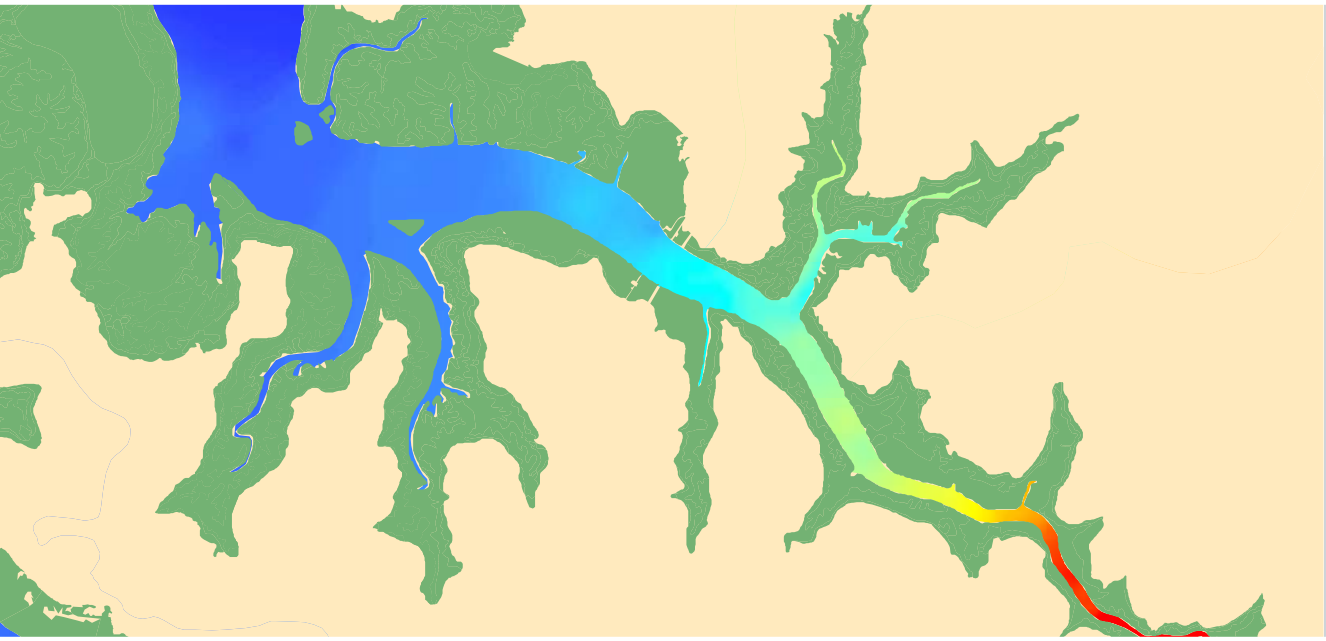
Interpreting the Report Cards

A fluorometer is used to gather data for chlorophyll *a* mapping.



Distribution of conductivity in Elizabeth River estuary.

Laboratory equipment used to filter chlorophyll *a* water samples.

Introduction

This section contains information to help interpret the Report Cards.

Water quality

Darwin Harbour water quality (referred to as estuarine), catchment freshwater quality (ambient or low flow conditions) and interpretation methods are presented.

Information on the assessment of water quality using water quality objectives, and the assessment of the current condition of waterways is provided. These techniques are widely used in other regions of Australia. State and regional-scale water quality guidelines, such as water quality objectives, are considered more appropriate than national guidelines. The methods used have been established under a process developed by the National Water Quality Management Strategy. Further details are available in Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines and related publications.

Biological indicators

The interpretation of biological indicators using an assessment system common in Australia is described in this section. The Northern Territory Government has monitored biological health at current freshwater sites since 2001.

Microbiological indicators

The interpretation of microbiological indicators uses guidelines from the Northern Territory Recreational Microbiological Water Quality Guidelines (2007).

A Hydrolab datasonde is used to measure water quality indicators.

Interpreting the Report Cards

Ambient estuarine water quality

Water quality objectives: Water quality objectives act as a local guideline level. Water quality objectives describe the water quality needed to protect human uses and aquatic ecosystem values identified by the community (Beneficial Uses). These water quality criteria act as guideline levels and/or reference levels to help guide planning and water management to achieve and protect each of the values over time. Water quality objectives may change over time as more monitoring data become available.

Water quality objectives for nutrients, total suspended solids, and chlorophyll *a*, were calculated from the 80th percentile of ambient water sampling 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 from reference sites in the region. Separate water quality objectives for the outer, mid and upper estuarine regions of Darwin Harbour will apply.

Water quality objectives have been formally declared under the Northern Territory legislation (*Water Act* part 7).

Current condition: The current condition for nutrients, total suspended solids, turbidity, chlorophyll *a* and electrical conductivity were calculated from the median concentration of local ambient water quality data from recent years, as shown on the Report Cards. Dissolved oxygen (% saturation) and pH were calculated using the 20th to 80th percentile range.

Compliance: A tick indicates the current water quality condition for the indicator is equal to or better than specified by the water quality objective. A cross indicates the current condition for the indicator is outside the water quality objective.

Sampling for macroinvertebrates (water-bugs) to assess biological health of streams in the Darwin Harbour region. Photo: Matt Majid

Ambient freshwater quality

Water quality objectives: The water quality objectives for nutrients, total suspended solids, turbidity, chlorophyll *a*, and electrical conductivity were calculated from the 80th percentile of ambient (low flow) water sampling data 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 data from reference sites in the region.

Current condition: The current condition for nutrients, total suspended solids, turbidity, chlorophyll *a* and electrical conductivity were calculated from the median concentration of local ambient water quality sampling. Dissolved oxygen (% saturation) and pH were calculated using the 20th to 80th percentile range. The period of sampling is indicated in the Report Cards. The current condition is for ambient (low flow) conditions. Aquatic Health Unit monitoring sites are shown on the maps.

Compliance: A tick indicates the current condition for the indicator is equal to or better than specified by the water quality objective. A cross indicates the current condition for the indicator is worse than the water quality objective.

Catchment disturbance index

The catchment disturbance index (CDI) is an assessment of catchment-scale human impacts. It uses information on the area of different land uses, and weightings which reflect the relative impact of different land uses on stream water quality. Land use mapping is based on the Australian Land Use and Management (ALUM) classification which groups land uses with similar impacts into six classes. The weightings applied to each class were developed using expert opinion.

Land use class	ALUM classification	Weighting
1	Conservation and natural environments	0
2	Production from grazing natural vegetation	0.35
3	Production from dryland agriculture and plantations	0.53
4	Production from irrigated agriculture and plantations	0.70
5	Intensive uses	0.68
6	Water	0

The catchment disturbance index (CDI) is calculated using the fractional area of each land use within a catchment and its weighting to give a value between 0 and 1.
A low CDI value reflects a high level of catchment disturbance. The CDI for most subcatchments in the Darwin Harbour area is relatively high, reflecting the remaining large areas of natural vegetation present.

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 damaged or degraded stream. Water scientists regularly monitor the health of streams in the Darwin area 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. AUSRIVAS produces a score based on the number of types found in a sample relative to the number of types expected. To simplify interpretation of these scores a banding system has been developed. Band X is more biologically diverse than reference. Band A means streams are equivalent to unimpacted reference streams; bands B, C, or D indicate that the stream is not equivalent to reference condition and is degraded to varying degrees. These Report Cards present data from a genus-level model based on 192 taxa and 114 reference sites within the Darwin-Daly region.

The table explains how to interpret bands from AUSRIVAS.

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	O/E 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

The interpretation of microbiological indicators uses guidelines from the Northern Territory Recreational Microbiological Water Quality Guidelines (2007). Several guidelines are summarised in the table. For full details and protocols refer to the guidelines, as not all compliance details are presented here. The table summarises some of the Northern Territory Recreational Microbiological Water Quality Guidelines.

Mode	Enterococci sample criteria		*E. coli* single sample criteria
Green: Surveillance / Open for Swimming	All samples to be less than or equal to 50 enterococci /100 mL	or	All samples to be less than or equal to 200 *E. coli* /100 mL
Amber: Alert / Open for Swimming	All samples between 51 and 200 enterococci /100 mL	or	Single sample greater than 200 *E. coli* /100 mL
Red: Closed for Swimming	Two consecutive samples within 24 hours greater than 201 enterococci /100mL	or	Single sample greater than 500 *E. coli* /100mL

Water quality rating

A ‘water quality rating’ was developed as an instantly recognisable assessment. Rating A is ‘excellent water quality’, through to E being ‘very poor water quality’.

The water quality rating was calculated from the percentage of compliance values for available water quality objectives listed for ambient fresh and marine waters. This rating method may change when catchment and water quality assessment schemes are further developed.

For these Report Cards, the total suspended sediment and dissolved oxygen (%) data are excluded from the marine water compliance and water quality ratings. These two indicators are under revision and new water quality objective values will be based on a larger dataset than the current water quality objective values.

Water quality rating	What the rating means	Compliance and method
	**Excellent water quality**	100% of indicators comply with water quality objectives
	**Very good water quality**	85% to <100% of indicators comply with water quality objectives
	**Good or moderate water quality**	50% to <85% of indicators comply with water quality objectives
	**Poor water quality**	30% to <50% of indicators comply with water quality objectives
	**Very poor water quality**	<30% of indicators comply with water quality objectives