



Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.

SECTOR 5 — CHART INFORMATION

SECTOR 5

AUSTRALIA—NORTH POINT (SYDNEY HARBOR) TO CAPE TOWNSHEND

Plan.—This sector describes the E coast of Australia from the N entrance point of Sydney Harbor to Cape Townshend, including the off-lying islands and dangers as far E as Norfolk Island. These islands and dangers are described first and are arranged from E to W and from S to N. The arrangement of the coastal description is N from Sydney Harbor.

General Remarks

5.1 From North Point, on the N side of the entrance of Sydney Harbor, the E coast of Australia trends about 104 miles NE to Sugarloaf Point and then about 95 miles NNE to Smoky Cape. It then trends more to the N for about 141 miles to Cape Byron, the easternmost point of Australia. From Cape Byron the coast trends N and NNW for about 238 miles to Sandy Cape.

Between Sandy Cape and South Head, about 47 miles W, Hervey Bay indents the coast about 33 miles to the S. From South Head the coast trends about 187 miles NW to Cape Townshend, with Cape Capricorn lying a little more than half-way between. Bustard Head lies about 56 miles NW of South Head.

A number of bays and bights indent the coast and numerous rivers discharge from it. Much of this coast is low and sandy; however there are numerous headlands and in the vicinity of Cape Townshend the coast becomes high and rugged.

Newcastle and Brisbane are the important ports on this coast, but vessels call at Port Stephens, Coffs Harbor, Clarence River, Richmond River, Maryborough, Port Curtis for Gladstone, and Rockhampton. Vessels also call at Bundaberg.

Norfolk Island is the easternmost of a number of off-lying islands and dangers located between about 210 and 790 miles E of the coast described in this sector. Lord Howe Island and dangers S and to the W of it are the southwesternmost of these dangers. Kelso Bank is the northwesternmost of these dangers.

The principal headlands and harbors are well lighted. Visibility may be reduced by occasional fog in the fall and winter by haze which sometimes accompanies the SE trade winds and occurs most often in September and October, or by heavy rains.

Restricted areas.—The Commonwealth of Australia has established a system of regulated zones within the waters comprising the Great Barrier Reef.

These areas, established as the Great Barrier Reef Marine Park, are designed to control the movement of all vessels within specific size categories and geographic locations.

The limits of these areas, accompanied by amplifying information, are seen on the appropriate chart.

Information relating to the Australian Maritime Rescue Coordination Center (MRCC), Search and Rescue (SAR), and the Australian Ship Reporting System (AUSREP) may be found in Pub.120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia.

Fishing.—Commercial and recreational fishing vessels operate along the E coast throughout the year, especially between

Newcastle and the Evans River (29°08'S., 153°28'E). Trawler fleets operate and are dominant, especially off the coast of New South Wales.

Winds—Weather.—The climate of this region is quite warm, and because of the anticyclonic storms in summer and thendepressions over the ocean during the winter, wind and weather are variable.

Offshore and S of 30°S, the winds tend to be from the SW from June to August and from the E from January to March. There is no predominating wind direction in any season. Gales are most frequent from May to September, during which time they occur on an average of about 6 days per month.

Offshore between 25°S and 30°S the winds are variable, but from December to May, the Southeast Trade Winds predominate. West of 155°E, these trade winds are not well developed until March and in May the wind tends to be from between the SE and SW. In June, they tend to be S to SW. Gales are most frequent from February to July, during which time they occur about 3 days per month.

On the coast, land and sea breezes are well developed with the sea breeze most prevalent in summer and early fall, when it is strengthened by the Southeast Trade Winds. In the vicinity of Brisbane and further S, the sea breeze is NE, usually occurring between 1300 and 1900. The land breeze is prevalent in winter, with its direction influenced by the coastal mountains.

When W winds prevail at sea, strong squalls from the highlands may be expected on the coast.

Black Northeasters, strong NE winds which may be encountered on the coast and at sea, are associated with a steep pressure gradient between an anticyclone over the Tasman Sea and a monsoonal low pressure over New South Wales. They are sometimes accompanied by dense clouds, heavy rain squalls, and occasionally by thunder.

When Black Northeasters are reinforced on the coast by the NE sea breeze, a gale may result which usually reaches its maximum velocity by mid-afternoon. These winds are sometimes persistent before a Southerly Buster.

Southerly Busters, heavy rain squalls with gusts of 17 to 35 knots, are particularly violent on the coast of New South Wales S of Port Macquarie.

The Southeast Trade Winds prevail throughout the year off this part of the coast. Southwest winds occur 4 to 5 days a month from May to July; NW or N winds occur about 6 to 7 days a month from September to December. The wind is usually moderate, but attains force 7 or more about 20 or 30 days a year. Brief squalls, sometimes of gale force, are fairly frequent with the Southeast Trades.

Land and sea breezes, strengthened by the trade winds, are often strong in the afternoon and may cause a considerable sea. At such times, the wind often shifts to NE.

Tropical cyclones, called Queensland Hurricanes, occur about 4 or 5 times a year. They are most frequent from December to April, but have occurred in every month except August.

Fog is almost unknown 20 miles or more off the coast, and visibility is good except during heavy rain. At times, there may be some haze with the trade winds. Along the coast, fog or mist sometimes develops at night, but usually disperses soon after sunrise. Such fogs occur 2 or 3 times a month from May to September and sometimes in other months.

Storm warnings and weather information are broadcast by radio.

Tides—Currents.—The East Australian Coast Current originates in the sea area E of Swain Reefs and flows S along the Australian coast as far as Cape Howe. It occupies a broad belt that extends 20 to 60 miles offshore and has a rate that varies from about 0.5 knot to more than 3 knots. Its greatest strength is found near the 200m curve, which varies in position from about 10 to 30 miles offshore and near which, at 31°S, a rate of about 4.5 knots was observed. The strength of current is first felt in the vicinity of a position about 12 miles NE of Sandy Cape.

The set of this current, which is mainly between SE and SW, is not a very constant one. It is subject to interruptions throughout the year by sets in other directions, notably reverse sets, and there is also a considerable seasonal variation, both in the S and N flows.

Close inshore and in the bights, particularly N of Cape Moreton, there is a N countercurrent with a rate of 0.2 to 1 knot. In general, the strongest S set is found between 26°S and 32°S, particularly between 28°S and 30°S, where several observations of about 4 knots were recorded in the months of February to April. The current is apt to be strong off projecting points; off Danger Point, a S set of about 4 knots was observed.

Between Danger Point and Sydney Harbor, during the months of November to April, a considerable number of currents setting between SE and SW exceed the rate of 2 knots. From February to April, the number of S currents exceeding a rate of 2 knots increases to 12 per cent of all currents observed, and currents exceeding a rate of 3 knots may be experienced. The S current may sometimes cease and set N, but it lasts a day or two and may be attributed to local causes, such as strong S winds.

In the same area during the months of May to October, the number of currents exceeding a rate of 2 knots occurs at less frequent intervals than during the summer months. From August to October, a rate of 3 knots may be occasionally met. From May to July, the S current is neither regular nor strong, as during the remainder of the year. At this time, N currents reach their greatest strength, approximately 1 knot, and increase in frequency of occurrence.

Between Port Stephens and the coast S of Sydney Harbor, the current sometimes sets toward the land. In a SE gale in December it has been known to set SW.

The outer part of this S current, when about abreast of Port Stephens, curves to the E and ENE, sometimes running with considerable velocity. Abreast of Sydney Harbor, the outer part of this same current will be found diverted from its course to a SE and E direction as it leaves the land, the rate being 1 to 2 knots; it has been found to completely reverse and run strongly in the opposite direction.

Farther S, in the vicinity of Cape Howe, the current may set in either direction at a rate of 1 to 1.5 knots.

Off-lying Islands and Dangers

5.2 Most of the off-lying islands and dangers lie within a 100 mile radius of a position about 30 miles N of Lord Howe Island, which lies about 310 miles ESE of Smoky Cape. Norfolk Island and the dangers in its vicinity lie about 500 miles ENE of Lord Howe Island.

Norfolk Island (29°02'S., 167°57'E.) lies about 900 miles ENE of Sydney. It is about 4 miles long from N to S and about the same distance wide. Mount Pitt and Mount Bates rise near the NW end of the island. Aeronautical lights are shown from the summit of each mountain. The island is fairly steep-to, but fringing reefs and rocks lie up to 0.5 mile offshore.

Kingston (29°04'S., 167°57'E.) (World Port Index No. 55500) lies on the S side of Norfolk Island at the head of Sydney Bay. The harbor is fronted by an almost continuous detached reef, outside of which there are usually heavy breakers. Pilots are not available. There are facilities for mooring and the port can be contacted on VHF channel 16.

A historic wreck, protected from unauthorized interference, lies on the bank about 0.1 mile to seaward of the reef.

There is a boat harbor at the W end of Kingston, but the approach to it is sometimes dangerous, owing to the W end of the off-lying reef, which must be rounded. There is a wharf, 183m long, on the SE side of the boat harbor.

Anchorage.—Anchorage is available, in depths of 18 to 22m, 0.5 mile WSW of Point Hunter. Vessels may also anchor on the S part of Norfolk Island. Leading lighted beacons, each with a white triangular daymark, point up, stand at the W end of Kingston, and in line bearing 016°, lead to the anchorage.

There is no protected anchorage at Norfolk Island. Cascade Bay, on the NE side of the island, is the normal winter anchorage and is moderately secure, even in strong SW winds. Vessels anchor 0.4 mile NNE of Landing Rock. Anchorage is also afforded 1 mile N of Landing Rock, in depths of 31 to 37m. Anchorages are clearly shown on the chart.

Anchorage is prohibited in Anson Bay. Submarine cables are laid SW from a position 0.5 mile ESE of Anson Point. There are tanker moorings in Ball Bay, with a pipeline to the storage tank ashore.

Nepean Island (29°07'S., 167°56'E.) lies about 0.5 mile S of Norfolk Island. The island is about 0.2 mile in extent, and fringed by reefs up to about 0.5 mile offshore. An obstruction, the depth over which is unknown, was reported to lie about 0.2 mile SE of the SE extremity of the island.

Philip Island lies about 3 miles SSW of Nepean Island. The island is about 1 mile in extent and fringed by reefs and rocks up to 0.3 mile offshore. Landing is possible at times in a small bay on the N side of the island. A number of above-water rocks lie on the N side of the island.

Lord Howe Island

5.3 Lord Howe Island (31°33'S., 159°05'E.), crescent-shaped, mountainous, and wooded, lies about 430 miles ENE of Sydney Harbor. It is about 6 miles long and about 1 mile wide. Mount Gower rises at the S end of the island and Mount Lidgbird lies about 1.5 miles NNE of Mount Gower. The island lies on and near the middle of a bank, about 22 miles long and 12 miles wide, with depths of less than 200m.

The N and E sides of the island, although fringed by foul ground, rocks, and islets, are fairly steep-to. Most dangers are contained within the 20m curve, which lies about 0.5 mile off this part of the island.

The W side of the island is a bight formed by the crescent shape of the island and indents it about 1.5 miles ENE. Coral reefs, lying up to 1.2 miles offshore, extend across the bight from the NW end of the island to a position about 1.2 miles N of the S end of the island. The lagoon inside these reefs has depths of 2.1 to 2.4m at HW, but it is barely navigable by boats.

Winds—Weather.—Sudden and violent squalls are common off the SE coast of the island. In summer, NE winds prevail, but during a thunderstorm the wind may shift to the S or SE for a short time. In the winter, the wind is variable from the W, but the SW wind prevails and is frequently strong. When the mountains are capped with clouds, a NW wind may be expected.

Tides—Currents.—The mean tidal range at Lord Howe Island is 1m; the spring range is 1.2m. The ebb current begins to set S at HW; the flood sets N beginning at LW.

Pilotage.—Prior advice of intention to visit Lord Howe Island is advisable. Vessels anchoring in the open roadstead are subject to pilotage advice and direction.

Signals.—Radio contact on VHF channel 16 can be established with the port and guidance for anchorage may be requested. The harbormaster maintains around the clock watch on VHF.

Signals are made from a flagstaff on the SE side of Hunter Bay as follows to indicate the assigned anchorage:

Signal	Anchorage
White flag	Southwest Roadstead for Townside Anchorage.
Red flag	Northeast Roadstead for Ned's Beach.
Red flag and white flag	No landing either side.

Anchorage.—Although there are moderate depths at convenient distances around the island, anchorage is not good due to a bottom fouled by rocks and coral, and also because of violent and shifting squalls. During SW gales, anchorage may be found in Northeast Roadstead, between Mutton Bird Island and Admiralty Islets, in 18 to 29m, coral, about 1 mile E of North Peak, the NE end of the island. Anchorage may be taken closer to shore, however, there are depths of 8.2m and less up to a little over 0.2 mile offshore, E of North Peak. Landing can be made at Ned's Beach, in a bight S of North Peak.

During NE and E gales, anchorage may be taken, in 18m, in Southwest Roadstead, located off the reefs on the W side of the island. In winter months, vessels using these anchorages should be prepared to get underway at short notice. Landing can be made in Hunter Bay, a small bight on the S side of the N end of the island.

5.4 The Admiralty Islands (31°30'S., 159°05'E.) lie between 0.5 and 1.5 miles NNE of the NE extremity of Lord Howe Island; all are cliff-faced. Two patches of 5.5m and 6m

lie about 0.2 mile S and about 0.3 mile SSW, respectively, of the summit of North Islet.

Mutton Bird Island and Wolfe Rock, surrounded by foul ground up to a distance of about 0.1 mile, lie about 0.7 mile offshore N and E, respectively, of the E extremity of Lord Howe Island.

Ball's Pyramid (31°46'S., 159°14'E.) lies about 13 miles SE of Lord Howe Island. This islet is about 0.5 mile in extent and lies on and near the N central part of a bank, which is about 11 miles long, 5 to 10 miles wide, and has depths of less than 200m. A number of detached dangers fringe the islet. Observatory Rock and Wheatsheaf Islet lie about 0.5 mile WNW and 0.5 mile WSW, respectively, of the W extremity of Ball's Pyramid.



Ball's Pyramid

Southeast Rock is a dangerous pinnacle lying about 2.2 miles SE of Ball's Pyramid. A 16.4m patch is located 1.5 miles S of the rock. A shoal, with a depth of 8.8m, lies 1.3 miles SSE of the same point. Heavy breakers have been seen about 5 miles S of Ball's Pyramid. Vessels should not approach within 7 miles of that side of the islet.

Caution.—In 1990, Ball's Pyramid and Southeast Rock were reported to lie 0.3 mile NE of their charted positions.

5.5 Elizabeth Reef (29°56'S., 159°02'E.), a dangerous, oval-shaped reef about 5 miles long and 3 miles wide, lies about 95 miles N of Lord Howe Island and 300 miles off the Australian coast. In 1988, the reef was reported to extend 1.5 miles farther E than charted. Several shipping lanes pass close to this vicinity. The reef, which encloses a lagoon, may under favorable conditions, be seen at a distance of 5 miles, but most of it covers at HW. In 1983, the stranded wreck on the W extremity of the reef was reported to be a good radar target.

At HW, with E and SE winds, there is little break on the W and NW sides of the reef. When approaching from the W, great care is necessary, especially in the morning, with the sun ahead, when breakers on the E side may not be seen until too close to avoid danger. A depth of 46m lies 3 miles SE of Elizabeth Reef.

The lagoon, with the exception of the center of the N part, is studded with coral patches, most of which dry and none have a depth of more than 2.7m. With an E wind, boats can cross the reef at half-tide on either side of the sand cay.

Anchorage.—Anchorage may be obtained, in a depth of 18m, 0.4 mile NW of the sand cay, with shelter from the prevailing E and SE winds. Small vessels can anchor within the entrance on the NE side of the reef, in depths of 4 to 7m, broken coral, with shelter from all but the NE winds. The entrance is difficult and dangerous with E winds.

5.6 Middleton Reef (29°28'S., 159°04'E.), about 30 miles N of Elizabeth Reef, is crescent-shaped, about 5 miles long, and about 3 miles wide. The entire perimeter dries at LW; heavy breakers and surf mark the S and W sides. The relative positions of several wrecks which lie stranded on the reef can best be seen on the appropriate chart.

Anchorage.—Anchorage can be taken in The Sound, which indents the N side of the reef about 1 mile SSE. The best anchorage is in Herald Haven, about 0.2 mile S of the NW horn of the reef, in depths of 9 to 11m, 0.1 mile S of the point, sheltered by the reefs.

Gifford Tablemount, with depths of 261m and 330m, lies between 26°40'S and 27°00'S on the meridian of 159°20'E.

Capel Bank (25°16'S., 159°27'E.), about 250 miles N of Middleton Reef, has depths of 46 to 144m, but it has not been examined nor are its limits defined. A depth of 10m has been reported in position 25°09'S, 159°45'E. There are depths of 60 to 80m about halfway between Capel Bank and Kelso Bank.

Kelso Bank (24°16'S., 159°27'E.), about 70 miles N of Capel Bank, has been defined but not examined. There is a least charted depth of 14.6m over its S end. The bank is sometimes marked by tide rips.

Argo Bank, with a depth of 263m, lies in position 23°10'S, 159°35'E.

Nova Bank, with a depth of 22m, lies in position 22°34'S, 159°14'E. A depth of 30m lies 20 miles S of the 22m depth.

North Point to Newcastle

5.7 North Point (33°48'S., 151°19'E.) is the NE point of the high precipitous North Head promontory on the N side of the entrance to Sydney Harbor. The point is steep-to and clear of dangers and has depths of 7.3 to 18.3m about 0.1 mile

offshore. The Cardinal's Palace, a large building on the NW end of the promontory, is prominent.

Cabbage Tree Bay lies on the N side of the North Point headland. It indents the coast about 1 mile to the W. The bay provides anchorage for small craft, sheltered from S winds. A conspicuous tower stands on the S shore of the bay.

Long Point (33°45'S., 151°19'E.) lies about 4 miles N of North Point. The point is fringed by reefs up to about 0.5 mile offshore, over which dangerous rollers sweep. A prominent water tower stands about 1.2 miles NW of the point. Bungan Head, also fringed by reefs up to about 0.5 mile offshore, lies about 4.7 miles N of Long Point. A shoal, with a depth of 11.2m, lies 1 mile SE of Long Point.

Barranjoey Head, a promontory 103m high, lies at the N end of a low neck of land and forms the S entrance point of Broken Bay. A light is shown on the head.

Broken Bay (33°34'S., 151°22'E.) is entered between Barranjoey Head and Box (Hawke) Head. About 1.5 miles within the entrance, the bay narrows to a width of about 1.2 miles at Middle Head, located on the N side of the bay, about 2 miles WSW of Box Head. An inlet indents the N side of the bay about 1.5 miles NNW between Box Head and Middle Head. The town of Ettalong lies on the N end of this inlet, about 2 miles N of Box Head. Small craft may enter Brisbane Water, a sheltered inlet off the town, but sometimes there are depths of less than 1.2m over the bar. A bridge spans Brisbane Water.

Pitt Water, an inlet about 0.7 mile wide, indents the S side of Broken Bay about 5 miles S between Barranjoey Head and West Head (First Head), about 1 mile W. A bar, with a depth of 2.7m in the fairway, extends across the entrance, but within there are depths of 12.8 to 18.3m. There are several small villages on the shore of the inlet.

The Hawkesbury River, the largest of the rivers on this coast, discharges into Broken Bay between Juno Point and Eleanor Bluffs, about 0.7 mile SW. The river is about 330 miles long and navigable by small craft for 70 miles from the sea. The current runs at a rate of 4 knots in the mouth of the river.

Navigable channels and bays in the Hawkesbury River, Pitt Water, and Brisbane Water are marked in places by lighted beacons.

Caution.—This area is frequently used by divers, by day and night, undergoing diving instruction. Appropriate signals are displayed when divers are in the water. Mariners should navigate with care when in the vicinity of Taylors Point

Anchorage.—Inside Middle Bank, anchorage in Broken Bay is protected. Good sheltered anchorage can be taken, in 11 to 13m, sand and mud, in Flint and Steel Bay, close SW of Flint and Steel Point, with the point almost in line with Middle Head and Juno Point, bearing 290°. The best anchorage in Broken Bay is reported to be in Cowan Creek, in about 8.2m, about 1 mile inside the entrance of the creek.

Anchorage can be taken in Refuge Bay, on the S side of Challenger Head, in 4.5m. In the entrance of the Hawkesbury River, anchorage can be taken E of the second sandy bay, in 12.8m, with Croppy Point bearing 005° and Juno Point bearing 086°.

Naval port.—The port lies W of a line between Barranjoey Head and Box Head, and E of a line between West Head and Middle Head. It includes Pitt Water, but not Brisbane Water.

The villages of Palm Beach and Newport have small craft piers and a small pier lies just inside Pitt Water.

Submarine cables.—Cables are laid in Pitt Water across the entrance and the central part of the inlet. A cable is laid across Cowan Creek about 2.7 miles above the entrance, and also in the Hawkesbury River from Dangar Island to the E bank. Additional cables are laid from time to time and are generally indicated by notice boards on the shore.

Broken Bay to Nobbys Head

5.8 Between Broken Bay and Nobbys Head, 45 miles NNE, the coast is formed by sandy beaches, separated by rocky points backed by Tuggerah Lake and Lake Macquarie, behind which there is mountainous country. Warralong, a conspicuous peak, rises 20 miles W of the entrance to Lake Macquarie (33°05'S., 151°40'E.).

First Point (33°29'S., 151°27'E.) lies about 8 miles NE of Barranjoey Head. The point forms the NE extremity of Cape Three Points. Two towers, each at an elevation of 260m, stand 5.5 miles NNW of First Point.

Tuggerah Reef, with a depth of 5.5m, lies about 2 miles offshore and 9 miles NNE of First Point. The narrow shallow entrance of Tuggerah Lake. The narrow shallow entrance of Tuggerah Lake indents the coast WNW of Tuggerah Reef. The entrance to the lake is frequently shoaled and the depth over the bar is generally about 1m. A tower stands near the E shore of the lake, about 1.5 miles SW of the entrance.

Norah Head (33°17'S., 151°35'E.) is a prominent point which is fringed by dangers up to 0.1 mile offshore. A light stands on the head. The point has been reported to be a good radar target up to 16 miles. Several detached rocks lie awash about 0.5 mile offshore and 3.2 miles NNE of Norah Head.

5.9 Catherine Hill Bay (33°09'S., 151°38'E.) (World Port Index No. 53630) lies about 8 miles NNE of Norah Head. The bay indents the coast for about 0.5 mile on the N side of Hales Bluff, a point about 0.7 mile N of Flat Island.

A coaling jetty, with depths of 6.1 to 9.1m alongside at its head, extends about 325m ENE from the SW shore. A mooring buoy lies NW of the jetty's head. A 0.6m patch and a 4.9m patch lie about 30m E and about 0.1 mile ENE, respectively, from the head of the jetty.

Range lights, in line bearing 230.5, are situated near the root of the jetty. Another pair of range lights, the rear situated midway between Hales Bluff and the root of the jetty, and the front on the head of the jetty, in line bearing 202.5°.

The intersection of the approach alignment with that of the pair of beacons indicates the anchoring position.

An old wreck, with a depth of 2.1m, lies 0.1 mile NW of the head of the jetty.

Signals.—A red square flag by day and a red light at night shown from the head of the jetty indicates that it is unsafe to lie alongside.

Lake Macquarie, the entrance of which lies 4.5 miles NNE of Catherine Hill Bay, is a coal exporting center. The bar at the entrance, for which local knowledge is necessary, has depths of 1.2 to 1.8m, but is subject to change.

Moon Islet (33°05'S., 151°40'E.) lies 0.5 mile E of the entrance to Lake Macquarie and acts as a breakwater to it. A light is shown from Moon Islet.

Between Moon Islet and the mainland there is a channel with a depth of 4.3m. Local knowledge is necessary owing to the rocks fringing the mainland and off the SW side of the islet.

Lake Macquarie is entered between two breakwaters, but the channel is narrowed by sand banks on each side. The channel is approximately 30m wide and has a depth of 1.7m as far as Swansea Road Bridge, which spans the channel at the town of Swansea, 1 mile within the entrance.

Tidal currents at Swansea and **Pelican Islet** (33°04'S., 151°38'E.), at the inner end of the channel, attain a rate of 4 to 5 knots.

There is no pilot, but the District Officer, Swansea, while taking no responsibility, will assist. Entry or departure should only be made on the flood tide, which will be indicated by signal at the signal station. A red light indicates that the bar is dangerous and should not be approached. A green light indicates that the bar is safe to cross.

Swansea Road Bridge, with a navigable width of 14m, will open for traffic. Two fixed red lights indicate the span is closed; two fixed green lights indicate the bridge is open and vessels may proceed.

5.10 Redhead (33°01'S., 151°44'E.), a high bluff, lies about 5.5 miles NE of the entrance to Lake Macquarie and has been reported to give good radar returns up to 27 miles. The intervening coast consists of a sandy beach backed by sand dunes. A conspicuous water tower stands at an elevation of 136m at the N end of the town of Dudley, 1.7 miles NNW of Redhead Point.

Nobbys Head, about 6.5 miles N of Redhead, rises abruptly from a narrow peninsula extending about 0.5 mile NE from the mainland. It lies on the S side of the entrance to Newcastle Harbor and has been reported to give good radar returns up to 15 miles. The S breakwater extends about 0.3 mile NE from this head. Reefs, rocks awash, and other dangers fringe Nobbys Head up to about 200m off its SE side and 260m off its E side. The N breakwater lies about 0.2 mile NW of and about parallel to the S breakwater.

A light is shown from Nobby's Head. A signal station stands on the head. Lights are shown from the breakwater heads.

Flagstaff Hill, a prominent 35m high hummock, on which there is a flagstaff, lies 0.6 mile SW of Nobbys Head.

Anchorage.—Anchorage may be taken with Nobbys Head light bearing 306°, distant 2.6 miles.

Caution.—A spoil ground, with sides approximately 1 mile long, is centered 2.5 miles SE of Nobbys Head.

Newcastle Harbor (32°55'S., 151°47'E.)

World Port Index No. 53610

5.11 Newcastle Harbor, one of the important harbors in Australia, lies at the mouth of the Hunter River, which discharges between the breakwaters extending from Nobbys Head and Pirate Point, about 0.5 mile to the W. The river is about 300 miles long and is navigable by smaller vessels for 23 miles

above the port. Although somewhat narrow, the harbor is well protected and has excellent berthing and other facilities.

Newcastle Port Corporation

<http://www.newportcorp.com>

Winds—Weather

During severe SE winds, a confused sea builds up in Newcastle Bight. The port has been closed for up to 3 days by heavy swells from the SE.

Tides—Currents

Signals describing the height of tide and direction of the current are displayed from the signal station on Nobbys Head. Currents within the harbor generally flow at 1 or 2 knots, but have been known to reach a speed of 6 knots on the ebb during freshets. Strong cross currents can be expected in the Horse-shoe, as well as on the outer range.

Depths—Limitations

Vessels up to 290m long and over 90,000 grt may be accommodated at Newcastle.

Mariners are warned of the heavy breakers during SE winds on the 9.1m depth about 0.2 mile E of the N breakwater. A rocky patch, with a depth of 5.2m, lies about 0.2 mile SSE of the S breakwater head and is the easternmost of the dangers.

A wreck lies 2.4 miles NE of the head of the S breakwater. Depths of 16.5m and 15.5m are located 3.4 miles bearing 043°, and 3.1 miles bearing 056°, respectively, from the same breakwater head. A 15.1m depth is located 2.9 miles, bearing 063°, from the same head.

As of 2003, the entrance channel to Newcastle Harbor has a depth of 15m from seaward to the Horseshoe, a deep basin from which all parts of the harbor are accessible. Basin Cut, the channel leading W from the Horse Shoe to The Basin, has a depth of 12.3m. The Steelworks Channel, leading N from the Horseshoe, has a depth of 15m to the Swinging Basin. The Swinging Basin has a depth of 15.1m.

Throsby No. 1 Berth, includes a transit shed and is designed to accommodate heavy container handling equipment. It has a length of 183m and a depth of 11m.

The Basin, just N of the Tug Company Wharves (charted as Lee Wharf), is divided into Eastern Basin and Western Basin. The Eastern Basin berths, with alongside depths of 10.7 to 11.4m, service a variety of cargo, including timber, aluminum and steel products.

The Western Basin offers three berths. No. 4 Berth is a ro-ro/container terminal, with a length of 250m and a depth of 11.4m. No. 3 Berth, with a length of 258m and a depth of 11.4m, handles bulk grain cargo. No. 1 Berth is used as a lay-up berth. It has a length of 155m and a depth of 8.9m alongside.

The Dockyard Berths lie on the SW end of Steelworks Channel. The deepest berth provides a length of 262m and a depth of 8.2m.

The area N of the Horse Shoe is known as the North Harbor. The Dyke Berths, just N of the Dockyard Berths complex, are five in number. No. 1 Berth is a tie up berth, with a length of 238m and a depth of 11.8m alongside. No. 2 Berth is a bulk loading facility for ore concentrates; with a length of 238m and a depth of 12.4m alongside. No. 4 Berth and No. 5 Berth function as a coal loading area, with a total length of 540m, and a depth from 16.2 to 16.5m alongside. No. 6 Berth has a length of 68m and a depth of 7.9m alongside; coal is landed at this berth.

Port Warrath, the termination of Steelworks Channel, comprises a turning basin, and divides into two arms at its N end. The E arm has the three Kooragang Berths, of which the bulk berth offers facilities for handling liquid dangerous cargo. The bulk berth (Kooragang 2) has a length of 274m and a depth of 11.6m. The alumina berth (Kooragang 3), also a bulk facility, offers a length of 190m and a depth of 13.2m. Kooragang 5 and Kooragang 6 have depths of 16.2 and 16.3m alongside respectively.

The W arm of Port Warrath offers six berths. BHP Steelworks No. 1, No. 2, No. 3, and No. 4 handle steel products in bulk, the largest of which provides a length of 152m, with a depth of 9.6m. BHP Steelworks No. 5, a bulk discharge berth, will accept a vessel with a length of 274m and has an alongside depth of 12.3m. BHP Steelworks No. 6, a coke-loading facility, has a length of 213m and an alongside depth of 7.0m. BHP Steelworks ceased production in 1999. The area is being considered for development as a multi-purpose terminal.

Aspect

The approach to the harbor is easily identified, as it lies at the SW end of a long sweep of beach and low sandhills trending to the NE, while the coast to the S is higher. The tall chimneys behind Redhead are very conspicuous. Nobbys Head and Fort Scratchley, a high hill about 0.5 mile SW, are prominent from offshore, and the city of Newcastle and ships in the harbor are obvious on closer approach. Nobbys Head has a flagpole on its summit. Shepherds Hill, near which there is a tall water tower, lies about 1.5 miles SW of Nobbys Head and is conspicuous. A conspicuous radio tower stands on a hill 13 miles W of Nobbys Head.

Pilotage

Pilotage for Newcastle Harbor is compulsory and available 24 hours. Pilots may be ordered through the signal station or via VHF.

Vessels will be boarded by the pilot at the inner or outer pilot station depending on the vessels size. Vessels of 90,000 dwt or less are boarded 3 miles E of Nobbys Head Light (32°55'S., 151°48'E.); vessels of 90,000 dwt or larger are boarded 5 miles E of the same light.

Vessels should signal their ETA to the pilot station at least 4 hours before arrival, confirming or amending 2 hours before.

Vessels should maintain a continuous listen watch on VHF channels 9 and 16 and inform the Vessel Traffic Information Center when the pilot boards.

Regulations

The Port Limits for Newcastle are delimited by the arc of a circle, 3 miles in radius, centered on Nobbys Head Light.

Additionally, a Restricted Area and Prohibited Anchorage has been established within the port area by a line drawn 057° from North Breakwater Light to the Port Limit Line, and a line drawn 127° from South Breakwater Light to the port limit line. The Restricted Area represents a fairway for commercial shipping and vessels should neither anchor in this area or hamper the navigation of commercial shipping in any way. Vessels must not transit the area without the permission of the harbormaster.

Traffic is controlled via the signal station on Nobbys Head, which may be contacted by VHF or visual signals. The station should be contacted at least 30 minutes prior to a scheduled movement. A vessel may not enter or leave berth unless granted permission.

Quarantine line.—The quarantine line for the port is drawn from North Breakwater Light to South Breakwater Light. There is no defined quarantine anchorage, but pratique is granted around the clock.

Signals

Traffic and general signals are made from the signal station on Nobby's Head.

The state of the tide is shown from the highest mast, as follows:

Tidal Signals		
Tide	Day	Night
Flood	Black triangle	Green light
Ebb	Black circle	Red light

Flood tide is indicated by a black triangular shape by day, or a green light by night. The ebb is shown from the mast as a black circular shape by day, or a red light at night.

Depth signals are displayed in accordance with the uniform signals for Commonwealth Ports. See Pub. 120, *Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia*.

Unfavorable sea or swell conditions in the entrance channel are indicated by signals shown from a shorter mast, as follows:

Sea/Swell Conditions Signals		
	Day	Night
Moderate	Black triangle	Green light
Heavy	Black circle	Red light

Vessels proceeding E from The Basin must sound one prolonged blast of 4 to 6 seconds duration on the whistle or siren immediately before entering the channel out of The Basin.

Anchorage

While no anchorage can be recommended that is secure in all weathers, anchorage can be had in Newcastle Bight, 1 to 2 miles N of the N breakwater, or 2 to 3 miles S of the entrance and clear of the Restricted Area.

Directions

Keep a sharp lookout for fishing vessels, particularly within the anchorage areas in Newcastle Bight.

From a position about 2 miles E of the S breakwater, proceed NE until the approach channel range is intersected. Steer on this range, watching for a strong NW set in SE to S winds. In moderate to heavy sea conditions, waves may build to twice their normal height up to 0.8 mile off the entrance, causing problems for deep-draft vessels and small craft alike.

Once within the breakwaters, vessels are guided by the buoys and ranges to the various parts of the port.

Caution

Bombing and gunnery practice may be conducted by aircraft or artillery in the approaches to the harbor.

Depths in Newcastle Harbor have been decreased by as much as 0.6m during freshets and dredging is continually pursued throughout the harbor. Information on the latest promulgated depth for each area is available from the Harbor Master Newcastle by contacting the Vessel Traffic Information Center on VHF channel 9 or by telephoning (02) 4985-8292.

An underkeel clearance of 10 per cent of the vessel's draft must be maintained while in the waters of the port; a clearance of at least 0.3m must be maintained while at berth.

Newcastle to Port Stephens

5.12 Between Newcastle and Port Stephens, about 23 miles ENE, the coast is indented about 2 miles NNW by Newcastle Bight. The low sandy beach between these two points is backed by sandhills. The surf breaks continually on this shore and in bad weather heavy rollers extend a considerable distance seaward. Morna Point, 17 miles ENE of Nobbys Head, has been reported to give good radar returns up to 10 miles.

A number of wrecks lie within Newcastle Bight, on the following bearings and distances from Nobbys Head Light:

- 033°, 4.3 miles.
- 043°, 2.4 miles.
- 067°, 5.5 miles.

Telegraph Shoal, with a depth of 4.5m lies about 0.2 mile W of Morna Point. A wreck, least depth 27m, lies 3 miles WSW of Morna Point. A shoal, with a least depth of 14.6m, lies about 2.7 miles ENE of Nobbys Head. Vessels should avoid this area during periods of heavy swell.

Point Stephens (32°45'S., 152°12'E.) lies about 5 miles NE of Morna Point and shows a light. The point is fringed by foul ground and detached shoal patches up to 0.3 mile offshore. The light has been reported to give good radar returns up to 9 miles.

Caution.—A submarine cable is laid from a position 0.6 mile bearing 309° from Point Stephens Light in a 305° direc-

tion to the shore. A dangerous wreck lies almost 0.5 mile offshore about 1 mile NW of Point Stephens.

South Head (Toomere Head) lies on the S side to the entrance of Port Stephens. Three conspicuous hills mark the head and a prominent tower stands 3 miles to the SW. North Head (Yacaaba Head) lies about 1.2 miles NE of South Head and is connected to the mainland. Three small islands lie to the E of North Head.

5.13 Port Stephens (32°43'S., 152°12'E.) (World Port Index No. 53580) is entered between North Head and South Head, and extends about 11 miles to the W. The harbor is obstructed by sand banks, some of which dry in patches. South Channel, on the S side of the harbor, is the only passage through the banks for vessels other than small craft. There are a few small towns and farms on the shores of the harbor.

Anchorage.—Anchorage can be had in Fly Roads, S of South Head, in a depth of about 20m. Beware of the 8m patches, and the wreck close by, lying about 1 mile WNW of Point Stephens Light. With offshore winds and in calm weather, anchorage may be obtained, in depths of 11 to 27m, N of Nelson Head, but with SE winds, a heavy swell breaks across the entrance of the harbor making the anchorage unsafe.

Nelson Bay is a convenient anchorage for weather bound vessels. Coasters frequently take shelter in adverse weather conditions in the bay, which has depths of 7 to 11m.

Caution.—Caution is advised when proceeding through S channel, owing to the eddies occurring off the S shore. It is inadvisable for deep-draft vessels to enter Port Stephens at night.

Port Stephens to Sugarloaf Point

5.14 Between North Head and Sugarloaf Point, about 24 miles NE, the low sandy coast, on which there are numerous sandhills, trends regularly in that direction. A number of high hills stand about 8 miles inland. Most dangers are contained within 1 mile offshore, except those in the vicinity of the Broughton Islands and those off Sugarloaf Point.

The **Broughton Islands** (32°37'S., 152°19'E.), a group of islands and rocks, lie 8 miles NE of North Head. The outermost island is steep and rocky, with patches of scrub on its summit. This island is joined at LW by a chain of rocks to the larger and inner island.

Small vessels with local knowledge, can obtain anchorage sheltered from all winds between the islands. With S winds, anchorage can be obtained on the N side of the larger island, between the two reefs, 0.2 mile E of the NW end of the island, in a depth of 9m, sand. During NE or E winds, good anchorage may be taken, in depths of 11 to 20m, 0.3 mile SSW of the NW end of the larger island.

Small craft may obtain anchorage in a cove on the SW side of the larger island, 0.7 mile SSE of its NW end. A 1.5m rocky patch lies in the middle of the entrance, and should be passed on its N side when entering.

Sugarloaf Point (32°27'S., 152°32'E.) lies 15 miles NE of the Broughton Islands. A light is shown from the SE extremity of the point. A signal station situated on the point will answer

signals if observed. The point has been reported to give good radar returns up to 21 miles. Seal Rocks, several steep-to rocky islets, lie about 1.7 miles SSE of the point. Edith Breaker, a 4.9m rocky patch, lies about 3 miles SW of the point.

Sugarloaf Bay, a small bight on the N side of Sugarloaf Point, affords shelter from SW and S winds. There is anchorage for small vessels, in 7.3m, about 0.2 mile WNW of the NE end of Sugarloaf Point promontory.

Sugarloaf Point to Crowdy Head

5.15 Between Sugarloaf Point and Cape Hawke, 13 miles N, the low coast trends regularly in that direction. The coast is fairly steep-to and all dangers except Black Rocks are contained up to 0.5 mile offshore.

Cape Hawke (32°13'S., 152°34'E.) is reported to give good radar returns up to 17 miles.

Between Cape Hawke and Crowdy Head, about 24 miles NNE, a bight indents the coast about 5 miles WNW. Except for a few points, this part of the coast is low. Most dangers are contained within 2 miles of the coast.

Black Rocks (Skeleton Rocks) (32°24'S., 152°32'E.), several detached above-water rocks less than 0.1 mile in extent, lie about 0.7 mile offshore, and about 2 miles N of Sugarloaf Point.

Charlotte Head lies about 6 miles N of Sugarloaf Point. Anchorage may be obtained by small vessels with local knowledge, in a depth of 7m, on the N side of Charlotte Head, with shelter from S winds. Booti Hill rises 1.5 miles NW of Charlotte Head. Between the hill and Cape Hawke, the coast is formed by a narrow sandy strip separating Wallis Lake from the sea. The lake extends 9 miles N and enters the sea through Cape Hawke Harbor.

5.16 Cape Hawke Harbor (32°10'S., 152°30'E.), about 4 miles NW of Cape Hawke, is in the shallow entrance of Wallis Lake, a large body of water extending about 9 miles to the S. The entrance, requiring local knowledge, is on the N side of a breakwater extending 305m NE from the shore. There is a depth of 2.1m over the bar. Lighted beacons and a lighted range mark the entrance to the harbor. The village of Forster is situated on the S side of the entrance.

Anchorage, in depths of 15 to 18m, may be found about 0.8 mile NE of the village at Forster.

There is no pilot, but the harbor officer in charge will assist vessels, if necessary. There are several wharves with depths of 1 to 3m alongside.

Harrington Inlet (31°53'S., 152°41'E.) lies at the head of the Manning River, about 20 miles NNE of Cape Hawke Harbor, and is no longer available to commercial traffic.

Crowdy Head (31°51'S., 152°45'E.) is a prominent headland on which a light is shown. Depths of less than 11m extend 0.5 mile E from the head. Crowdy Bay, a small bight on the N side of Crowdy Head, affords shelter to small craft.

Anchorage may be taken off the boat harbor, in a depth of 7m. A lighted beacon stands on the shore of the boat harbor and, in line with Crowdy Head Light, leads through the entrance.

Crowdy Head to Port Macquarie

5.17 Between Crowdy Head and Port Macquarie, about 28 miles NNE, the low coast trends in that direction with several prominent headlands between. Giles Shoal, with a depth of 9.8m, lies about 1.7 miles NNE of Crowdy Head. Curphey Shoal, with a depth of 8.2m, lies 3 miles NE of Crowdy Head. Mermaid Reef lies about 5.2 miles NE of Crowdy Head. All the above shoals are covered by the red sector of Crowdy Head Light.

Indian Head (Diamond Head) (31°44'S., 152°48'E.) lies about 8 miles NNE of Crowdy Head. The head has been reported to give good radar returns up to 27 miles. Between Indian Head and Camden Head, 5 miles NNE, the coast continues as a sandy beach, backed by swampy ground. Camden Head terminates in Perpendicular Point.

Camden Haven, a narrow inlet in the estuary of the Camden Haven River, lies about 1 mile W of Perpendicular Point. The entrance channel is fronted by a bar of shoal depth, which is sounded regularly. Local knowledge is necessary and local authorities should be consulted before planning a voyage here.

The channel, marked by beacons in range, leads to Laurieton, about 2 miles above the bar. A road bridge, with a vertical clearance of 4.5m, spans the channel at Laurieton.

Tacking Point (31°29'S., 152°56'E.), from which a light is shown, lies 11 miles NNE of Camden Head. All dangers are contained within 0.2 mile off the point. Flat Rock, a dangerous submerged rock about 0.2 mile offshore, lies about 2 miles N of Tacking Point.

From Tacking Point to the entrance to Port Macquarie, 3 miles NNW, the coast is steep and fronted by rocks. An obelisk stands on Nobby Head, midway along this stretch of coast.

5.18 Port Macquarie (31°26'S., 152°55'E.) (World Port Index No. 53560), at the entrance of the Hastings River, is entered between Green Mound and Pelican Point. The town is situated on the S side of the entrance. Two towers, with elevations of 75m and 61m, stand in the middle of the town. The wharves in the port are no longer in use, and vessels berth at Hibbard, a town on the S side of the river, 5 miles within the entrance.

Pontoon berths and other facilities for small craft are situated at the NW side of the town, about 0.5 mile SW of Pelican Point.

Port Macquarie is dangerous to enter, owing to the shifting sandbanks, which are sounded regularly. Local knowledge is necessary, and the local authorities should be consulted before planning a voyage here.

A dangerous wreck, with a least depth of 2.5m, lies in mid-channel in the entrance to the harbor, about midway between the lights at the heads of the N and S breakwaters.

Red triangular lighted beacons stand on the S breakwater and lead across the bar. The front light is moved as necessary to reflect changes in the channel over the bar.

Good anchorage may be obtained, in a depth of 11m, sand, 0.7 mile E of the entrance.

Bird Rock, 8m high, lies 0.8 miles SE of the harbor entrance and about 0.4 mile offshore. Patches of reef lie inshore of Bird Rock.

Port Macquarie to Coffs Harbor

5.19 The coast between Port Macquarie and Smoky Cape, 32 miles NNE, is mostly low, sandy, and covered with thick scrub, and broken at intervals by rocky points, which from the offing appear like islands. Behind the coast the land rises to tree covered peaks. A heavy surf generally breaks on the beaches.

Point Plomer (31°18'S., 152°59'E.) lies about 7.5 miles NNE of the entrance to Port Macquarie and is fringed by rocks and foul ground up to 0.2 mile offshore. A bank, with depths of 160m, was reported to lie 13 miles ESE of Point Plomer. Crescent Head lies about 7 miles N of Point Plomer.

Korogoro Point lies about 9.5 miles NNE of Crescent Head and rises to a height of 153m. A conspicuous tower stands about 6.5 miles WNW of this point. The tower shows three lights at night and is a good radar return for about 14 miles.

Smoky Cape (30°56'S., 153°05'E.), on which a light is shown, is at the SE end of a prominent headland of three hills, the southernmost of which is South Smoky Peak. Smoky Cape has been reported to give good radar returns up to 20 miles. Lagger's Point, about 2.7 miles N of Smoky Cape, is the N end of the headland. A breakwater extends in a NW direction from Lagger's Point.

Trial Bay is entered between Lagger's Point and Monument Point, 1.5 miles WSW. The towns of Arakoon and South West Rocks are located S of the entrance to the bay. A light stands on Southwest Rocks.

Pilotage.—Pilotage may be arranged through Sydney Maritime and is compulsory. The pilot boards 1.5 miles NE of the entrance to the Macleay River.

Anchorage.—The area behind the breakwater provides good anchorage and shelter from winds from the SE through SW to NW.

5.20 The Macleay River, which flows into the sea 2 miles W of Lagger's Point, is about 100 miles long and has several towns on its banks. The river is navigable by small vessels with local knowledge, to Smithton, 15 miles above the entrance. The large town of Kempsey lies 10 miles farther upstream.

The bar, the position of which is liable to change, has a depth of 1.5m. The best time to enter the river is on the last of the flood.

Pilotage.—The pilot boards 1 mile NW of Lagger's Point.

Anchorage.—Anchorage may be obtained, in a depth of 4m, 1 mile within the entrance.

Nambucca Heads (30°39'S., 153°01'E.), a low rocky point, lies about 14 miles N of the Macleay River entrance. The Nambucca River discharges into the sea on the S side of Nambucca Heads. The river is closed to commercial traffic.

Coffs Harbor (30°18'S., 153°08'E.) (World Port Index No. 53540) is a confined harbor about 0.5 mile in extent, with a town of the same name on its W side. It is formed by several islands and breakwaters and has depths of about 6.5 to 7.3m. A jetty extends from the town into the NW end of the harbor. A conspicuous tower stands 6.5 miles NW of the harbor entrance. Those unacquainted with the harbor should not attempt to enter at night.

Pilotage.—Pilotage is compulsory, and the pilot boarding ground is situated 0.5 mile E of the E breakwater light.

A jetty, 460m long, with a berth on each side of its outer end, is available for vessels up to 4,000 grt. Depths alongside each berth are from 5.8 to 6.4m. A mast, on which there is a light, stands on the head of the jetty. A white flag shown from the mast indicates it is safe to berth. A red flag indicates it is dangerous to berth. Vessels berth bow-to seaward. Small marker buoys off each side of the head of the jetty indicate the position for letting go the anchor in order to swing before berthing. A mooring buoy lies off the S side of the jetty for the use of vessels mooring.

Anchorage, in good weather, can be had, in 7m, sand, on the entrance range, with the outer end of the jetty bearing NNW.

It has been reported that the harbor is no longer used by commercial traffic

Coffs Harbor to Evans Head

5.21 Between Coffs Harbor and Evans Head, 72 miles NNE, the land, although continuing low, is less regular in outline, and the coastal range of rocky hills approach near the sea. Many rivers enter the sea on this stretch of coast, the most important of which is the Clarence River, which enters the sea on the N side of Woolli Head. The off-lying islands and dangers off the S part of this stretch of coast extend 6 miles offshore, and lie within the 20m curve.

Split Solitary Island (30°14'S., 153°11'E.) lies about 4.5 miles NNE of Coffs Harbor entrance. The island is divided into two parts by a cleft. Owing to the irregular depths between the coast and the island, the passage between is not recommended.

The island is the SW island of the Solitary Islands, a scattered group of islands and rocks, which lie between 1 to 6 miles offshore, and extend 22 miles NNE of Split Solitary Island. Passage between the islands and the mainland should only be used by small vessels with local knowledge.

South Solitary Island (30°12'S., 153°16'E.) shows a light and is located about 5 miles NE of Split Solitary Island. Two above-water rocks lie off its N end, and Arched Rock off its E side. Black Rock, 1.8m high, lies 0.5 mile NW of the island.

South West Solitary Island (Grouper Islet) lies about 3.5 miles NW of South Solitary Island and 1 mile E of **Bare Bluff** (30°10'S., 153°12'E.). A reef extends 0.5 mile SW, and another the same distance S, respectively, from the island. Air bombing practice takes place at times near the island.

Stack Rock lies close offshore midway between Bare Bluff and **Green Bluff** (30°07'S., 153°13'E.). The town of Woolgoolga is situated on the latter bluff, which is a low saddle-back point. A conspicuous tank stands 0.2 mile SW of Green Bluff.

North West Solitary Island (30°01'S., 153°16'E.) lies 8.5 miles NNE of South West Solitary Island. A shoal, with a depth of 2.4m and which breaks, lies 0.5 mile N of the island. Chopper Rock, lies at the N end of a bank, with depths of less than 5.5m.

Breaker Rocks lie 2.5 miles ENE of North West Solitary Island. There are depths of 15.8 and 16.5m over them. Vessels are recommended to pass at least 1 mile E of them.

5.22 North Solitary Island (29°56'S., 153°24'E.) is an islet lying about 6.5 miles offshore and about 8 miles NNE of North West Solitary Island. It consists of two above-water rocks with a narrow opening between. A number of detached rocks, some on which the sea breaks, lie N of the islet. North West Rock lies in the middle of a bank with depths of less than 5.5m, 0.7 mile NNW of the islet. A below-water rock was reported to lie 1 mile N of North West Rock. A light is shown from the NE side of the islet.

The **Woolli River** (Woolli Woolli River) (29°53'S., 153°16'E.), which is only navigable by boats, lies about 1.5 miles N of Tree Point. A dangerous submerged rock lies about 0.1 mile NE of the S entrance point of the river. The entrance of the river is protected by two breakwaters, which are lighted. A conspicuous tank stands about 1 mile NW of the breakwaters.

Sandon Bluffs (29°40'S., 153°20'E.), appear as white cliffs and lie about 15 miles NNE of Tree Point. Sandon Shoals, a 7.5 to 9.1m patch over which the sea sometimes breaks, lies on a bank about 2 miles SSE of Sandon Bluffs. The mouth of the Sandon River, navigable only by boats, lies on the N side of Sandon Bluffs. Plover Island is an islet in the river entrance.

Cakora Point (Brooms Head) lies about 4 miles N of Sandon Bluffs. Buchanan Rock, a 4.2m rocky patch over which the sea breaks, lies about 0.7 mile NE of Cakora Point. Freeburn Rock, with a depth of 2.7m and over which the sea breaks, lies about 6 miles NE of Cakora Point.

Clarence River (29°25'S., 153°23'E.)

World Port Index No. 53530

5.23 Clarence River is entered between Clarence Head Breakwater (29°29'S., 153°22'E.) and North Spit Breakwater. The river is 240 miles long and is navigable by vessels of 4m draft to the town of Grafton, 42 miles above the entrance. Only light draft vessels can proceed to Copmanhurst, 26 miles farther upriver. The bar, which lies between the breakwaters, is subject to frequent changes, and local knowledge is necessary for crossing it. The depth over the bar is 2.9m at LW. The river is buoyed and beacons.

The port limits extend to 1 mile E of the seaward ends of the N breakwater and the S breakwater.



Courtesy of Debra Fisher

Clarence River

Tides—Currents.—The average rate of the tidal currents at the river entrance is from 3 to 5 knots, but after heavy rains they may attain a rate of 5 to 8 knots. For several days after freshets, the ebb current is of 9 hours duration, and there is no perceptible flood above Grafton. Slack water is usually 2 hours after HW and 2 hours 30 minutes after LW.

Depths—Limitations.—The largest vessel to have entered the port was 3,484 grt with a draft of 5m.

Several towns along the river offer berthage. The most important berth is at **Goodwood Island** (29°24'S., 153°19'E.), can will accommodate timber-loading vessels of up to 5.1m draft.

Aspect.—**Mount Doubleduke** (29°17.4'S., 153°11.2'E.) and **Clarence Peak** (29°34'S., 153°15'E.) are useful landmarks for approaching the river entrance. The entrance itself is easily distinguished from seaward.

Pilotage.—Pilotage is compulsory, and the pilot station on Yamba Head may be contacted via VHF or visual signals. No special watch is kept, but signals will be answered if seen. The pilot boards about 0.7 mile E of the S breakwater head.

Regulations.—The limits of the port are defined by a line drawn between the breakwater heads.

Anchorage.—Anchorage may be had, in a depth of 6m, off several white piles at **Iluka** (29°25'S., 153°21'E.).

Mount Doubleduke, steered for on a W bearing, is an excellent mark for making the river entrance from seaward. The entrance and channel above the breakwaters require extensive local knowledge, therefore no directions are given.

Between the entrance to the Clarence River and Evans Head, 18 miles NNE, the coast is formed by a low sandy beach, backed by swampy ground, covered with grass and scrub. Wooded Bluff, 3 miles N of the entrance to the Clarence River, is reported to be a good radar target up to 14 miles.

South Evans Reef (29°12'S., 153°26'E.) is comprised of a number of shoal patches over which the sea sometimes breaks, and lies about 5 miles SSW of Evans Head. North Evans Reef, which dries, lies on a bank with depths of less than 11m, 2 miles SSE of Evans Head. Deep-draft vessels should not approach this part of the coast within 3 miles.

Evans Head (29°08'S., 153°28'E.) is a low, sandy point. Air bombing and gunnery practice take place S and N of Evans Head. A 33m patch lies 8.5 miles ENE of Evans Head.

Evans Head to Danger Point

5.24 Between Evans Head and Danger Point, 58 miles N, the coast is bold, and in parts has a rugged aspect from offshore, although much of the intervening coast is low and sandy. Cape Byron, the E extremity of the Australian Continent, lies midway along this stretch of coast.

The **Evans River Entrance** (29°07'S., 153°26'E.) lies 2 miles NW of Evans Head. The town of Evans Head stands on the W entrance point to the river, with an airfield W of it. A water tower stands 0.5 mile WNW, and water tanks 1 mile NW, respectively, of the same point. A road bridge, with a vertical clearance of 3m, spans the river, 0.7 mile above the entrance. Breakwaters extend from each side of the entrance to the river. Lights are shown from the head of both breakwaters. The channel within the entrance is marked by lighted beacons. No attempt should be made to enter the river at night without local knowledge.

From the entrance to the Evans River, a barren, sandy, and swampy coast, covered with low scrub and a few trees, extends 17 miles NNE to the entrance to the Richmond River. This river, for 12 miles SSW from its entrance, flows nearly parallel with the coast, and is separated from the sea by a low strip of land, 1 to 2 miles wide. Two conspicuous gray tanks stand 4 miles NW of the Evans River entrance.

5.25 South Riordan Shoal (29°00'S., 153°30'E.), with a depth of 10.4m, lies 1.5 miles offshore, midway between Evans Head and the Richmond River entrance. North Riordan Shoal, with a depth of 9.1m, lies 2.5 miles NNE of South Riordan Shoal.

The Richmond River is approximately 120 miles long and navigable by small vessels to the town of Lismore, 70 miles above the entrance. Several towns and villages are situated on the river bank. The river is entered between two breakwaters which show lights at their heads.

Ballina Head, on the N side of the entrance, shows a light. The pilot and signal station stands close to the light. A continuous watch is not kept: night watch is not maintained, but visual signals will be answered if observed.

Tides—Currents.—Tidal currents at the river entrance attain a rate of 3 to 3.5 knots, decreasing to the head of tidal influence, approximately 35 miles upriver. The flood current sets into the river round the N breakwater in a S direction; the ebb current sets out along the channel and round the N breakwater in a NE direction.

Depths—Limitations.—All dangers E of the entrance are contained within a distance of 0.5 mile offshore. Depths over the sandy bar across the entrance are subject to change. In 1988, the minimum depth reported on the leading line over the bar was reported to be 2.5m. The bar is sounded occasionally and local authorities should be contacted for the latest information before planning a voyage here. Numerous shoals and sand flats lie in the river.

Pilotage.—Pilotage is compulsory. Vessels should pay strict attention to the signals displayed at the signal station. Pilots board 0.7 mile SE of Ballina Head.

5.26 Ballina (28°51'S., 153°34'E.) (World Port Index No. 53520) lies at the entrance to the Richmond River and comprises Ballina and West Ballina on the N bank of the river, and South Ballina on the S bank. It is a first port of entry for vessels arriving from New Guinea, New Zealand, and the Pacific Islands.

There are several berths at Ballina. The Commercial Boat Harbor has a depth of 2.7m.

It is advised that vessels use caution, as the position of the buoys can not be relied on due to tidal currents and other circumstances which may move them.

Regulations.—The port limits are defined by a line drawn between the breakwater heads.

The quarantine line for the port is drawn N-S from the W entrance point of the boat harbor at Ballina.

Vessels must not exceed a speed of 8 knots in the approaches to, or in the channel of the Richmond River. Vessels should sound a warning blast and reduce speed to slow when passing the drydock. Overhead cables cross the river and care must be taken when navigating near them.



Courtesy of Colin Cooksex

Ballina

Coastal Features

5.27 Between Ballina Head and Cape Byron, about 14 miles to the N, the coast trends about 1.5 miles ENE to Sand Point, off which a reef extends about 0.4 mile E.

From Sand Point, the coast trends about 2.2 miles N to Lennox Head. A rock, with a least depth of 5m, lies about 0.2 mile offshore E of Lennox Head. From Lennox Head the coast is lower and trends about 10 miles N to Cape Byron. Broken Head, with an above-water rock, known as Cocked Hat Rock, lying close N, is located about 6 miles N of Lennox Head.

Cape Byron (28°38'S., 153°38'E.), is a steep head which appears as white cliffs from the E. The cape extends about 2 miles ENE from the foot of coastal hills, and in the approaches from S or N it looks like an island. The cape has been reported to give good radar returns up to 14 miles. Foul ground extends 0.1 mile off its E side and a reef extends about 0.3 mile N from the NE end of the cape. A strong rip tide may be encountered off the cape.

Cape Byron Light is shown from a tower situated on the E side of the cape. A conspicuous water tank stands 1.2 miles SW of the cape, and a tower stands 4.5 miles WSW of the cape. Juan and Julia Rocks lie 1.5 miles NNW of Cape Byron. A 10.4m patch lies about 0.2 mile N of the rocks.

Byron Bay (28°38'S., 153°37'E.) (World Port Index No. 53510) lies in a bight which indents the N side of Cape Byron. The bay is a first port of entry for vessels from New Zealand only. A canning factory is situated at the W end of town, with two beacons standing close together E, and the remains of a demolished jetty 0.2 mile NW of it, respectively. The flood tidal current sets E round the bay at a rate of 0.5 knot.

Anchorage may be obtained in Byron Bay, in a depth of 13m, midway between the demolished jetty and Juan and Julia Rocks, but there is considerable swell.

From Cape Byron to the entrance to the Brunswick River, 7.5 miles NW, the coast is formed by a sandy beach, backed by low grass covered hills.

Brunswick River Entrance (28°32'S., 153°32'E.) lies between two breakwaters on the heads of which are lights. A rock, which dries 1.2m, lies close off the entrance. Inside the entrance the river divides into three arms. Training walls extend on either side of the breakwaters. A boat harbor is situated on the S side of middle arm, on the E entrance point of which there is a light.

The town of Brunswick Heads is situated at the junction of south and middle arms of the river. The village of New Brighton is situated on north arm, 1.7 miles N of the entrance to the river.

Hastings Point (Cudgera Headland), with foul ground extending about 0.5 mile E from it, lies about 11 miles N of the Brunswick River entrance. Mount Warning, 1,155m high and about 17 miles W of Hastings Point, is a prominent peak visible for about 100 miles. A conspicuous tower stands about 4 miles WNW of Hastings Point. An 8.2m patch lies about 2.5 miles S of the point.

5.28 Fingal Head (28°12'S., 153°34'E.), on which a light is shown, lies about 10 miles N of Hastings Point. Fingal Head is reported to give good radar returns up to 18 miles. A white 28-story building stands about 1 mile W of Fingal Head. A 4.2m reef lies between the head and Cook Island, located about 0.5 mile to the ENE. Cook Island is also a good radar target up to 15 miles.

Anchorage.—Anchorage may be obtained, in a depth of 13m, off the NW side of Cook Island.

Danger Reefs, three rocky patches over which the sea breaks, lie up to about 3.5 miles E of Fingal Head. Inner Reef, with a depth of 2.7m and Outer Reef, with a depth of 5.2m, lie about 1.5 miles and 3.5 miles E of Fingal Head. South Reef, with a depth of 4.9m, lies about 2 miles ESE of the head. There are several patches of shoals having depths of 9.1 to 13m between these reefs. Small craft with local knowledge use the passage between Cook Island and Inner Reef.

Danger Point (28°09'S., 153°33'E.) lies about 2.2 miles NNW of Fingal Head, on the N side of the mouth of the Tweed River. A light is shown from the N side of the point. The point is reported to give good radar returns up to 22 miles.

The Tweed River is entered between the NW end of a narrow sandy peninsula, which extends 2 miles NNW from Fingal Head, and Danger Point, 0.2 mile to the N. When waiting for the tide to enter the river, good anchorage may be obtained, in a depth of 15m, 1.2 miles NW of Danger Point. Two breakwaters, with a light shown from each head, form the entrance to the Tweed River. Within the entrance, the banks are fronted by training walls. A lighted beacon is shown from a crosswall, 0.5 mile within the entrance.

The town of Coolangatta is situated on the N side of the river entrance, with the town of Tweed Heads SW of it. There are several towns on the river banks above the entrance, but owing to shoaling, only small vessels drawing 1.4m can reach the town of Murwillumbah, 15 miles upriver.

A signal station stands on Danger Point; communications can be made by visual signals. At night, a red light indicates that the bar is dangerous and a green light indicates the bar is safe.

Depths—Limitations.—The bar, which is subject to frequent change, is exposed to the ocean swell, and can be very

dangerous on the ebb tide, and in heavy weather. It should only be crossed on the flood tide, and then only by vessels with local knowledge, or advice from the District Officer. The bar, which has a depth of 2.9m, is sounded regularly. Local authorities should be consulted for the latest information before planning a voyage here.

After heavy weather, a narrow spit, known locally as Lettitia Spit, extends N from the S shore, and reduces depth and the width of the channel, which scours out again. When the channel is near Danger Point, the bar can only be crossed in a calm sea.

Pilotage.—No pilotage is available. No attempt should be made to enter the river without consulting the District Officer who, while taking no responsibility, will assist and advise as far as possible.

Danger Point to Moreton Island

5.29 The coast from Danger Point to Point Lookout, 44 miles N, may in good weather, be approached to a distance of 1 mile, except off the entrance to the Nerang River, 14.5 miles NNW of Danger Point, where a 6.4m patch, was reported to lie 1 mile ENE of the river entrance. The depths off the entrance to the river are subject to frequent changes. Jumpin Pin, between South Stradbroke Island and North Stradbroke Island, 12 miles N of the Nerang River entrance, has shoal depths extending 1 mile offshore, and is subject to frequent change.

Burleigh Heads (28°05'S., 153°27'E.), 6.5 miles NW of Danger Point, is a prominent, bold, rocky headland that is bare of trees on its seaward side. The towns of Palm Beach and Tugun front the coast for 4 miles SSE of the headland. A creek enters the sea on the S side of Burleigh Heads.

The Nerang River enters the sea between Nerang Head on the S side, and **Porpoise Head** (27°57'S., 153°26'E.), the S end of South Stradbroke Island, on the N side. The ebb current sets strongly out of the entrance, which is very shallow. Coastal steamers call at Southport, 2 miles inside the river entrance. There is a jetty at Southport with a depth of 3m alongside its head.

From the Nerang River entrance to Point Lookout, the E coasts of South Stradbroke Island and North Stradbroke Island, and the N coast of the latter island between Point Lookout and Amity Point, 6 miles WNW, are formed by sandy beaches. Broadwater, separating the S island from the mainland, is filled with low islands and sand banks, and is only navigable by small craft.

Point Lookout (27°26'S., 153°33'E.) shows a light and forms the NE extremity of North Stradbroke Island. Boat Rock, 1.3m high, lies on the outer end of a reef, which extends 1 mile NE from Point Lookout. The point has been reported to give good radar returns up to 15 miles. Shag Rock, 3m high, lies 1 mile NW of the N end of Point Lookout.

Flat Rock, 3m high, with a rock awash off its S side, lies 2.5 miles N of Point Lookout. A 7.3m patch, over which the sea breaks heavily during SE gales, lies about 0.2 mile NNE of Flat Rock, and a 19.8m patch lies about 1.2 miles NE of the rock. The passage between Boat Rock and Flat Rocks should not be used without local knowledge.

5.30 Amity Point (27°24'S., 153°27'E.) forms the NW extremity of North Stradbroke Island. There is a jetty 0.3 mile S of the point.

Anchorage.—Anchorage can be obtained off the coast between Amity Point and Point Lookout, in good weather or off-shore winds, in depths of 11 to 15m, 0.5 to 1 mile WNW of Shag Rock.

South Passage leads into Moreton Bay through the narrow entrance between Amity Point and Reeders Point, the S extremity of Moreton Island. The entrance is considered dangerous as the bar and banks on either side are exposed to the sea. The bar is subject to such frequent change in position and depth that reliable directions cannot be given. Only light-draft vessels with local knowledge use this passage.

Tidal currents through the entrance to South Passage attain a rate of 3 to 4.5 knots. Farther W of Amity Point the rate is reduced to 2 to 3 knots. South Passage merges with Rous Channel in Moreton Bay.

Rainbow Channel (27°27'S., 153°25'E.) lies between Amity Bank and a drying mud flat lying up to about 1 mile off the W side of North Stradbroke Island. The channel is marked by beacons and buoys. The channel trends about 7 miles S from Amity Point to Peel Island, an islet about 7 miles SSW of Amity Point.

Moreton Island (27°12'S., 153°24'E.) extends about 20 miles N from South Passage. It is separated from the mainland, about 15 miles W, by Moreton Bay. The S part of the island is low and sandy, but it becomes quite hilly to the N. Mount Tempest, 310m high, lies near the middle of the island. Cape Moreton, the NE extremity of the island, shows a light. North Point lies about 0.7 mile from Cape Moreton and shows a light. Cape Moreton has been reported to give good radar returns up to 23 miles.

Henderson Rock, with a depth of 9.1m, lies about 6 miles SSE of Cape Moreton. An 18.3m rocky patch lies 3.5 miles SSE of the same cape. Roberts Shoal, with a depth of 12.2m, lies 1 mile E of the cape. Hutchison Shoal, with a depth of 6.7m, lies 5.2 miles N of Cape Moreton.

Between Roberts Shoal and Hutchison Shoal is Brennan Shoal, with a depth of 8.5m; Smith Rock, with a depth of 3m, and which breaks occasionally; and Flinders Reef, with an above-water rock on its NE end that dries 1 to 2m. The above shoals and rocks are covered by the red sector of North Point Light.

5.31 Moreton Bay (27°20'S., 153°15'E.), through which the approach channel to Brisbane passes, is a large body of water lying between North Stradbroke Island and Moreton Island and the mainland to the W. The bay is about 38 miles long from N to S and from 9 to 17 miles wide, narrowing toward its S end, where it is encumbered with numerous islets.

The main approach is from the N through the banks and shoals encumbering the entrance, the most important channel being Northwest Channel. Small vessels of light draft may enter from the E through South Passage. Local knowledge is required for this body of water.

An area through which surface navigation is permitted, but anchorage is prohibited, exists in Moreton Bay; it lies centered

in position 27°14'36"S, 153°21'06"E, and is 1 mile in radius. Caution should be exercised when transiting this area.

Tides—Currents.—The tidal currents set obliquely across the channels, necessitating great caution. The general set of the flood current is S, and the ebb N, but in places the directions are varied by the shoals.

The strength of the tidal current is much less near the middle of the bay than along either shore. The tidal currents S of the shoals encumbering the N entrance are weak, until S of Mud Island, 15 miles S of **Skirmish Point** (27°05'S., 153°12'E.).

On the W shore abreast Skirmish Point, the flood current attains a rate of 3.5 knots at springs. On the E shore abreast Cowan Point, the rate is 2.5 to 3.5 knots, causing a short sea, which is dangerous to small craft during SW winds.

The flood current is felt as far S as Russell Island, which lies off the W side of the S end of North Stradbroke Island. Abreast the banks, which lie off the W side of Amity Point, the ebb sets strongly NE through South Passage. The vicinity of shallow water throughout Moreton Bay is often indicated by tide rips.

Depths—Limitations.—The 20m curve lies across the N approach to the Port of Brisbane, from Flinders Reef to a position about 1 mile E of Caloundra Head. Shoals and banks, with depths of less than 2m, extend from the NW end of Moreton Island to within about 1 mile of the coast about 1.5 miles S of Caloundra Head.

Several channels lead into Moreton Bay through the above-mentioned shoals and other shoals and banks S. The fairways through the bay are subject to frequent change and the buoyage marking these channels is altered accordingly.

North West Channel, the main approach from seaward, has a maximum depth of 14m and extends about 14 miles to a point off the WSW extent of Spitfire Banks (27°01'S., 153°16'E.). Spitfire Channel, with a depth of 14m, leads from North West Channel to the NE terminus of Main Channel.

Main Channel offers deep water for most of its length, but has a controlling depth of 9.7m in its SW leg.

Deep-draft vessels normally use East Channel, entered abreast of **Cowan Cowan Point** (27°08'S., 153°22'E.). East Channel, leading between Middle Banks and Ridge Shoal, has a dredged depth of 14m. North East Channel, entered about 6 miles NW of North Point Light (27°02'S., 153°27'E.), has a depth of 5.5m and is used by local traffic only.

Underkeel clearances are required (2001) in the approach channels, as follows:

1. North West Channel:
 - a. Vessels with a beam of less than 35m—1.6m.
 - b. Vessels with a beam of 35m and over—1.8m.
2. Spitfire Channel—1.2m.
3. East Channel—1.2m.
4. Brisbane Channel Entrance to Swing Basin—1.0m.
5. The Brisbane River above Swing Basin—0.6 to 0.9m.

A spoil ground, with a radius of 0.7 mile, is centered about 1.4 miles, bearing 139° from Lighted Beacon No. 3.

A spoil ground, with a radius of 0.7 mile, is centered a little over 2 miles ENE of the water tower charted in 27°04'18"S, 153°12'12"E.

A spoil ground, with a radius of 0.7 mile, is situated 8.5 miles, bearing 167° from the tower charted in position 26°48'00"S, 153°08'24"E. A spoil ground, with a radius of 0.7 mile, is centered about 5.5 miles, bearing 172° from the same

tower. A spoil ground, with a radius of 1 mile, is centered about 4.8 miles, bearing 121° from the same tower.

Aspect.—The N approach to Moreton Bay can be easily identified by Cape Moreton and Caloundra Head, both of which are prominent. Mount Tempest is a conspicuous landmark on Moreton Island.

The Glass House Mountains are three adjacent peaks rising abruptly from the coastal plain.

5.32 Mount Beerwah (26°54'S., 152°53'E.), 553m high, lies about 15 miles WSW of Caloundra Head and is visible for about 50 miles. Coonowrin, 390m high and cylindrical in shape, lies about 1.2 miles E of Mount Beerwah. Tibrogargan, 350m high, lies about 2.5 miles SE of Coonowrin.

Cowan Cowan Point (27°08'S., 153°22'E.), on the W side of Moreton Island, shows a light and is easily identified. Tangalooma Point, S of Cowan Cowan Point, is prominent and readily made out by Ship Patch, a sandy patch resembling a vessel under sail.

Mud Island and the outer channel entrance lighted beacons, about 2 miles WNW, are prominent marks for the Brisbane River entrance channel. Several towns lie on the W side of the central part of the bay. A conspicuous water tower stands at Margate, about 7 miles NW of the outer beacons of the entrance channel. Cleveland Point Light, about 10 miles S of Mud Island, is easily recognized by a pier extending N from the point.

Brisbane (27°28'S., 153°04'E.)

World Port Index No. 53490

5.33 The port of Brisbane is situated at the entrance to the Brisbane River, near the head of Moreton Bay. The port offers facilities for the handling of container, bulk petroleum, and bulk solid commodities, as well as general cargo.

Port of Brisbane Corporation

<http://www.portbris.com.au>



Port of Brisbane Corporation

Brisbane—Fisherman Island

Tides—Currents

The tidal rise in the Brisbane River is 2.1m. The tidal current attains at springs a rate of about 2 knots in the upper reaches of the river, and of about 3 knots below Hamilton Reach Cutting. Strong tidal effects have been reported by vessels alongside berths.

At South Brisbane Drydock, opposite Gardens Point, the flood current runs for 5 hours and the ebb for 7 hours 30 minutes. Slack water occurs from 12 to 30 minutes after HW and LW. Tidal influence is felt as far upstream as Ipswich. Freshets in the river may make navigation dangerous.

Depths—Limitations

Brisbane Entrance Channel is entered from Brisbane Roads, about 9 miles NE of Luggage Point. The channel is dredged to a depth of 14m as far as the S edge of the turning basin S of Luggage Point, then 9.1m to the ANL Wharf (27°27'S., 153°03'E.), and 8m from the ANL Wharf to the Mercantile Wharf, about 0.3 mile SE. It has been reported that all berths upstream of the Mercantile Wharf have been closed to commercial traffic.

An overhead power cable, with a vertical clearance of 48m, spans the channel just S of the ANL Wharf.

Submarine cables and pipelines, as well as ferry traffic, cross the channel at various places along the river and are best seen on the chart.

Information on berthing facilities in Brisbane is given in the accompanying table below.

Pilotage

Pilotage for Brisbane and Moreton Bay is compulsory for vessels over 35m in length. Vessels should radio their ETA and request for pilotage at least 24 hours in advance, confirming 8 hours before arrival. Pilotage is also available for the Inner Route or other Queensland coastal ports from the Brisbane Pilotage Service by prior arrangement.

Vessels should contact Brisbane Harbor 2 hours before ETA on VHF channel 12 for instructions.

The pilot boarding ground is situated about 3 miles SE of Point Cartwright, near Caloundra Head, but a vessel will be met outside the boarding ground if the situation requires it.

Visual signals may be exchanged with the signal station on Caloundra Head, or the station may be contacted via VHF.

Brisbane Marine Pilots

<http://www.brisbanepilots.com.au>

Regulations

The quarantine anchorage is situated just E of the Brisbane River channel entrance.

Vessels with explosives must not proceed SW of a line joining Woody Point, Outer Bar Entrance lighted beacons, St. Helena Island, and the N point of North Stradbroke Island.

Commercial explosives must not be brought into the Brisbane River if the quantity on board exceeds 9kg.

A Vessel Traffic Service operates in Brisbane. Inbound vessels should report to Brisbane Port Control not less than 30 minutes before entering Bar Cutting. Outbound vessels should report not less than 5 minutes before ETD and again on passing the entrance beacons.

Vessels over 35m long should not enter the port of Brisbane without permission from the harbormaster.

No tanker containing a cargo with a flash point below 66°C may move in the river at night, except by express permission of the harbormaster's office. A tanker may not pass any other vessel in the dredged cuttings upriver of Luggage Point. Vessels, except loaded crude oil tankers over 213m in length, may only pass similar vessels in the 230m wide part of Inner Bar Cutting. Loaded crude oil tankers will be given a clear river at all times. Only vessels under 153m long may be passed seaward of Inner Bar Cutting, but those under 107m in length may pass in any part of the river cuttings.

Brisbane—Berthing Facilities (2003)			
Berth	Length	Depth alongside	Remarks
Fisherman Island Terminal			
Berth No. 1	200m	13.5m	General cargo, ro-ro, and containers.
Berth No. 2	200m	13.8m	General cargo, ro-ro, and containers.
Berth No. 3	300m	13.8m	General cargo, ro-ro, and containers.
Berth No. 4	300m	13.1m	General cargo, ro-ro, and containers.
Berth No. 5	250m	13.0m	General cargo, ro-ro, and containers.
Berth No. 6	150m	13.1m	General cargo, ro-ro, and containers.
Berth No. 7	210m	12.9m	Containers.
Berth No. 8	—	12.7m	
Caltex Crude Berth	260m	14.3m	Petroleum products.
Grain Wharf	240m	13.2m	

Brisbane—Berthing Facilities (2003)			
Berth	Length	Depth alongside	Remarks
Coal Wharf	240m	13.2m	
P. and O. Terminal (Hamilton Terminal)			
Cold Stores	—	4.5m	To be developed.
Berth No. 1	140m	10.4m	General cargo, vehicles, and containers.
Berth No. 2	240m	9.8m	General cargo, bulk, vehicles, and containers.
Berth No. 3	170m	10.4m	Bulk liquid, general cargo, and vehicles.
Berth No. 4	210m	10.4m	Bulk liquid, dry bulk, and general cargo.
Patrick Terminal (Maritime Terminal)			
Berth No. 1	170m	9.1m	Bulk liquids and vehicles.
Berth No. 2	255m	9.9m	General cargo, ro-ro, vehicles, and containers.
Berth No. 3	260m	10.2m	General cargo, ro-ro, vehicles, and containers.
Other Facilities in Brisbane			
BP Luggage Point	320m	14.3m	Crude oil discharge. Maximum vessel length of 280m.
Caltex Products Wharf	180m	9.8m	Petroleum products.
QCL Wharf	220m	9.4m	Gypsum and bulk clinkers.
BP Products Wharf	240m	10.6m	Petroleum products.
Shell Wharf	220m	11.0m	Petroleum products.
Pacific Terminals	180m	9.1m	Bulk tallow and bulk liquids.
INCITEC North Wharf	122m	9.7m	Dry bulk.
INCITEC South Wharf	150m	10.4m	Dry bulk and bulk liquids.
Pinkenba 1	256m	10.7m	Grain, dry bulk, and general cargo.
Pinkenba 2	—	10.5m	
Sugar Terminal	270m	10.1m	
Mobil Products Wharf	190m	8.3m	Petroleum products. (Wharf closed)
ANL Newstead	—	7.4m	Wharf closed.
Cairncross Breating	—	7.1m	
Cairncross Fitting Out	300m	8.5m	Maximum vessel size of 85,000 dwt.
Note. —All berths require an underkeel clearance of 0.3m.			

There is a speed limit of 10 knots in the Brisbane River between the entrance and Luggage Point and 8 knots thereafter. A minimum speed consistent with safe navigation should be used when passing wharves, moored vessels, dredges or barges, and in particular when passing the harbor oil fuel lighter, whether moored or under tow.

As the slightest surging of a container vessel during cargo operations could cause considerable damage, vessels should approach at a minimum speed possible when the container

boom is in the lowered position, and, if possible stop engines when passing.

Signals

The Pilotage Control Signal and Radar Station, Caloundra Head and Harbor Control Radar Station, Whyte Island, keep a continuous watch and can be contacted on VHF channel 16.

Weather signals are displayed from the customhouse flag-staff on the W side of Town Reach. These signals are displayed

on weekdays from 1030 to 1630, and on Saturdays from 1030 to 1200.

Channel signals.—A deep-draft vessel, equipped with a radiotelephone and intending to use the dredged Northwest Channel, Spitfire Channel, and East Channel should advise its intention by radio.

Vessels, not equipped with radiotelephone, should fly the International Code Flags HI and in addition the Morse Signal HI by flashing light directed towards approaching vessels (day or night).

At night, a vessel of more than 40m in length, shall exhibit two green lights, disposed vertically, when navigating in the Brisbane River.

Anchorage

Anchorage may be obtained in any part of Moreton Bay among the shoals, the bottom being sand, fine silt, and mud. Caution is necessary as a heavy sea, caused by N to NE winds, combined with the strong tidal currents experienced in parts of the bay, can cause vessels much difficulty.

In Brisbane Road, anchorage, in 8.4 to 9.1m, mud, may be anywhere up to about 4.5 miles WNW of Mud Island or N of a line from the N end of that island to Woody Point. The quarantine anchorage, situated 1 mile E of West Entrance Lighted Beacon No. 1, has a least depth of 5.7m.

Yule Road (27°05'S., 153°20'E.) affords temporary anchorage in good weather with Cowan Cowan Light bearing 161°, distance 3.7 miles. Small vessels may obtain anchorage in Tangalooa Roads, in depths of 11 to 16m. Some protection from W gales is afforded by Sholl Bank, and in SE gales is the best anchorage on the W coast of Moreton Island, where little current is felt.

Vessels may anchor, in 9.1 to 11m, with **Cleveland Point** (27°31'S., 153°17'E.) bearing 242°, distance 1 mile, and the S end of Peel Island bearing 110°. Anchorage, in not less than 5.5m, good holding ground, may be found about 0.7 mile NE of Cleveland Point.

Directions

The channels through Moreton Bay, although well-marked, require extensive local knowledge. Strong cross-channel sets are experienced in many portions of the bay and must be guarded against.

Caloundra to Sandy Cape

5.34 Raper Shoal (26°46'S., 153°10'E.), over which the sea breaks, is a 3.6m shoal lying about 1 mile offshore and 3 miles N of Caloundra Head. Point Cartwright, from which a light is shown, lies about 7.5 miles N of Caloundra Head. A conspicuous water tower stands close E of Point Cartwright Light.

Mooloolaba Harbor (26°41'S., 153°08'E.), at the entrance to the Mooloolaba River, is entered between two breakwaters and lies 0.3 mile W of Point Cartwright. There is a depth of 2.7m over the bar outside the entrance. Range lights mark the center of the channel.

A channel, dredged to 3m, leads to a mooring basin dredged to a least depth of 2.1m, on the N side of the harbor close inside the entrance. Shoaling has been reported (1996) in this entrance. The channel is marked by lighted beacons. The W limit of the channel is marked by a beacon.

A prohibited anchorage extends 0.6 mile E from the coast 3 miles S of Point Cartwright.

The **Maroochy River** (26°39'S., 153°05'E.), which enters the sea 3 miles NNW of Point Cartwright, can only be used by small boats in good weather and local knowledge. The bar usually has a depth of 0.8m, but is subject to change.

Gneering Shoal, with a depth of 6.7m, lies 2.5 miles NNE of Point Cartwright. The sea breaks over the shoal in bad weather. A reef, with a depth of 10m, lies 3 miles NE of Point Cartwright. A rocky shoal, with a depth of 12.8m, lies 1 mile ESE of Leach Shoal. A lighted buoy is moored about 0.2 mile ENE of Leach Shoal. Broken water is reported to have been seen SE of the rocky shoal and it is advisable to give this part of the coast a wide berth. The sea breaks over the above shoals in bad weather.

Arkwright Shoal (26°33'S., 53°07'E.), with a depth of 7.6m, rock, lies on the outer end of a spit, which extends 1.2 miles E from Arkwright Point. Hancock Shoal, with a depth of 9.1m, lies 2.5 miles NNE of Arkwright Point.

Noosa Head, bold and rocky, is the N end of a ridge of sand hills, partially covered with scrub, which runs parallel with the coast and lies 9.5 miles N of Arkwright Point.

Laguna Bay, on the W side of Noosa Head, affords anchorage, close in, sheltered from the S and SE gales, in depths of 11 to 13m, 1.5 miles WNW of Noosa Head. This anchorage is not recommended should the wind shift to the E.

5.35 The Noosa River (26°25'S., 153°04'E.), which discharges into the SW part of Laguna Bay, about 2 miles W of Noosa Head, has depths of 0.6 to 1.2m over a shifting entrance bar. The channel is marked by buoys and beacons and, when practicable, lights are shown which lead to the entrance. The river connects with a series of shallow lagoons paralleling the coast close inland for about 11 miles to the N.

Double Island Point (25°56'S., 153°12'E.) lies 28 miles N of Noosa Head. The point shows a light and has been reported to give good radar returns up to 17 miles. There is a signal station at the lighthouse. A red pendant displayed at the lighthouse indicates a storm warning message has been received and will be signaled on request.

Wolf Rock, awash, lies 1.2 miles NNE of Double Island Point, with a 4m rocky shoal between it and Double Island Point.

Wide Bay lies between Double Island Point and **Inskip Point** (25°49'S., 153°04'E.), 10.5 miles to the NW. The shore of the bay is formed by a sandy beach, backed by sand hills. The bay affords anchorage, as long as the wind is S of ESE, in a depth of 11m, 2.5 miles W of Double Island Point.

Fraser Island (Great Sandy Island) (25°11'S., 153°10'E.), which lies with Hook Point, its S extremity, 1.2 miles ENE of Inskip Point, is formed by a range of barren sand hills and cliffs with stunted trees. The E coast is an unbroken sandy beach, which extends 50 miles to Indian Head. Boomerang Hill rises 19 miles SSW of Indian Head and is one of the few hills

easily identified. A conspicuous radio tower stands 6 miles NE of Boomerang Hill.

Indian Head (25°00'S., 153°22'E.), the E extremity of Fraser Island, is a steep bluff promontory and when seen from N or S appears as an island. Waddy Point, similar to Indian Head, lies 3 miles N of the head. A conspicuous radio tower stands 2 miles W of Waddy Point.

Between Waddy Point and Sandy Cape, 17 miles NNW, the coast continues as a sandy beach, off which anchorage may be obtained in offshore winds.

5.36 Sandy Cape (24°42'S., 153°16'E.), the N extremity of Fraser Island, is a prominent headland and an excellent landmark when proceeding by the Inner Route to Torres Strait. The cape has been reported to give good radar returns up to 14 miles. Sandy Cape Light is situated 3.5 miles SW of the Cape. There is a signal station at the light, equipped with a radio-telephone. A racon transmits from the light. A red pendant displayed at the light indicates a storm warning message has been received and will be signaled on request.

The site of a historic wreck, protected from unauthorized interference, lies 6 miles S of Sandy Cape.

Breaksea Spit, which dries in places and is formed of dead coral and sand, over which the sea breaks heavily, extends 19 miles NNW from Sandy Cape. Vessels should exercise caution when approaching Breaksea Spit, as both the ebb and flood currents set strongly across it. In daylight, during good weather, the broken water on the edge of the spit can generally be seen at a distance of 5 to 6 miles.

Sandy Cape Shoal (24°35'S., 153°20'E.), with a depth of 2.7m, and over which the sea breaks in bad weather, lies 8 miles NE of Sandy Cape. Patches, with depths of 13.1m and 19.2m, lie 1.5 miles S and 4.5 miles SSE, respectively, of Sandy Cape Shoal. Except in cases of necessity, vessels should pass E of Sandy Cape Shoal, and at night, should keep in depths of more than 65m.

Long Shoal, with a depth of 4m, and over which the sea breaks in bad weather, lies 13 miles NNW of Sandy Cape. Depths of less than 11m extend 1.2 miles N and 5 miles SW, respectively, of Long Shoal.

Porpoise Shoal (24°38'S., 153°09'E.), with a depth of 5.5m, lies 7.5 miles NW of Sandy Cape. Four patches, with depths of 11 to 16.5m, lie between 4 and 8 miles WNW of Porpoise Shoal.

Great Sandy Strait

5.37 Great Sandy Strait (25°30'S., 152°59'E.) separates Fraser Island from the mainland and is approximately 40 miles long. From Wide Bay Harbor, which lies within the S entrance of the strait, the channel leads N to the entrance of the Mary River, and then N into Hervey Bay. Only those with local knowledge can navigate the strait.

Pilotage.—If a pilot is required for Great Sandy Strait, notice should be given at the harbor office at the port of departure at least 24 hours before sailing. The ETA and the ship's draft should be sent with the request for pilotage.

The quarantine anchorage for any part of the Port of Maryborough lies 1 mile N of the fairway entrance buoy.

5.38 South entrance to Great Sandy Strait.—The bar across the entrance to Wide Bay Harbor, which leads into the S part of the strait, can be seen by the discoloration of the water or the sea breaking over it. The bar can only be crossed during good weather, at or near HW, and by light-draft vessels with local knowledge.

There is a least charted depth of 4m over the bar in the channel entrance. The entrance between Hook Point and Inskip Point has depths of 9.1 to 29m between steep-to shores, and inside the entrance there are depths of 7.5 to 21.9m. A light is shown from a position about 0.7 mile N of Hook Point.

Depths—Limitations.—The channels through Great Sandy Strait are marked by range beacons, buoys, and beacons, most of which are lighted. The depths in the channels are subject to frequent changes and the navigational aids are moved to meet them. The least depth in the strait, through the banks between South White Cliffs and Sheridan Flats 3 miles WSW, is normally from 0.6 to 1.4m. For the latest information regarding the depths, contact the Port Officer, Brisbane, or the harbormaster, Maryborough; the Australian Notice to Mariners should be obtained.

Anchorage.—Anchorage may be taken, in 7.3 to 21.9m, in the deep channel in Wide Bay Harbor. Good anchorage will be found in 10 to 18.3m, about 0.2 mile off the SW side of Fraser Island and about 1.5 miles NW of the W end of Inskip Point. The latest available information should be sought from Tin Can Bay Coast Guard.

Hervey Bay

5.39 Hervey Bay (24°55'S., 152°52'E.) is entered between Sandy Cape and South Head, the S entrance point to the Burnett River, 47 miles W. During NW winds the bay offers little shelter and as hazy visibility generally accompanies these winds, those without local knowledge should proceed with caution. If proceeding to Great Sandy Strait, keep in depths of more than 13m until an accurate position is obtained. During N, NE, and SE winds, good shelter is obtainable in Platypus Bay on the E side of Hervey Bay.

Ferguson Spit, with depths of less than 11m, extends 3.5 miles NNW from **Rooney Point** (24°49'S., 153°07'E.). The coastline in this area is low and sandy, backed by sand hills.

Platypus Bay (24°57'S., 153°09'E.) lies between Rooney Point and Moon Point (Sandy Point), 25 miles SSW. The shore is formed by a sandy beach, backed by wooded high land, with several fresh water lagoons in its N part.

The bay affords good anchorage, in depths of 13 to 24m, sheltered from winds between SE and N, but there is a short sea with inshore winds. Small vessels can anchor in Lagoon Anchorage, 3 miles N of Triangle Cliff, in depths of 7 to 11m, 0.5 to 1.5 miles offshore.

The W shore of Hervey Bay between South Head, the Burnett River, and Vernon Point, 37 miles SE, is formed by sandy beaches interspersed with rocky points. A conspicuous tower stands 0.7 miles N of **Elliot Heads** (24°56'S., 152°30'E.). Burrum Point lies 15.5 miles SE of Elliot Heads, with the entrance of the Burrum River 2 miles SSW of it, and appears as a thickly-wooded point from the vicinity of Great Sandy Strait Fairway Buoy.

The **Burrum River** (25°11'S., 152°35'E.), whose entrance is easily recognized as it shows a well-defined opening in the coast, is navigable by small vessels of 1.8m draft to Howard, a mining town, 14 miles upriver. The bar and channel are marked by beacons. Within the bar there is safe anchorage, in a depth of 5m.

Vernon Point lies 11 miles SE of Burrum Point. The town of Pialba is situated 3 miles SSE of Vernon Point. A radio mast, marked by lights, stands midway between the point and the town.

5.40 Port of Maryborough (25°53'S., 152°43'E.) (World Port Index No. 53470) includes the oil port of **Urangan** (25°18'S., 152°53'E.) and is accessible from sea via Hervey Bay and Great Sand Strait.

The port is no longer used commercially except for fishing.

Depths—Limitations.—Urangan Boat Harbor, marked by lighted beacons, lies on the SE side of Dayman Point, but in 1990, depths in the entrance were reported to be uncertain and the harbor should not be used without local knowledge.

Pilotage.—Pilotage is compulsory for vessels over 35m long. Vessels send ETA and pilotage request 24 hours in advance to Bundaberg. The pilot boards 2 miles NW of the Fairway Light in Hervey Bay.

Bundaberg (24°52'S., 152°21'E.)

World Port Index No. 53460

5.41 The Burnett River discharges into the sea on the N side of South Head, which shows a light. The wharves of the Port of Bundaberg are situated on the E bank of the river, 2 miles above the entrance, and at Fairymead, on the W bank, 3 miles farther upriver. The town of Bundaberg is situated 4 miles above Fairymead. Barubbra Island encumbers the mouth of the river; the main entrance lies between the SE end of the island and South Head. Training walls extend from the N bank of the river to within about 0.2 mile of South Head.

Tides—Currents.—The tidal rise at Bundaberg is 2.4m at MHWS, and 1.9m at MHWN. The tidal currents have a rate of 2.5 to nearly 4 knots in the entrance, and are even stronger in the entrance channel.

It is reported that a strong N set is frequently experienced close seaward of South Head Light.

Depths—Limitations.—Sand flats, with depths of less than 3m, extend up to 2 miles NE from Barubbra Island and a shoal, with a depth of 7.9m, lies about 4.5 miles from the SE extremity of the same island.

The three entrance reaches have depths (2003), as follows:

1. Sea Reach—9.7m.
2. Middle Reach—9.7m.
3. Inner Reach—9.7m.

The Bulk Liquids Terminal at the John T. Fisher Wharf is 240m long, with an alongside depth of 9.8m. The terminal offers facilities for handling bulk petroleum, ammonia, and molasses. The turning basin off the terminal has a depth of 8.2m alongside.

The Bulk Sugar Terminal at the Sir Thomas Hiley Wharf is 191m long, with a dolphin connected by a catwalk at each end and a depth of 11.2m alongside.

Above the sugar berth, the river has a controlling depth of 1.6m.

Aspect.—The light on South Head, the pilot station on the same point, and the white tower to the S, as well as the sugar sheds are all excellent marks for making the port.

Pilotage.—Pilotage is compulsory, and vessels are met about 4.5 miles E of South Head. The pilot vessel is equipped with a radiotelephone. Vessels should order pilots well in advance, radioing their ETA at least 24 hours in advance.

Regulations.—The port limits are described by the arc of a circle 4 miles in radius, centered on South Head.

The quarantine line for the port is drawn N from South Head for 1 mile, then W to the shore.

Entering vessels are restricted to a length of 183m and must maintain an underkeel clearance of 0.9m at all times. Vessels normally berth only in daylight hours on the outgoing tide, with departures made on the incoming tide.

There is a 10 knot speed limit in the river from its entrance to Bundaberg Creek, at the E end of the town, and of 4 knots thereafter.

Signals.—The pilot station and harbormaster office may be contacted via VHF.

Anchorage.—Vessels may take anchorage, in 7.3m, about 1.5 to 2 miles ENE of South Head Light. There is a spoil ground centered 2 miles ESE of South Head. An additional anchorage area is located in a depth of 12m about 5 miles E of South Head.

Directions.—Vessels bound for the Burnett River from the N should keep at least 7 miles offshore until South Head Light bears about 245°. Vessels bound from the S, after passing E of **Sloping Hummock** (24°50'S., 152°25'E.), should keep more than 2 miles offshore, until the approach can be made on the entrance range.

Off-lying Islands and Reefs

5.42 Extensive off-lying detached reefs, islets, and shoal patches lie between Sandy Cape and a position about 138 miles NW. They parallel the coast between about 21 miles and 52 miles offshore, except at a position about 25 miles ESE of Cape Capricorn, where they lie about 15 miles offshore. These dangers are comprised of Lady Elliot Island, the Herald Patches, the Bunker Group, and the Capricorn Group. Several detached dangers lie up to about 78 miles NE of Sandy Cape.

Lady Elliot Islet (24°07'S., 152°43'E.), is a coral, scrub-covered islet fringed by coral reefs. It is reported to give radar returns up to 15 miles. A light, equipped with a racon, and signal station are situated here.

A marine park is established in the vicinity of Lady Elliot Island. This is an area to be avoided.

Anchorage, sheltered from SE winds may be taken in the lee of the island, about 0.2 mile off the reef, in depths of 18 to 37m.

Herald Patches, a group of detached 10 to 18m coral and sand patches, lie about 6 miles S of Lady Elliot Islet. They extend about 7 miles from E to W and are about 2.5 miles wide with the shallowest water reported over the E end.

Bunker Group (23°50'S., 152°21'E.) comprises several coral islets and reefs which lie between 20 and 33 miles NW of Lady Elliot Islet. Lady Musgrave Islet, the southernmost of the

group, from which a light is shown, has been reported to give good radar returns up to 11 miles. A depth of 16.9m was reported to lie about 2.5 miles NE of the reef on which the islet lies.

Caution.—An Area to be Avoided, best seen on the chart, surrounds the Bunker Group. This area is to be avoided by all unauthorized vessels greater than 500 gross tons, except in emergencies.

5.43 Fairfax Islet, several islets in the center of a reef which is about 2 miles long, lies about 3 miles NNW of Lady Elliot Islet. Hoskyn Islet, two islets almost connected at LW, lies on a reef about 1.5 miles long, about 5 miles NW of Fairfax Islet.

Boult Reef (23°45'S., 152°17'E.), which dries, has a sand cay on its SW end, which nearly covers at HW. Heavy breakers occur on the NE end of the reef.

Patches, with depths of 14.6m and 17.4m, lie 1.7 miles apart, 16 miles W of Hoskyn Islets.

Capricorn Group consists of a number of coral islets and steep-to coral reefs, lying between 5 and 41 miles NW of the Bunker Group. Its NE side is formed by a line of islets and reefs extending about 36 miles NNW from Llewellyn Reef to North Reef, the S and N extremities, respectively, of the group. From the middle of the NE side, the central part of the group extends about 28 miles WSW to Rock Cod Shoal, about 15 miles ENE of the coast at Facing Island. The sea breaks heavily over most of the reefs, parts of which dry or are awash. Large areas of discolored water, caused by masses of plankton, have been reported in the waters surrounding the Capricorn Group.

Llewellyn Reef (23°42'S., 152°11'E.), about 3.5 miles long and 2 miles wide, is the southernmost of the Capricorn Group. It lies about 5 miles NW of Boult Reef. A 9.1m coral patch, and a 25.5m sand and coral patch lie 3 miles NW and 4 miles WNW, respectively, of Llewellyn Reef.

North Reef (23°11'S., 151°54'E.), on which a light is shown, is about 1.2 miles long and lies at the N end of the Capricorn Group. North Reef has been reported to give good radar returns up to 14 miles. Broomfield Reef, with a sandy cay on its W side, lies about 5 miles SSE of North Reef. The channel between the two reefs has not been closely examined and should not be used.

Guthrie Shoal (23°03'S., 151°51'E.), with a depth of 9.4m, lies on the SE end of a bank with depths of less than 36.6m, which lies 8 miles NNW of North Reef. Innamincka Shoal, with a depth of 9.4m, lies about 2.5 miles N of Guthrie Shoal. Haberfield Shoal, with a depth of 9.8m, lies from 4 to 6 miles WNW of Guthrie Shoal.

Johnson Patch, with a depth of 11.9m, and steep-to, lies about 9.5 miles WSW of the middle of Haberfield Shoal. Douglas Shoal, with a depth of 8.2m, lies about 3 miles ESE of Johnson Patch.

Goodwin Shoal (22°55'S., 151°44'E.), with a depth of 8.2m and over which the sea breaks in bad weather, lies 8.5 miles NW of Innamincka Shoal. Shoals, with depths of 16.2m and 18.3m, lie 6 miles W and 10 miles WSW, respectively, of Goodwin Shoal.

5.44 **Edgell Bank** (22°53'S., 151°47'E.), with a depth of 15.5m, lies 3 miles NE of Goodwin Shoal. Moresby Bank,

with depths of less than 36.6m, and a least depth of 16.1m over its E end, lies 3 miles NE of Edgell Bank. Both the E end of Moresby Bank and Edgell Bank have been reported to break in heavy weather.

Barcoo Bank, with a depth of 17.7m, lies 1.5 miles WNW of the W end of Moresby Bank.

Karamea Bank, with a depth of 18.3m, and which breaks in heavy weather, lies 14.5 miles NW of the W end of Moresby Bank. During calm weather the bottoms of all the above shoals can clearly be seen. Their positions are indicated by slight tide rips.

Northwest Islet lies on the W end of a reef and is about 6 miles long. It is located about 13 miles W of Broomfield Reef. An abandoned cannery may be seen here.

The central islets and reefs of the Capricorn Group can best be seen on the appropriate chart.

Burnett River Entrance to Bustard Head

5.45 The **Kolan River** (24°40'S., 152°12'E.) empties into the sea 12.5 miles WNW of the entrance to the Burnett River. The channel across the bar at the entrance is subject to frequent changes, and local knowledge is essential. Camp Island, low and sandy, lies off the NW entrance point. A lookout tower stands N of a village fronting the entrance.

Baffle Creek discharges into the sea about 10 miles NW of the Kolan River entrance, and the mouth of Mullet Creek lies about halfway between. A shifting unmarked bar, with a least depth of 0.6m, obstructs the entrance to the creek.

Anchorage.—Anchorage during offshore winds may be taken, in a depth of 10.9m, about 2.5 miles ENE of the entrance with Double Sloping Hummock, bearing about 210°.

Round Hill Head (24°10'S., 151°53'E.) lies about 14.5 miles NNW of Toowong Hill, a conspicuous hill about 9.7 miles NNW of Baffle Creek entrance. A monument is situated on the W side of this headland, about 0.7 mile S of its N end. Round Hill Head has been reported to give good radar returns up to 17 miles. A light is shown on Round Hill Head.

Bustard Bay indents the coast about 3.2 miles SW between Round Hill Head and Bustard Head, about 10 miles NW. The low coast on the W side of the bay is backed about 3.5 miles inland by the Munro Range, up to 323m high. The S end of the bay has depths of less than 2m S of the 5.5m curve, which trends W from the N end of Round Hill Head.

A narrow and shallow inlet, on the E side of which is a small settlement, lies on the W side of Round Hill Head. Several beacons mark the entrance of a creek at the S end of Bustard Bay, but there are only depths of 0.6 to 1m over the bar. Although Bustard Bay affords shelter only during offshore winds, small craft may find protection from SE winds in depths of 4.5 to 5.5m about 1.5 miles W of the N end of Round Hill Head.

Bustard Head (24°01'S., 151°46'E.) shows a light on its SE point; another light is shown on Clews Point, on the NW point of the head. Storm signals are also displayed from the station.

Tides—Currents.—The tidal currents off Bustard Head set NW during the rising tide and SE during the falling tide and have a rate of about 2 knots.

Pancake Creek (24°01'S., 151°44'E.), the entrance to which is narrow, has a least depth of 3.7m in the fairway. On the E side, rock ledges, which dry 1.8m, extend 0.2 mile offshore.

The W side is formed by Shelter Spit, which dries 1.5m, and extends 1 mile N from Pancake Creek. The edge of this spit is easily seen.

Anchorage.—Anchorage may be obtained in the creek by small vessels, with local knowledge, in a depth of 4m, good shelter. Tidal currents in the creek attain a rate of 1.5 to 2 knots.

A reef of above and below-water rocks extends 1.7 miles NNE from Bustard Head. Inner and Middle Rocks, each 0.3m high, lie on the seaward end of the reef. Outer Rocks lie 1 mile NNE of Middle Rocks. The reef and Outer Rocks are covered by the red sector of Bustard Head Light. Outer Rocks are also covered by the red sector of Clews Point Light.

5.46 Richards Point (23°59'S., 151°38'E.), a low point fronted by a rocky ledge, lies near the NW end of the Rodds Peninsula. Ethel Rocks, which uncover, lie up to a little over 0.2 mile N of this point.

Rodds Bay lies between Richards Point and Seal Rocks, about 7.5 miles W. There are depths of less than 5.5m over most of Rodds Bay, but a channel with depths of about 6.4 to 9.1m leads into Rodds Harbor, a confined anchorage at the SE end of Rodds Bay.

Seal Rocks (23°57'S., 151°29'E.), a ridge of sand and rocks, parts of which dry, extend about 4 miles NE from Tiber Point. A rock, about 1.5m high, lies on this ridge about 0.5 mile from its NE end. Depths of less than 5.5m extend up to about 1 mile NNE from this rock. Seal Rock lies at the NW end of Rodds Bay and separates it from Port Curtis.

Jenny Lind Bank, a 2.7 to 5.2m bank, extends about 1 mile NE from a position about 1.5 miles NE of Seal Rocks. Several drying rocks lie near the middle of this bank and rocks with depths of less than 1.8m lie between the drying parts of Jenny Lind and Seal Rocks.

Gladstone (Port Curtis) (23°55'S., 151°23'E.)

World Port Index No. 53450

5.47 Gladstone occupies the NW end of the bight indenting the coast between Richards Point and Gatcombe Head, and extends about 22 miles NW between Facing Island and Curtis Island and the mainland. The port, one of the safest and most commodious anchorages on the Queensland coast, is entered through South Channel between the S end of East Banks and Jenny Lind Bank. The town of Gladstone, where there are several wharves, lies on the SW side of Port Curtis, about 7 miles WNW of Gatcombe Head. There are also wharves at South Trees Point, Barney Point, and Clinton, all on the S side of the channel.

Gladstone Port Authority

<http://www.gpa.org.au>

Tides—Currents.—The tide at the Port of Gladstone has a mean spring rise of 3.8m and a mean neap rise of 3m.

The tidal currents at the SE end of East Bank, in the channel entrance, set WSW during the rising tide and NE during the

falling tide, at a rate of 2 to 3 knots. In the entrance channel between East Bank and the banks to the S, the tidal currents set NW during the rising tide, and SE during the falling tide at a rate of 2 to 3 knots. The current between South Trees Point and Auckland Point set WNW during the rising tide and SE during the falling tide, at a velocity of 2 to 3 knots. The prevailing winds may considerably influence the set and rate of these currents.

Depths—Limitations.—It has been reported (2003) that the approach channel for the Port of Gladstone has a limiting dredged depth of 16.3m as far as South Trees Point Wharves, a depth of 12.8m from South Trees Point to **Auckland Point** (23°50'S., 151°15'E.), and a depth of 16m from Auckland Point to Clinton Wharf. The three numbered berths at Clinton Wharf have alongside depths of 18.8m. Above Clinton Wharf, the channel has a depth of 8.9m. The Clinton swing basin has a reported depth of 10.4m. The Targinie Swing Basin has a reported depth of 8.9m.

The South Trees Island Wharf, situated about 4.5 miles NW of **Gatcombe Head** (23°53'S., 151°23'E.), handles bulk aluminum products. East Wharf, with a depth of 12.8m, is a loading berth. West Wharf, with a depth of 12.8m, is a discharge facility which handles bulk ore and petroleum products. Both berths are limited to a length of 243m and a beam of 35.4m.

The Smelter Wharf, situated at **Boyne Island** (23°55'S., 151°20'E.), has a length of 250m, an alongside depth of 15m, and can handle bulk carriers up to 60,000 dwt.

The Barney Point Wharf is situated N of the South Trees Island Wharf and has facilities for handling bulk coal. The wharf has an alongside depth of 15m and will accept vessels up to 245m in length.

The Auckland Point Wharf is situated at the town of Gladstone itself, and provides a variety of facilities. Berth No. 1, with an alongside depth of 11.3m, will accommodate vessels loading bulk coal with lengths of up to 228m.

Berth No. 2 is a bulk grain loading facility with an alongside depth of 11.3m. Vessels up to 189m in length, and a beam of 30m, are accommodated.

Berth No. 3, with alongside depths of 11.3m, is a general purpose berth that will handle general cargo, bulk petroleum products, bulk liquid, dangerous cargo, and heavy lifts.

Berth No. 4 has an alongside depth of 11.4m.



Courtesy of Major Metals Queensland
Gladstone—RG Tanna Coal Loading Wharf

The RG Tanna Coal Loading Wharf, situated about 1.5 miles NW of the Auckland Point Wharf, has an alongside depth of 18.8m at each of the three berths. Vessels loading here are limited to a length of 320m and a beam of 55m.

Fishermans Landing Wharves (Targinie Berths) have two berths. Berth No. 4 is 228m long, with an alongside depth of 11.2m; vessels berth bow headed SE at Berth No. 4. Berth No. 5 has a length of 220m and a depth of 11.2m alongside.

Aspect.—Most of the coast of the Port of Gladstone is low, but there are several prominent hills that are useful landmarks. In addition to Many Peak Range and the Edinburg Mountains S of the port, a short range lies on the W side of the N end of the port.

Mount Stanley (Peak Hill) lies near the end of Many Peak Range, about 12.5 miles SSW of Tiber Point. Mount Larcom, 628m high, is another prominent peak about 9.5 miles WNW of Gladstone.

Hummock Hill is a prominent landmark on the S side of the entrance, and Round Hill lies close S of Gladstone on the SW side of the port. View Hill and Ship Hill lie on the S end of Curtis Island; these hills provide useful landmarks when arriving at the port.

Gatcombe Head (23°53'S., 151°23'E.), the N entrance point of the Port of Gladstone, is a bold prominent bluff at the S end of Facing Island.

Pilotage.—Pilotage is compulsory. Vessels should forward their ETA 24 hours and 2 hours in advance through Brisbane (VIB). The pilot boards 2 mile NE of the Fairway Lighted Buoy. The pilot working channels are VHF channels 12, 13, and 16; the call sign is "Gladstone Pilots."

A helicopter pilot transfer service for vessels able to provide landing facilities is available for the Port of Gladstone.

Vessels not able to accept a helicopter, due to physical restrictions or safety considerations, will be serviced by launch.

Vessels should advise in their ETA message whether the vessel is capable of accepting a helicopter, or if not, the impediment precluding the use of this service.

The helicopters use VHF channel 13 for communications.

Regulations.—The Port Limit Line for Gladstone is best seen on the chart.

The quarantine line for the port is drawn across the channel just S of the South Trees Island wharf. Pratique is usually granted at the wharf, but if the vessel is proceeding to an anchorage, it will be boarded there.

Vessels wishing to enter the port must advise harbor control by VHF. Deep-draft vessels must not pass each other in South Channel; an inflammable liquids tanker must not pass deep-draft vessels, or another tanker, in South Channel.

Outbound deep-draft vessels and tankers may, provided there is sufficient depth of water for safe navigation, pass inbound deep-draft vessels or tankers between South Trees Lighted Beacon and the inner end of South Channel.

A Vessel Traffic Service, which is compulsory for all commercial vessels, is situated in the port. Inbound vessels should call Gladstone Harbor Control on VHF channel 16 at least 2 hours before arrival and again on crossing a line located a radius of 4 miles from Fairway Lighted Buoy. Outbound vessels should contact the VTS Center on VHF channel 13 at least 15 minutes before departure, on departure, and when outside the port limits.

All vessels arriving or departing Gladstone must contact harbor control on VHF channel 13 or 16 at least 15 minutes in advance.

Signals.—The Port Radio Station at Gladstone keeps a constant watch; a listening watch is maintained in the harbor-master's office during office hours. Mobile stations are maintained in the tugs, launches, pilot boat, and the main wharves.

Anchorage.—Anchorage may be taken, in a depth of 11m, between Barney and Auckland Points. Several anchorage berths are available clear of the range lines, and are best seen on the chart.

Gatcombe Head to Cape Capricorn

5.48 Between Gatcombe Head and Cape Capricorn, about 26 miles NNW, the coast trends in that direction along the E side of Facing Island and Capricorn Island. All dangers except the Rundle Islands are contained within a distance of 2.7 miles offshore.

East Point Ledge (23°52'S., 151°24'E.), with depths of less than 2.7m, extends up to about 1.2 miles NE and NW from East Point. Sable Chief Rocks, a small group of detached rocks which dry, lies about 1 mile offshore about 3 miles N of East Point.

North Entrance lies between North Point and the SE end of Curtis Island, about 0.7 mile to the W. This entrance into Port Curtis is suitable only for small craft with local knowledge.

Caution.—Several dangerous wrecks, best seen on the chart, exist approximately 5 miles NE of North Point.

From North Entrance to Cape Capricorn, about 17 miles to the NNW, the coast is a series of rocky points and sandy beaches backed, less than 1 mile inland, by a ridge of hills.

The **Rundle Islands** (23°32'S., 151°17'E.) lie about 2.5 miles offshore and 4 miles SE of Cape Capricorn. The E islet shows a light; the W islet is low, sandy, and rocky. The islets are steep-to and lie on a bank, with depths of less than 10m.

Cape Capricorn (23°29'S., 151°14'E.), a bold headland, lies on the NE end of Curtis Island and appears white and barren. A wreck lies in about 24m, about 1.5 miles NNE of the cape. A light is shown on the summit of the cape. A white house on which there is a lantern, is situated on the N side of the cape.

Keppel Bay

5.49 Keppel Bay (23°22'S., 151°00'E.) indents the coast about 12 miles SW between Cape Capricorn and Great Keppel Island. The S end of the bay is formed by the N end of Curtis Island and the W side is formed by the low mainland, which is backed by hills up to about 488m high. The N end of the bay is formed by the Keppel Islands and the shoals between them and the mainland.

Tides—Currents.—In the outer part of the bay, the flood current sets S, and the ebb N. From abreast Cape Capricorn, on the S, and Hummocky Island, on the N, however, the direction is reversed, probably due to an eddy, with the flood setting N into the bay and the ebb S out of it. Close E of Cape Capricorn, the N current runs for approximately 7 hours, from about 3 hours before LW at Mackay, to about 1 hour before HW at that port. The current then turns, and the S current runs for approx-

imately 4 hours, 42 minutes, the current turning again as stated above. The flood current W of Cape Capricorn sets W past Cottier Bank.

The strength of the tidal current in the outer part of the bay has seldom been found to exceed 1.5 knots.

Caution should be exercised by mariners who may be deceived by discolored water. Muddy water is carried out by the deep channels during the latter part of the falling tide, while the water is clear over the shallower parts where the current does not set at that time.

5.50 South end of Keppel Bay.—The coast between Cape Capricorn and **Cape Keppel** (23°27'S., 151°03'E.) is formed by a sandy beach, backed by low, swampy and mangrove-covered ground rising inland to the Ramsay Range. Between the two above capes, a flat, with depths of less than 10m, extends up to 4 miles offshore.

Boat Rock, which dries 1.5m, lies 2.5 miles E, and Cottier Bank, with a least depth of 1.2m, lies close inside the edge of the flat, 2.2 miles NE of Cape Keppel. Cape Capricorn Light, in line bearing 121°, leads NE of the bank.

Ship Rock (23°25'S., 151°11'E.) and **Fairway Rock** lie 5.2 miles NW and the same distance WNW, respectively, of Cape Capricorn. Both rocks are good marks when entering Keppel Bay from the S. There is deep water between them and between the rocks and Hummocky Island.

Hummocky Island (23°24'S., 151°09'E.) lies about 6.5 miles NW of Cape Capricorn. This small, steep-to island consists of three conspicuous hills. A rock, awash, lies about 0.5 mile off the SW side of the island. Depths of less than 10m extend 0.6 mile W from the island. A spit, with depths of less than 10m, extends 1 mile NW from the middle of the N side of the island. A detached 9.4m patch lies 0.7 mile NW of the W extremity of the island.

Sea Hill Point is the NW extremity of Curtis Island, and the E entrance point to The Narrows at the N end. Sea Hill rises 1 mile ENE of the point. There is a village close SE of Sea Hill Point. A light is shown on the point.

Anchorage.—Anchorage, with good shelter from all but N and NW winds, may be obtained, in a depth of 11.9m, 0.7 mile WNW of Sea Hill Point. As the tidal currents set fairly strongly through The Narrows, it is recommended that a longer scope of anchor cable be used than is indicated by the water depth alone.

Timandra Bank (23°26'S., 151°00'E.), which dries in places, extends 3.5 miles W from the outermost of Keppel Rocks. North West Bank, with depths of less than 5m, extends 1.5 miles offshore between Station and Sea Hill Points.

Off-lying Islands and Shoals

5.51 Jabiru Shoals (23°21'S., 151°05'E.), four patches with depths of 7.9 to 10m, lie between 3 and 6 miles WNW of Hummocky Island. Lisa Jane Shoals, three patches with depths of 7.6 to 11.9m, lie 7.5 miles NW of the above island.

Peak Island (Second Lump) (23°21'S., 150°56'E.) is shaped like a sugarloaf. Arch Rock lies on the outer end of a reef, which extends 1 mile SSE from the island. A bank, with depths of less than 5m, extends 1 mile W of the island and a rock lies

close off its N extremity. Split Rock lies 0.5 mile NW of Peak Island.

Divided Island, 35m high, clifty, and divided into two parts at HW, lies 2.5 miles NNW of Peak Island. A rock, which dries, lies on the outer end of a reef which extends 0.5 mile NNW from the island. Wedge Island lies 2.5 miles WNW of Divided Island.

Pelican Island (23°15'S., 150°52'E.) lies 2.5 miles NNW of Wedge Island. Pelican Rock is joined to the island by a drying reef. A bank, with a least depth of 2.7m, extends 1.2 miles WNW from Pelican Island, and a 4m patch lies 0.3 mile S of the same island.

Egg Rock (23°12'S., 151°06'E.), the E of the islands and rocks which form the N side of Keppel Bay, is steep-to on its S side. Two above-water rocks lie close off its E side. Barren Island (First Lump) lies 2.3 miles NW of Egg Rock. The Child, a clifty rock, 49m high, lies close off the NE side of the island.

Great Keppel Island (Wapparaburra) (23°10'S., 150°58'E.) lies with its E extremity about 6 miles WNW of Egg Rock. The island, the largest of the Keppel Isles, is inhabited and covered with grass and a few trees. A bight is shown from the E side of the island. A number of islets, rocks, and banks, lies off each side of the island and can best be seen on the chart. A light hut stands on the E point of Great Keppel Island.

The Fitzroy River

5.52 The Fitzroy River (23°30'S., 150°55'E.) flows into the SW end of Keppel Bay between Sea Hill Point and Cattle Point. The mouth of the river is about 6 miles wide and is encumbered by islets, shoals, and rocks. The shore is low within the river entrance, where numerous creeks empty from its S bank. Between Sea Hill Point and Cardigan Point a shallow inlet, separating the N part of Curtis Island from the mainland, extends almost 9 miles SSE to The Narrows at the N extremity of Port Curtis.

The river is entered through three channels. The main channel is through Sea Reach and then through South Channel. Middle Channel is closed to navigation. North Passage can only be used by small vessels with local knowledge.

Sea Reach and South Channel are marked by lighted beacons and buoys. The lighted range markers can best be seen on the chart.

Tides—Currents.—Inside the mouth of the river, the tidal currents tend to parallel the channels. In the approach to Port Alma and in the river channel off Broadmont, they may attain a rate of 2 to 3 knots. At Port Alma, the flood current sets diagonally off the wharf and the ebb sets parallel to the wharf.

Depths—Limitations.—In 1993, there was a least depth of 7.3m in the approach channel to Port Alma. In the channel to Rockhampton, which is about 30 miles upstream from Port Alma, there are depths of about 4.6m at LW; however, seasonal variations may carry the level below this datum.

The Rockhampton port limit extends from the E tip of Cattle Point to the N tip of Arch Rock and then to the NW extremity of Cape Keppel.

Pilotage.—Pilotage is compulsory. Vessels shall send their ETA and draft to the Rockhampton Harbormaster at least 6 hours in advance. As the time taken for the pilot boat to reach the boarding ground in Timandra Bay is approximately 3

hours, the time of arrival should be confirmed or adjusted, as necessary.

In bad weather, if the pilot is unable to board, proceed inbound on the range lights situated on the N end of **Balaclava Island** (23°32'S., 150°56'E.), keeping them slightly open to the W until past the lighted buoy marking the W end of Timandra Bank, where the pilot will board. If the pilot is not at the buoy, proceed to the anchorage off Sea Hill Point.

5.53 Port Alma (23°36'S., 150°52'E.) (World Port Index No. 53440) is part of the Port of Rockhampton and lies 8 miles SW of Sea Hill Point. The Rockhampton Port Authority administers Port Alma.

The port consists of three berths. Berth No. 1 is 168m long, No. 2 berth is 137m long, and No. 3 berth, a dolphin berth, is 238m long. Berth No. 2 can handle containers. Berth No. 3 is also used for tanker discharge. All three berths have depths of 9.5m.

Because of the limited depths in the river, only smaller vessels with local knowledge can proceed to Rockhampton. It has been reported that all commercial shipping is now calling at Port Alma.

Anchorage.—Anchorage can be taken, in 12m, WNW of Sea Hill Point and between Shell Point and Kazatch Point, clear of the entrance range.

A vessel must not anchor in any of the cuttings, on any of the range lines, nor in any position where the vessel's lights might be mistaken for channel range lights.

Rockhampton Port Authority

<http://www.rpa.qld.gov.au>

Double Head to Port Clinton

5.54 Double Head (23°10'S., 150°48'E.) is a prominent headland at the N end of Keppel Bay. Although the head is steep-to on its E side, an extensive shoal, with depths of less than 3.6m, lies between a position about 1.5 miles E of the head of Great Keppel Island.

North Keppel Island lies 7.5 miles NE of Double Head. The island is inhabited and similar in formation to Great Keppel Island. Sloping Island lies near the outer end of a spit of foul ground which extends 1.5 miles S from the S side of North Keppel Island, with Pumpkin Island between.

Yeppoon Inlet (23°08'S., 150°45'E.) lies about 3 miles NW of Double Head on the N side of the mouth of Yeppoon Creek and is a harbor for small craft. A breakwater, on the head of which stands a lighted beacon, extends from the E entrance point. The entrance should not be attempted without recent local knowledge. Tidal currents in the inlet are strong.

An overhead power cable, with a vertical clearance of 11m spans the entrance to the inlet.

Cape Manifold (22°41'S., 150°50'E.) is composed of rocky heads with sandy beaches between, behind which rise the Manifold Hills. An islet, sparsely covered with vegetation, lies 0.2 mile E of the cape, with an above-water rock between. Tide rips occur N of the islet.

Flat Island and Peaked Island, both steep-to and bare, lie 9 miles ESE and 7 miles ENE, respectively, of Cape Manifold.

The latter is perforated and light can be seen through it from the SE. Cliff Point lies 1.5 miles NW of Cape Manifold.

Anchorage.—Anchorage may be taken during offshore winds, in 11 to 14.6m, in a position about 1.3 miles N of the N side of Cape Manifold, and also in a position about 2.2 miles N of Cliff Point.

Quoin Island (22°34'S., 150°48'E.) lies about 7.5 miles NNW of Cape Manifold. Anchorage may be obtained during offshore winds, in depths of 15 to 18m, 0.5 mile S of the island.

Cape Clinton (22°32'S., 150°48'E.) is the E point of a bold headland on the S side of the entrance to Port Clinton. Mount Flinders, a 160m peak, lies about 1.5 miles W of the cape. The steep-to NE side of Cape Clinton headland trends about 1.5 miles NW from the cape to the N extremity of the headland. It then trends about 0.3 mile W to Inner Head, the NW point of the headland. Round Islet lies about 0.2 mile N of the N extremity of the headland with a drying reef between. Perforated Point lies about 2.2 miles NNW of Round Islet. The entrance of Port Clinton lies between the point and the islet.

5.55 Port Clinton (22°32'S., 150°46'E.) (World Port Index No. 53415) consists of an inlet which indents the coast about 4.5 miles SW between Round Islet and Perforated Point. This inlet, much of which dries or is encumbered with shoals, offers sheltered though somewhat confined anchorage, but is difficult to enter because of the bar. Coasters frequently seek shelter here during bad weather.

Tides—Currents.—The flood current sets W off the N end of Round Islet at the rate of 1.5 to 2 knots, and then sets SSW between Inner Head and Black Rock at a rate of 2.5 to 3 knots. In the vicinity of Bullock Point the flood divides, one branch sets S into South Arm at a rate of about 2 knots, and the other branch sets W into the channel S of West Point at a rate of 1.5 to 2 knots. In the vicinity of Black Rock, the flood current sets toward the sands off West Point. Between Entrance Island and Perforated Point, the flood current sets to the N.

The ebb current sets in the opposite direction to the flood current described above and attains about the same rate.

Depths—Limitations.—A bar, with depths of about 1.8 to 5.2m, lies across the entrance to Port Clinton. There are depths of 7.3 to 14.6m on the approach to the bar. Inside the bar, there are depths of about 9.1 to 28m in the fairway to the anchorage. During a fresh breeze, the sea breaks over the shallower parts of the bar; when the sea is calm, there are current rips over them.

A 10 to 29m deep channel trends SW along the W side of the entrance bar from a position about 0.5 mile NNE of Inner Head to close off the W side of the head. Care must be taken to avoid the shoal water from 0.2 to 0.3 mile SW of the islet off Bullock Point. At Fish Rock, the channel narrows and trends SSE into South Arm, a narrow inlet which extends about 5 miles to the S. In South Arm, the channel has depths of about 5.5 to 7.3m for a considerable distance.

A channel, with depths of about 7 to 10.9m, trends about 1.5 miles toward the W part of Port Clinton from a position about 1.5 miles SE of West Point.

Aspect.—The entrance of Port Clinton is easily distinguished from seaward as it is about midway between the high hills at Cape Manifold and Mount Westall, about 16 miles NW of Cape Clinton. The headlands on either side of the entrance

and the islets and rocks described above are prominent identifying features.

A remarkable sand cliff is located about 3 miles S of West Point on the E side of the low point from which West Flats extends. The remains of a wharf, with a depth of 5.5m alongside, is situated close S of Holtness Point.

Pilotage.—Pilots are not available at Port Clinton and vessel intending to enter should obtain a pilot at Keppel Bay. Vessels should not attempt to enter without local knowledge.

Anchorage.—An indentation outside the bar and immediately NW of Round Islet affords temporary anchorage, in 12.8m, for vessel waiting to cross the bar. The only secure anchorage in Port Clinton is in about 10.9 to 16.5m, close SW of Fish Rock. Here a vessel will be sheltered from all winds and from the heavy swell which occasionally sets over the bar. Anchorage may also be taken, in 10.9 to 16.5m, about 0.2 mile W of Fish Rock.

Care must be taken when anchoring in order to avoid Fish Rock and Creek Rock and the shore bank close SW of the anchorages.

Port Clinton to Cape Townshend

5.56 Between Port Clinton and Reef Point, about 15 miles NNW, the high rugged coast trends in that direction and is indented by a number of small bays and inlets. Hills rise abruptly from the coast and a mountain range parallels the shore about 5 miles inland.

Pearl Bay (22°25'S., 150°42'E.) lies about 5 miles NNW of Port Clinton. The bay is entered between the S entrance point and a point 5 miles NW. Prominent patches of sand are located 0.5 and 1.5 miles W of the S entrance point to the bay. A group of islets, with shallow water between them and the mainland SW, extends 1 mile NW from the S entrance point to Pearl Bay. Depths of less than 5.5m extend 1 mile E from the middle of the bay.

The Hervey Islands consists of two groups of rocks and islands. The S group lies 1.7 miles N of the S entrance point to Pearl Bay. The Clara Group, the N group, lying 3 miles NE of

the N entrance point to Pearl Bay, consists of three islets and a number of rocks.

The S group is comprised of **Dome Island** (22°25'S., 150°45'E.), Split Island, and a number of rocks.

Tides—Currents.—The flood current sets NW at a rate of 1.5 to 2 knots past the Hervey Islands; the ebb current sets to the SE.

Anchorage.—Anchorage may be obtained, in depths of 6 to 13m, 1.5 miles WSW of Dome Island.

5.57 Island Head (22°20'S., 150°40'E.), an island, lies 3 miles W of the Clara Group. Island Head Creek extends 7 miles S from its entrance and is obstructed by rocky shoals. Small craft, with local knowledge, may enter the creek by keeping close to the S shore.

Reef Point lies on the S side of the E entrance of Strong Tide Passage. This reef-fringed point rises abruptly to the peak of Mount Westall, about 2.7 miles to the S.

Secure anchorage, out of the tidal currents and sheltered from SE gales, may be obtained, in depths of 7 to 16m, 1 mile NW of **Pinetrees Point** (22°20'S., 150°38'E.).

Strong Tide Passage (22°20'S., 150°32'E.) may be entered between Reef Point and the SE end of Townshend Island, about 1 mile to the N. The passage trends about 5 miles SW into Shoalwater Bay. There are depths of not less than 5.5m in the channel, but the W end is obstructed by a bar with a least depth of 3.6m.

The tidal currents attain a rate of 5 to 6 knots in the passage, and the ebb current causes strong overfalls which break at the E entrance. This dangerous passage is not recommended for any vessel.

Townshend Island, on the NW side of Strong Tide Passage, is high, level, and sparsely wooded. Cape Townshend forms the N extremity of the island. The cape marks the SE entrance to Broad Sound Channel. Raynham Island lies 2.5 miles NW of the SE extremity of Townshend Island. Cape Islet, a rock, lies W of Cape Townshend, and is connected to it by a rocky ledge at LW. A drying rock was reported (1990) to lie 0.9 mile W of Cape Townshend.

