Ecohealth

A health check for our waterways

About Ecohealth

Ecohealth is an aquatic ecosystem monitoring program that measures the health of our rivers and estuaries for the plants and animals that live in them.

Ecohealth reports on the condition of key environmental indicators including water quality, riparian (riverbank) vegetation, geomorphology (channel shape), estuarine zooplankton, and freshwater macroinvertebrate (waterbug) and fish communities.

This information enables natural resource managers to determine where our rivers are under stress and where to invest in environmental management activities.

Ecohealth does not comprehensively assess human health issues in catchments such as drinking water quality; if it's safe for swimming due to faecal coliform concentrations; heavy metal, pesticide or herbicide contamination; disease; viruses; or our ability to harvest shellfish or fish. However, we do identify where these issues impact aquatic biota such as plants, waterbugs and fish.

Ecohealth indicators

Scientists and natural resource managers use the health of particular components of an ecosystem to indicate if there are stresses to the habitat as a whole. The Ecohealth team has ensured that the selection of indicators used in the Ecohealth program have been subject to a scientific review process. The Coffs Harbour Ecohealth program comprised four indicators:

Water Quality provides an understanding of how changes in land use practices within the catchment are affecting the health of our rivers and estuaries. Ecohealth measures oxygen level, salinity, acidity, murkiness (turbidity), and nutrients in our waterways.

Riparian vegetation is important for maintaining good water quality, stabilising riverbanks and providing habitat for animals including macroinvertebrates and fish. Ecohealth looks at the occurrence of weeds, structure of riparian vegetation, habitat (e.g. fallen logs) and current management (e.g. fencing).

Geomorphic condition assesses bank condition (e.g. slope, bank failure, exposed tree roots and undercutting), bed condition (e.g. active erosion, smothering of the bed substrate by high loads of fine sediment), and trampling by stock.

Macroinvertebrates are waterbugs such as worms, beetles, mayflies and shrimps that are sensitive to changes in aquatic habitat, pollution and poor water quality. Ecohealth looks at the types of waterbugs occurring at different freshwater sites in our rivers. Waterbugs are not assessed in estuaries.

intertidal zone, Woolgoolga Lake

Ecohealth scoring and grading

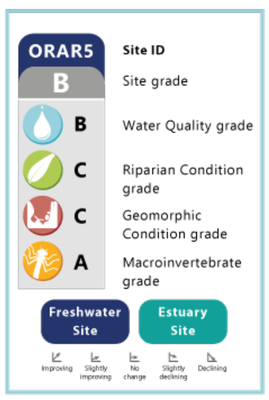
Information about each of the indicators was collected from 36 sites across the Coffs Harbour coastal catchments over the course of 12 months in 2019-20 and 2021-22. This was used to calculate scores for each indicator at each site, based on how often the measured values satisfied regional and national guidelines for healthy rivers and estuaries. The condition scores were then given a corresponding grade (see below).

Indicator Score	Result	
91 - 100	A	Excellent
76 - 90	B	Good
61 - 75	C	Fair
46 - 60	D	Poor
0 - 45	F	Very Poor

This scoring and grading system is based on the traditional format of a school report card, with ratings ranging from a high of 'A', through intermediate ratings of 'B', 'C' and 'D', to the lowest possible score of an 'F'. Secondary grades of + and - are included to provide greater resolution within a grade, and to help show improvements over time.

Interpreting the results

The diagram to the right shows the Ecohealth grading system, where a grade is given for water quality, riparian condition, geomorphic condition and aquatic macroinvertebrates. Based on the average of these grades, an overall grade is awarded to the site. Overall grades are then also awarded for each river system, subcatchment, and for all freshwater and estuarine sites. The arrows indicate the overall change in site condition between the two survey periods (2019-20 and 2021-22).



What we found

A total of 36 sites across 12 catchments was used to calculate an overall moderate condition of C (2020) and C+ (2022) for the Coffs coastal catchments (see map below). Individual indicators ranged from good (water quality) to moderate (aquatic macroinvertebrates, geomorphic condition and riparian condition).

Water quality was good across the Coffs LGA, with a grade of B- in both the 2019-20 and 2021-22 surveys. Variables were grouped into Physical-Chemical, Nutrients and Chlorophyll a subindicators. Measurements were compared to national or state guideline values to calculate water quality grades. These grades used a modified calculation to the 2015 report in order to align with the NSW Department of Environment and Planning's estuary monitoring program. For more information, go to www.coffsharbour.nsw.gov.au/Environment/Compliance-and-reporting or www.ecohealth.une.edu.au.

Chlorophyll a is a measure of algal biomass with high observations indicating the presence of an algal bloom. Some algal species are harmful to humans and aquatic biota. Typically, algal biomass decreased from 2019-20 to 2021-22 surveys, as high rainfall resulted in high streamflows that flushed nutrients to estuaries and nearshore coastal areas. Total and dissolved concentrations of nitrogen and phosphorus were assessed and these concentrations also tended to decrease across the Coffs catchments from 2019-20 to 2021-22 surveys due to the flushing effects of high rainfall and streamflows. The decreasing algal and nutrient concentrations led to improved water quality grades. In contrast, physical-chemical variables remained similar or decreased slightly between the two survey periods because of increases in turbidity due to higher flows containing more suspended fine sediments.

Aquatic macroinvertebrate condition was moderate in the freshwater reaches across the Coffs catchments. The macroinvertebrate communities at most sites improved from 2015 to the 2019-20 survey, and also improved slightly from the 2019-20 to 2021-22 surveys. This is likely due to increased rainfall and streamflow providing good oxygenated water and increased food supply. There were no exotic waterbug species found in the Coffs catchments through either survey period. The improved macroinvertebrate condition was primarily due to increased abundances of waterbugs as well as the general increase in 'EPT' waterbugs which comprise mayflies, dragonflies and caddisflies and are known to be more sensitive to pollution and poor water quality.

Fenced riparian zone that has left a wide corridor for revegetation

River works to control bank erosion on the Orara River

Geomorphic condition was moderate across the Coffs catchments, with most stream channels in good or moderate condition. However, Coffs Creek was in poor condition due to trampling and a high load of fine sediment that is smothering the streambed in the freshwater and upper estuary reaches. These reaches have experienced significant clearing of catchment vegetation and riparian vegetation is heavily impacted by weeds which can shade out groundcover plants, leading to bare ground that is more susceptible to erosion during heavy runoff. This highlights the importance of maintaining healthy native vegetation to reduce the load of fine-grained sediment reaching the waterways. Healthy riparian vegetation also helps to protect banks from eroding during high flows.

Riparian condition was moderate across the Coffs catchments. Arrawarra Creek, Moonee Creek and Corindi River, had good riparian condition, although disturbance intensified in the freshwater reaches. Boambee, Bonville, Darkum, Pipeclay and Willis Creeks, and Hearnes Lake had moderate riparian condition. The main stressors to riparian condition were the prevalence of invasive weeds, clearing of riparian vegetation and limited riparian management such as fencing of riparian zones or rubbish removal.

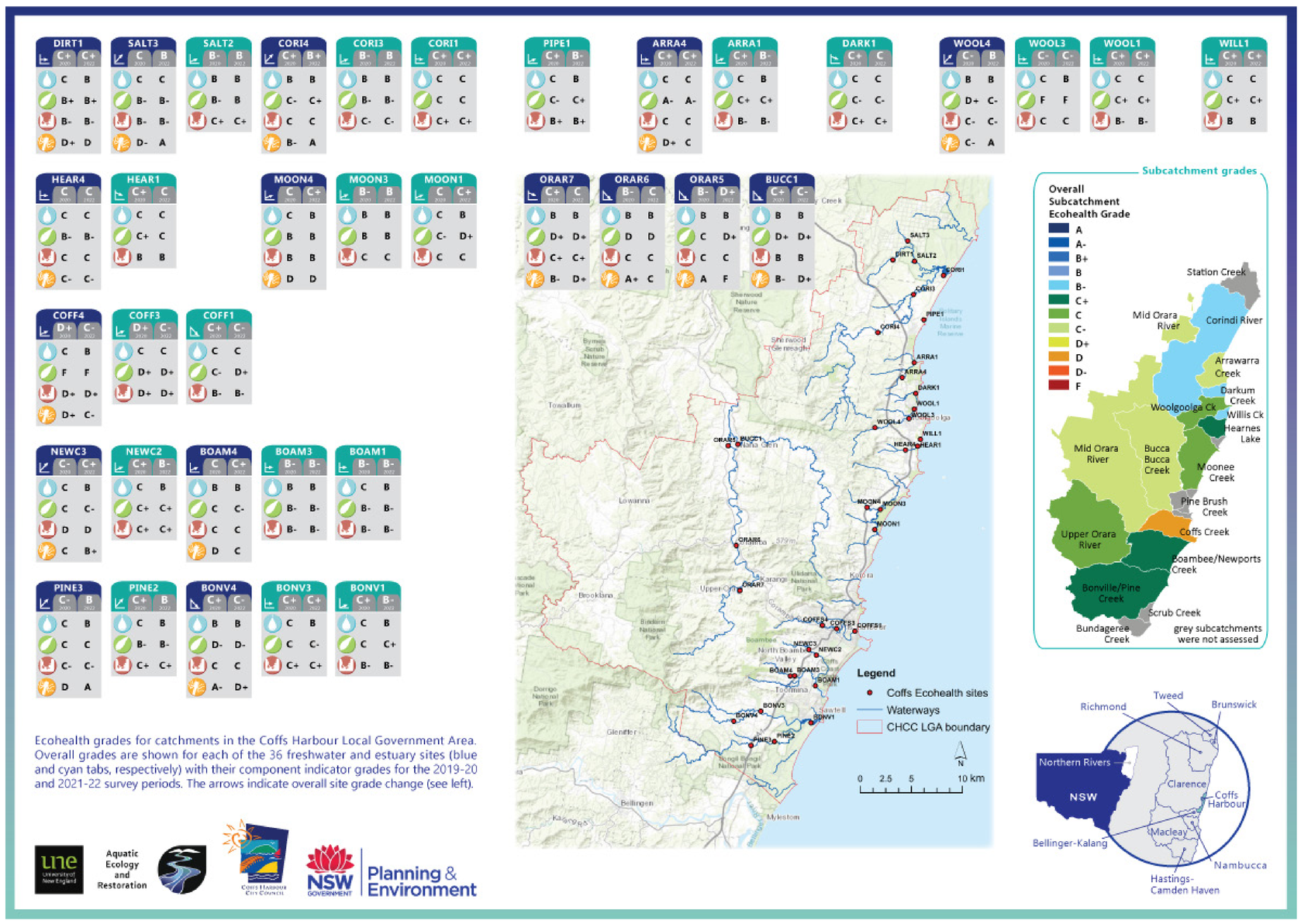
There were small declines in riparian condition at many sites between the 2019-20 and 2021-22 riparian surveys. This was primarily due to a reduction in leaf litter due to heavy rainfall washing it into waterways and in increase in exotic grasses and weedy woody species responding to the high rainfall experienced from 2020 onwards.

How can you be involved?

- Control and manage stock access to streams by fencing riparian areas and providing off-stream stock watering points and shade access.
- Reduce nutrient and pollutant runoff into streams (e.g. fertilisers, chemicals or cleaning products).
- Conserve and maintain well-vegetated riparian areas, particularly deep-rooted native species that help stabilise streambanks.
- Revegetate streambanks that have been cleared or depleted of riparian vegetation using a range of suitable local native plant species.
- Leave woody debris and natural rock formations in waterbodies.
- Identify and manage weeds appropriately. Council or North Coast Local Land Services can help you with this.
- Reduce water consumption.
- Please don't litter – take all rubbish with you.
- Report any rubbish dumping to Council - dumping garden waste is a main cause in the spread of weeds.
- Keep to designated paths in recreation areas to minimise soil erosion and compaction and to avoid trampling native vegetation.

Project partners

This project was funded by Coffs Harbour City Council and NSW Office of Environment and Heritage through the OEH Estuary Management Program and the CHCC Environmental Levy Grants Program.



Ecohealth grades for catchments in the Coffs Harbour Local Government Area. Overall grades are shown for each of the 36 freshwater and estuary sites (blue and cyan tabs, respectively) with their component indicator grades for the 2019-20 and 2021-22 survey periods. The arrows indicate overall site grade change (see left).