Saving the Swamps

At the edge of the south-west forests are small pockets of wetland, watery expanses where plants, birds and invertebrates abound. These virtual soup-pots of rare living things are now under threat from rising salinity. Local landowners, the Department of Conservation and Land Management (CALM), Agriculture WA (AgWA), the Water and Rivers Commission and other agencies are combining forces to save the swamps.

BY MANDY CLEWS

To the European eyes of the early colonists, Lake Muir would have been almost unbelievable in its contrasts: a large open lake in winter, a dry saltpan in summer. But the practical appeal of the nearby wetlands—many of them abundant with permanent supplies of fresh water—made them attractive for settlement, and likewise, local Aboriginal inhabitants frequented the area for its variety of edible plants.

Nowadays, the Lake Muir and nearby Unicup Lake catchments are equally, if not more important for different reasons. Biodiversity in its own right has become a prime ecological value, and these catchments are known to be hubs of a complex system of wetlands at the edge of the south-west forests, supporting a vast array of plants, invertebrates and waterbirds. Protected as nature reserves in Western Australia, the catchments are unique in representing the only wetlands of their type in near-pristine condition. In addition, Lake Muir is listed on the Register of the National Estate for its conservation significance, and is included in the List of Wetlands of International Importance developed under the Ramsar Convention—a listing shared by Kakadu and the Macquarie Marshes.

While the lay person may not find much to look at in the wetlands, the scientific community is just beginning to realise the biodiversity of these well-hidden wetlands to be impressive. In total area, the Muir-Unicup reserve system is barely one-tenth the size of the Fitzgerald River National Park—a declared international biosphere reserve—yet 950 plant species have so far been observed here, just more than half of the 1883 species recorded in the Fitzgerald.

Above: The largest WA populations of the secretive brown bittern are found in the Muir Wetlands. The birds require dense sedges to nest and feed in.
Photo – Jiri Lochman

BIRDLAND

All these waterbodies, whether permanent or ephemeral, attract crowds of waterbirds, with some 50 species having been observed in the catchments. Nine of these species are listed under the Japan-Australia or China-Australia migratory bird agreements. Seven species of waterbirds—the little bittern, spotless crake, Australian shelduck, musk duck, black swan, purple swamphen and silver gull—are known to use the wetlands for breeding.

At some times of year, the bird life swells from feature to spectacle, with

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Orange buttercup (*Hibbertia stellaris*). The only hibbertia that occurs in waterlogged fresh swamps. The orange flowered form occurs from Busselton to Esperence.
Photo – Ann Storrie

Below: The western long-billed corella occurs in nearby woodland areas.
Photo – Jiri Lochman

Top left: A swamp in Kulunilup Nature Reserve. In the foreground is a complex natural hybrid swarm of *Kunzea* species (*K. ericifolia* and *K. recurva*). Preservation of the naturally fresh wetlands will allow these unusual occurences to continue.

Top centre: A flower spider awaits its prey, blending with flowers of swamp tea tree (*Pericalymma ellipticum*).

Top right: Melaleuca rhaphiophylla forest over native grassland and the rare aquatic *Montia australasica* at Byenup Lake.

Above: Along the southern edge of Lake Muir are low trees of saltwater paperbark (*Melaleuca cuticularis*) and low succulent shrubs of samphires. In the background is the sedge *Gahnia trifida*.
Photos – Greg Keighery/CALM

some 52,000 individuals having been counted at one time on Lake Muir alone. In addition to breeding here, many ducks and swans use the wetlands as a moulting refuge. Birds in their thousands shed flight feathers and grow new ones while loafing on the water, so that in the early summer the leeward edges of the lakes are fringed with carpets of feathers.

Several bird species that make use of the wetlands are listed as threatened. The Australasian bittern (*Botaurus poiciloptilus*), which has been recorded in seven wetlands within the Muir-Unicup system, is on the WA threatened fauna list. The western long-billed corella (*Cacatua pastinator pastinator*) and Baudin's cockatoo (*Calyptorhynchus baudinii*) also occur in the area.

NOT A NETWORK

Although many of the marshes may interact in some ways, it would be misleading to suggest that they are all connected. The wetlands have been formed by various combinations of geographic happenstance: they sit in crustal folds formed at the edge of the ancient Darling plateau, within the Ravensthorpe Ramp, the downtilting of the Earth's crust formed when Australia separated from Antarctica. The area has been under the sea several times in the last million years. Different geological forces have resulted in a regional patchwork of aquifers, which have varying degrees of natural salinity from fresh to brackish to salty. Soil types as well as drainage patterns differ in the various water bodies, with the result that many have independent ecosystems and are affected differently by the changes to groundwater and drainage that result from clearing and other human intrusions into the environment.

In some of the system's wetlands there is peat, a rare phenomenon in Australia, particularly in the dry conditions of Western Australia. Formed by reedy plant matter decomposing in perpetually-moist conditions, peat adds a rich organic dimension to the soil, supporting a diversity of unusual plant and invertebrate life. The peaty swamps in the Muir-Unicup system provide habitat for a number of macro-invertebrates—midges and water-mites—that are found nowhere else in the world.

DEADLY LEGACY

European-style farming in the 1850s changed the Western Australian landscape forever, but the real threat to the delicate geography underlying the wetlands was not to emerge until more than a hundred years later, when conditional release of farmlots meant purchasers had to clear the land within a certain time. In the 1960s and 1970s, more than 20,000 hectares were cleared in the Lake Muir catchment alone for pasture and horticulture. The removal of deep-rooted vegetation led to rising water tables that mobilise stored salt

upwards from the deeper soils. Meanwhile, the channeling of water to create summer grazing areas changed natural surface water-courses. All across southern Australia swamps started to drown and show signs of dramatic increases in salinity. By the late 1980s, it was becoming plain that land degradation in general was getting out of control, and that salinity in particular was shaping up to become one of the nation's most critical environmental problems. Locally, it was also becoming apparent that the wetlands, along with their rich and rare pot-pourri of life, were under threat.

In 1996, the Government of Western Australia released the Salinity Action Plan, a coordinated project prepared by Agriculture WA (AgWA), the Department of Conservation and Land Management (CALM), the Department of Environmental

Top left: Grevillea leptobotrya. An unusual form of this beautiful summer-flowering shrub is found in the Lake Muir area.

Top right: Lilaeopsis polyantha in full flower. This very odd carrot relative is only known in WA in the wetlands of Lake Muir.

Centre left: Andrew Storey (UWA Zoology) and Alan Clarke (CALMScience) sampling invertebrates and water quality in a monitoring wetland in Kulunilup.

Left: A clayflat in autumn. Dominated by jointed rushes and several *Melaleuca* species, these wetlands contain the largest known populations of several rare plants.
Photos – Greg Keighery/CALM

Above left: A clay flat affected by salt, now dominated by dead paperbarks and saltwater couch. This has lost most of its conservation values.
Photo – Greg Keighery/CALM

Above: A saline watercourse in the Wheatbelt, with plantings and contour plowing. The management of surrounding land is crucial to the maintainence of the Muir recovery catchment.
Photo – Jiri Lochman

Protection and the Water and Rivers Commission (WRC), to arrest and reverse salinity around the State. In the Plan, the Lake Muir-Unicup wetland complex was nominated as one of three high-priority areas for a recovery strategy, along with Toolibin Lake in the Wheatbelt and the Lake Warden wetland systems near Esperance. The recovery strategies, being developed by AgWA, WRC, afforestation companies, CALM and community organisations, will coordinate and facilitate local community action to restore and protect the catchments.

Meanwhile, CALM has drafted a management plan for Muir-Unicup Nature Reserves. The draft plan describes the problems facing the wetlands in the reserves, notes the shortfall in knowledge of the ecology and hydrogeology of the systems, and proposes programs of research and remedial action.

THE RESCUE EFFORT

Remedial action proposed in the draft management plan is now getting under way, with extensive community consultation. With assistance from CALM, local communities have been taking action to repair the damage. The main strategies to save the wetlands are to replant cleared areas on private property with deep-rooted vegetation, to restore the water table and stabilise the stored salt in the soil. It is also necessary to protect remnant vegetation by fencing it off from stock and removing weeds.

Some landholders have revegetated by turning their land over to tree plantations. Others have a preference for more traditional agricultural alternatives. CALM appreciates the importance of keeping local farming communities close to their environment. In conjunction with AgWA, WRC and local landcare groups, CALM is encouraging field trials of deep-rooted perennial and high-water-use crops such as lucerne, kikuyu grass and strawberry clover, which enable farmers to continue grazing crops while reducing salinity. CALM is also encouraging the strategic location of high-water-use trees to revegetate and protect discharge areas and drainage lines.

There is much still to be learned about the Muir-Unicup wetlands system. The present understanding of its significance and vulnerability is only the tip of an iceberg of knowledge and appreciation of the environment. The draft management plan also calls for further flora and fauna surveys and research into early Aboriginal inhabitation. In many cases, it can only be guessed where the groundwater comes from; meanwhile, CALM has recently conducted radiometric and geomagnetic surveys. Together with the evidence of early maps and aerial photographs, drilling records, and ground surveys, this information will reveal more about how the groundwater flows and how clearing has affected drainage patterns.

There is no question that the importance of the wetlands is becoming more widely understood and appreciated, and the work of many other agencies in gaining precious new knowledge must be acknowledged. Invaluable contributions have come from the Semenuik Research Group, Birds Australia, Greenskills and Murdoch University. As public consciousness of the importance of biodiversity grows, there is potential for eco-tourism in the wetlands—boardwalks with hides for birdwatching—linking in with the popular Perup Forest. A bright side of the salinity problem is the opportunity it has presented to advance knowledge and community ownership of the precious wetlands.

Mandy Clews is a freelance writer and a regular contributing editor to *LANDSCOPE*.
The author acknowledges the assistance of Rod Simmonds, Jim Lane and Aminya Ennis in writing this article.

Winner of the 1998 Alex Harris Medal for excellence in science and environment reporting.

LANDSCOPE

VOLUME FOURTEEN NUMBER 3, AUTUMN 1999

Western Everlasting, see page 22, follows the same successful approach to protecting threatened plants as Western Shield did for mammals.

Beneath its black and burnt exterior, the common balga is giving up its secrets. See 'Believing the Balga' on page 10.

For 25 years, CALM's Wildlife Research Centre in Woodvale has been 'A Centre of Diversity'. See page 36.

The spectacular coastline of Torndirrup National Park has been years in the making. See page 28.

Read how locals, CALM and other agencies are working together to save the Lake Muir-Unicup wetlands. See page 49.

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REGULARS

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'Moving Mala' (page 17) tells the story of the translocation of these endangered mammals from Australia's Central Desert Region to a small island off WA's north coast.

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Colour Separation by Colourbox Digital
Printed in Western Australia by Lamb Print

Visit *LANDSCOPE* online on our award-winning Internet site NatureBase at http://www.calm.wa.gov.au

Published by Dr S Shea, Executive Director
Department of Conservation and Land Management,
50 Hayman Road, Como, Western Australia