Government of Western Australia
Department of Health

Recreational water monitoring in Western Australia

Rationale for bacterial recreational water monitoring

Bacterial recreational water monitoring in Western Australia has a history tied to protecting public health by assessing the microbial quality of popular waterways used for swimming and other recreational activities. The Department of Health (WA Health) oversees this monitoring, with many local government authorities (LGAs) and other stakeholders collecting water samples primarily tested for bacteria like Enterococci to assess health risks.

The rationale for this monitoring is based on the understanding that illness including gastroenteritis, respiratory, skin, ear and eye irritation/infection can occur from swimming or recreating in waters contaminated by faecal or other pollution. This can result in a significant burden of disease and economic loss to the community.

The monitoring aims to provide informed public information including site classifications called beach grades [1], which combine long-term bacterial *Enterococci* water sampling results with site sanitary assessments that assess potential pollution sources. This microbial risk management framework approach is based upon the Australian Government's National Health and Medical Research Council (NHMRC) Guidelines for Managing Risks in Recreational Water (the Guidelines) [2].

This approach provides a quantitative risk assessment method, designed to establish a reliable understanding of bacterial water safety at popular recreational sites, and to manage and communicate, faecal contamination health risks at these sites.

The formal evaluation and application of this management framework in Western Australia results in the classification of recreational beach sites ranging from "very good" to "very poor". Ongoing and regular bacterial water quality monitoring promote public awareness, risk mitigation, and timely management actions, such as advisories or temporary closures in response to adverse water quality events. These actions help protect the public and ensure appropriate health risk communication of recreational water environments.

The microbial water quality component of a site classification is a 95th percentile calculation of enterococci counts from water samples taken at the site. This percentile reflects both the central tendency and variability of bacterial measurements. The 95th percentile is used to categorize the microbial risk into four classes (A to D), with thresholds originally established

by the World Health Organization and adapted for local conditions. For reliable estimation, the data set should contain at least 65 samples collected over five years.

WA uses a parametric method embodied in a tool called the “Enterotester,” developed by Dr. Richard Lugg [3]. This approach assumes a lognormal distribution of bacteria counts and incorporates both the geometric mean and standard deviation to calculate the 95th percentile in a statistically robust way. The 95th percentile value is then compared against microbial category thresholds, which indicate different levels of gastrointestinal illness risk.

The beach grade is determined by cross-referencing the microbial assessment category and the sanitary inspection category through a matrix. For example, a site with low sanitary risk and good microbial quality might be graded as “very good,” while high sanitary risk plus poor microbial results lead to a “very poor” grade.

Monitoring arrangements, guidelines and expansion

Monitoring arrangements & NHMRC Guideline implementation

WA Health has conducted water monitoring since the 1950’s and its electronic records for water sample results date back to 2002. Early electronic records indicate that microbial recreational water sampling primarily centred around the Swan and Canning Rivers and Perth metropolitan coastline.

In 2004, the NHMRC, introduced the recreational water guidelines. The Guidelines initiated a long-term risk-based approach to bacterial water quality monitoring in recreational waters, rather than relying on a one-off, or median monthly sample analysis regime, as per the former ANZECC ARMCANZ 2000 Australian and New Zealand Guidelines for Fresh and Marine Water Quality [4].

The NHMRC reissued the Guidelines in 2008, with several updates for recreational water management application. Since then, WA Health has implemented this general approach to environmental/recreational waters microbial monitoring and management within WA.

Between 2004-2008, Perth metropolitan ocean and river environmental/recreational water sampling was undertaken in partnership between WA Health and LGAs. In addition, several monitoring locations including Garden and Rottnest Islands, metropolitan lakes and several regional recreational water bodies were sampled independently by a variety of water body managers (WBMs).

Monitoring program expansion

Monitoring arrangements continued between 2008 – 2015, during which time WA Health expanded the environmental/recreational waters microbial monitoring program, to include key recreational ocean, river, lake, and reservoir environments within Great Southern, Midwest, Peel, Wheatbelt, Southwest regions. In addition, metropolitan coastal ocean monitoring continues to expand with population growth and urban development. From 2015 because of the continual expansion of the metropolitan and statewide-based monitoring programs the responsibility for sampling was completely transferred to LGAs and WBMs with WA Health providing support and system management.

Ongoing support for the monitoring program

As part of the ongoing annual/seasonal monitoring of environmental/recreational waters within Western Australia, WA Health provides supporting information [5] to assist LGAs and WBMs understand the required details of the sampling program. In addition, more detailed guidance of WA Health's approach to applying the NHMRC Guidelines [6] is also available.

Monitoring continues to this day and a summary of long-term sampling results can be found on the WA Health web site Beach grades for Western Australia.

References

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2. National Health and Medical Research Council, *Guidelines for Managing Risks in Recreational Water*. 2008: Canberra. p. 215.
3. Lugg, R.S.W., A. Cook, and B. Devine, *Estimating 95th Percentiles from Microbial Sampling: A Novel Approach to Standardising their Application to Recreational Waters*, in *The Significance of Faecal Indicators in Water: A Global Perspective*. 2012, The Royal Society of Chemistry. p. 62–71.
4. ANZECC and ARMCANZ, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* 2000: Canberra, ACT, Australia.
5. Department of Health - Western Australia, *Recreational water monitoring season – supporting information*, Department of Health - Western Australia, Editor. 2023, Department of Health - Western Australia,: East Perth, Western Australia. p. 5.
6. Department of Health, *Application of the NHMRC Guidelines for Managing Risks in Recreational Water within Western Australia*, WA Health, Editor. 2022. p. 28.

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