Tasmanian Summer Weather

1. Overview

During the summer months, the typical weather patterns that affect Tasmania, can be split into five types as follows:

Type 1. Highs (Sub Tropical Ridge) in the Great Australian Bight (known as the Bight). This is the only high-pressure situation in which winds over Tasmania can reach any significant strength. As the high maintains a slow eastward track from the Bight, a continuing south-west to westerly airstream can be expected. The more south-west the airstream is, the better the chances of colder temperatures being experienced over the state. Although winds will strengthen with such a change, it would be rare for winds to reach gale force.

Type 2. Highs to the south of Tasmania. This situation forms after a south to south-easterly airstream develops following the passage of a cold front. Sometimes a small low may form over Bass Strait which could result in locally strong easterly or south easterly winds in north-eastern Tasmania. However, winds are usually fairly light. A south-east to north-east airstream is likely to continue for a number of days.

Type 3. Highs to the east of Tasmania. When highs are positioned far enough south, between Tasmania and the south island of New Zealand, they can become a dominating influence over the state. This is a very common summer situation with moist north-easterlies providing humid conditions with possible sea fog occurring over Bass Strait and north-eastern waters. This situation can last for a number of days until either a north-westerly change occurs or a low moves in from the north-west or north.

Type 4. Highs over Tasmania. During the warmer months it is more common for highs to move either across Tasmania or through Bass Strait. Sometimes the development will be such that a new high-pressure cell will form in the east, and the old high to the west will gradually disappear. When it is possible to track the high directly across the state the movement is usually fairly rapid. Winds will be very light, except in the far south.

Type 5. Passage of a single cold front. The passage of a single cold front between high-pressure cells is usually associated with a low-pressure system already close to Tasmanian latitudes. The low may move just to the south of the state, and the cold frontal change usually appears as a well-defined cloud band on a satellite photo. Gale force winds may be associated with the passage of the front. Another example in this category occurs with the deepening of a small low centre (usually less than 996 hPa central pressure) as it is swept from the Bight to the south-east of Tasmania. Pressure falls of 3 hPa or more, every 3 hours are usually noted over south-east Australia in this type of situation.

Sea and land-breezes are much influenced by topography and vary considerably from one part of the coast to another. In Tasmania the actual sea-breeze has an average speed of about 10 to 15 knots from November to February. The sea-breeze usually extends 50km inland especially along elongated river valleys, such as the Tamar. The seaward extent of the sea-breeze is much less.

Some other weather issues could be as follows: - The east-coast low. This may be a low that has moved south from regions to the north. A typical movement is down the East Coast of Tasmania. Strong to gale force north-easterly winds may occur while the low is still in the north, later veering south easterly as the low moves to the south

- The occasional thunderstorm could cause some problems.

- A local scale heat low can form due to land heating up during the daytime just inland of the East Coast. Occasionally these can form over the Central Plateau as well as over south-west

Tasmania. Where the influence of a heat low circulation extends to coastal regions it may have an interesting effect on the local winds in the area. For example, the circulation associated with a heat low near the central east coast would tend to assist the development of the south-east sea-breeze on the Derwent estuary, while that from a heat low over south-west Tasmania could induce a north-easterly surface wind. In fresh to strong westerly flow a low-pressure circulation or trough is often formed to leeward of the main mountain barrier. This situation can result in areas of relatively light winds on the East Coast although a strong westerly airstream may be prevailing elsewhere (covered below)

2. **Bass Strait** (includes all seasons)

is a place that one can loathe one day and love the next!
It is the shallow stretch of water between Tasmania and mainland Australia connecting the Tasman Sea with the Great Australian Bight. It is about 80m deep in the centre and has sills slightly deeper than 50m on either side. It is the shallowness coupled with the complicated tidal flows that can make it one of the worst hell-holes on earth especially since a fully risen sea can set-up very quickly only after a strong wind has been blowing for a relatively short period of time. OK the subject of this article is the weather but nevertheless the oceanography of the area is very interesting and will be the subject of a future article.

Wind

During the winter and spring months, fairly intense low pressure systems 'in the westerlies"occur in the Bass Strait area on 4 to 5 occasions. The great majority of these have their centres passing south of Tasmania but strong westerly winds affect Bass Strait, including the coastline east of Wilson's Promontory. Common or "garden variety" low pressure systems tend to have a favoured track through Bass Strait after having approached its western entrance from a northwest or west direction. The frequency of these systems is about 2 to 3 per month in the winter half of the year, around 1 per month in autumn and **almost none** in summer (**BUT** remember the 1983, 1993 and the 1998 Sydney to Hobart yacht races amongst others!). However the most frequent interruption to the settled weather of the sub-tropical ridge of high pressure is provided by the passage of cold fronts with wind changes from the north and northwest to west and southwest. This is a regular phenomenon in the winter half of the year, in which case low centres pass to the south of Tasmania in the Southern Ocean . The succession of highs and fronts is not by any means regular; and strong winds between northwest and southwest are sometimes maintained with bad weather for weeks at a time.

The strongest winds usually blow from somewhere between the northwest and the southwest. However southeast gales can affect the eastern part of the Strait at infrequent periods, particularly in autumn. Maximum wind speeds are generally in excess of 50 knots. Gale-force winds blow mainly from directions between north and southwest (through the west) and are associated with very deep lows with steep pressure gradients (isobars very close together). Occasionally in summer the combined influence of an intense ex-tropical low over NSW latitudes and a high pressure system over Tasmania can produce easterly gales over the Strait as well as the exposed Victorian coastline.

With the lows in the "westerlies", the average duration of the strongest winds is around 1 to 2 days, in slower moving, more intense lows, generally centred south of Tasmania, 3 to 4 days and the southeasterly gales 4 or 5 days. Wave heights exceeding 14 metres have been encountered in Bass Strait. The complicated tidal streams through this area in general, coupled with the wind pattern, ensures us that the dreaded situation of wind opposing current and hence the exaggerated wave height scenario crops up with monotonous regularity. Banks Strait which lies between Flinders Island and the Tasmanian mainland in the east, is particularly very bad for this situation.

Bass Strait essentially being land-locked on its northern and southern boundaries, behaves in a similar way to that of a wind tunnel. Broad westerly wind flow is tunnelled/channelled such that in eastern Bass Strait, wind speeds can nearly be double those further west. Banks Strait on a localised scale, can

further enhance this already heightened wind flow and consequently has a bad reputation amongst the seafaring community. The key to estimating the speed of the wind through the Strait in general is the air pressure difference between each end. In essence, the greater the pressure difference the stronger the winds! So one should check the pressure readings at both Flinders and King Islands each time they are read out over VMC, other coastal radio stations and of course the Bureau of Meteorology's web-site http://www.bom.gov.au/marine

Eastern Bass Strait can from time to time be the place where an east coast low will intensify after moving down the NSW coast, or develop in situ in which case southwesterly/south easterly gales (storm-force at times) can be experienced.

Sea/Swell

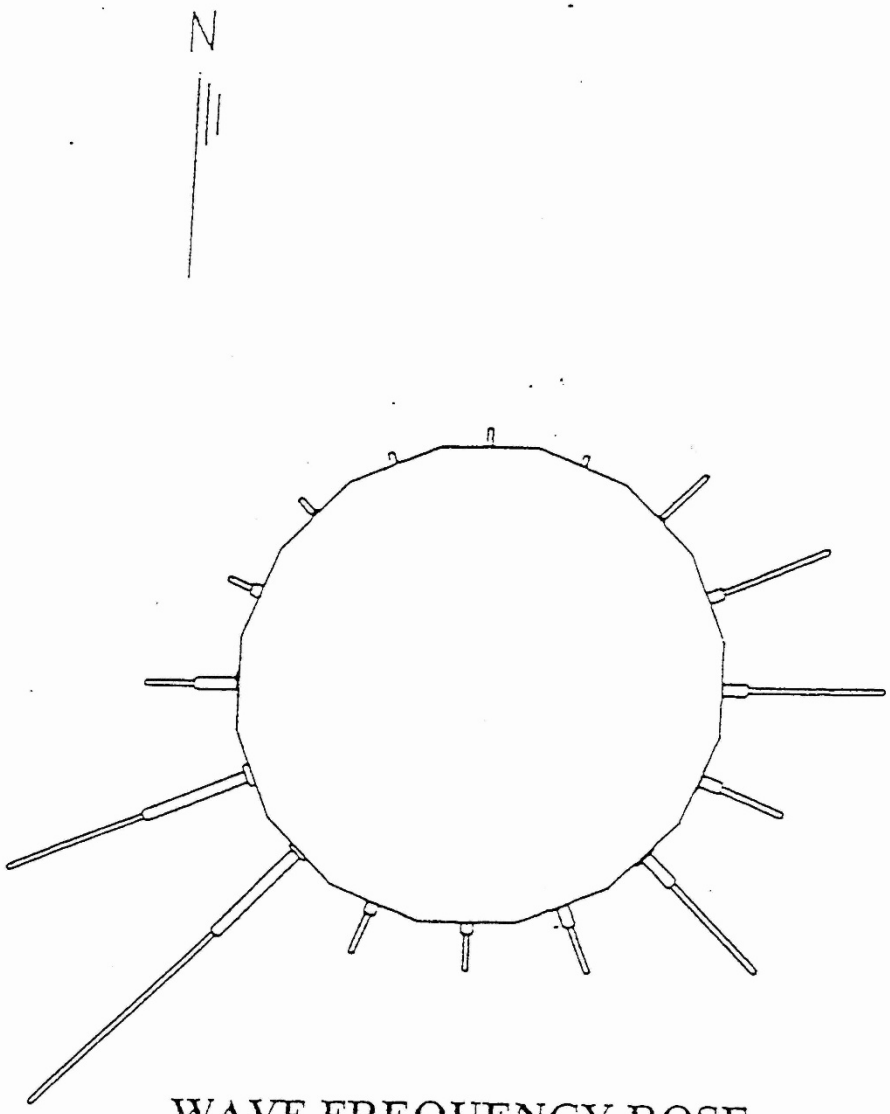
In winter and spring, seas are generally roughest in Bass Strait, as the lows in the "westerlies" and their associated cold fronts are then farthest north and probable limits of conditions are well represented by the two following examples. At times in winter, successive highs follow unusually far southern tracks and show a tendency to stagnate around Tasmania, and quiet weather in months of usually stormy conditions results. On the other hand a situation bringing widespread sea disturbances, often of a prolonged nature occurs occasionally in winter or spring when the high pressure track, and with it the cold fronts and associated lows, moves abnormally far north, permitting westerly gales in a steep pressure gradient of west/east oriented isobars to blow interruptedly over the Strait.

Over Bass Strait in general, swell waves are present on about 75% to 85% of days in all seasons, and about 40% to 50% of the time it is of moderate intensity. Of slight and heavy swell, the former is the more frequent by a small margin. The most common swell direction is between west and south; this is particularly so in the west and southwest parts, where in more than 60% of cases of swell it comes from this quarter. Easterly swell sometimes persists through the whole length of Bass Strait, this is mainly a summer phenomenon, but it occurs less frequently at the western end than at the eastern end of the Strait.

Satellite derived images can be used to show the probability of experiencing certain wave heights for most areas of the Australian Coastline. These images can be viewed in a book called "A Users Guide to the Australian Coast", by Dr. Greg Laughlin. The year round probability of encountering 3 metre or higher waves is around 30% at the western end of the strait, compared to around 15% in the North East.

The year round average wave height is near 2.5 metres at the western end of the strait, decreasing to 1.6 m in the east. However, it should be noted that in the event of an East Coast Low, significant waves from the south east in excess of 6m are likely. Waves in excess of 15 m have been reported in the strongest storms.

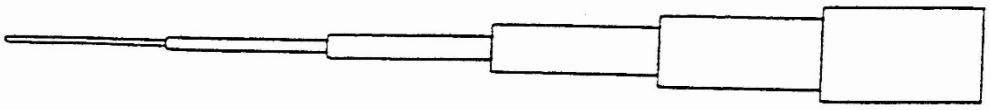
Acknowledgement: Data used in this article has been made available with the kind co-operation of Lawson & Treloar P/L and ESSO Australia Ltd.



WAVE FREQUENCY ROSE

EASTERN BASS STRAIT

Information Courtesy of ESSO AUSTRALIA LTD



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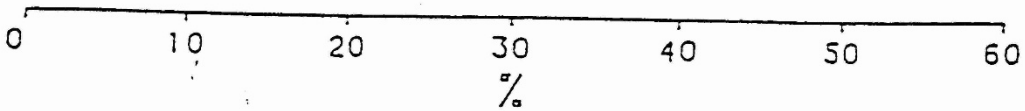
SIGNIFICANT WAVE HEIGHT (Hs) (m)



3. **The East Coast of Tasmania** (Eddystone Point to Tasman Island):

Under broad westerly (NW to SW) gradient (900m) wind flow, a lee trough will usually form on the east coast of Tasmania, and affect waters up to 30 nm of the coast (Figure 1).

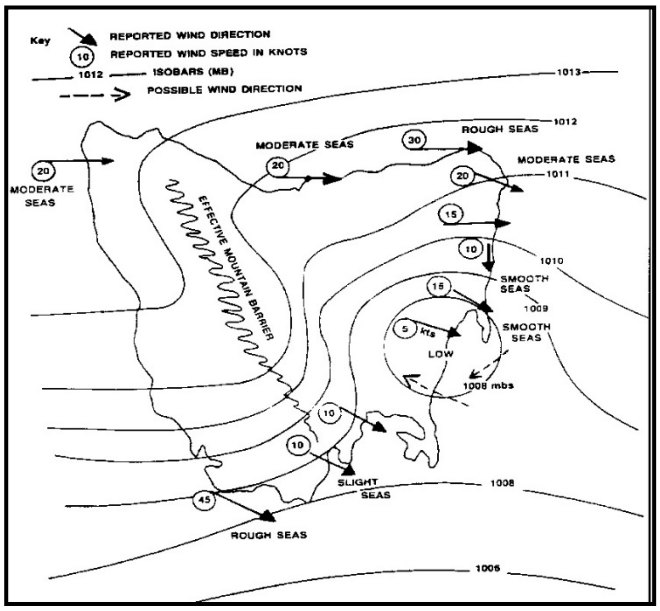


Figure 1.
Lee trough over Eastern Tasmania.
(From Wind, Waves and Weather. Tasmania)

However, the effects of a northwesterly versus a southwesterly can vary markedly. Let's examine them in more detail.

(a) NW gradient winds: Surface winds in the morning (up to around 11am local) will generally start as northwesterlies over most of the coastal waters. North of around St Helens Point, winds may even be slightly accelerated as winds funnel through Banks Strait. However, as the day wears on and the Tasmanian land mass heats, pressures fall along the coast and winds will start to turn more northerly and by 1-2pm will start to turn northeasterly inshore south of Eddystone Point. While there is the temptation to move inshore to benefit from this northerly, be aware that at sunset, this breeze will decrease quite quickly and can become quite light and variable for a period until the northwesterly kicks back in during the early hours of the morning.

(b) With a SW gradient, winds on the East coast become pretty aweful inshore. To the north of Freycinet Peninsula, winds will be markedly affected. They often become light and variable during the morning after a light westerly land breeze overnight. During the day there is a good chance of a light E to NE sea breeze. South of the Freycinet though, winds mostly commence as W/SW then gradually turn more southerly north of around Maria Island and then often SE during the afternoon due to the seabreeze effect. The stronger the southwesterly, the further offshore these effects will be felt. However,. in a race like the Sydney to Hobart where one is not constrained by distance offshore. The 30/10nm rule is normally adopted in order to negate the worst effects. Unfortunately in the Launceston to Hobart race, one has to pass inshore Maria Island. This situation will normally prevent one from moving offshore and a compromise has to be made. One thing that won't change, is that winds around Tasman Island in a SW'ly will be much, much stronger than those experienced offshore, due to the Tasman Island Hydraulic Jump and/or the funnelling effect of the sheer cliffs.

There is an obvious trap in the above, in that a prefrontal NW stream with it's most attractive inshore N'lies, will be replaced with SW/S'lies and very light inshore conditions post frontally. Moral of the story – To get the most out of the situation, be very sure of the timing of the fronts that are almost certain to affect you as you move down the East coast.

(c) With W gradient winds: The entire coast generally suffers from the effects of the lee trough.
By utilising the 30/10nm rule, one should be outside the worst effects of the lee trough. But in the L2H race you are constrained in having to be closer to the Tassie coast.

(ii) When yachts are at Tasman Island, wind speeds can increase and decrease (gusts/lulls) quite rapidly and the direction can also jump around all over the "shop". Be prepared for the bullets (squally winds)!!

(iii) You can generally go very close to Tasman Island, apart from its southern extremity, where there is a reef!

(iv) As you approach Tasman Island under west through to southerly flow, it generally pays to lay inside of the Hippolyte (at least between the Little Hippolyte and Cape Hauy). This firstly keeps you out of current that is generally setting northeastwards around Tasman Island and in flatter water. Secondly, on starboard tack you can get a nice lift along Munroe Bight if you are fairly close in. There is a definite line of pressure on the water that you have to be inside of to gain the maximum advantage.

(iv) Thunderstorms with their gusty, erratic winds could also pose problems with the passage of a cold front.

(v) Intense low pressure systems passing very close to southern Tasmania could see gale to storm force wind conditions prevailing through the southern part of the race track.

4. **Tasman Island to the Iron Pot (**Storm Bay**)**: Once you get around Tasman Island and clear away to the west, wind conditions will generally ease.

(i) Under most conditions, one would straightline it from Tasman Island to Cape Raoul, but giving the Raoul a slightly wide berth (about 1nm off). The only situation that you would want to be slightly north of this rhumb-line and closer to the Raoul, would be in smooth water and/or under sea breeze conditions. In the sea breeze situation, the NE ocean sea breeze can get squeezed between Tasman Island and Cape Pillar (Tasman Passage) and slightly more pressure can result just to the north of the rhumb-line.

(ii) Under any kind of offshore gradient wind flow, Storm Bay is affected by the significant topographic features of southern Tasmania and can be most frustrating for sailors. In a N'ly stream, winds will start the day as a northerly, but a NE seabreeze usually develops early in the afternoon. In a light to moderate NW stream (up to 23 knot gradient winds), winds will start the day from the NW then ease with NE to SE seabreezes developing shortly after noon. In a strong, prefrontal NW stream, strong, warm NW'lies can be experienced during the day, with occasionally very strong gusts. West to southwest gradient situations tend to be even more flukey through Storm Bay, with SE afternoon seabreezes developing if the gradient strength is not above 25 knots.

(iii) Once you have cleared Cape Raoul, then it is a straightline course to the Iron Pot.

(iv) If it has rained heavily in southern Tasmania in the week leading up to the race, then there will be a lot of extra water ebbing out of Fredrick Henry Bay. Don't be pushed too far left of your course.

(iv) Storm Bay can live up to its name, so be ready!!!

5. **Iron Pot to the Finish (**includes some stuff on the Channel and Storm Bay**)**

The rugged topography of southern Tasmania makes for extremely tricky wind conditions over this extremely attractive sailing area. To the west lies a range of mountains extending from Collins Cap and Mt Wellington (1460 metres) in the north which are only approximately 15 km west of the Sydney/Hobart finish line, to Adamsons Peak (approx 1200 metres) in the south, which is only 20 km from Cape Bruny. Even Federation Peak and Precipitous Bluff further south and west, may have an effect on winds over southern Storm Bay and they aren't even visible from Storm Bay itself. To the

northwest lies the large elevated area of the Central Plateau, which on occasions will act to shelter Storm Bay from strong northwesterly winds and on others, cause very strong winds and gusts to descend on the area from a significant height in the atmosphere. Even to the east and northeast there are significant ranges of mountains that rise up to almost 800 metres, which sometimes have a significant effect on the winds. With such significant features so close to the shores of Storm Bay, it is easy to see why sailing can be very frustrating and wind forecasting on the Derwent and elsewhere a forecaster's nightmare.

The Derwent River drains not only water from Tasmania's Central Plateau, but it also drains cold air. Temperatures fall overnight, particularly over the Central Plateau, significant areas of which are above 800 metres. Air over higher ground is naturally cooler and overnight, temperatures inland become markedly colder than those on the coast. As the air cools, it becomes denser and this denser air flows down slopes into the valleys. Like its liquid counterpart, this heavier colder air flows down the valleys into the sea. Hence in the morning, summer or winter, it is most frequent that winds flow down the Derwent and Huon Valleys from the north and northwest. This flow, known as a "katabatic flow", extends out a considerable distance from the Derwent River mouth, typically 10-20 km, resulting in most of Storm Bay being influenced by this under most circumstances. The flow out of the Huon River affects an area west of about Gordon (in the D'Entrecasteau Channel, known locally as the "Channel") and out around the southern parts of Bruny Island. Areas of the Channel, east of Gordon to around Northwest Bay, can be plagued by very light winds overnight. The BIG secret in traversing this area successfully, especially overnight, is the state of the tide! Do your homework! The katabatic looses its influence over the winds, only when there is a strong (20 to 30 kts) SW through S to easterly gradient airflow. Thus, unless there is a 6 hPa pressure gradient or more across Tasmania from the SW, S or E, expect winds in the Derwent, Channel and Storm Bay to come from the N or NW. Over the eastern parts of Storm Bay, a NE wind is possible, but it quickly backs N to NW as one moves further towards the centre. That's the easy bit!

Once the sun comes out and warming commences, all sorts of different things have to be taken into consideration to determine which wind directions are going to be favoured in different areas.

Let's first examine the northwest quadrant – N through W. As long as the gradient wind does not exceed 23 knots, we would normally expect the morning NW wind to decrease and a SE seabreeze to develop over the Derwent around noon local summer time. It could occur slightly earlier if it is warm and skies are clear inland, or later if it is cool to cold or it's cloudy inland. If the maximum temperature inland is not expected to exceed 16 or 17C and it's cloudy, the seabreeze could fail altogether and light NW winds persist all day. The seabreeze in the Channel is likely to be more southerly and over the rest of Storm Bay, S to SW'ly. The strength is extremely difficult to quantify and will depend on the strength of the gradient and the temperature inland. Suffice to say, there will be areas where it funnels, particularly around headlands. The Dennes Point area is also affected in this way.

If the gradient strength is more than 23 knots, a seabreeze is unlikely and sailors can look forward to a lovely afternoon of shifting winds varying from very light to "bullets". The shape of the Central Plateau is such that it can sometimes "drag" air down from a considerable height to the surface over southeastern Tasmania. More often than not, the wind well above the surface is stronger than that lower down and consequently, air that is brought down to the ground level results in strong gusts. In this wind regime, it generally does not pay to be too close to western parts of the Derwent between Kingston and the John Garrow Light as winds can be extremely flukey.

We said above that in this circumstance, a seabreeze is unlikely, but it's not impossible.

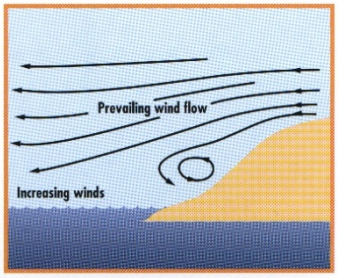
In summer, SE Tasmania can become very hot in a NW gradient stream, causing pressures to fall even more strongly than they do as a normal lee trough forms over eastern and southeastern Tasmania. On rare occasions, pressures fall so strongly that a small low develops in the lee trough, effectively forming in Storm Bay, resulting in fresh to strong S/SE winds developing over the western Storm Bay, including the lower Derwent Valley. In this situation, it is not unusual for the winds to continue

NW through Hobart airport and northerly down the eastern side of Storm Bay. This circulation may also enhance the northerly winds at the southern end of Tasmania's East Coast.

So much for northwesterlies!

Winds in the southwest quadrant can be almost as flukey. Because Mt Wellington acts as a giant cliff over Hobart in a southwesterly, a SW stream can often result in N/NE winds over western parts of the Derwent as a return flow (known as a rotor) develops (Figure 1).

Figure 1 (From Wind, Waves and Weather, Tasmania)



Further south however, S/SW winds tend to funnel northwards through the D'Entrecasteau Channel, particularly past Dennes Point and may be considerably accelerated in comparison to southwesterlies further out in Storm Bay or in the Derwent. Similarly, southwesterlies can be accelerated around the southern part of Bruny Island and if beating southwards along Bruny's east coast, expect much stronger southwesterlies upon rounding Tasman Head.

In south to southeast gradient wind situations, winds over Storm Bay and the Derwent are generally more uniform, although some acceleration can be expected near the more prominent points and headlands.

In an easterly gradient situation, surface winds over northern Storm Bay and the Channel are quite frequently light in the morning and turn SE during the afternoon. Over southern Storm Bay, winds more often turn northeasterly during the afternoon under the influence of Coriolis force, which is caused by the Earth's rotation.

The final quadrant, east to north, is again strongly affected by topography. Because of the steep sides of the Derwent Valley, northeast winds are generally uncommon on the River and during the morning, will more often than not result in light to moderate N/NW winds, while in the afternoon, they tend to veer into the east. In Storm Bay and the Channel, NE winds are possible and these may tend to freshen during the afternoon as the seabreeze from the East coast breaks through across the Tasman Peninsular and enhances the stream.

There are variations on all the above themes so obviously, take careful note of the forecast on the day. However, as we hope we have illustrated, there are so many variations possible and likely across Storm Bay, the Channel and the lower Derwent River, that forecasters have got little chance of describing them all. Indeed, would you be able to absorb a forecast that included every little nuance and shift?