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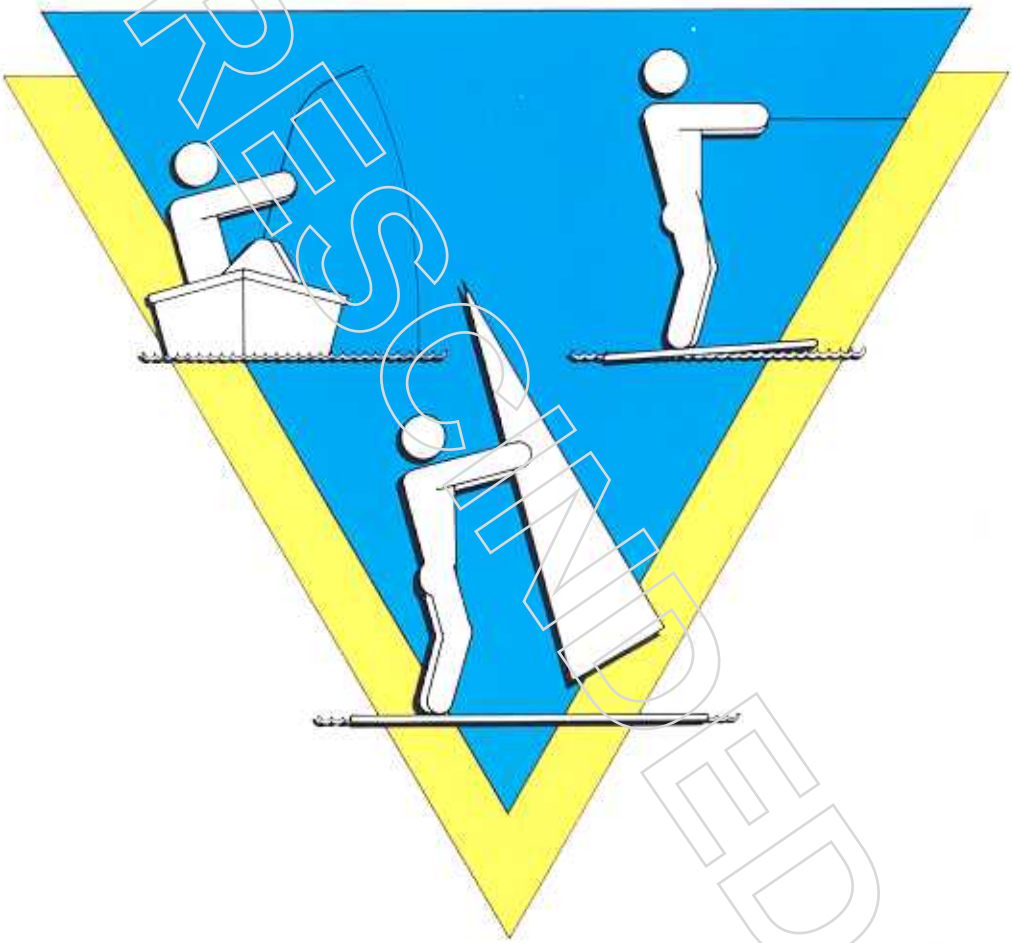

recreational use of water

National Health and Medical Research Council

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Australian guidelines for recreational use of water

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DEPARTMENT OF
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AND HEALTH

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Contents

1. Introduction

1.1 Purpose

These guidelines have been developed to provide assistance to public health administrators water authorities, and the general public to assess the suitability of waters for recreational use. They apply to all open waters, that is fresh and saline inland waters as well as marine and estuarine waters. While the guidelines have not been developed for regulatory purposes, they attempt to provide a benchmark to ensure that recreational waters are safe to use.

1.2 Recreation and health

Recreation includes all activities relating to sport; pleasure and relaxation which for the purpose of these guidelines depend on water resources. Most Australians live close to the coast, so there is a consequent concentration of water-based recreational activity associated with beaches and estuaries. However, there have been "many pressures to develop and manage streams and lakes for recreational use in inland areas .

The importance of recreation to human well-being highlights the need to establish guidelines which also protect public health. Apart from establishing guidelines, there are a number of practical measures to be addressed which can reduce the adverse public health impacts associated with recreation including:

- education on water safety;
- legislation to control recreational activity:
- water resort management; and
- pollution control measures.

In the absence of proper planning and control, the pressure associated with heavy recreational use can itself rapidly reduce the value of a body of water as a public amenity. Generally, however, the impact of domestic, agricultural and industrial waste discharges is of greater concern, especially as it affects the microbiological and aesthetic quality of water.

2. Primary contact recreation

Primary contact recreation is characterised by bodily immersion or submersion where there is a direct contact with the water, and includes activities such as swimming, diving, water skiing and surfing. There are a number of practical considerations that can be addressed which may help protect the health and well being of recreationalists.

2.1. Health criteria

People engaged in primary contact recreation may swallow significant amounts of water, absorb toxic chemicals through the skin or acquire a range of infections. The amount of water that may be accidently swallowed varies considerably but in practice probably does,not exceed 100 millilitres for any individual per day.

Depending on the level of control' exercised over the open water resource, effort should be made to either warn the public or control access and use when water is found to be heavily polluted.

Faecally contaminated water may expose swimmers to a range of infectious gastrointestinal diseases. Norwalk virus has been commonly cited as the most likely disease causing organism in such waters. The protozoans *Giardia* and *Cryptosporidium* may also be a cause for concern, particularlly if farm, animal and sewage wastes are dumped into streams or lakes.

2.2 Safety and aesthetic criteria

Water should be free of floating or submerged objects which may cause physical injury. In terms of water quality control, floating debris, oil, grease, scum, foam and other floating materials orginating from waste discharges or of natural origin are of concern. Ideally, water should have a low turbidity and have low colour. For many activities, for example, swimming and diving, it is important that the bottom be clearly visible.

Formulation of criteria to ensure that water is universally appealing is difficult. Aesthetic preferences are subjective and dependent upon cultural conditioning.

Water quality criteria recommended for primary contact recreation relating to human health, safety and aesthetics are provided in schedule 1.

3. Secondary contact recreation

Secondary contact recreation includes activities such as paddling activities of children, wading, boating and fishing in which there is some direct contact with water but where the probability of swallowing water is unlikely. Schedule 2 provides recommended water quality criteria where there is limited body contact.

3.1 Health criteria

Since limited skin contact is likely to occur in secondary contact recreation, and the possibility of ingestion of water is less likely, criteria to minimise the risk of internal and external infection are less stringent.

3.2 Safety criteria

Waters should be free of floating and submerged objects which risk the safety of boat users and waders.

3.3 Aesthetic criteria

Similar considerations apply as for primary contact recreation.

4. Passive recreation

Aesthetic enjoyment is the primary consideration of passive recreation. Water provides a focal point for many recreational activities, including scenic appreciation, picnicking and walking. To maintain the recreational resource, the quality of the water should be consistent with the preservation of flora and fauna which require the water for their habitat or watering needs.

While human wellbeing may be promoted by passive recreation, water is not directly used, so risk to health and safety should not be attributed to water quality problems. Those factors which may degrade the water resource and reduce its recreational amenity are of environmental rather than of public health concern.

SCHEDULE 1

Primary contact recreation

Swimming, diving, waterskiing and surfing

Characteristic	*Guideline*	*Comment*
Microbiological		
Faecal indicators	median value not exceeding 150 faecal coliforms per 100 mL[1] for a minimum of 5 samples taken at regular intervals not exceeding 1 month[2] with 4 out of 5 samples containing less than 600 faecal coliforms per 100 mL[3]	Designated recreational waters should be protected against direct contamination with fresh faecal material of human or domesticated animal origin.[4] The main health risk is from viruses and enteric protozoans.
Environmental indicators		
Protozoans	pathogenic free-living protozoans should be absent from warm (greater than 24°C) fresh water bodies[5] used for primary contact recreation.	Diving or swimming in warm fresh waters may result in contraction of primary amoebic meningoencephalitis. Children and adolescents are most suseptible.

1. In practice, this equates to the widely used geometrical mean level of 200 faecal coliforms per 100 mL. A geometrical mean criterion of 33 Enterococci per 100 mL has been used in marine waters and may be useful where pollution is suspected, but only low numbers of faecal coliforms can be detected.
2. As a guide, sampling for microorganisms in a designated recreational area should be conducted where and when swimmers are present. Samples should be taken at the beginning of the swimming season and thereafter a single sample taken weekly throughout the season or when conditions change, or whenever heavy pollution is suspected.
3. Where possible, a site specific criterion should be developed. High temperature and high salinity adversely affect faecal coliform survival and may indicate the need to adopt a more stringent faecal coliform criterion. Since some human viruses may survive chlorination, the criterion must be applied with caution for assessing health risk where effluents of human origin are chemically disinfected.
4. Swimming should be avoided near sewerage and stormwater outfalls and drains.
5. Brackish and marine water containing more than 2 per cent salt are free of pathogenic *Naegleria fowleri*.

(schedule 1 cont.)

Characteristic	*Guideline*	*Comment*
Physical and chemical		
pH	6.5–8.5	A wider pH range of 5–9 is acceptable for poorly buffered waters. Inside this range eye irritation is minimized.
Temperature	15–35°C	Exposure for periods exceeding 1 hour at temperatures below 15°C can cause excessive heat loss (hypothermia).[6] Prolonged exposure to waters above 35°C can be hazardous causing disorientation and stress (hyperthermia).
Plant nutrients	Nutrients should not promote excessive aquatic macrophyte and algae growth or growth of toxic cyanobacteria	Designated recreational lakes may be seasonably unsuitable for swimming.
Turbulent and high velocity flows	Flow rates should be less than 1.5 meters per second at waist or greater depth.[7]	The criterion is based on the assumption that an adult can normally maintain a footing at these water velocities. Velocities above 1 meter per second may be unsafe under some conditions even in shallow water, particularly for children.
Dangerous objects	Waters should not contain floating or submerged objects which might injure, tangle or obstruct users.	Injuries related to these objects may result during activities such as diving and water skiing.
Water clarity	Secchi disc (a circular plate printed black and white) visible at a depth of 1.2 metres.	The bottom should be clearly visible in designated learn to swim areas and where diving facilities are provided.
Toxic substances	Waters containing chemicals which are either toxic or irritating to the skin or mucous membranes are unsuitable for recreation.	Mine tailings dams, industrial discharge outlets, and areas affected by leaching from dumps are likely to be unsafe to use.

6. Hypothermia is a common contributory cause of drownings.

7. High velocity flows, particularly adjacent to intakes, high-walled channels, spillways, in ocean rips, over rocks in streams or over ocean platforms pose high risks to swimmers, fishermen and the like and should always be avoided. Where swimming is permitted in areas with man-made structures, they should be designed to minimize dangerous flow conditions.

(schedule 1 cont.)

Characteristic	*Guideline*	*Comment*
Aesthetic quality		
Odour and appearance	Waters should be acceptable to a majority of potential recreationalists.	Consumer complaints are a useful guide to the suitability of waters for recreational use.
Floatable and settleable matter	Floating debris, grease, oil, scum and foam should not be visible. The bottom should be safe to walk on.	Waste oil, plastic containers and bags, bottles, cans, containers and domestic refuse greatly detract from recreational amenity.
Biological		
Harmful organisms	Dangerous aquatic parasites are almost unknown in Australia.[8] Waters should have low levels of cercarial stages of avian schistosomes.	The schistomosomes cause temporary skin rritation (swimmer's itch) and are locally common in some estuarine and freshwater habitats.
	Direct contact with a range of bottom dwelling animals on reefs should be avoided; water should be reasonably free of poisonous coelenterates such as box jelly fish and blue bottles.	Appropriate protective clothing such as sandshoes on reefs and wetsuits in open waters should be worn.
	Freshwater leeches should be avoided where possible as they can enter body orifices and cause considerable damage.	

8. Local knowledge of problems, such as the prevalance of schistosome infections, is the best indicator of swimming hazards.

SCHEDULE 2

Secondary contact recreation

Wading and boating

Characteristic	*Guideline*	*Comment*
Microbiological		
Faecal coliforms	median value not exceeding 1000 organisms per 100 mL for a minimum of 5 samples taken at regular intervals not exceeding 1 month with 4 out of 5 samples containing less than 4000 organisms per 100 mL.	Waters grossly contaminated with raw sewage or used for processing food wastes are generally unsuitable for secondary contact recreation
Other Indicators	as for primary contact recreation	Criteria should only be applied where there is some direct contact with water.

9. Problems may arise from consumption of contaminated fish and shellfish products. These may be attributed either to food handling after the products are harvested or indirectly to water pollution. The *Food standards code* (National Health and Medical Research Council, 1987) addresses food, including fish and shellfish, standards.

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