfage is charged for small craft. The harbor master can usually be found on the town wharf.

Provincetown is a customs port of entry but marine documents are not issued. A relief station is at 322 Commercial Street, Provincetown.

Bus service is available throughout the year and the railroad operates freight service. During summer months, July through Labor Day, daily steamer service is operated to Boston.

A marine railway can haul out small craft 60 feet in length and 8 feet in draft. A machine shop is available.

Chart 1208.—The eastern side of Cape Cod is described in *United States Coast Pilot, Atlantic Coast, Section B, Cape Cod to Sandy Hook.*

Peaked Hill Bar, about 4.5 miles east-northeast of Race Point Light and 0.6 mile offshore, includes shoals covered by 14 and 16 feet. Vessels have grounded here, mainly because of failure to take soundings. This area should be given a berth of at least 2 miles. A lighted whistle buoy is moored about 2 miles off Peaked Hill Bar and about 5 miles northwestward of Cape Cod Light. Keeping in a depth of 20 fathoms will insure passing 2 to 2.5 miles off the eastern side of Cape Cod and will lead to the lighted whistle buoy off Peaked Hill Bar.

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CHAPTER 14

Cape Cod Canal

Chart 251

CAPE COD CANAL is a deep-draft, sea-level waterway that extends westward from Cape Cod Bay to the head of Buzzards Bay. The total length of the waterway, including approach channels, is about 15 miles. The canal shortens the distance between points north and south of the cape by 50 to 150 miles and eliminates the necessity for the run outside the cape and Nantucket Shoals. The canal is maintained by the Government as a free waterway.

Prominent features.—A light, 40 feet above the water and visible 12 miles, is shown from a red skeleton structure at the outer end of the breakwater on the north side of the Cape Cod Bay entrance to the canal; the fog signal at the light is an electric-diaphragm horn. A radiobeacon is near the Coast Guard station on the south side of the entrance. Other marks for the entrance are the lighted channel buoys, the white daymarks on the skeleton structures of the 245° lighted range, the Coast Guard boathouse, and the high-level highway bridge that crosses the canal at Sagamore, 2.5 miles west of the breakwater light. The breakwaters should not be confused with the smaller jetties at Sandwich Harbor, 1 mile to the southeastward, nor should the two white church spires back of Sandwich Harbor be mistaken for the range towers.

On the eastern side of the Buzzards Bay approach to the Cape Cod Canal is **Cleveland Ledge Light,** which is 74 feet above the water, visible 14 miles, and shown from a white cylindrical tower and dwelling on a white caisson; the fog signal is an air-diaphragm horn that is synchronized with the radiobeacon for distance finding. Other marks for the western entrance are the lighted buoys along Cleveland Ledge and Hog Island Channels; the abandoned lighthouse on Bird Island; the light, 59 feet above the water and visible 13 miles, that is shown from a white skeleton tower on the southwest end of Wings Neck; the white skeleton towers and tankhouses of the Cleveland Ledge Channel 015° lighted range; the two tanks on the mainland immediately northeastward of Hog Island; the vertical-lift railroad bridge over the canal at the village of Buzzards Bay; and the high-level highway bridge at Bourne. The railroad bridge is especially conspicuous and can be seen for many miles down Buzzards Bay.

Channels.—The Federal project provides for a channel 32 feet deep and 500 to 700 feet wide. The project is under constant maintenance, and controlling depths are published from time to time in the weekly *Notice to Mariners.*

Anchorages.—Mooring basins are located at the east and west ends of the canal. The East Mooring Basin, located on the north side of the canal, is 2,000 feet long, 300

feet wide, and has been dredged to a depth of 25 feet. The West Mooring Basin, located on the southeast side of Hog Island Channel, is 2,600 feet long, 350 feet wide, and has been dredged to a depth of 32 feet. Mooring dolphins are provided in both basins. Controlling depths reported in July 1950 were 19 feet in the East Basin and 21 feet in the West Basin.

The small-boat basin, on the south side of the canal opposite the East Mooring Basin, is 440 feet long, 250 feet wide, and has been dredged to a depth of 12 feet. The controlling depth reported in July 1950 was 12 feet.

Bridges.—The canal is crossed by two fixed high-level highway bridges at **Sagamore** and **Bourne** and by a vertical-lift railroad bridge at the village of **Buzzards Bay.** The highway bridges have horizontal clearances of 500 feet and vertical clearances of 135 feet at high water. The railroad bridge has a horizontal clearance of 500 feet, a closed vertical clearance of 7 feet at high water, and an open vertical clearance of 135 feet; the lift span is normally maintained in the raised position and lowered for the passage of trains. Signals for the railroad bridge are given in the regulations which follow this general discussion of the canal. An overhead cable that crosses the canal about midway between the highway bridges has a vertical clearance of 160 feet at high water.

Traffic Lights.—Red, green, and amber electric traffic lights, 30 to 35 feet above the water and visible about 2 miles, day or night, are located on the south side of the Cape Cod Bay entrance to the canal, on the north side near the Corps of Engineers substation 0.2 mile west of the railroad bridge, and near Wings Neck Light on the southeast side of the Buzzards Bay entrance. Traffic signals are given in the regulations which follow this general discussion of the canal.

The canal proper is lighted at night, on both banks, by sodium-vapor and white lights spaced, alternately, about 500 feet apart, 140 feet from the edge of the channel, and 25 feet above the water.

Two-way traffic through the canal will be allowed when, in the opinion of the Corps of Engineers representative charged with directing traffic, conditions are suitable.

When the railroad bridge lift span is lowered during periods of low visibility, there will be four blasts on an air whistle on the span every two minutes.

Vessels should not attempt to transit the canal until clearance by radio, radiotelephone, signal lights, megaphone, or motorboat contact has been obtained. Strong tidal currents occur in the canal, especially during spring tides. Low-powered vessels should await slack water or favorable current. Fishing boats and small craft should not obstruct the channel, and anchoring in the fairway is not permitted except in emergencies. **All vessels, large and small, must operate at moderate speed.**

Tides.—The mean range of tide is about 9½ feet at the Cape Cod Bay entrance and 4 feet at the Buzzards Bay entrance. As the tide in Cape Cod Bay occurs about 3 hours later than that in Buzzards Bay, the periodic differences in level are large, and this causes strong currents. Subnormal tides may lower the canal level 2 feet below mean low water or even more if attended by heavy offshore winds.

Currents.—Predictions for the time of slack water and the times and velocities of strength of current for every day in the year are given in the *Current Tables.* Under ordinary conditions the currents have an average velocity at strength of about 3½ knots in midstream. The average strength of current at spring tides is about 4 knots.

Weather.—The fog is said to be always less dense over the canal than outside,

but at times a water vapor rises from the canal to such an extent that traffic has to be suspended. The canal proper never has been closed by ice, but occasionally Buzzards Bay becomes so congested with ice that navigation through the canal is prevented.

Storm warnings are displayed, day and night, at the Coast Guard station at the eastern entrance, and at Wings Neck Light on the western side.

Pilotage.—Pilotage is not compulsory for vessels carrying a pilot licensed for the canal by the Coast Guard. The pilots maintain a station at the wharf at the east end of the canal. Usually pilots may be obtained by making signal on approaching either end of the canal, but advance calls by radio are advised. The Corps of Engineers does not maintain pilot service, but will contact local independent pilots whenever requested. Towboats may be had by prior arrangement.

Terminal facilities.—The State Pier at the village of Buzzards Bay, on the north side of the canal near the western entrance, is 600 feet long and the berthing space at the face has been dredged to a depth of 25 feet. The controlling depth reported on the channel side of the pier in July 1950 was 22 feet.

A harbor master supervises use of the State Pier. Supplies and communications are available. Water, fuel oil, and gasoline also are available at the terminal near the boat basin at the Cape Cod Bay entrance to the canal.

Communications.—Information on operating conditions, widths, depths, or other data concerning the canal is available at all hours, day or night, by telephoning Buzzards Bay 97; or by ship-to-shore telephone to the Scituate station, whose call letters are WOU; or by radiotelegraph to the Chatham station, whose call letters are WIM and WCC, whence messages are relayed by telephone to the canal authority.

The radiotelephone in the canal office at Buzzards Bay is in continuous operation. The call letters are WUA21 and the frequency is 2350 kc.; only calls on that frequency can be answered.

§ 207.20 *Cape Cod Canal, Mass.; use, administration and navigation*—(a) *Limits.* The Cape Cod Canal, including approaches, extends from the outer extremity of the northerly stone breakwater in Cape Cod Bay at Sandwich through dredged channels and land cuts to a point in Buzzards Bay, Massachusetts, about 5 miles southwest of Wings Neck Light.

(b) *Supervision.* The movement of all vessels and craft of every description through the canal, and the care and maintenance of the canal and all property of the United States pertaining thereto, shall be under the supervision of the United States Division Engineer, New England Division, Building No. 21, U. S. Naval Drydock, South Boston, Mass., who has general charge of Federal waterway improvements in the locality, and his authorized representatives.

(c) *Vessels allowed passage.* The canal is open for passage to all adequately power motivated vessels in good condition, of sizes consistent with safe navigation as governed by the controlling dimensions of the waterway. Vessels without engine motive power must not attempt to sail through the canal. Low powered vessels should await slack water or favorable current.

(d) *Tows.* Tows shall be assembled outside the canal entrances when practicable. Vessels in tow shall be securely fastened to the towing vessel and to each other. Long hawsers are not permitted.

(e) *Obtaining clearance.* Vessels 25 feet or more in length shall not transit the canal until clearance has been obtained. Ordinarily, vessels will be given clearance in order of arrival, but when several vessels are to be passed, clearance will be given in the following order:

(1) *First.* To vessels owned by the United States or employed on canal improvement work.

(2) *Second.* To passenger vessels.

(3) *Third.* To freight vessels, towboats and pleasure craft.

(f) *Clearance signals.* The following signals apply to all vessels 25 feet or more in length:

(1) *Westbound traffic.* When the green light is showing at the eastern or Cape Cod Bay terminal, vessels may proceed through the canal. When the amber light is showing, vessels may proceed as far

as the East Mooring Basin where they must stop and from whence clearance will be granted by motor boat or other signal. When the red light is showing, vessels must stop clear of the outer end of the Cape Cod Bay approach channel.

(2) *Eastbound traffic*—(i) *Signals at Wings Neck.* When the green light is showing, vessels may proceed through the canal. When the amber light is showing, vessels may proceed through the Hog Island Channel as far as the West Mooring Basin or the State Pier. When the red light is showing, vessels, other than those bound to Onset Bay or Monument Beach, must stop clear of Buoys Nos. 1 and 2 at the entrance to Hog Island Channel. In daytime when sunshine partially obscures the traffic lights or if the electrical current should be temporarily interrupted, a red ball or shape will be operated from a pole about 60 feet southwest of the traffic lights. The raised ball has the same meaning as the red light; the ball lowered to the ground, the same meaning as the green light.

(ii) *Signals at Station 389.* (*a*) These signals will be operated in synchronism with the signals at Wings Neck except:

(*1*) In emergencies not foreseen when a vessel passes in by Wings Neck.

(*2*) When dispatching vessels from the West Mooring Basin or the State Pier.

(*3*) When the railroad bridge is lowered.

(*b*) When the green light is showing, vessels may proceed. When the amber light is showing, vessels may proceed through the Hog Island Channel as far as the West Mooring Basin or the State Pier. When the red light is showing, vessels must not pass Station 389.

(3) *Procedure in thick weather.* (i) *Obtaining clearance.* When signal lights are obscured by thick weather clearance should be secured by radio or other reliable medium.

(ii) *Signalling by vessels.* In thick weather all vessels, having obtained clearance, shall signal by three long blasts of whistle or horn when passing in by Wings Neck Light or Sandwich Breakwater.

(4) When signal lights are obscured by thick weather, clearance should be secured by radio or other reliable medium.

(g) *Railroad bridge signals.* (1) The vertical lift span of the railroad bridge is normally kept in the raised position except when lowered for the passage of trains. Immediately preceding the lowering of the span the operator will sound two long blasts of a whistle or horn. Immediately preceding the raising of the span, the operator will sound one long blast of a whistle or horn. When a vessel is approaching the bridge with the span in the lowered position, if it will not be raised immediately, the operator will so indicate by sounding four short blasts in quick succession upon a whistle or horn.

(2) When the railroad lift span is lowered in foggy weather, there will be 4 blasts of a whistle or horn on the span every 2 minutes. Vessels in transit, especially when with a fair current, must exercise extreme caution when the span is lowered.

(h) *Speed*—(1) *General.* No boat in the canal shall be raced or crowded alongside another boat. All vessels must pass mooring dolphins, wharves, landings, and dredging plant or other floating work units at minimum speed so as to avoid damage to moored or anchored vessels by wave wash or suction.

(2) *Limits.* Vessel speed will be determined by the time of passage (east or west) between Canal Stations 35+00 (opposite U. S. Engineer Observer's Station near east end) and 388+00 (opposite U. S. Engineer Sub-Office near west end). No boat shall pass between these points in less than the following specified minimum running times:

Current direction:	*Minimum running time canal stations 35 to 388 (minutes)*
Head (against boat)	60
Fair (with boat)	30
Slack	45

This minimum running time for slack water shall apply to any boat which enters that portion of the canal between Stations 35 and 388 by passing either Station 35 or Station 388 at any time within a period of 1 hour before the predicted time of slack water as given in the U. S. Coast & Geodetic Survey publication "Current Tables, Atlantic Coast." The applicable minimum running times for head or fair current, respectively, shall apply to any boat which enters that portion of the canal between Stations 35 and 388 by passing either Station 35 or Station 388 at any time other than designated above for applicability of the requirement for slack water.

(3) *Example.* For example, the predicted times of slack current on October 1, 1940, at Cape Cod Canal (Bournedale), Mass., as given on page 32 of the U. S. Coast & Geodetic Survey publication "Current Tables, Atlantic Coast" are 2:25 a. m., 8:43 a. m., 2:50 p. m., and 9:07 p. m. On October 1, 1940, the slack current schedule will apply to any boat which enters the canal by passing either Station 35 or Station 388 between 1:25 a. m. to 2:25 a. m., 7:43 a. m. to 8:43 a. m., 1:50 p. m. to 2:50 p. m., and 8:07 p. m. to 9:07 p. m.; the head or fair current schedule, as applicable, will apply to any boat which enters the canal by passing either Station 35 or Station 388 between midnight to 1:25 a. m., 2:25 a. m. to 7:43 a. m., 8:43 a. m. to 1:50 p. m., 2:50 p. m. to 8:07 p. m., 9:07 p. m. to midnight.

(i) *Management of vessels*—(1) *Pilot rules.* The canal is an inland waterway of the United States and the pilot rules for such waterways as contained in the United States Coast Guard publication "Pilot Rules" are applicable concerning matters not otherwise covered in this section.

(2) *Passing of vessels.* Restricted passing is permissible, particularly when a leading, low-powered vessel is unable to stem the current, but extreme care to avoid collision is imperative.

(3) *Unnecessary delay in canal.* Vessels must not obstruct navigation by unnecessary delay in entering or passing through the canal or by anchoring in the channel.

(4) *Mooring or anchoring in mooring basins.* Vessels mooring or anchoring in the mooring basins shall do so in such manner as not to obstruct the canal channel or impede vessel movement to and from the basins.

(5) *Landing of freight, etc.* Except in emergencies, vessels shall not stop to land passengers, freight or baggage or to transfer same to another vessel under such conditions as would in any way interfere with navigation.

(j) *Statistics.* Masters of vessels shall furnish the authorized representative of the Division Engineer, on each passage through the canal, such verbal or written statement of passengers, freight and registered tonnage as may be requested by said authorized representative.

(k) *Deposit of refuse.* No oil or other liquid, ashes or other material of any kind shall be thrown, pumped or swept into the canal or approaches, or deposited on canal grounds.

(l) *Trespass or injury to property.* Subject to the provisions of paragraph (m) of this section, trespass upon the canal property or injury to the canal, lands, banks, revetment, bridges, breakwaters, dikes, dolphins, fences, culverts, trees, telephone lines, power lines, or any other property of the United States pertaining to the canal is prohibited.

(m) *Fish and game.* All persons are forbidden to enter upon the canal or the lands of the United States pertaining thereto for the purpose of fishing or hunting or taking fish or game by any means without a written permit from the Division Engineer or his authorized representative, except that fishing with rod and line from the banks of the canal at such locations as may be established by the Division Engineer or his authorized representative is allowed without such a permit, subject to the provisions of paragraph (l) of this section. The fish and game laws of the United States and of the State of Massachusetts will be enforced upon the canal and the lands of the United States pertaining thereto.

Appendix

COAST and GEODETIC SURVEY.—COAST PILOTS.—Atlantic Coast, Section A, St. Croix River to Cape Cod, 1950.
Atlantic Coast, Section B, Cape Cod to Sandy Hook, 1950.
Atlantic Coast, Section C, Sandy Hook to Cape Henry, 1947.
Atlantic Coast, Section D, Cape Henry to Key West, 1948.
Gulf Coast, Key West to Rio Grande, 1949.
West Indies, Puerto Rico and Virgin Islands, 1949.
Pacific Coast, California, Oregon, and Washington, 1942.
Alaska, Part I, Dixon Entrance to Yakutat Bay, 1943.
Alaska, Part II, Yakutat Bay to Arctic Ocean, 1947.
Hawaiian Islands, 1950.
Philippine Islands, Part I, Luzon, Mindoro, and Visayas, 1939.
Philippine Islands, Part II, Palawan, Mindanao, and Sulu Archipelago, 1939.
Distances between United States Ports, 1938.

DISTRICT OFFICES.—Northeastern District: Tenth Floor, Customhouse, Boston 9, Mass.
Eastern District: 602 Federal Office Bldg., 90 Church St., New York 7, N.Y.
Southeastern District: 418 U. S. Post Office Bldg., Norfolk 10, Va.
Southern District: 314 Customhouse, 423 Canal St., New Orleans 16, La.
Caribbean District: Post Office Box 3067, Santurce, San Juan, Puerto Rico.
Southwestern District: 1426 Post Office and Courthouse, Los Angeles 12, Calif.
Western District: 114 Customhouse, San Francisco 26, Calif.
Midwestern District: 502 Panama Bldg., 534 Southwest Third Ave., Portland 4, Oreg.
Northwestern District: 705 Federal Office Bldg., Seattle 4, Wash.
Pacific District: 244 Federal Office Bldg., Honolulu, T. H.

CHART AGENCIES.—Agents marked with an (*) asterisk also handle certain United States Hydrographic Office publications.
Agents marked with a (†) dagger also handle United States Coast Guard publications.

MAINE

Bar Harbor: Frenchmans Bay Boating Company
Bath:† Hall & Hunt, 106 Front Street

Boothbay Harbor: The Marine Service, Inc., Commercial Street
Brunswick: F. W. Chandler & Son, 150 Maine Street
Camden:† The Village Shop, 25 Main Street
Eastport:*† S. L. Wadsworth & Son, 5–8 Central Wharf
Northeast Harbor: F. T. Brown
Portland:*† W. S. Jordan Co., 102 Commercial Street
Rockland:*† Huston-Tuttle Book Co., 408 Main Street
Southwest Harbor: Manset Marine Supply Company
Stonington: R. K. Barter

NEW HAMPSHIRE

Portsmouth: W. S. Jackson, 111 Market Street

MASSACHUSETTS

Boston:
U. S. Coast and Geodetic Survey District Office, 10th Floor, Customhouse
*† Advance Nautical Equipment Company, 154 State Street
Marine Hardware & Supply Co., 390 Atlantic Avenue
*† Wilfrid O. White & Son, 90 State Street
Gloucester:
* George K. Rogers Co., 150 Main Street
Marine Service Co., 2 Chestnut Street
Marblehead: * Fred L. Woods, Jr., 76 Washington Street
Plymouth: M & M Sporting Goods Co.
Provincetown: Land's End Marine Supply Co., Inc., 337 Commercial Street

Monthly Mean Surface Water Temperatures

Place	Years of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
		°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
Eastport, Me.	20	37.3	34.3	34.4	36.8	40.2	44.3	48.6	51.5	52.1	50.8	47.5	42.4	43.4
Bar Harbor, Me.	2	33.8	31.5	34.0	40.0	45.9	52.2	56.3	57.2	55.2	52.0	47.2	39.9	45.4
Pulpit Harbor, Me.	1	33.6	29.8	-------	40.5	46.9	53.2	59.9	60.3	58.6	54.3	48.7	42.1	-------
Portland, Me.	25	33.1	32.0	34.5	40.1	47.7	54.9	59.6	60.3	57.9	52.0	44.9	37.1	46.2
Portsmouth, N. H.	6	34.7	33.5	36.5	42.2	48.4	54.1	59.6	61.8	59.0	52.6	47.0	39.4	47.4
Boston, Mass.	28	34.3	33.2	37.2	44.1	52.4	60.0	64.2	65.4	63.2	55.8	47.6	38.7	49.7

The monthly means of surface water temperature may vary somewhat from year to year and therefore means from different series are not strictly comparable. For temperature data in greater detail, write to the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C., for publication TW-1, *Surface Water Temperatures, Atlantic and Gulf Coasts.*

Monthly Mean Sea Water Densities

Reduced to 15° C. (59° F.)

Place	Years of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
Eastport, Me.	20	1.0237	1.0236	1.0235	1.0231	1.0230	1.0232	1.0236	1.0238	1.0240	1.0240	1.0239	1.0238	1.0236
Bar Harbor, Me.	2	1.0238	1.0238	1.0236	1.0233	1.0232	1.0232	1.0233	1.0236	1.0240	1.0241	1.0240	1.0240	1.0237
Pulpit Harbor, Me.	1	1.0223	1.0216	-------	1.0208	1.0203	1.0218	1.0225	1.0231	1.0232	1.0232	1.0233	1.0232	-------
Portland, Me.	25	1.0223	1.0221	1.0214	1.0208	1.0210	1.0218	1.0226	1.0227	1.0226	1.0226	1.0223	1.0220	1.0220
Portsmouth, N. H.	6	1.0222	1.0220	1.0192	1.0191	1.0194	1.0204	1.0218	1.0225	1.0227	1.0230	1.0228	1.0220	1.0214
Boston, Mass.	28	1.0216	1.0218	1.0201	1.0200	1.0206	1.0214	1.0221	1.0224	1.0222	1.0225	1.0223	1.0219	1.0216

The monthly means of sea water density may vary somewhat from year to year and therefore means from different series are not strictly comparable. For density data in greater detail, write to the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C., for publication DW-1, *Density of Sea Water, Atlantic and Gulf Coasts.* A table for converting density to salinity is included in that publication.

Distance Table

DISTANCES GIVEN IN NAUTICAL MILES

From— \ To—	Calais	Eastport	Machiasport	Winter Harbor	Bar Harbor	Bangor	Searsport	Belfast	Rockland	Boothbay Harbor	Bath	Portland	Saco River Entrance	York	Portsmouth	Newburyport	Gloucester	Beverly	Salem	Marblehead	Lynn	Boston	Scituate	Plymouth	Provincetown	Cape Cod Canal East Entrance	Pollock Rip Lightship bearing 046°, distant 2.6 miles	Nantucket Shoals Lightship bearing 352°, distant 5.0 miles
Calais	----	24	66	100	104	184	160	161	151	176	193	204	212	233	244	254	253	260	260	260	269	273	270	286	285	312	316	355
Eastport	24	----	44	78	82	162	137	139	128	153	170	182	189	211	222	232	230	238	238	238	247	250	248	264	263	293	283	373
Machiasport	66	44	----	48	52	132	107	109	98	123	140	152	159	181	192	202	200	208	208	208	217	220	218	234	233	242	263	343
Winter Harbor	100	78	48	----	9	93	69	72	60	85	102	113	121	143	153	163	162	169	170	169	178	182	180	195	194	203	225	304
Bar Harbor	104	82	52	9	----	94	70	73	61	86	103	114	122	144	154	164	163	170	170	170	179	183	181	196	195	204	226	305
Bangor	184	162	132	93	94	----	29	34	50	88	105	116	124	146	156	166	173	181	181	181	189	193	191	206	206	214	236	315
Searsport	160	137	107	69	70	29	----	6	23	61	78	90	97	119	130	140	146	154	154	154	162	166	164	180	179	187	209	289
Belfast	161	139	109	72	73	34	6	----	24	62	79	90	98	119	130	140	147	154	154	154	163	167	165	180	179	188	210	289
Rockland	151	128	98	60	61	50	23	24	----	43	60	71	78	100	111	121	128	135	135	135	144	148	146	161	160	169	191	270
Boothbay Harbor	176	153	123	85	86	88	61	62	43	----	22	36	43	65	76	86	96	104	104	104	113	116	114	130	129	137	159	239
Bath	193	170	140	102	103	105	78	79	60	22	----	40	48	70	81	91	101	109	109	109	117	121	119	133	134	142	164	233
Portland	204	182	152	113	114	116	90	90	71	36	40	----	19	43	59	68	78	86	86	86	95	98	96	112	111	120	141	225
Saco River Entrance	212	189	159	121	122	124	97	98	78	43	48	19	----	28	42	52	66	74	74	74	82	86	84	99	98	107	129	213
York	233	211	181	143	144	146	119	119	100	65	70	43	28	----	13	25	42	50	50	50	58	62	60	76	75	83	105	189
Portsmouth	244	222	192	153	154	156	130	130	111	76	81	59	42	13	----	22	40	48	48	48	57	60	58	74	73	82	103	187
Newburyport	254	232	202	163	164	166	140	140	121	86	91	68	52	25	22	----	30	38	38	38	47	50	48	64	63	71	93	173
Gloucester	253	230	200	162	163	173	146	147	128	96	101	78	66	42	40	30	----	12	12	13	22	25	26	43	45	52	77	156
Beverly	260	238	208	169	170	181	154	154	135	104	109	86	74	50	48	38	12	----	3	6	23	26	28	46	49	54	83	162
Salem	260	238	208	170	170	181	154	154	135	104	109	86	74	50	48	38	12	3	----	6	23	26	28	46	49	54	83	162
Marblehead	260	238	208	169	170	181	154	154	135	104	109	86	74	50	48	38	13	6	6	----	19	22	24	42	45	50	79	159
Lynn	269	247	217	178	179	189	162	163	144	113	117	95	82	58	57	47	22	23	23	19	----	12	22	41	47	50	82	162
Boston	273	250	220	182	183	193	166	167	148	116	121	98	86	62	60	50	25	26	26	22	12	----	25	44	49	52	84	164
Scituate	270	248	218	180	181	191	164	165	146	114	119	96	84	60	58	48	26	28	28	24	22	25	----	21	29	30	66	146
Plymouth	286	264	234	195	196	206	180	180	161	130	133	112	99	76	74	64	43	46	46	42	41	44	21	----	28	21	67	146
Provincetown	285	263	233	194	195	206	179	179	160	129	134	111	98	75	73	63	45	49	49	45	47	49	29	28	----	20	57	136

CORPS of ENGINEERS DISTRICTS.—New England Division: Office: Bldg. No. 21, U. S. Naval Drydock, South Boston, Mass.
Mail Address: Army Base, Boston 10, Mass.

The New England Division, an operating division with both district and division functions, comprises all of New England except western Vermont and small portions of Massachusetts and Connecticut along their western boundaries, and includes small portions of southeastern New York, all embraced in the drainage basins tributary to Long Island Sound and the Atlantic Ocean east of the New York-Connecticut State line. It also includes Fishers Island, N. Y.

BRANCH HYDROGRAPHIC OFFICES.—Tenth Floor, Customhouse, Boston, Mass.

COAST GUARD DISTRICTS.—First, Office: 1400 Customhouse, Boston 13, Mass. The First District comprises: Maine; New Hampshire; Vermont except the counties of Orleans, Franklin, Grand Isle, Chittenden, and Addison; Massachusetts; Rhode Island; all U. S. Naval reservations on shore in Newfoundland.

Third, Office: 80 Lafayette Street, New York 13, N. Y. The Third District comprises: The counties of Orleans, Franklin, Grand Isle, Chittenden, and Addison in Vermont; Connecticut; New York, except that part of north latitude 42° N. and west of longitude 74°39′ W.; New Jersey; Pennsylvania east of longitude 79° W.; Delaware, including Fenwick Island.

Marine Inspection Offices:
Portland, 76 Pearl Street, Portland 3, Maine
Boston, 447 Commercial Street, Boston, Mass.
Air Stations: Salem, Maine.
Base: Boston, Mass.
Depots: Southwest Harbor, Maine. South Portland, Maine

Lifeboat Stations, St. Croix River to Cape Cod

Number for aviation purposes only	Name of station	State	Location
1	Quoddy Head	Maine	44°48′48″ N., 66°58′00″ W. ¾ mile west of Quoddy Head Light.
2	Cross Island	Maine	44°36′54″ N., 67°16′48″ W. Northeast end of Cross Island.
4	Moose Peak	Maine	44°28′30″ N., 67°32′00″ W. At Moose Peak Light on Mistake Island.
5	Southwest Harbor	Maine	44°16′30″ N., 68°18′45″ W. South side, end of Clark Point in Southwest Harbor.
6	Whitehead	Maine	43°58′40″ N., 69°08′00″ W. Whitehead Island, ⅜ mile west of light.
7	Burnt Island	Maine	43°52′20″ N., 69°17′20″ W. North side of Burnt Island off mouth of St. George River.
8	Damariscove Island	Maine	43°45′20″ N., 69°37′00″ W. West side of Damariscove Harbor.
9	Kennebec River	Maine	43°45′00″ N., 69°46′55″ W. West side of mouth of river.
10	Cape Elizabeth	Maine	43°33′58″ N., 70°12′00″ W. Dyers Cove near light.
11	Fletchers Neck	Maine	43°26′30″ N., 70°20′30″ W. Southeast end of Fletchers Neck.
12	Portsmouth Harbor	Maine	43°04′16″ N., 70°42′33″ W. At Portsmouth Harbor Light on Fort Point.
14	Isles of Shoals	Maine	42°59′12″ N., 70°36′48″ W. Appledore Island.
16	Hampton Beach	New Hampshire	42°56′20″ N., 70°47′40″ W. 1½ mile north of Great Bears Head.
20	Merrimack River	Massachusetts	42°48′36″ N., 70°48′36″ W. North end of Plum Island.
22	Straitsmouth	Massachusetts	42°39′30″ N., 70°35′54″ W. Cape Ann, ½ mile west of Straitsmouth Light.
23	Gloucester	Massachusetts	42°35′30″ N., 70°41′10″ W. Old House Cove, west side of harbor.
24	Nahant	Massachusetts	42°25′52″ N., 70°56′05″ W. On Little Nahant Beach.
25	Boston (floating)	Massachusetts	About 42°19′30″ N., 71°01′18″ W. Moored about ¼ mile south of City Point, Dorchester Bay, from about April 1 to November 1.
26	Point Allerton	Massachusetts	42°18′21″ N., 70°54′01″ W. Stony Beach, Hull, Mass., 1⅜ miles south-southwest of Boston Light.
27	Scituate	Massachusetts	42°11′56″ N., 70°43′01″ W. First Cliff, ⅛ mile southwest of entrance to Scituate Harbor.
30	Gurnet	Massachusetts	42°00′12″ N., 70°36′10″ W., lower end of Duxbury Beach.
31	Manomet	Massachusetts	41°55′30″ N., 70°32′40″ W., 5⅜ miles southeast from Gurnet Light.
32	Cape Cod Canal	Massachusetts	41°45′14″ N., 70°30′00″ W. East side of canal entrance, Sandwich, Mass.
33	Wood End	Massachusetts	42°01′18″ N., 70°11′15″ W. End of Cape Cod, ¼ mile east of Wood End Light.
	Race Point	Massachusetts	42°04′42″ N., 70°13′24″ W. 1.5 miles northeast of Race Point Light.

Customs Districts and Ports of Entry

(The first port named in the following list is the headquarters port. * Indicates customs ports authorized to issue marine documents)

Name of district	Limits of district	Ports of entry
Maine & New Hampshire	The State of Maine and the State of New Hampshire except the county of Coos.	*Portland, Me. *Bangor, Me. *Bar Harbor, Me. *Bath, Me. *Belfast, Me. *Calais, Me. *Eastport, Me. *Jonesport, Me. *Portsmouth, N. H. *Rockland, Me.
Massachusetts	The State of Massachusetts	*Boston, Mass. *Gloucester, Mass. *Plymouth, Mass. Provincetown, Mass. *Salem, Mass.

PUBLIC HEALTH SERVICE

Quarantine Stations:

MAINE:

Portland, 331 Veranda Street.

MASSACHUSETTS:

Boston, 61 Summer Street, East Boston 28. Supervision of quarantine and immigration from Eastport, Maine, to New London, Conn.

Additional ports of entry at which quarantine inspection and/or medical examination of aliens is performed.

Belfast, Maine
Eastport, Maine
Searsport, Maine
(None in the State of New Hampshire)
Gloucester, Mass.
Plymouth, Mass.
Provincetown, Mass.

Marine Hospitals:

MAINE:

Portland, 331 Veranda Street.

MASSACHUSETTS:

Boston, 77 Warren Street. Outpatient Department Annex, Customhouse, Boston 9, Mass.

Medical Relief Stations:

MAINE:

Bangor, 15 Ohio Street
Bath, 118 Front Street
Calais, Me.
Machias, Me.

MASSACHUSETTS:

Gloucester, Customhouse, Dale Avenue.
Provincetown, 322 Commercial Street.

IMMIGRATION and NATURALIZATION OFFICES

MAINE:

Gloucester, Post Office Building
Portland, 76 Pearl Street

MASSACHUSETTS:

Boston, 73 Tremont Street

BUREAU of ENTOMOLOGY and PLANT QUARANTINE.—Inspectors are at 405 U. S. Appraiser's Stores Building, 408 Atlantic Avenue, Boston, Mass.

FOREIGN CONSULS.—The following foreign governments are represented by consuls at the port of **Boston:** Argentina, Belgium, Bolivia, Brazil, China, Colombia, Costa Rica, Cuba, Denmark, Dominican Republic, France, Great Britain, Greece, Guatemala, Honduras, Iceland, Ireland, Italy, Lithuania, Mexico, Netherlands, Nicaragua, Norway, Panama, Peru, Portugal, Spain, Sweden, Switzerland, Thailand, Turkey, Venezuela.

The following foreign consuls are stationed at **Portland,** Maine: Canada, France, Norway.

FEDERAL COMMUNICATIONS COMMISSION.—Engineer in Charge: 1600 Customhouse, Boston 9, Mass.; 748 Federal Bldg., 641 Washington Street, New York 14, N. Y.

Yacht Clubs

American Yacht Club, Newburyport, Mass.
Annisquam Yacht Club, Annisquam (Gloucester), Mass.
Atlantic Sailing Club, Marblehead, Mass.
Bar Harbor Yacht Club, Inc., Bar Harbor, Maine
Barnstable Yacht Club, Barnstable, Mass.
Beachmont Yacht Club, Pearl Ave., Revere, Mass.
Biddeford Pool Yacht Club, Biddeford Pool, Maine
Boothbay Harbor Yacht Club, Commercial St., Boothbay Harbor, Maine
Boston Yacht Club, 5 Rowe's Wharf, Boston, Mass.
1805 Columbia Rd., South Boston, Mass.
Front St., Marblehead, Mass.
Bucks Harbor Yacht Club, South Brooksville, Maine
Bunker Hill Yacht Club, Chelsea (South Bridge), Charlestown, Mass.
Camden Yacht Club, Camden, Maine
Center Harbor Yacht Club, Brooklin, Maine
Charles River Yacht Club, Cambridge, Mass.
Chelsea Yacht Club, Chelsea, Mass.
Cohasset Yacht Club, Cohasset, Mass.
Columbia Yacht Club, 1825 Columbia Rd., South Boston, Mass.
Conomo Point Yacht Club, Conomo Point, Essex, Mass.
Corinthian Yacht Club—Marblehead, Marblehead Neck, Mass.
Cottage Park Yacht Club, Orlando Ave., Winthrop, Mass.
Deer Isle Yacht Club, Sylvester Cove, Deer Isle, Maine
Dorchester Yacht Club, 320 Freeport St., Dorchester, Mass.
Duxbury Yacht Club, Duxbury, Mass.
Eastern Yacht Club, Marblehead, Mass.
Eastern Point Yacht Club, Eastern Point, Gloucester, Mass.
Harraseeket Yacht Club, Harraseeket, Maine
Hingham Yacht Club, Crow Point, Hingham, Mass.
Hull Yacht Club, Nantasket Ave., Stony Beach, Hull, Mass.
Jeffries Yacht Club, Jeffries Point, East Boston, Mass.
Kennebunk River Club, Kennebunkport, Maine
Kollegewidgwok Yacht Club, Bluehill, Maine
Lynn Yacht Club, 971 Washington St., Lynn, Mass.
Manchester Yacht Club, Manchester, Mass.
Manchester Harbor Boat Club, Manchester, Mass.
Marblehead Yacht Club, Inc., 4 Cliff St., Marblehead, Mass.
Marblehead Harbor Yacht Club, Marblehead, Mass.
Mere Point Yacht Club, Mere Point, Brunswick, Maine.
Merriconeag Yachting Assn., R. F. D. 2, Brunswick, Maine
Merrymount Yacht Club, Quincy, Mass.
Milton Yacht Club, Milton, Mass.
Mt. Desert Yacht Club, Mt. Desert, Maine
Nahant Dory Club, Nahant, Mass.
Naskeag Yacht Club, Great Cove, Brooklin, Maine
Neponset Valley Yacht Club, Granite Avenue Bridge, Milton, Mass.
Northeast Harbor Fleet, Mount Desert Island, Maine
North Haven Yacht Club, North Haven, Maine
Northport Yacht Club, Bayside, Northport Wharf, Maine
Old Colony Yacht Club, Victory Road, Dorchester, Mass.
Orient Heights Yacht Club, Inc., East Boston, Mass.
Palmer's Cove Yacht Club, 74 Leavitt St., Salem, Mass.
Pattens Bay Yacht Club, Surry, Maine
Penobscot Yacht Club, Bangor, Maine
Pleasant Park Yacht Club, Winthrop, Mass.
Pleon Yacht Club, Marblehead Neck, Mass.
Plymouth Yacht Club Co., Union St., Plymouth, Mass.
Point of Pines Yacht Club, 28 Rice Ave., Revere, Mass.
Portland Yacht Club, Falmouth Foreside, Maine
Port Norfolk Yacht Club, 179-181 Walnut St., Neponset 22, Mass.
Portsmouth Yacht Club, New Castle, N. H.
Prouts Neck Yacht Club, Prouts Neck, Maine
Provincetown Yacht and Tennis Club, 286 Bradford St., Provincetown, Mass.
Quincy Yacht Club, Sea St., Houghs Neck, Quincy, Mass.
Rockland Community Yacht Club, Public Landing, foot of Pleasant St., Rockland, Maine
Rockport Boat Club, Rockport, Maine
Saco Yacht Club, Saco, Maine
Salem Willows Yacht Club, Salem Willows Park, Salem, Mass.
Sandy Bay Yacht Club, Rockport, Mass.
Savin Hill Yacht Club, Fox Point Road, Savin Hill, Dorchester, Mass.

Yacht Clubs (Cont.)

Scituate Yacht Club, Scituate, Mass.
Scituate Harbor Yacht Club, Jerico Road, Scituate, Mass.
Seal Harbor Yacht Club, Seal Harbor, Maine
Sorrento Yacht Club, Sorrento, Maine
South Boston Yacht Club, 1849 Columbia Road, South Boston, Mass.
Southport Yacht Club, West Southport, Maine
Squantum Yacht Club, Wollaston Blvd., Wollaston, Mass.
Stimpson's Island Yacht Club, Stimpsons Island, North Haven, Maine
Swampscott Yacht Club, Swampscott, Mass.
Tarratine Club (Yachting Dept.), Dark Harbor, Maine
Town River Yacht Club, Quincy, Mass.
Watertown Yacht Club, Watertown, Mass.
Wellfleet Yacht Club, Wellfleet, Mass.
Wessagussett Yacht Club, Wessagussett Rd., North Weymouth, Mass.
Winter Harbor Yacht Club, Winter Harbor, Maine
Winthrop Yacht Club, Winthrop Beach, Mass.
Wollaston Yacht Club, Foot of Beach St., Wollaston, Mass.

FISH and WILDLIFE SERVICE.—Enforcement agents:
Portland, Me., 310 Federal Building
Jonesboro, Me.
Plymouth, Mass., 205 Federal Building
Fish Cultural Stations:
Boothbay Harbor, Me.
Gloucester, Mass.
National Wildlife Refuges:
Moosehorn, Me.
Widows Island, Me.
Parker River, Mass.

Commercial Broadcasting Stations Along the Coast

Frequency	Call	City	Position of Antenna	Power	Hours of Operation
			Canada		
550	CFNB	Fredricton, N. B.	45°53′.8 N., 66°41′.0 W.	5 kw.	
930	CFBC	St. Johns, N. B.	45°14′.3 N., 66°06′.2 W.	5 kw.	
1150	CHSJ	do.	45°18′.8 N., 66°00′.8 W.	5 kw.	
			Maine		
560	WGAN	Portland	43°41′.5 N., 70°19′.1 W.	5 kw.	0600–0005.
620	WLBZ	Bangor	44°49′.8 N., 68°47′.1 W.	5 kw.	
910	WABI	do.	44°46′.8 N., 68°44′.8 W.	5 kw.	
970	WCSH	Portland	43°36′.3 N., 70°19′.3 W.	5 kw.	0600–0005.
1230	WJOR	Bangor	44°49′.4 N., 68°45′.8 W.	250 w.	
1240	WCOU	Lewiston	44°05′.6 N., 70°11′.5 W.	250 w.	
1400	WIDE	Biddeford	43°30′.7 N., 70°27′.7 W.	250 w.	0615–2100.
1450	WGUY	Bangor	44°49′.1 N., 68°45′.1 W.	250 w.	
1450	WPOR	Portland	43°39′.9 N., 70°16′.2 W.	250 w.	0600–0100.
1470	WLAM	Lewiston	44°03′.8 N., 70°14′.9 W.	5 kw.	
1490	WTUL	Waterville	44°33′.8 N., 69°36′.7 W.	250 w.	
1490	WMTW	Portland	43°39′.5 N., 70°15′.3 W.	250 w.	0600–0100.
	WAG	Thomaston	44°01′.5 N., 69°13′.0 W.		
			New Hampshire		
750	WHEB	Portsmouth	43°03′.0 N., 70°46′.1 W.	1 kw.	0600 to 1 hour after sunset.
			Massachusetts		
590	WEEI	Boston	42°24′.3 N., 71°05′.3 W.	5 kw.	0530–0105.
850	WHDH	do.	42°16′.7 N., 71°16′.0 W.	50 kw.	0615–0105.
950	WORL	do.	42°17′.2 N., 71°15′.5 W.	1 kw.	
1030	*WBZ	do.	42°16′.7 N., 70°52′.5 W.	50 kw.	0530–0100.
1090	WBMS	do.	42°24′.7 N., 71°04′.5 W.	1 kw.	0700–sunset.
1150	WCOP	do.	42°24′.8 N., 71°12′.7 W.	5 kw.	
1230	WESX	Salem	42°31′.1 N., 70°51′.8 W.	250 w.	0700–2300.
1260	WNAC	Boston	42°16′.5 N., 71°02′.5 W.	5 kw.	0600–0100.
1300	WJDA	Quincy	42°15′.2 N., 70°57′.5 W.	1 kw.	Sunrise–sunset.
1360	WLYN	Lynn	42°27′.3 N., 70°58′.7 W.	500 w.	Varied.
1510	WMEX	Boston	42°16′.5 N., 71°01′.9 W.	5 kw.	0730–2400.

* Do not use for directional purposes. Station operates two separate transmitters synchronized.

Aircraft Radio Ranges

Frequency	Place	Identifier	Position of Antenna	Power
212	Pennfield Ridge, Canada	YP	45°06′.7 N., 66°45′.5 W.	150 w. or more.
215	Portland, Maine	PWM	43°40′.4 N., 70°20′.4 W.	50 w. or more.
233	Squantum, Mass.	NZW	42°15′.7 N., 70°58′.1 W.	50 w. or more.
239	Bangor, Maine	BGR	44°50′.7 N., 68°51′.0 W.	150 w. or more.
382	Boston, Mass.	BOS	42°23′.4 N., 70°59′.1 W.	150 w. or more.

892339°—51——25

WEATHER BUREAU.—Offices.—Barometers may be compared with standards at these offices.

Boston, Massachusetts, Weather Bureau Office, Post Office and Courthouse Building, Devonshire, Water, Congress, and Milk Streets.

Portland, Maine, Weather Bureau Office, Administration Building, Portland City Airport, 101 Westbrook Street.

Eastport, Maine, Weather Bureau Office, Post Office and Customhouse, Washington and Water Streets.

STORM WARNING DISPLAY STATIONS.—Stations marked with an asterisk (*) display signals both day and night.

Maine:
- *Eastport
- Machiasport
- Cross Island Coast Guard Station
- *Marshall Point Light
- *Boothbay Harbor
- *Portland Coast Guard Depot
- *Cape Elizabeth Coast Guard Station
- Southwest Harbor

New Hampshire:
- *Portsmouth Harbor Light

Massachusetts:
- *Straitsmouth Coast Guard Station
- *Tenpound Island Light
- *Marblehead
- Boston
- Boston Lightship
- Fort Revere
- *Cape Cod Light
- Nantucket Shoals Lightship
- *Provincetown
- *Cape Cod Canal Coast Guard Station
- *Wings Neck Light

Weather broadcasts by commercial radio stations.—The following table lists geographically the radio stations that have installed microphones in nearby Weather Bureau offices. From these offices forecasts and weather summaries are broadcast on regular schedule by Weather Bureau personnel.

City	Station	Frequency	Power
Portland, Me.	WPOR	1450	250.
Manchester, N. H.	WMUR	610	5,000 D–1,000 N.
Do.	WMUR-FM	95.7	
Boston, Mass.	WBMS	1090	1,000.
Do.	WBMS-FM	104.1	
Do.	WHDH	850	50,000.
Do.	WHDH-FM	94.5	
Chicopee, Mass.	WACE-FM	100.3	

Note: The installation and removal of microphones in Weather Bureau Offices is in cooperation with the radio stations concerned. Therefore, this list is subject to change without advance notice.

Radiotelephone broadcasts by United States Coast Guard.—Regular forecasts, including weather forecasts, local Notice to Mariners, and hydrographic information, are transmitted by radiophone in plain language on 2698 kc., preceded by a preliminary announcement on 2670 kc., as follows:

Boston, Mass.	NMF	1120	2320

Emergency broadcasts, including storm warnings, advisories, and urgent information, are transmitted immediately upon receipt and at 2-hour intervals thereafter on each odd hour for a period of six hours unless information is canceled or superseded.

All radiotelephone broadcasts will be made through once at good writing speed.

Hours of Operation of Fog Signals on Account of Fog and Snow

SIX-YEAR AVERAGES

Station	January	February	March	April	May	June	July	August	September	October	November	December	Total
West Quoddy Head	52	66	54	43	118	202	324	251	137	52	51	41	1,391
St. Croix River	12	22	17	16	32	59	75	67	47	17	9	14	387
Little River	66	79	72	51	111	184	275	233	122	57	52	54	1,356
Libby Islands	77	85	73	57	110	189	284	244	130	56	52	57	1,414
Nash Island	70	88	62	51	95	161	219	196	107	47	57	44	1,197
Petit Manan	82	92	76	61	145	136	229	203	115	57	56	69	1,321
Mount Desert	91	85	80	83	103	174	249	214	119	58	58	64	1,378
Egg Rock	57	80	51	44	76	154	189	180	89	44	45	45	1,054
Blue Hill Bay	52	61	56	42	58	121	179	166	79	41	47	36	938
Saddleback Ledge	41	51	38	45	69	128	189	161	86	34	31	29	902
Matinicus Rock	53	65	59	55	89	147	205	213	100	47	49	39	1,121
Whitehead	72	93	70	54	83	143	184	187	99	54	55	49	1,143
Fort Point	57	59	48	31	28	76	98	105	62	37	45	40	686
Manana Island fog signal	58	79	64	57	94	144	166	168	96	57	57	48	1,088
Perkins Island	30	34	29	18	30	55	62	85	39	32	30	27	471
Seguin	82	109	78	51	89	129	149	173	93	65	64	67	1,149
Halfway Rock	88	112	76	50	80	121	126	158	85	62	77	76	1,111
Portland Lightship	86	107	71	60	93	129	105	89	70	55	88	76	1,029
Portland Head	74	98	71	45	68	94	121	125	67	46	64	67	940
Cape Neddick	46	56	34	27	40	73	88	85	31	29	33	36	578
Portsmouth Harbor	34	44	23	15	32	68	73	69	21	21	27	23	450
Isles of Shoals	81	95	73	54	76	101	109	119	51	45	56	61	921
Cape Ann	41	78	28	22	23	69	128	50	10	39	52	31	571
Bakers Island	34	52	7	14	9	37	88	30	5	22	51	15	364
Boston Lightship	134	151	100	59	26	122	171	71	34	59	104	114	1,145
The Graves	73	110	24	22	8	63	94	35	8	43	50	52	582
Boston Light	66	115	26	22	8	69	106	34	18	46	58	55	623
Plymouth (Gurnet)	15	64	1	8	5	63	126	44	----	18	51	28	423
Race Point	43	66	16	24	35	86	151	49	7	33	72	36	618
Cape Cod Light	70	83	31	59	29	101	165	100	9	33	109	58	847
Pollock Rip Lightship	85	78	56	49	84	200	351	199	47	53	128	64	1,394
Great Round Shoal Lightship	54	85	50	39	72	139	234	129	22	50	128	57	1,059
Nantucket Shoals Lightship	72	77	64	44	94	232	290	178	52	46	111	28	1,288

892339°—51——26

Meteorological Tables

COMPILED BY THE UNITED STATES WEATHER BUREAU

Eastport, Me.—Position: Latitude 44°54′ N., Longitude 66°59′ W.—Altitude: 76 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Wind																	
		Extremes		Mean			Extremes					Amount (inches)									Direction (percentage of observations)																Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm	Mean	Maximum [4]
January	29.99	31.05	28.63	20.9	28.8	13.1	58	−20	74	66	44	3.58	3.02	16.3	14	10	2	*	29	3	11	--	7	--	4	--	4	--	7	--	17	--	26	--	24	--	#	11.1	52 NE.
February	29.97	31.04	28.35	21.4	28.7	14.1	52	−23	73	62	50	3.17	3.06	17.8	12	10	2	*	27	2	12	--	9	--	6	--	4	--	8	--	12	--	24	--	25	--	#	10.9	49 E.
March	29.94	31.05	28.61	29.9	36.5	23.3	76	−8	72	63	51	3.67	3.18	12.9	14	8	3	*	25	3	11	--	9	--	7	--	5	--	18	--	12	--	18	--	20	--	#	10.5	49 E.
April	29.96	30.76	28.99	38.9	45.3	32.4	81	2	74	64	53	2.83	2.75	6.8	12	4	4	*	13	1	11	--	10	--	10	--	4	--	21	--	12	--	15	--	17	--	#	10.0	43 E.
May	29.96	30.67	29.01	47.8	55.1	40.5	90	26	76	67	50	2.96	5.48	0.2	12	*	7	1	1	0	9	--	12	--	10	--	5	--	30	--	11	--	9	--	14	--	#	8.5	40 E.
June	29.94	30.52	29.10	55.1	63.3	46.9	92	30	79	65	54	3.05	3.30	0	12	0	9	3	*	0	4	--	10	--	6	--	4	--	38	--	14	--	11	--	12	--	1	7.6	43 NE.
July	29.95	30.46	29.11	60.4	68.9	52.0	93	45	82	63	55	3.14	5.24	0	12	0	13	4	0	0	5	--	8	--	5	--	2	--	45	--	15	--	10	--	9	--	1	6.9	37 E.
August	29.98	30.51	29.14	60.7	68.4	53.0	91	44	81	61	55	2.93	4.18	0	11	0	12	3	0	0	5	--	9	--	4	--	4	--	41	--	13	--	10	--	13	--	1	6.9	38 E.
September	30.05	30.71	28.93	56.1	62.8	49.2	92	30	80	60	55	3.04	3.66	0	11	0	7	1	*	0	9	--	7	--	5	--	3	--	30	--	16	--	12	--	17	--	1	7.6	41 E.
October	30.00	30.69	28.80	47.7	53.9	41.1	83	22	77	64	49	3.58	5.33	0.2	11	*	4	1	2	1	9	--	5	--	4	--	2	--	21	--	16	--	22	--	21	--	#	9.3	41 E.
November	30.01	30.85	28.70	37.3	43.1	31.2	67	−13	77	72	38	3.50	3.69	4.1	12	3	3	*	15	3	11	--	9	--	6	--	4	--	16	--	15	--	20	--	19	--	#	10.3	49 NE.
December	29.98	30.97	28.24	24.8	32.5	18.6	57	−23	75	70	38	3.46	3.74	12.2	14	8	1	*	26	3	9	--	5	--	6	--	5	--	7	--	13	--	29	--	26	--	#	10.9	52 NE.
Mean	29.98	------	------	41.7	48.9	34.6	--	------	76	65	49	------	------	------	------	--	--	--	------	--	9	--	8	--	6	--	4	--	24	--	14	--	17	--	18	--	--	9.2	------
Total	------	------	------	------	------	------	--	------	------	------	------	38.87	------	70.5	147	45	65	13	138	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	------	------
Extreme	------	31.05	28.24	------	------	------	93	−23	------	------	------	------	5.48	------	------	--	--	--	------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	------	52 NE.
Number Years Record	60	60	60	75	75	75	75	75	31–61	41	38	76	76	64	76	64	56	63	75	26	12	--	12	--	12	--	12	--	12	--	12	--	12	--	12	--	12	76	76

[1] Mean of 0700, 1300 and 1900.
[2] Visibility, ¼ mile or less.
[3] Winds ≧34 knots.
[4] Highest 5-minute velocity.
T Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 0.5.
# Less than ½ of 1 percent.

Portland, Me.—Position: Latitude 43°39′ N., Longitude 70°15′ W.—Altitude: 103 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Wind																		
		Extremes		Mean			Extremes					Amount (inches)									Direction (percentage of observations)																		Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm	Mean	Maximum [4]
January	30.03	31.02	28.64	23.0	30.7	15.4	65	−18	69	50	54	4.05	3.57	18.0	12	9	1	*	30	0	24	--	4	--	1	--	2	--	5	--	20	--	20	--	24	--	#	9.0	38 SW.
February	29.99	31.09	28.65	23.8	31.6	15.9	58	−18	67	47	59	3.89	3.06	20.2	11	8	1	*	27	0	25	--	7	--	4	--	4	--	7	--	13	--	17	--	23	--	#	9.2	42 SE.
March	29.97	30.98	28.63	32.6	39.6	25.5	79	−7	66	49	59	4.05	3.67	12.2	13	7	2	*	24	0	16	--	7	--	6	--	5	--	13	--	14	--	16	--	23	--	#	9.7	41 SE.
April	29.97	30.72	28.77	42.6	50.3	35.4	89	9	64	50	57	3.48	3.82	4.6	11	3	2	*	9	0	15	--	8	--	8	--	7	--	14	--	12	--	15	--	21	--	#	9.5	38 SE.
May	29.96	30.65	29.14	53.4	61.3	45.5	96	27	66	51	59	3.29	4.86	T	12	0	3	2	*	0	12	--	9	--	12	--	10	--	19	--	12	--	12	--	14	--	#	8.7	40 NW.
June	29.95	30.58	29.18	62.5	70.8	54.2	96	38	68	50	61	3.28	4.96	0	12	0	3	3	0	0	7	--	5	--	12	--	8	--	22	--	15	--	15	--	16	--	#	7.8	30 NW.
July	29.95	30.48	29.17	68.1	76.3	60.2	103	48	71	46	65	3.26	4.25	0	12	0	4	4	0	0	9	--	5	--	11	--	7	--	24	--	17	--	15	--	11	--	1	7.5	35 W.
August	30.00	30.51	29.35	66.6	74.2	59.0	98	44	72	44	65	3.15	2.47	0	11	0	3	3	0	0	10	--	5	--	11	--	9	--	22	--	14	--	13	--	15	--	1	7.1	33 SE.
September	30.06	30.66	29.00	59.9	67.6	52.2	96	32	73	42	61	3.19	5.28	T	10	0	3	2	*	0	14	--	6	--	8	--	7	--	19	--	16	--	14	--	15	--	1	7.7	38 S.
October	30.04	30.72	29.88	49.8	57.3	42.4	85	22	70	46	57	3.21	3.93	T	10	*	3	0.5	2	0	17	--	5	--	6	--	4	--	15	--	16	--	18	--	19	--	#	8.5	36 S.
November	30.01	30.89	28.49	38.6	45.4	31.9	74	−6	70	50	48	3.51	3.76	4.1	11	3	2	*	16	0	21	--	6	--	4	--	4	--	11	--	19	--	18	--	17	--	#	9.2	42 S.
December	30.01	30.97	28.40	27.4	34.3	20.6	65	−21	69	50	51	3.84	2.69	11.5	12	7	1	*	27	0	24	--	5	--	2	--	2	--	4	--	18	--	22	--	23	--	#	8.9	42 SE.
Mean	30.01	------	------	45.9	53.6	38.2	---	----	69	60	58	------	------	------	----	--	--	--	----	--	16	--	6	--	7	--	6	--	14	--	16	--	16	--	18	--	--	8.6	--------
Total	------	------	------	------	------	------	----	----	------	----	----	42.16	------	70.6	137	37	28	15	135	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----	--------
Extreme	------	31.09	28.40	------	------	------	103	−21	------	----	----	------	5.28	------	----	--	--	----	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----	42 SE
Number Years Record	49	77	77	67	67	67	70	70	25–55	72	51	73	73	62	73	63	73	21	68	52	12	--	12	--	12	--	12	--	12	--	12	--	12	--	12	--	--	72	72

[1] Mean of 0730, 1200 and 1930.
[2] Visibility, ¼ mile or less.
[3] Winds ≧34 knots.
[4] Highest 5-minute velocity.
T Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 0.5.
# Less than ½ of 1 percent.

Boston, Mass.—Position: Latitude 42°21′ N., Longitude 71°04′ W.—Altitude: 125 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Wind																		
		Extremes		Mean			Extremes					Amount (inches)									Direction (percentage of observations)																	Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm	Mean	Maximum [4]
January	30.05	31.00	28.67	28.5	36.2	20.8	70	−13	67	57	48	3.57	3.25	12.1	12	6	1	*	26	1	9	--	3	--	4	--	4	--	6	--	24	--	29	--	21	--	0	10.8	57 SW.
February	30.01	31.03	28.69	28.5	36.5	20.5	68	−18	63	56	56	3.22	4.45	12.5	10	6	1	*	24	1	10	--	6	--	6	--	4	--	7	--	17	--	26	--	23	--	0	11.0	59 W.
March	29.97	31.02	28.45	36.6	44.3	28.9	86	−8	64	52	58	3.72	3.04	7.2	12	4	1	1	19	1	7	--	6	--	9	--	5	--	9	--	18	--	25	--	21	--	0	11.2	63 E.
April	29.97	30.72	28.86	46.6	54.6	38.6	89	11	63	53	57	3.49	3.19	1.9	11	1	1	1	4	*	8	--	8	--	13	--	5	--	8	--	17	--	22	--	19	--	0	10.5	47 W.
May	29.97	30.63	29.11	57.5	66.1	48.9	97	31	68	55	59	3.17	3.31	T	11	0	1	2	*	0	7	--	8	--	18	--	5	--	10	--	19	--	19	--	14	--	0	9.7	43 W.
June	29.95	30.57	29.26	66.6	75.4	57.9	100	41	69	54	62	3.19	5.35	0.0	10	0	1	4	0	*	5	--	5	--	13	--	6	--	11	--	25	--	23	--	12	--	0	9.3	42 W.
July	29.96	30.51	29.21	72.0	80.6	63.4	104	50	70	55	63	3.31	6.04	0.0	10	0	2	5	0	0	6	--	6	--	15	--	6	--	9	--	30	--	18	--	10	--	0	8.9	42 W.
August	30.00	30.48	29.26	70.4	78.3	62.4	101	46	71	51	63	3.59	4.99	0.0	10	0	1	4	0	0	7	--	7	--	14	--	6	--	9	--	26	--	17	--	14	--	0	8.6	45 NE.
September	30.06	30.65	26.62	63.8	71.3	55.8	102	34	72	51	61	3.15	5.63	0.0	9	0	2	2	0	*	9	--	7	--	13	--	6	--	9	--	24	--	17	--	15	--	0	9.1	76 S.
October	30.02	30.76	28.97	53.5	61.9	45.1	90	25	68	52	58	3.22	4.92	T	9	0	2	*	1	*	7	--	6	--	7	--	4	--	9	--	21	--	25	--	21	--	0	9.7	52 S.
November	30.04	30.87	28.73	42.9	50.2	35.6	78	−2	68	60	48	3.65	5.48	1.6	10	1	1	*	9	*	8	--	5	--	6	--	6	--	8	--	23	--	26	--	18	--	0	10.4	59 NE.
December	30.02	30.96	28.49	32.2	39.2	25.2	69	−17	66	60	48	3.34	3.36	7.7	11	5	1	*	22	1	8	--	5	--	4	--	4	--	5	--	13	--	33	--	23	--	0	10.6	52 NE.
Mean	30.01	------	------	49.9	57.9	41.9	----	----	68	55	57	----	----	----	----	----	----	----	----	----	8	--	6	--	10	--	5	--	8	--	22	--	23	--	18	--	0	11.5	------
Total	------	------	------	----	----	----	----	----	----	----	----	40.62	----	43.0	125	23	15	19	105	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----	------
Extreme	------	31.03	26.62	----	----	----	104	−18	----	----	----	----	6.04	----	----	--	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----	76 S.
Number Years Record	76	76	76	78	78	78	78	78	12–59	10	57	79	79	79	78	58	58	58	78	20	10	--	10	--	10	--	10	--	10	--	10	--	10	--	10	--	10	----	------

[1] Mean of 0130, 0730, 1330, 1930.
[2] Visibility, ¼ mile or less.
[3] Winds ≧34 knots.
[4] Highest 5-minute velocity.
T Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 0.5.

Ocean Area 1.—Position: Latitude 40°–45° N., Longitude 65°–70° W., Greenwich Noon Observations—Years Covered: 1879–1933

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from— N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Weather: Percentages of observations recording— Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy Squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (percent)	Average air temperature	Average sea surface temperature
January	8,221	16.0	12	9	6	5	8	13	24	22	1	3	3	3	1	7	9	2	0	7	1	8	4	70	39.3	43.7
February	7,198	16.5	13	9	7	6	7	9	26	22	1	4	3	3	1	7	13	2	0	8	1	9	4	69	37.4	42.1
March	8,107	15.0	14	10	7	7	9	11	21	20	1	4	3	5	2	6	5	2	0	4	0	6	5	65	40.3	42.2
April	8,399	12.0	14	9	8	7	11	14	19	16	2	7	3	10	2	6	1	2	0	2	0	3	5	55	45.1	44.3
May	8,579	9.3	12	10	9	8	15	18	13	11	4	10	5	18	1	5	0	1	0	1	0	1	5	56	52.0	49.7
June	8,430	8.4	9	9	7	9	15	23	14	9	5	10	5	22	1	5	0	2	1	1	0	0	4	54	59.6	57.0
July	8,949	7.6	7	7	5	7	18	28	14	8	6	11	5	22	1	5	0	2	1	1	0	0	3	55	65.8	63.2
August	9,498	7.6	10	11	7	7	14	22	14	9	6	9	5	15	1	5	0	2	1	1	0	1	4	53	67.3	65.6
September	9,418	9.3	15	14	8	7	11	15	13	12	5	6	3	8	1	5	0	2	1	2	0	1	6	50	64.3	63.9
October	9,556	12.5	14	13	8	7	9	13	17	17	2	5	3	4	1	6	0	2	1	4	0	4	7	56	57.3	58.9
November	8,839	14.5	14	10	6	6	8	14	21	20	1	4	3	2	2	7	1	3	0	6	0	5	6	66	49.5	53.2
December	8,151	15.5	11	8	6	5	7	13	26	28	1	3	2	2	2	7	6	2	0	7	0	7	5	69	42.9	47.7
Means		12.0	12	10	7	7	11	16	18	16	3	6	4	10	1	6	3	2	*	4	*	4	5	60	51.2	52.6
Totals	103,345																									

Compiled by the U. S. Weather Bureau.

* Less than 0.5 percent.

Ocean Area 2.—Position: Latitude 40°–45° N., Longitude 70°–75° W., Greenwich Noon Observations—Years Covered: 1878–1933

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from— N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Weather: Percentages of observations recording— Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy Squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (percent)	Average air temperature	Average sea surface temperature
January	3,060	14.5	13	10	6	6	7	12	23	22	1	7	4	4	1	6	7	1	0	4	0	6	5	64	38.2	43.0
February	2,779	15.0	13	11	6	6	6	10	23	24	1	7	3	4	2	6	8	1	0	4	0	7	5	61	36.9	40.4
March	3,159	13.5	14	10	7	7	10	10	20	20	2	8	4	9	2	5	5	1	0	3	0	5	6	57	39.7	40.4
April	3,368	10.6	12	11	6	7	12	15	18	16	3	9	5	10	1	5	1	1	0	1	0	2	6	53	45.2	43.3
May	3,722	8.0	12	11	9	7	14	18	14	10	5	12	6	17	2	5	0	1	1	1	0	1	5	55	53.2	50.2
June	3,612	7.2	11	10	7	6	14	22	14	9	7	15	6	17	1	3	0	1	0	1	0	0	4	51	62.1	58.9
July	3,788	7.2	9	8	5	6	17	26	14	9	6	14	6	13	1	3	0	2	1	1	0	0	3	52	68.7	66.0
August	3,820	7.6	11	13	7	7	13	20	13	11	5	11	7	6	1	4	0	1	1	1	0	1	5	51	69.7	68.7
September	3,743	8.4	14	15	9	6	12	16	12	12	4	9	6	5	1	4	0	1	1	1	0	1	6	49	65.7	65.8
October	3,811	12.0	16	15	7	6	9	13	15	17	2	7	4	4	2	7	0	1	0	3	0	3	6	53	57.3	59.0
November	3,212	13.0	13	9	6	6	10	14	21	20	1	6	4	3	2	6	1	1	0	3	0	5	5	58	49.4	53.2
December	2,955	14.5	13	8	5	4	6	12	28	23	1	5	4	3	1	6	4	1	0	4	0	5	6	63	41.8	47.3
Means		11.0	12	11	7	6	11	16	18	16	3	9	5	8	1	5	2	1	*	2	0	3	5	56	52.3	53.0
Totals	41,029																									

Compiled by the U. S. Weather Bureau.

* Less than 0.5 percent.

Conversion Tables

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0. 00	0. 30	0. 61	0. 91	1. 22	1. 52	1. 83	2. 13	2. 44	2. 74
10	3. 05	3. 35	3. 66	3. 96	4. 27	4. 57	4. 88	5. 18	5. 49	5. 79
20	6. 10	6. 40	6. 71	7. 01	7. 32	7. 62	7. 92	8. 23	8. 53	8. 84
30	9. 14	9. 45	9. 75	10. 06	10. 36	10. 67	10. 97	11. 28	11. 58	11. 89
40	12. 19	12. 50	12. 80	13. 11	13. 41	13. 72	14. 02	14. 33	14. 63	14. 93
50	15. 24	15. 54	15. 85	16. 15	16. 46	16. 76	17. 07	17. 37	17. 68	17. 98
60	18. 29	18. 59	18. 90	19. 20	19. 51	19. 81	20. 12	20. 42	20. 73	21. 03
70	21. 34	21. 64	21. 95	22. 25	22. 55	22. 86	23. 16	23. 47	23. 77	24. 08
80	24. 38	24. 69	24. 99	25. 30	25. 60	25. 91	26. 21	26. 52	26. 82	27. 13
90	27. 43	27. 74	28. 04	28. 35	28. 65	28. 96	29. 26	29. 57	29. 87	30. 17

FATHOMS TO METERS

Fathoms	0	1	2	3	4	5	6	7	8	9
0	0. 00	1. 83	3. 66	5. 49	7. 32	9. 14	10. 97	12. 80	14. 63	16. 46
10	18. 29	20. 12	21. 95	23. 77	25. 60	27. 43	29. 26	31. 09	32. 92	34. 75
20	36. 58	38. 40	40. 23	42. 06	43. 89	45. 72	47. 55	49. 38	51. 21	53. 03
30	54. 86	56. 69	59. 52	60. 35	62. 18	64. 01	65. 84	67. 67	69. 49	71. 32
40	73. 15	74. 98	76. 81	78. 64	80. 47	82. 30	84. 12	85. 95	87. 78	89. 61
50	91. 44	93. 27	95. 10	96. 93	98. 75	100. 58	102. 41	104. 24	106. 07	107. 90
60	109. 73	111. 56	113. 39	115. 21	117. 04	118. 87	120. 70	122. 53	124. 36	126. 19
70	128. 02	129. 85	131. 67	133. 50	135. 33	137. 16	138. 99	140. 82	142. 65	144. 47
80	146. 30	148. 13	149. 96	151. 79	153. 62	155. 45	157. 28	159. 11	160. 93	162. 76
90	164. 59	166. 42	168. 25	170. 08	171. 91	173. 74	175. 56	177. 39	179. 22	181. 05

NAUTICAL MILES TO STATUTE MILES

1 nautical mile=6,080.20 feet. 1 statute mile=5,280 feet.

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0. 000	1. 152	2. 303	3. 455	4. 606	5. 758	6. 909	8. 061	9. 212	10. 364
10	11. 515	12. 667	13. 819	14. 970	16. 122	17. 273	18. 425	19. 576	20. 728	21. 880
20	23. 031	24. 183	25. 334	26. 486	27. 637	28. 789	29. 940	31. 092	32. 243	33. 395
30	34. 547	35. 698	36. 850	38. 001	39. 153	40. 304	41. 456	42. 607	43. 759	44. 911
40	46. 062	47. 214	48. 365	49. 517	50. 668	51. 820	52. 971	54. 123	55. 275	56. 426
50	57. 578	58. 729	59. 881	61. 032	62. 184	63. 335	64. 487	65. 639	66. 790	67. 942
60	69. 093	70. 245	71. 396	72. 548	73. 699	74. 851	76. 003	77. 154	78. 306	79. 457
70	80. 609	81. 760	82. 912	84. 063	85. 215	86. 366	87. 518	88. 670	89. 821	90. 973
80	92. 124	93. 276	94. 427	95. 579	96. 730	97. 882	99. 034	100. 185	101. 337	102. 488
90	103. 640	104. 791	105. 942	107. 094	108. 246	109. 397	110. 549	111. 701	112. 852	114. 004

STATUTE MILES TO NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0. 000	0. 868	1. 737	2. 605	3. 474	4. 342	5. 210	6. 079	6. 947	7. 816
10	8. 684	9. 552	10. 421	11. 289	12. 158	13. 026	13. 894	14. 763	15. 631	16. 500
20	17. 368	18. 236	19. 105	19. 973	20. 842	21. 710	22. 578	23. 447	24. 315	25. 184
30	26. 052	26. 920	27. 789	28. 657	29. 526	30. 394	31. 262	32. 131	32. 999	33. 868
40	34. 736	35. 604	36. 473	37. 341	38. 210	39. 078	39. 946	40. 815	41. 683	42. 552
50	43. 420	44. 288	45. 157	46. 025	46. 894	47. 762	48. 630	49. 499	50. 367	51. 236
60	52. 104	52. 972	53. 841	54. 709	55. 578	56. 446	57. 314	58. 183	59. 051	59. 920
70	60. 787	61. 655	62. 524	63. 392	64. 261	65. 129	65. 997	66. 866	67. 734	68. 603
80	69. 471	70. 339	71. 208	72. 076	72. 945	73. 813	74. 681	75. 550	76. 418	77. 287
90	78. 155	79. 023	79. 892	80. 760	81. 629	82. 497	83. 365	84. 234	85. 102	85. 971

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Number in parentheses immediately following any item in this Index is number of the largest scale United States Coast and Geodetic Survey Chart on which that feature appears.

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Conversion Table, Degrees to Points and Vice Versa

° ′	Points	° ′	Points	° ′	Points	° ′	Points
0 00	N	90 00	E	180 00	S	270 00	W
1 24		91 24		181 24		271 24	
2 49	N ¼ E	92 49	E ¼ S	182 49	S ¼ W	272 49	W ¼ N
4 13		94 13		184 13		274 13	
5 38	N ½ E	95 38	E ½ S	185 38	S ½ W	275 38	W ½ N
7 02		97 02		187 02		277 02	
8 26	N ¾ E	98 26	E ¾ S	188 26	S ¾ W	278 26	W ¾ N
9 51		99 51		189 51		279 51	
11 15	N x E	101 15	E x S	191 15	S x W	281 15	W x N
12 39		102 39		192 39		282 39	
14 04	N x E ¼ E	104 04	ESE ¾ E	194 04	S x W ¼ W	284 04	WNW ¾ W
15 28		105 28		195 28		285 28	
16 53	N x E ½ E	106 53	ESE ½ E	196 53	S x W ½ W	286 53	WNW ½ W
18 17		108 17		198 17		288 17	
19 41	N x E ¾ E	109 41	ESE ¼ E	199 41	S x W ¾ W	289 41	WNW ¼ W
21 06		111 06		201 06		291 06	
22 30	NNE	112 30	ESE	202 30	SSW	292 30	WNW
23 54		113 54		203 54		293 54	
25 19	NNE ¼ E	115 19	SE x E ¾ E	205 19	SSW ¼ W	295 19	NW x W ¾ W
26 43		116 43		206 43		296 43	
28 08	NNE ½ E	118 08	SE x E ½ E	208 08	SSW ½ W	298 08	NW x W ½ W
29 32		119 32		209 32		299 32	
30 56	NNE ¾ E	120 56	SE x E ¼ E	210 56	SSW ¾ W	300 56	NW x W ¼ W
32 21		122 21		212 21		302 21	
33 45	NE x N	123 45	SE x E	213 45	SW x S	303 45	NW x W
35 09		125 09		215 09		305 09	
36 34	NE ¾ N	126 34	SE ¾ E	216 34	SW ¾ S	306 34	NW ¾ W
37 58		127 58		217 58		307 58	
39 23	NE ½ N	129 23	SE ½ E	219 23	SW ½ S	309 23	NW ½ W
40 47		130 47		220 47		310 47	
42 11	NE ¼ N	132 11	SE ¼ E	222 11	SW ¼ S	312 11	NW ¼ W
43 36		133 36		223 36		313 36	
45 00	NE	135 00	SE	225 00	SW	315 00	NW
46 24		136 24		226 24		316 24	
47 49	NE ¼ E	137 49	SE ¼ S	227 49	SW ¼ W	317 49	NW ¼ N
49 13		139 13		229 13		319 13	
50 38	NE ½ E	140 38	SE ½ S	230 38	SW ½ W	320 38	NW ½ N
52 02		142 02		232 02		322 02	
53 26	NE ¾ E	143 26	SE ¾ S	233 26	SW ¾ W	323 26	NW ¾ N
54 51		144 51		234 51		324 51	
56 15	NE x E	146 15	SE x S	236 15	SW x W	326 15	NW x N
57 39		147 39		237 39		327 39	
59 04	NE x E ¼ E	149 04	SSE ¾ E	239 04	SW x W ¼ W	329 04	NNW ¾ W
60 28		150 28		240 28		330 28	
61 53	NE x E ½ E	151 53	SSE ½ E	241 53	SW x W ½ W	331 53	NNW ½ W
63 17		153 17		243 17		333 17	
64 41	NE x E ¾ E	154 41	SSE ¼ E	244 41	SW x W ¾ W	334 41	NNW ¼ W
66 06		156 06		246 06		336 06	
67 30	ENE	157 30	SSE	247 30	WSW	337 30	NNW
68 54		158 54		248 54		338 54	
70 19	ENE ¼ E	160 19	S x E ¾ E	250 19	WSW ¼ W	340 19	N x W ¾ W
71 43		161 43		251 43		341 43	
73 08	ENE ½ E	163 08	S x E ½ E	253 08	WSW ½ W	343 08	N x W ½ W
74 32		164 32		254 32		344 32	
75 56	ENE ¾ E	165 56	S x E ¼ E	255 56	WSW ¾ W	345 56	N x W ¼ W
77 21		167 21		257 21		347 21	
78 45	E x N	168 45	S x E	258 45	W x S	348 45	N x W
80 09		170 09		260 09		350 09	
81 34	E ¾ N	171 34	S ¾ E	261 34	W ¾ S	351 34	N ¾ W
82 58		172 58		262 58		352 58	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ S	354 23	N ½ W
85 47		175 47		265 47		355 47	
87 11	E ¼ N	177 11	S ¼ E	267 11	W ¼ S	357 11	N ¼ W
88 36		178 36		268 36		358 36	

Distance of Visibility of Objects at Sea

The table following gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Statute miles	Height, feet	Nautical miles	Statute miles	Height, feet	Nautical miles	Statute miles
1	1. 1	1. 3	100	11. 5	13. 2	760	31. 6	36. 4
2	1. 7	1. 9	105	11. 7	13. 5	780	32. 0	36. 9
3	2. 0	2. 3	110	12. 0	13. 8	800	32. 4	37. 3
4	2. 3	2. 6	115	12. 3	14. 1	820	32. 8	37. 8
5	2. 5	2. 9	120	12. 6	14. 5	840	33. 2	38. 3
6	2. 8	3. 2	125	12. 9	14. 8	860	33. 6	38. 7
7	2. 9	3. 5	130	13. 1	15. 1	880	34. 0	39. 2
8	3. 1	3. 7	135	13. 3	15. 3	900	34. 4	39. 6
9	3. 5	4. 0	140	13. 6	15. 6	920	34. 7	40. 0
10	3. 6	4. 2	145	13. 8	15. 9	940	35. 2	40. 5
11	3. 8	4. 4	150	14. 1	16. 2	960	35. 5	40. 9
12	4. 0	4. 6	160	14. 5	16. 7	980	35. 9	41. 3
13	4. 2	4. 8	170	14. 9	17. 2	1, 000	36. 2	41. 7
14	4. 3	4. 9	180	15. 4	17. 7	1, 100	38. 0	43. 8
15	4. 4	5. 1	190	15. 8	18. 2	1, 200	39. 6	45. 6
16	4. 6	5. 3	200	16. 2	18. 7	1, 300	41. 3	47. 6
17	4. 7	5. 4	210	16. 6	19. 1	1, 400	42. 9	49. 4
18	4. 9	5. 6	220	17. 0	19. 6	1, 500	44. 4	51. 1
19	5. 0	5. 8	230	17. 4	20. 0	1, 600	45. 8	52. 8
20	5. 1	5. 9	240	17. 7	20. 4	1, 700	47. 2	54. 4
21	5. 3	6. 1	250	18. 2	20. 9	1, 800	48. 6	56. 0
22	5. 4	6. 2	260	18. 5	21. 3	1, 900	49. 9	57. 5
23	5. 5	6. 3	270	18. 9	21. 7	2, 000	51. 2	59. 0
24	5. 6	6. 5	280	19. 2	22. 1	2, 100	52. 5	60. 5
25	5. 7	6. 6	290	19. 6	22. 5	2, 200	53. 8	61. 9
26	5. 8	6. 7	300	19. 9	22. 9	2, 300	55. 0	63. 3
27	6. 0	6. 9	310	20. 1	23. 2	2, 400	56. 2	64. 7
28	6. 1	7. 0	320	20. 5	23. 6	2, 500	57. 3	66. 0
29	6. 2	7. 1	330	20. 8	24. 0	2, 600	58. 5	67. 3
30	6. 3	7. 2	340	21. 1	24. 3	2, 700	59. 6	68. 6
31	6. 4	7. 3	350	21. 5	24. 7	2, 800	60. 6	69. 8
32	6. 5	7. 5	360	21. 7	25. 0	2, 900	61. 8	71. 1
33	6. 6	7. 6	370	22. 1	25. 4	3, 000	62. 8	72. 3
34	6. 7	7. 7	380	22. 3	25. 7	3, 100	63. 8	73. 5
35	6. 8	7. 8	390	22. 7	26. 1	3, 200	64. 9	74. 7
36	6. 9	7. 9	400	22. 9	26. 4	3, 300	65. 9	75. 9
37	6. 9	8. 0	410	23. 2	26. 7	3, 400	66. 9	77. 0
38	7. 0	8. 1	420	23. 5	27. 1	3, 500	67. 8	78. 1
39	7. 1	8. 2	430	23. 8	27. 4	3, 600	68. 6	79. 2
40	7. 2	8. 3	440	24. 1	27. 7	3, 700	69. 7	80. 3
41	7. 3	8. 4	450	24. 3	28. 0	3, 800	70. 7	81. 4
42	7. 4	8. 5	460	24. 6	28. 3	3, 900	71. 6	82. 4
43	7. 5	8. 7	470	24. 8	28. 6	4, 000	72. 5	83. 5
44	7. 6	8. 8	480	25. 1	28. 9	4, 100	72. 4	84. 5
45	7. 7	8. 9	490	25. 4	29. 2	4, 200	74. 3	85. 6
46	7. 8	9. 0	500	25. 6	29. 5	4, 300	75. 2	86. 6
47	7. 9	9. 0	520	26. 1	30. 1	4, 400	76. 1	87. 6
48	7. 9	9. 1	540	26. 7	30. 7	4, 500	76. 9	88. 5
49	8. 0	9. 2	560	27. 1	31. 2	4, 600	77. 7	89. 5
50	8. 1	9. 3	580	27. 6	31. 8	4, 700	78. 6	90. 5
55	8. 5	9. 8	600	28. 0	32. 3	4, 800	79. 4	91. 4
60	8. 9	10. 2	620	28. 6	32. 9	4, 900	80. 2	92. 4
65	9. 2	10. 6	640	29. 0	33. 4	5, 000	81. 0	93. 3
70	9. 6	11. 0	660	29. 4	33. 9	6, 000	88. 8	102. 2
75	9. 9	11. 4	680	29. 9	34. 4	7, 000	96. 0	110. 5
80	10. 3	11. 8	700	30. 3	34. 9	8, 000	102. 6	118. 1
85	10. 6	12. 2	720	30. 7	35. 4	9, 000	108. 7	125. 2
90	10. 9	12. 5	740	31. 1	35. 9	10, 000	114. 6	132. 0
95	11. 2	12. 9						