

Interpreting the Report Cards



Measuring flow as part of annual monitoring













Introduction

This section contains information to help interpret the Report Cards. The techniques used to assess water quality (compliance against local water quality objectives) are used in other regions of Australia. State and regional water quality objectives are considered more appropriate for water quality assessments than national guidelines. The methods used for these Report Cards have been established under the National Water Quality Management Strategy.

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Water quality indicators

The following indicators were measured at the freshwater and estuarine water quality monitoring sites. Surface samples were collected from a depth of 25–50cm.

Indicator	What it represents	Why it is used as an indicator
 Electrical conductivity	A measure of amount of dissolved salts.	Inhibits plant and animal growth if too high.
 Turbidity	Cloudiness in water.	A measure of the light scattering by material suspended in water. This affects the amount of light available for photosynthesis.
 pH	Indicator of how alkaline or acidic the water is.	Important to chemical and biological processes.
 Dissolved oxygen (% saturation)	A measure of the amount of oxygen in the water. Varies with temperature and salinity.	Critical for aquatic organisms to survive. Low dissolved oxygen is the major cause of freshwater fish kills.
 Total suspended solids	Particulate material in the water column.	Indicator of eroded material such as sediment. Travels in water.
 Chlorophyll a	The green component of plants used in photosynthesis.	Is used as an index of the amount (biomass) of algae.
 NO_x	Nitrate + nitrite (dissolved) forms of nitrogen.	Stimulates plant growth. Travels with water in solution.
 Ammonia	Total ammonia is the sum of un-ionised ammonia and the ammonium forms of nitrogen.	Readily used by aquatic plants. Decomposition and excretion product. High ammonia concentrations can be toxic to biota.
 Total nitrogen	Nitrogen.	Nitrogen is essential for living organisms. Includes all forms of nitrogen.
 Total phosphorus	Phosphorus.	Phosphorus is essential for living organisms. Travels mainly with sediment in water.
 Filterable reactive phosphorus	Fraction of phosphorus that passes through a fine filter.	Stimulates aquatic plant growth. Travels with water in solution.
 Enterococci	A group of bacteria common to the faecal matter of warm-blooded animals, including humans (NHMRC 2008).	Enterococci are recommended for the assessment of marine waters for swimming by the National Health and Medical Research Council.

Water quality objectives

Water quality objectives declared under the Northern Territory legislation (*Water Act* part 7) act as a local guideline level against which water quality is assessed. Water quality objectives describe the water quality needed to protect human uses and aquatic ecosystem values identified by the community (Beneficial Uses). The water quality objectives help guide planning and water management.

Water quality objectives for nutrients, total suspended solids, electrical conductivity, turbidity and chlorophyll *a* were calculated from the 80th percentile of ambient water sampling results from reference sites in the region. Water quality objectives for dissolved oxygen (% saturation) and pH were calculated using the 20th to 80th percentile range of ambient water sampling results from reference sites. Different water quality objectives apply for the outer, mid and upper estuarine regions of the harbour due to different residence times. Separate water quality objectives apply for freshwater. **Note:** These water quality objectives do not apply for microbiological testing for recreational purposes at beach sites.

Compliance

A tick indicates that water quality at a site for an indicator was equal to or better than the water quality objective. A cross indicates that the current water quality at a site for an indicator does not comply with the water quality objective. Water quality data was calculated as the median of data collected over several sampling events.

Water quality rating

Water quality ratings were assigned for each region using the degree of compliance to water quality objectives. A rating of A is considered excellent water quality, while a rating of E is considered very poor water quality. This rating system was also used in the 2009 and 2010 Report Cards. For these Report Cards, the total suspended sediment and dissolved oxygen (%) data were excluded from the marine water compliance and water quality ratings, as these are under revision.

Water quality rating	What the rating means	Compliance and method
A	Excellent water quality	100% of indicators comply with water quality objectives
B	Very good water quality	85% to <100% of indicators comply with water quality objectives
C	Moderate water quality	50% to <85% of indicators comply with water quality objectives
D	Poor water quality	30% to <50% of indicators comply with water quality objectives
E	Very poor water quality	<30% of indicators comply with water quality objectives

Biological indicators

Organisms living in streams and rivers can tell us about the condition or “health” of waterways. Diverse communities of macroinvertebrates (or water-bugs) indicate a stream in good condition, while simple communities of few water-bug types indicate a degraded stream.

Water scientists monitored the health of Darwin Harbour streams using an assessment system known as AUSRIVAS. This stands for Australian River Assessment System, and works by comparing the water-bugs present in a stream with those expected to be present in reference streams of a similar type. The AUSRIVAS methodology produces a score or band (see table).

These Report Cards used a genus-level model, which was based on 192 taxa and 114 reference sites within the Darwin-Daly region.

Band	Description	What it represents
X	More biologically diverse than reference	More types found than expected. Potential biodiversity “hot-spot” or mild organic enrichment.
A	Similar to reference	Observed vs Expected scores range found at 80% of the reference sites, or equivalent to reference condition.
B	Significantly impaired	Potential impact either on water and/or habitat quality resulting in a loss of types.
C	Severely impaired	Many fewer types than expected. Loss of water and/or habitat quality.
D	Extremely impaired	Few of the expected types and only the hardy, pollution tolerant families remain.

Microbiological indicators

Up until 30 June 2011, beach water samples were tested for levels of *E. coli* and enterococci and assessed against the *Northern Territory Recreational Microbiological Water Quality Guidelines (2007)*. The new *Public and Environmental Health Act* was enacted on 1 July 2011. The Department of Health formally adopted the National Health and Medical Research Council (NHMRC) '*Guidelines for Managing Risks in Recreational Water*'. Enterococci is now used as the trigger indicator for recreation in marine waters.

Guidelines for marine waters from 1 July 2011 are summarised in the table below. For full details and protocols refer to the guidelines list on the Department of Health website. (http://www.health.nt.gov.au/Environmental_Health/Beach_Water_Quality/index.aspx)

Mode	Marine water quality criteria from 1 July 2011 for enterococci
Green: Surveillance / Open for Swimming	All samples to be less than or equal to 50 enterococci /100 mL
Amber: Alert / Open for Swimming	All samples between 51 and 200 enterococci /100 mL
Red: Closed for Swimming	Two consecutive samples within 48 hours greater than 200 enterococci /100mL



Sampling in Darwin Harbour being undertaken by the Aquatic Health Unit. Northern Territory Parliament and CBD in background. Photo: John Drewry