



Controversial Coorong

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Lake Albert (SA) Oct 2008. Photo: Jennifer Rogers.

Most birders will be aware that the environmental values of the Coorong and the associated Lower Lakes (Lakes Alexandrina and Albert) in South Australia are undergoing radical change which could greatly affect their birdlife. This article briefly considers the current environmental condition of the area and examines some of the actions that are being undertaken, or are being considered by, the South Australian Government as options to combat the environmental degradation of the Coorong, Lower Lakes and Murray Mouth (CLLAMM) area.

HISTORY

The CLLAMM area is no stranger to controversy. As early as 1889, the South Australian Government complained that water extraction in NSW and Victoria had allowed salt water to encroach upon the Lower Lakes. Over the next few decades, extraction of water for irrigation and the construction of dams further reduced River Murray flows, increasing the salinity of the Lower Lakes and threatening the supply of freshwater to Adelaide and communities surrounding the Lower Lakes. In the late 1930s, five barrages (the Goolwa barrages) were constructed between Lake Alexandrina and the Coorong to prevent the flow of seawater into the Lower Lakes and secure freshwater supplies for Adelaide and communities around the Lower Lakes.

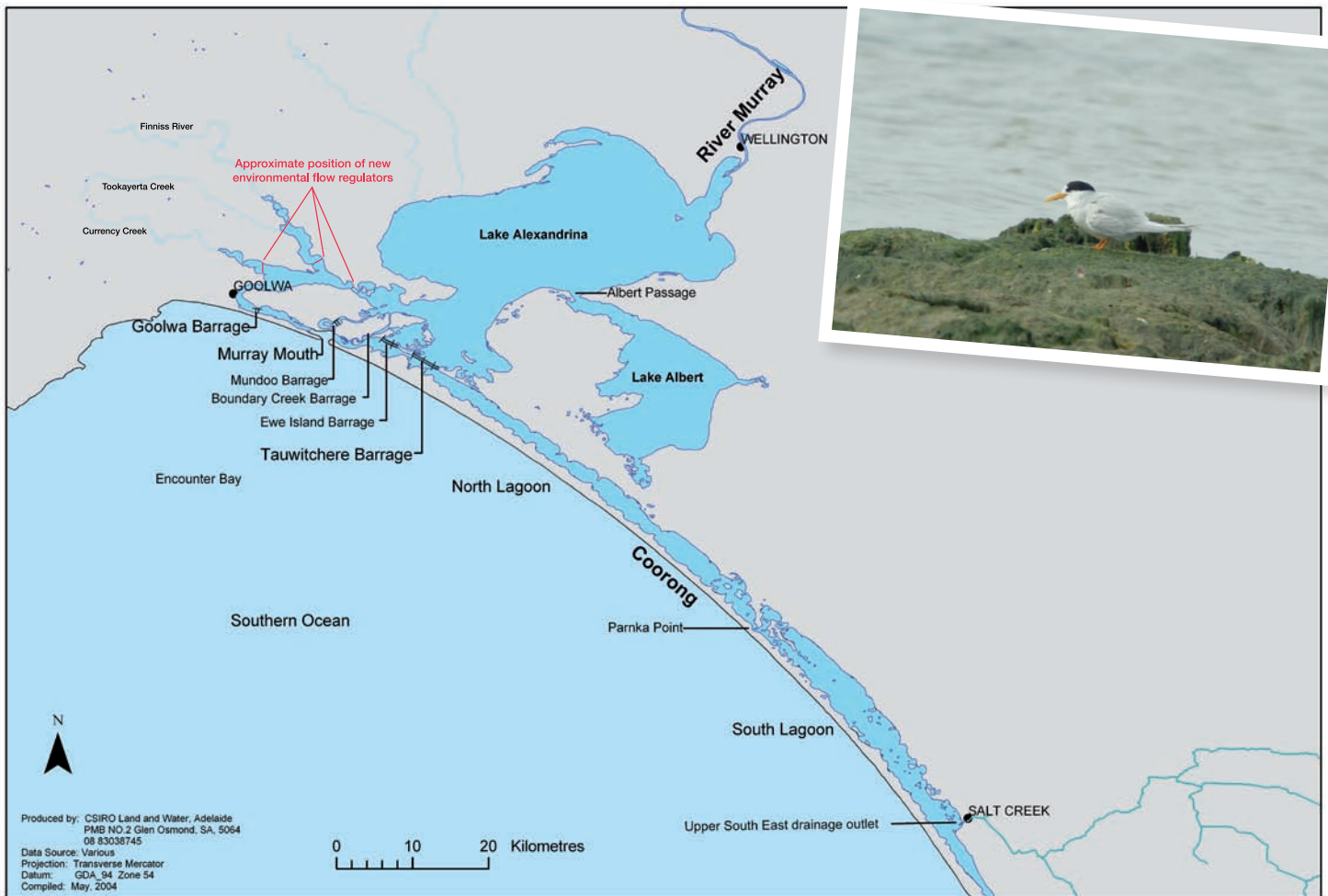
In 1985 the CLLAMM area was declared a Wetland of International Importance under the Ramsar Convention. It was recognised as an important site for both endemic and migratory shorebirds (stilts, avocets, sandpipers and plovers), piscivorous species (terns, cormorants and pelican) and waterfowl (ducks and swans). The area was recognised as an important non-breeding area for thousands of Red-necked Stint, Curlew Sandpiper and Sharp-tailed Sandpiper and contained important breeding sites for Fairy Tern and Australian Pelican.

ABOUT THE COORONG, LOWER LAKES AND MURRAY MOUTH (CLLAMM)

This extract is taken from the final report of the CLLAMMecology research cluster (see reference below).

Coorong water levels vary at daily to seasonal time scales creating habitats, including periodically inundated mudflats, which are ideal for shorebirds. Typically, the Coorong has a strong salinity gradient along its 110 km length. When the barrages are flowing, water can be near fresh at its Mouth end and when they are not, seawater salinity prevails in this region. Towards the south-eastern end of the Coorong, salinity increases steadily due to evaporation. Frequently, salinity in the South Lagoon is substantially above that of seawater (hypersaline condition). The salinity variation representing estuarine, marine and hypersaline conditions supports different ecological communities.

Modifications to the flow regime of the River Murray have resulted in a significant change to the ecological character of the region since its listing as a Ramsar wetland in 1985. Currently, consumptive use of water across the Murray-Darling Basin has reduced the average annual stream flow at the Murray Mouth by 61% (from 12,333 GL/year to 4733 GL/year). In combination with a regional drought in the Basin, inflows to the Coorong have been especially low since 2002, with no inflow recorded since 2006. This has resulted in the siltation of the Murray Mouth channel and the extreme hypersalinisation of the South Lagoon, where salinity is currently in excess of four times seawater. These changes to the water regime of the River Murray have been linked to a decline in abundance of a number of fish and waterbird species in the Coorong.



Map: Coorong, Lower Lakes and Murray Mouth Region, South Australia. Reproduced with permission from CSIRO. Inset: Since 1985 Fairy Tern numbers have dropped by 82% in South Lagoon. Photo: Jennifer Rogers.

CURRENT STATUS, CONCERNS AND RESEARCH

The flow of freshwater across the barrages and into the Coorong is a major factor controlling salinities, and therefore food webs, within the Coorong; it is also a major factor in determining whether the Murray Mouth is open or closed.

Since being listed as a Ramsar site in 1985, the environmental condition of the CLLAMM area has changed dramatically (see inset on previous page). In 2005, CSIRO launched a collaborative research program, the CLLAMMecology Research Cluster, under its Water for a Healthy Country Flagship. Scientists from CSIRO, universities and government have worked together to evaluate water management options for the region that will secure and sustain the health of the estuary. CLLAMMecology aimed to improve ecological knowledge about the CLLAMM region and develop a framework to support the design of longer-term management interventions. The focus of CLLAMMecology was on the Coorong because this was the main region of concern at the time the study was designed.

The CLLAMMecology group found that with declining inflows of freshwater, salinities along the Coorong have increased significantly and parts of the Coorong (particularly South Lagoon) are now four times saltier than seawater. This has led to a decline in key food resources such as the aquatic plant *Ruppia tuberosa* and the fish species Smallmouth

Hardyhead *Atherinosoma microstoma*. In South Lagoon, these declines showed a significant correlation with declines in the abundance of many bird species (relative to census data from 1985) including Black Swan (59% decline) and piscivorous species such as Fairy Tern (82% decline) and Australian Pelican (77% decline) (Rogers *et al.* 2009). Interestingly, Rogers *et al.* (2009) found that declines in the abundance of migratory shorebirds such as Curlew Sandpiper (94%), Sharp-tailed Sandpiper (63%) and Red-necked Stint (68%) in South Lagoon were not correlated with changes in the density of key food resources for these species. They hypothesised that declines amongst these *Calidris* shorebird species may be more closely related to changes in the availability of suitable physical habitats, having found that foraging performance declined with increasing water depth. While the Coorong has extensive mudflats, at any one time only a small proportion of the total mudflats are suitable for shorebird foraging.

While it is clear that the majority of bird species that utilise the Coorong have declined in abundance over the last 24 years, high salinities have allowed the Australian Brine Shrimp *Parartemia zietziana* to flourish and become a major food source for Banded Stilt. In 2006, Banded Stilts nested at the Coorong for the first time.

The CLLAMMecology project has significantly advanced our knowledge of the ecology of the Coorong. The detailed

hydrodynamic and ecological models developed under the project will be used to predict the impacts of flow regimes on the ecology of the area and will be used to guide future water allocations to the region. The solution to the degradation of the Coorong and the entire CLLAMM area would be to restore flows of freshwater into the Lower Lakes and over the barrages. However, with the drought continuing in south-eastern Australia and over-allocation of water throughout the Murray Darling Basin, extra freshwater is unlikely to be allocated to the CLLAMM area any time soon. A further option for decreasing salinities in the Coorong would be to pump hypersaline water out of South Lagoon. This may also require increased dredging of the Murray Mouth to facilitate the flow of seawater into the Coorong to replace the extracted hypersaline water.

The final CLLAMMecology report is now available online at: <http://www.clw.csiro.au/publications/waterforahealthycountry/clangm/CLLAMM-Final-Report-Ecosystem-Assessment.pdf>

OPTIONS FOR THE LOWER LAKES

Falling water levels in the Lower Lakes have exposed thousands of hectares of actual and potential acid sulphate soils to the air. Acid sulphate soils occur naturally along our coastlines and in estuaries but do not cause problems if they remain covered by water. However, when acid sulphate soils are exposed to the air, they react with oxygen to produce sulphuric acid. Sulphuric acid can directly affect plants and animals when it is washed into streams and lakes, but it can also trigger the release of toxic metals such as aluminium, manganese and arsenic from soils.

In May this year the South Australian Minister for the River Murray issued an alert to communities in the Goolwa region warning that parts of the Finniss River and Currency Creek had become acidic. The South Australian Government's initial response to the crisis was to place more than 300 tonnes of micro-fine limestone in Currency Creek and 80 tonnes in the Finniss River to neutralise the acid and prevent it from being washed into the Goolwa Channel. In June 2009, the South Australian Government began work on earthen environmental flow regulators (the Goolwa Regulators) in the Goolwa Channel, Finniss River and Currency Creek. The three Goolwa Regulators will capture winter inflows, which will raise water levels in the Goolwa Channel, covering exposed acid sulphate soils and preventing the flow of acidic water into the Lower Lakes. The regulators are temporary and will be removed when River Murray flows increase and the Lower Lakes recover.

Other major works currently being considered are the construction of a temporary weir near Pomanda Island (Wellington) and the release of seawater through the Goolwa Barrages to flood the Lower Lakes and cover exposed acid sulphate soils.

The primary aim of the proposed temporary weir at Pomanda Island is the protection of South Australia's water supply. The South Australian Department for Environment and Heritage



Top: Aerial photo of the Murray Mouth, October 2005. Photo: Jennifer Rogers
Bottom: The number of Australia Pelicans breeding in the Coorong has dropped dramatically - this photo was taken in 1976. Photo: Don Saunders

has prepared an Environmental Impact Statement (EIS) and a supplementary EIS which are under consideration by the Australian Government's Department of Environment, Water, Heritage and the Arts (DEWHA). A decision on whether to allow the building of the weir is expected on 12 October 2009

The primary aim of the proposal to allow seawater through the Goolwa Barrages is to cover the exposed acid sulphate soils on the lake beds of the Lower Lakes. Some have argued in favour of this, stating that it will return the Lower Lakes to their former brackish state as existed prior to the construction of the Goolwa Barrages. However, others argue that with the flow of freshwater into the Lower Lakes at an historical low, flooding the Lakes with seawater will make the Lakes more saline than they have ever been, irreversibly altering and damaging the ecology of the Lower Lakes. In March 2009, DEWHA issued guidelines for the preparation of an EIS on the proposal. The EIS is currently being prepared by the South Australian Government.

While these are the major options being considered by the South Australian Government, a raft of other measures are also under consideration. These are summarised in the document 'Murray Futures: Lower Lakes & Coorong Recovery', available online at: www.environment.sa.gov.au/cllmm/pdfs/mhf-document.pdf.

Reference

Rogers, D J and Paton, D C. 2009. *Spatiotemporal variation in the waterbird communities of the Coorong*. CSIRO: Water for a Healthy Country National Research Flagship, Canberra.