

Suitability for Swimming at Recreational Beaches

BACKGROUND

Recreational contact with polluted water, for example through swimming, can have health effects such as water-borne diseases. Water-borne diseases are caused by ingesting pathogens, which can originate from animal or human faeces, and can be transmitted through drinking-water or recreational water (Ball 2006). In New Zealand, guidelines have been set for water quality at recreational marine and freshwater beaches to protect human health, as part of the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (Ministry for the Environment and Ministry of Health 2003). The bacterial group Enterococci are used to index faecal pollution in recreational marine water (including coastal and estuary waters), while the bacterium *E. coli* is used to indicate the presence of faeces, and therefore an increased risk of water-borne infection in recreational freshwater (including rivers and lakes). Councils monitor coastal and freshwater beaches during the swimming season, usually from November to March (Ministry for the Environment 2007).

Contamination of recreational freshwater and marine water is mainly caused by discharged human sewage and animal and livestock effluent from agricultural and urban areas. Faecal contamination of waterways is generally correlated with rainfall events, which cause much higher levels of run-off. In general, coastal beaches are less likely than freshwater beaches to have higher background levels of bacteria and longer-lasting contamination events, as faecal pollution is more rapidly diluted and dispersed by currents and large volumes of water at the coast (Ministry for the Environment 2007).

Studies have shown that human exposure to recreational marine water contaminated with Enterococci can have health effects, including eye, ear, nose and throat symptoms and respiratory and gastrointestinal illnesses (Corbett et al 1993; Harrington et al 1993; McBride et al 1998; WHO 2003a). Epidemiological studies have found that adverse health outcomes in swimmers and surfers were associated with high concentrations of Enterococci at marine beaches in New Zealand (McBride et al 1998) and in Australia (Corbett et al 1993; Harrington et al 1993). Exposure to contaminated freshwater (indicated by high levels of *E. coli*) can have adverse health effects, including gastrointestinal and respiratory diseases (Ministry for the Environment and Ministry of Health 2003).

Data for the indicator were collected by regional, district and city councils, and provided in aggregated form by the Ministry for the Environment (2010c). Water quality is monitored at recreational marine and freshwater beaches during the swimming season, generally between November and March and usually on a weekly basis. Samples of water are tested to ensure they comply with the guidelines in the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (Ministry for the Environment and Ministry of Health 2003). At marine and estuary beaches, the maximum guideline level of Enterococci is 280 Enterococci per 100 millilitres. At freshwater beaches, the maximum guideline level of *E. coli* is 550 *E. coli* per 100 millilitres of water. If levels of Enterococci and/or *E. coli* breach these action (high alert) levels, councils co-ordinate with health authorities to mitigate health risks and ensure public awareness by restricting access to recreational and/or drinking-water sources.



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The indicator presents the number of beaches that fall into one of four water quality categories, according to the proportion of samples taken that was compliant with the guidelines. The categories and exceedance thresholds are consistent with those used by the Ministry for the Environment (2007):

- 95 to 100% of samples at the beach complied with guidelines, indicating that the water quality is suitable for swimming ‘almost all the time’;
- 90 to 95% of samples at the beach complied with guidelines;
- 75 to 90% of samples at the beach complied with guidelines;
- 0 to 75% or more of samples at the beach complied with guidelines, indicating that water quality is ‘often unsuitable for swimming’.

Some regional councils did not monitor sites in the 2008–2009 summer, as they rotate their monitoring programmes on a biannual basis, or conducted targeted water quality investigations (Ministry for the Environment 2010c). In addition, some beaches were insufficiently sampled, as they had fewer than 10 samples over the time period.

In 2011, the Ministry for the Environment changed their reporting method to one that provides a better indication of health risk (Ministry for the Environment, 2012). The measure now used is ‘suitability for recreation grade’ (SFRG) (Ministry of the Environment, 2013b) which describes the overall health risk from microbiological contamination from primary contact recreation such as swimming or surfing. The measure has two components (Ministry of the Environment, 2013a):

- The Microbial Assessment Category (MAC) is a quantitative measure of the health risk associated with direct contact with water based on actual sampling of indicator bacteria carried out over the last five summer bathing seasons
- The Sanitary Inspection Category (SIC) is a qualitative measure of the susceptibility of the water body to faecal contamination. This assessment considers potential sources of faecal contamination in the catchment, such as agricultural runoff, storm water discharges or dense waterfowl populations.

Table 1: SFTG matrix

SFRG matrix		Microbial Assessment Category (MAC)			
		A (low risk)	B	C	D (high risk)
Sanitary Inspection Category (SIC)	Very low risk	Very good	Very good	Follow up	Follow up
	Low risk	Very good	Good	Fair	Follow up
	Moderate risk	Follow up	Good	Fair	Poor
	High risk	Follow up	Follow up*	Poor	Very poor
	Very high risk	Follow up	Follow up*	Follow up	Very poor

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There are five grades of SFRG. The descriptions below have been adapted from the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (Ministry of the Environment, 2013b).

- Very good – water is considered suitable for swimming for almost all of the time.
- Good – the site is considered suitable for swimming for most of the time. Swimming should be avoided during or following heavy rain.
- Fair – the site is generally suitable for swimming, but avoid swimming during or following rainfall or if there are signs of pollution such as discoloured water, odour, or debris in the water.
- Poor – the site is susceptible to faecal pollution and microbial water quality is not always suitable for swimming.
- Very poor – the site is very susceptible to faecal pollution and microbial water quality may often be unsuitable for swimming.

References

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