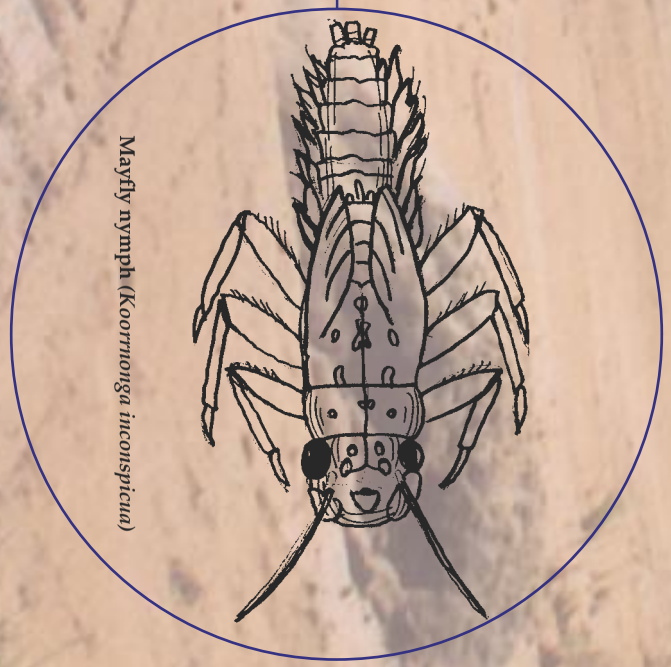
River Health in the Mid North



Mayfly nymph (*Koorrnonga inconspicua*)

Aquatic macroinvertebrates in the Mid North

The region is biologically diverse, with over 380 types of aquatic macroinvertebrates having been collected from 1994–1999. The most common members include amphipod crustaceans (e.g. *Pseudomoera* species and *Austrochiltonia australis*), blackfly larvae (*Simulium ornatipes*), oligochaetes (worms), chironomid midge larvae (*Chironomus* species), molluscs (hydrobiid snails) and nematodes (roundworms).

A number of rare and uncommon macroinvertebrates are also found in the region. They include bristle worms (polychaete worms from the family Syllidae) found in the main channel of the Broughton River, as well as from the lower Rocky River and Mary Springs. These worms are normally found in marine and estuarine environments and their widespread presence in the Broughton catchment was unexpected. Other interesting records include horsehair worms (Gordiidae) from Skillogallee Creek, and planorbid snails (*Gyraulus* species) from the Light River at Mingays Waterhole. There are also three rare blackfly larvae that occur in the region: *Austrosimulium furiosum* from the Broughton River, *Simulium melatum* from Mary Springs and *Paracnephia* species from Belalie Creek. Among the rarer midges in the area are *Podonomopsis* from Eyre Creek, *Apsectrotanypus* from the Light River at Kapunda and *Harrissius* from the Wakefield River. Mayflies such as *Offadens* sp. 5 and *Centroptilum elongatum*, from the Broughton River and Mary Springs respectively, were unusual records, as were the presence of several caddisflies (e.g. *Apsilochorema gisbum, Taschorema evansi, Orphninotrichia maculata* and *Lingora aurata*) from Skillogallee and Eyre creeks, Mary Springs
and the lower Broughton River.

Mayfly nymphs (e.g. *Koorrnonga inconspicua*) have flattened bodies that allow them to cling to rocks in flowing streams.

Photo: Jim Rathert, Missouri Dept. of Conservation

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, 57 sites in the Mid North have been assessed. This brochure describes the monitoring methods and the overall condition of the Broughton, Wakefield and Light River systems in the Mid 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.

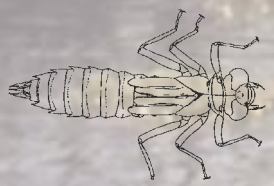
What is river health?

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.

The amphipod crustacean *Austrochiltonia australis* is commonly found in streams throughout the Mid North.

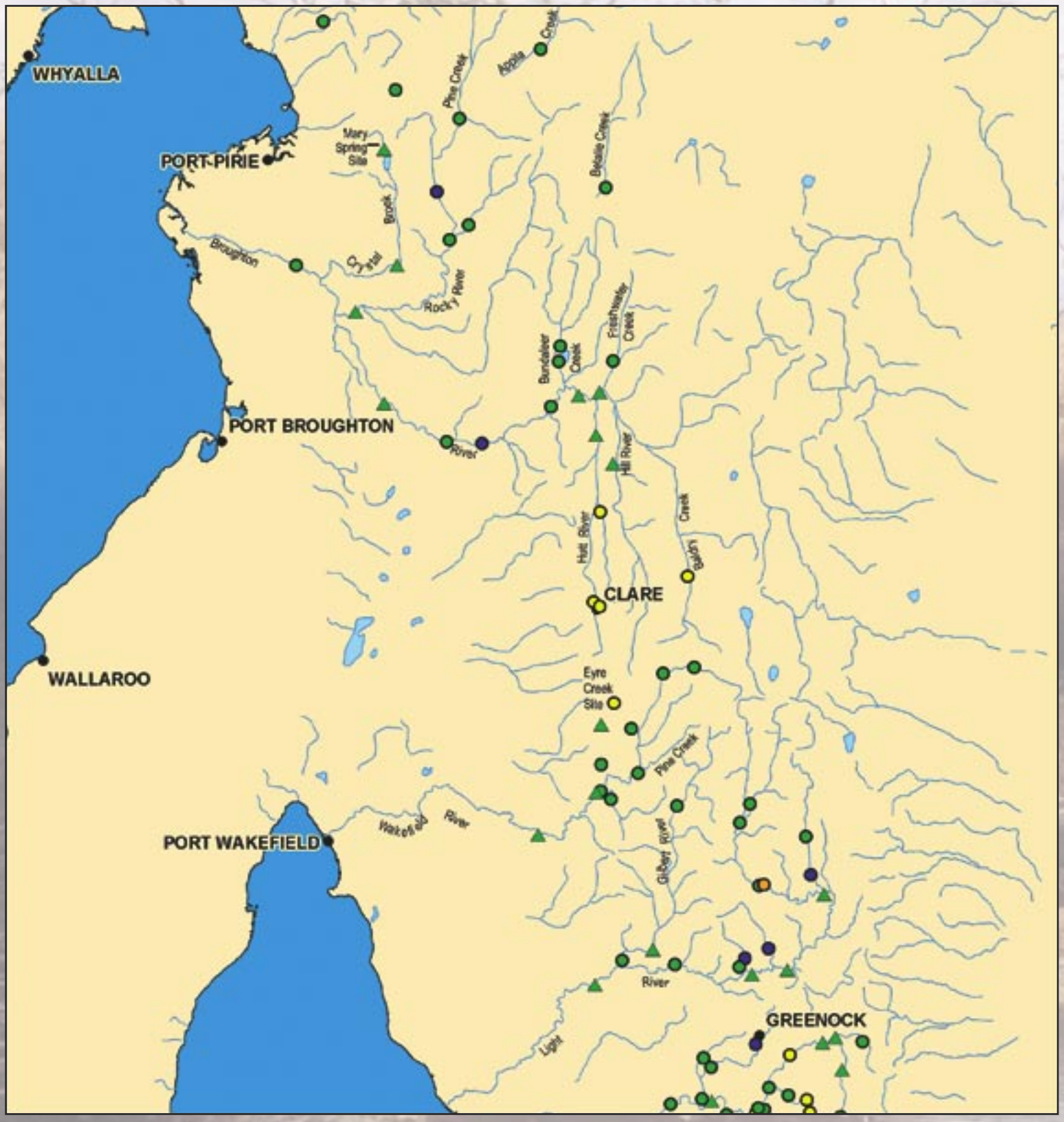
Photo: Cliff White, Missouri Dept. of Conservation

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.


WHYALLA
PORT PIRIE
PORT BROUGHTON
WALLAROO
PORT WAKEFIELD
CLARE
GREENOCK
Mary Spring Site
Pine Creek
Broughton
Crystal Brook
Rocky River
Bundaleer Creek
Freshwater Creek
Hill River
Hutt River
Baldry Creek
Eyre Creek Site
Gilbert River
Light River
Southern Ocean
0 200 400 600 kms
Site Description
More biologically diverse than reference sites (needs detailed investigation) (X)
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
N
0 5 10 15 20 kms

Riverine environments in the Mid North

Streams in the region drain from two different ranges. The northern catchment of the Broughton River drains part of the southern Flinders Ranges. This includes Crystal Brook, and Appila and Pine creeks, which flow through gorge or constrained valley environments and typically flow for only part of the year. The southern catchment of the Broughton River and the Wakefield and Light rivers receive water from the northern Mt Lofty Ranges. In this part of the Mid North, stream flows are generally more regular and permanent, although some streams cease to flow or even dry completely on occasion in some reaches.

The general climate of the region varies considerably, from the top of well-eroded hills at an elevation of 500–600 m to the lower reaches of each river that traverse across flat plains at an elevation of 50–100 m above sea level. The annual average rainfall ranges from around 400 mm on the plains to 650–700 mm on the upper reaches of the Broughton and Wakefield rivers in the Watervale and Clare areas. Most rainfall occurs during cool, wet winters, and summer periods are characterised by hot, dry conditions. Major flows occur from July to September, although storm events in January–February often contribute considerable flow to many streams.

The hydropsychid caddisfly larva (*Cheumatopsyche* species) is common in flowing stream habitats throughout the region.
Photo: M. Marchetti, California State University

The contribution of groundwater is also an important component of the base-flow conditions in many of the waterways in this region. This provides flowing water habitat and often maintains pool habitats in each river and many of the major tributary streams in the Mid North.

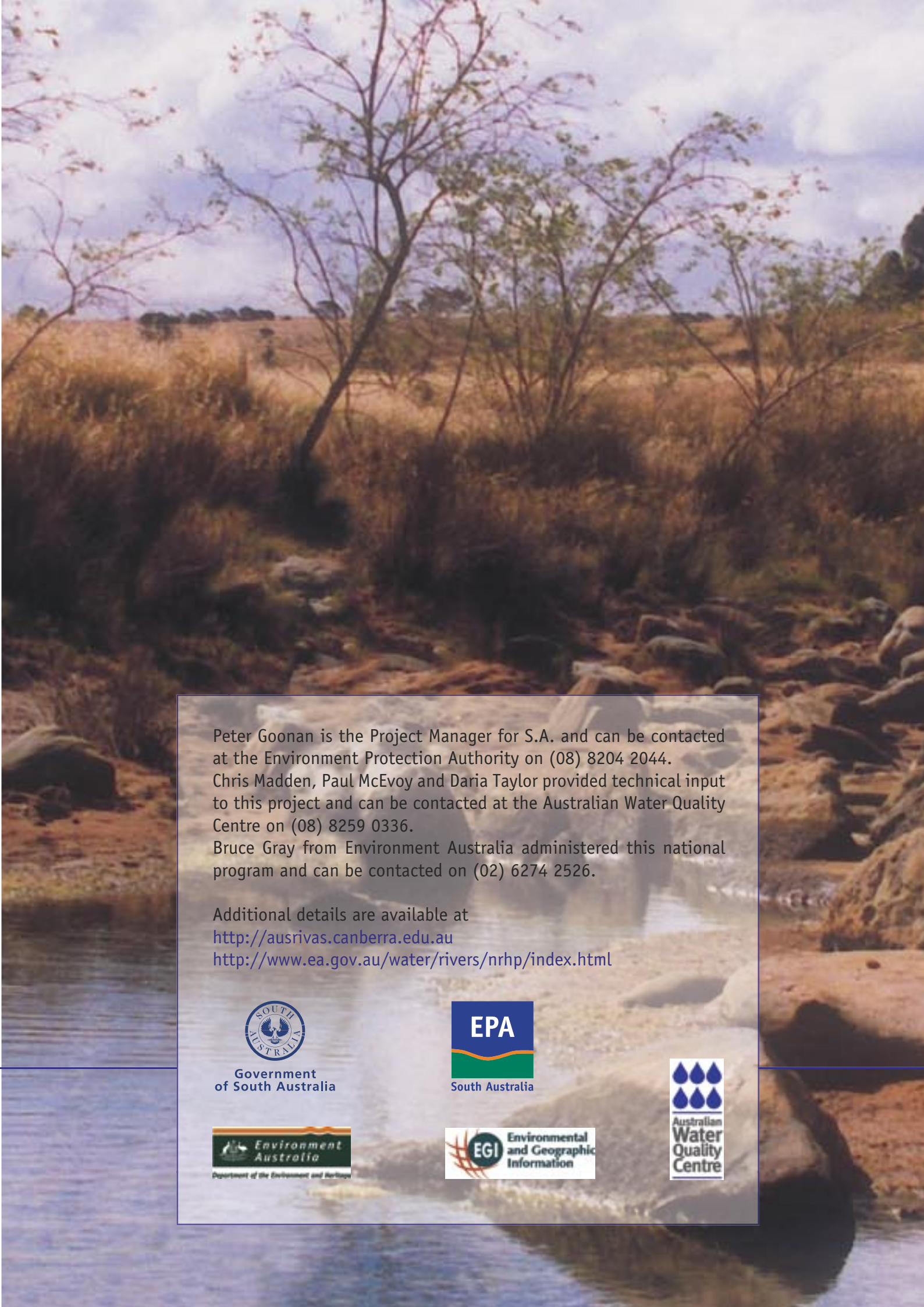
Salinity is a major issue for rivers in the region. The salinity of the lower Broughton River is typically around 4000–5000 mg/L, the Wakefield River ranges from 4000 to nearly 9000 mg/L, and the Light River is generally between 8000 and 11,000 mg/L. For comparison, fresh waters are those with a salinity of less than 3000 mg/L, and seawater has a salinity of about 35,000 mg/L.

River health in the Mid North

The map provides an overall assessment of the health of individual sites in the region. Most waterways were rated as equivalent to reference condition, including sites from each major river system. This means that for moderately saline streams most were in a good condition when compared to other saline waterways in the State.

Several sites were more biodiverse than expected, including Julia, Ross and Allen creeks in the Light catchment, and Broughton River at White Cliffs and Rocky River in the Broughton catchment. However, the sites with the most species were typically from reference sites such as Mary Springs and Skillogallee Creek. The major impacts associated with streams in the region relate to nutrient enrichment by stock and irrigation, stock trampling of habitat, and high salt concentrations. The poorest rating sites were from Fox Creek near Kapunda (salty, turbid water), Eyre Creek at Watervale (poor habitat), and several sites from the Hutt River and Baldry Creek in the Broughton catchment (poor habitat, water quality).

Three life stages of blackflies (Simuliidae): larva, pupa and adult.
Photo: © Dwight R. Kuhn



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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

EPA South Australia

Environment Australia
Department of the Environment and Heritage

EGI Environmental and Geographic Information

Australian Water Quality Centre