

11 March 2021

Assessing risks to recreational water users in Port Phillip Bay using quantitative microbial risk assessment



Publication 1935 March 2021

Summary

This summary outlines how Environment Protection Authority Victoria (EPA) used quantitative microbial risk assessment (QMRA) to improve its understanding of recreational water quality in Port Phillip Bay. QMRA is an evidence-based, objective and transparent approach to assess the microbial safety of water and is a more precise basis for informing water quality management, reporting and communication. This summary outlines the results of EPA's QMRA for Port Phillip Bay for water authorities, local government, recreational water users and those interested in the assessment and reporting of water quality.

EPA monitors water quality at 36 beaches around Port Phillip Bay during summer as part of the Beach Report program. This program helps Victorians make decisions about when and where to swim, based on microbial water quality forecasts and monitoring data.

Using enterococci testing to assess water quality

EPA assesses the quality and microbial safety of water by monitoring for a group of bacteria called enterococci, an indicator of faecal pollution. Faecal pollution in water can cause illness in humans. It can come from sewer overflows or from animals like dogs, birds and livestock. The established link between enterococci and risk of illness allows scientists to forecast potential impacts on human health using water quality monitoring data. Using an indicator like enterococci is an efficient and cost-effective way to assess potential risks to human health.

EPA uses nationally accepted enterococci levels to assess water quality. These levels are based on criteria from overseas, which are not always comparable to conditions in Port Phillip Bay. For example, these criteria assume all enterococci are from human faeces. This is a conservative assumption because in Port Phillip Bay we expect animal faeces are also a source of faecal contamination, which is less likely to cause illness in humans than human faeces. While conservative, these criteria provide the best basis for providing good advice to the community.

Aims of the QMRA for assessing risks to recreational users in Port Phillip Bay project

To better understand the health risks from swimming in Port Phillip Bay, EPA conducted a study using QMRA at three beaches (Altona, Elwood and Frankston) during the 2017–18 summer.

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The aims of the project were to:

- check that the nationally accepted water quality assessment method used to assess water quality in Port Phillip Bay reflects health risks in this unique environment
- develop an understanding of the different sources of faecal contamination at the three beaches
- assess whether the study data could be used to improve water quality monitoring and information provided to the community about the water quality at Port Phillip Bay beaches.

What is QMRA?

QMRA is a detailed risk assessment approach, which can be used to estimate the potential for illness in people exposed to pathogens in recreational waters. To estimate the potential for illness, QMRA combines measured concentrations of different pathogens (not just enterococci) in water with an understanding of how people use (and may ingest) the water. General assumptions or measured data can be used to describe how much water might be ingested during different recreational water activities.

For the three Port Phillip Bay beaches assessed, the potential for illness was estimated by:

- water sampling to determine relevant pathogen types and levels
- applying standard assumptions regarding the volume of ingested water when recreating
- estimating the likelihood of people becoming ill from ingesting those pathogens when swimming or coming into contact with the water.

What the QMRA study of Port Phillip Bay found

The current enterococci criteria assume that 100 per cent of faecal contamination in water is from humans. The QMRA found that at Altona, Elwood and Frankston beaches, humans caused an average of 13 per cent of the total faecal contamination. At these locations, the main sources of faecal contamination were birds and dogs, which are less likely to cause illness in people. As a result, the calculated probability of becoming ill was much lower than when predicted using the current criteria. At all three beaches, the calculated probability of becoming ill fell, in some cases, from more than 10 per cent to around one per cent.

The results indicate that the standard approach for assessing water quality to determine the potential risk for illness from water recreation activities in Port Phillip Bay is likely to overestimate health risks.

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What the QMRA study's results mean for EPA's assessment of water quality in Port Phillip Bay

The study's data and insights into microbial water quality has enhanced EPA's understanding of Port Phillip Bay water quality.

EPA's conclusions from the QMRA study in Port Phillip Bay are:

- EPA's current water quality assessment method overestimates the potential for illness
- knowledge of the source of the faecal contamination allows EPA to better estimate the potential risks to human health
- an increased understanding of Port Phillip Bay's sources of faecal contamination and the associated health risks will allow for the development of site-specific objectives. These will be more reflective of localised conditions and better estimate the risk of contracting an illness at specific locations
- study findings could be used to help target interventions to manage sources of faecal contamination in the Bay. These could include discouraging visitors from feeding birds, or providing plastic bags and bins to pick up and dispose of dog faeces.

Next steps

EPA is examining how it will apply the findings of the QMRA study in Port Phillip Bay. This includes using the findings to help manage faecal contamination and to improve communications to the community about the health risks from swimming in Port Phillip Bay.

EPA is working closely with the Department of Environment, Land, Water and Planning and Melbourne Water to support appropriate water quality reporting. This includes ensuring appropriate reporting through the Commissioner for Environmental Sustainability's five-yearly Victorian State of the Marine and Coastal Environment Report.

Further information

- Beach Report: www.epa.vic.gov.au/beachreport
- General QMRA guidance: www.who.int/water_sanitation_health/publications/qmra/en/
- National Health and Medical Research Council (NHMRC) guidelines for managing risks in recreational water: www.nhmrc.gov.au/about-us/publications/guidelines-managing-risks-recreational-water

This publication is for general guidance only. You should obtain professional advice if you have any specific concern. EPA Victoria has made every reasonable effort to ensure accuracy at the time of publication.

EPA acknowledges Aboriginal people as the first peoples and Traditional custodians of the land and water on which we live, work and depend. We pay respect to Aboriginal Elders, past and present and recognise their continuing connection to, and aspirations for Country.



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