

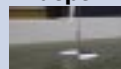
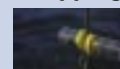





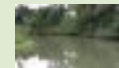





Report Card Methods


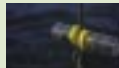

Ecosystem Health Index (EHI)

| Moreton Bay Indicators | | | | |
|---|---|---|---|---|
| Total nitrogen | Chlorophyll a | Secchi depth | $\delta^{15}N$ mapping | Lyngbya |
|  |  |  |  |  |
| 83 sites Monthly | 83 sites Monthly | 83 sites Monthly | 83 sites Annually | Fortnightly during blooms |

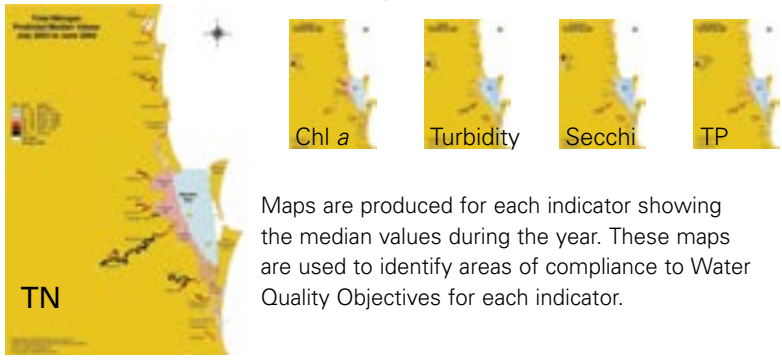
| Estuarine Indicators | | | | |
|---|---|---|---|---|
| Total nitrogen | Chlorophyll a | Turbidity | Total phosphorus | Dissolved oxygen |
|  |  |  |  |  |
| 165 sites Monthly | 165 sites Monthly | 165 sites Monthly | 165 sites Monthly | 165 sites Monthly |

Biological Health Rating (BHR)

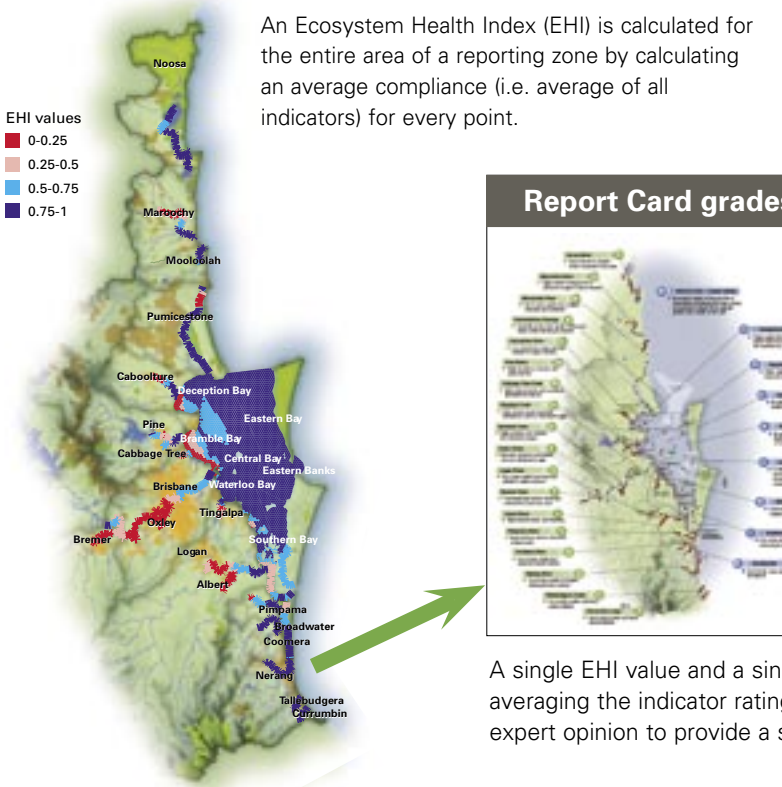
| Moreton Bay Indicators | | |
|---|---|---|
| Seagrass distribution | Seagrass depth range | Coral cover |
|  |  |  |
| Baywide 3 yearly | 17 sites Biannually | 5 sites Annually |

| Estuarine Indicators | | |
|---|---|---|
| Mixing plots | $\delta^{15}N$ mapping | Riparian condition |
|  |  |  |
| Biannually | 165 sites Annually | Annually |

Estuarine and Marine Report Card Generation



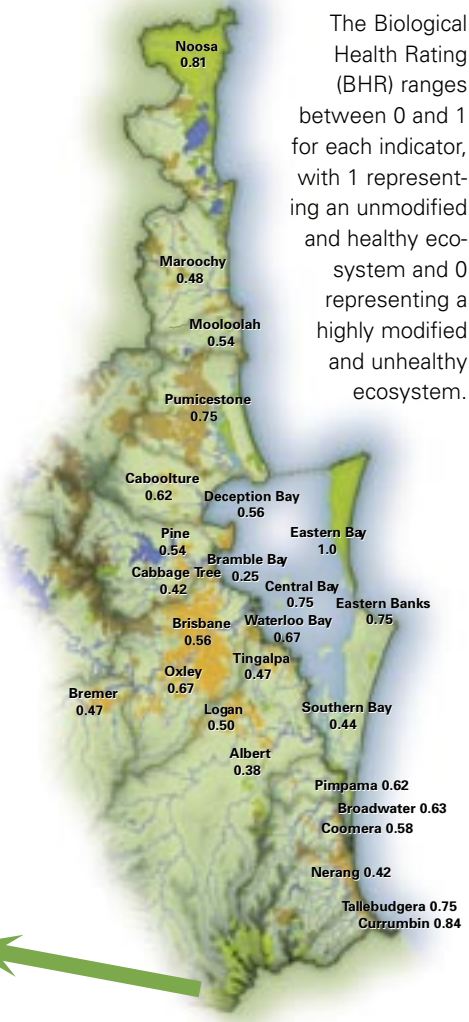
Maps are produced for each indicator showing the median values during the year. These maps are used to identify areas of compliance to Water Quality Objectives for each indicator.



An Ecosystem Health Index (EHI) is calculated for the entire area of a reporting zone by calculating an average compliance (i.e. average of all indicators) for every point.



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.



The Biological Health Rating (BHR) ranges between 0 and 1 for each indicator, with 1 representing an unmodified and healthy ecosystem and 0 representing a highly modified and unhealthy ecosystem.





Report Card Methods

October, 2004

Report Card 2004

Freshwater monitoring is carried out twice a year, during spring and autumn, at 120 representative sites. Five indicator types are used to assess the health of freshwater ecosystems: physical and chemical, nutrient cycling, ecosystem processes, and communities of both aquatic macroinvertebrates and fish.

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:

- Native species richness
- Ratio of observed to expected number of native fish
- Percentage of alien fish

Aquatic macroinvertebrates

Aquatic invertebrates (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:

- Invertebrate richness
- PET richness
- Average SIGNAL score

Nutrients

This provides a measure of how sensitive the stream is to nutrient inputs and which nutrients are limiting algal growth in a stream. Two measures of nutrient assimilation are used as part of the EHMP:

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



Physical and chemical parameters

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 based on:

- Water temperature
- Conductivity
- Dissolved oxygen
- pH

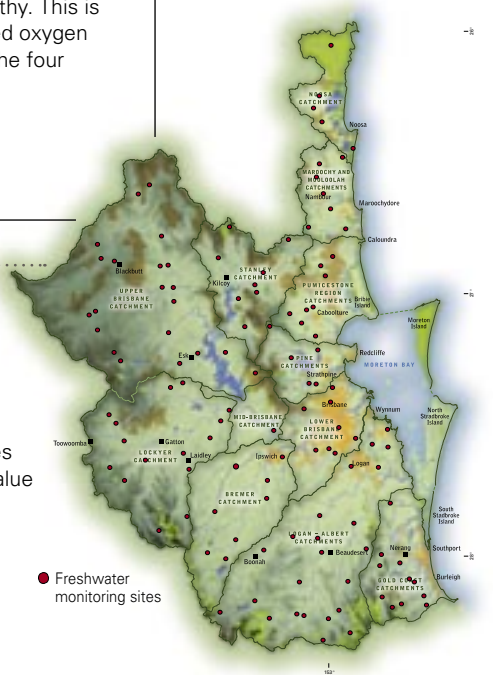
Ecosystem processes

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:

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

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 measures are averaged to produce a single value for each indicator type (e.g. fish, invertebrates, etc.).
3. The standardised scores for all sites within a reporting area are averaged.
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.



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