

### **Why swim, and why in cold water?**

Most of us swim in the bay because we enjoy the open water and the health benefits that swimming imparts. Furthermore, there is increasing evidence that regular swimming in **cold** water is particularly rewarding health-wise.

### **What are the health benefits associated with regular cold-water swimming?**

The health benefits derive largely from physiological changes that occur in the body during **cold adaptation** which is a gradual process requiring repeated and persistent cold exposure (*eg.* once or twice per week over the whole winter period). The benefits reported by cold-adapted swimmers are both mental and physical and may include: \*

- A feeling of general well-being with less stress and fatigue.
- Better mood, sometimes verging on euphoria (a natural high).
- Improved memory function.
- Amelioration of depression to a variable extent.
- Reduction in the body's inflammatory response which may help relieve pain from lower-back instability, rheumatism, fibromyalgia etc.
- Activation of the immune system; for example, fewer upper respiratory tract infections.
- Further increases in cardiovascular fitness (over that achieved by warm temperature swimming), with improved heart function and blood flow. Better circulation is particularly noticeable in the hands and feet.
- Further improvements in lung function and reduction in asthma.
- Better antioxidant protection that may be anti-ageing (we can only hope).
- Improved thermogenesis (ability to generate heat metabolically) together with increased cold tolerance.

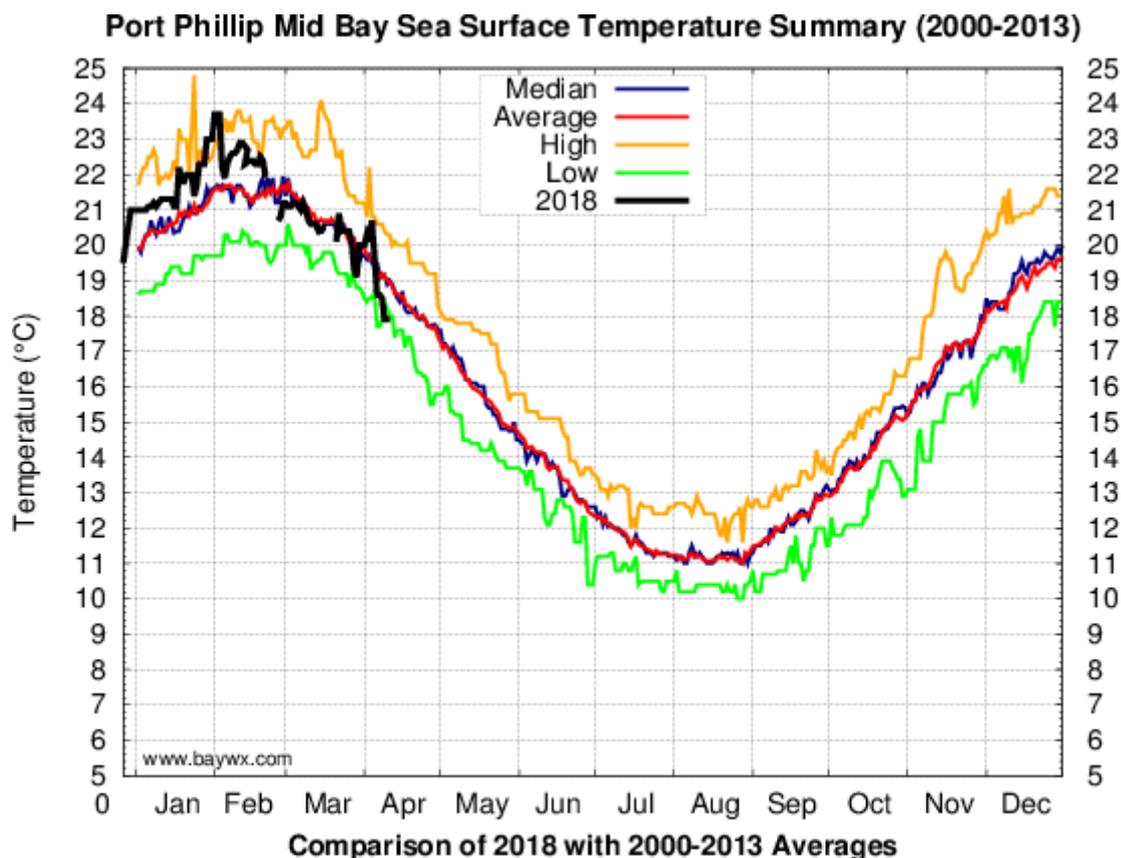
Plus, it's a great way to start the day!

\* There is a growing body of evidence for many of these claims, but others currently remain anecdotal – see resources on p.12. Also, there is considerable variation in the extent to which individuals experience these benefits

### When is the water cold?

It is generally agreed that by the time the water temperature gets down to about 15°C it is cold (see next page for a less arbitrary definition). On that basis, the water at Mount Martha is 'cold' for more than six months of the year, usually from late April until early November, or approximately from ANZAC Day until after Melbourne Cup Day if that's easier to remember. The minimum occurs around mid-August, and is often below 10°C, and maybe as low as 8°C.

Bay temperatures may be monitored online at [baywx.com.au](http://baywx.com.au). The data are updated daily and show the surface temperature in the middle of the bay. The graph below shows how the 2018 water temperature was tracking in comparison with previous years.



Shallow water responds more markedly and more rapidly to environmental change than does deep water. Consequently, in winter the bay becomes colder than the open ocean. Also, at the edge of the bay where we actually swim it is about 1-2°C colder than the mid-bay temperatures shown in this graph. The same logic explains the fact that the bay becomes warmer in summer than the much deeper open ocean.

### Local temperature variations

- The water in the shallows, where we get in, is the coldest. It's usually warmer at the poles, especially if there are sandbars in between.
- The combination of very still water and cold overnight temperatures can lead to the formation of an extra cold surface layer in the morning. Choppy water has a much more even temperature distribution.
- Fresh water from the estuary is noticeably colder than the salty water of the bay and creates cold patches when the creek's flowing out. When the bay water is still, the fresh estuarine water forms a layer on top that is colder than the water below.

For those interested, there is an underwater thermometer attached to Pole 2. This obviously does not measure the surface temperature but is useful to keep an eye on daily fluctuations in the sub-surface temperature. It's all relative.

It may be of interest to put our local conditions into the broader context of cold-swimming. International swimming bodies like FINA, Outdoor Swimming Society, World Open Water Swimming Association, and the Ice Swimming Association use water temperature to loosely define various categories of cold swimming, especially as applied to distance swimming.

- Cold-water swimming – between 18°C and 12°C
- Extreme cold-water swimming – between 11°C and 6°C
- Ice swimming – below 5°C

Each category comes with its' own set of challenges, though this booklet concentrates on those most relevant to our local conditions. These include at least 2 or 3 months of extreme cold-water swimming temperatures.

## What are the risks associated with cold-water swimming?

Swimming in cold water puts us at risk of three potentially life-threatening conditions:

**COLD SHOCK, SWIM FAILURE & HYPOTHERMIA**

### **REMAINING SAFE requires KNOWLEDGE and AWARENESS**

Swimming regularly in winter in Mount Martha, we are most **unlikely** to suffer true HYPOTHERMIA if we swim for less than about 30 minutes; but it becomes increasingly probable with prolonged exposure. COLD SHOCK is dangerous to the uninitiated but it can generally be managed by conditioning. However, **SWIM FAILURE is a very real danger** for us and has happened in the past.

#### Cold shock

Sudden immersion in very cold water triggers an immediate, involuntary 'gasp' reflex, followed quickly by hyperventilation. This results in a massive ingestion of air; or water – sufficient water to cause drowning if you happen to be underwater at the time. So, don't dive or jump into cold water if you're not acclimatised. Cold shock can also cause a rapid increase in heart rate and blood pressure which may in rare cases, lead to a heart attack.

#### Swim failure

Swim failure (or cold-water incapacitation) occurs when the muscles of the arms and legs are cooled sufficiently to become weak. Swimming strokes become shorter and more rapid (*ie.* less efficient) and the body position becomes more vertical. This can make swimming increasingly difficult to the point of being impossible, and there is a real danger of drowning. This usually happens too soon to be the result of true hypothermia and is not dependant on a significant drop in core temperature. Clearly this is extremely dangerous, and probably provides the best reason for never swimming alone in cold water. Children and skinny adults are more vulnerable to swim failure.

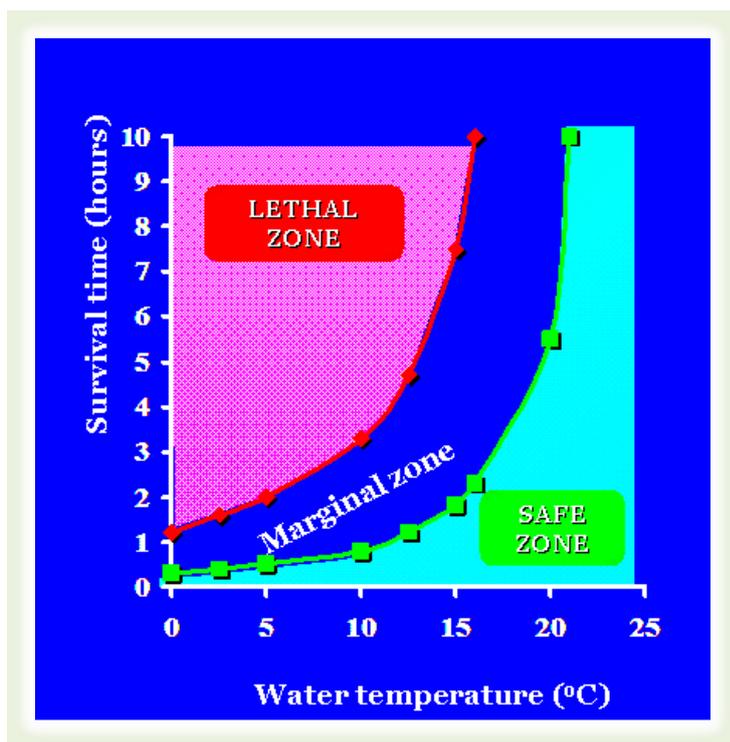
**All swimmers should be aware – it can happen to you!**

## Hypothermia

Hypothermia is a medical emergency! It is also inevitable if you remain exposed to cold water long enough. So, what is hypothermia and how much exposure to the cold is too much?

Hypothermia is defined by a core temperature of less than or equal to 35°C (compared to a normal temperature of 37°C (98.6°F)). The electrical activity of the heart and brain is very cold-sensitive and ultimately, if the core cools enough, these organs may fail causing death.

The core temperature starts to fall when the body loses heat faster than it can be generated by the metabolism. The human body cools about 25 times faster in cold water than it does in cold air. The relationship between water temperature and survival time is shown below. Clearly this relationship is not precise and there is considerable variation between individuals, resulting in a quite broad marginal zone.



For normal unacclimatised individuals at

- 15°C – survival times vary between 90 mins and 6-7 hrs. Unconsciousness will occur much earlier.
- 10°C – death may occur in 1 – 3 hours, unconsciousness in about 30 – 60 mins.
- 0°C – death in 20-60 mins, unconsciousness in 15–30 mins

<https://sportsscientists.com/2008/01/exercise-in-the-cold-part-ii/>

Hypothermia develops gradually and can be quite advanced before it is recognised. Detecting the onset of hypothermia whilst in the water is largely a matter of self-awareness. Thinking and reasoning are usually affected first, making recognition somewhat problematic. Other warning signs are numerous

and varied, but include shivering which then stops, clumsiness, drowsiness, slurred speech, a lack of concern about your own condition, combativeness, disorientation, a weak pulse, slow shallow breathing, the onset of swim failure. Reluctance to acknowledge that you're showing some of these signs is what makes hypothermia so dangerous in the water.

### Risk reduction through conditioning/acclimatising

Most of these risks can be modified through processes of physical adaptation and mental conditioning. However, the risks cannot be eliminated.

What helps?

1. Fitness – improves your ability to generate body heat, control breathing and swim more efficiently
2. Cold exposure – repeated and regular exposure to cold water gradually leads to acclimatisation
3. Focus – mental conditioning is vital, and is often the hardest part
4. Insulation – an extra layer of subcutaneous insulation can work wonders. So can a wetsuit
5. Knowledge - learn and acknowledge your limits – don't push them!

Acclimatisation takes time, patience and effort but is quite straight forward if you start at the right time. And the right time is summer! If you keep swimming regularly as the weather and the water gradually get colder, your body will adapt. Over time you will develop more control of your breathing and will condition your body to cope better with cold shock through progressive desensitisation. Your shivering threshold will reduce and your non-shivering thermogenesis (metabolic heat production) will improve, along with improvements in blood flow. The ultimate outcome is greater cold tolerance and more efficient swimming which will reduce, but not eliminate, the chances of swim failure or hypothermia. You will also feel more comfortable in the water

Maintaining cold adaptation requires continued exposure to cold water. The odd swim in warm water such as a pool won't be a problem, though you might find the warmth a little more uncomfortable than previously.

## **Deciding whether or not cold-water swimming is for you**

**Despite the benefits, cold water swimming is a potentially dangerous sport, especially swimming without a wetsuit.**

However, there is no need to fear cold-water swimming if you respect the water and prepare yourself physically and mentally for the challenge. Also, you don't have to make your decision to swim through winter all at once; many people find it easier to just to keep on swimming one day at a time, thus avoiding making any actual decision.

That said, winter swimming in the bay is not for everyone. Before proceeding, you need to consider your individual circumstances. Factors suggesting that winter swimming may not be a great idea include:

- Older age (unless you're physically fit)
- Childhood (not recommended for the under 16s)
- Medical conditions – such as underactive thyroid (hypothyroidism), poor nutrition, anorexia, severe arthritis, history of stroke, Parkinson Disease, obesity, high blood pressure, cardiac arrhythmia, heart/respiratory disease, disorders that affect sensation in the extremities, e.g. diabetes, dehydration
- Mental problems that are not well managed
- Medication - such as antidepressants, antipsychotics, narcotic pain killers, sedatives, medication affecting temperature regulation
- Alcohol/drug use
- Jet lag – wait until it's gone

Before you start, consult your doctor about your capacity to undertake this sport safely, especially if you have any doubts.

Note: If you use swimming to keep fit, you may need to supplement your winter bay swims with some pool sessions, because you're unlikely to swim far enough in the cold water to achieve or maintain a high level of swimming fitness. See the lifesaving club website for details of winter pool sessions.

Remember, cold-water swimming is essentially a **battle of mind over matter**

## **Recommendations for safe winter swimming**

### Swim planning:

- Plan to swim regularly throughout the season, starting before the water temperature has dropped into the cold zone – start in summer.
- Meet fellow swimmers on the beach at a pre-arranged time. If you are new to cold water swimming, swim with someone who's experienced.
- Take time to observe the prevailing conditions carefully. For example, the air temperature can have considerable effect on how quickly your body cools. Inhaling very cold air, and having your head, arms and back exposed can be a quite different experience from swimming in similarly cold water when the air temperature is warmer. Also take into account the state of the tide, obvious currents, the size and condition of waves, the wind direction and strength, position of sand bars, whether or not Balcombe Creek is open\* (when swimming from the club) *i.e.* be aware of your environment.
- Based on these factors decide where, and for how long, you intend to swim. Plot a course that's within your capability, and that brings you closer to shore and nearer to the clubhouse in the later part of your swim (you don't want to be caught out wide or way up the beach when you're most likely to be getting really cold). Don't let anyone talk you into swimming for a time or distance that you feel might be beyond your limits. Swimming 'laps' between Poles 1 & 2 can be a good option, particularly when the conditions are adverse. It will keep you fairly close to home and within view.
- See the map at the end of this booklet for approximate swim distances.
- Find yourself a buddy or buddies to swim with.

**PLEASE DON'T SWIM ALONE**

*\*when the Balcombe Creek opens to the bay, the water quality may well provide a health risk for a day or so, especially if it's been closed for some time. The risk of ear/throat infections and/or gastroenteritis may be greatly increased. Consider relocating.*

### What to wear:

- If not wearing a wetsuit, it is important to wear at least a neoprene hood or 2 or 3 silicon caps (hi-vis is best). Maybe neoprene booties for comfort.
- Ear plugs are advisable for comfort and to lessen the risk of developing surfers' ear\*\*. They can also help prevent dizziness, vertigo, and nausea in rough water. Most use silicon ear plugs available from any chemist.
- Consider towing a hi-vis float, especially in rough water.

### Getting wet:

- Diving in is not recommended, due to the danger of cold shock (see p4). This is particularly important if you are not cold adapted. The recommendation is to dip yourself into the water and make sure you establish a controlled breathing pattern before you start to swim.
- Getting wet is arguably the hardest part of the swim.

### Swimming:

- Be mindful of the water conditions. They can change very quickly in the bay, especially when the wind changes.
- Look up often to check you are on course
- Keep an eye out for your swim buddies at regular intervals.
- Listen to your body. Swim failure and/or hypothermia will creep up on you if you are not vigilant. Initial symptoms vary widely between individuals. However, most people who swim regularly will learn to read their own warning signs. These may include numbness or lack of control over your hands or feet, and/or splaying or flexing of the fingers. Among the other effects of the cold are impaired thinking and reasoning which you may not be quick to acknowledge. Don't ignore or deny these signs – get out of the water as soon as possible. If you cannot immediately exit the water, swallow your pride, and call for help before swimming becomes too difficult and you stop completely (swim failure - see p4).
- Swim within your limits

*\*\*continued exposure to cold water/wind can lead to ear infections, ear blockage, discomfort, hearing loss and ultimately to abnormal bone growth within the ear canal.*

## Rewarming:

Rewarm from the inside out, not the outside in.

- After leaving the water you will continue to cool for several minutes. Minimize heat loss by getting out of the wind, wearing footwear, and entering a warm environment. Your rewarming options depend on the facilities available.
- Option 1 – No facilities. Rug up. Remove your wet gear and dress in dry clothes and footwear ASAP (multiple layers of wool, beanie, gloves, jacket etc). Warm water in which to immerse your hands/feet can make getting dressed much easier but pouring it onto your body does little to rewarm your core. Have a warm drink. Have your car heater working overtime and use seat heating if you have it. Finish rewarming at home in the shower, working from cool to warm to avoid fainting.
- Option 2 - Shower (this can be tricky). Initially the shower should be relatively cold and warmed up only slowly over several minutes. A hot shower simply warms the skin and draws blood away from the core where it's needed. If you start to feel dizzy or have tingling in any extremities, make your shower colder. If the feeling persists, sit down, or lie down until you feel better. This feeling is usually due to a sudden drop in blood pressure and is a forerunner to collapsing. Don't leave the shower while you still feel cold. This can take quite a while; often 10 minutes or more.
- Option 3 – Steam room (easier and safer). Rewarming in a steam room is gradual and the heat distribution is very even. Steam warms the core more directly than most methods, while the air is not hot enough to draw the blood to the surface or cause blood pressure problems.

Warm drinks should be used to aid the rewarming process. Also drink plenty of water, as rehydration is important in re-establishing a good body balance.

In the depths of winter, many people show some of the early signs of hypothermia as they leave the water; and remember that your core temperature may continue to drop for several more minutes. Common signs include a slight slurring of speech, being a little clumsy or wobbly, disorientation *etc.* If you observe any of these signs in your fellow swimmers, please keep a close eye on them during their rewarming process.

### **When trouble strikes**

Self-awareness is your greatest asset. If, despite your best preventative measures, you feel the onset of symptoms of either swim failure or hypothermia, raise the alarm (preferably before you're in real trouble).

- Call loudly to any nearby swimmer or board paddler, or raise your arm while you still can
- Don't panic and try to maintain rhythmic breathing
- Try to stand up if the water is shallow
- Try to use your legs – they don't cool as quickly as your arms
- Roll onto your back to make breathing easier

If you observe another swimmer in difficulty or starting to lose their swimming efficiency (often indicated by increased stroke rate, decreased stroke length, more vertical swim angle):

- Summon help quickly (a board or rescue tube if possible)
- Re-assure the swimmer and keep them calm
- Keep swimmer afloat, preferably on their back and stand up if possible
- Remember your own time is also limited – do not put yourself in danger

### **Treating cold-affected swimmers**

If you suspect hypothermia seek medical attention immediately by calling 000. In the meantime:

- Remove them from the water and the wind, into a warm environment
- If the steam room is on, lay them down, get them a warm drink and apply skin-to-skin contact with warmer individuals if possible
- If the steam room is unavailable, dry them off very gently without rubbing the skin, lay them down on a dry surface in a warm place and warm them passively using blankets and warm drinks. Do not apply any direct heat.
- Attempting to rewarm them in a shower is very problematic and would be the option of last choice.
- Monitor breathing and pulse and administer CPR if necessary.

### **Who swims at Mount Martha in winter, and who are the Icebergers?**

A diverse group of people choose to swim here in winter. For safety and fun in doing this consider joining the Mount Martha Lifesaving Club, whose facilities include hot showers and steam rooms. Joining requires a current Working with Children clearance. Membership details: <http://www.mmlsc.com.au>

**Iceberger:** Is a club member who has swum **regularly** throughout at least one winter season without the benefit of a wetsuit. Icebergers must earn the right to wear the Iceberger rugby top, have their name added to the club honour board and be awarded a certificate to attest to their achievement.

**Iceberger Rookie:** Is a club member attempting to swim through their first winter season without a wetsuit. This is very much a learning phase, and involves obligatory pre-season information sessions, together with continual encouragement and support from the more experienced Icebergers. It's no big deal not to make it through the season at your first attempt, whatever the reason. There's always another winter.

**Rubber Duck:** Is someone who chooses to swim wearing a wetsuit. This is perfectly acceptable, even on an ongoing basis. It is a more comfortable and safer option. Just don't expect to be first in the showers!

Social events are open to **all**. Just make sure you are on our email list and are a member of the Iceberger group on the MMLSC Team App.

**Contact:** email to [icebergers@mmlsc.com.au](mailto:icebergers@mmlsc.com.au) , or via the MMLSC Team App

**Resources:** COVID-19 has resulted in a dramatic increase world-wide in people taking up 'wild' or open water swimming and there's been a corresponding increase in information and (unfortunately) mis-information on the internet. One of the best websites is: <https://www.outdoorswimmingsociety.com>. This is a non-commercial website of a UK-based group that is free to join and has >100K members and is a great starting point to explore the world of cold-water swimming. It provides masses of science-based articles, together with an extensive library of swimming related books, movies, music, a monthly journal called 'Elsewhere' (free on email), plus lots of external links. Being UK-based most of the info on this site is relevant to 'cold' water swimming.