

Report Card²⁰¹⁰ Methods

How are the grades calculated?

Freshwater Methods

Freshwater monitoring is carried out twice a year, during spring (pre-wet season) and autumn (post wet season), at 135 representative sites across South East Queensland. Five ecological indicators are used to assess the health of freshwater ecosystems: Physical and Chemical, Nutrient Cycling, Ecosystem Processes, Aquatic Macroinvertebrates and Fish.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates (insects, crustaceans, snails, etc.) are common, widespread and easily sampled. They vary in sensitivity to disturbance and reflect environmental conditions, and thus stream health, over time. Sampling methods used are based on those used for the Queensland AusRivAS (Australian River Assessment System) program.

The three indices used are:

- Number of macroinvertebrate taxa
- PET richness (number of stonefly, mayfly and caddisfly families)
- SIGNAL (Stream Invertebrate Grade Number – Average Level)

Fish

Fish communities reflect a range of environmental disturbances and provide a measure of stream condition due to their mobility, long life and position near the top of the food chain. Sampling of fish is carried out using a combination of electrofishing and seine netting.

The three indices used are:

- Percentage of Native Species Expected (PONSE)
- Ratio of Observed to Expected native species (O/E)
- Proportion of alien fish

Ecosystem Processes

Measuring the rate of the production and decomposition of organic matter reflects the vigour or 'pulse' of a stream and indicates if it is healthy or unhealthy.

The three indices used are:

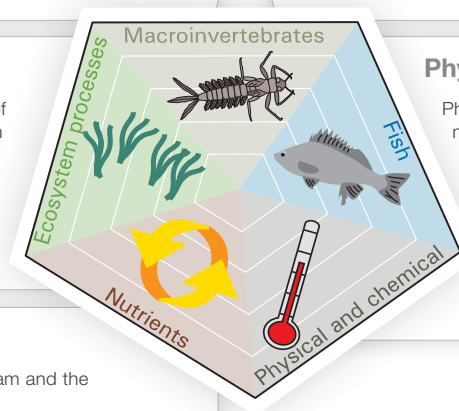
- Ratio of ¹³C to ¹²C stable isotopes
- Respiration (R_{24})
- Gross Primary Production (GPP)

Nutrient Cycling

This describes the processing of nitrogen within a stream and the sensitivity of the stream to the input of nutrients.

The index used is:

- Ratio of ¹⁵N to ¹⁴N stable isotopes



Physical and Chemical

Physical and chemical measures are important for monitoring direct changes in water quality and aiding in the interpretation of other measures of stream health.

The six indices used are:

- pH
- Conductivity
- Diel (24hr) range and maximum temperature
- Diel range and minimum dissolved oxygen

Freshwater Report Card Generation

1. Results for each site are assessed against regional Ecosystem Health Guidelines for the corresponding stream type and standardised scores (ranging between 0 and 1) are derived.
2. The standardised scores for each of the indices within each indicator type are averaged to produce five summary scores per site.
3. The indicator scores for all sites within a reporting area are averaged to produce five summary scores per reporting area.
4. The values for the five indicator types are then averaged to give a single value for each reporting area.
5. The values for each reporting area are then averaged across seasons (spring and autumn).
6. Catchments are then ranked based on these scores and Report Card Grades are assigned.



Estuarine/Marine Methods

The Estuarine and Marine Report Card Grade is calculated by combining an Ecosystem Health Index (EHI) and a Biological Health Rating (BHR) to produce a single value of ecosystem health.

Parameters used for Ecosystem Health Index (EHI)

(EHI) Moreton Bay Indicators

Total nitrogen TN 87 sites monthly	Chlorophyll a Chl 87 sites monthly	Secchi depth 87 sites monthly	$\delta^{15}\text{N}$ mapping 60 sites annually	Lyngbya Fortnightly during blooms
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(EHI) Estuarine Indicators

Total nitrogen TN 167 sites monthly	Chlorophyll a Chl 167 sites monthly	Turbidity 167 sites monthly	Total phosphorus TP 167 sites monthly	Dissolved oxygen DO 167 sites monthly
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Parameters used for Biological Health Rating (BHR)

(BHR) Moreton Bay Indicators

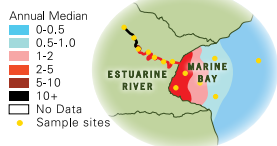
Seagrass distribution Baywide 3 yearly	Seagrass depth range 17 sites biannually	Coral cover 5 sites annually
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(BHR) Estuarine Indicators

Seagrass distribution 3 yearly (where applicable)	Nutrient plots Biannually	$\delta^{15}\text{N}$ mapping 167 sites annually	Riparian assessment Biennially
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(EHI) Estuarine and Marine Report Card Generation (BHR)

Median Map



1. From a total of 254 estuarine and marine sites, maps are produced for each indicator which show the median values for each site from the reporting year.

Compliance Map



2. Compliance scores are then calculated for each indicator as the proportion of the reporting zone that complies with the Queensland Water Quality Guidelines, 0 representing non-compliance and 1 representing total compliance.

EHI Map



3. An Ecosystem Health Index (EHI) for the reporting zone is calculated by averaging the compliance scores for each indicator.

The BHR assesses the biological indicators measured by the EHMP which don't have established guidelines. Half of the total BHR score is based on results of the riparian assessment program, which assesses the percentage of unmodified estuarine habitat for each estuarine system. The other half of the total BHR score is based on the results of the remaining biological health indicators for estuaries and the Bay. The BHR ranges between 0 and 1 for each zone, with 1 representing an unmodified and

Riparian assessment



healthy ecosystem and 0 representing a highly modified and unhealthy ecosystem.

Report Card 2010 for the waterways of South East Queensland



C Estuarine River
Fair water quality with several indicators non-compliant for part of the year.

B Marine Bay
Good water quality, non-compliance for one or more indicators during the year.

A single EHI value and a single BHR value are calculated for each waterway by averaging the indicator ratings. These two values are combined together with expert opinion to provide a single value used to assign a Report Card Grade.



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Acknowledgements:
EHMP Technical Group and
SEQHWP Scientific Expert Panel.