Australian Government

Wetlands Australia

NATIONAL WETLANDS UPDATE 2007

ANNUAL UPDATE FOR AUSTRALIA'S WETLAND COMMUNITY

NEW LIFE IN LAGOON CREEK

Bryony Barnett, TYTO Consulting, Townsville
Vern Veitch, Australian Centre for Tropical Freshwater Research

A kingfisher dips over Lagoon Creek, a flash of blue reflected on the water surface. A year ago there were no reflections on this small channel on the lower Herbert River floodplain—just a dense mat of weeds over the whole surface with barely a glimpse of water. Today the cleared stretch of water reflects overhanging trees and the hills beyond, and ripples with signs of life.

Lagoon Creek is a remnant distributory channel on the expansive floodplain of the Herbert River, one of many channels that snake through cane paddocks, reflecting current and past courses of this mobile river. The creek lies 4 kilometres east of the small town of Ingham in Hinchinbrook Shire, and flows eastward into the Great Barrier Reef Marine Park via the mangrove-lined Victoria Creek estuary. The creek is connected to the Herbert River only in times of major flood events when the river overflows its banks.

The surrounding land is largely planted with sugar cane, with runoff draining into the creek via waterways lined with para grass. Much of the riparian vegetation was removed with early land clearing for cane growing—though there has been extensive replanting by the community in recent years, mostly funded by the Natural Heritage Trust.

Once a fish habitat for barramundi and other native fish, Lagoon Creek's 7 kilometres of interconnected freshwater lagoons have become progressively infested with aquatic weeds over the past decade, leading to a significant loss of water quality. Nutrient loading has promoted massive growth of weeds like water hyacinth, giant sedge and para grass, forming a dense mat on the water surface. This in turn has led to oxygen depletion, loss of habitat and biodiversity, and a potential threat to the estuary and nearby reefs.

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New reflections on Lagoon Creek—after the clean up in 2006. Photograph: Vern Veitch

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Editorial, artwork and project management: Wilton Hanford Hanover

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2007: MINISTER'S FOREWORD

Welcome to the 2007 edition of *Wetlands Australia*, an annual publication that highlights current activities and projects across Australia focusing on wetlands and their conservation, management and education.

Awareness of the importance of wetlands has never been greater. Australians have never been more attuned to water and the need for its conservation and good management.

Wetlands are a critical component of our environment and increasingly recognised for their unique role in managing and conserving the flow of water through our environment and cities. Wetlands are a vital part of our river systems and water quality. They also protect our coasts and catchments from erosion, provide water storage areas, absorb water-borne pollutants, and provide habitat for plants and animals.

The Australian Government strongly supports the conservation, repair and wise use of wetlands across Australia. As a nation we face some of the most difficult environmental circumstances ever encountered—decreasing rainfall, increasing salinity, and decreasing water quality and quantity. Everyone has been affected by the drought and/or other changing climatic conditions, and the decreasing availability of water. Wetlands, too, have suffered. We are now facing a challenge, on a scale not previously encountered in Australia, in balancing the needs of the environment, industry, and communities.

In these times it is important that we work together—with all levels of government, community organisations, industry, land-holders and interested groups. We need to gain heart from what others are achieving. During periods of climatic stress it is ever more important that wetlands, with their critical ecological role in the water cycle, are looked after. Increasingly in many cases this requires managed environmental flows. This *Wetlands Australia* newsletter once again shows us the important work being undertaken around Australia in a range of different forums to care for and protect our wetlands.

This edition illustrates the many different types of wetlands in Australia—from urban landscapes regenerating stormwater run-off, mountain wetlands, ephemeral wetlands that occur after major rain events, water holes in desert landscapes, to riverine systems. This great diversity is united by the critical role of water in both urban and natural landscapes.

A notable theme running through these articles is that great things are possible when groups of people work together towards a common goal. In many cases the results are truly remarkable. The rehabilitation of Lagoon Creek, a tributary of the Herbert River near Ingham in Queensland, is just one example of what can be achieved with a coordinated approach and the integrated support of many local organisations. We cannot underestimate the impact of the many local actions which are all building towards the greater goal of conserving our wetlands.

The Hon. Malcolm Turnbull, Australian Government Minister for the Environment and Water Resources

This edition again highlights the outstanding work being undertaken under the second phase of the Australian Government's Natural Heritage Trust at a state, regional and national level across the country. When reading these articles it is obvious how Australia's wetlands have benefited, with many regional projects well into the implementation phase and achieving tangible on-the-ground results.

Unfortunately, only a small number of the many wetlands conservation and management activities across Australia can be reported in this edition. These provide a window from which to gain a view of the growing momentum in wetland conservation. And I hope that, like me, you will find this national update both interesting and informative; and that it kindles your inspiration to care for and appreciate our diverse wetlands.

The Hon. Malcolm Turnbull
Australian Government Minister for the Environment and Water Resources

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A communal effort

Before 2005 several uncoordinated small-scale efforts to control the weeds in Lagoon Creek had provided short-term relief only. In 2005 Conservation Volunteers Australia (CVA), WetlandCare Australia, and the Australian Centre for Tropical Freshwater Research (ACTFR) at James Cook University joined forces as a consortium to provide an integrated approach to addressing regional wetland issues.

With extensive landholder and community consultation, the consortium successfully sought funding from the Great Barrier Reef Coastal Wetlands Protection Programme (Pilot Programme) to remove, control and monitor the offending weeds in accessible parts of the lagoons; help restore life in the creek; and manage the threat of anoxic, high-nutrient water draining into the Great Barrier Reef lagoon. Further support came from the Herbert River Catchment Group, Hinchinbrook Shire Council, Far North Queensland (FNQ) NRM Ltd, canegrowers and the local landholders— $280 000 in total.

The excavator claws weeds from the water with the help of two small boats. Photograph: Vern Veitch

Grabs, paddles and punts

Starting in early 2006, the project team—scientists, resource managers, landholders and contractors—used a mix of innovative spraying and mechanical removal, helped by natural wet-season flushing, to tackle the weeds. The workers first sprayed banksides with herbicide to release the hold on the weed mat, followed by aerial salt-spraying over the lagoon by helicopter to break up the solid mat. A week of heavy rain subsequently flushed almost half the weed mass downstream, though much of it remained bound to itself and to the banks of the creek. It was time to bring the machinery in.

For ten days in May 2006 the team used a bankside excavator and grab—a floating mechanical paddle-powered harvester hired from the Burdekin Shire—and two small boats using simple reef anchors and net booms, to remove the remaining weed mat. This combination of treatments had not been tested before, and proved to be very effective. The harvester fragmented the weakened weed mat by carving tracks through its surface. Then the boats worked with their anchors to grab the matted weed 'islands' and push them towards the excavator. Gradually the water reappeared— albeit stirred up by the activity— and a mound of rotting vegetation built up beside the lagoon, attracting the interest of local canegrowers looking for nutrient-rich fertiliser.

Two small punts, fitted with net-draped booms, drive weed towards the shore. Photograph: Vern Veitch

Tracking the change

So has it made a difference to the health of Lagoon Creek? Scientists from ACTFR are seeking the answers through a broader-scale monitoring Programme focused on water quality and fish and bird observations, using baseline data from previous fish-kill studies at the site as benchmarks. The water was locally very turbid for a period after weed removal, followed briefly by a visual algal bloom—a combined effect of nutrients stirred up from sediment and organic matter in the weed roots, and reintroduced sunlight. Dissolved oxygen, essential for life and naturally variable, improved rapidly at the surface and will be monitored regularly. Early in the project the scientists recorded only six fish species (including one introduced species)—all tolerant to low-dissolved oxygen levels. A sign of improvement will be when more sensitive species choose to migrate into the lagoon during the wet season. The monitoring team expect to identify such indicators of improved health in the lagoon in the longer term, but only with sustained effort in weed management and attention to other stretches of the creek.

On reflection

The project built on earlier revegetation efforts and tested the effectiveness of different treatments for weed management. The dynamics of wetland systems are such that Lagoon Creek must be maintained on a regular basis. Future weed removal and monitoring will be overseen by a new Water Board comprised of landholder, council and industry representatives. Meanwhile one landholder and a scientist are back to the drawing board, re-designing their punt as a weed rake, while the creek bank trees look down on their new reflections.

The paddle-powered harvester carves a track through the weed mat, helped by small punts. Photograph: Vern Veitch

PUTTING WETLANDS ON THE MAP

Alison Beard
WA Department of Environment and Conservation

The south-west of Western Australia—stretching from Shark Bay in the north to Israelite Bay in the south—has been recognised internationally as a biodiversity hotspot, and the Busselton and Augusta region has been recognised nationally. Wetlands help sustain this biodiversity by providing habitat, refuge, food and water sources, and breeding sites. To assist with wetland management and protection, it is important to identify and assess their characteristics and values.

Within the south-west region, detailed wetland mapping is currently available for the Swan Coastal Plain, along the Scott Coastal Plain, and for part of the Blackwood Plateau. However, wetlands in some key areas of the south-west have not been mapped. The Western Australian Department of Environment and Conservation (DEC) is implementing a project to assess wetlands within a study area between Busselton and Augusta. The project will provide better resources to support wetland management and protection for the identified study area, and increase the coverage of wetland assessment throughout the south-west of Western Australia.

The project is funded by the Natural Heritage Trust (NHT) and the National Action Plan for Salinity and Water Quality (NAP), which are joint state, territory and Australian government initiatives. The wetlands mapping project is administered by the South West Catchments Council (SWCC) under the *South West Regional Natural Resource Management Investment Plan for 2005–2006* (SWCC 2005).

The first component of the project aims to map wetlands at a scale of 1:25 000 and to classify wetlands into types based on landform and water permenance. This geomorphic classification system (Semeniuk & Semeniuk 1995) has previously been used to classify wetlands in the areas of wetland mapping referred to above. The project will also develop an evaluation methodology to assess the wetland values and allocate each wetland to a management category ('conservation', 'resource enhancement' or 'multiple use').

It is envisaged that the final mapping, classification and evaluation will be made available via the DEC website,

Long-necked Tortoise making tracks in the drying Lake McLarty, a component of the Peel-Yalgorup Ramsar site and one of the monitoring sites. Photograph: Alison Beard

A sumpland in Tuart Forest National Park – one of the monitoring sites. Photograph: Alison Beard

similar to the *Geomorphic Wetlands Swan Coastal Plain* dataset. It will inform a wide variety of natural resource management processes: defining the wetland assets of the study area; providing an indication of their values; and developing a baseline for monitoring loss and degradation. It is also envisaged that the information will assist in regional and local decision-making processes, including:

- wetland protection and management strategies and reserve planning
- land-use planning, from strategic to development stages
- water resource planning and management.

The second component of the project is a monitoring programme for wetlands in the south-west region. Several wetland monitoring programmes have been implemented in the south-west and other areas of Western Australia, and this programme has been developed to complement these existing programmes. The programme will establish a baseline condition for a selection of representative wetlands of the portion of the Swan Coastal Plain in the south-west region. It also provides an opportunity for interested members of the community to be involved and to participate in wetlands monitoring training. The data will be made available through the Statewide Wetlands Database (administered by DEC).

Useful web links:
Geomorphic Wetlands Swan Coastal Plain dataset http://portal.environment.wa.gov.au/portal/page?_pageid=55,84732&_dad=portal&_schema=PORTAL

Statewide Wetlands Database www.naturebase.net/projects/wetlands_database.html

References:
Semeniuk, CA & Semeniuk, V, 1995, 'A geomorphic approach to global classification for inland wetlands', *Vegetatio* 118: 103–24

South West Catchments Council, 2005, *South West Regional Natural Resource Management Investment Plan for 2005–2006* www.swcatchmentscouncil.com/index.htm

If you would like to know more about the project, or have information that may be helpful, please contact Alison Beard at alison.beard@dec.wa.gov.au or (08) 6467 5205.

THE ESTUARINE WETLAND HEALTH ASSESSMENT AND INVESTMENT PRIORITISATION PROJECT

Adam Gosling
WetlandCare Australia

At present there is no established methodology for rapidly and simply assessing and prioritising estuarine wetland ecosystems that require management, conservation and/or rehabilitation. Many of our estuarine wetlands are privately owned and managed. It is WetlandCare Australia's vision to give wetland managers with little current knowledge of wetlands the tools to assess their wetland's health, to monitor it over time, and to recognise when it needs improved management.

The Estuarine Wetland Health Assessment project, funded by the NSW Government's Environmental Trust, is a two-year project that aims to develop a sound methodology for assessing and prioritising estuarine wetlands (including inter-tidal mangroves, saltmarsh and dunal swamps and lagoons) by reviewing and adapting existing assessment techniques with the guidance of a technical reference group. To date, over 50 wetlands have been assessed in the Tweed, Brunswick and Richmond catchments. A further 50 wetlands are due to be assessed before completion of the trial in 2007.

Individual wetlands are assessed using a process of GIS desktop analysis; steering committee review to access local knowledge; and field health assessments. Data gathered is then entered into a database for the production of health summary reports (including suggested management options), health mapping and priority wetland listings that can be tailored to suit a range of wetland managers and funding sources.

The project will also trial the use of historical aerial photography and surveyors' notes (dating back to the 1800s) to identify changes in the health—and particularly the extent—of wetlands over time.

Key objectives of the project are to:

- establish a methodology and database for assessing estuarine wetland condition—the methodology to be a field-based method that can be easily used by community groups, natural resource managers and landholders alike
- identify wetlands requiring management, conservation and/or rehabilitation
- provide an estuarine wetland condition-assessment technique to complement existing condition-assessment techniques for paperbark swamp complexes and open freshwater wetlands
- provide wetland health mapping using existing GIS data for priority wetland areas (Tweed, Brunswick, Richmond and Clarence catchments)
- assess estuarine wetland health by field survey and provide baseline data to wetland managers and to the Northern Rivers Catchment Management Authority (CMA)
- use assessments and GIS mapping to provide wetland health maps, management requirements and a wetland priority-works register to wetland managers, corporate sponsors and the CMA to rationalise and focus investment.

Numerous agencies and community organisations have kindly contributed time and resources during the course of the project, including:

- Northern Rivers CMA
- Department of Environment and Conservation
- Department of Primary Industries
- Department of Natural Resources
- Tweed Shire Council
- Byron Shire Council

NRM Coordinator Cassie Burns from WetlandCare Australia presenting the wetland assessment technique at the Nerang workshop. Photograph: Adam Gosling

Project Officer Adam Gosling of WetlandCare Australia leading an assessment training day at Cabbage Tree Island in Northern New South Wales. Photograph: Tatiana Velasco

- Ballina Shire Council
- Clarence Valley Council
- Clarence Landcare
- Richmond Valley Landcare.

In addition, a number of private landholders have been willing to allow access to the estuarine wetlands on their properties for assessment. This has been an invaluable opportunity to convey the importance and value of estuarine wetlands to property owners and to the wider community.

Achievements

The three most important outputs from the project to date are:

- production of a draft estuarine wetland assessment methodology
- collection of baseline health data for 50 wetland sites
- production of a database for storing wetland data, heath summary reports and health mapping for sites assessed in the Brunswick and Tweed catchment areas.

An additional grant in 2006 from Land & Water Australia's Exchange Incentive Fund allowed WetlandCare Australia to run a series of workshops aimed at natural resource managers who were interested in the technique. A total of 60 participants attended the four workshops in northern NSW and southern Queensland, with a further 80 requests for copies of the assessment manual were received from all parts of Australia and from China. Responding to this high demand, further funding for more workshops in 2007 has been awarded to WetlandCare Australia.

On completion of the Estuarine Wetland Health Assessment project, it is anticipated that a rapid and simple technique for assessing estuarine wetlands will be available to complement existing freshwater and paperbark wetland techniques. The information obtained from these assessments will be stored in a database that is able to produce concise wetland health reports to enable landowners and natural resource managers to make informed allocations of resources for wetland management.

Further information or copies of the assessment manual may be obtained by contacting Adam Gosling or Cassie Burns at WetlandCare Australia on (02) 6681 6169.

WATERBIRDS TEEM IN TEMPORARY TANAMI WETLANDS

Julian Reid, Centre for Resource and Environmental Studies, Australian National University

Roger Jaensch, Wetlands International—Oceania

The Tanami Desert is not usually equated with wetlands or waterbirds—but this perception is changing. A 2006 inventory of arid-zone wetlands by the Northern Territory Government demonstrated a wealth of temporary wetlands in the southern Tanami. It confirms that these Tanami wetlands are important to a large number of waterbirds and that significant breeding events may occur.

Frequent (often anecdotal) accounts abound of waterbirds flocking into newly-created wetlands in the interior of the continent within days of a significant rainfall event: brief surveys in the north-eastern Tanami after heavy rainfall in February 1993 discovered around 20 000 waterbirds in suites of wooded lakes. Although these events can occur anywhere—by virtue of topography, soil type and the presence of defined drainage networks—there are certain regions where the filling of wetlands is more extensive and frequent than most parts of the inland. These regions, including the northern Tanami, were mapped by Roshier et al. (2001) to explore the possibility that the majority of waterbird movements within Australia may occur through well-defined networks of temporary wetlands.

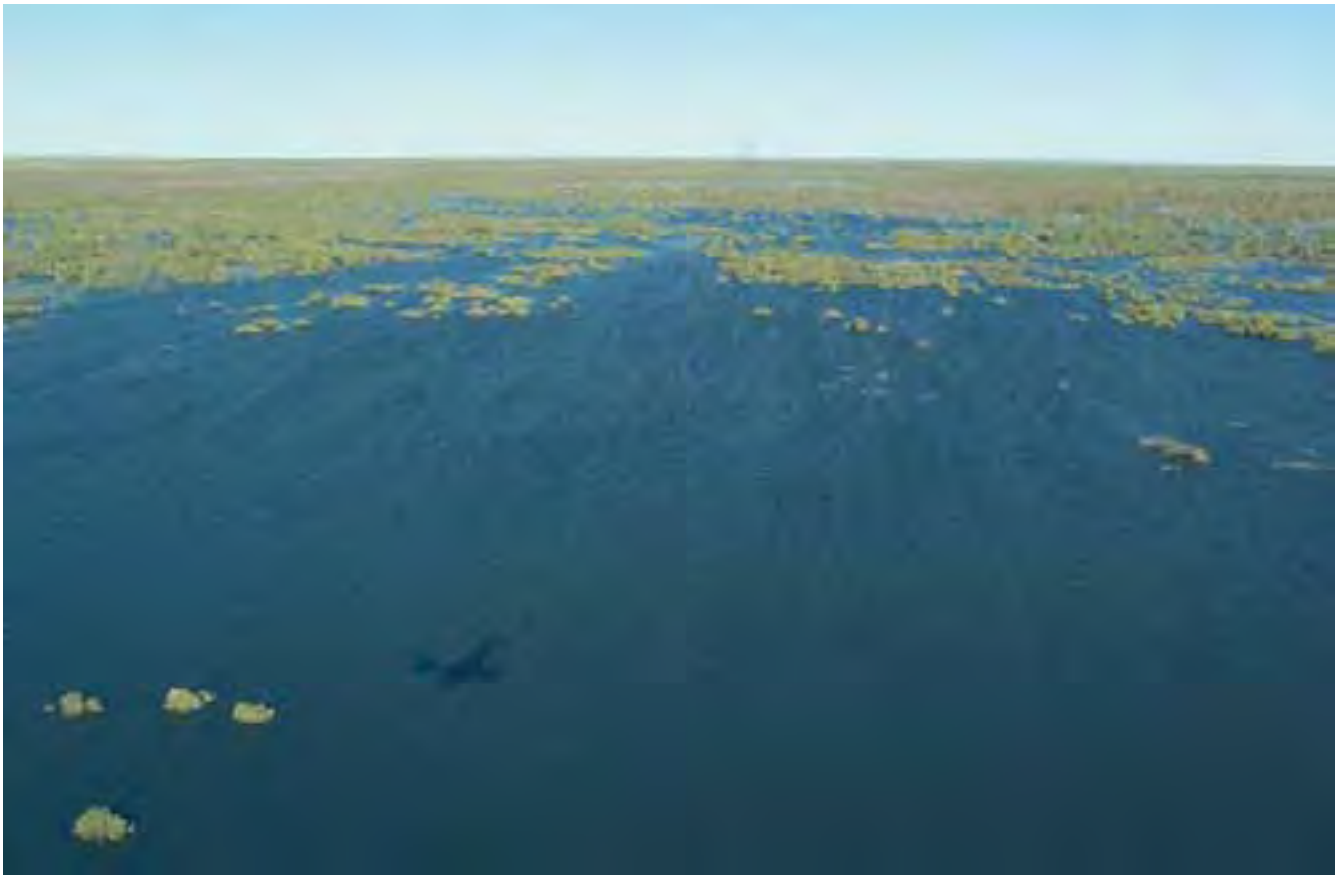
In late January 2006 a massive monsoonal downpour, centred on the junction of the Tanami and Lajamanu Tracks, attracted the attention of researchers who recognised another rare opportunity to document the extent, characteristics and waterbirds of wetlands in the northern Tanami. There was only one way into the region—by air.

Exploring the desert

A two-day aerial survey was organised by Wetlands International and the Australian National University (ANU) with funding and/or logistical support from the Australian and Northern Territory (NT) Governments, Newmont Mining, the Central Land Council and other landholders. With Wetland Management Solutions project funds from the Natural Heritage Trust (NHT), Wetlands International provided wetland advice to graziers and secured top-up funds from the NHT to extend its aerial work into the Tanami.

At the end of April, Julian Reid (ANU) and Mark Ziembicki (NT Government) undertook the aerial survey. They collaborated with Roger Potts (Newmont) who gathered rare observations on the immediate response of waterbirds to dramatic local inundation around the Tanami and Granites gold mines.

Flying a zigzag course over multiple sub-catchments, the aerial team observed 19 wetlands comprising coolibah-wooded swamps, open lakes, broad open watercourses and some wetlands with fringing shrubs. Satellite imagery showed the total area of water in these surveyed wetlands to be 17 700 ha, with another 33 400 ha not surveyed. Roger Potts's ground-level observations of waterbird abundance, species composition and breeding at several wetlands, allowed a basic calibration of ground-to-air counts.



A deepwater portion of Lake Talbot, 30 km north of Tanami, which supported large numbers of Whiskered Tern. Photograph: Julian Reid

A portion of the interconnected Warayla or 'Spider' Lakes, 50 km east of Tanami, on which Black Swan and other waterbird species nested. Photograph: Julian Reid

Discoveries

Collectively these efforts identified 54 species of waterbird that had responded to the filling of wetlands in the northern Tanami. The aerial survey identified 40 species—with the Whiskered Tern accounting for half of all waterbirds counted.

Conspicuous among the 18 species found breeding in the three-to-four months following inundation were Gull-billed and Whiskered Terns, many of which had nested early in the cycle on the tops of termite mounds protruding above floodwaters. Grebes, native hens, stilts, avocets and dotterels, as well as many ducks and swans, also bred in sparsely-vegetated temporary wetlands. Many of the Gull-billed Terns appeared to vacate the region soon after the juveniles fledged and this was reflected in the lower count of this species during the aerial survey.

By applying standard analysis techniques based on bird densities in aerial transects, the total number of waterbirds present in the surveyed wetlands was estimated to be a minimum of 145 000. Taking into account typical under-counting effects and the total area of available habitat in the northern Tanami at the time, the real number present may have been in the order of 500 000 or more.

This first systematic assessment of waterbird use of the northern part of the Tanami has revealed that, though only intermittently available, the wetlands can support numbers comparable with many of the most important wetland systems in Australia. Any one such system may be critically important at some point in time because others may be dry.

In 2006, broadly similar numbers of waterbirds were present in neighbouring systems such as the Barkly wetlands. But each system seems to have a particular role to play—for example, supporting breeding by waterbirds such as the Hoary-headed Grebe in the northern Tanami but egrets in the Barkly.

The ability of a wide range of Australian waterbirds to somehow sense high-intensity but localised flooding events, then rapidly move into the region and start breeding, has been demonstrated again with this opportunistic survey. But this phenomenon is nonetheless remarkable and the birds' capacity to locate such remote, irregularly filled wetlands is all the more intriguing.

Benefits to natural resource management

The investment by the Australian and NT Governments and corporate/private partners in the opportunistic Tanami wetlands survey delivered outcomes that will be beneficial to planning for biodiversity conservation. First, knowledge of the natural resource—the location and maximum extent of water bodies in this region—has greatly improved. It has been confirmed that many specific wetlands are inundated periodically—not just once only—and other wetlands have been recognised for the first time.

Second, baseline knowledge of which waterbird species occur and breed in the Tanami bioregion has been substantially improved. Use of natural resources in the northern Tanami has been limited to localised pastoral grazing, several mines and ongoing Indigenous use. With the uncertainty caused by global warming and reduced river-flows across much of the continent, knowledge of the extent and location of important waterbird breeding sites is vital. While the 2006 survey did not assess wetland condition, as wetlands continue to decline elsewhere, the relatively undisturbed wetlands in remote areas such as the Tanami Desert may assume even greater importance for conservation of waterbirds and other biodiversity.

References

Duguid A, Barnetson J, Clifford B, Pavey C, Albrecht D, Risler J & McNellie M 2002, *Wetlands in the arid Northern Territory*, Report to Environment Australia on the inventory and significance of wetlands in the arid NT, Parks and Wildlife Commission of the Northern Territory, Alice Springs.

Reid J, Potts R, Ziembicki M & Jaensch R 2006, Aerial survey of waterbirds in the northern Tanami Desert, Wetlands International—Oceania, Brisbane.*

Roshier DA, Robertson AI, Kingsford RT & Green DG 2001, 'Continental-scale interactions with temporary resources may explain the paradox of large populations of desert waterbirds in Australia', Landscape Ecology, vol. 16, pp. 547–56.

*The survey report on which this article is based can be downloaded from the Wetlands International website at www.wetlands.org/Oceania/EN ; go to Biodiversity & Networks, then to Waterbird Populations.

If you would like to know more about the project, or have information that may be helpful, please contact Roger Jaensch at roger.jaensch@wetlands-oceania.org

WATERING THE LIVING MURRAY ENVIRONMENT DURING DROUGHT

Gillian Lee
Department of the Environment and Water Resources
Australian Government

After 200 years of altered flows and the current severe drought, stressed River Murray wetlands and floodplains are showing reduced potential for recovery. River Red Gum and Black Box communities are dying. They are suffering a 'double drought'. Diverted river water combined with the current climatic conditions are not the natural events that the River Murray system has evolved to tolerate. Under regulation, floods are less frequent, less extensive, less variable, and of altered duration and seasonality. This has had an adverse impact on flood-dependent processes such as fish spawning and recruitment, and on natural River Red Gum watering.

In response to this, on 9 May 2006 the Australian Government provided an additional $500 million to the Murray-Darling Basin Commission to accelerate progress in water recovery and effective delivery under The Living Murray. This brings total payments to the Murray-Darling Basin system by the Australian Government to over $2 billion since 1996.

Despite the drought conditions, approximately 35 GL of water was allocated to The Living Murray to meet critical environmental needs in 2006–07. This figure represents about 1 per cent of the total available water. About 25 GL of this water came from savings made by Victoria and NSW, with the remainder a donation from South Australia.

Environmental management plans developed for the six Living Murray Icon Sites provide guidance for the use of water for environmental purposes. These include goals, such as those for the Chowilla site: retaining high value wetlands, maintaining the current area of River Red Gums and at least 20 per cent of the original area of Black Box vegetation.

The Living Murray icon sites

Lower Lakes, Coorong and Murray Mouth
Chowilla (including Lindsay-Wallpolla)
Hattah Lakes
Barmah–Millewa Forest
Gunbower Koondrook-Perricoota Forest
River Murray Channel

As water resources and availability drop to an all-time low, our ability to meet the objectives of the management plans becomes limited. In communities where livelihoods are threatened by the short supply of water for irrigation, environmental watering is sometimes questioned. However, many remain supportive in recognition that their communities depend on a healthy river environment in the long term.

One example of community support for environmental watering is Victoria's Irrigation Water Donation for the Environment Programme. In 2005 and 2006, irrigators donated 6.9 GL of unused water to help save stressed or dying River Red Gum and Black Box trees.

Through the Murray-Darling Basin Commission, governments are implementing an adaptive management approach to ensure that use of environmental water during 2006–07 is targeted to those areas in critical need.

Environmental watering is allocated to maximize its benefits and—at a minimum—to provide small ecological refuges for riverine plants and animals that can recover at the icon sites once more water is available. Wherever possible, environmental water is delivered when consumers that need their water entitlements delivered at high flow rates will not be affected.

Achievements in 2005–06 and 2006–07 include active environmental management of existing water over spring and summer, including:

- release of the Barmah–Millewa Forest environmental water allocation for the first time in five years, which achieved one of the most significant waterbird and threatened-fish breeding events in recent decades
- watering of drought-stressed River Red Gums
- coordinated raising of weir pools to water riparian vegetation.

Under The Living Murray programme, waterflow regulators have been constructed at Gunbower Forest, the Lindsay–Wallpolla floodplains and Packer's Crossing at Menindee Lakes. The regulators will help improve the health of these wetlands by enabling better control of the wetting and drying cycles for these important sites.

Another significant project is improvement to native fish habitat through resnagging within the Hume Dam to Yarrawonga reach of the river. Combined with continued implementation of the fishway programme at Lock 10, these projects improve habitat for our native fish species.

In an effort to secure more water for wetlands and the environment, the Australian Government opened the 'Water Through Efficiency Request for Tender' (RFT) on 1 November 2006. Through this project the Australian Government will purchase excess water offered for sale by irrigators who have installed more efficient on- and off-farm irrigation systems. Willing sellers must have submitted their tenders by 31 January 2007. More information about the RFT can be found at www.daff.gov.au/watertender.

All users of River Murray water, including the environment, are struggling in this current drought. Efforts to source water for the environment will continue and water made available for environmental use will be used to meet the highest priorities identified.

Case study: Coorong

The Lower Lakes, Coorong and Murray Mouth, a 140 000 ha wetland of international importance listed under the Ramsar Convention—and one of six icon sites in the River Murray under The Living Murray initiative—is one of our

best-known wetlands and a national asset. The Lower Murray environment includes a diverse range of ecological systems, with hypersaline and freshwater environments, ephemeral and permanently watered systems.

The health of the Coorong has declined since European settlement. Its biodiversity and productivity are at an historical low point. Water birds, waders, fish and aquatic vegetation are all being adversely affected.

The Environmental Management Plan for the Lower Lakes, Coorong and Murray Mouth Icon Site explains that in the River Murray's natural state, years with annual flows less than 5000 GL occurred 7 per cent of the time, but under regulated conditions these occur 66 per cent of the time. Medium-sized flood events (20 000–80 000 ML/day) have had a threefold reduction in frequency and their duration has also decreased. The flow regime in this part of the river is the most modified in the Basin, relative to its natural state. At the barrages, the median annual outflow to the sea is now 27 per cent of the natural outflow. The Murray Mouth now ceases to flow on average once every two years, compared to before regulation when this occurred once every 20 years.

Actions to reverse this decline have been identified in the plan. The objectives include keeping the Murray Mouth open; increasing the frequency of estuarine fish spawning and recruitment; and enhancing migratory wader-bird habitat in the Lower Lakes and Coorong.

Proposed environmental works and measures include dredging to maintain an open Murray Mouth, installation of fishways at the barrages adjoining the Coorong, and management of barrage flows to more naturally replicate seasonal cycles for improved water quality and fish ecology.

The Lower Lakes and Coorong rely on South Australia's entitlement-flow and above-entitlement flow events to receive water. There are also some water allocations for the environment that can be timed to meet specific water-use targets.

Efforts this year were to focus on freshening of the Coorong through increasing fresh-water flows. However, with the unprecedented low water availability in 2006–07, management is being adapted and options are being investigated for providing more flows through the rivers and creeks that flow into the Coorong Lagoon further south. Available water will be trickled through fishways—keeping them operating to help migrating native fish species complete their breeding cycles. This will ensure that achievements in native fish breeding under The Living Murray will continue to improve.

Further information is available at http://thelivingmurray.mdbc.gov.au/home

If you would like to know more about the article, please contact Gillian at Gillian.Lee@environment.gov.au or (02) 6274 2565.

Gunbower Forest in flood, after environmental watering, December 2005. Courtesy Murray-Darling Basin Commission. Photograph: Sandra Volk

WETLANDBASE: NEW ONLINE DATABASE TOOL FOR WESTERN AUSTRALIA

Holly Smith and Stephen Quiterio
WA Department of Environment and Conservation

Wetlandbase became available at the beginning of 2006. This tool is a free, publicly accessible database that brings together wetland data—enabling it to be viewed and queried through an easy-to-use map-based web interface.

The database was developed by the Western Australian Department of Environment and Conservation (DEC) with assistance and support from the Natural Heritage Trust; the Western Australian Departments of Agriculture and Food, and Indigenous Affairs; WWF Australia; Murdoch and Edith Cowan universities; and the Western Australian Museum.

During 2006 the project received financial support from Coastwest to expand the scope of the database to include data on coastal areas, including wetlands maintained by marine processes such as tidal flat wetlands, estuarine flats, and nearshore marine areas to a depth of six metres. Pilot regions for this work have been the Kimberley and upper Gascoyne. The intention is to take the project throughout the state if ongoing support is received.

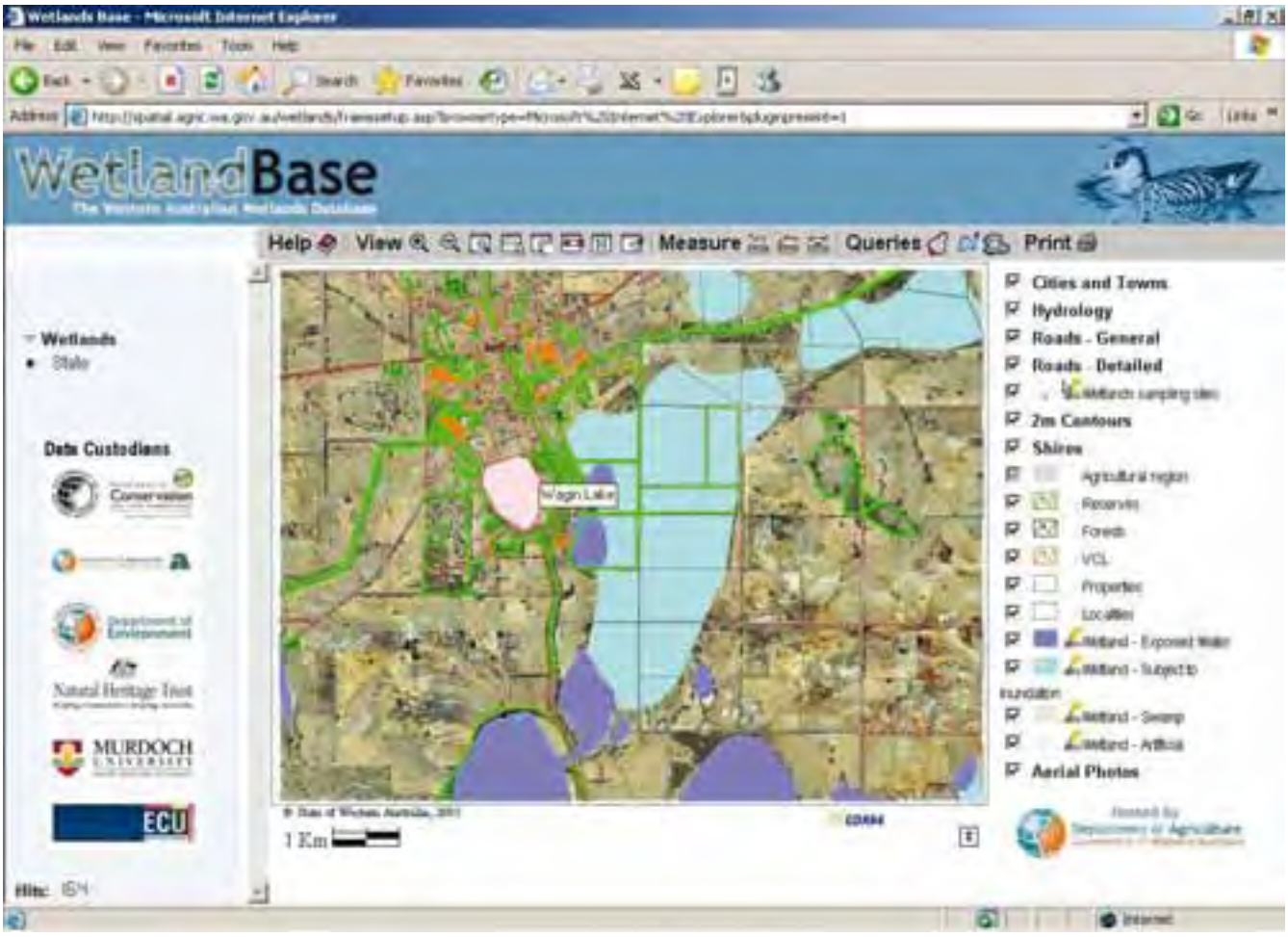
What *Wetlandbase* can do

Wetlandbase has easy-to-use automated functions that allow the user to search for an area by name and display it in the map viewer; to see what wetland sampling has been conducted; and to generate maps and reports on a wetland or coastal area of interest.

- The map viewer displays many datasets including wetlands; sampling sites; administrative boundaries over an aerial-photography backdrop for the south-west; and satellite imagery for the northern parts of the state.
- More general reports are also available that display details on basic identification; hydrology, geomorphology; tenure; sample sites; and listings of threatened fauna, flora and ecological communities in proximity to a wetland.
- If specific biophysical parameters are of interest to the user, then sample site reports can be generated to display specific survey lists of water chemistry values, identified aquatic macroinvertebrates and waterbird species and abundance counts.

Improvements to *Wetlandbase*

- The search capability of the database has recently been greatly improved to make it far simpler to use, yet more powerful. Users can now search on a wider range of features including wetland name; water-feature name; wetland sample sites (name or ID); Ramsar; *Directory of Important Wetlands in Australia*; DEC-managed lands; local government areas; catchments; and more. The database is being updated to ensure that the currency of information provided to the public is maintained.



- A user manual for *Wetlandbase* has been prepared as additional support to the user. It guides anyone accessing the database on a step-by-step basis in using the various tools to search for wetlands and to generate reports. This will help people apply the use of the database to projects they are conducting on-ground, or to their particular area of interest.

Workshops on how to use the database will be conducted in the coming months in Perth, the WA south coast and the Kimberley. *Wetlandbase* can be accessed at www.naturebase.net/projects/wetlands_database.html

Holly Smith and Stephen Quiterio demonstrating how to use the database. Photograph: Basil Schur

WATER ON YOUR PLACE

Jade DeFavari
South Australian Arid Lands Natural Resource Management Board

For more than 100 years, property owners have been recording rainfall information—much of it stored in record books that are not easily accessed. Although this information is not always complete and has not been collated in the past, its potential to provide a valuable record of wetting and drying cycles has been recognised by the South Australian Arid Lands Natural Resource Management Board (SAAL NRM Board).

In addition to providing a way of recording data on rainfall trends, the project allows participating property owners to record observations on the immediate and longer-term effects of rainfall events such as creek flow and local inundation and the resultant effects on vegetation growth.

The SAAL NRM Board has worked in collaboration with the University of South Australia (UniSA) to develop the Water on Your Place web-based tool. The Natural Heritage Trust and SAAL NRM Board have jointly funded the project that began in 2005 with design of the template and software.

Property owners participating in the programme are able to simply adapt a template to set up their own recording set. Data input can be for the property as a whole, for individual paddocks or for rain-gauge locations. Data can be recorded via a secure web link anytime after a rain event and can be modified as necessary after the initial input. The programme summarises accumulated data and makes the data available in graphical form for individual properties. As well, aggregated regional summaries are produced from all input data and provided to project participants. A group of ten keen landholders will start providing feedback in early 2007, which will be used to refine the design of the system.

A key strength of the project has been the collaborative and consultative approach designed to ensure benefits to all project partners. Those benefits include:

- easily interpreted data for property owners that can be used to manage the productive capacity of their land
- capturing data from remote areas that will be extremely valuable to NRM managers and which would be difficult for public land managers to collect
- maximising the interpretative power of small datasets collected from individual properties by combining it to create more robust data that can be used to more confidently infer regional trends.

This collaboration is particularly valuable to the SAAL NRM Board because the ephemeral nature of surface water resources makes it difficult to gather data on the cycles of wetting and drying of wetlands and creeks. This lack of base data has meant that there is currently limited understanding of the ecology and regional trends of surface water-dependent ecosystems across the arid zone of South Australia.

For further information contact the South Australian Arid Lands Natural Resources Management Board on (08) 8204 9328.

PUTTING THE PICCANINNIE PONDS JIGSAW PUZZLE BACK TOGETHER

Steve Clarke
South Australian Department for Environment and Heritage

Imagine a magnificent, long, wetland swamp, a kilometre wide, framed on one side by grassy woodland and on the other by coastal dunes and the wild Southern Ocean. Imagine this system stretching for 12 kilometres, the fresh crystal-clear water rising from vast limestone springs then moving slowly through a myriad of sedges and primeval tea-tree forest before eventually flowing into the Glenelg River estuary. This is the picture of Piccaninnie Ponds 200 years ago.

But the spectacular Piccaninnie Ponds Conservation Park—located 30 kilometres south-east of Mount Gambier, South Australia, with 20 000 visitors annually—shows the ravages of time. Drainage, vegetation clearance, grazing and fragmented ownership left a significantly reduced and altered system, and some of the original flora and fauna locally extinct. Perhaps most importantly, as a result of drainage, the wetland was slowly closing in on itself.

Then in 2005, the South Australian Department for Environment and Heritage, concerned with the wetland's decline, purchased the 230-hectare property immediately to the west of Piccaninnie Conservation Park in the hope of rejoining some of the wetland jigsaw that had been disassembled in previous years. This property, Pick Swamp, had been a grazing property for many years but still retained a large tract of Silky Tea-tree (*Leptospermum lanigerum*), and a rare example of a near-pristine karst-fed spring pool. The reason why this precious remnant remains today is simple—the sheer amount of water flowing out of it. No matter how hard people tried, the swamp refused to be drained.

The springs that rise into the Piccaninnie system flow from an ancient limestone seabed, the water being collected over thousands of square kilometres. It wells up from ponds, some as deep as 90 metres, to flow into shallow swamps and peat fens. The varied habitat supports nearly 300 indigenous plant species and at least a dozen vegetation associations. These associations give sanctuary and sustenance to hundreds of mammal, reptile and bird species, including annual visitors such as the Orange-bellied Parrot. The OBPs, as they are affectionately named, number only 170 individuals and are listed as critically endangered. Originating from western Tasmania and wintering on the mainland, these parrots seek specific habitat, such as Piccaninnie Ponds, for food and roosts.

Walking into parts of the remnants of the Silky Tea-tree forest is like being transported back into time. While

Cresent Pond. Photograph: Steve Clarke

Research at Piccaninnie. Photograph: Steve Clarke

Green Corps OBP watching. Photograph: Steve Clarke

'walking' is not actually practicable due to the dense vegetation, the feeling is one of awe as you move into the mottled light, muted by close trunks of tea-tree, Tree Daisy (*Ozothamnus ferrugineus*) and Tall Saw-sedge (*Gahnia clarkia*). Underfoot is deep saturated peat accumulated over thousands of years, sustaining spindly light-deprived sedges, rare orchids and unusual fungi. The sense of the ancient is deepened by treacherous boggy areas, leeches and the close, still, humic microclimate that the forest induces.

So the task today is to build on the state government's foresight, to restore Pick Swamp, reintegrate it as part of the Piccaninnie wetland system and continue to manage the entire Piccaninnie Ponds Park for conservation. To this end, over the past year:

- A wetland restoration ecologist has been appointed. A few of his many tasks include writing a restoration plan for Pick Swamp and implementing it; restoring the original hydrology of Pick Swamp; re-integrating Pick Swamp as part of the Piccaninnie system; and implementing an extensive vegetation survey to monitor the effects of hydrological changes being initiated.
- A weir and fishway have been constructed to raise the ponds' hydrological level to that prior to 1968. At that time a lessee of what is now the Park attempted to drain the main ponds wetland area by deepening the artificial outlet drain—needless to say, since then the wetlands of the Park have contained less water. The new adjustable weir functions perfectly and the accompanying fishway allows indigenous fish such as Common Jollytail (*Galaxias maculatus*) and Congolli (*Pseudaphritis urvillei*), that spend part of their life cycle in estuaries or the sea, to migrate freely.

With this hydrological and forthcoming vegetation re-establishment, the wetlands of Piccaninnie Ponds will become more resilient and sustainable, and in doing so, help conserve the estimated 50 threatened flora and fauna species that still thrive there.

Ramsar-listing of Piccaninnie Ponds is also high on the agenda. Attempts are currently being made to acquire funding necessary to satisfy the Australian Government's nomination requirements, such as preparation of a Ramsar Information Sheet, ecological character description, and site management plan.

Postscript: During June 2006, the first stage of the hydrological restoration of Pick Swamp took place, a minor trial re-flooding of 20 ha of grazing land. Virtually overnight an estimated 1000 water birds took up residence and within two months, indigenous aquatic plants started growing in the spring waters. This part of the Piccaninnie wetland had not died, it was only sleeping.

If you would like to know more about the article, please contact Steve at Clarke.Steve@saugov.sa.gov.au or (08) 8735 1116

Pick Swamp. Photograph: Steve Clarke

Steve Clarke at Piccaninnie. Photograph: Ken Jones

SUPPORTING COMMUNITY-BASED MANAGEMENT PLANNING IN FAR NORTH-WEST TASMANIA

Denna Kingdom
Tasmanian Land Conservancy

The Tasmanian Land Conservancy, working with Community Solutions and Birds Tasmania, has received funding from Cradle Coast NRM to prepare a draft management plan for the Boullanger Bay–Robbins Passage wetlands in far north-west Tasmania.

The management planning project seeks to deliver:

- a community-based draft management plan for the Boullanger Bay–Robbins Passage wetland areas
- increased community awareness and participation in the management of key wetlands in the Boullanger Bay–Robbins Passage area.

Importance of the Boullanger Bay – Robbins Passage wetlands

The Boullanger Bay – Robbins Passage area has many special values and is an iconic part of north-west Tasmania. Among Tasmania's most important wetlands, they cover an area of almost 30 000 ha. They are home to as many as 24 000 migratory shorebirds—more shorebirds than all other sites across Tasmania combined. The wetlands also support a range of recreational and commercial uses including marine farming, dairy and beef cattle farming, a growing tourism industry and a developing wind-farm industry. Consequently, the wetlands provide a setting for development and maintenance of strong cultural and social values—connecting people to place.

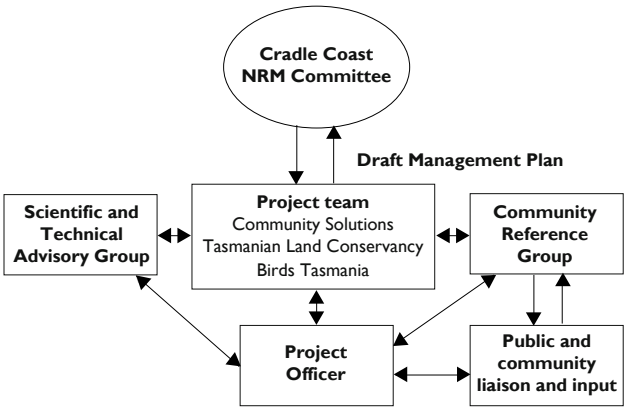
Community-based management planning

Management of the wetlands is not the responsibility of any one agency, organisation or individual: the wetlands are a responsibility shared amongst the community, industry and all levels of government. This shared responsibility has been recognised in the planning process and reflected in the establishment of a Community Reference Group (CRG) and a Scientific and Technical Advisory Group (STAG). This collaborative management planning project (similar to another planning project under way in Roebuck Bay, WA, see page 32) is one of a few examples of community-based planning in Australia.

A collaborative, community-based process fosters shared understanding, agreement and support for management—especially where a combination of crown, freehold and leasehold land is involved.

Shorebirds, Robbins Island. Photograph: Fiona Spruzen

The figure below illustrates the relationships between the various groups involved in the project.



Groups and individuals involved throughout the collaborative planning process include local community representatives, representatives of commercial industries including aquaculture, agricultural and tourism; Circular Head Council; Indigenous, conservation and recreational interests; scientists; and state government bodies.

Key processes

The planning process to date has involved:

- desktop assessment to provide background information
- establishment of the CRG and STAG
- a wetland management issues paper, summarising information gathered on wetland values, condition, issues and management
- a wetland awareness strategy and plan
- community consultation on the issues paper using focus groups and a facilitated workshop
- development of a draft wetland management plan
- community consultation on the draft wetland management plan via public display, a feedback sheet and a facilitated workshop.

The draft wetland management plan was submitted to Cradle Coast NRM in December 2006. Following endorsement by the Cradle Coast NRM Committee, the next phase of the project will be a more formal consultation process extended to the broader community.

Further information

For more information, please contact Denna Kingdom at the Tasmanian Land Conservancy on (03) 6225 1399 or dkingdom@tasland.org.au

THE PARADOX OF SALT

Associate Professor Jenny Davis
School of Environmental Science, Murdoch University

Although there can be no doubt that secondary salinisation has ruined productive agricultural land in the valley floors and destroyed the original freshwater communities of wetlands and river channels in the Avon catchment in south-western Australia, the hypersaline lakes that have resulted provide some fantastic visual imagery, particularly when viewed from above. I have undertaken a number of aerial surveys as part of ongoing research to describe the ecological character and condition of wetlands in the wheatbelt region of Western Australia. In the process I have had the opportunity to photograph waterbodies displaying an amazing array of patterns and colours.

The images presented here display some of the spectacular patterns evident in the hypersaline lakes of the upper Avon River. The waterbody, known as The Channels, is part of the Yenyening Lakes system, near Beverley, approximately 150 kilometres south-east of Perth. The pools of The Channels fill with seasonal winter rains or when large episodic summer rains cause the adjoining river to overflow. The patterns created by sandbanks of varying lengths and shapes appear to have resulted from the combined effects of strong prevailing winds from the south-west and of water flowing from the north-east. Differing salinities, created by high evaporation rates, favour different algal and microbial species, resulting in a range of colours from purple to pink to orange to green.

The sandbanks and channels have probably changed little over hundreds of years. However, the salinity of the system has increased as a result of secondary salinisation. Low annual rainfall (350 mm per annum) and high annual evaporation (2100 mm) suggest that water within The Channels was probably brackish during summer, but the advent of secondary salinisation has increased salinities to well beyond that of seawater. The result has been devastating for the original flora and fauna but has created a new system with new, and different, values. These images display some of the visual effects.

Wind & Water 1 — a close-up view of patterns created by wind and water in The Channels, May 2006. Photograph: Jenny Davis

The initial research on ecological regimes in secondary saline lakes was funded by Land and Water Australia between 2001 and 2004. Ongoing research is supported by Murdoch University.

A closer view of The Channels, May 2006. Photograph: Jenny Davis

NEW URBAN WETLAND CLEANS UP STORMWATER POLLUTION

Gillian Doig
Melbourne Water

Stormwater runoff is the biggest source of pollution in Melbourne's urban waterways, carrying nitrogen, litter and other contaminants down drains into rivers, creeks and bays. A CSIRO study found in 1996 that the rising nitrogen load entering Port Phillip Bay was one of the biggest threats to its long-term environmental health.

As the custodian of Melbourne's waterways, Melbourne Water is committed to tackling stormwater pollution, and works closely with councils and developers. It manages about 100 wetlands across the city, and invests some $5.5 million a year on building and designing new wetlands. Melbourne Water aims to reduce nitrogen entering Port Phillip Bay from the stormwater system by 100 tonnes a year by 2010.

Royal Park wetland

Opened in June 2006, Melbourne's new Royal Park wetland sits alongside a towering yellow beam on the Tullamarine Freeway, the symbolic 'gateway' to the city for visitors from the north. It is a fitting backdrop for a quintessential urban wetland.

Trin Warren Tam-boore—the local Indigenous name for Bellbird waterhole—covers five ha of old hockey fields in one of Melbourne's largest inner city parks. It is close to freeways and roads, dense residential development, a major hospital and Melbourne Zoo.

A joint initiative of Melbourne City Council and Melbourne Water, the wetland cleans stormwater runoff from the surrounding suburbs, which is then used to irrigate Royal Park. The park adjoins the 2006 Commonwealth Games Athletes Village, and funding for the $5 million wetlands came from the state government's Games environment programme.

How it works

Made up of two linked ponds, the project receives water from a purpose-built diversion weir on Melbourne Water's Royal Park main drain.

The design of the wetland slows the water and filters out sediments and gross pollutants like litter. Plants and sunlight in the 'S'-shaped treatment pond provide natural biological cleansing. Finally, treated water flows out through an underground pipe to a storage pond next to the freeway. The wetland will remove 600 kilograms of nitrogen a year from stormwater runoff from a suburban catchment of about 187 ha. The nitrogen would previously have washed down the drain to Moonee Ponds Creek and ended up in Port Phillip Bay.

Melbourne City Council, which manages Royal Park, has a Melbourne Water diversion licence to pump 74 ML a year from the pond for irrigation. The council estimates this will reduce its freshwater demands for the park by 79 per cent.

Melbourne Water will manage both the wetland and the storage pond. Monash University has begun a research project to assess the wetlands system.

Around the wetland, native plantings on the banks, paths and boardwalks; a bird hide; information signs; a self-guided tour; and barbeque and picnic tables have changed this area into a valuable educational and recreational environment close the centre of Melbourne.

Mount Waverley Wetland

Like Royal Park, a $1.8 million wetland at Mount Waverley in the city's east will remove sediments, litter, nitrogen and other pollutants from stormwater before it enters the local Scotchmans Creek. In this case, 1.3 tonnes of nitrogen a year will be removed before it reaches the receiving waterways and Port Phillip Bay.

The 3.3 hectare Waverley Road Flood Protection and Wetland Reserve, completed by Melbourne Water in 2005, is part of its ongoing investment in improving the health of urban rivers, creeks and bays. The project was built on an existing flood-retarding basin, which also protects nearby properties from flooding.

Advice and feedback from local communities and friends' groups was sought early in the planning stages for both wetlands projects. At Mount Waverley, local primary school children helped plant the thousands of native plants that will both act as a filter and as a haven for wildlife in the reserve.

Benefits

As well as reducing nitrogen loads to receiving waterways (especially Port Phillip and Western Port bays), Melbourne Water builds stormwater treatment wetlands as a means of involving and educating the community about stormwater pollution and its impact on the health of rivers, creeks and bays; and providing new natural, recreational environments for communities, and havens for native flora and fauna.

For more information about Melbourne Water's wetland projects and to download *Constructed Wetland Systems – design guidelines for developers*, please visit www.melbournewater.com.au/wetlands

View from the old bird hide at Edithvale–Seaford Wetlands. Photograph: Melbourne Water

Royal Park Wetlands. Photograph: Melbourne Water

SECURING WATERHOLES IN THE NORTHERN FLINDERS RANGES

Jade DeFavari
South Australian Arid Lands Natural Resource Management Board

Aboriginal communities in the northern Flinders Ranges are reviving degraded waterholes and springs as part of a project to protect environmentally and spiritually significant water features across much of South Australia.

Springs, waterholes, rockholes, creeks and underground soaks are scattered across the rugged, dry region, located near the magnificent Vulkathunha-Gammon Ranges National Park about 700 kilometres north of Adelaide. These natural water features are critical to the survival of many plants, fish and animals—particularly during droughts. Many are also of great cultural and spiritual significance to the Adnyamathanha people, the traditional owners of the land.

Unfortunately, some of these magnificent landscape features are degraded as a result of weed invasion and grazing by feral animals. Goats are the most serious introduced pest in these sensitive habitats, having developed into feral herds over many years. Like cattle and sheep, they devour and destroy native plants, cause erosion and contaminate the water.

Last year, the South Australian Arid Lands Natural Resources Management Board received more than $318 000 over three years from the Natural Heritage Trust to help the Adnyamathanha people and other Indigenous communities in the northern arid and semi-arid zone of the state to restore culturally important water bodies on their land. The project is working through the Aboriginal Lands Trust to coordinate rehabilitation activities.

One of the project's first challenges was to repair the Yadgindanha Spring, about 300 kilometres north of Port Augusta near Nepabunna. Feral goats had degraded the native rushes along the spring's edge, leading to erosion and large amounts of sediment flowing into the spring and blocking its flow.

Small spring in the Flinders Ranges. Photograph: Robert Aebi, UNISA

Large waterhole, Mayo Gorge, Flinders Ranges. Photograph: Robert Aebi, UNISA

Nepabunna community members removed the sediment with a tractor to unblock the spring, and erected a kilometre-long fence on the perimeter to control goat access. They then built a trap yard with a water trough to entice and catch the animals. A solar pump draws water from the spring up to the trough.

'The traditional owners have not only protected the spring, they've gained new skills in modern conservation techniques. They'll also profit when the captured goats are sold to abattoirs for export to the Middle East and Europe.'

Wetlands Management Officer Rachael Young

Yadgindanha Spring is one of 14 natural water features being restored by the project, a component of the Arid Rivers Natural and Cultural Heritage Programme. The Programme has received $1.3 million from the Trust over three years for the long-term management and rehabilitation of water features through biological surveys and by fostering communication between communities and policy makers across the Lake Eyre Basin.

For more information contact the South Australian Arid Lands Natural Resources Management Board on (08) 8204 9328.

Aerial view of the Yadginhanha spring, about 300 km north of Port Augusta. Photograph: Jonathon Fatt-Clifton, Aboriginal Lands Trust

INDIGENOUS CULTURAL HERITAGE IN WETLANDS OF THE NSW WESTERN REGION

Suzanne Hudson
Archaeologist

The diverse range of wetlands within the western catchment forms an integral part of ecological and cultural values within the NSW western region. Past management practices have seen wetland functionality threatened by activities such as over-allocation of water, overgrazing, clearing, salinity, and feral-animal and plant infestations.

As part of the process of assessing biodiversity, ecological threats and land use undertaken by landholders, the Western Catchment Management Authority (WCMA) aims to identify wetlands of high conservation value in western New South Wales, including to Indigenous and European cultures.

In assessing the cultural value of wetlands it is important to develop an understanding of the nature, distribution, condition and significance of pre-contact sites in the survey area. In addition to developing management recommendations for Indigenous sites, the WCMA is also interested in gaining a more in-depth understanding of the Indigenous cultural significance of wetland and riverine environments in the area, and will seek funding to cover this work.

Studies undertaken by researchers on the Willandra Lakes, adjacent to the Darling River, show that Indigenous people have been living in the Murray-Darling Basin for about 36 000 years (Balme 1989; Balme & Hope 1990). In the vicinity of the study area, dates for late-Pleistocene midden sites on sand plains range from 14 000 years through to Holocene sites dating from 2000 years ago to European arrival in the region (Balme 1989).

Indigenous sites that may be found on the lunettes and banks of wetlands and in the vicinity of the Darling River could include:

- open or living sites (where people once lived)
- scarred or carved trees indicating tools have been removed
- artefact scatters associated with living sites or hunting places
- rock art including painted, pecked or abraded surfaces
- manufacturing places (quarries and grinding grooves)
- sacred or ceremonial places including burial sites
- Dreamtime, story-telling and oral history places.

All or any of these sites and places adjacent to wetlands may be affected by:

- inundation and accumulation of sediment that would bury artefactual material
- gully erosion causing artefact material to be moved by water action
- erosion of topsoil exposing subsoil layers, which enables artefact material to be seen on the bare surface—giving a skewed sample.

Ranking importance of cultural heritage artefacts

The methodology used to rank wetland sites was dependent upon the degree of accessibility of each site; ground cover; the degree of erosion or build-up of sediments; and the degree of use or development the site had undergone. In raking each site, we:

- conducted surveys of over 100 accessible wetlands across the study area
- assessed the Indigenous cultural significance of the ground surface in the wetland area
- liaised with the local Indigenous community to determine their interest in the study area and their assessment of the Indigenous significance of any sites identified
- assessed the Indigenous, historic, scientific, aesthetic, and public significance of any sites identified in the study area
- sought advice from the local Indigenous community on preferred management options for any registered sites, new sites and associated artefacts found during the survey
- investigated the sites to ascertain if there are any relics, sites or cultural remains present on the land.

Scores for density

1–3 Evidence of Indigenous and/or European use of the area (one site in close proximity to wetland)

4–5 Two or more sites of Indigenous and/or European occupation but low intensity use

6–7 Three to ten sites of Indigenous and/or European occupation of the area; moderate intensity that combines the raw materials of the area; and occupation sites that indicate multiple return visits

8–9 Multiple use of the area over millennia: sites containing evidence of raw material debitage; scarred/carved trees; hearth sites; living sites and use of the wetland for hunting/gathering activities; and European use of the area

10 A site of exceptional value indicating all of the above criteria.

Assigning priority to sites

Priority 1—a site that demonstrates all scores 1–10 for Indigenous/European tenancy (sites with multiple evidence of both Indigenous and European occupation) and exhibits:

- uniqueness
- exceptionality
- sacredness
- sensitivity.

Priority 2—a site that demonstrates scores of 6–9 for Indigenous/European tenancy (sites with evidence of multiple occupation but not exceptional) and exhibits:

- density
- land use
- focus.

Priority 3—a site that demonstrates scores of only 1–5 for Indigenous/European tenancy (sites with artefacts only—indicating limited use) and exhibits:

- low density
- low sensitivity
- duplication.

Culturally significant sites

Open or living sites

Stone artefacts (called lithics) are found almost everywhere because stone is a very durable material. This is the most common type of pre-European site in areas where there are no habitable rockshelters or caves. These scatters signify different human activities and are found in conjunction with organic refuse and hearths.

Most sites located on or adjacent to wetlands were living sites that contained stone and sometimes bone material. Scatters such as the ones pictured below consisted of flakes (silcrete, chert and quartz); spear points and blades; and grindstones.

Hearths are the remains of fireplaces where Indigenous people cooked their meals. These can be located on the surface of claypans and may contain charcoal remains, sometimes recognisable as a black-stained area—or more commonly by hearth stones that have been manufactured out of termite antbeds, rolled into balls, heated in the coals and used to cook food.

Top grindstone eroding out of claypan. Photograph: Sue Hudson

Grindstone, hammerstone and flaked stone tools at living site. Photograph: Sue Hudson

Charcoal and hearth stones at campsite. Photograph: Sue Hudson

Scarred trees

The main reason to look for scarred trees is to ensure they are unharmed by development or other forms of human land use—and this can be achieved only if they can be identified and managed.

During the survey the following scars were measured on the trunks of trees:

- sixteen coolamons (dishes for winnowing seeds, carrying food, transporting babies)
- eighteen shields (used in hunting and conflict)
- thirteen canoes (used for crossing or fishing on wetlands)
- six woomeras (spear throwers)
- sixteen ceremonial scars or tribal markings.

At each wetland, Indigenous stone tools were found and a random sample of tools was measured by its length, width and thickness; the raw material used in its construction; and the form of the tool (flaked tool, point, core, grindstone, etc.). However, for this survey only cutting tools were compared.

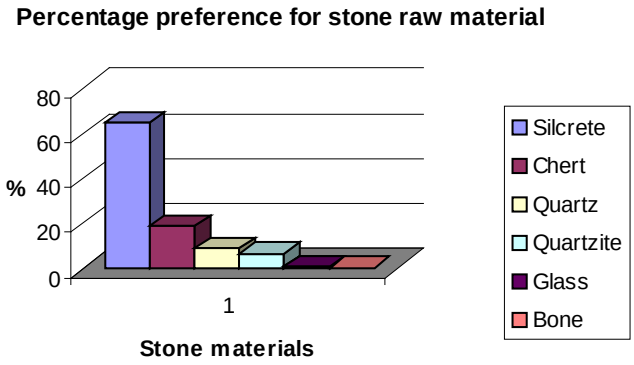


Table 1. Raw material preference (730 artefacts)

Overall, the preferred raw material was silcrete at 64.8 per cent, present at each site recorded. Such a large percentage indicates that the source for the raw material is close to most sites, or large pieces are carried away from the quarry site for reduction where needed.

Raw material	Other NSW %	Western NSW %
Chert	33.7	18.9
Silcrete	27.4	64.8
Quartzite	11.9	6.4
Quartz	19.5	8.9
Basalt	1.8	0
Hornfels	1.5	0
Glass	0.9	0.8
Mudstone	1.2	0
Granite	0.3	0
Greywacke	1.8	0
Bone	0	0.2

Table 2. Raw material preferences across New South Wales

Hudson's studies (2000, 2003, 2006) in central, northern and eastern New South Wales (Table 2) compared raw material preferences with those from western New South Wales. The preferred raw material changes from chert at 33.7 per cent for other NSW sites to silcrete at 64.8 per cent in western New South Wales. The preference for

silcrete (a stone composed of cemented sand grains) in the west could mean several things.

- Stone artefacts are easier to find in the western zone because there is less ground cover, flatter terrain and a greater contrast between soil colour and artefact colour, making stone tools easier to see.
- The more convenient or most common raw material is preferred—chert (a hard silicious sedimentary rock) would be the preferred material but is not as easy or economically viable to obtain.
- Mean daily temperatures are higher in the western zone, which impacts on the comfort of collecting dark-coloured raw material.
- Different landforms generate different raw materials—hunting-gathering-fishing is easier adjacent to wetlands compared to easterly regions.

Where to from here?

Further research in the WCMA region will enable planners to make strategic and tactical decisions for future development of Indigenous environmental conservation. In liaison with local Indigenous communities, plans can be put in place for increased Indigenous input into environmental planning.

References

Balme, J 1989, 'The antiquity of grinding stones in semi-arid western New South Wales', *Australian Archaeology*, vol. 17, pp. 3–9.

Balme, J & Hope, J 1990, 'Radiocarbon dates from midden sites in the lower Darling River area of western New South Wales', in *Archaeology in Oceania*, vol. 25, no. 3, pp. 85–101.

Hudson, S 1996, Salisbury Axe Quarry: the acquisition, distribution and cross-exchange patterns from a local distribution site, unpublished honours thesis, University of New England, Armidale.

Hudson, S 2006, Archaeological assessment of Copeton Dam and Gwydir River, in Copeton Dam Upgrade Project, unpublished report for the State Water Corporation of NSW.

Hudson, S, Duncan, L, Kim, M, McKenzie, P, Townsend, L, & Hudson, C 2003, An archaeological survey of the Southern New England Landcare area, unpublished report for the Southern New England Landcare Coordinating Committee, Armidale

Hudson, S, Sutherland, M, Holthouse, L & Plummer, R 2000, An archaeological survey of Genaren Hill Landcare Group Area, Peak Hill, Central Western NSW, unpublished report for the NSW Environmental Trust.

European site—rubbish dump on top of Aboriginal artefact scatter.
Photograph: Sue Hudson

ADDRESSING WETLAND HEALTH IN HAY: NARI NARI TRIBAL COUNCIL ACHIEVING POSITIVE RESULTS IN FLOODPLAIN WETLAND MANAGEMENT

Krista Hey
Nari Nari Tribal Council

The importance of a healthy wetland ecosystem in the Toogimbie Indigenous Protected Area (IPA) is two-fold.

- The flora and fauna of the wetland enjoy a restored habitat in which to breed and survive the drought.
- The return of traditional food sources means that the Nari Nari people of Hay are able to teach their children and visitors traditional hunting and gathering practices that might otherwise be lost.

The strong link between a healthy landscape and continuance of traditional practices is readily visible at Toogimbie.

The Toogimbie IPA is owned and managed by Nari Nari Tribal Council, an Aboriginal community organisation committed to protection of the natural environment and Aboriginal culture. Toogimbie is located 35 kilometres west of Hay, in the heart of the Riverina region of New South Wales. The total landholding exceeds 11 300 ha, of which almost 5000 ha were formally declared an IPA in March 2004, offering protection under the National Reserve System. All environmental works are structured to comply with world conservation standards.

A variety of ecosystems exist in Toogimbie, including River Red Gum forests along the banks of the Murrumbidgee River, floodplain wetlands and the flat rangelands areas unique to the Hay Plains.

The floodplain wetland area, which covers 1000 ha, is dominated by lignum and other semi-aquatic plants and—given the extended drought—has not flowed naturally since 1992.

A section of floodplain wetland on Toogimbie IPA. Photograph: Mark Brettschneider

Deeper sections of the wetlands have held water for extended periods allowing natural revegetation to occur. Photograph: Krista Hey

This area is a priority site for the Nari Nari people and extensive research and effort has gone into returning flows to this location. A partnership with the Murrumbidgee Wetland Working Group saw an opportunity to utilise their wetland allocation in 2003, when 307 ML were used to inundate a small section, with positive results seen in vegetation growth and bird activity.

In 2004 the Murrumbidgee Catchment Management Authority (CMA) worked with the Nari Nari people to produce an inundation event using the Cultural Access Licence allowed under the Murrumbidgee Blueprint. This allocation of 2150 ML was again transferred to the Nari Nari people in the 2006–07. To date approximately 1500 ML have been pumped from the river, using irrigation infrastructure, to restore flows to the floodplain and to numerous billabongs and small creek systems throughout the riparian zone.

Response by flora has been immediate and encouraging—hundreds of seedlings from species such as River Red Gum (*Eucalyptus camaldulensis*) and River Cooba (*Acacia stenophylla*) have emerged, as well as traditional food and medicine plants such as Nardoo (*Marsilea drummondii*) and Old Man Weed (*Centipeda cunninghamii*). Birdlife has increased dramatically and a series of bird surveys are being undertaken to gauge the effects of this inundation event. Field staff have also noted an increase in the frog and reptile populations.

Photographic records and bird surveys are being kept to monitor the changes in the landscape and to allow the Nari Nari people to better plan future watering events, to ensure maximum effect while ensuring an efficient use of the water. Flows are currently pumped from the river into controlled wetland cells and allowed to dissipate naturally. While this has huge benefits for plant growth and habitat provision, there is no effect on fish breeding, an issue the Nari Nari people wish to address in the future.

Dieback from lack of water has been avoided for several stands of mature trees. Photograph: Krista Hey

YOU HAVE TO BE INVOLVED

Margrit Beemster
Institute for Land, Water and Society, Charles Sturt University

Brian Sharp has a simple philosophy when it comes to the management of our natural resources and looking after the Murray River—if you want to make a difference you have to be involved.

'It's no good just sitting back and looking on… I believe the river itself is in a fairly good condition but we've got to manage it and make sure there are no further extractions. We've got to make sure the river system itself is healthy—it's no good pumping out unhealthy water to irrigate crops.'

'We've got to make sure that watering of our magnificent riverine forests is managed correctly and that the water covers the maximum amount of forest it can when you do water it. It's important to keep the whole of the river system healthy—not just the river itself but the surrounding floodplains and wetlands.'

Caring for the Horseshoe Lagoon Recreation Reserve

Brian, 62, has lived along the Murray River nearly all his life. He is mayor of Murray Shire, on the board of the Murray Catchment Authority, on the executive of the NSW Murray Wetlands Working Group, and is past president of the Murray-Darling Association. One way in which Brian has been able to make a local difference has been in successfully encouraging the community of Moama to work together to care for its 145 ha Horseshoe Lagoon Recreation Reserve on the southern edge of the town.

This reserve—typical of a Murray River floodplain environment, with an open forest of river red gums, grey box and silver wattle—includes a 'horseshoe' lagoon, a billabong and a small depression that fills during high rivers. The Murray-Darling Association and the Murray Shire decided that Horseshoe Lagoon was an area that should, and could, be developed as an education resource to promote the importance of Murray River wetlands and floodplains.

NSW Murray Wetlands Working Group

The NSW Murray Wetlands Working Group, an initiative of the Murray and Lower Murray-Darling Catchment Management Committees, was established in 1992 to develop and implement scientifically sound and community-endorsed management of wetlands. It is a community group with numerous representatives from industries and agencies. Since 2000 it has managed adaptive environmental water within the Murray and Lower Murray-Darling catchments.

In 2005–06 the group:

- distributed $187 000 across the Murray and Lower Murray-Darling catchments to landholders for wetland rehabilitation works and small community programmes
- invested over $800 000 in 100 projects across the Murray and Lower Murray-Darling catchments since the Wetlands Incentive and Wetlands Rehabilitation and Investigations Programme began in 2004
- distributed 10 415 ML of adaptive environmental water into 28 wetlands areas, inundating an accumulative 940 ha of wetland areas
- completed wetland mapping for the majority of the Murray CMA region
- facilitated donations of water for the environment from the community
- instigated a wider environmental watering programme in the Lower Murray-Darling.

After the Murray-Darling Association undertook a management plan for Horseshoe Lagoon, its regional manager, Adrian Wells, was asked to be project leader for a community education and awareness strategy for the lagoon.

Getting everyone involved

'In the last ten years there has been increasing community awareness and understanding of the significance of wetlands', says Adrian. 'Communities are now starting to understand that wetlands are to be treasured and managed properly.'

The Moama community has done just that. The reserve, while managed by the Murray Shire Council, is very much

Horseshoe Lagoon with retirement units. Photograph: Margrit Beemster

Horseshoe Lagoon at dusk. Photograph: Margrit Beemster

Brian Sharp on the wooden footbridge over Horseshoe Lagoon. Photograph: Margrit Beemster

a community project with many local groups involved in its care. They include Friends of Moama, the Lead On Community Development group, Moama and District Landcare, Moama Bowling Club, Moama Local Aboriginal Land Council and the Moama Public School.

'The project really excited the local community', says Adrian. 'We started by forming a Friends of Horseshoe Lagoon community group, made up of community and local government representatives to provide ownership and commitment to enhancing and improving the reserve.'

'We have people of all ages from a diverse range of interest groups and organisations including government and catchment agencies helping look after the area', says Brian. 'We've got the young people involved—they helped design and print a new brochure. The wetlands group did a survey of the flora and the fauna of the whole site and helped fund the project; Friends of Old Moama helped with writing the brochure and signs; the Shire installed signs, built new access steps to the lagoon, upgraded the walking trails and are getting rid of the introduced species; Moama and District Landcare gave advice on plants and planted Phragmites; and Forests NSW provided interpretative sign posts.'

The reserve's strong link to the traditional Aboriginal owners is now reflected in a cultural heritage and bush tucker trail, being developed with Moama's local Aboriginal Land Council. 'This trail will celebrate Aboriginal culture and lifestyle while increasing awareness of the importance of native plants to Indigenous communities', says Adrian.

The project received a small grant from the NSW Murray Wetlands Working Group plus a donation from the Moama Bowling Club. With in-kind and community contributions, the money went a long way.

Photograph: Steve Clarke

EFFORTS UNDER WAY TO IMPROVE RAMSAR IMPLEMENTATION IN AUSTRALIA

Australia has 64 Ramsar sites covering around 7.3 million ha. Governments are working together to provide better nationally agreed systems that will improve Australia's implementation of the Ramsar Convention. This work is being coordinated through the Wetlands and Waterbirds Taskforce, comprising Australian and state and territory government officials who work on wetland issues. Some of the work under way and the expected benefits include:

- *National guidelines for Ramsar wetlands*: The Guidelines will be a series of modules providing clear, nationally agreed guidance on key processes relating to listing and management planning for Ramsar sites. The first module covers mapping requirements and will be released shortly.
- *Framework for describing the ecological character of Ramsar sites*: The Framework, to be published as a module of the National Guidelines, shows how to describe the ecological character of a Ramsar wetland. An ecological character description is vital for the preparation of site management plans and to guide on-site monitoring. It also helps in assessing potential impacts of actions under the *Environment Protection and Biodiversity Conservation Act 1999*.
- *Reviewing the status of Australia's Ramsar estate*: While we understand the condition of many of Australia's Ramsar sites and the management challenges they face, there is no regular or systematic mechanism for assessing this across all 64 Ramsar sites. Work is under way to address this, starting with a rapid 'snapshot' of the status of Australia's Ramsar estate, followed by development of an ongoing 'rolling review' process. This work will help identify future management and investment priorities, and provide greater understanding of the health of our Ramsar wetlands.

Other work-in-progress includes developing an Australian Wetland Inventory and national indicators for wetland extent, distribution, and condition. This work has been covered in more detail in this or previous editions of *Wetlands Australia*.

For more information on Australia's Ramsar wetlands go to www. deh.gov.au/water/wetlands

FISH FOR TOMORROW?

Mel Bradbury
OceanWatch Australia Ltd

'Fish for tomorrow' is the mantra of OceanWatch Australia (OWA). The environmental health of Australia's coastal regions has been significantly degraded since European settlement. The recently released Millennium Ecosystem Assessment's *Wetland and Water Synthesis Report* (2005) has identified that the greatest threat to these precious regions is the loss or modification of coastal habitat—particularly coastal estuarine wetlands—due to agricultural and urban development and industrialisation, and to poor understanding of coastal processes and mismanagement of our coastal resources. It has been estimated that since European settlement, 60 per cent of Australia's coastal wetlands have been lost or degraded. Loss of these coastal wetlands and other coastal aquatic and fish habitats has placed increased pressure on the survival of wild-harvest fisheries that depend on these habitats.

Currently, Australia is experiencing a 'sea change', seeing thousands of people flock to the coast each year to settle, and placing ever-increasing pressure on our coastal systems. It is critical we take action to look after these precious coastal environments in the face of this mounting pressure.

OceanWatch Australia's vision is: *healthy catchments and healthy oceans for sustainable, quality Australian seafood*—or in other words *No Habitat = No Fish*.

OWA is a national, environmental, not-for-profit organisation that works to achieve sustainability in the Australian seafood industry through protecting and enhancing fish habitats, improving water quality and advancing the sustainability of fisheries.

Two of the three programmes run by OWA focus heavily on this habitat theme. The Aquatic Habitat Protection and Enhancement Programme informs and provides advice to governments, NRM managers and the community about NRM issues impacting on the seafood industry. The *Our Valuable Estuaries* educational CD was produced as part of this programme (see p. 27).

The Aquatic Habitat Rehabilitation Programme undertakes on-ground works to rehabilitate and enhance priority fish habitat areas across Australia. The flagship project within this programme is known as Tide to Table and is funded under the National Landcare Programme.

The other OWA programme is the Advancing Sustainable Fisheries Programme that focuses on addressing the environmental issues caused by fishing. This programme is delivered predominately to the professional sector through a national environmental extension service called SeaNet.

The Tide to Table project

The Tide to Table project is an NRM delivery model focused on fish habitat rehabilitation, piloted in the Sydney metropolitan catchment region in 2005–06 by OWA and now being rolled out in the Hawkesbury Nepean and Hunter Central Rivers Catchment Management Authority regions. It is funded by the National Landcare Programme.

Tide to Table concentrates on linking primary producers, government and the community together to restore fish habitat. In partnership with catchment management authorities, the NSW Department of Primary Industries and the NSW Farmers' Federation, the programme is restoring fish habitat for the benefit not only of marine life and the reliant seafood and recreational fishing industries, but also of land-based primary producers.

'Times are changing—integrating the seafood industry into the NRM process is vital if this sector wants to continue fishing and harvesting into the future.'

Tide to Table aims to repair and restore critical fish habitat and to address water quality impacts on the aquatic environment, while improving land productivity through working with the community on a number of on-ground projects. The project strives to highlight the importance of land management activities in the catchment that impact on estuarine wetlands and water quality and have a flow-on effect to the productivity of the seafood industry. That is, without important aquatic habitats such as saltmarsh, mangroves and seagrass, there will be no fish!

During 2006, 30 on-ground sites were funded in Sydney focusing on:

- fencing off valuable wetlands from four-wheel drive and trail bike damage
- removing barriers to fish passage
- installation of stormwater detention basins reducing gross pollutants, sediments and nutrients impacting on saltmarsh and mangroves
- stabilising riverbanks with plantings and Bushcare works
- maintaining and creating wetlands
- restoring ecosystem functioning by weeding

Cabramatta Creek is a tributary of the Georges River. A redundant weir was removed opening up fish passage—allowing a return to natural estuarine wetland conditions above the weir. Photograph: Katie Cabezas, Environment Officer, Fairfield City Council

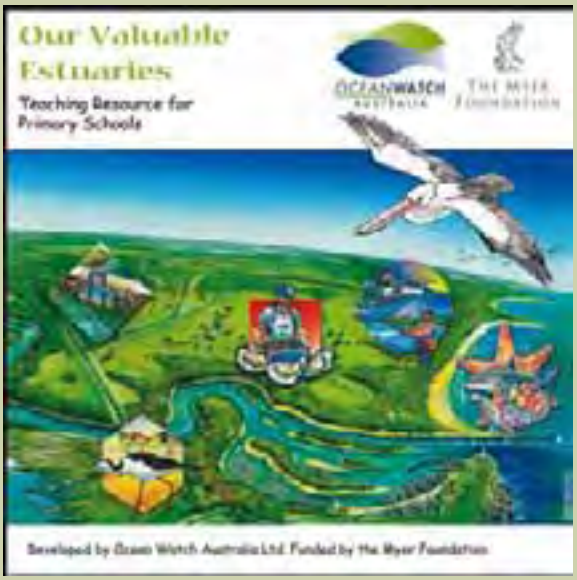
Field excursion where Bushcare volunteers toured the seafood industry to see how their actions upstream affect the produce and livelihood of the fishing and aquaculture industry downstream. Photograph: Simon Rowe

- increasing habitat
- reclaiming suitable land.

The educational side of the project focuses on the need for a more informed understanding by the community of the role estuarine wetlands play in maintaining sustainable aquatic habitat and fisheries production. It is about how small actions initiated at sites such as those being worked on by Landcare or Bushcare, private landowners and local government can add to a supportive network that encourages fish breeding and provides shelter and food.

To discuss further aspects of the Tide to Table project please contact Simon Rowe, Programme Manager, OWA at simon@oceanwatch.org.au or (02) 9660 2262.

This stormwater detention basin not only looks good but mitigates against the damaging impacts of nutrients and sediment on the adjoining saltmarsh. The results of this particular project were recently inspected by local and state government staff. Photograph: Simon Rowe



Our Valuable Estuaries educational CD

OWA, supported by the Myer Foundation and the NSW Department of Primary Industries, has produced an innovative interactive environmental education resource to help primary school teachers and students learn about the importance of healthy catchments for healthy and productive estuaries, coastal wetlands and fisheries, and how to keep these environments healthy. Ultimately, *Our Valuable Estuaries* seeks to facilitate attitudinal and behavioural change, so students minimise their impacts on these coastal environments and are empowered with the knowledge and skills to make better natural resource management decisions into the future. This will ensure that these scarce remaining habitats and their fisheries are protected for future generations.

Our Valuable Estuaries was distributed to all public primary schools in coastal catchments of NSW and has been exceptionally well received by teachers, students and environmental education specialists.

OWA will be evaluating the effectiveness of the resource over the coming months. OWA welcomes feedback, particularly from teachers and education stakeholders. An evaluation form will be available on the website over the next few months at www.oceanwatch.org.au.

OWA has received considerable interest in the CD from other states particularly Queensland, Victoria and South Australia, and is currently seeking sponsorship to enhance, adapt and distribute the resource nationally.

For more information about the resource or for additional copies, please go to www.oceanwatch.org.au and complete an order form or contact Monique Needham on (02) 9660 2262.

SWAMPED AND LOVING IT ON THE FLEURIEU PENINSULA, SOUTH AUSTRALIA

Alys Stevens
The Conservation Council of South Australia

Mount Lofty Ranges Southern Emu-wren and Fleurieu Peninsula Swamps Recovery Programme

The Mount Lofty Ranges Southern Emu-wren and Fleurieu Peninsula Swamps Recovery Programme ('the Recovery Programme') came into existence 13 years ago in 1993. In the beginning it was the Emu-wren that was the focus of work, with concern for Fleurieu Peninsula Swamps based on utility for this nationally endangered species of bird. However, it was soon recognised that the swamps themselves were rare and unique systems requiring conservation, protection and improvement in their own right. In 2003 the Fleurieu Peninsula Swamps were listed as a critically endangered ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Recovery Programme expanded to formally adopt protective responsibility for the swamps.

The swamps

The Fleurieu Peninsula Swamps are localised areas of densely and diversely vegetated wetlands, typically characterised by waterlogged soils around low-lying creeks and flats, beneath gullies or perched swamps. The swamps contain at least 204 plant species of which 167 (81 per cent) are indigenous. Fifty per cent of the native plant species recorded in the swamps (84 species—five of which are endangered) are of conservation significance at the state level and 57 per cent (96 species) have regional conservation status. Five threatened plant species of national significance occurring in small populations are *Euphrasia collina* ssp. *osbornii, Prasophyllum frenchii* (both rated as endangered under the EPBC Act), *Spyridium spathulatum*, *Schoenus discifer* and *Diurus brevifolia* (not currently rated under the EPBC Act).

The faunal assemblages of the Fleurieu Peninsula Swamps are also unique, with many highly significant species not found elsewhere in Australia—such as the Mount Lofty Ranges

Stipiturus Conservation Park in the Mount Compass region covers over 30 ha of swamp. Photograph: Marcus Pickett

The 2006 addition to a range of permanent photo-monitoring points. Shown here is one established at Mt Compass School Swamp to monitor swamp regeneration after a wildfire in 2003. Photograph: Alys Stevens

Southern Emu-wren, *Stipiturus malachurus intermedius* (endangered under the EPBC Act) and the invertebrates *Acanthoferonia ferox* (previously thought extinct), *Nousia fuscula* and *Leptoperla tasmanica* (two species unique to certain areas of swamp to the east of the Fleurieu Peninsula).

More than 75 per cent of the Fleurieu Peninsula Swamps has been lost through drainage, water extraction, vegetation clearance (broad scale and through grazing activity) and other inappropriate land uses. The remaining distribution consists predominantly of small and isolated patches still under threat from the same range of degrading processes that have reduced the community to its current extent. Decline is then exacerbated by invasion of weed plant species. Most remaining Fleurieu Peninsula swamps have been changed or modified and require some level of intervention to restore them to a healthy functioning ecosystem.

Restoration activities and ongoing projects

The Recovery Programme approaches conservation and natural resource protection from a landscape-scale perspective. Protection of the swamps and emu-wrens extends to consideration of land use; management; existing and potential threats; soils; hydrology; landform elements; topography; and the interaction between these variables. Recovery actions are integrated with the principles of biodiversity conservation, and local on-ground work is strategically planned to contribute to natural resource protection at a broad landscape scale.

State rare *Sprengelia incarnata* with ice crystals after a cold night in a swamp. Photograph: Alys Stevens

The Recovery Programme also undertakes scientific research that targets—and develops a greater understanding of—the ecological processes operating on and within the Fleurieu Peninsula Swamps. Swamp experiments established seven years ago, looking at the effects of various management actions, are monitored biannually. A system of surveys has collected quantitative species and structural data from a large number of swamps of differing physical and ecological attributes, and subject to various management regimes.

The year 2005–06 saw some huge accomplishments by the Recovery Programme in terms of swamp conservation. Those actions included:

- creation of a partnership with over 25 landholders to produce and execute management plans for over 30 swamp management units
- erection of over 20 kilometres of fencing to physically protect approximately 200 ha of remnant Fleurieu Peninsula swamp vegetation—significant in relation to the amount of Fleurieu Peninsula swampland left
- supporting landholder heritage agreement applications on four properties
- woody weed control on almost all of the involved properties
- completion of a swamp vegetation survey of over 200 quadrats at 40 different sites
- ongoing surveying of swamp experiments
- research links established with the University of Adelaide including a PhD project looking at swamp vegetation response to disturbances such as fire
- creation of a draft booklet for developers, landholders, NRM advisors and planners—helping them to understand more about swamps and emu-wrens, the major threats facing them and ways of reducing impacts
- creation of strategies for the Fleurieu Peninsula Swamps which summarise the internal and external knowledge previously amassed and then prioritises future actions for recovery
- organisation of and/or participation in various workshops, field days, bus tours, presentations, newspaper and newsletter articles, radio discussions—all of which create awareness about the swamps and emu-wrens.

2007 and beyond…

The year 2006–07 is shaping up to be another exciting and busy time for the Recovery Programme with the high pace of swamp conservation continuing:

- 29 new partnerships with landholders have been initiated to date
- approximately 190 ha of remnant Fleurieu Peninsula swamp will be fenced for protection with most also receiving woody weed control
- four new heritage agreements are being coordinated.

The Recovery Programme will also undertake a process of prioritising key areas to target for threat-abatement planning and will then develop information about the identification of potential issues, and general management of the swamps to reduce or avoid current and potential threats.

For more information on the swamps, the Emu-wren, the Recovery Programme and all of the fantastic activities that are occurring, go to www.ccsa.asn.au, click on the Biodiversity link and follow your nose!

Programme staff also enthusiastically welcome any direct enquiries—see our contact details below:

Melanie Rees
Project Manager
melanie.rees@ccsa.asn.au
ph. (08) 8223 5155

Recently discovered perched swamp at a SA Water property at Hindmarsh Valley. Photograph: Alys Stevens

Extension Officer Tim Vale led an educational field day at Mount Compass School Swamp in June 2006. Photograph: Marcus Pickett

DELIVERING PRACTICAL REGIONAL WETLAND MANAGEMENT SOLUTIONS

Bill Phillips
Coordinator, Wetlands.edu *training programme*

Wetland Management Solutions (WMS) is a coalition of Australia's premier wetland management organisations and experienced professionals. It offers an information-brokering and delivery service— identifying and interpreting the latest science and innovations; and providing ways for regional and catchment bodies, community organisations, local governments and landholders to better manage their wetlands and shorebirds.

WMS aims to provide a range of information-transfer options and training tools. This includes using established wetland centres across the country as training hubs; web-based and hard-copy delivery of information resources; and face-to-face consultations and training days in regional centres or with landholders. The WMS partners are developing and pilot-testing complementary information-transfer approaches tailored to address regional and local needs. Wetland management expertise gained from the four WMS projects will progressively be made available to regional and urban Australia to support on-ground management of inland and coastal wetland assets.

Funding for this initiative comes from the Natural Heritage Trust (NHT). Since its inception in October 2005, WMS has held three meetings and each of these has strengthened the collaboration between partner projects, leading to the development of a business plan and joint website. The partners are now exploring ways that this innovative umbrella framework might be prolonged after NHT funding comes to an end.

Partners in Wetland Management Solutions

- The *Wetlands.edu* consortium—comprising Hunter Wetlands Centre Australia; the Wetland Education and Training Programme of the Sydney Olympic Park Authority; Banrock Station Wine and Wetland Centre; and Regional Ecosystem Services (Dr Bill Phillips, MainStream Environmental Consulting; Dr Rhonda Butcher, Water's Edge Consulting; and Jennifer Hale Consulting)
- WetlandCare Australia
- WWF Australia
- Wetlands International – Oceania

To find out more about WMS and each of its projects visit www.wetlandmanagementsolutions.org.au

Participants in the first *Wetlands.edu* training course at Banrock Station Wine and Wetlands Centre in September 2006 examine the flood depth pole. Photograph: Bill Phillips

WETLANDS.EDU TRAINING PROGRAMME – ABOUT TO GO NATIONAL

Bill Phillips
Coordinator, Wetlands.edu *training programme*

Wetlands.edu is a Natural Heritage Trust (NHT) funded programme designed to provide capacity building and training for regional and community investments in wetland-related assessment, planning and action. The programme is aimed primarily at regional natural resource management and catchment bodies and their stakeholders—including Landcare and river management groups, local governments and private landholders.

During 2006 the programme has completed a training needs assessment, developed a number of training modules, and pilot-tested these in New South Wales and South Australia. This has involved one course at Hunter Wetlands Centre Australia, one at Sydney Olympic Park, and two at the Banrock Station Wine and Wetlands Centre in South Australia's Riverland.

Commencing in 2007, this training will become available across Australia through wetland centres and key regional towns and cities—with a particular emphasis on regional and local issues. Training modules will address:

- fundamentals of wetland ecology
- hydrology and flow management
- inventory and assessment
- classification and prioritisation
- monitoring and use of indicators
- development of management plans
- raising awareness and appreciation of wetland values
- managing wetlands to benefit native fish

Tony Sharley of Banrock Station Wine and Wetlands Centre briefing participants at the first *Wetlands.edu* training course. Photograph: Bill Phillips

- carp management in wetlands
- managing wetlands in the urban setting
- impact assessment
- managing wetlands for multiple-use outcomes.

Wetlands.edu is at present exploring formal accreditation of its courses. Beginning in 2007 it will start to phase in user-pays so that by the end of 2008, when the NHT funds end, the programme can be self-sufficient and ongoing.

Further information on *Wetlands.edu*, including advice on upcoming training opportunities, can be obtained from www.wetlandsedu.org.au or contact the *Wetlands.edu* coordinator, Dr Bill Phillips on telephone (02) 62817470 or email wetlands.edu@mainstream.com.au

Participants in the second *Wetlands.edu* training course at Sydney Olympic Park in October 2006. Photograph: Bill Phillips

THE SHOREBIRD CONSERVATION PROJECT 2006–07

Bianca Priest
WWF-Australia

WWF-Australia, with funding from the Australian Government's Natural Heritage Trust (NHT), is working to minimise threats to shorebirds and their habitat by building community capacity.

Shorebirds under threat

Shorebirds are among the most spectacular migratory species in the world, travelling some of the greatest distances of any migratory birds—up to 10 000 kilometres non-stop. Many travel a round-trip of 25 000 kilometres each year between Australia and their breeding grounds in Siberia, northern China and Alaska.

These birds share their flyway with nearly half of the world's human population and are particularly under threat from rapid economic development and population growth in east and south-east Asia. Twenty per cent of shorebird species that regularly migrate along the east Asian–Australasian flyway have been officially classified as globally threatened, with substantial population declines.

In Australia, threats to both migratory and resident shorebirds include:

- loss of coastal and inland wetlands to agriculture and urban development
- invasive weeds such as spartina and marram grass
- introduced predators including cats, dogs and foxes
- human-related disturbance—people, pets and 4WDs on beaches.

Shorebird Conservation Project

To address these threats, the Shorebird Conservation Project is working to:

- improve management of important shorebird sites for conservation
- reduce human disturbance impacts through shifts in behaviour
- target and improve monitoring of the impacts of conservation.

To do this, the project will:

- produce, promote and distribute a shorebird conservation toolkit
- develop projects for migratory shorebirds in priority NRM regions
- deliver a shorebird conservation roadshow in priority regions
- evaluate the success of the toolkit and projects in achieving conservation outcomes.

Priority regions and projects

Four priority NRM regions are the focus of the project:

- Northern Territory
- Western Australia rangelands
- south-east South Australia
- West Gippsland in Victoria.

The table below describes the aims, activities and coordinators of three current projects.

Aim(s)	Key activities/outcomes	Coordinator
Roebuck Bay—support for community-based management planning		
A community-based management plan for Roebuck Bay	• Community consultation • Issues paper to address values, issues and management practices • Workshop to guide planning for a management plan • Interim management guidelines	Community Solutions Roebuck Bay Working Group
Limestone Coast Shorebird Disturbance Project		
To assess the nature of human-induced disturbance along the Limestone Coast—what, how, who and when	• Collation of supporting information on important sites for migratory and resident (beach-nesting) shorebirds • Assessment of the nature of human-induced disturbance to vulnerable sites • Poster or information sheet to raise awareness and educate beach-users and management groups on the impacts of human disturbance to shorebirds	Department of the Environment and Water Resources (DTEWR) Friends of Shorebirds SE (FOSBSE)
West Gippsland Shorebird Habitat Mapping Project		
To map the distribution and extent of shorebird habitat in West Gippsland Information to support management planning to minimise development and human disturbance impacts on shorebird habitat	• Meeting with council and state-agency staff • Desktop review and collation of supporting information • Field assessment and mapping • Linking mapping to council and state-agency planning • Shorebird information sheet	Daniel I Rogers Birds Australia

Shorebird Conservation Toolkit

The toolkit—available online at www.shorebirds.org.au and on CD—builds on the success of the national Shorebird Conservation Project (2001–05), drawing from over 30 on-ground and community-driven projects across Australia.

The toolkit is a comprehensive resource that enables users to:

- understand and appreciate shorebirds, their habitat and conservation needs
- locate important shorebird sites in Australia and access population estimates
- develop site-survey and monitoring programmes
- identify and assess site-management needs, and implement and evaluate management actions
- write grant applications, site communication plans and media releases
- access existing resources
- identify and advocate international and national conservation options
- access organisations with knowledge and expertise in practical shorebird and wetland conservation.

Wetland Management Solutions

The Shorebird Conservation Project is a partner in Wetland Management Solutions (WMS)—www.wetlandmanagementsolutions.org.au—a partnership of wetland practitioners and experts working together for better management of Australian wetlands. See page 30 for more detail on WMS.

Further information

For further information on regional projects, or to obtain a copy of the toolkit, please contact Bianca Priest, National Coordinator—Shorebird Conservation Project on (03) 6225 1394 or 0413 300 797 or bpriest@wwf.org.au

Shorebird Talk at Welshpool and District Primary School
Photograph: Liz Batten

WetlandLink, WetlandCare Australia's subscription e-newsletter and website, was re-launched on World Wetlands Day 2006 with a new look and focus.

WetlandLink is a tool that landholders can use to access practical information and incentive programmes run through catchment management authorities in coastal NSW. It is funded by the Australian Government and WetlandCare Australia with support from coastal catchment management authorities. It is one component of the Natural Heritage Trust-funded national wetland project Wetland Management Solutions: http://www.wetlandmanagementsolutions.org.au/ (see p.30)

To access WetlandLink and to subscribe to the free e-newsletter, go to http://www.wetlandlink.com.au/ To contribute information about a wetland restoration or research project contact the editor directly at Lizaschaeper@wetlandcare.com.au

WESTERN AUSTRALIA PALS AWARDS 2006: NANNUP WINNERS

Jack Bunatin
Blackwood Waterwatch

Nannup town rests on the lower banks of the lengthy Blackwood River and traditionally is part of Wardandi Boodjar country. Blackwood Waterwatch initiated a Nannup reconciliation project by creating a 'pathway to reconciliation' on the Blackwood River foreshore. The pathway is symbolic of the Noongar translation of 'Nannup' as *resting* or *gathering place*. Traditionally, four main Noongar clan groups would travel distances to congregate in Nannup to meet, celebrate, communicate and trade. In the centre of the pathway we planted a balga tree, a highly valued plant that could sustain life and provided the Noongar people with the means for food, shelter and fire. This pathway is the first permanent public acknowledgement in Nannup of the traditional owners of this land.

The pathway is made of pavers individually painted by students from Nannup District High School (DHS), Lake Jasper Special Project School, and Indigenous and non-Indigenous community members. Nannup Shire donated pavers, willing workers and the balga tree. Funding was provided through PALS (Partnership Acceptance Learning Sharing)—an annual programme run by the Western Australian Department of Indigenous Affairs and supported by BHP Billiton Iron Ore. PALS projects encourage young Western Australians to learn more about the state's Indigenous culture and heritage through the development of projects that promote and practice reconciliation.

Chosen as one of 20 main Western Australian winners, the Nannup project was recognised as fulfilling PALS objectives. Year 7 Nannup DHS students, staff, parents and the local Waterwatch coordinator travelled to the Fremantle Wardarnji Festival, where the awards were presented to Nannup DHS and Lake Jasper Special Project School for their efforts in promoting local reconciliation and cultural awareness. Three brave Year 7 girls accepted the awards, speaking in Noongar and English about the project.

Michella Hutchins. Photograph: Jack Bunatin

Janessa Crouch, Phoebe Bunatin-Barrie and Annie McWilliam. Photograph: Jack Bunatin

The reconciliation project is ongoing and additions of an interpretive garden and signage will follow. An event was held to open the pathway, hosted by Michella Hutchins, local Noongar spokesperson, sowing the seeds for continued community partnerships, environmental awareness and beginning what will—hopefully—become an annual Nannup event.

Pathway to reconciliation. Photograph: Jack Bunatin

THE CHEETHAM EXPERIENCE: SHOREBIRD IDENTIFICATION TRAINING FOR NOVICE BIRDWATCHERS

Sean Dooley, Birds Australia
Dean Ingwersen, Threatened Bird Network

Birds Australia's project officer, Sean Dooley, and Threatened Bird Network coordinator, Dean Ingwersen, recently conducted shorebird identification training workshops at Cheetham Wetland near Melbourne. The Ramsar-listed wetland is a former saltworks now managed by Parks Victoria. During peak season over summer it is home to thousands of migratory birds, including the Red-necked Stint, Curlew Sandpiper and Sharp-tailed Sandpiper. Double-banded Plovers also use the site over winter, and resident shorebirds such as Red-capped Plover breed around the wetlands.

The training workshops, funded by PricewaterhouseCoopers, were designed to introduce their staff and other volunteers to shorebirds and to test the methodology of training novice birdwatchers to identify and count these birds. In a morning theory session, participants were given an introduction to the wetlands and their importance to national and global networks, as well as an explanation of survey methodology used to count flocks containing several hundred birds. A shorebird-identification component was also conducted, followed by a quick identification test using pictures of the more commonly-encountered species.

The afternoon involved a field session in which birds were identified and counted. To test the merit of field training prior to such counts, two of the four groups were taught to identify the birds present before completing their surveys, while the other two were not. Count results of volunteers were compared

Project coordinator Sean Dooley leading participants through the process of wader identification. Photograph: Dean Ingwersen/Birds Australia

with the assessment made by Dean (a counting expert), with accuracy of numbers and identification compared.

While it seems that field training had little effect on the accuracy of counts or the rate at which species that were present were identified, it seemed to reduce the reporting of species that were not present. Given the short duration of field training, it seems likely that such training is a crucial part of any shorebird-counter training Programme.

PricewaterhouseCoopers has also generously supported a second component of the project, which will involve production of kits for new residents in the surrounding area. When the saltworks was sold, part of the land was purchased by developers for housing. The first estate—Sanctuary Lakes—was completed several years ago, but the next instalment of 1900 houses is about to take shape. The kits will be supplied to all new residents in the area to highlight the importance of the wetlands for shorebirds, and to provide information on being a responsible resident and on looking after such important avian visitors.

The Threatened Bird Network is funded through the Australian Government's Natural Heritage Trust. For more information on the Threatened Bird Network, and how to get involved in one of their exciting projects, visit www.birdsaustralia.com.au/tbn or email tbn@birdsaustralia.com.au or ring (03) 9882 2622.

Participants test their newly acquired identification skills in the field. Photograph: Dean Ingwersen/Birds Australia

NSW RAMSAR WETLANDS COMMUNICATION PROGRAMME: AN UPDATE

Kym Bilham
Hunter Wetlands Centre Australia

The NSW Ramsar Wetlands Communications Programme, launched in July 2004, set out to increase awareness of the Ramsar Convention and of wetlands in general. The programme was a two-year initiative of the NSW Ramsar Managers Network, and was funded by the Australian Government through the Natural Heritage Trust and coordinated by the Hunter Wetlands Centre Australia (HWCA). The programme has proved to be successful in providing baseline information and developing wetland communication tools and activities that continue to be well received by the target audience and the general public.

Preliminary research had provided the Programmeme implementation team with baseline information on levels of awareness about the Ramsar Convention, and wetlands in general, among key audiences in New South Wales (HWCA 2004). This research was the basis for a communications strategy that was implemented in 2005 and 2006.

The messages on the postcards are designed to inspire a connection between people and wetlands. Photographers for postcards are Chris Herbert and George Hardy.

Aim

The strategy aimed to '… increase awareness, appreciation and value in New South Wales for wetlands and the Ramsar Convention, as a key tool for the conservation and wise use of wetlands, to key target audiences', including government organisations, politicians and senior officials, communities and individuals from the education sector in private Ramsar wetland areas, the general community, and visitors.

Methods

The communications strategy included a media campaign; web-based communication and information links; brochures; site tours; school presentations; conference presentations; attendance at key events; a NSW Ramsar wetlands DVD; as well as posters, postcards, magnets, bookmarks, shower timers and carry bags as part of a trade display kit. More than 800 individuals were involved in the two research phases. Engaging this audience was a key communication and awareness-raising tool in itself.

Key elements of the initial research in 2004 were designed to allow comparison between results at the start and finish of the Programme. During the final evaluation phase in 2006, more than 400 people took part in online surveys, telephone interviews and visitor surveys. During these surveys:

- individuals from communities in the vicinity of the four privately managed Ramsar wetlands in New South Wales were randomly selected from the White Pages for telephone interviews
- stakeholders selected from an extensive wetlands database, who did not participate in the online survey, were also randomly chosen for telephone interviews
- The online survey was open to anyone who had access to the web, so the geographic spread was not limited to New South Wales or localities near Ramsar wetlands.

Key findings

The number of people who independently completed the online survey at the end of the programme had increased by 23 per cent, indicating an increase in people's awareness of the programme and wetlands in general. These surveys revealed that:

- There was a notable increase in awareness of wetland functions among those surveyed. This was demonstrated by the more sophisticated responses to questions about threats to wetlands and the importance of their role in the natural environment.
- Survey participants indicated that wetlands are one of the most important environments and placed an increased priority on their protection.
- The community still considers that education is the most important value of wetlands.
- Significantly more participants indicated that their key sources of information on wetlands and environmental issues were websites and internet-based media.
- By the end of the Programme, a much higher number of participants considered that wetlands improved water quality and had biodiversity values.
- During the evaluation a large number of individuals considered—for the first time—that wetlands are valuable for human wellbeing.

Children's Poster – Children play an important role in bringing information into households. This is the back of a double-sided children's poster produced by the RWCP which is interactive to cater for that target audience. Illustrator: Elizabeth Oldmeadow

- There was no significant change in the level of awareness of the Ramsar Convention and wetlands in general amongst the broader community.
- 22 per cent fewer respondents were 'unsure' of the 'relevance of the Ramsar Convention'. However, more respondents indicated that the Convention 'meant little' as far as wetland protection.
- There was an increased awareness amongst survey participants of what a wetland was; and during the evaluation phase participants were able to identify more wetlands that they were familiar with.

Interestingly, the increase in knowledge of wetlands and their functions amongst the participants correlated with an increased number of respondents who thought the general community's understanding of the importance of wetlands was poor.

This increased knowledge of the complexities of wetlands was associated with an increase in awareness of the variety of animals one might find in a wetland. Throughout the evaluation, 'birds' remained the most popular response to 'the type of animal you would expect to find in a wetland', but there was a 43 per cent increase in the different types of animals recorded—indicating an increased awareness of wetlands' role in supporting biodiversity.

Challenges

Respondents selected at random still had a limited awareness of wetlands, their natural functions and value to the environment and community. This response suggests that ongoing communication, education and public awareness activities are essential beyond the life of this project to ensure momentum is continued.

When asked about how to raise awareness of wetlands, the consistent response throughout the Programme was to 'get the information onto television' (this was considered during the Programme's implementation phase, but budgetary constraints prevailed).

Raising awareness of environmental values amongst the community continues to be a challenge. In terms of being even more specific and raising the profile of Ramsar wetlands, the challenge is even greater. The key to meeting

Gwydir Wetlands Poster – The Gwydir wetland complex faces issues to do with water allocation. This image is designed to portray the threats to the wetland environment due to lack of water. It has a strong message and plays an awareness-raising role. Photographer: Howard Blackburn

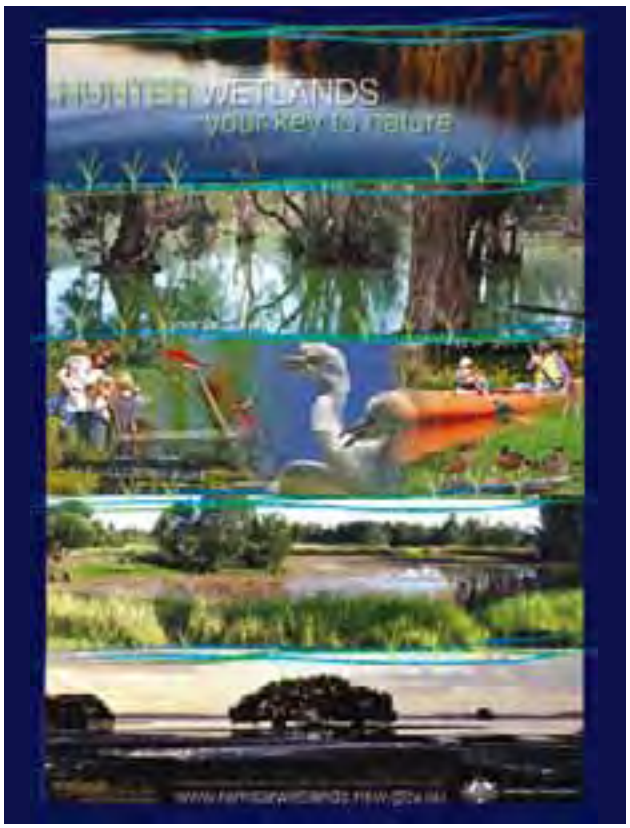
the challenge is to continue with the momentum of the Programme and build on the great example of benchmark initiatives such as the New South Wales Ramsar Wetlands Communications Programme.

More information on Ramsar and wetlands in New South Wales is available at: www.ramsarwetlands.nsw.gov.au and www.wetlands.org.au/WhoCaresAboutOurWetlands

You can also contact Kym Bilham, Project Officer, NSW Ramsar Wetlands Communications Programme on (02) 4951 6466 or ramsar@wetlands.org.au

Reference

Hunter Wetlands Centre Australia, Who cares about our wetlands? 2004



Hunter Wetlands Poster. Photographs: HWCA and G Woods

THE HEALTHY WETLAND HABITATS PROGRAMME CONSERVES WETLANDS ON THE SWAN COASTAL PLAIN

Anthea Jones
WA Department of Environment and Conservation

The Healthy Wetland Habitats Programme is an initiative of the Western Australian Government and is administered by the Department of Environment and Conservation (DEC). It is a voluntary programme giving technical and financial support to private landholders who care for wetlands on the Swan Coastal Plain.

The programme was originally developed to support the implementation of the draft Environmental Protection (Swan Coastal Plain Wetlands) Policy. This policy was not implemented but protection of wetlands is provided for under new land-clearing regulations and the existing development and approval process, with assessment by the Environmental Protection Authority where environmentally sensitive wetlands are involved.

Wetlands on the Swan Coastal Plain are under threat from the pressures of development. At least 80 per cent of all the wetlands that were once present on the Swan Coastal Plain before European settlement have been cleared, filled or developed (Water and Rivers Commission 2001). Land clearing and the introduction of weeds and feral animals, such as foxes and cats, have contributed to the extinction of 18 fauna species, 15 flora species and three ecological communities across Western Australia in the last hundred years (Department of Conservation and Land Management 2004). The Healthy Wetland Habitats Programme aims to support those landholders who are managing their wetlands for biodiversity conservation and for the enjoyment of future generations.

The focus of the programme is to help private landholders develop wetland management plans to protect and care for their wetlands. The purpose of the management plans is to identify priority management actions, such as fencing and weed control, which will mitigate threats to the wetlands and protect important biodiversity values for future generations. Once a management plan is prepared, a landholder can access funding of up to $10 000 to carry out the priority management actions identified in the management plan.

The Healthy Wetland Habitats Programme aims to work cooperatively with, and complement, other wetland-conservation programmes operating on the Swan Coastal Plain. To this end, it was agreed that clients within the areas of operation of existing WWF-Australia Wetland Watch and GeoCatch programmes would be referred to these programmes first. The Wetland Watch coordinator, Christina Mykytiuk, is also on the technical advisory committee for the Healthy Wetland Habitats Programme and has been instrumental in the programme's development.

As part of the programme, a GIS-based wetland-prioritisation process is being developed. This process will be used to rank wetlands based on biodiversity values and to determine the priorities for the programme, should it be over-subscribed. It is also hoped that this wetland-prioritisation process will have value beyond the programme within DEC, as well as for NRM groups.

The prioritisation process will use the Geomorphic Wetlands Swan Coastal Plain dataset, for which DEC is the custodian, and overlay biodiversity data—such as threatened flora and fauna data—to produce a score for each wetland. The biodiversity data has been given values and weighted using DEC conservation-management taxa (for example, 'Declared Rare Flora' has a value of 5, while 'Priority 3' flora has a value of 2). The analysis has been run, reviewed and refined a number of times. The prioritisation process is still in development and is currently being reviewed by the Healthy Wetlands Habitats technical advisory committee.

Promotion of the programme has already begun with articles in conservation newsletters and e-bulletins. As well, 3500 brochures are being distributed in a mail-out to private landholders near Swan Coastal Plain wetlands; DEC staff; other state government departments; local governments; NRM and Landcare groups; and other community groups.

The on-ground component of the Healthy Wetland Habitats Programme is expected to begin early in 2007.

For further information, please contact the Healthy Wetland Habitats Coordinator, WA Department of Environment and Conservation, on (08) 9334 0570.

References

Water and Rivers Commission 2001, *Position statement: wetlands*, Water and Rivers Commission, Perth.

Department of Conservation and Land Management 2004, *Towards a biodiversity conservation strategy for Western Australia*, Government of Western Australia, Perth.

Michael Coote (Senior Environmental Officer) and Melissa Rogers (Environmental Officer) of the Department of Environment and Conservation, helping with a wetland assessment for Healthy Wetland Habitats.
Photograph: Anthea Jones

LINKING WETLAND CENTRES IN ASIA AND OCEANIA

Christine Prietto
Hunter Wetlands Centre Australia
Australian Ramsar NGO CEPA Focal Point

Wetland Link International (WLI) is an initiative of the Wildfowl and Wetlands Trust (WWT) in the United Kingdom and a major platform of the Ramsar Convention on Wetlands. It aims to improve links between wetland educators at all levels.

Australia has had wetland centres for over 20 years. Presently there are at least 40 centres operating in all states and territories, dedicated to wetland education or with a strong focus on wetlands. They are associated with many types of wetlands, including Ramsar-listed sites. They range from small, non-staffed interpretation facilities to staffed, highly developed centres.

Linking these centres under the WLI umbrella and establishing WLI-Australia was coordinated in 2002 by the Hunter Wetlands Centre Australia (HWCA). Since that time WLI-Australia members have collaborated on a communication strategy, tourism brochures and surveys to review the needs and capacities of centres. Wetland centres are now being approached with the opportunity to serve as delivery hubs for a series of wetland-management training modules under the *Wetlands.edu* initiative funded by the Australian Government (see p. 31).

Wetland centres are prime vehicles for helping people experience wetlands, understand their values and contribute to their management. Increased communication around the world among wetland educators and wetland centres allows better exchange of information and expertise.

Expanding WLI-Australia to WLI-Oceania

One of the goals of the WLI-Australia communication strategy is to develop links with international colleagues. Expanding WLI-Australia to WLI-Oceania to include our partners across the Tasman is one option that has strong support. It would be wonderful to identify opportunities for collaboration between wetland centres in Asia and Australia. During 2006 the CEO of HWCA, Tara O'Connell, attended international meetings in New Zealand and China. There was great interest in building links among centres for communication and education work. HWCA has initiated contact with centres in the WLI-Asia network. Centres wishing to work with Asian wetland centres should contact HWCA to express their interest.

Coming opportunities to build links

A WLI-Asia symposium is to be held in late January 2007 at the newly opened Hong Kong Wetland Park—the first official meeting of the newly-formed WLI-Asia network. The symposium is jointly supported by the Hong Kong Wetland Park and WWF Hong Kong. This meeting will undoubtedly be the first of many such meetings to bring together wetland educators working in countries across the region. The three-day symposium aims to promote communication among wetland centres in Asia and to share experience on wetland-park management and on wetland communication, education and public awareness programmes.

In 2008 South Korea will host the next international meeting of the Ramsar Convention, COP 10. Korea shares a close connection with Australia through migratory bird agreements and other joint initiatives. There is a strong possibility that wetland education will have a place on the COP 10 agenda, so it is likely that activities for COP 10 will be a topic of discussion during the Hong Kong symposium. As this would be an opportunity to work towards a strong coordinated representation from Australian wetland centres, HWCA will look for opportunities to share the results from the Hong Kong symposium with our partners in the WLI-Australia network.

Further information

For further information, please contact Christine Prietto at HWCA at Christine.prietto@det.nsw.edu.au

Bird hides for use by visitors at the recently opened Hong Kong Wetland Park. Photograph: Christine Prietto

PERTH WETLAND TACKLES NUTRIENTS THE NATURAL WAY

Amy Kimber
Swan River Trust

Former Western Australian Premier Geoff Gallop once described the Swan and Canning rivers as 'environmental, cultural and historic icons—they are the crowning glory of our beautiful city.'

The Swan and Canning rivers are living icons of Perth. They are an important tourist attraction, providing recreational opportunities for visitors and residents.

Since European settlement, large sections of land surrounding Perth's rivers have been cleared and replaced with urban developments, industry and agriculture. This has resulted in nutrient-rich runoff entering the river system via the stormwater drainage network and contributing to algal blooms and fish kills.

In 2004 the Liege Street Wetland was built in Cannington, Perth, to demonstrate that a well-planned and constructed wetland can:

- tackle nutrients the natural way
- provide ecological habitat
- restore species diversity.

This project, a major initiative of the Western Australian Government's Drainage Nutrient Intervention Programme, demonstrated positive outcomes in all three areas.

One of the greatest successes of the project has been a partnership arrangement leading to the wetland's creation and ongoing management.

Together, the Swan River Trust, the City of Canning, the South East Regional Centre for Urban Landcare, the Two Rivers Catchment Group, the Department of Environment and Conservation, and the Water Corporation cooperatively built the innovative demonstration wetland, designed by Syrinx Environmental Pty Ltd.

Resourcing the project

The project to date has cost more than $700 000 to build, including site investigations, designs, earthworks and plants. In addition, the City of Canning has provided nearly $300 000 in kind, while other partners have also provided substantial in-kind staff time.

Since the first planting day more than 140 volunteers (contributing more than 1840 hours) have assisted with restoration works. Volunteer works have included:

- community and school planting days
- Corporate Care days hosted by the Trust
- planting and weeding by Conservation Volunteers Australia.

The Swan River Trust also committed $65 000 for monitoring in 2004–05 and $40 000 each year for the next three years together with $15 000 each year for maintenance.

The development and application of water-sensitive urban design technologies

Although wetlands have been constructed to treat stormwater in other parts of Australia and the world for many years, they have not been appropriate for Western Australian conditions. The Liege Street Wetland Project is a leading model for the construction of artificial wetlands for WA and can be widely implemented in the Swan and Canning river systems. The Liege Street Wetland has been designed to intercept pollutants through sedimentation, filtration, adhesion, nutrient uptake, microbial assimilation and nutrient transformation. The wetland demonstrates these benefits in an attractive stormwater treatment system accessible to everyone.

With the importance of water quality increasing and continued loss of wetlands and habitat on the Swan Coastal Plain, using vegetated systems to treat stormwater will guide best practice. Artificial wetlands provide flood control, stormwater treatment and improved habitat and amenity.

As can be seen in the figure below, specific design features include:

- a sediment forebay for collecting and removing sediment including metals and nutrients
- a series of naturally clay-lined ponds for sedimentation and aesthetics
- gross pollutant traps at each major drain outfall to trap floating litter
- densely vegetated sumplands to provide nutrient filtration, adhesion, direct uptake and substrate for biofilms, and to oxygenate the root zone
- a raised weir to create a floodplain
- two internal weirs for water-level manipulation to allow maintenance and planting
- the local council's Greenfield Street Drain with a subsurface flow filter bed
- a small council drain near the sediment forebay to allow draining if required
- an average detention time of five days in summer and autumn, engaging two ha of the wetland—with modelling estimating that nutrients will be at least halved.

How the wetland functions

Construction of the wetland was staged during a five-year period to allow adequate time for stakeholder consultation, appropriate construction schedules, planting and establishment. The five-year period also allowed for adaptive management using various techniques trialed in the wetland.

Three previously-degraded drainage channels discharged high levels of nutrients directly into the Canning River, contributing to summer and autumn algal blooms, and were only a few metres wide with little habitat, water quality or aesthetic value. The drains and surrounding areas had some remnant vegetation, but suffered from weed infestations.

Degraded nutrient-enriched drain with limited habitat value pre-works. Photograph: Department of Water, October 2003

The drains were converted into a diverse and attractive wetland system, with the system acting as a filter to restore the floodplain and prevent pollutants from entering the Canning River.

With construction and planting complete, education and monitoring strategies are now being put in place.

Constructed wetland post-works. Photograph: South East Regional Centre for Urban Landcare, 2006

Environmental outcomes

The environmental benefits of the project speak for themselves—with preliminary results showing a reduction of 33 per cent total nitrogen and 45 per cent total phosphorus. Monitoring has shown a significant improvement in habitat and remnant vegetation retention and enhancement, with 1.2 ha of active wetland created and 3.2 ha of dryland habitat restored. More than 70 000 native plants including 34 new local native species have been planted.

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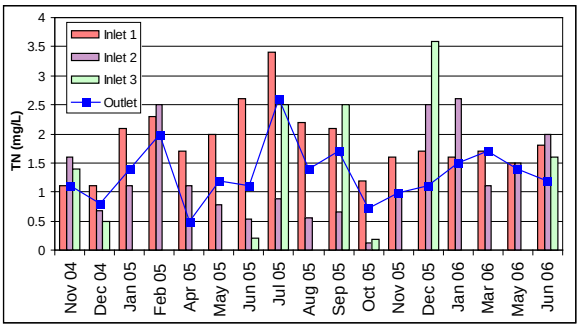

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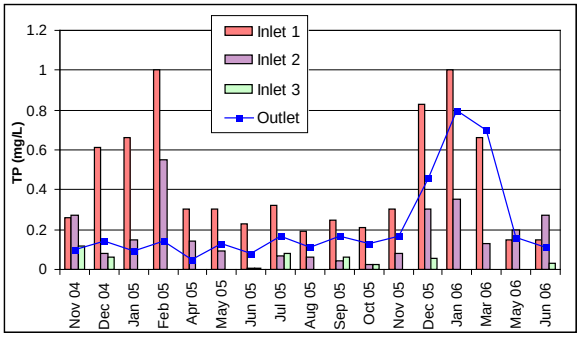

Graphs showing (A) total nitrogen and (B) total phosphorus concentrations at the three inlets and outlet (blue line)

The success of the project was recognised with two awards in 2006: a Western Australian Environment Award in the 'Bush, Lands and Waterways' category, and the National Award for Excellence in Stormwater Management from the Stormwater Industry Association.

The Liege Street Wetland has set a new standard for the control of nutrients entering Perth's river systems and provided a model for future projects coordinated by the Drainage Nutrient Intervention Programme and other stormwater managers.

For further information, please contact Amy Kimber at amy.kimber@dec.wa.gov.au or on (08) 9278 0919.

QUEENSLAND WETLANDS PROGRAMME

Angela Pattie
Queensland Wetlands Programme

What is the Queensland Wetlands Programme?

Queensland has one of the most diverse arrays of wetlands in Australia. A number are nationally and internationally acknowledged for their significant values. For instance, five Queensland wetlands are listed under the Ramsar Convention.

Queensland's wetlands provide essential habitat for 130 fish species. The state's wetlands also support 150 species of waterbirds, both resident and migratory, and more than 3000 species of plants. Many of the wildlife that live in these wetlands are considered rare or threatened.

The Australian and Queensland governments are committed to protecting and restoring these wetlands.

The Queensland Wetlands Programme was launched in 2003 to support projects and programmes that would result in long-term benefits to the sustainable use, management, conservation and protection of the state's wetlands.

The programme funds projects on the basis that they do one or a number of the following:

- improve the wetland information base
- assist in ensuring wetlands are considered in planning activities
- assist on-ground activities to protect and rehabilitate wetlands
- educate wetland managers and the community
- provide support for wetland managers to monitor the state of wetlands.

Today, the programme supports more than 30 projects across Queensland.

Urging the community to get involved!

The Queensland Wetlands Program achieved a major milestone recently with the completion of the mapping and classification of wetlands in the Great Barrier Reef catchment from the Wet Tropics to Wide Bay.

The mapping provides detailed information about 37 000 individual wetlands. The mapping team mapped a total of 58 million ha of land and water.

The maps are to a scale of 1 ha along the coastline and 5 ha inland and identify:

- location of wetlands
- size
- type
- degree of hydrological modification
- frequency of inundation
- salinity
- vegetation.

The maps are available at www.deh.gov.au/water/wetlands/qwp or as a DVD, which can be accessed by e-mailing wetlands@epa.qld.gov.au or calling (07) 3006 4621.

What the programme offers

The programme is developing tools to assist natural resource management regional groups, local and state governments, landholders, industry and researchers in making informed decisions about best practice management of wetlands.

A pilot programme has been established to implement on-ground works that deliver permanent protective measures for wetlands. A consortium led by Conservation Volunteers Australia on behalf of WetlandCare Australia, the Australian Centre for Tropical Freshwater Research and CSIRO is working with landholders in more than 20 sites around the Great Barrier Reef catchment.

Under the pilot programme, efforts are under way at a number of sites to trial various methods for the removal of aquatic weeds; develop 'local area work-plans' on weeds and hydrology; trial a wetland grazing management regime; establish a range of incentive mechanisms; engage property owners in environmentally sustainable production; and develop management techniques to rehabilitate and protect wetlands. A best management practice guideline on riparian and wetlands is also being developed in consultation with cane growers.

The Queensland Wetlands Programme is also developing a number of other projects, which are already available or due to be completed over the next two years, including:

- A comprehensive set of maps of wetlands that border the Great Barrier Reef. These maps provide planners, landholders and other decision-makers with valuable wetland information. The maps identify location of wetlands; size; type; degree of modification; frequency of inundation; salinity and vegetation. They are available through the Queensland Wetlands Programme web link at the end of this article.

- A series of Wetland Management Profiles are available online at www.deh.gov.au/water/wetlands/qwp. These are designed to help landholders make and implement management decisions about local wetlands.
- The Wetland Information Capture project will develop a system allowing local government, regional bodies and non-government stakeholders to contribute wetland inventory to the Queensland Wetlands Programme database. The information in this database will be available to all stakeholders online.
- A guideline with an interactive online database is being developed that will provide a list of assessment methods based on the user's needs and will allow users to search on key words for published Australian assessment tools.
- A customised grazing land management component is being developed.
- A decision support system is being developed to assist in prioritising wetlands for investment in the Great Barrier Reef catchment. This tool will help NRM regional groups, community groups and other organisations determine key sites for conservation.
- A wetlands monitoring scoping study will develop indicators for Queensland wetlands—tools to help assess and monitor wetland condition and extent.

The programme has developed an education component and welcomes opportunities to work with other groups in this area.

The suite of educational products includes:

- a field trip for Year 7 students, embarking on a two-day adventure through a local wetland
- a school programme that includes curriculum material for teachers and a series of 'Reef Beat' posters and activity books used in schools from Townsville to Bundaberg
- an interactive online activity called Web-Quest for students to do virtual assessment of wetlands from within the classroom.
- an interactive online tool for exploring wetlands in the Great Barrier Reef catchment, available at http://www.deh.gov.au/water/wetlands/qwp/explore.html

Central State School principal Anthony Ryan (left) with students, Queensland Wetlands Programme Field Trip project manager Donna Audas and Great Barrier Reef Marine Park Authority Education Officer Fred Nucifora.

- a wetland exhibit at the Great Barrier Reef Marine Park Authority Reef HQ Aquarium in Townsville, which demonstrates the importance of maintaining healthy inland and coastal wetlands in the Great Barrier Reef catchment. The exhibit has a waterfall high in the 'catchment area' that flows into still wetland pools surrounded by riparian vegetation.

Funding

The programme is a $23 million joint initiative of the Australian and Queensland governments and is funded through the Great Barrier Reef Coastal Wetlands Protection Programme and the Natural Heritage Trust Queensland Wetlands Programme. The Australian Government is contributing $15.5 million and the Queensland Government $7.5 million in-kind support.

Get involved

Managing wetlands is a collaborative effort. The Queensland Wetlands Programme encourages wetland managers to contribute to and develop wetland management tools.

For more information on the Queensland Wetlands Programme, visit www.deh.gov.au/water/wetlands/qwp or contact the programme's communications manager Angela Pattie on (07) 3006 4621 or email angela.pattie@epa.qld.gov.au.

The Queensland Wetlands Programme's latest education project will see Townsville students embark on a two-day adventure through a local wetland.

In 2007 the Townsville Central State School Year 7 class will leave their classroom behind and canoe down Stuart Creek as part of a field trip designed to highlight the importance of wetlands and their role in sustainable futures.

During the field trip, the students will be asked to develop an environmental impact study. They will draw on information studied during the term, supported by a school curriculum package developed in conjunction with the Great Barrier Reef Marine Park Authority under the Queensland Wetlands Programme.

Project coordinator Donna Audas said the students would gain an understanding of the relationship between wetlands, the land and the reef. 'The programme focuses on the journey of a water droplet from the upper catchment to the marine environment', she said.

'The students will develop resource assessment techniques (soil, vegetation, water quality, planning, social and economic), which will allow them to do hands-on field assessments in Stuart Creek. It will also give them a

WETLANDCARE AUSTRALIA: PROJECTS ON THE NSW FAR NORTH COAST

Garry Owers
WetlandCare Australia

During 2006 WetlandCare Australia completed on-ground works at 74 wetland sites under six separate projects with the aim of restoring wetlands on the north coast of NSW. The six projects were funded by the NSW Environmental Trust and the Northern Rivers Catchment Management Authority (NRCMA) with assistance from the Natural Heritage Trust—funding of over $580 000 plus a similar amount of local in-kind contributions.

Works involved environmental weed control, animal-control fencing, sediment control, aquatic-weed control, acid-sulphate soils management, cane-toad control and revegetation.

Overall achievements included:

- works carried out at 74 project sites located on properties and reserves
- 9860 metres of fencing
- over 445 ha of wetlands directly benefiting from improvements
- planting of more than 6200 trees to increase aquatic and terrestrial habitat and water quality
- engaging ten partner organisations to assist in wetland restoration and planning
- mutual benefits from the help of 71 volunteers
- demonstration of the effectiveness of riparian vegetation for sustainable management of artificial drains.

Useful projects that have benefited wetlands

Examples include:

- on-ground works at eight sites, totalling 93 ha, to protect wetlands with high conservation value—rated as endangered ecological communities (EEC)
- the coastal EECs targeted were freshwater wetlands on coastal floodplains, swamp-oak floodplain forest, and swamp-sclerophyll forest on coastal floodplains
- works included weed control, landowner education, restoration of natural-wetland hydrology and the installation of 4700 metres of stock-control fencing
- testing of two designs of cane-toad traps in urban and rural locations at the southern limit of cane-toad expansion in coastal NSW
- water-management trials, in cooperation with landowners, to improve coastal floodplain drainage and acid-sulphate soil management in the Bellinger and Nambucca River catchments
- demonstration of sustainable management of constructed drains with trial riparian-drain plantings involving 600 metres of wallaby fencing protecting a planting of 1500 trees—designed to show the effectiveness of riparian vegetation in naturally maintaining bank-stability and controlling drainage-system weeds through shading
- erection of 700 metres of stock-control fencing and planting of 1551 trees and wetland plants around a large dam to provide additional habitat for Black-necked Stork and Comb-crested Jacana, which are listed as threatened species in New South Wales
- erection of 750 metres of stock-control fencing and planting of 1463 trees and wetland plants around a reinstated wetland frequented by Black-necked stork and Comb-crested jacana
- extensive weed control, planting of 1700 trees and erection of 520 metres of wallaby fencing on a council wetland reserve to provide improved habitat and assist in controlling aquatic weeds
- funding assistance to enable a local Dunecare group to control weeds, erect 160 metres of post-and-rail fencing and plant 300 trees at a high-visitation public reserve
- erection of 575 metres of stock-control fencing to protect a freshwater- and swamp-sclerophyll wetland used by Black-necked stork and Comb-crested jacana
- erection of 1200 metres of stock-control fencing to protect a natural billabong.

For further information about any of the projects, visit the WetlandCare Australia website at www.wetlandcare.com.au

Trial drain planting under way. Photograph: Garry Owers

Bungawalbin wetland fencing and planting with EnviTE. Photograph: Garry Owers

NAMOI CATCHMENT MANAGEMENT AUTHORITY: WHERE ARE OUR WETLANDS?

Nathan Penny
Namoi Catchment Management Authority

The challenge

How do you invest in managing the wetlands in a large catchment if you don't know where they are? This was the challenge faced by the Namoi Catchment Management Authority (CMA) in north-west NSW as wetlands are important areas for management and investment in the CMA Catchment Action Plan. In 2006, Namoi CMA commissioned a study to answer this question and determine how to invest its incentive programme in this area.

Wetlands are an integral component of the Namoi CMA catchment target for water:

From 2006, there is an improvement in the condition of surface and ground water ecosystems.

Topographic maps close to four decades old held only limited information on wetland location. Even less was known about the type of wetlands, their biological and hydrological features or threats, and their condition. To fill this void the Namoi CMA commissioned a Namoi wetlands study.

What was the Namoi wetland study?

The purpose of the study was to identify and map the wetlands of the Namoi catchment and collate information into a GIS layer and database.

The study consisted of a desktop analysis followed by fieldwork. SPOT imagery was used to map the extent and location of the Namoi flood plain and its depressional wetland features. The fieldwork consisted of a rapid assessment of wetland type and condition for a representative range of individual wetlands.

Satellite image of wetlands in Namoi Catchment.
Namoi Catchment Authority

What did the study find?

The wetland study mapped the location and extent of the floodplain and depressional features capable of holding water. A total of 805 depressional features were mapped. Table 1 summarises size-class information of depressional wetland features.

Wetlands greater than	Total number of sites	Percentage of total sites
20 ha	56	7 %
10 ha	145	18 %
5 ha	280	35 %

Table 1: Summary statistics for depressional wetlands

In their report to the CMA, Hale et al. (2006) reported that the majority of the wetlands were in good condition, with low impacts to geomorphology and hydrology. However:

- the assessments were only a snapshot in time
- the method did not account for river regulation, which must be considered to impact on the hydrology in this region
- no measure of change in wetland type was incorporated—so condition assessments may have over-scored on a number of parameters.

Condition	Catchment	Hydrology	Geomorphology	Vegetation	Overall
Excellent	3	29	9	14	1
Good	29	5	18	13	21
Moderate	11	3	10	5	7
Poor	0	6	6	10	14

Table 2: Summary statistics for condition of wetlands assessed (Hale et al. 2006)

How will the study be used?

The mapping will be used to direct investment funds to significant wetland areas. The wetlands investment programme offers additional funding to landholders to improve the management of their wetland areas. In the targets for water quality this is stated as:

> *Incentive funding to improve wetland management is available for a range of works such as fencing and alternative watering systems for livestock.*

Most wetlands are located in the lower Namoi and this is where most of the investment will occur. Namoi CMA will add more field data to the database with ongoing fieldwork. Future monitoring and evaluation of wetlands will benefit from the database created through this study.

References

Hale, J, Kobryn, H, Butcher, R & Phillips, B 2006, *Namoi Catchment Wetland Inventory and Mapping*, report to the Namoi Catchment Management Authority, Gunnedah, NSW.

Namoi Catchment Management Authority 2006, *Namoi Catchment Action Plan 2006*, Part B Natural Resource Management Plan.


Photograph: Namoi Catchment Authority

COMMUNITY WETLAND PROJECTS

Yoni Levy
Community Water Grants
Australian Government Department of the Environment and Water Resources
Australian Government Department of Agriculture, Fisheries and Forestry

Background

Over 3000 community-based water-quality and water-saving projects were approved for funding by the Australian Government's Community Water Grants Programme in 2006. Wetland conservation projects have featured prominently in the two rounds of funding completed to date.

Community Water Grants is one of the three national programmes in the Australian Government's $2 billion Water Fund. The programme provides $200 million over five years to help communities meet Australia's water management challenge. The grants encourage better water use and improved water quality through practical, on-the-ground projects.

Grants of up to $50 000 help local community organisations save, recycle or improve the health of their local water resources. Typical projects involve:

- water saving and efficiency
- water recycling and reuse
- water treatment—improving surface and groundwater health.

Community Water Grants initiated a pilot scheme for larger grants up to $250 000. Due to a high level of interest, these grants will also be offered in the upcoming round.

Outcomes

Community Water Grants projects are implemented by community groups such as schools; environmental groups; rural organisations; sporting associations; community-care organisations such as hospitals, nursing homes and childcare centres; natural resource management regional bodies; local governments; and non-government organisations.

Many projects have involved:

- restoration of damaged wetlands—involving weed-removal and replanting of native vegetation
- improved flow and filtration of water entering wetlands
- construction of wetlands to control and filter run-off to creeks, rivers and the sea
- measures to exclude livestock and vermin from wetland areas.

Water quality projects close to Ramsar wetlands and wetlands of national importance are favoured in the grant-assessment process. Community Water Grants is working in partnership with a range of community groups to protect and improve wetlands.

- Wildlife Enterprises Pty Ltd initiated a project aimed at the rehabilitation of ephemeral wetlands and the associated creek line on Magnetic Island in Queensland. Removal of rubbish and weeds will be followed by the planting of native vegetation. These rehabilitation efforts will improve water quality and create a wildlife corridor from the National Park to the wetlands.
- Western Port Seagrass Partnership Limited organised efforts to protect Victoria's Western Port Ramsar wetland. The project involves the propagation of mangrove seedlings at a local school's nursery, along with 0.25 ha of seagrass. Educational programmes will enhance the community's stewardship ethic for Western Port and illustrate the role of mangroves and seagrass in protecting water quality. Revegetation will cover an area of 4.03 ha.
- Kimberley Land Council Aboriginal Corporation is working to protect the natural wetlands around Lake Gregory in Western Australia. Repairs will be made to stock watering points to draw cattle away from the wetlands—reducing erosion and the loss of habitats and vegetation.
- Werribee Catchment Management Protection Association in Victoria is constructing a vermin-proof fence to prevent animals and litter from entering wetlands. Water quality will be improved by the creation of a revegetated buffer zone.

The future

Community Water Grants will open Round 3 early in 2007. Information on successful projects and grant applications is available at the Community Water Grants website www.australia.gov.au/communitywatergrants

Volunteers from Friends of Oxley Common remove salvinia weeds from Pelican Lagoon in Brisbane. Photograph: Marion Joyce Forrest

Harvester boat removes salvinia weeds from Pelican Lagoon, Oxley Common in Brisbane. Photograph: Marion Joyce Forrest

Glossary

adaptive environmental water. Water committed under an access licence for specified environmental purposes, either generally or at specified times or in specified circumstances.

bioregion. A relatively large area of land or water that contains a geographically distinct assemblage of natural communities.

conservation management taxa. Classifications used to rate flora, fauna or regions considered to be in danger or in need of special protection.

debitage. The sharp-edged waste material left over when a tool is made.

Envirofund. An Australian Government community grant scheme under the Natural Heritage Trust, providing funding for on-ground actions by groups and individuals aimed at conserving biodiversity and promoting sustainable resource use.

karst-fed. Fed by underground drainage or other hydrological system.

lunette. A crescent-shaped dune.

midden. A mound of shells of edible molluscs and other refuse, indicating prehistoric human habitation.

montane. Mountain top ecology.

National Action Plan for Salinity and Water Quality (NAP). A joint initiative of Australian governments at the state, territory and federal levels, targeting 21 priority regions affected by salinity and water-quality problems.

Natural Heritage Trust (NHT). The Australian Government's $3 billion investment in the coordinated restoration and conservation of Australia's environment and natural resources.

Ramsar. The Ramsar Convention on Wetlands, agreed in Ramsar, Iran in 1971. Aims to achieve 'the conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world'.

refugia. A region that has retained earlier geographical, climatic and other conditions, and therefore becomes a haven for older varieties of flora and fauna.

wetland. The Ramsar Convention definition of 'wetland' includes areas of marsh, fen, peatland or water—whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt—including areas of marine water that does not exceed six metres at low tide. A wetland may also incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands.

Abbreviations and acronyms

CMA	Catchment Management Authority
EPA	Environmental Protection Authority
GIS	Geographic Information Systems
GL	gigalitres
ha	hectare/s
HWCA	Hunter Wetland Centre Australia
ML	megalitres
NAP	National Action Plan for Salinity and Water Quality
NHT	Natural Heritage Trust
NRM	natural resource management
PALS	Partnership Acceptance Learning Sharing—an annual programme run by Western Australian Department of Indigenous Affairs
TRG	technical reference group
WWF-Australia	World Wildlife Fund Australia

The Australian Government facilitators network

The Australian Government funds a network of facilitators to support the regional delivery of natural resource management under the Natural Heritage Trust Extension and the National Action Plan for Salinity and Water Quality.

The primary purpose of the Australian Government NRM facilitators is to support and communicate Australian Government policies, programmes and priorities, particularly in relation to the National Action Plan on Salinity and Water Quality and the Natural Heritage Trust. These facilitators also engage relevant government, industry and community stakeholders in relation to one of four broad natural resource management themes:

- coastal and marine;
- biodiversity conservation;
- water; and
- sustainable resource use.

The 30 Australian Government facilitators located across the country foster activities that fall within the Bushcare, Landcare, Coastcare, and Rivercare themes of the Natural Heritage Trust, and also support the National Action Plan for Salinity and Water Quality. The Rivercare facilitators have an extensive understanding of river and wetland issues. Their contact details are:

	Name	Email	Phone	Mobile
Queensland	Brad Lewis	brad.lewis@csiro.au	(07) 3214 2369	0438 201 246
New South Wales	Sally Hunt	sally.hunt@interact.com.au	(02) 4388 2163	0428 874 846
Australian Capital Territory	Michael Schultz	michael.s.schultz@environment.gov.au	(02) 6272 3305	0438 093 798
Victoria	Pam Robinson	pam.robinson@dse.vic.gov.au	(03) 9637 8979	0438 089 231
Tasmania	Imogen Birley	Imogen.Birley@nht.tas.gov.au	(03) 6233 3401	0439 410 040
South Australia	Paul Francis	paul.francis@csiro.au	(08) 8303 8673	0439 411 431
Western Australia	Clare Taylor	clare.taylor@csiro.au	(08) 9333 6706	0438 218 162
Northern Territory	Russell Willing	russell.willing@nt.gov.au	(08) 8999 4507	0438 089 281

For more information about the Australian Government NRM facilitator network please refer to the Natural Resource Management web site at www.nrm.gov.au/community/network.html#austgov

If you would like to tell your story in the next edition of *Wetlands Australia*, or have any feedback on this edition, please contact the Wetlands Section of the Department of the Environment and Water Resources on (02) 6274 1111 or via email: wetlandsmail@environment.gov.au

www.deh.gov.au/water/wetlands