Environment Report

Beach Report 2011-2012

Publication number 1484 August 2012
Authorised and published by EPA Victoria, 200 Victoria Street, Carlton

Summary

EPA Victoria's Beach Report program was transformed during the 2011-12 summer season. We added more frequent daily forecasts, and issued updates at weekends and public holidays. We also made it easier to find bacterial water quality information on the new-look Beach Report website. And, in 2011-12 Beach Report information was accessible to the community on Twitter and a mobile version of the website.

The Beach Report program found bacterial water quality suitable for swimming during fine weather at Port Phillip Bay beaches this summer, with only a handful of sites exceeding the bacterial water quality trigger levels. Each of these exceedences followed heavy and persistent rain.

It is important to note that Melbourne's summer weather patterns have changed dramatically over the past two years, with persistent wet weather and heavy rain events becoming increasingly common. This summer's above average rainfall resulted in frequent stormwater run-off and river flows into Port Phillip Bay.

Enterococci results over the summer season reinforced Beach Report's advice of not swimming at beaches near stormwater drains or rivers after heavy rain events. Beaches without nearby rivers or drains generally met the State Environment Protection Policy (Waters of Victoria) 2003 (SEPP (WoV)) objective for primary contact recreation (that is swimming) during the 2011–12 summer season; while those located near stormwater drains or the mouth of major rivers and creeks did not.

Beach Report's historical data indicates good bacterial water quality during fine weather. However, in recent summers bacterial water quality has been affected by above average rainfall, with an increase in the number of beaches not meeting the (SEPP (WoV)) objective for primary contact, such as swimming.

Beach Report recommends using judgement and local knowledge when visiting a beach. And, as a general precaution, Beach Report advises against swimming near stormwater drains, rivers, streams and other outlets into Port Phillip Bay during heavy rainfall events and for 24-48 hours afterwards. Weekly water quality results and daily water quality forecasts are reported in major daily newspapers and on EPA's website, www.epa.vic.gov.au/BeachReport

EPA's beach report program

EPA's Beach Report program provides information and bacterial water quality forecasts to the community during the summer peak period. It is supported by weekly monitoring of bacterial water quality at 36 beaches in Port Phillip Bay. When monitoring identifies poor water quality, Beach Report provides advice to the community and may investigate it further if required.

Beach Report enhancements for 2011–2012

This year Beach Report included a number of visual and forecasting enhancements including:

- A refreshed and upgraded website – www.epa.vic.gov.au/BeachReport, as well as smart phone capability and Twitter feed.
- Enhanced water quality forecasting including additional daily updates. The coverage was expanded to include weekend and public holiday updates in January 2012.

The popularity of the service was reflected in a near five-fold increase in the number of website visits, with a total of 281,000 web page views over the Beach Report season.

On 1 January 2012 web page views peaked at 25,000 as beachgoers wanted to be informed of the latest beach water quality following the heavy rains on Christmas Day, as well as due to extensive media coverage and forecast temperatures over the New Year period nearing 40°C.

Photo 1. Beachgoers enjoying the summer sun at Port Phillip Bay beaches.

Figure 1. Beaches monitored in the Beach Report program (LSC - Life Saving Club; CG - Coast Guard).

Why do we monitor?

Beach Report provides the latest information on water quality so that beachgoers can make informed decisions about visiting Port Phillip Bay beaches.

The program aims to:

- provide information to the public about bacterial water quality at beaches
- identify short-term pollution problems
- look for long-term changes in water quality
- provide the data necessary to support beach water quality forecasting.

The data we collect assists Beach Report and local councils to respond effectively to pollution incidents when they occur and identify areas for improved stormwater management. Beach Report also promotes actions the wider community can take to protect bay beaches. For more information go to: www.epa.vic.gov.au/BeachReport

What do we monitor?

Beach Report monitors levels of enterococci (measured in organisms/100 mL (org/100 mL)) weekly at 36 beaches in Port Phillip Bay (refer to Figure 1). Enterococci are a group of bacteria found in the intestinal tract of warm-blooded animals. Elevated levels of enterococci are a sign of possible faecal pollution. The World Health Organisation (WHO) and the National Health and Medical Research Council (NHMRC) recognise these bacteria as the best indicator for primary contact (swimming, diving or surfing) recreational water quality in marine environments.

How do we assess beach water quality?

Short-term water quality is assessed against bacterial water quality triggers. The triggers determine the suitability of beaches for primary contact recreation. These triggers are regularly reviewed with the Department of Health (DoH) to ensure that they are based on the latest guidance and information available.

The two triggers used to assess short-term water quality are:

Two-consecutive-sample investigation trigger (>400 org/100 mL)

- Based on the Microbial Quality of Recreational Water: Guidance Notes to the NHMRC 2008 guidelines. If it is triggered once during any weather, a resample will be collected. If it is triggered twice in a 24-hour period, a swim advisory will be issued.

One sample dry weather impact indicator trigger (>1000 org/100 mL)

- Based on historical monitoring of beaches in PPB and may indicate that a spill or other event has occurred.
- Only needs to be triggered once during dry weather for a swim advisory to be issued.

For both triggers, Beach Report undertakes re-sampling until bacterial levels return below the trigger levels. A desktop and/or site investigation is also commenced if bacterial levels are over both triggers during dry weather (refer to the 'Site investigations' section below). Beach Report works closely with local councils during these investigations to determine the source of the bacterial contamination.

Swim advisories

- During the summer season the Beach Report program may issue a swim advisory when the water quality is not suitable for swimming.
- This occurs when any site has two consecutive daily results over the investigation trigger value, or any site has a single sample over the dry weather impact indicator trigger that is not linked to rain.
- Beach Report works with local councils to inform beach users of the risks of swimming, through signage at the affected beach and through notification on the Beach Report website, media outlets and Twitter.

Summer season and long-term bacterial water quality are assessed against the 75th percentile[1] objective (150 org/100 mL) for primary contact recreation in the State Environment Protection Policy (Waters of Victoria) 2003 (SEPP (WoV)). The objective is used by Beach Report to monitor whether bacterial water quality is sufficient for the protection of beneficial uses of bay beaches (for more information on the objectives go to www.epa.vic.gov.au/about_us/legislation/water.asp). Assessment of summer season bacterial water quality determines if the objectives have been met for a season. The long-term bacterial water quality assessment allows water quality to be compared between summers to monitor trends.

Forecasting beach water quality

Every day during the summer reporting season (28 November 2011 to 12 March 2012) EPA issued bacterial water quality forecasts for 36 PPB beaches. The forecasts were reported on the Beach Report website. Beach Report forecasts were accessible via Twitter (@EPABeachReport) and media also carried the forecast.

On weekdays, the forecast was updated in the morning and afternoon. The afternoon update also provided an advance forecast for the next day. From January 2012, morning and afternoon forecast updates were introduced on weekends and public holidays.

The forecasts predict levels of bacteria in the water which helped beachgoers make informed choices about visiting a beach. Bacterial water quality forecasts are based on rainfall, weather forecasts and warnings, bacterial water quality history and weekly sample results.

Forecasts are assigned a rating of 'Good', 'Fair' or 'Poor' (refer to Figure 2) for each beach. If there are a significant number of poor bacterial water quality forecasts for the next day, a stormwater alert is issued through the media, the Beach Report website and Twitter. If Beach Report detects high bacterial levels from weekly bacterial water quality monitoring, an 'Unacceptable' rating is assigned for the beach and a swim advisory is issued.

The water quality forecasts are only predictive. When rain enters the stormwater system it can wash pollutants into the nearest waterway and onto local beaches. The forecasts cannot predict the effect of localised sources of contamination (such as a leak from a public toilet block) on water quality. Beach Report is continually improving the accuracy of the forecasts by testing the model on which the predictions are based against weekly monitoring results.

Figure 2. Bacterial water quality forecast ratings.

Following from the 2010-11 Beach Report season, the 2011-12 summer also had above average rainfall and subsequently, a higher number of 'Fair-Poor' forecasts (refer to Figure 3). Seven stormwater alerts were issued this season which were attributed to forecast heavy rainfall. The decrease in days with good forecasts since 2009-10 is attributed to the two recent wet summers after previous summers of drought conditions.

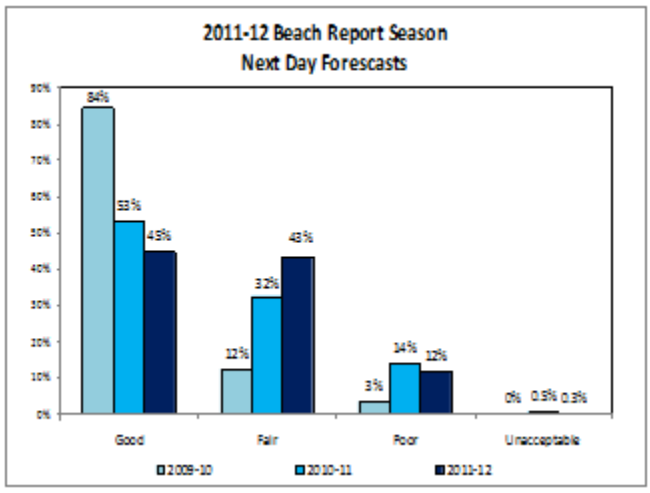

Figure 3. Comparison of bacterial water quality forecasts between 2009-10, 2010-11 and 2011-12.

[1] The 75th percentile is a value such that, after the data have been ordered from smallest to largest, at least 75% of the data are less than or equal to this value and at least 25% of the data are greater than or equal to this value.

How was the water quality?

Beach Report monitored 36 beaches across Port Phillip Bay (see Figure 1) from the 21 November 2011 to the 12 March 2012. Weekly samples were collected each Monday morning over the season, with 576 water samples collected in total (see Appendix 1).

On days of fine weather water quality was found to be generally good, but during and after rain, bacterial levels could be elevated and exceed bacterial water quality triggers. Persistent rain and heavy rain events can elevate bacterial levels through stormwater run-off and increased river flows into Port Phillip Bay.

Short-term water quality

'Short-term water quality' refers to the bacterial levels on any given day or week. Figure 4 provides a summary of the routine enterococci monitoring results from 2011–12 compared to the previous four years. It shows that the majority (87%) of bacterial water samples for the 2011–12 Beach Report season had bacterial levels suitable for swimming (below the investigation trigger of 400 org/100 mL). Bacterial water quality was suitable for swimming during fine weather at Port Phillip Bay beaches, with trigger exceedance occurring during and after heavy rain.

The slightly higher number of trigger exceedance compared to the previous season and eight swim advisories issued can be attributed to above average rainfall for the 2011-12 summer. Melbourne's summer weather patterns have changed dramatically over the past two years, with more persistent wet weather and frequent heavy rain events across the Port Phillip Bay catchment. Frequent stormwater run-off and river flows into the bay during November and December of 2011, early January 2012 and late February 2012 often resulted in elevated bacterial levels, but were short-lived, with many levels returning to below trigger levels within 48 hours (for example refer to Figure 5).

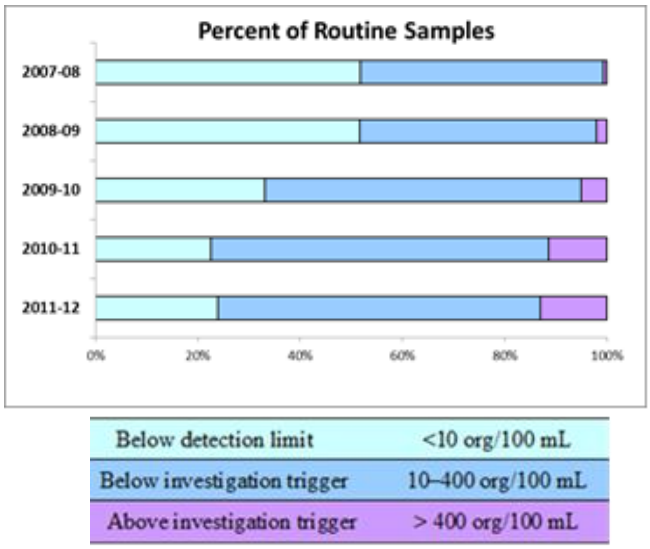

Figure 4. Summary of routine enterococci results for the last five years.

During the 2011-12 season, dry weather trigger exceedance were observed on two separate occasions. The first instance was recorded at Middle Park and Queenscliff beaches on the 2 January 2012. The second occurrence was at Portarlington and St Leonards beaches on the 30 January 2012 (refer to the 'Site Investigations' section on page 8 for further details). Beach Report conducted desktop investigations, site inspections and continued sampling until the water quality returned to below trigger levels.

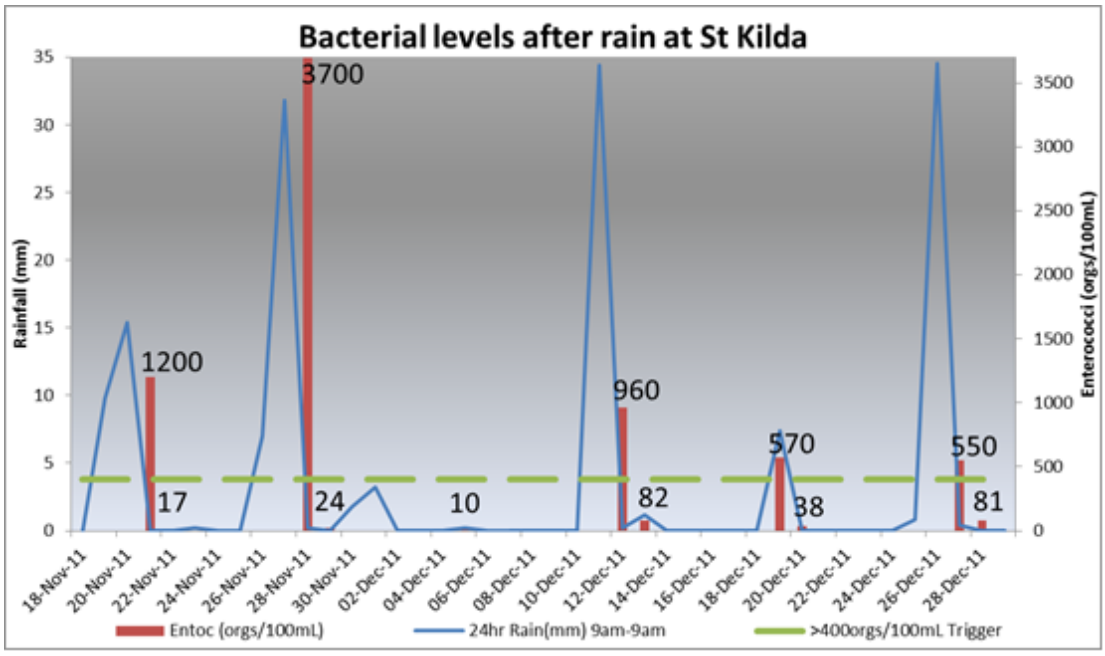

Figure 5. Bacterial levels at St Kilda beach returning to below trigger levels within48 hours of rain.

Christmas Day Storms 2011–2012

On the evening of Sunday the 25 December 2011, areas of Melbourne experienced a severe storm event which triggered a large flow of stormwater into the rivers and tributaries of the Melbourne catchment, eventually impacting on Port Phillip Bay. Over 32,000 megalitres of freshwater flowed into the bay in the six days after the storm.

Beaches closer to the mouth of the Yarra River had elevated bacterial levels after the Christmas Day storm. For Sandridge beach, the closest beach to the Yarra River, a swim advisory was issued due to bacterial levels remaining high for up to 72 hours following the storm. The large volume of freshwater into the bay also affected broader water quality, after bacterial levels had returned to being low.

EPA's routine sampling from the *Spirit of Tasmania1* tracked the environmental response in the bay throughout this period. This data indicated an unprecedented drop in salinity in Hobsons Bay as water flowed into the bay from the Yarra River and other stormwater sources, associated with discolouration of the bay. Four days after Christmas, the highest ever measured plankton (a form of algae) levels were recorded. When plankton numbers started to decline, reports of fish deaths around the northern beaches began to be logged by the EPA. A thick brown 'gunge' was reported in late January at some southern beaches and consisted of naturally decomposing organic material that was potentially related to the large algal bloom observed in northern Port Phillip Bay following the Christmas Day storms. EPA issued warnings on the Beach Report website that beachgoers may experience skin irritations due to contact with algal material.

Ecosystem responses to storm events such as the one over the Christmas-New Year period, although infrequent, have previously occurred in Port Phillip Bay. EPA will continue to monitor and improve our understanding of bacterial water quality and environmental health of the bay after storm events.

What influences short-term bacterial water quality at beaches?

Potential sources of faecal pollution affecting short-term bacterial water quality are:

- stormwater run-off and river discharge after rain
- bather shedding (where no toilet facilities are available)
- leaks from toilet facilities and septic tanks
- sewage/wastewater treatment plant discharges
- sewage overflows
- wastewater re-use run-off
- animal faeces
- seagrass
- boat sewage discharge.

To date, rainfall (and associated surface run-off into stormwater drains and rivers) is the only factor that generally shows a consistent relationship with bacterial water quality at Port Phillip Bay beaches. High bacterial levels in stormwater run-off and river discharge can also be caused by sewage and septic tank leakages, litter and animal faecal waste entering drains and rivers.

Additionally, when there have been large rain events, such as in the 2011-12 Beach Report season, sewage overflows can increase bacterial levels in stormwater drains and rivers. Large rainfall events can strain sewage systems by increasing flows in sewer pipes to beyond the capacity of the sewer. If this occurs, the excess flow (a mixture of stormwater and sewage) is discharged directly into receiving waters or into the stormwater system through emergency relief structures. This prevents sewers backing up and overflowing into houses, reducing risk to human health.

On the 27 November 2011 releases occurred into the following waterways after heavy rains of up to 88 mm across Port Phillip Bay:

- Patterson River at Patterson Lakes (and close to the headwaters of Kananook Creek);
- Mordialloc Creek at Keysborough;
- Yarra River at Kew (also Maribyrnong River at Keilor East, which flows into the Yarra River); and
- Werribee River at Melton.

Beach Report's bacterial water sampling on the 28 November found elevated bacterial levels (over the >400 orgs/100 mL investigation trigger) at Werribee South, Sandridge, Port Melbourne, Middle Park, St Kilda, Elwood, Mordialloc, Aspendale North, Carrum and Frankston Coast Guard beaches. These beaches are close to the mouth of waterways or stormwater drains where releases entered the bay. Most beaches returned to low bacterial levels on the 29 November, except Frankston Coast Guard and Aspendale North which were issued with swim advisories when elevated bacteria levels persisted.

Rainfall can also have a considerable effect on bacterial water quality by what is known as the 'first flush'. The 'first flush' of the stormwater system is the first water after rain. It carries most of the pollution that has built up in the drains since the last time it rained. Pollution can be up to three times more concentrated in the first flush than during ongoing rain and lasts about 48 hours. This can cause damage such as fish kills and habitat destruction which lasts long after the first flush passes.

This is why it is important to avoid polluting drains all the time, not only during wet weather. The problem is not the rain, it is the material it carries.

How you can help prevent beach pollution

Pollutants from our streets can enter stormwater drains and be transported to our waterways after rain, ending up at your local beach. To help protect bay beaches you can:

- put litter in a bin (including cigarette butts)
- report sewer spills and blockages
- pick up after your dog and put it in a bin
- regularly maintain septic tanks
- make sure that only rainwater goes into stormwater drains.

Photo 2. Stormwater run-off can increase bacterial levels and also wash street litter, dog droppings, cigarette butts and oil onto our beaches.

In dry weather, potential sources of contamination at bay beaches include leaking sewer infrastructure (particularly where it overlies the drainage system), illegal or cross-connections between sewage and drainage systems, illegal connections of septic tanks to stormwater, poorly operating septic tanks, animals, agricultural run-off and boat sewage discharge.

Increased levels of enterococci can be expected as a result of these inputs, however, elevated concentrations are usually short-lived.

Summer season water quality

'Summer season water quality' refers to the overall water quality over the summer at each beach, rather than water quality on an individual day. It is a measure of the prevailing water quality conditions across the summer period, rather than single events.

The Beach Report program assesses overall water quality for the Beach Report season against the SEPP (WoV) 75th percentile objective for primary contact recreation (refer to the 'How do we assess beach water quality?' section above).

Enterococci results over the 2011-12 summer season reinforced Beach Report's advice of not swimming at beaches near stormwater drains or rivers following heavy rain events. Beaches without rivers or drains nearby generally met the SEPP (WoV) objective during the 2011–12 summer season, while those located near stormwater drains or the mouth of major rivers and creeks did not (see Appendix 2).

Long-term water quality

Long-term trends in water quality are assessed by comparisons of annual 75th percentiles against the SEPP (WoV) 75th percentile objective for primary contact recreation (refer to the 'How do we assess beach water quality?' section above).

Long-term beach water quality at the 36 monitored beaches reflected increased summer rainfall over the 2010-11 and 2011-12 Beach Report seasons. These wetter summers have seen an increase in the number of beaches not meeting the objective for primary contact recreation. As a result, beaches located close to the mouth of major rivers and large stormwater drains around the bay have only met the objective for three to four years out of the last five years (refer to Figure 6 and Appendix 2). Beaches that have met objectives for all of the last five years are further away from major waterways and stormwater drains, or are located close to waterways and drains, but are not in the direction of prevailing winds or currents.

Overall, long-term trends indicate good water quality during fine weather.

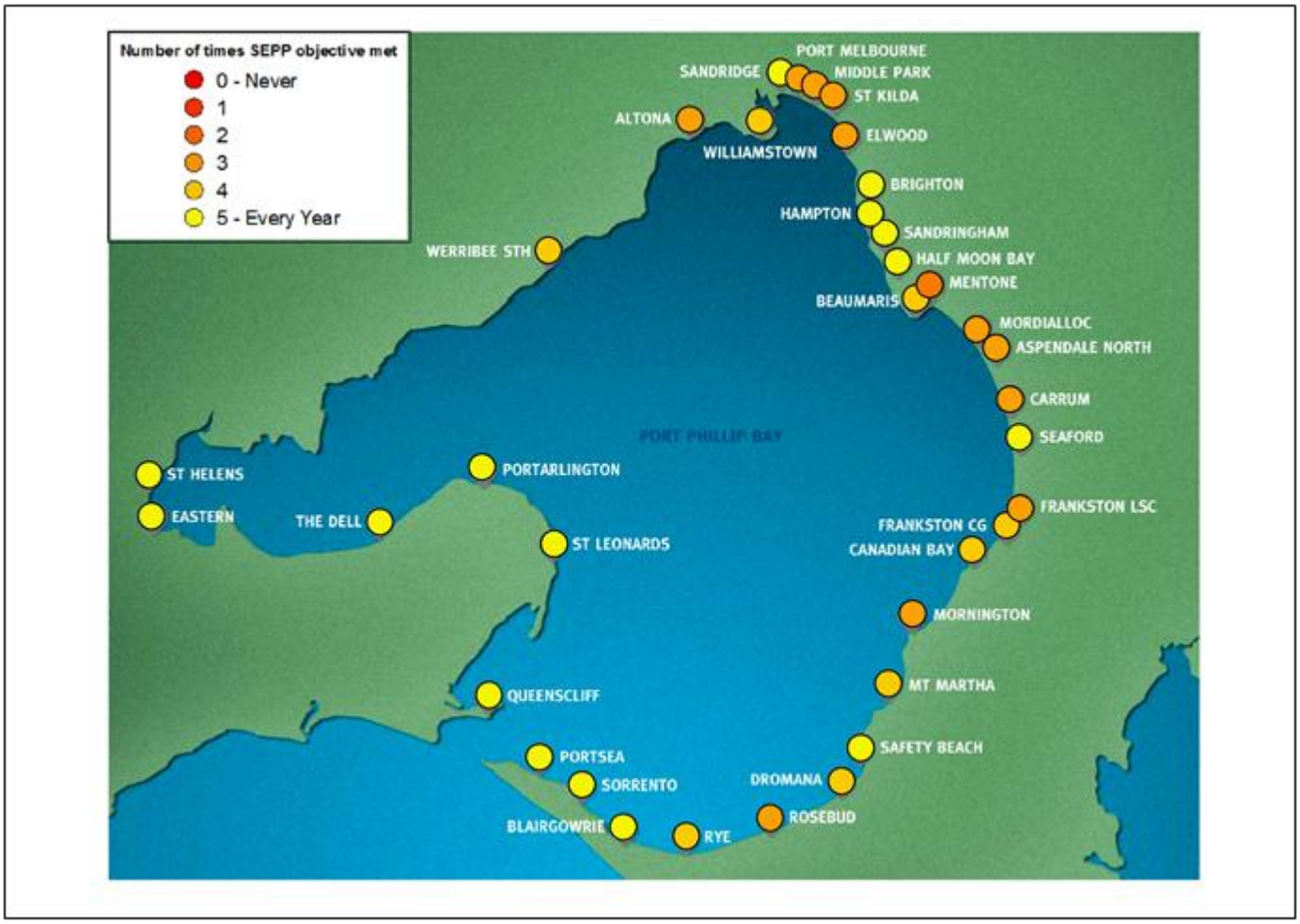

Figure 6. The number of times beaches have met the SEPP (WoV) objective for primary contact recreation over the last five summers (2007-12).

Site investigations

Four beaches exceeded the investigation trigger (>400 org/100 mL) during dry weather in the 2011-12 Beach Report season.

The Beach Report program initiated investigations into possible causes of the high bacteria results at the four sites. This included re-sampling at the beaches as well as conducting inspections and sampling near possible high risk sources such as stormwater drains. The cause of elevated bacterial levels during fine weather can be difficult to ascertain, as sources can be unpredictable, short-lived and difficult to pinpoint. The findings from the investigations are detailed below.

On the 2 January 2012, Middle Park and Queenscliff beaches exceeded the investigation trigger of >400 orgs/100 mL, with a result of 620 org/100 mL and 450 org/100 mL, respectively. Elevated bacterial levels were short-lived, with bacterial levels returning to below trigger levels on the 3 January 2012.

After investigating the Middle Park result, the plausible cause was attributed to heavy rainfall between the 25-26 December 2011. The stormwater run-off from drains and major rivers resulted in large inflows of freshwater and sediment into the bay. The newly deposited sediments at beaches from these inflows may contain bacteria, as well as providing colonisable surfaces for bacteria to grow. During the day of sampling there were strong northerly winds at Middle Park, potentially re-suspending these sediments and elevating bacterial levels in the water. No other pollution events were reported to EPA's Pollution Watch Hotline on the day of sampling.

An investigation at Queenscliff indicated that high enterococci levels in seaweed was the most plausible cause of the high result at the start of January. Large amounts of seaweed is common at this beach. Bacterial levels in the seaweed can be elevated by faeces from birds feeding on seaweed and from natural decomposition. Elevated bacterial levels at Queenscliff may have been caused by old seaweed being transported back into the water. This can occur from strong winds and associated wave action before and during sampling, together with tidal movements. Seagrass deposition is highly variable at Queenscliff beach and may explain bacterial levels returning to low levels the following day. No other pollution events were reported to EPA on the day of sampling.

On the 30 January 2012, Portarlington and St Leonards beaches exceeded the investigation trigger of >400 orgs/100 mL, with bacterial results of 430 and 570 org/100 mL, respectively. The elevated bacterial levels at both beaches were short-lived, with bacterial levels returning to low levels on the 31 January 2012.

Investigation of the high results at St Leonards and Portarlington found no conclusive cause. No pollution events were reported to EPA on the day of sampling. Due to the time-lag of 24 hours between sampling and receiving results, the precise cause of the high enterococci levels could not always be determined.

Beach Report will continue to conduct sanitary surveys (investigation of potential sources of faecal contamination) at beaches with higher risk of poor bacterial water quality and work with local councils, other authorities and the community to further understand factors affecting beach water quality.

Photo 3. Bacterial water quality sampling at Middle Park beach.

Conclusions

EPA Victoria found good bacterial water quality during fine weather at Port Phillip Bay beaches. The majority of weekly bacterial water quality results indicated that beaches were suitable for swimming.

When bacterial levels did exceed bacterial water quality triggers, it was on occasions when there had been persistent wet weather over consecutive days or heavy rain events. Melbourne's summer weather patterns have changed dramatically over the last two years, with more persistent wet weather and heavy rain events becoming more common. The above average rainfall this summer resulted in frequent stormwater run-off and river flows into the bay, and subsequent trigger exceedances and/or swim advisories.

Enterococci results over the summer season reinforced EPA's advice of not swimming at beaches near stormwater drains or rivers following heavy rain events. Beaches without rivers or drains nearby generally met the SEPP (WoV) objective during the 2011–12 summer season, while those located near stormwater drains or the mouth of major rivers and creeks did not.

Long-term beach water quality at the 36 monitored beaches reflected increased rainfall over the 2010-11 and 2011-12 summers, with an increase in the number of beaches not meeting the objective for these seasons. Results from 2011–12 continue to emphasise that rain can temporarily cause poor water quality at bay beaches. Overall, long-term trends indicate good water quality during fine weather.

As a general precaution, EPA advises against swimming near stormwater drains, rivers, streams and other outlets into Port Phillip Bay during heavy rainfall events and for 24-48 hours afterwards.

Future directions

EPA will maintain the Beach Report program in line with national and international guidelines.

EPA will continue to work on improving the accuracy of the beach water quality forecasts by updating the model on which the predictions are based.

EPA will keep working with the community, local councils, Department of Health, Melbourne Water and other relevant metropolitan and regional water authorities to assess and resolve local issues influencing beach water quality.

Acknowledgements

EPA wishes to thank the following organisations for their support of the 2011–12 Beach Report program:

- Bayside City Council
- Bellarine Bayside Foreshore Committee
- Borough of Queenscliff
- City of Greater Geelong
- City of Kingston
- City of Port Phillip
- Department of Health, Victoria
- Frankston City Council
- Hobsons Bay City Council
- Life Saving Victoria
- Melbourne Water
- Mornington Peninsula Shire Council
- Wyndham City Council.

Further information

EPA Victoria Information Centre
200 Victoria Street,
Carlton, Victoria 3053

Postal Address: GPO Box 4395, Melbourne, Victoria 3001

For further information on Beach Report, go to:
http://www.epa.vic.gov.au/BeachReport

General inquiries and pollution reporting 24 hours.

Telephone: 1300 EPA VIC (1300 372 842)

Facsimile: 03 9695 2610

Email: contact@epa.vic.gov.au

Appendix 1: 2011–12 enterococci results

Table 1: Enterococci results (orgs/100 mL) from the Werribee, Geelong and Bellarine region in 2011–12.

Beach	21-Nov-11	28-Nov-11	5-Dec-11	12-Dec-11	19-Dec-11	27-Dec-11	2-Jan-12	9-Jan-12	16-Jan-12	23-Jan-12	30-Jan-12	6-Feb-12	13-Feb-12	20-Feb-12	27-Feb-12	5-Mar-12	Number of Occurrences		
																	<=400 orgs/100mL	>400 orgs/100mL	>=1000 orgs/100mL
Werribee South	<10	420	52	97	41	<10	<10	52	<10	31	10	10	<10	10	<10	10	15	1	0
St Helens	52	10	<10	<10	<10	41	<10	110	<10	<10	<10	10	31	74	5200	<10	15	1	1
Eastern	31	52	<10	52	31	20	<10	130	10	<10	97	390	170	31	240	10	16	0	0
The Dell	<10	10	<10	20	240	<10	<10	1100	52	<10	98	430	20	<10	63	31	14	2	1
Portarlington	<10	51	<10	<10	30	51	10	910	<10	<10	**430*** **	20	20	<10	1300	20	13	2	1
St Leonards	<10	10	<10	10	52	74	<10	98	10	20	**570*** **	52	<10	<10	480	<10	14	1	0
Queenscliff	86	<10	<10	20	10	86	**450*** **	52	<10	<10	20	10	10	<10	10	63	15	0	0
																	102	**7**	**3**
Laverton Weather Stations	3 and 7 Day Cumulative Rainfall (mm) (from 9 am to 9 am on the previous day)																		
3 day Rainfall	**22.2**	**63.0**	**0.0**	**20.2**	**6.6**	**45.8**	**0.0**	**13.2**	**0.0**	**0.0**	**0.0**	**3.8**	**6.8**	**0.0**	**4.4**	**18.2**			
7 day Rainfall	**28.0**	**63.4**	**4.8**	**20.4**	**7.4**	**45.8**	**0.6**	**13.2**	**2.8**	**0.0**	**0.0**	**10.4**	**6.8**	**6.6**	**4.4**	**47.4**			
Avalon Weather Stations																			
3 day Rainfall	**21.2**	**88.0**	**0.0**	**14.0**	**9.0**	**2.0**	**0.0**	**9.8**	**0.0**	**0.0**	**0.0**	**2.6**	**8.6**	**0.0**	**4.2**	**12.2**			
7 day Rainfall	**22.8**	**88.2**	**3.8**	**14.2**	**9.6**	**2.0**	**0.2**	**9.8**	**5.0**	**1.0**	**0.0**	**6.4**	**8.6**	**0.0**	**4.2**	**58.2**			

***Dry weather trigger exceedances

Table 2: Enterococci results (orgs/100 mL) from the Melbourne region in 2011-12.

Beach	21-Nov-11	28-Nov-11	05-Dec-11	12-Dec-11	19-Dec-11	27-Dec-11	02-Jan-12	3/01/2012 *	10/01/2012 **	16-Jan-12	23-Jan-12	30-Jan-12	06-Feb-12	13-Feb-12	20-Feb-12	27-Feb-12	5-Mar-12	Number of Occurrences		
																		<=400 orgs/100mL	>400 orgs/100mL	>=1000 orgs/100mL
Frankston CG	63	470	52	<10	700	10	85		460	63	10	7300	720	20	10	1900	120	10	6	2
Frankston LSC	340	52	<10	250	960	63	31		1500	10	<10	1100	790	31	31	120	230	12	4	2
Seaford	210	31	<10	52	74	10		74	52	10	<10	240	63	10	63	150	250	16	0	0
Carrum	420	2900	<10	460	20	10		31	41	<10	41	280	74	<10	20	10	270	13	3	1
Aspendale North	73	1900	<10	190	560	41		41	230	<10	<10	350	74	<10	<10	150	63	14	2	1
Mordialloc	41	700	10	220	110	140	10		510	<10	<10	<10	170	150	<10	31	170	14	2	0
Mentone	130	41	<10	280	62	290	<10		370	10	20	160	230	200	230	130	170	16	0	0
Beaumaris	96	260	63	300	3700	500	160		510	98	41	210	460	63	270	190	330	12	4	1
Half Moon Bay	130	<10	20	200	110	320	20		41	41	<10	170	31	30	110	250	84	16	0	0
Sandringham	10	20	<10	20	150	98	85		20	10	<10	98	160	<10	<10	5200	<10	15	1	1
Hampton	74	72	<10	<10	300	74	20		460	10	<10	<10	10	20	74	<10	140	15	1	0
Brighton	86	230	<10	10	290	98	63		<10	<10	<10	31	30	<10	<10	96	41	16	0	0
Elwood	1200	14000	<10	910	1600	2200	<10		170	<10	<10	31	540	63	31	<10	320	10	6	4
St Kilda	1200	3700	<10	960	570	550	20		130	10	20	270	150	130	74	6500	41	10	6	3
Middle Park	10	3400	<10	800	20	7700	**620*** **		73	10	10	41	230	20	10	<10	41	12	3	2
Port Melbourne	20	1900	<10	860	110	16000	10		51	<10	<10	10	330	63	20	110	990	12	4	2
Sandridge	<10	1200	<10	800	98	13000	41		<10	10	<10	41	20	10	<10	<10	52	13	3	2
Williamstown	41	74	52	900	130	1500	10		73	10	85	74	160	74	74	31	10	14	2	1
Altona	10	10	<10	86	290	320	10		1000	20	10	10	120	10	41	10	52	15	1	1
																		255	**48**	**23**
Melbourne Weather Station	3 and 7 Day Cumulative Rainfall (mm) (from 9 am to 9 am on the previous day)																			
3 day Rainfall	**25.0**	**39.2**	**0.2**	**34.6**	**7.4**	**33.0**	**0.0**	**0.0**	**14.4**	**0.8**	**0.0**	**2.8**	**6.8**	**7.2**	**0.2**	**10.2**	**17.0**			
7 day Rainfall	**34.4**	**39.6**	**5.4**	**34.6**	**9.0**	**33.0**	**0.4**	**0.0**	**16.4**	**8.0**	**0.0**	**2.8**	**10.0**	**7.2**	**9.4**	**10.2**	**58.6**			
Moorabbin Weather Station																				
3 day Rainfall	**17.2**	**53.0**	**0.0**	**20.6**	**6.4**	**15.0**	**0.0**	**0.0**	**14.8**	**0.6**	**0.0**	**3.6**	**9.0**	**14.8**	**0.2**	**4.4**	**16.8**			
7 day Rainfall	**24.0**	**53.0**	**9.4**	**20.6**	**8.2**	**15.0**	**0.2**	**0.0**	**15.6**	**11.6**	**0.6**	**3.6**	**11.2**	**15.4**	**5.4**	**4.4**	**44.0**			

*Samples were collected on the 3 January due to weather conditions preventing safe collection of samples on the 2 January

**Samples were collected on the 10 January due to sea and weather conditions preventing safe collection of samples on the 9 January

***Dry weather trigger exceedances

Table 3: Enterococci results (orgs/100 mL) from the Mornington Peninsula in 2011-12.

Beach	21-Nov-11	28-Nov-11	5-Dec-11	12-Dec-11	19-Dec-11	27-Dec-11	2-Jan-12	10/01/2012 *	16-Jan-12	23-Jan-12	30-Jan-12	6-Feb-12	13-Feb-12	20-Feb-12	27-Feb-12	5-Mar-12	Number of Occurrences		
																	<=400 orgs/100mL	>400 orgs/100mL	>=1000 orgs/100mL
Portsea	10	<10	10	<10	31	63	<10	98	<10	10	63	10	<10	<10	20	<10	16	0	0
Sorrento	2200	<10	<10	74	63	<10	160	63	<10	20	170	10	<10	<10	380	31	15	1	1
Blairgowrie	180	<10	41	10	31	<10	<10	97	51	10	520	<10	<10	10	240	230	15	1	0
Rye	470	<10	<10	20	30	41	280	430	10	74	200	280	<10	<10	770	20	13	3	0
Rosebud	20	52	10	63	470	120	20	340	97	160	610	290	10	10	1300	260	13	3	1
Dromana	<10	41	<10	10	3900	20	<10	96	<10	10	850	400	31	20	8700	<10	13	3	2
Safety Beach	10	20	<10	140	190	98	<10	220	<10	<10	10	290	<10	74	20	86	16	0	0
Mt Martha	10	<10	10	130	250	41	74	260	20	<10	160	210	<10	<10	160	130	16	0	0
Mornington	10	280	<10	74	350	<10	41	84	120	<10	11000	52	<10	41	6100	85	14	2	2
Canadian Bay	10	190	31	86	430	41	240	180	<10	<10	6500	74	<10	10	17000	260	13	3	2
																	144	**16**	**8**
Cerberus Weather Station	3 and 7 Day Cumulative Rainfall (mm) (from 9 am to 9 am on the previous day)																		
3 day Rainfall	**22.6**	**41.6**	**0.4**	**32.4**	**2.0**	**6.8**	**0.0**	**13.0**	**0.8**	**0.0**	**2.4**	**10.0**	**6.8**	**0.0**	**14.2**	**24.2**			
7 day Rainfall	**25.6**	**41.8**	**8.0**	**32.4**	**2.0**	**6.8**	**0.4**	**13.2**	**22.0**	**0.0**	**2.4**	**20.0**	**7.4**	**0.0**	**14.2**	**80.0**			

*Samples were collected on the 10 January due to sea and weather conditions preventing safe collection of samples on the 9 January

Appendix 2: SEPP (WoV) objective attainment

Table 4: Enterococci (orgs/100 mL) 75th percentiles (calculated from routine sampling across the summer period).

Prior to the 2010–11 Beach Report season, values have been recalculated from the previous reports to ensure a consistent method of calculation for the 75th percentile across all reporting years. Shaded cells indicate that the objective of 150 org/100 mL was not attained.

Beach	75th percentile (SEPP (WoV) objective 150 org/100 mL)				
	2007-08	2008-09	2009-10	2010-11	2011-12
Portsea	10	10	25	23	23
Sorrento	25	<10	20	43	96
Blairgowrie	10	10	41	63	118
Rye	41	42	58	103	280
Rosebud	26	47	47	245	303
Dromana	15	20	26	58	172
Safety Beach	<10	10	10	88	109
Mt Martha	10	15	15	53	160
Mornington	47	155	20	70	160
Canadian Bay	10	20	10	120	245
Frankston CG	31	20	52	93	528
Frankston LSC	20	86	125	258	453
Seaford	15	42	20	110	93
Carrum	15	31	41	315	273
Aspendale North	26	63	107	280	200
Mordialloc	10	53	41	205	170
Mentone	20	146	195	273	230
Beaumaris	15	31	58	55	363
Half Moon Bay	10	10	63	30	140
Sandringham	15	15	26	60	98
Hampton	<10	<10	20	53	74
Brighton	<10	10	15	50	89
Elwood	30	63	58	295	983
St Kilda	52	20	130	288	668
Middle Park	20	26	53	255	328
Port Melbourne	21	10	41	738	463
Sandridge	20	<10	63	110	64
Williamstown	20	20	26	240	96
Altona	75	47	155	373	95
Werribee South	31	15	63	1020	44
St Helens	68	<10	10	43	44
Eastern	10	20	36	40	105
The Dell	10	10	15	108	72
Portarlington	20	10	15	23	51
St Leonards	10	20	63	63	58
Queenscliff	25	41	36	60	55
Rainfall (mm) recorded from November-March; Average of 5 sites[2] totalled across Port Phillip Bay	224.8	165.0	250.8	463.2	312.7

[2] Australian Bureau of Meteorology weather stations: Avalon, Cerberus, Laverton, Melbourne and Moorabbin