Sound signals

An efficient sound signal device like an air horn, can be used to indicate manoeuvres, attract attention and as a fog signal in restricted visibility.

Tool kit

As discussed in Section 2.4, every boat should have a tool kit containing tools and spare parts.

Care of equipment

All safety equipment must meet minimum standards, be in good working order and easily accessible.

Find a home for your gear where it is accessible and easily located during the day or night.

Safety equipment is generally durable and long-lasting. Keep small storable items like flares, V-sheet, EPIRB, torch and other bits and pieces in a sealed waterproof container.

2.9 Weather

Weather is important to safety. Always check and understand the weather before and during boating. If it looks dicey, don't go out—and if it starts to turn, head straight for shelter.

Learn to understand and read weather patterns. Know the wind and the boat's limits.

Sources of weather information

The Bureau of Meteorology issues regular forecasts for small boats operating in coastal waters including expected wind direction and strength, the state of the sea and swell, visibility, and changes expected during the forecast period.

Routine coastal waters forecasts and observations for particular areas within 60 nautical miles of the coast are updated several times daily. Coastal warnings are issued whenever strong wings, gales, storm-force or greater winds are expected, and renewed every six hours. You can access these by a range of methods including:

Broadcast band radio and television

A very useful start but not all these sources focus on the needs of mariners.

Marine radio

27 MHz marine radio

Most limited coast stations are run by volunteer marine rescue groups and provide weather schedules and/or weather information on request over 27 MHz (as well as VHF) marine radio. These stations could be contacted on channel 88 to determine local availability of weather information.

VHF marine radio

Bureau of Meteorology offices in Central and Northern Queensland issue coastal waters warnings, forecasts and observations on VHF. Weather information is available on request through VHF Channel 67 at several locations. Check the Bureau of Meteorology's (BOM) website.

MF/HF Marine Radio

Warnings, forecasts and coastal and offshore weather observations are broadcast from VMC (Charleville) and VMW (Wiluna). Schedules and frequencies are advised on the BOM website.

Telephone

Maritime Safety Queensland's Maritime Weather Service provides weather information from the Bureau of Meteorology at the cost of a local phone call.

All of Queensland	1300 360 426
Marine warnings	1300 360 427
South-east Queensland	1300 360 428

Internet

A full range of weather information is available on the Bureau of Meteorology's website at ‹www.bom.gov.au›.

In summary

To get the best possible idea of the weather, put your trust in a combination of the latest professional and local advice, your own local knowledge, and a constant, critical observation of the sea and sky.

Types of weather information

Warnings

Any strong wind, gale, storm or tropical cyclone warnings applying to coastal waters.

Situation/synopsis

A description of the position and movements of highs, lows and frontal systems expected to affect coastal waters in the next 36 hour period.

Forecast

A general description of the expected weather in the forecast period and outlook including:

- wind strength and direction
- height and direction of sea waves and swell
- factors affecting visibility.

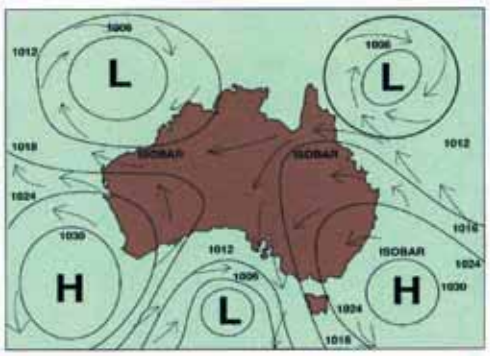
Station observations

Details of recorded conditions at various positions along the coast.

Note—in forecasting terminology:

- wind gusts may be up to 40% stronger than the average speed given
- some waves will be higher (up to twice the height) and some will be lower than the average heights given
- sea and swell forecasts do not take into account local influences on waves (currents, tidal flows, depths and coastal landforms).

Weather map (synoptic chart)



Winds are generated by differences in pressure within the atmosphere. Isobars (lines joining points of equal atmospheric pressure) on a weather map illustrate the pressure systems at sea level at a given time.

The pressure systems tend to move eastwards taking two to three days to cross Australia enabling a loose interpretation of the systems influencing the east coast in the day or two ahead.

A mariner can make judgements about wind strength and direction from a perusal of these charts.

Wind strength

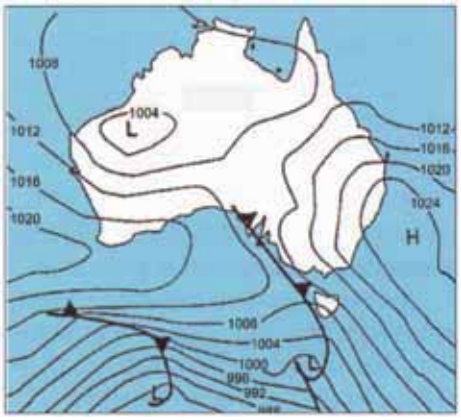
Winds will tend to be strong where the isobar lines are close together (a steep pressure gradient).

Where they are widely spaced, winds will tend to be gentle.

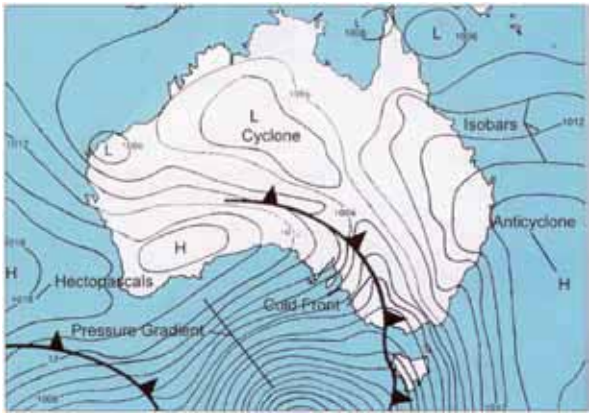
Wind direction

Winds tend to blow out of a high pressure area and rotate anticlockwise around it and tend to produce stable fine conditions.

Winds tend to travel into a low pressure system and rotate clockwise around it and can produce unstable air with the chance of overcast, gusty and at times stormy conditions.



On this typical summer weather map, the east coast of Queensland would be experiencing light winds from the east/south east. Gulf waters would be essentially calm.



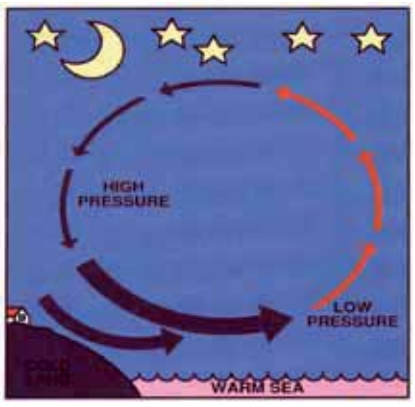
A cold front, such as that shown here moving across South Australia and Victoria, can produce a relative short period of extremely turbulent weather followed by a shift to stronger west/south westerly breezes. They are identifiable by a long band of dark clouds moving quickly from the south west and small boats should seek urgent shelter.

Further information on interpreting a weather map is available from ‹www.bom.gov.au›.

Local winds

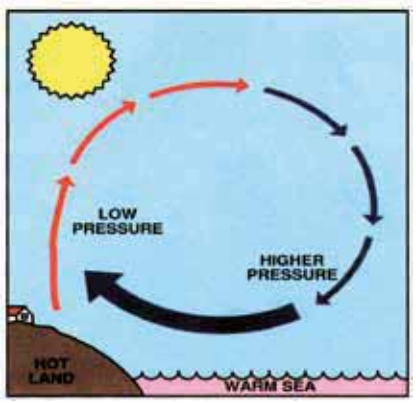
The sea breeze/land breeze effects along the coast modify synoptic winds.

Land breeze (offshore)



Because of the cooling of the land overnight, winds in the morning tend to be offshore and tend to produce better sea conditions. Be wary of overnight anchorages exposed to the west/south west.

Sea breeze (onshore)



As the land heats up, winds tend to blow onshore in the afternoons and, particularly in summer, may become quite strong. This may also contribute in summer to the development of thunderstorms in late afternoon along the coast.

Winds and waves

To a large extent, wave action sets the performance limitations and capabilities of a small boat. This must be taken into account in buying a boat and, once bought, in selecting types of conditions and operational areas.

The Beaufort Scale

The Beaufort Scale is useful in providing a relationship between wind strength and sea state and wave height. The latter can present a considerable threat to small boats.

Sea waves are created by direct local action of wind on the sea. They have shorter wavelengths and periods than swell waves and are generally steeper. They are measured by length and height.

Swells are created by large weather disturbances operating at a distance. Though smooth and harmless looking, they travel very quickly and can create big breakers in shallowing water. Swell waves are long and smooth and are generally characterised by a wave period (time between consecutive wave crests) greater than 8 seconds.

Beaufort force	Mean winds		Explanatory titles	Open sea	Probable wave heights (metres)
	(km/h)	(knots)			
0	0	0	calm	mirror like	0
1	1–5	1–3	light air	ripples	0.1
2	6–11	4–6	light breeze	small wavelets	0.2–0.3
3	12–19	7–10	gentle breeze	large wavelets	0.6–1.0
4	20–28	10–16	moderate breeze	small waves	1.0–1.5
5	29–38	17–21	fresh breeze	moderate waves	2.0–2.5
6	39–49	22–27	strong breeze	large waves - rough	3.0–4.0
7	50–61	28–33	near gale	very rough – sea heaps up	4.0–5.5
8	62–74	34–40	gale	moderately high waves	5.5–7.0
9	75–88	41–47	strong gale	high waves – crests topple	9.0– 12.5

A growing swell can indicate an approaching storm.

Swell is also measured by:

Length	*Short*	0–100 m
	Average	100–200 m
	Long	over 200 m
And height	*Low*	0–2 m
	Moderate	2–4 m
	Heavy	over 4 m

Sea waves caused by the local wind are often superimposed on swell moving in from a distance. Interaction between the two can cause unpredictably high waves and add to the dangers for mariners.

In addition to being determined by the strength of the wind, the height of waves also depends on:

- The time the wind has been blowing—conditions will deteriorate quite quickly over time in response to a steady wind (roughly double in size over a 12 hr duration). Take early action to seek shelter.
- The fetch—the further the winds travel across water, the larger the sea waves. Offshore breezes make for smaller waves than onshore breezes. In large bays, the waves will be smaller on the leeward shores (for example, near the south-east shoreline in a south-easterly breeze). Plan your boating areas to take advantage of this.

On the water

Conditions can change quickly and, in rapidly worsening weather, 2 km offshore can be just as dangerous as 20 km therefore:

- Regularly monitor available sources of weather information (marine radio, broadcast band radio and mobile phone can all be available afloat).
- Keep a constant lookout for signs of changing weather:
  - darkening and lowering clouds
  - whitecaps and changing sea state
  - falling barometer.
- Find out the local factors that influence sea conditions (including those on coastal bars).
- If whitecaps are visible offshore, stay in sheltered waters.
- Know where to reach shelter (protected shore, harbour or lee of an island) quickly and have alternative contingency plans.
- If winds are expected to pick up, plan to be upwind of your home shelter. Returning downwind will generally be easier and quicker.
- Be flexible—change your plans (destination and/or route) if necessary and tell whoever holds the voyage plan.
- If conditions deteriorate, put on life jackets.
- As the sea state develops, adjust boat handling to match conditions:
  - adjust course and speed to minimise water spray in the boat and stresses from pounding

- angle across waves to reduce the steepness of waves and limit pitching
- avoid surfing downwind.

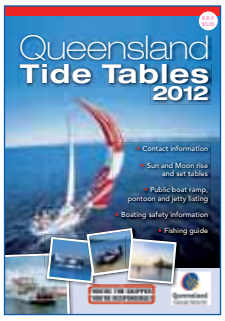
- If necessary, ride out the initial onslaught of sudden, short-duration squalls by keeping the bow either directly into the wind and waves or slightly off their direction. The main criterion is to keep a speed sufficient to allow you to steer the boat, but no faster.
- Without power to maintain steerage, a boat will drift side on (beam on) to the sea. In big seas this is dangerous as the boat may easily capsize. A drogue tied onto a suitable rope to the bow will keep the boat pointing into the waves should the engine fail.
- Rough water may substantially increase your fuel consumption so carry extra fuel as a contingency.

2.10 Tides

Tides have a major impact on depths available and access for your boating activities and resulting tidal flows and offshore currents can substantially alter sea conditions.

Learn to consult tidal prediction tables and take into account their impact on boating.

Sources of tide information



Basic tide information is often broadcast on radio and television, included in newspapers and can usually be obtained on marine radio from limited coast stations. However, every boat operator should have available a current set of tide tables such as *Queensland Tide Tables* produced by Maritime Safety Queensland.

This publication provides the times and height of highs and lows for 28 primary ports in Queensland. It also provides conversion information to derive tides at about 250 additional secondary places along the coast.

Tide predictions

Although tides are influenced by astronomical and non-astronomical factors, local tides can be predicted with a high degree of accuracy from analysis of long-term tide records.

The tide predictions provide a forecast of the time and height of high and low water for a particular day at a particular place.

The height of the tide in metres and decimals is reckoned from the lowest astronomical tide. When a low water falls below datum, it is marked with a minus sign (–).

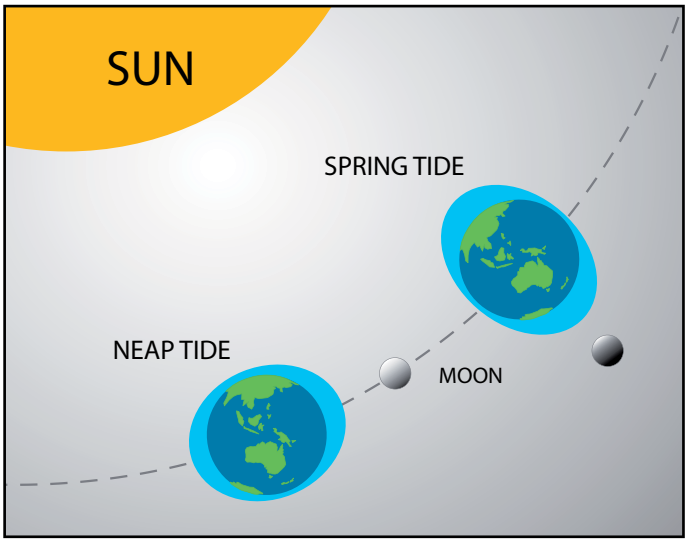
The range of the tide is the difference between the height of 'high water' and the next succeeding or last preceding 'low water'.

The rise of the tide is the height of high water above chart datum.

Causes of tides

Tides are the rising and falling of sea levels that result from the gravitational interaction and motion of the sun, the moon and the Earth acting on ocean waters. Tidal patterns are influenced by the shape and depth of oceans and the weather. The combination of factors influencing local tides is complex and varies greatly from one site to another.

Along most of the Queensland coast, there are usually two high waters and two low waters in each day. Tidal ranges (height difference between high and low water levels) vary significantly from about 6 m around Mackay to about 1 m along the south coast and less than 2 m in Cairns.



The moon orbiting the earth effects tide times and ranges. Tide times are almost an hour later each day.

During a full moon and new moon phase there is an increase in tidal range and water movement (spring tides). The high tides are very high and the low tides are very low.

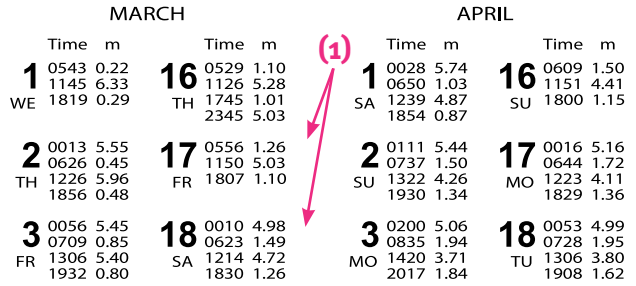
During the first quarter and third quarter moon phase there is decreased tidal range and water movement (neap tides). The high tides are low and low tides are high.

Tide levels are measured from a reference water level known as chart datum (usually taken as the lowest astronomical tide [LAT]). This same datum is also used as the reference water level for the depth soundings (and drying heights) shown on most marine charts.

Hence, depth at any place will be a combination of the chart sounding plus the level of the tide.

Reading tide tables

Tide tables — like those shown below — provide detailed predictions of the times and heights of high and low waters at standard ports for every day of the year. The precise position is usually named and given a latitude and longitude. The time is given in the standard time for the area in a 24 hr clock. The depth of the tide is given in metres–the smaller number indicates low tide and the higher number indicates high tide (1).



MARCH						APRIL					
	Time	m		Time	m		Time	m		Time	m
1 WE	0543	0.22	16 TH	0529	1.10	1 SA	0028	5.74	16 SU	0609	1.50
	1145	6.33		1126	5.28		0650	1.03		1151	4.41
	1819	0.29		1745	1.01		1239	4.87		1800	1.15
				2345	5.03		1854	0.87			
2 TH	0013	5.55	17 FR	0556	1.26	2 SU	0111	5.44	17 MO	0016	5.16
	0626	0.45		1150	5.03		0737	1.50		0644	1.72
	1226	5.96		1807	1.10		1322	4.26		1223	4.11
	1856	0.48					1930	1.34		1829	1.36
3 FR	0056	5.45	18 SA	0010	4.98	3 MO	0200	5.06	18 TU	0053	4.99
	0709	0.85		0623	1.49		0835	1.94		0728	1.95
	1306	5.40		1214	4.72		1420	3.71		1306	3.80
	1932	0.80		1830	1.26		2017	1.84		1908	1.62

(1)

Secondary places (2) are those for which detailed predictions are not listed. The times and heights of high and low waters can be obtained by applying corrections to the predictions of a nearby standard port. These are listed in the back of the Queensland Tide Tables.

To calculate the time, add or subtract the time difference (3) as given in the tide table for the required secondary port to the predicted time of high and low tide for the standard port. The time variations are found in columns 1 and 2.

To calculate the height of the high or low water, multiply that of the standard port by the ratio listed in column 9 (4) then add or subtract (+ or -) the figure in column 10 (5).

Semidiurnal Tidal Planes 2006

Height above Lowest Astronomical Tide

(4) (5)

Place	Latitude South	Longitude East	Time Difference HW (1) H M	Time Difference LW (2) H M	MHWS 3 m	MHWN 4 m	MLWN 5 m	MLWS 6 m	AHD 7 m	MSL 8 m	Ratio 9	Cons 10 m	HAT 11 m
Gold Coast Seaway	**27 57**	**153 25**	**Standard Port**		**1.41**	**1.15**	**0.49**	**0.23**	**0.760**	**0.85**	**1.00**	**0.00**	**1.89**
North Coast New South Wales -													
Ballina (Richmond River)	28 52	153 35	+0 06	+0 06	1.4	1.1	0.5	0.2		0.79			1.9
Brunswick Heads	28 32	153 37	+0 07	+0 07	1.5	1.2	0.5	0.2		0.86			2.0
Kingscliff	28 16	153 35	+0 09	+0 09	1.3	1.1	0.4	0.2		0.75			1.9
Tweed River Breakwater	28 10	153 33	-0 04	+0 00	1.46	1.24	0.65	0.41	0.86	0.86	0.92	+0.04	1.89

(3) (2)

In coastal areas, tides are accompanied by changing horizontal movements of water or tidal streams. Although there is interaction between the two phenomena, tidal streams are distinct from ocean currents.

Meteorological effects on tides

Meteorological conditions which differ from the average will cause corresponding differences between the predicted and the actual tide. Variations from predicted tide heights are mainly caused by unusually high or low barometric pressure or by strong prolonged winds. Low-pressure systems tend to raise sea levels and high-pressure systems tend to lower them. In general, it can be said that wind will raise the sea level in the direction towards which it is blowing.

Watching the tides

Tidal ranges in some locations can be extreme—the morning launching spot could be high and dry in the afternoon.

Bar crossings

Tides (height and direction of flow) can impact heavily on the state of the waves in coastal bars. Most bars are at their safest before high tide when the flow is still inwards (flooding) and depths are towards their greatest. The peak ebb flow (midway between high and the next low) will generally produce the worst conditions. More information on bar crossings is on page 64.

Fuel consumption

Local tidal effects such as wind against tide or tidal races in narrow channels can create hazardous sea conditions. Pushing hard against an unfavourable tide slows speed and increases fuel consumption.

Course planning

Tidal rips, overfalls, and the speed and direction of tidal streams and offshore currents are indicated on charts.

Overhead clearances

On Maritime Safety Queensland charts, overhead clearances are generally given above a water level known as Highest Astronomical Tide (HAT). In the case of electrical power lines, an additional safety margin is built in.

Note:

- the point of maximum clearance may not coincide with the deepest part of a channel
- clearance height may reduce during king tides or floods
- extra caution is required when launching/retrieving boats with a mast on shore—keep a lookout for overhead power lines.

Section 2 activities

Activity 1

A trip plan is important for a safe day on the water. Prepare a list of tasks in the table below under the headings 'what to do' and 'how to do it'.

What to do	How to do it
Example: tell someone where you are going	Leave a note on the fridge stating destination and estimated time of return and emergency contact numbers like Water Police.

Activity 2

Most boating incidents occur due to poor trip preparation. In the table below list problems or emergencies that could happen to you on the water. Also list the equipment you would need to have on board to prevent the situation.

Type of probem	Equipment to cope with problem
Example: engine breakdown—drifting towards rocks	An anchor to secure the boat, a V-sheet or flares to attract attention, a marine radio to call for help.

Activity 3

Should you refuel portable tanks on the boat?

Yes or no _____

Activity 4

Using the secondary port information on page 42, calculate the high and lows tides for Brunswick Heads on March 17th and 18th.

_____

_____

Activity 5

The preparation of your boat is of utmost importance; if you don't do your pre-departure checks it may let you down. List the main tasks and checks for your boat, its machinery and equipment before each boating trip.

_____

_____

_____

_____

Activity 6

Routine maintenance must be carried out on a regular basis. List the tasks you would perform on the following areas of your boat.

Hull _____

Engine _____

Steering _____

Controls _____

Electrical _____

Batteries _____

Fuel system _____

Safety gear _____

Activity 7

All good boaters will carry a tool box and spares on board. Make a list of tools and spares you think you would carry on your boat.

_____

_____

_____

_____

_____