River Health in the River Murray Catchment
Aquatic macroinvertebrates in the Eastern Mt Lofty Ranges and River Murray

The region is very diverse, with over 490 different types of aquatic macroinvertebrates being recorded from 1994–1999. Most of the diversity (477 types) was recorded from waterways in the Eastern Mt Lofty Ranges and only 203 taxa were collected from the River Murray floodplain. The most common members included oligochaetes (worms), amphipod crustaceans (*Austrochiltonia australis*), nematodes (roundworms), chironomid midge larvae (*Tanytarsus, Cricotopus, Chironomus* species), molluscs (hydrobiid snails), blackfly larvae (*Simulium ornatipes*) and isopod crustaceans (*Heterias pusilla*).

Many rare macroinvertebrates are found in the region. They include several types that live in cool, moist localities, such as blind syncarid crustaceans (Parabathynellidae) in Tookayerta Creek, various chironomid midge larvae (*Stictocladius, Xenochironomus, Rheocricotopus, Podonomus* and *Aphirotiellidae* species) from a number of streams flowing into Lake Alexandrina, waterbugs (*Paraplea* species) from the Finniss River, scirtid beetles (*Cyphon* species) from Nairne Creek and caddisflies (*Ethochorema hesperium, Lingora aurata* and *Ulmerochorema* species) from the Angas River, Bull Creek and Finniss River respectively.

The River Murray also has a number of rare species including waterbugs (*Aquarius antigone* and *Diplonychus* species) from the River Murray at Murtho and Chambers Creek respectively, the freshwater crab (*Amarinus lacustris*) from Woods Point, and blackfly larvae (*Simulium* species) from only Pilby Creek and Little Duck Wetland.
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, 107 sites in the River Murray catchment in South Australia have been assessed. These include 21 sites on the River Murray and 86 sites on streams that drain towards the river in the Eastern Mt Lofty Ranges. This brochure describes the monitoring methods and the overall condition of the rivers and streams in the River Murray catchment in South Australia.

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 river.

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.

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.

The isopod *Austroargathona picta* is only found in the River Murray in South Australia.

Photo: Vlad Tsymbal
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 (?)

* Site that varies in condition from one year to the next (eg. B /C)
Riverine environments in the Eastern Mt Lofty Ranges and along the River Murray

The major physical features of the Eastern Mt Lofty Ranges are the hills that run from north to south-west at an elevation of 400–550 m and the flat Murray Plain that surrounds the River Murray in South Australia. Further south, several streams discharge into Lake Alexandrina across the sandy deposits of the Milang Plain.

The River Murray in South Australia has a broad floodplain about 4–9 km wide, and is characterised by large meanders, with numerous swamps and anabranches. Downstream from Overland Corner the floodplain narrows and is mostly confined to a steep-sided limestone gorge about 400–1600 m wide. Between Mannum and Wellington, most of the floodplain has been isolated from the river by embankments and drained for dairy production. At Wellington, the river flows into Lake Alexandrina, which along with Lake Albert formed the Murray’s estuary before the construction of the barrages near the river mouth in 1939–40.

The general climate of the region is highly variable due to the effects of air movement over the ranges. This results in parts of the Mt Lofty Ranges receiving significant rainfall for several months. However, during summer, prolonged dry spells for 2–3 months occur in the region. Mean annual rainfall ranges from as high as 1600 mm at the summit of Mt Lofty to less than 300 mm in the rain shadow around the Monarto area. Similarly, the Waikerie to Renmark regions along the River Murray have low annual rainfalls in the 250–270 mm range, and only a small amount of surface runoff that falls in South Australia actually enters the River Murray. The higher rainfall in the ranges creates near-permanent water in the upper reaches of many waterways in the region. However, most cease flowing during summer months and many of the smaller streams dry completely for several months.

The major freshwater streams that flow from the Eastern Mt Lofty Ranges into the River Murray include the Marne River and Reedy Creek and their tributary streams. A number of streams rise in the ranges but do not persist as surface streams and contribute little water into the River Murray. They include Burra, Truro, Saunders, Preamimma, Salt and Mitchell creeks, and the Dry Creek–Rocky Gully system. Most of these are typically quite saline streams. The other streams in the region are those that flow into Lake Alexandrina, including the Bremer River system which includes Dawesley, Nairne and Mt Barker creeks, the Finniss River which includes Meadows, Tookayerta and Nangkita creeks, and Currency Creek.

River health in the Eastern Mt Lofty Ranges and along the River Murray

The map provides an overall assessment of the health of individual sites in the region. The better waterways were generally from streams in the high rainfall part of the region. The Bremer and Finniss rivers, upper Marne River and Truro, Saunders, Angas, Currency, Meadows, Tookayerta and Rodwell creeks were all generally in good condition.

The more biodiverse sites were typically on streams with a range of habitat types and good quality water. They included sites on Mt Barker, Meadows, Bull, Rodwell, Tookayerta and Preamimma creeks, the North Rhine River (formerly Somme Ck), and Dawesley Creek near Davidson Creek. The waterway that rated the poorest in the region was Dawesley Creek near Nairne in the Mt Lofty Ranges. This stream is severely impacted by acid mine leachate from the disused Brukunga mine. Other streams with poor ratings included Mt Barker Creek (high nutrients), Salt, Rocky Gully and Long Gully creeks (high salinity), and parts of Reedy, Nairne and Baker creeks and the Marne River (low flow, high nutrients).

The sites from the River Murray floodplain were generally below reference condition, particularly along the main channel. The poorest sites were from Morgan and Blanchetown, and from various sites in the Riverland and lower reach. High salinity impacts were evident at Disher and Salt creeks. Floodplain sites that were in good condition included the freshwater wetlands and anabranches at Chambers, Katarapko, Pilby and Monoman creeks, Pike River and Little Duck Lagoon.
Peter Goonan is the Project Manager for S.A. and can be contacted at the Environment Protection Authority on (08) 8204 2044. Chris Madden, Paul McEvoy and Daria Taylor provided technical input to this project and can be contacted at the Australian Water Quality Centre on (08) 8259 0336. Bruce Gray from Environment Australia administered this national program and can be contacted on (02) 6274 2526.

Additional details are available at
http://ausrivas.canberra.edu.au