

# River Health in the Far North



Caddisfly larva (*Orthotrichia* species)

## Aquatic macroinvertebrates in the Far North

The region is biologically diverse, with over 310 types of aquatic macroinvertebrates having been collected from 1994–1999. The most common members include chironomid midge larvae (e.g. *Larsia*, *Cricotopus*, *Tanytarsus*, *Paratanytarsus* and *Dicrotendipes* species), mayfly nymphs (*Tasmanocoenis* and *Cloeon* species) and oligochaetes (worms).

A number of rare and uncommon macroinvertebrates are found in the region but are generally absent from other parts of the State. They include the viviparid snails (*Notopala* and *Centrapala* species) from the Diamantina River and Cooper and Bull Hole creeks, the hydrobiid snail (*Gabbia australis*) from Bull Hole Creek, and mayflies (*Offadens* sp. 5 and *Wundacaenis dostini*) from Cooper Creek and the Diamantina River. A number of rare beetles (e.g. *Haliphus gibbus*, *Necterosoma aphrodite*, *Paranacaena* species and Ptiliidae species), dipteran fly larvae (e.g. *Chaoborus*, *Austrosimulium pestilens*), caddisflies (*Orthotrichia* species) and crustaceans (e.g. *Caridina nilotica*) highlight the uniqueness of individual sites in the region in terms of biodiversity values and significance. Some unusual records for the area include the rarity of amphipod crustaceans (*Austrochiltonia australis*) that are common elsewhere in the State, and the common occurrence of the freshwater prawn (*Macrobrachium* species) in the region.



The blackfly (*Austrosimulium pestilens*) is able to survive in arid areas by laying eggs in damp river sediments that hatch into larvae only during periods of flooding.

Photo: Freising Water Authority, Germany

Since 1994 scientists from the Environment Protection Authority and Australian Water Quality Centre have been assessing the ecological health of rivers and streams throughout South Australia.

As part of this work, 30 sites in the Far North have been assessed. This brochure describes the monitoring methods and the overall condition of the rivers and streams that drain into Lake Eyre in the Far North of the State.

## The AUSRIVAS Program

This work is part of the AUstralian RIVer Assessment System (AUSRIVAS), and represents the first national biological assessment of river health to be conducted on a continental scale anywhere in the world. It has involved sampling over 6000 sites across Australia, including about 650 sites in South Australia.

## What is river health?

Defining 'river health' is similar to defining human health, as it provides an overall assessment of the health of waterways. It is important to note that the concept of 'health' often has different meanings to different people, and largely depends on each person's values and knowledge. However, for our purposes when we describe river health we are really talking about the ecological condition of a waterway.

*It's not just about rivers, but also includes streams, creeks and earthen drains.*

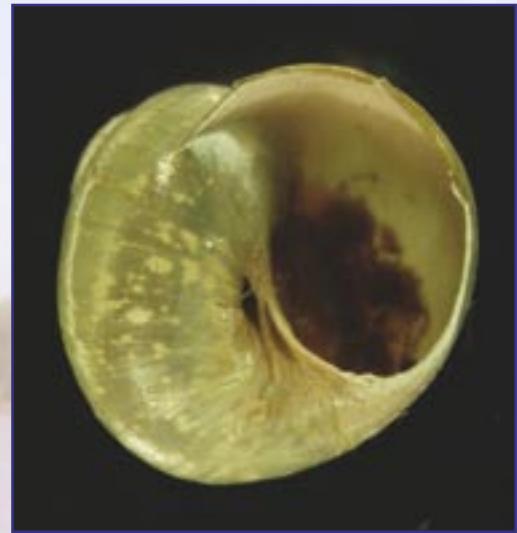
## How do we measure river health?

We measure river health by comparing the condition of a river to similar rivers of the same type in an undisturbed, unimpacted state (i.e. reference condition). To provide a nationally consistent approach, all States and Territories have used aquatic macroinvertebrates as the major biological indicator group to focus on and model. Our assessments provide a measure of the degree of similarity between the aquatic macroinvertebrates found at each site and those predicted to occur at the site if it were not impacted.



## What are macroinvertebrates?

Macroinvertebrates are aquatic animals without backbones that are large enough to be seen with the naked eye. They include insects, crustaceans, snails, worms, mites and sponges. The insects include the larvae of flying insects (e.g. midges, two-winged flies, dragonflies, mayflies, stoneflies and caddisflies) and adults of some groups (e.g. waterbugs, beetles, springtails). The more familiar crustaceans include yabbies, and freshwater shrimps and prawns.



Viviparid snails (e.g. *Centrapala species*) are generally confined to the rivers and streams of the Far North of the State.

Photo: Vlad Tsymbal

## Why use macroinvertebrates?

Macroinvertebrates are most commonly used in biological monitoring studies because they are common, widely distributed, easily sampled and most can be readily identified by experienced biologists.

## Why worry about river health?

The decline of water quality, blooms of blue-green algae, contamination with pesticides, nutrients and sediment, microbes that threaten drinking water supplies, fish deaths, and the threats posed by increasing salinity are some of the widespread issues that affect many waterways in Australia. This often leads to questions about the overall health of rivers and streams and the actions we should take to improve the environmental condition of our waterways.

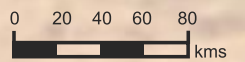


### Site Description

- ▲ Reference site
- Reference condition (A)
- Significantly impaired (B)
- Severely impaired (C)
- Beyond the capacity of current AUSRIVAS models (?)

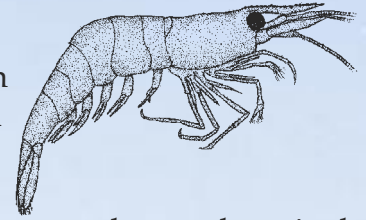
### Land Type

- Lake
- Land
- Ocean
- River
- Towns
- Streams



## Riverine environments in the Far North

The Far North landscape includes a variety of features including the Simpson and Strzelecki dunefields, gibber plains, stony plateaus, artesian springs, and the 9690 km<sup>2</sup> Lake Eyre basin and associated river systems.



The geological record of the region consists of a thick sequence of sedimentary layers deposited over more than 500 million years. During this span of time many different environments evolved in response to changes in global climate and geology. At times shallow seas covered the area and during other periods ice caps formed. There were also times when the climate was warm and wet, and the region was well forested and contained many large rivers, lakes and swamps. Later, as drier conditions developed and the lakes evaporated, the land became arid and large sandy dunefields formed.

The general climate of the region is hot and dry, with a very low, unpredictable rainfall. Average annual rainfall ranges from 110–125 mm around Lake Eyre itself to 150 mm in the wetter parts of the Lake Eyre basin.

Three major river systems flow into Lake Eyre from Queensland and the Northern Territory. They originate from areas of higher and more regular rainfall and, during very wet conditions, may extend floodwaters into Lake Eyre. The Diamantina River is the most important of these, originating in western Queensland and providing regular but often minor fillings of Lake Eyre. The Georgina River drains a large part of the Northern Territory and joins the Diamantina River in South Australia, where they flow into Goyder Lagoon. The third major river system is Cooper Creek and, while it is the largest of the rivers in the region, its flows seldom reach as far downstream as Lake Eyre.

Several smaller watercourses also flow into Lake Eyre on its western side, including the Macumba and Neales rivers. Lake Eyre South receives water from the Margaret River, the Stuart, Gregory and Frome creeks and other smaller waterways.

Mabel Creek and Yellow Bullock Creek flow into an ephemeral lake to the west of Lake Eyre. Like most of the rivers and creeks in the region, they consist of isolated waterholes that are filled during irregular rains and floods, and dry completely during extended dry periods.

## River health in the Far North

The map provides an overall assessment of the health of individual sites in the region.

Most waterways were in good condition, including sites from Cooper Creek, Diamantina River, Macumba River and part of the Neales River.

The major impacts associated with streams in the region relate to nutrient enrichment by stock and high salt concentrations, particularly when some pools dry during summer. The poorest sites were Yellow Bullock and Mabel creeks west of Lake Eyre (high nitrogen and phosphorus concentrations, very high turbidity due to stock access to water), Salt Water Springs on Jeremiah Creek near Copley (moderate salinity, high nitrogen concentration), and isolated sites from the Diamantina (high turbidity) and Alberga (poor habitat) systems. There were also a group of sites from the Neales, Margaret and Derwent waterways which were so unusual that they could not be assessed using the AUSRIVAS models.



Freshwater prawns (*Macrobrachium* species) are common in large waterways such as the Diamantina River and Cooper Creek.

Photo: Sally Aebi

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Additional details are available at  
<http://ausrivas.canberra.edu.au>  
<http://www.ea.gov.au/water/rivers/nrhp/index.html>



Government  
of South Australia

