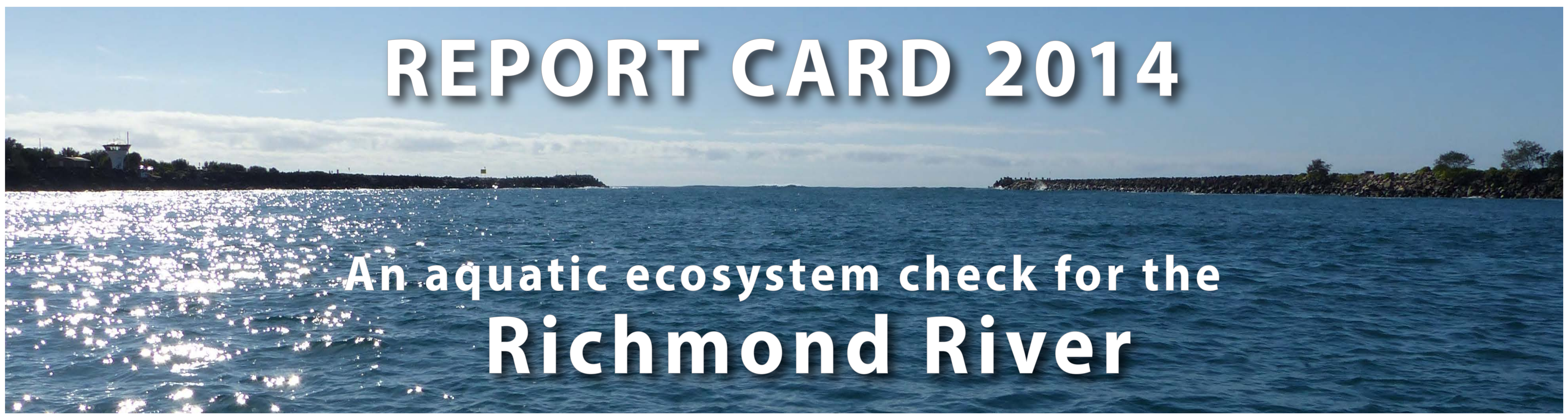
Ecohealth

A health check for our waterways

REPORT CARD 2014

An aquatic ecosystem check for the Richmond River

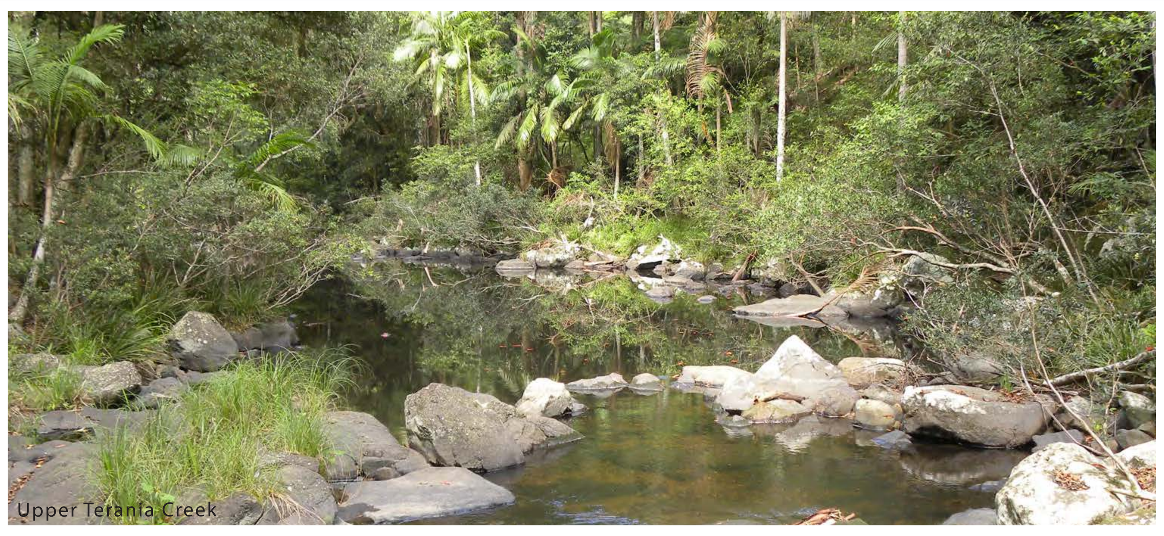


What is Ecohealth?

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

Ecohealth looks at key environmental indicators including water quality, riparian vegetation, geomorphic (channel) condition, macroinvertebrates (waterbugs), fish (distribution and population sizes) and plankton, and reports on their condition. This information enables natural resource managers to determine where our rivers are under stress and where to invest in environmental management activities. It also helps Councils and State Government agencies meet Local and State monitoring, evaluation and reporting requirements.

Ecohealth does not attempt to report on human environmental health issues in the rivers such as drinking water quality, if it's safe for swimming, heavy metal contamination, disease, bacteria, viruses or our ability to harvest shellfish or fish.



Upper Terania Creek

What we found

A total of 48 sites in 17 waterways in the Richmond catchment were used to calculate an overall condition of D+ for the catchment (see below). This score is consistent throughout the Richmond catchment with 12 of the 17 waterways recording a score of D or lower. The upper freshwater reaches of the Richmond catchment had better water quality, aquatic macroinvertebrates and geomorphic condition than the lower freshwater reaches, but no better riparian condition. The upper estuary (upstream of Woodburn) was consistently in the poorest condition, with very high nutrient concentrations, turbidity and algal biomass. Scores were consistent among indicators within each system, highlighting that water quality and physical habitat are driving the condition of streams.

Concentrations of all nutrients exceeded guideline values consistently across all sites leading to very low scores, with 9 waterways receiving an F grade. Low dissolved oxygen concentrations, low pH and high chlorophyll a (algal biomass) and nutrient concentrations were a feature of estuarine reaches, and recorded levels that would influence the health and distribution of aquatic animals. The clear pattern of deteriorating water quality with distance downstream highlights the need to improve riparian and bank condition throughout the catchment as a management priority.

Macroinvertebrate scores were low throughout the catchment with 10 of the 17 waterways receiving a grade of D or lower. The number of macroinvertebrate families found ranged from a very low 5 in the lower Terania and Bungawalbin Creeks to a very high 30 families recorded in the upper Terania and Iron Pot Creeks. Low macroinvertebrate numbers reflect poor water quality and habitat conditions, particularly the erosion of river channels and smothering of habitat with fine sediment.

Riparian condition scores were poor throughout all regions of the Richmond River catchment, with 10 of the 17 waterways recording a grade of D or lower. The main stressors to riparian condition are from invasive weeds, disturbances from floodplain clearing and agriculture, and access from livestock. Strongly linked to riparian condition was the state of the riverbanks with locally severe bank slumping, high bank slopes and exposed tree roots in many of the streams in the Richmond catchment.

What action is happening?

In partnership with local landholders, state agencies and funding bodies, the local Councils of the Richmond catchment are working to ensure that information on catchment condition is readily available and restoration works are targeted to key sites and issues. The Richmond catchment covers Richmond Valley Council, Richmond River County Council, Lismore City Council, Kyogle Council and Ballina Shire Council local government areas who all work together to manage the natural resources for local communities and industries.

Office of Environment and Heritage (OEH) and National Parks and Wildlife Service manage many of the conservation areas in the catchment, working closely with the Department of Primary Industries (Fisheries) to manage native fish habitat and communities as well as sustainable and productive fisheries in the estuary.

OEH provides technical and financial assistance to local councils through the NSW Estuary Program to improve the health of NSW estuaries. North Coast Local Land Services will support the implementation of projects by councils and other agencies to achieve best practice natural resource management and sustainable agricultural activities in the Richmond catchment.

The management of natural resources on the Richmond River coastal floodplain is a complex relationship of programs, organisations and funding covering issues such as drainage, acid sulfate soils, floodgate management, water quality monitoring, and estuary and wetlands management. The Richmond Estuary Coastal Zone Management Plan (CZMP) provides a blueprint for the long-term sustainable management of the Richmond River estuary and the Richmond River CZMP Reference Group coordinates natural resource management activities and projects on the floodplain in partnership with councils, state government and the community.

To access the 2014 Richmond Ecohealth Technical Report and other information about the results of this report card, go to www.rrcc.nsw.gov.au/environmental-management/water-quality-monitoring/.

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. Not all projects use all 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 and 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.

Ecohealth scoring and grading

Information about each of the indicators is collected from sampling sites over the course of a year and analysed to provide an assessment of water quality, riparian condition, geomorphic condition, fish, macroinvertebrates and plankton. Condition scores are then calculated for each indicator at each site, based on how often the measured values satisfied regional or national guidelines for healthy rivers. The condition scores are then given a corresponding grade and result (see below).

Condition Score	Grade	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 better help show improvements over time.

Interpreting the results

The diagram (at right) shows an example of the Ecohealth grading system, where a grade is given for water quality, riparian condition, geomorphic condition and macroinvertebrates. Based on the average of these grades, an overall grade is awarded to the site. Overall grades are also then awarded for each river system, region, and for all freshwater and all estuarine sites.

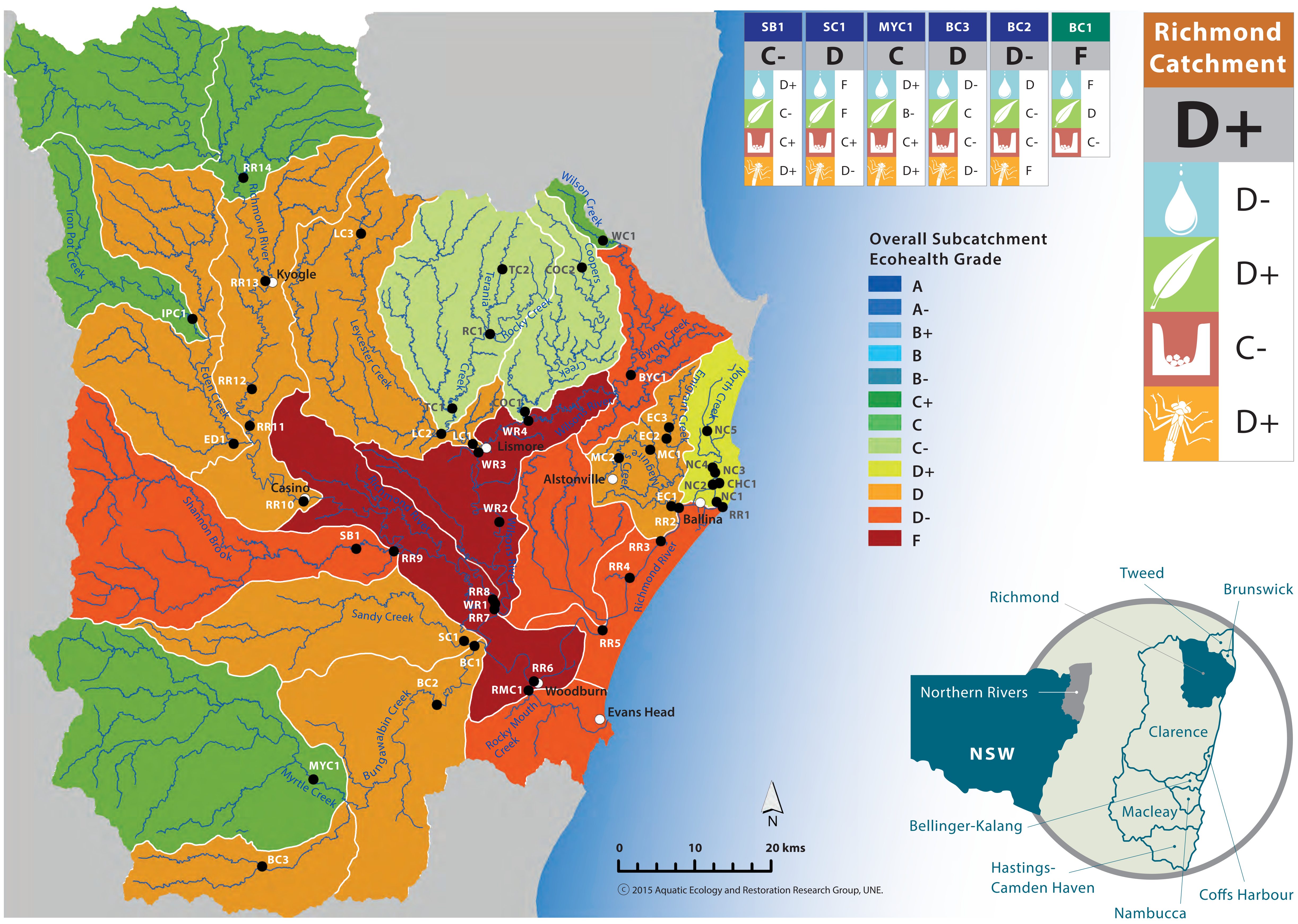
Site Name	Example of Site Grades
B-	Average of all four grades for the Site
A-	Water Quality grade
B-	Riparian Condition grade
C+	Geomorphic Condition grade
C+	Macroinvertebrate grade

The Richmond catchment

The Richmond River catchment on the far north coast is the sixth largest in NSW with an area of just over 7000 km^2 including over 1000 km^2 of coastal floodplain. The Richmond River channel is approximately 237 km in length with the tidal limit extending 114 km upstream.

Ecohealth monitoring was undertaken at 48 sites in the Richmond catchment between December 2013 and November 2014. There were 24 freshwater sites (represented by blue backgrounds on the site grades at right) and 24 estuarine sites (represented by green backgrounds). The results reflect the average health of the system over the 12-month sampling period. It provides a baseline measure of the aquatic ecosystem health of these river systems to which future monitoring can be compared. Site grades are organised longitudinally from left to right.

RR14	C-	D+	D	D+	B-
RR13	D-	D	F	C-	F
RR12	D-	D-	F	D	F
RR11	C-	D	C+	C	D+
RR10	D+	D-	C-	B-	D-
RR9	F	F	F	C-	
RR8	F	F	F	F	
RR7	F	F	F	D+	
RR6	F	F	F	C+	
RR5	D-	F	F	C	
RR4	D	F	F	C+	
RR3	D	F	D-	C+	
RR2	D+	D	D	C+	
RR1	C	C-	D-	C+	
RMC1	D-	F	F	C+	
NC5	D-	F	D-	C	
NC4	C-	D-	C-	B-	
NC3	C-	D-	C-	B-	
NC2	C	C-	C-	B-	
NC1	D+	C-	F	C+	
CHC1	D+	F	D	B-	



SB1	C-	D+	C-	C+	D+
SC1	D	F	F	C+	D-
MYC1	C	D+	B-	C+	D+
BC3	D	D-	C	C-	D-
BC2	D-	D	C-	C-	F
BC1	F	F	D	C-	

Richmond Catchment	
Overall	D+
Water Quality	D-
Riparian	D+
Geomorphic	C-
Macroinvertebrates	D+

WC1	C+	C-	B-	B-	C
BYC1	D-	D-	F	D+	D-
WR4	D	F	C	D	
WR3	F	F	F	C+	
WR2	F	F	F	C-	
WR1	F	F	F	D-	
COC2	C+	C-	B	B-	C
COC1	D+	D	D+	D+	D+
TC2	B	C	B+	B-	B+
RC1	B-	C	C+	B-	B
TC1	F	D	F	D+	F
LC3	C	D	D-	C	B-
LC2	F	D	D-	D+	F
LC1	D-	F	D-	C+	
MC2	C	C-	F	B-	C
MC1	D+	D	F	C	C
EC3	C+	C+	D+	C+	C
EC2	D-	F	F	C+	
EC1	D	D-	F	C	
IPC1	C-	D+	C	D	C
ED1	D-	D-	D+	D-	F

Richmond Ecohealth project partners

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