

Report Card '07

How are the grades calculated?



Freshwater monitoring is carried out twice a year, during spring and autumn, at 127 representative sites across South East Queensland. Five indicator types are used to assess the

health of freshwater ecosystems: physical/chemical, nutrient cycling, ecosystem processes, and communities of both 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)
- Average SIGNAL score

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:

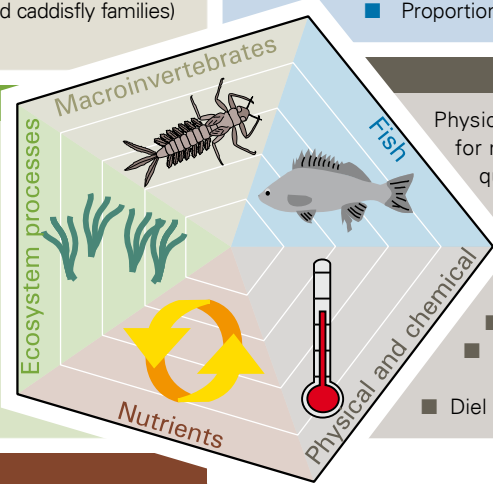
- Proportion of native species expected
 - Ratio of observed to expected species
 - Proportion of alien fish

Ecosystem Processes

Measuring the rate of production reflects the vigour or 'pulse' of a stream and indicates if it is healthy or unhealthy. This is determined by measuring the amount of dissolved oxygen produced or consumed by algae and microbes.

The four indices used are:

- Growth rate of algae
- Ratio of ¹³C to ¹²C stable isotopes
- Respiration (R₂₄)
- Gross Primary Production (GPP)



Physical/chemical

Physical/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

Nutrients

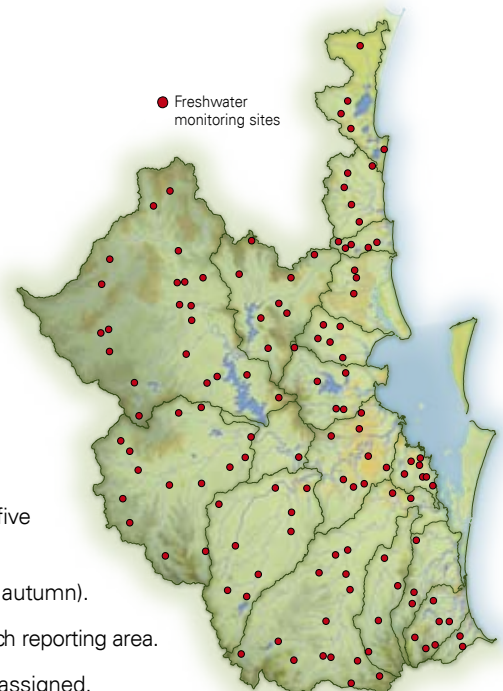
This describes the processing of nitrogen within a stream and the sensitivity of the stream to the input of nutrients.

The two indices used are:

- Ratio of ¹⁵N to ¹⁴N stable isotopes
- Algal bioassay

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 each reporting area are then averaged across seasons (spring and autumn).
5. The values for the five indicator types are then averaged to give a single value for each reporting area.
6. Catchments are then ranked based on these scores and Report Card grades are assigned.



Report Card Methods

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 $\delta^{15}\text{N}$ 87 sites annually	Lyngbya Fortnightly during blooms
---	---	---	---	---

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
--	--	---------------------------------------	--	--

Parameters used for Biological Health Rating (BHR)

BHR Moreton Bay Indicators

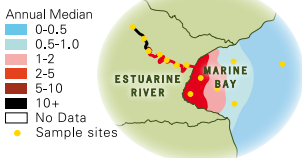
Seagrass distribution Baywide 3 yearly	Seagrass depth range 17 sites biannually	Coral cover 5 sites annually
--	--	--

BHR Estuarine Indicators

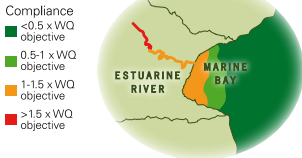
Nutrient plots Biannually	$\delta^{15}\text{N}$ mapping $\delta^{15}\text{N}$ 167 sites annually	Riparian assessment Annually
-------------------------------------	--	--

Estuarine and Marine Report Card generation

Median Map



Compliance Map



EHI Map



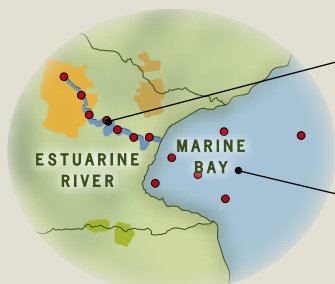
- From a total of 254 estuarine and marine sites, maps are produced for each indicator which show the median values for each site from the reporting year.
- Compliance scores are then calculated for each indicator as the proportion of the reporting zone that complies with the Queensland Water Quality Guidelines, 0 representing non-compliance and 1 representing total compliance.
- An Ecosystem Health Index (EHI) for the reporting zone is calculated by averaging the compliance scores for each indicator.

The Biological Health Rating (BHR) assesses those 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 from 0 and 1 for each zone, with 1 representing an unmodified and healthy ecosystem and 0 representing a highly modified and unhealthy ecosystem.

Riparian assessment



Report Card 2007 for the estuarine and marine 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.



South East Queensland Healthy Waterways Partnership
GPO Box 1434, Brisbane QLD 4001
Tel: 07 3403 4206 Fax: 07 3403 6879
Web: www.healthywaterways.org
For further information contact:-
Jo Burton
jo.burton@healthywaterways.org

Design and Layout: Kate Moore
Acknowledgements: EHMP
Technical Group, SEQHWP Scientific
Expert Panel and Planning and
Implementation Program
Banner photos: Queensland Museum,
EPA, UQ, SEQ Healthy Waterways
Library and Tourism Queensland.

© South East Queensland Healthy Waterways Partnership 2007. This publication may be used for research, individual study and educational purposes. Properly acknowledged quotations may be made but queries regarding the republication of any material should be addressed to the Partnership.