Australian Government

Department of the Environment and Energy

# Wetlands Australia 2018

Front cover: City of Caloundra near Pumicestone Passage, Moreton Bay Ramsar wetland (Jim Mollison)

Back cover: The blue fairy orchid, *Pheladenia deformis* and the carnivorous *Drosera menziesii* growing together in the Alison Baird Reserve (André Arruda)

# Contents

# Introduction

Wetlands Australia 2018 brings together a collection of inspiring stories of amazing wetland places and the people who are passionate about looking after them. This edition highlights *Wetlands for a sustainable urban future*, the theme for World Wetlands Day 2018.

Urban wetlands provide refuges for wildlife as well as welcome retreats for city dwellers and their families from the hustle and bustle of city life. Some urban wetlands, including constructed wetlands, can remove sediment and pollutants from urban runoff—providing clean water that can also be used for irrigating sporting fields, watering gardens and preventing pollutants entering rivers and estuaries.

This edition also features articles about internationally-significant Ramsar wetlands, habitat restoration in coastal and inland settings, community engagement and innovative approaches to wetland management.

We hope you enjoy this edition of *Wetlands Australia*.

If you would like to contribute to future editions of *Wetlands Australia*, please contact wetlandsmail@environment.gov.au.

You can also to subscribe to *Wetlands Australia* to receive new editions by going to our web page and signing up: http://www.environment.gov.au/water/wetlands/publications/wetlands-australia

Fact sheets highlighting the importance of wetlands are also available.

*Mangroves in Kakadu* (Allan Fox)

# Wetlands for a sustainable urban future

# Creating wetlands to treat stormwater—keeping city gardens alive and Gulf St Vincent clean!

Mark Hannan, Strategic Planner—Open Space Environmental Management
Shannon Watkins, Co-ordinator—Recycled Water
City of Charles Sturt

The 'Waterproofing the West' project captures and treats up to 2400 million litres of stormwater from local urban catchments, as well as stormwater flowing into the urban section of the River Torrens, each year. The project created wetlands along Old Port Road, Cooke Reserve, West Lakes Golf Course and the former Cheltenham Racecourse site. In a major stormwater use project, City of Charles Sturt is now harvesting, treating and storing this water in aquifers for use in irrigation and for flushing toilets, watering gardens, washing cars and paving, and filling ornamental ponds and water features.

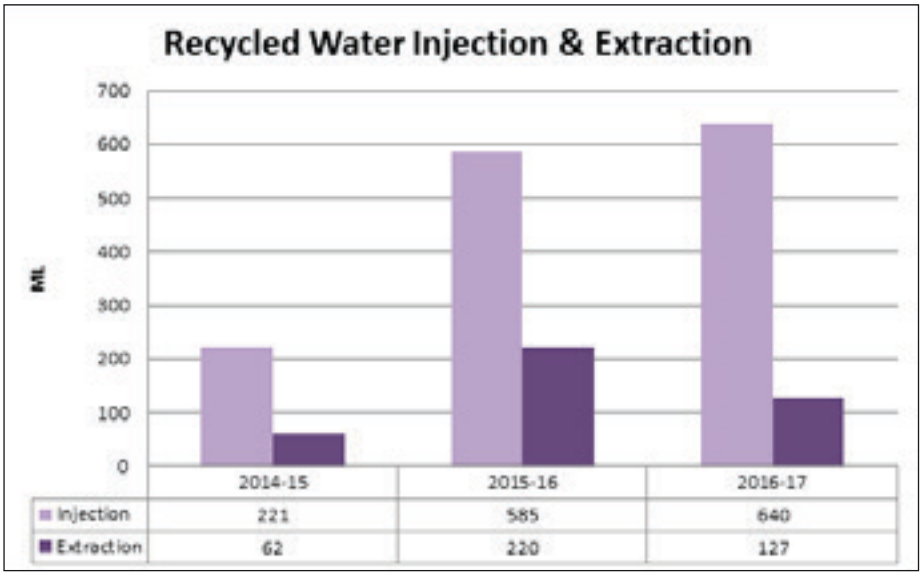
The Charles Sturt city council's recycled water operations consists of a large number of individual components working together as one stormwater harvesting and reuse scheme.

Stormwater, a combination of rainwater and roof water, is captured within two of the council's surface water catchment areas—the Torrens Road catchment, an area of approximately 460 hectares, and the Port Road catchment, an area of approximately 590 hectares. Water is also extracted from the River Torrens.

Water entering each of the constructed wetland treatment systems flows through gross pollutant traps to remove large debris before entering one or more sedimentation basins where many of the pollutants settle and are eventually removed by dredging. The sedimentation basins are mainly open water with aquatic vegetation on the edges.

*Original (pre-construction) site condition showing concrete drain* (City of Charles Sturt)

*Construction phase once concrete channel drain had been removed* (City of Charles Sturt)




The next stages are wetlands comprising large and small open bodies of water with deep pools and shallow areas with a selection of aquatic plants for a natural water treatment process. Water becomes cleaner as it travels through each stage of the system. The resulting clean water is injected into local aquifers for storage and is available for later extraction.

Council has used extracted water to irrigate open space or to top up the wetlands, where required.

The past two years have been quite wet—during both winter and summer—leading to increased volumes of water being injected but little water being extracted as it was not needed for irrigation and other uses such as topping up ponds.

In drier times, the stored water will become a highly-valued resource.

The wetlands are preventing stormwater-borne pollutants from being discharged into the marine environment of Gulf St Vincent. Pollutants including manganese, molybdenum, dissolved and suspended solids, nitrogen, phosphorus and zinc were shown in laboratory tests to have decreased after treatment in the wetland systems.

Between 2014 and 2017 the total volume of potentially polluted stormwater prevented from being discharged to the gulf, and thus protecting the fragile marine environment per annum has been estimated to be 1704 megalitres.

For further information visit our website: www.charlessturt.sa.gov.au or contact: mhannan@charlessturt.sa.gov.au, or swatkins@charlesturt.sa.gov.au

*Post-construction, landscaped and operational* (City of Charles Sturt)

*Close up of water body and macrophytes* (City of Charles Sturt)

# Restoring the Fotheringham Reserve Billabong

Bertrand Salmi—Water Technology, and Matthew McClymont, Jack Chittenden and Maree Keenan—City of Greater Dandenong

Water stress is believed to be a key contributor to the declining health of fragmented ecosystems in urban areas. This is thought to be the case for Fotheringham Reserve—16 hectares of public open space in the City of Greater Dandenong, Victoria.

Fotheringham Reserve hosts one of the largest intact, remnant river red gum (*Eucalyptus camaldulensis*) woodlands in Dandenong and benefits from an active 'friends' group' that assists the Greater Dandenong City Council in its management.

The bushland reserve features a revegetated billabong system and is dependent on the Yarraman Creek for its water and survival. The billabong is a treasured asset, highly valued by both the council and community.

The reserve is adjacent to EastLink; a major motorway. The Yarraman Creek was realigned to allow for the new road in 2006, but the health of the riparian vegetation in the billabong has since declined. Billabongs are ephemeral systems and further decline may reduce the long-term viability of the wetland vegetation, facilitating a transition to a terrestrial ecosystem.

Due to the high value of the billabong, the council wants to protect and enhance its ecological condition and function. Water Technology is currently undertaking year-long hydrological monitoring, funded by Melbourne Water's Living Rivers program, and quarterly vegetation surveys to determine whether water levels in the billabong could be manipulated to protect its ecosystem.

Despite anecdotal evidence from council officers and the community that, since the construction of the EastLink, the billabong areas no longer 'flood' during the winter season; four 'flood' events were recorded between December 2016 and September 2017 showing floodwater entering the billabong.

*The Billabong, Fotheringham Reserve* (Water Technology)

Monitoring data was used to calibrate a hydraulic model of the Yarraman Creek and the billabong. The model showed that while the billabong received water from the creek during these events; plant litter, debris and sediment may have partially filled it, thereby reducing its capacity to retain sufficient water to sustain water plants between flood events.

The long-term hydrological water regime of the billabong will continue to be monitored. Possible measures to restore the billabong to health over the next ten years are being identified. Measures could include artificially triggering inundation periods. This study will also provide council with well-informed, context-specific management options for the billabong which aren't available through broader best-practice management plans.

For more details on Water Technology activities, see our website at www.watertech.com.au.

For more information on how the City of Greater Dandenong is managing urban wetlands, see our website at www.greaterdandenong.com.

For more information on the Living Rivers program and how Melbourne Water assist local government on water quality and wetland projects, see https://www.melbournewater.com.au/livingrivers.

*Monthly flow monitoring regime: checking the Yarraman Creek flow logger at Fotheringham Reserve* (Amelia Leavesley)

# Darwin's urban wetland revival

Nick Fewster, Regional Coordinator Darwin, Conservation Volunteers Australia

The Revive Darwin's Wetlands project aims to raise awareness and foster community action at two, lesser-known Darwin wetlands. Knuckey and McMinns lagoons are within an hour's drive of Darwin and are part of *Directory of Important Wetlands in Australia* listed sites. However, many Darwin locals and tourists have never visited the wetlands or are unaware of their conservation significance.

This project, delivered through Conservation Volunteers Australia and supported by the Northern Territory Government, aims to activate interest in these wetlands and contribute to their conservation by developing education resources, holding community events and supporting local communities in planning and on-ground environmental management and monitoring activities.

A key element of this project is a partnership with Landcare NT to boost newly-formed and existing Landcare groups, so that strong community connections with these wetlands can be sustained well beyond the project's 12-month timeframe.

Both lagoons contain water long after the wet season has passed, providing an important habitat for native wildlife, particularly magpie geese (*Anseranas semipalmata*), the little curlew (*Numenius minutus*), egrets (*Ardea ibis, Ardea alba, Egretta intermedia, Egretta garzetta*), and the long-necked turtle (*Chelodina rugosa*), as they wait out the dry season.

McMinns Lagoon also hosts the black-footed tree rat (*Mesembriomys gouldii*), recently captured on night camera and which is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

It is expected thousands of volunteer hours will be invested in improving the health of Darwin's local wetlands over dozens of on-ground community volunteering days. The activities undertaken will include managing pest plants and animals, undertaking tree planting, removing litter and monitoring flora and fauna.

For further information contact Louise Duff, Program Manager—Wetlands Catchment Coasts, CVA. M: 0432 688775; E: lduff@cva.org.au

*McMinns Lagoon, Darwin* (B McWilliam)

# Engaging the community in a water-smart project to capture stormwater for biodiversity

Louise Duff, Program Manager Wetlands Catchments Coasts, Conservation Volunteers Australia

Newcastle is a wetland city. Encompassing the Hunter Estuary Ramsar site, it is a key stopover for migratory shorebirds on the East Asian-Australasian Flyway. Managing urban waterways to protect water quality and biodiversity is a priority for land managers across the city. Engaging the community to understand the issues, help manage natural resources and practise sustainable behaviours should benefit the habitat.

Conservation Volunteers Australia (CVA) recently completed construction of a water-smart wetland at Allowah Reserve in Newcastle that shows how community engagement can be incorporated into a major project for maximum impact.

Allowah Reserve is in the Ironbark Creek catchment, which feeds into the Hunter Wetlands Centre; part of the Ramsar site. Our goal was to capture run-off from a sportsfield, store it in the soil and use it to create a biodiverse open woodland. The project reduces peak flows, stops erosion, filters pollutants and creates a tranquil walkway to the University of Newcastle.

CVA partnered with the university, the Newcastle City Council and the Soil Conservation Service to complete the project, using innovative design and practicality. The project was designed through a collaborative process run by the university's Tom Farrell Institute (TFI) for the Environment.

An on-site workshop gave participants the opportunity to assess the reserve and identify objectives, issues and solutions. A consultant from Soil Conservation Service translated TFI's concept design into detailed drawings. Newcastle City Council was a partner throughout—authorising the site, participating in the design phase and approving the project.

*Allowah Reserve before the works began* (Conservation Volunteers Australia)

*Allowah Reserve during remediation works* (Conservation Volunteers Australia)

Work commenced with construction of contour banks, swales and ponds. CVA engaged local community volunteers and professional bush regenerators to plant 10,900 local natives from 25 species. A community planting day enabled neighbours to participate.

Asked about the day in an evaluation survey, one of the participants wrote: "A *wonderful activity for all community members. It raised awareness of the importance of caring for our local environment, and brought us back to earth."* The benefits of this approach could be seen when the project manager was inspecting the site months later and came upon a neighbour hand-weeding the new trees on her day off, nurturing the wetland habitat.

The project was funded by the Australian Government through the National Landcare Program. It was one of 14 sites in Newcastle Wetland Connections, a four-year program to improve the upstream catchment of the Hunter Wetlands Centre. CVA is keen to replicate these activities in other locations through its Revive our Wetlands program.

Find out more by visiting http://conservationvolunteers.com.au/what-we-do/revive-our-wetlands/newcastle-wetland-connections/

To discuss Revive Our Wetlands opportunities in your area email lduff@cva.org.au

*Allowah Reserve after the works were completed* (Conservation Volunteers Australia)

# Conserving the Greater Brixton Street Wetlands and Yule Brook: iconic wetlands within an industrial area

Katy Evans—Curtin University
Hans Lambers and André Arruda—University of Western Australia
Patricia Harris—Murdoch University

The Greater Brixton Street Wetlands (GBSW) provide an irreplaceable rarity repository of floristic biodiversity in the Perth Metropolitan Region. The 143 hectares, located less than 15 kilometres from central Perth, host an extraordinary total of over 558 flora taxa, some found nowhere else.

The wetlands are home to 11 listed threatened flora species (eight listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and three under Western Australia's *Biodiversity Act 2016*; three EPBC Act-listed threatened fauna species; four EPBC Act-listed threatened ecological communities, including the critically endangered '*Claypans of the Swan Coastal Plain*'; and more carnivorous plant species than the European continent. There are also 27 priority flora species listed by the WA Department of Biodiversity, Conservation and Attractions.

Flora and geomorphic studies suggest that the adjacent Yule Brook was vital in the development of the complex habitats that nurture the floristic biodiversity of the GBSW. Yule Brook and the GBSW form a 'Falls to Floodplain' corridor that connects the intact native forest of the Darling Plateau, the botanically hyper-diverse GBSW, and the Canning River Regional Park—a haven for water birds and other native fauna. In Indigenous creation lore, the brook marks the journey of the Wagyl (a snake-like dreamtime creature) between the ancient ceremonial site (Jerban) at Lesmurdie Falls through Indigenous sites in and around the GBSW, to the Canning River.

*Alison Baird Floral Reserve, part of the Greater Brixton Street Wetlands* (André Arruda)

*The blue fairy orchid,* Pheladenia deformis *and the carnivorous* Drosera menziesii *growing together in the Alison Baird Reserve* (André Arruda)

The GBSW and Yule Brook lie within the Maddington-Kenwick Strategic Industrial area, which has been earmarked for industrial development for the last two decades. While the GBSW are protected under the Bush Forever state government policy, environmental challenges associated with development remain.

To showcase the environmental values of the wetlands and explore best practice for industrial development in such sensitive areas, a symposium was held on 17 October 2017. The symposium, entitled "Rich and Rare: Knowing and Caring for the Greater Brixton Street Wetlands and Yule Brook" was organised by the The Beeliar Group—Professors for Environmental Responsibility, the City of Gosnells, and SERCUL (South East Regional Centre for Urban Landcare).

The symposium attracted a capacity crowd with more than 100 registered attendees. After a summary of the history of planning for the area, a multidisciplinary suite of talks addressed topics ranging from new results identifying the source nutrients for flora in the different threatened ecological communities to hydrogeology, best practice techniques for source control storm water management, regional ecological connectivity, applications of ground penetrating radar and electrical resistivity imaging for sub-surface imaging and transport planning. A new guided fieldtrip around the GBSW, designed for the phone app, CurTerra and developed by Curtin University, was released.

It is hoped that the knowledge transfer at the symposium will contribute to preservation of an outstanding natural asset in this biodiverse capital city.

Further information can be found at https://thebeeliargroup.com/

*Participants of the Rich and Rare field trip with leader Cate Tauss* (Katy Evans)

# Wetlands for treating greywater

Professor Max Finlayson, Institute for Land, Water and Society, Charles Sturt University

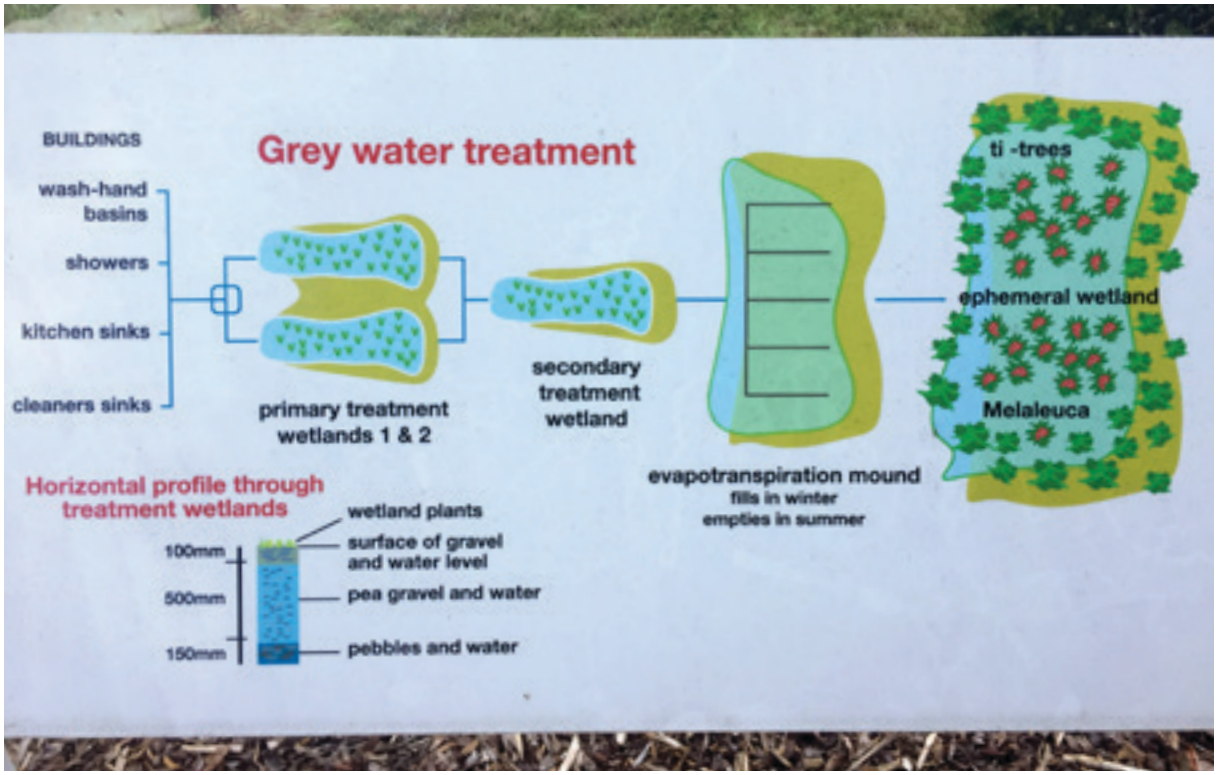
For more than 50 years constructed wetlands have been in use across the world to treat polluted water. Initial efforts in Australia were led through the CSIRO research station that existed in Griffith, NSW, with many wetland systems of different sizes now fully operational and delivering benefits to their local communities. One of the more integrated systems was established at the Charles Sturt University facilities in Thurgoona on the outskirts of Albury, NSW.

Now known as the David Mitchell Wetlands—in honour of Professor David Mitchell and his immense contributions to the evidence-based management of Australia's aquatic ecosystems—these systems were constructed as part of the development of a new campus, providing a marvellous opportunity to design an environmentally-efficient, on-site water management system in a "green field" site.

Three root-zone treatment, gravel-based wetland systems were constructed in 1989 for treating greywater from the university buildings. Slotted agricultural piping was buried in the gravel to make it possible to inject air into the system if needed to combat deoxygenation. Two primary systems are planted with the emergent aquatic plant, *Schoenoplectus validus*, leading to a third secondary system planted with the reed *Phragmites australis*. Greywater flows into one of the primary systems until the level rises to within about 5 cm of the gravel surface. The water is retained while the other primary system fills to the same level, and is then emptied into the secondary wetland system where it is retained while the first fills again. This sequence continues indefinitely. The plants in the systems grow vigorously and while they need maintenance, they do not need regular cropping.

As there was no firm evidence at the time of construction that this design would produce an effluent of acceptable quality, it was augmented by an evaporating mound planted with the sedge, *Carex appressa*. An ephemeral wetland was constructed adjacent to the evaporating mound to retain water not lost through evaporation.

*David Mitchell, whose pioneering work contributed to effective on-site greywater treatment systems* (Max Finlayson)




*The David Mitchell greywater treatment wetlands—plan* (Max Finlayson)

The principal criterion for judging the suitability of treated greywater for re-use is the count of thermo-tolerant coliform bacteria, as this is an indication of faecal contamination. On this basis, the David Mitchell wetland system has performed well and provides evidence that individual units of this nature are effective—they can treat greywater and meet the initial expectations and specifications. As such the David Mitchell Wetlands serve as a demonstration of sustainable practice.

The contributions of David Mitchell to the use of wetland plants to treat wastewater are just a part of his tremendous legacy. His leadership has been widely recognised and his willingness to spend time advising and supporting others is an example to all.

The following articles provide more detailed information:

Mitchell, D.S., Chick, A.J., and Raisin, G.W., 1995. The use of wetlands for water pollution control in Australia: An ecological perspective. Water Science and Technology, 32: 365–375.

Mitchell, D.S., Croft, I., Harrison, T., and Webster-Mannison, M. 2001. Water management on the Thurgoona campus of Charles Sturt University. In: R.A. Patterson and M.J. Jones, Proceedings of On-site '01 Conference: Advancing On-site Wastewater Systems. pp. 287–294.

# Wetland restoration for biodiversity and carbon storage

# Restoration of the Fleurieu Peninsula Swamps

Mark Bachmann, Nature Glenelg Trust

## The first project to address artificial drainage of Fleurieu Peninsula Swamps is up and running at Stipiturus Conservation Park.

Glenshera Swamp, situated six kilometres west of Mount Compass, South Australia, was first surveyed in February 1899. When the first aerial photograph was taken 50 years later in April 1949, the main change observed was the diversion of surface flows away from the swamp.

Today a sizeable portion of the former extent of Glenshera Swamp is located within Stipiturus Conservation Park and is widely considered one of the most important remaining swamps of the Fleurieu Peninsula, a nationally-threatened ecological community. The site retains a suite of important biodiversity values despite efforts over several decades (up to its reservation in 2003) to make the area more suitable for agricultural production through artificial drainage, as well as clearance and grazing activities.

A restoration options report, completed by Nature Glenelg Trust, in March 2016 comprehensively described the history of change that led to the current modified condition of the site. The report defined the location, past purpose and impact of the artificial drains across the entire wetland for the first time and proposed six actions to address key elements of the hydrological regime. Four of these were implemented in the autumn of 2017.

In April 2017, Nature Glenelg Trust completed the construction of a series of seven restoration structures along the main drain in the park with the support of a range of volunteers, including Conservation Volunteers Australia Green Army Team, the Youth and Community in Conservation Action group and a range of other helpers.

*Top left: Structure #5—the point where flows are now diverted north, back to the swamp—before works* (Nature Glenelg Trust)

*Top right: Structure #5—autumn works complete* (Nature Glenelg Trust)

*Bottom: Structure #5—winter diversion towards the swamp* (Nature Glenelg Trust)

Despite a dry June, the works have been fully operational since July 2017 when the catchment started to generate sufficient runoff to reactivate the former creek channel and a narrow band of adjacent floodplain and restore all low-moderate creek flows towards the main swamp for the first time in seven decades.

As a result of the early success at Glenshera Swamp, Nature Glenelg Trust has recently assessed the restoration feasibility of Fleurieu swamps in the nearby Tookayerta catchment, south east of Mount Compass. The Trust is looking at opportunities to initiate similar projects there, including at Hesperilla Conservation Park. Given the extensive array of drains across the valleys of the Fleurieu Peninsula, there is significant potential to replicate this type of restoration and improve the overall condition and resilience of the swamps of the Fleurieu Peninsula ecological community.

For more information on the progress of the Fleurieu Swamps eco-hydrology project or other Nature Glenelg Trust projects, please visit the Trust's website www.natureglenelg.org.au or email info@natureglenelg.org.au.

*Top: Structure #5—NGT and the Green Army team* (Nature Glenelg Trust)
*Bottom: Stucture 6—Youth and Community in Conservation Action group* (Nature Glenelg Trust)

# Working together to get the wet into wetlands and Wingillie Station

Cathryn Thiris and Richard Mintern, Commonwealth Environmental Water Office

Ken Warren looks out across an inundated lignum flat listening to the sounds of southern bell frogs. "It's bloody marvellous!" he says as environmental water flows through recently reinstated irrigation infrastructure originally established in 1930.

Ken is the manager of Wingillie Station, a not-for-profit private conservation reserve on an old sheep station near Wentworth in the far west of New South Wales. The property is being transformed through the application of environmental water and an innovative collaboration of partners.

The Commonwealth Environmental Water Office (CEWO) is working in partnership with the NSW Office of Environment and Heritage (OEH) and the Murray-Darling Wetlands Working Group (MDWWG) to deliver environmental water to six wetland complexes on Wingillie Station and Lucerne Day property. These semi-permanent and intermittent wetlands support a range of native flora and fauna, including waterbirds and the nationally endangered southern bell frog, which has been heard calling in all six wetlands following inundation.

River regulation and infrastructure has resulted in a decrease in the frequency, magnitude and duration of flood events along the River Murray. Before the 2016 natural flood event, the majority of wetlands in this region had not received water for many years, resulting in a deterioration of ecological health. Natural flooding in spring 2016 resulted in an improvement in vegetation health and breeding opportunities for native fauna, and the recent managed environmental watering activity seeks to capitalise on and enhance this rejuvenation.

The success of this environmental watering event is built on the important working relationships between the CEWO, NSW OEH, and the MDWWG. In particular, the MDWWG is responsible for the coordination of Commonwealth environmental water delivery and project management, including liaison with key stakeholders and monitoring.

*Wetland 793 on Lucerne Day* (Department of the Environment and Energy)

The MDWWG worked with landholders, particularly Ken Warren who, with a small cohort of volunteers, was responsible for the restoration of block banks, re-licensing of an old irrigation inlet and daily management and maintenance of water pumps.

The MDWWG conducted regular monitoring throughout the event, including recording canopy health, lignum shrub land condition, the number and extent of flora species, and frog and waterbird surveys. Spotted crake were reported using the lignum swamps, while a common greenshank (a northern hemisphere migrant) was observed feeding in a creek line. Regent parrots were also sighted and are thought to be nesting nearby. Local Traditional Owners from the neighbouring Tar-Ru Lands have also participated in the monitoring.

Ken Warren takes a detour as we head back from the Lucerne Day wetland across a wide saltbush plain to a broad depression long deprived of water. Kangaroos look on as Ken points out a nearby old irrigation channel, long since retired. He turns to me and grins. "What do you reckon?" he says, and there's a gleam in his eye.

To see drone footage of the Wingillie Station wetlands visit https://www.facebook.com/pg/envirogov/videos

*Top: Ken Warren watching environmental water* (Department of the Environment and Energy)
*Bottom: Wetland 451 on Wingillie Station at outflow point* (Department of the Environment and Energy)

# Murray wetland rehabilitation leaves a lasting legacy for local communities

Murray Darling Wetlands Working Group Ltd and Murray Local Land Services

A six-year project aimed at improving carbon storage and biodiversity in wetlands has had a big impact on inland NSW communities.

The Murray Wetland Carbon Storage Project, which completed its final year in 2017, has successfully implemented a program that:

- invested staff time to build relationships with landholders and community groups rather than making management payments
- used contractors to deliver on-ground works to free up landholder's time
- allowed for the development of management actions that integrated farming activities and biodiversity and carbon storage interests.

The approach to implementing the project proved to be a success. The overall aim of the project was to deliver 2000 hectares of rehabilitated wetlands. This target was far exceeded, with a total of 3750 hectares of wetlands rehabilitated. Activities included fencing and revegetation at private properties, and signage and visitor facilities such as bird hides at wetlands on public land.

*Murray Wetland—Doodle Comer* (Jim Ridley)

*Murray Wetland—Doodle Comer* (Bernard Clark)

## *Case Study: Doodle Comer Swamp Nature Reserve*

Doodle Comer Swamp Nature Reserve is a 1098 hectare ephemeral swamp near Henty, in southern NSW. When full, the wetland attracts large numbers of water birds, including brolga, Latham's snipe, and the white-bellied sea eagle. The swamp is the largest wetland of its type in southern NSW and is listed in the Australian Government's *Directory of Important Wetlands in Australia*.

In 2015, the Murray Wetland Carbon Storage Project began working with NSW National Parks and Wildlife Service (who manage the reserve) to increase carbon retention and improve biodiversity by planting more than 10,000 local woodland plants.

The installation of bird hides by the Wagirra Indigenous Works Crew (from Albury City Council's Aboriginal employment and training program) and signage has also improved the visitor experience. An investigation of the vegetation community at the site was also completed to support future management activities.

The health and diversity of the wetland and woodland vegetation at Doodle Comer Swamp will continue to be improved through ongoing management and monitoring, as will the other 39 project sites under the Murray Wetland Carbon Storage Project.

The project leaves a lasting legacy for local communities to build on and enjoy the benefits wetlands have to offer.

For more information:
Susanne Watkins
Murray Wetland Carbon Storage Project Officer
susanne.watkins@lls.nsw.gov.au

# Restoring Paiwalla wetland

Paiwalla Wetland Habitats Trust

Paiwalla is a wetland on the eastern floodplain of the River Murray between Mannum and Murray Bridge in South Australia, in the Lower Murray section of the Murray-Darling Basin.

Paiwalla is owned by the Wetland Habitats Trust (Paiwalla) and is managed by the Wetland Habitats (Paiwalla) Association Inc. The association was established in 2000 by a group of like-minded people, with the objective to acquire areas previously claimed from the river for the purposes of farming, and to restore them to managed wetlands.

The initial purchase comprised a 64-hectare site reclaimed from river swamps in 1967 for agricultural purposes—beef farming, vegetable growing and dairying.

The wetland is a significant site for the protection of native flora and fauna and is listed in the *Directory of Important Wetlands in Australia*.

The rehabilitation of Paiwalla wetland has seen significant progress and success in furthering the Trust's objectives. Surveys at the site have recorded:

- 174 bird species present, up from the 90 species recorded prior to rehabilitation. Fifty five bird species breeding at the site, including six of conservation significance, and a further 12 species of conservation significance that do not breed at the site
- 10 frog species present and breeding, including the vulnerable southern bell frog
- all three River Murray turtles present and breeding, including the vulnerable broad-shelled species
- seven species of native fish present and breeding
- 10 species of bat, including the uncommon large-footed bat.

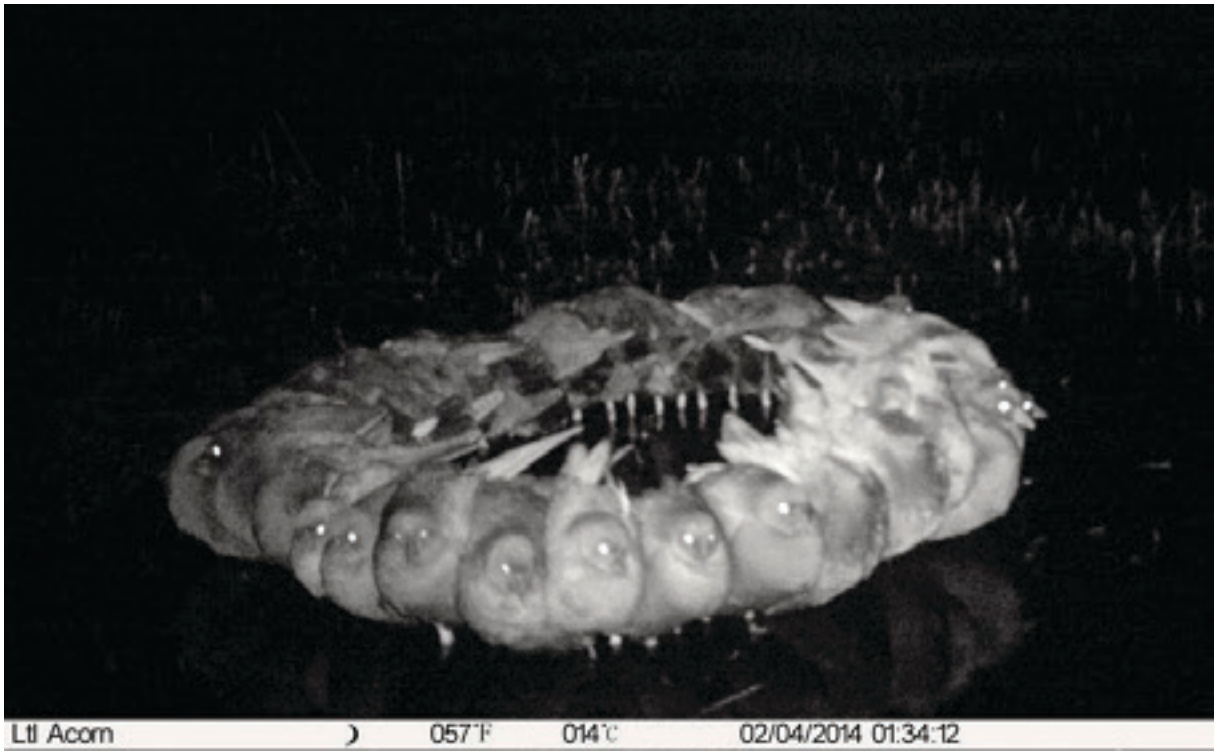
*Paiwalla wetland, Paiwalla* (Wetland Habitats Trust)

Paiwalla plays a significant role in generating scientific knowledge through research at the community level. In particular, knowledge previously not documented relating to bird behaviour has been acquired and publicised.

For example, we may have the first record of 'defensive circle' roosting behaviour in black-tailed native-hens *(Gallinula ventralis)*.The photograph below shows approximately thirty-five hens congregated in a defensive circle in water approximately 40mm in depth.

This behaviour allows the birds to roost in relative safety from their main night-time predators—water rats, red fox and feral cats.

Find out more about Paiwalla and how you can help us to continue our work on our website: www.paiwalla.org.au




*Black-tail native hen defensive circle, Paiwalla* (Wetland Habitats Trust)

# Restoring Vasse Wonnerup Ramsar Wetlands: a 10-year partnership

Christine Fleay, Department of Biodiversity, Conservation and Attractions (WA) and Pip Marshall, South West Catchments Council

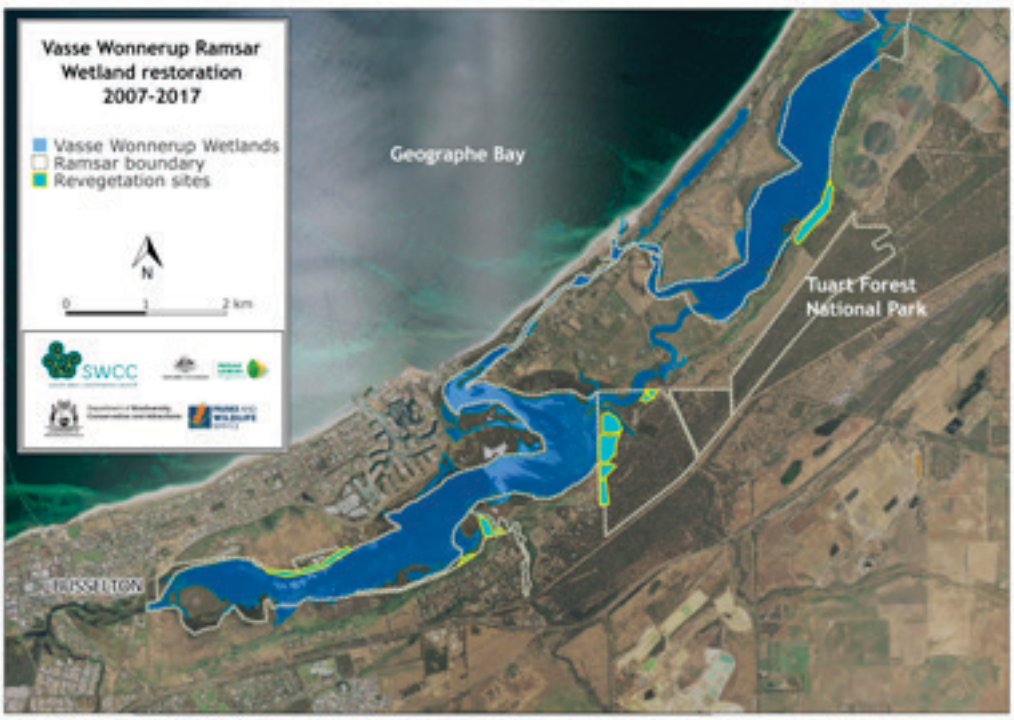
2017 marked a milestone—celebrating the 10-year partnership between South West Catchments Council (SWCC) and the Parks and Wildlife Service of the Department of Biodiversity Conservation and Attractions on the Vasse Wonnerup Restoration project.

The project aims to protect and enhance the ecological values of the internationally significant, Ramsar-listed Vasse Wonnerup Wetland system, near Busselton, Western Australia. Since 2007, the project has restored more than 42 hectares of fringing habitat surrounding the Vasse Wonnerup wetland through fencing, weed and pest animal control, stock management and revegetation.

The Vasse Wonnerup is a dynamic ecological system of 1115 hectares, regularly supporting more than 90 species of birds, including Western Australia's largest regular breeding aggregation of black swans—with about 1000 returning to the wetland each spring to breed.

Reflecting its Ramsar status, regular bird surveys have recorded over 37,000 waterbirds using the wetlands on a single day including over 30 species of migratory shorebirds.

Only a few minutes' drive from Busselton, a major urban centre, the wetlands have a long history of disturbance through extensive clearing and fragmentation, inflow river diversions, drains and manipulated water levels, invasive weed species and stock grazing. This disturbance has resulted in the surrounding riparian vegetation becoming degraded and drastically simplified in composition and structure.




*Vasse Wonnerup wetlands restoration map*

Water birds, raptors and other species rely on this fringing vegetation for breeding and foraging. Large eucalypts along the river corridors and in the adjoining Tuart Forest National Park provide essential nest hollows and roost sites for species such as ducks, spoonbills and birds of prey such as white-bellied sea eagles and swamp harriers. There has been a notable absence of natural recruitment in these aging roost trees and decline in canopy health and vegetation cover. Without intervention this will become a major issue for future water bird use.

This project aims to replace essential nesting and roosting trees and improve the habitat quality of the fringing vegetation for usage by birds and other fauna including bandicoots (*Isoodon obesulus fusciventer)* and the nationally threatened western ringtail possum (*Pseudocheirus occidentalis*).

A further aim is to establish a vegetated wildlife corridor between the wetlands and the adjacent Tuart Forest National Park, enhancing the broader landscape habitat values.

*Revegetation at Vasse Wonnerup wetlands* (South West Catchments Council)

So far over 270,000 native seedlings have been planted across 11 sites. The sites have also provided many revegetation challenges such as extreme flood events, highly variable patterns of inundation, vigorous weed species relict from the agricultural history of the area, and swans grazing on newly planted sedges.

Lessons learned from site preparation and soil improvement trials are continuing to improve best practice for rehabilitation not only at Vasse Wonnerup but throughout other South West Australian wetlands.

This project is supported by SWCC through funding from the Australian Government's National Landcare Program and the Government of Western Australia.

For further information visit: www.swccnrm.org.au

*Top: Revegetation at Vasse Wonnerup wetlands* (South West Catchments Council) *Bottom: Over 90 species of birds including 30* species of migratory shorebirds can be observed at the Vasse Wonnerup wetland system (Kim Williams)

# Restoring wetland function at Spotswood Lagoon in the Lower Burdekin

NQ Dry Tropics

The Lower Burdekin region in north Queensland is home to the Townsville-Burdekin wetland aggregation—one of the largest clusters of wetlands on the east coast of Australia. It is a stopover point for migratory waterbirds on the East Asian-Australasian Flyway, and its waters flow into the Great Barrier Reef through the Ramsar wetlands of Bowling Green Bay.

The Townsville-Burdekin wetland aggregation faces threats including declining water quality, loss of native habitat, introduced pest species and weed chokes. The integrated coastal wetland management program of NQ Dry Tropics, delivers projects that aim to restore health and natural function to these wetland ecosystems.

Our projects, which align with the Reef 2050 Plan, draft Reef 2050 Water Quality Improvement Plan 2017–2022 and the 2017 Scientific Consensus Statement, are delivered in partnership with key regional stakeholders and land managers through funding from the Australian and Queensland governments. We maximise funding through significant co-contributions from our partners and strategic alignments with other projects.

Since 2013, we have been running two projects concurrently at Spotswood Lagoon near Home Hill. This 100-hectare shallow, coastal wetland is a haven for migratory and resident wader birds, including the endangered Australian painted snipe.

For many years excess irrigation water delivered to downstream cane farms had been entering Spotswood Lagoon, altering its natural seasonal wetting and drying cycle, and leaving it permanently wet.

*Gary Spotswood co-invested in a recycle pump which is capturing and reusing excess water* (NQ Dry Tropics)

*The lagoon is a haven for waders—Australian painted snipe is a resident of Spotswood lagoon* (L Ezzy)

About half the lagoon was covered with thick weeds, in particular *Typha spp.*, a bulrush species commonly known as cumbungi. The birds were no longer present, and fish couldn't swim through the dense weed thickets. Nutrient-rich water entering from the cane paddocks, combined with low oxygen levels caused by the weeds, threatened downstream seagrasses, turtles and coral whenever the lagoon overflowed during floods.

The Reef Rescue Systems Repair project funded through the Australian government's reef program, has successfully worked with landowner Gary Spotswood to minimise water entering the wetland, so it could dry out seasonally and control the weeds. Gary also signed up to our Queensland Government-funded Landscape Resilience project, which monitored the volume and quality of water leaving his farm.

Gary was amazed by the water monitoring results: "I had no idea how much water I was losing to runoff," he said. "Any water and nutrient lost to the downstream environment is money lost—I want to keep it on my property, and if I'm wasting any I want to know so I can do something about it!"

Visit our website for more information
https://www.nqdrytropics.com.au/projects/waterways-wetlands-and-coasts-program/

# Space tech helps expose water weeds in Gwydir wetlands

North West Local Land Services

## Drones and images from space are being used to bring large-scale weed management back to earth in the Gwydir Wetlands State Conservation Area.

North West Local Land Services and the University of NSW have joined forces to embark on a low-cost mission to exterminate water hyacinth in the area.

Water hyacinth is an invasive weed that continues to be a risk to the health of the sometimes-inaccessible Gwydir wetlands ecosystems of north-west NSW.

Combining Landsat images—in use since the 1970s—with the latest drone technology, researchers have identified the potential to significantly reduce the cost of surveillance, such as helicopter and labour costs, by targeting and prioritising weed incursion areas.

The two-stage approach informs future practice by identifying water hyacinth distribution and changes over time to improve efficiency in identifying, targeting and tracking control efforts, while also reducing the ecological and economic toll in the area.

Over large landscapes or difficult-to-access terrain, ongoing satellite surveillance continues to play a key role in controlling and eradicating water hyacinth by building knowledge about the spatial and temporal behaviour of vegetation.

North West Local Land Services is a member of the Water Hyacinth Taskforce, a group made up of NSW Department of Primary Industries, Office of Environment and Heritage, Moree Plains Shire Council, National Parks and Wildlife Service and private landholders working together to manage and contain water hyacinth in the Gingham watercourse area.

For more information contact:
Raj Shilpakar, GIS and Data Modelling Officer,
North West Local Land Services
Raj.shilpakar@lls.nsw.gov.au

*Left: Gwydir wetlands* (North West Local Land Services) *Right: Water hyacinth at Gwydir Wetlands* (North West Local Land Services)

# Coordinated, inter-agency feral pig control preserving NSW wetland environments

Riverina Local Land Services

An on-going project funded by the Australian Government is using a multi-agency approach to achieve a large-scale reduction in feral pig numbers in western NSW.

The Western Riverina Pig Program covers over 1.3 million hectares and includes the Lowbidgee Floodplain, Great Cumbung Swamp and Booligal wetlands. These wetlands are listed in the *Directory of Important Wetlands in Australia.* Feral pigs have been identified as a threat to the wetlands. Predation, habitat degradation and disease transmission by feral pigs is a key threatening process under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Threatened Species Conservation Act 1995*.

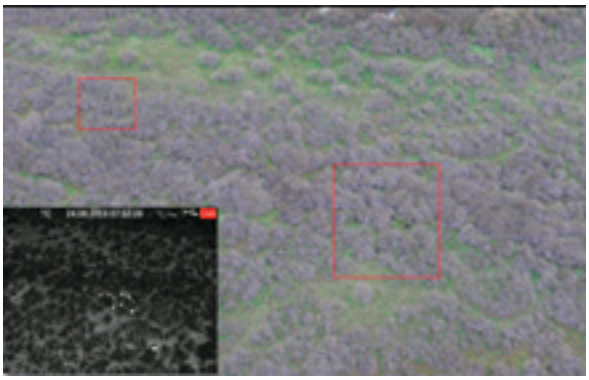
In western NSW, the core distribution of feral pigs is closely related to the location of permanent river systems and floodplain habitat. Land managers consider the project's target area a primary breeding ground for feral pigs and the river systems extending from the area have offered safe passage for pigs to spread and establish in new locations.

The feral pig control program is run by a steering committee of representatives from three Local Land Services regions, National Parks and Wildlife Service, Crown Lands and Water, Department of Primary Industries—Invasive Plants and Animals Unit, and Office of Environment and Heritage (environmental water management). The committee addresses control strategies, increasing participation of private land managers and communication and coordination strategies.

Coordinated activities have included aerial shooting, which removed 5901 pigs in the first 12 months of the project. To follow up on aerial programs, ground baiting, trapping and shooting are also being implemented. The project is also supporting private land managers with control programs that tie in to the wider-scale activities.

Aerial surveillance is being undertaken using an infra-red camera to measure the success of the program. The survey follows a replicated experimental design and uses a helicopter to follow east-west transects spaced two kilometres apart at a set height. The first survey was completed in 2016, just before the first aerial shoot. A second survey was completed in July 2017 and a comparison of the data is helping to determine where control efforts should target future control work.

For more information contact:
Suzie Holbery
Project Coordinator , Riverina Local Land Services
Suzie.holbery@lls.nsw.gov.au



*Top: Infra-red thermal camera comparison of 14 pigs* (Riverina Local Land Services) *Bottom: Wetland environment is the perfect pig habitat in the Lowbidgee* (Riverina Local Land Services)

# Unlocking the potential of wetlands in South-East NSW

South East Local Land Services

For the past four years, South East Local Land Services has been running the *Realise the Potential of Wetlands* program along the south eastern coast of NSW.

Funding from the Australian Government has allowed the program to implement large-scale protection and restoration of priority coastal wetland complexes.

With the south east region making up 40 per cent of the NSW coast, the project makes a significant contribution to building the resilience and health of coastal wetland habitats to store and sequester blue carbon. The project has also helped build the capacity of local communities to manage these unique ecosystems within the wider landscape.

Community members have reassessed the place wetlands hold in their community and can now take action to ensure their future.

By late 2017, nearly 4000 volunteers had worked with South East Local Land Services to:

- protect and preserve cultural heritage sites on the Tomaga River
- eradicate the wetland weed *Juncus acutus* from 40 hectares on the Moruya River floodplain
- reconnect priority wetlands to coastal floodplain and riparian communities through planting 70,000 wetland species across 100 hectares
- control weeds across 1700 hectares of wetlands
- protect 600 hectares of wetlands, including endangered ecological communities, such as coastal saltmarsh and swamp oak forest, from the impact of stock and vehicles.

A special mention needs to be made of local Aboriginal Land Councils who have been key collaborators on the project. Aboriginal ranger work crews undertook much of the on-ground work, gaining vital workplace experience and having the opportunity to connect with Country.

As many wetlands occur on private property, working with land managers to integrate wetland protection into their specific land management systems has been key to supporting conservation on private land.

For more information contact:
Kirsti Sampson
South East Local Land Services
Kirsti.sampson@lls.nsw.gov.au

*Grazing impacts being managed via revegetation and fencing work at Coila Creek* (South East Local Land Services)

# Big plans for Clybucca Wetland

M. Osborne, North Coast Local Land Services, Kempsey, NSW

The Clybucca Wetland is located on the Macleay River's coastal floodplain near Kempsey and is one of the biggest contiguous backswamp systems in NSW. It includes Mayes and Doughboy swamps that have sections below sea level. These swamps, once permanently wet swamps, are now dry due to over-drainage and drought.

Tidal restricting barriers, flood gates and extensive drainage networks have lowered groundwater levels and exposed naturally-occurring acid sulfate soils to oxygen—resulting in the acidification of topsoil, groundwater, in-drain water and, ultimately, the Macleay estuary.

Over-drainage has allowed flood-intolerant grass species to dominate where previously only wetland-adapted species thrived. During floods, these grasses are inundated for several days. They die and rot—depleting the floodwater of oxygen. This hypoxic (no oxygen) blackwater then drains into the Macleay estuary, which damages the aquatic ecosystem.

Improved hydrological management of the lowest sections of the Clybucca backswamps would reduce the amount of sulfuric acid being generated, as well as the frequency and intensity of blackwater events.

North Coast Local Land Services (LLS) has been working with key government agencies, academics and the University of New South Wales (UNSW) Water Research Laboratory to investigate hydrological management options to deliver better outcomes for landholders and the environment.

Having recently secured funding through the NSW Department of Primary Industries (Fisheries) Flagship Fish Habitat Rehabilitation Grant program, the North Coast LLS will now commission an 'implementation ready' plan, complete with engineering designs to improve the health of the Clybucca Creek and approximately 1800 hectares of surrounding wetlands.

*Unsustainable farming practices to give way to wetland rehabilitation, Mayes Swamp* (Max Osborne)

As a first step, the UNSW Water Research Laboratory will gather and use environmental data to model responses to proposed hydrological management actions. This will then be considered by the local community and their input incorporated into the final plan. The plan is intended to deliver the best outcomes for traditional Dunghutti custodians, landowners, community, industry and the environment.

Further investment will be required to undertake any recommended on-ground engineering works such as decommissioning old floodgates to reintroduce tidal exchange. To this end, North Coast LLS is working with government partners to source funding to provide landholders with financial incentives for changing land use across this site.

The Clybucca Wetlands may become healthy once again. Watch this space!

For further information on the Clybucca Wetland Project, please contact:
Max Osborne, North Coast Local Land Services
Phone: 1300 795 299
Email: max.osborne@lls.nsw.gov.au

*Top: Access denied to Clybucca Wetlands for thousands of juvenile prawns at the "floodgates of hell"* (Max Osborne)
*Middle: Menarcobrinni Floodgates on Clybucca Creek—The end or the new beginning of the Macleay Estuary?* (Max Osborne)
*Bottom: Tea Tree in Doughboy Swamp showing how Acid Sulfate Soil can impact this landscape* (Max Osborne)

# Information underpinning wetland protection

# Tracking carbon in Australia's wetlands

Dr Tertius de Kluyver, Department of the Environment and Energy, Land Inventory Section.

In 2017, Australia was one of the first countries to voluntarily report human-induced greenhouse gas emissions and removals in *coastal wetlands* as part of its National Greenhouse Accounts. The Department of the Environment and Energy compiles these accounts annually and reports to the United Nations' Framework Convention on Climate Change (UNFCCC).

Coastal wetlands are among the most carbon-dense environments on Earth. Recent international interest in 'blue carbon' includes a focus on the coastal wetland habitats of mangrove, tidal marsh and seagrass meadows. Australia has extensive areas of all three habitats along one of the longest national coastlines in the world.

Research estimates that Australian coastal wetlands occupy less than one per cent of the national area but account for five per cent of carbon stored across Australian ecosystems (soil and biomass).

Protecting and enhancing the carbon-dense environment of our wetlands can assist greenhouse gas mitigation efforts. The inclusion of a wetlands account in our national inventory enables us to quantify how these mitigation initiatives may contribute to meeting our international commitments.

Australia's National Inventory Report, submitted annually to the UNFCCC, outlines net emissions resulting from human activities across agriculture, industry, energy waste and land sectors. Within the land sector, activities that can degrade wetland habitat include building a canal estate or undertaking capital dredging to establish a new shipping channel.

Activities that can improve wetland habitat include removing a bund or tidal barrier to re-establish a coastal wetland's hydrological cycle or reinstating the natural hydrological regime of freshwater systems.

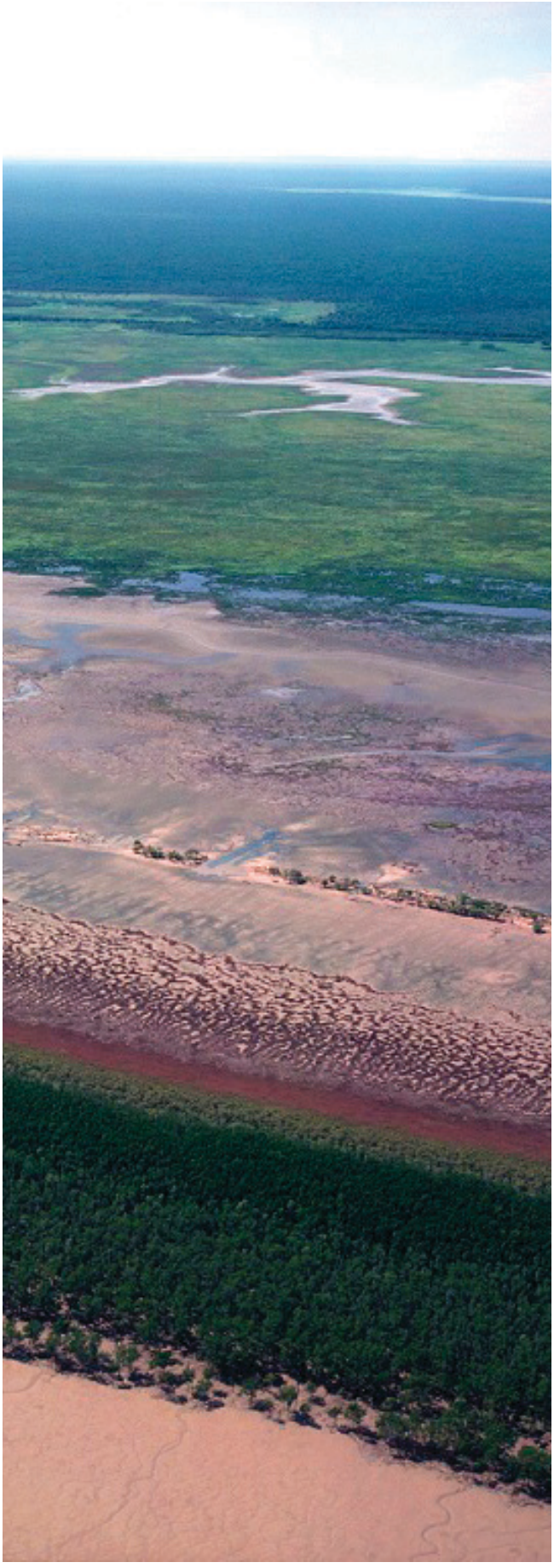
*Shark Bay seagrass* (Nick Rains)

Models developed for the wetlands account are informed by current and historical Australian wetlands research. This research provides the basis for developing regionally-appropriate parameter values, such as soil-carbon content, above and below ground biomass of the major species present, and other local habitat characteristics useful to the modelling effort.

Satellite-based imagery is used to estimate the extent of vegetation cover change across Australia's landscapes. For the wetlands account, this includes estimating changes to mangrove forest extent. The wetlands account will continue to be extended and enhanced in the coming years.

Through this ongoing work, Australia is demonstrating leadership and commitment to continuously improving our greenhouse gas emissions accounting systems that underpin national climate policy and the international reporting of progress towards our emissions commitments.

Australia's National Inventory Reports are published annually and can be viewed at: http://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/publications#national



*Mangroves in Kakadu* (Allan Fox)

# Global tourists flock to the Peel-Yalgorup Ramsar site

Steve Fisher, Thelma Crook & Kim Wilson, Peel-Harvey Catchment Council

The Peel-Yalgorup System is recognised as a wetland of international importance meeting seven of the nine criteria for listing as a Ramsar site. Two criteria are directly related to its importance for waterbirds, with the wetlands regularly supporting one per cent of the individuals in the populations of 14 species (Ramsar criterion six requires one species), and up to 150,000 migratory birds having been observed at one time (Ramsar criterion five requires more than 20,000).

The Peel-Yalgorup System is also an integral part of the East Asian-Australasian Flyway, a migratory pathway for birds spanning 22 countries across the northern and southern hemispheres, with shorebirds arriving each spring from Siberia, China, Japan and Korea. Global data suggests shorebirds using this flyway are under threat from habitat damage caused mainly by land reclamation, urban development and recreational activities.

Peel-Harvey Catchment Council (PHCC) chairman Andy Gulliver said: 'Our Ramsar site shares these threats, being located in the Southwest Australia Bioregion biodiversity hotspot, and adjacent to the City of Mandurah with a population of more than 80,000 people.'

In February 2017, shorebirds were identified and counted at 150 sites across Australia, including the Peel-Yalgorup System, as part of the annual Shorebird 2020 Count. The local count, coordinated annually since 2008 by PHCC in partnership with Birdlife WA, spans the 26,000 hectare Ramsar site. This year, 66 volunteers from the local community, research institutions and other organisations divided into 17 teams to cover the wetland system.

PHCC collates the count data for Birdlife Australia, helping to inform local and national population trends. Locally, the count is part of the monitoring program within the Peel-Yalgorup System's management plan, and guides decision-making to protect important habitat for shorebirds.

*Viewing birds through scopes* (Peel-Harvey Catchment Council)

PHCC CEO Jane O'Malley said, 'Early preparation is important in getting the count right. We organise identification workshops three months in advance to train new volunteers.

'There is nothing more powerful than when partners unite towards a shared vision. Our count is one of the largest and longest-running in the country with some of our volunteers having been involved for over 20 years. Our community can be proud of this achievement,' said Ms O'Malley.

Participation in the 2017 count was made possible with funding from the Australian Government's National Landcare Program.

For more information about the Shorebird 2020 Count visit www.peel-harvey.org.au

*Top: Shorebirds feeding* (Peel-Harvey Catchment Council) *Bottom: Shorebirds in flight* (Peel-Harvey Catchment Council)

# ‘Walking the Landscape’ to improve catchment understanding in Queensland

Queensland Wetlands Program, Queensland Government Department of Environment and Heritage Protection

‘Walking the Landscape’ is a process that synthesises a wealth of catchment information and expert knowledge through workshops, that are developed and led by the Queensland Wetlands Program.

Using data sets and key expert knowledge, Walking the Landscape workshop participants are guided through the catchment in detail, developing a whole-of-landscape understanding of how it functions.

The process integrates information on geology, topography, hydrology, soils, vegetation and land use. Information is provided by experts including natural resource managers, local and state governments, community groups, industry, landholders, traditional owners, ecologists, engineers and universities.

The process has delivered products to help understand catchment and wetland ecosystem function and value—the first of its kind in Queensland. More than 40 workshops have been run for South East Queensland, Wide Bay and the catchments of the Great Barrier Reef.

The workshops brought together people in their catchment areas and affirmed communication channels in the realm of catchment management, promoting a sense of ownership and sharing of ideas and resources. Throughout the project, the wetlands team received positive participant feedback, with clients feeling connected to the products.

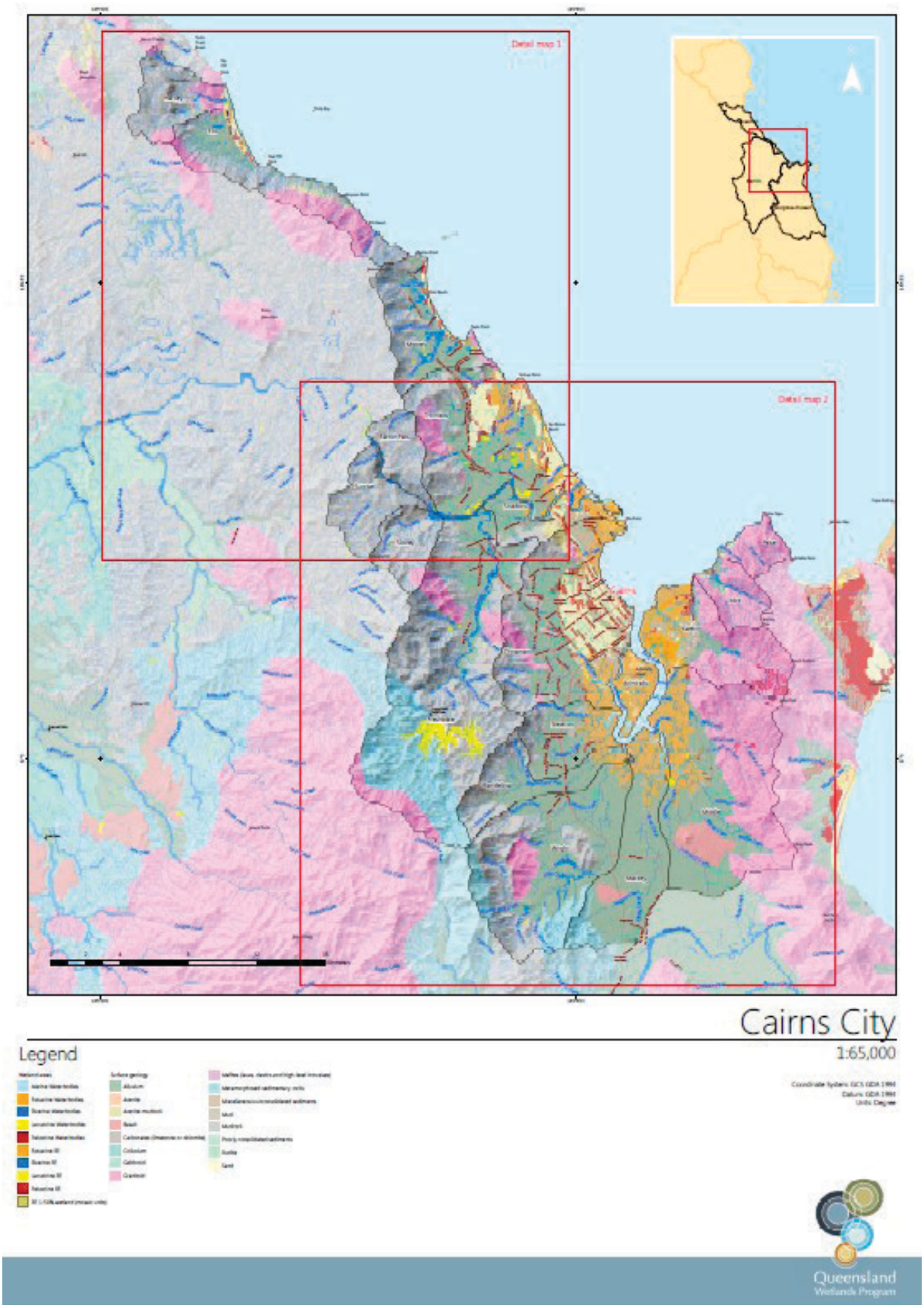
One result of ‘Walking the Landscape’ is the delivery of a “Catchment Story” through innovative on-line interactive medium—map journals. Around 20 catchment stories have been issued since June 2016 by the Queensland Wetlands Program and partners, with more under development.

Some of the regional groups in the Great Barrier Reef catchments have created their own interactive stories. An example of this can be seen on the Wet Tropics page from Terrain NRM http://wettropicsplan.org.au/Regional-Themes/Water/Catchment-Profiles.

Catchment stories are an important part of the implementation of South East Queensland Council of Mayors Catchment Action plans under the Resilient Rivers initiative and are recognised as a key step in this process.

For more information and to view catchment stories, visit the *WetlandInfo* website: https://wetlandinfo.ehp.qld.gov.au/wetlands/ecology/processes-systems/water/catchment-stories/

*Walking the Landscape prioritisation workshop* (Department of Environment and Heritage Protection, Qld)




*Cairns Map* (Department of Environment and Heritage Protection, Qld)

# NGO preparations for Ramsar COP 13

Louise Duff, Chair, World Wetlands Network

World Wetland Network (WWN) is a global network of Non-Government Organisations (NGOs) and Civil Society Organisations (CSOs) involved in wetland conservation.

WWN has 143 member organisations representing 527,000 grass-roots individuals. These organisations focus on wetland education and engagement, on-ground restoration, citizen science, research and advocacy. A snap poll of members revealed the top three wetland issues of concern to be changes to hydrology, wetland loss through clearing and filling, and chemical pollution. Members regard the primary drivers as agriculture, failure of legislation to protect wetlands, and lack of understanding of wetland values and ecosystem services.

WWN is planning a range of activities at Ramsar Conference of the Parties (COP) 13, to be held in Dubai, United Arab Emirates (UAE) in October 2018. The network is proposing two side events. One will present a citizen science survey on the state of wetlands globally. A second event will provide guidance for contracting parties on effective engagement with citizens for wetland policy and conservation.

The 12th International Korea-Japan NGO Wetlands Forum was held in September 2017. It was organised by the Korean Wetlands NGO Network and Wetlands and Waterbirds Korea, with support from Ramsar Network Japan and WWN.

Wetland conservation and alignment with the Ramsar Convention is very strong in South Korea. Many of the NGO leaders involved in Ramsar COP 10, held in Changwon in 2008, are still actively involved and working on an ambitious program of activities to celebrate a decade of activity since COP 10.

The Japanese and Korean networks have focussed on the importance of rice paddies for biodiversity for over a decade. An emerging theme is the issue of dams, and especially estuary dams, causing the collapse of river ecosystems including fisheries. WWN will support its Asian colleagues to present on this issue to contracting parties at Ramsar COP 13, and to build support for a draft resolution for Ramsar COP 14.

Middle Eastern NGOs were represented by Jacky Judas of the Emirates Wildlife Society—World Wildlife Fund (EWS-WWF), based in Dubai, where COP 13 will be held. Jacky reported on wetlands and the NGO sector in UAE and the Middle East, to provide context for the upcoming COP.

Among the 13 Middle East countries, 10 are signatory parties to the Ramsar Convention. There are 47 Ramsar-listed wetlands in the region; 24 of which are in Iran where the Ramsar Convention was signed in 1971, and seven are in UAE.

With Ramsar COP 13 in Dubai fast approaching, World Wetland Network is liaising closely, through their regional representatives, to facilitate effective engagement of the non-government and community sectors in this important triennial event.

Find out more by visiting http://www.worldwetnet.org/

To join World Wetland Network email lduff@cva.org.au.

# Focus on communities

# Thomas Lagoon and Arding Landcare: finding their future together

Kàren Zirkler, Local Landcare Coordinator, Southern New England Landcare Ltd

Thomas Lagoon is an endangered ecological community at Arding near Armidale on the NSW Northern Tablelands. Arding Landcare, once a thriving group, had become almost inactive. In a 'love story' that is still growing, these two communities are finding a pathway to a new future together.

In February 2016, a wetland field day at Little Llangothlin Lagoon near Guyra gave new Arding landholders, David and Chris Duncan, a chance to meet Northern Tablelands Local Land Services (LLS) staff and the Southern New England Landcare coordinator. David and Chris wanted to discuss getting Arding Landcare Group activities going again, and sort out 'what next for Thomas Lagoon', which had been the focus of many Arding Landcare Group activities in the past.

"When we bought our place, it included half of Thomas Lagoon, so the previous owner gave us a rundown on it and got us interested," said Chris Duncan.

"We kept reading and hearing about upland wetlands, and how they are disappearing, so we decided to try and conserve it," she said.

While David and Chris Duncan own half of the lagoon, Crown Lands own the other half.

"We can't see any point in conserving half, so are trying to make it happen as a whole," said Chris.

The Duncans sought a conservation covenant on Thomas Lagoon, so the Northern Tablelands LLS set up a series of decision-making workshops and invited representatives from Armidale Local Aboriginal Land Council, Anaiwan Elders, Crown Lands, University of New England, the Office of Environment and Heritage, private ecologists, Conservation Volunteers Australia, Uralla Shire Council, Arding Landcare Group and Southern New England Landcare.

"The workshops were critical to securing the commitment of all stakeholders to the desired outcome and their joint efforts resulted in the comprehensive *Thomas Lagoon Adaptive Environmental Management Plan*," said Carina Johnson from Northern Tablelands LLS.

*Thomas Lagoon in February 2017* (Northern Tablelands Local Land Services)

Meanwhile, with support from Ruth Trémont, Local Landcare Coordinator at Southern New England Landcare, Arding Landcare Group's newly-formed executive committee dug out old management plans, photos and ideas for the lagoon.

They then held their first annual general meeting in a long time, recruited new members, planned a fund-raiser, and discussed more group projects.

By falling in love with the lagoon and re-igniting community passion to care for it, David and Chris Duncan have ushered Arding Landcare Group and Thomas Lagoon into a new era.

"There are swans on it at present," said Chris Duncan.

"They had six cygnets in autumn. There are only three left now, but they are getting big, and there are lots of other birds as well," she said.

For more information on the Thomas Lagoon project contact: karen.zirkler@snelandcare.org.au

*Satellite image—sitting atop the Great Dividing Range, the lagoon is surrounded by grazing land* (Northern Tablelands Local Land Services)

# Hunter Local Land Services helps revive internationally-recognised wetlands

Hunter Local Land Services

## Change is the only constant in an estuary and Kooragang Wetlands, which is part of Hunter Wetlands National Park, is the perfect example.

Twenty four years ago, more than 1500 hectares of neglected wetlands were on the verge of becoming wasteland. The area had been completely altered since European settlement due to clearing, draining and filling to support various industries, including timber-getting and farming.

In 1984, Hunter Estuary Wetlands was listed as an internationally-important Ramsar site. Work began to transform Ash Island and its surrounding waters, and since then hundreds of volunteers have planted more than 200,000 trees and shrubs, transforming the area into a wildlife sanctuary.

The wetlands are now a haven for birdlife and are home to more than 200 species of native birds, including 45 species of shorebirds. The Hunter River and its estuaries are considered one of the most important sites for migratory shorebirds in NSW, and is a key location along the East Asian-Australasian Flyway, with more than 30 shorebird species recorded.

Hunter Local Land Services has played a key role in transforming the degraded, industrially-zoned wetlands to a national park and the area is now widely enjoyed by families, bushwalkers, birdwatchers and bike riders, who share in the tranquility of the park and its surrounding waterways.

An integral part of the restoration project on Ash Island was the use of managed grazing to control remaining areas of kikuyu, condition soil in preparation for restoring corridors of the red cedar floodplain forest and serve as a demonstration site for sustainable agriculture. In July 2017, Hunter Local Land Services removed the last cattle from Kooragang City Farm after more than 20 years. Much of the on-ground work was completed by volunteers, and lessons learnt here will continue to be communicated to landholders in the Hunter Estuary and further afield.

*Left: Cattle were present at Kooragang City Farm for more than 20 years* (Hunter Local Land Services)
*Right: Kooragang Wetlands* (Hunter Local Land Services)

The transition of the City Farm site marks the next stage of the area's restoration, which will be managed by National Parks and Wildlife Service through a landscape plan, jointly-developed with Local Land Services. From 2018, Hunter Local Land Services staff will continue to work with landholders throughout the Hunter Estuary to improve floodplain riparian management practices. Hunter Local Land Services acknowledges the significant and ongoing contribution of the hundreds of committed volunteers and supporting organisations who have achieved significant outcomes in the Hunter Estuary Wetlands over the last two decades, transforming the area into a world-recognised habitat, adjacent to one of the state's busiest ports and cities. We also acknowledge the Australian Government's contribution through the provision of funding.

For more information:
Peggy Svoboda, Hunter Estuary Program
peggy.svoboda@lls.nsw.gov.au
kooragangwetlands.com

*Boardwalk through the Hunter Estuary Wetlands has helped improve the visitor experience image* (Hunter Local Land Services)

# Gladstone Myco Restoration Project—an innovative approach to community engagement

Linda Fahle, Regional Manager Gladstone, Conservation Volunteers Australia

Myco restoration is a technique that cultivates fungi to accelerate decomposition processes to create healthy soil ecosystems. The technique is assisting mitigation of soil erosion on banks, slopes and disturbed sites.

Visible mycelium *(part of the fungus) in soil from fungus berm* (L Fahle)

Conservation Volunteers Australia led a community engagement project applying the Myco technique in an urban riparian setting in Gladstone, Queensland.

The goal was to trial a new approach preventing erosion and sediment run-off entering Gladstone Harbour and the Great Barrier Reef, while suppressing invasive weeds. The project was funded by the Gladstone Healthy Harbour Partnership and attracted strong interest; becoming an effective community education and engagement tool.

Historically, volunteer teams had spent hours removing persistent weed species from riparian areas using a variety of methods. However, due to the lack of organic material present in the soil, revegetation efforts required soil additives and extensive follow-up watering and weeding to ensure plant survival.

The project facilitated community information sessions and a workshop with a microbiologist who demonstrated how to create a berm by wrapping organic waste in hessian and keeping it damp; create ideal conditions for colonisation with fungi and mycorrhizae.

The information sessions were provided for community and youth groups, natural resource management agency employees, school groups, local government members and other community stakeholders. Local businesses were invited to participate, donating items for the berm and matting including cardboard (florists), coffee grounds (cafes, restaurants) and agricultural by-products.

Many engaged in the training returned on a weekly basis to participate—building, maintaining and monitoring the fungus berm, creating fungus mats for revegetated plants and conducting soil and macro invertebrate analysis. Methods for using organic waste on site were simple, and aimed to engage community members in practical applications they could carry out at home.

The project has helped to alleviate weed persistence, creating time for planting and other restoration activities. It achieved significant weed suppression, as fungal mats provide ground cover potentially impenetrable to weeds. As the mats decomposed they created rich topsoil, increasing soil biodiversity and soil nutrients. These soil conditions will further support new plant growth and natural regeneration.

For more information contact:
Conservation Volunteers Australia, Gladstone
gladstone@conservationvolunteers.com.au
(07) 4972 4969

*Fungus fruits appear in the berm* (L Fahle)

# Ballina Wetland Restoration Education Pilot Project—a successful partnership

Lyn Thomson, Schools Officer Richmond Landcare Inc.

This project—delivered through a partnership between Richmond Landcare, OzFish-Northern Rivers and Dorroughby Environmental Education Centre—grew from a desire to educate students on the important role wetlands play in a river's ecology. It involved three primary schools and two high schools—one school each day for five days.

Over time, through various agricultural ventures, Ballina Wetland had deteriorated leading to the degradation of the site's ecological features. Roads and Maritime Services NSW purchased the 198-hectare site in 2007 and began its restoration, as part of their biodiversity offset for the Pacific Highway upgrade.

The project's aim is to encourage environmental stewardship and to educate young people about the importance of wetlands and their relationship to the health of rivers and their inhabitants.

For primary schools, the project involved:

- water testing, bug surveys and microscope work
- catchment Role Play—teaching through play the journey of water throughout a catchment
- bird watching techniques—this site is now habitat for many species of coastal birds.

*Ballina Coast High School students at Ballina Wetland*
(Richmond Landcare Inc)

*Students looking at water test results at Ballina wetlands*
(Richmond Landcare Inc)

Many of the students were truly inspired by the beauty and the beasts (raptors) they observed. Over the three days, with assistance from Birdlife Northern NSW, the students recorded 40 species of birds. Local birdwatchers have now identified more than 160 species at this wetland.

For high schools the project involved:

- advanced water testing such as, measuring pH, turbidity and temperatures.
- comparing the wetland to the very unhealthy, nearby Tuckean wetland.

*Left: Teven Tintenbar Primary School students bird watching at Ballina Wetland* (Richmond Landcare Inc)
*Right: Teven Tintenbar Primary School students water testing at Ballina Wetland* (Richmond Landcare Inc)

The students' and teacher's realisation of what a community could do to restore a wetland was evident when they arrived at the comparison site—the Tuckean, where the pH only measured 3 and there are no fish or birds in sight. They learnt about the history of its barrage structure and the effect the drains had on the health of Tuckean wetland.

In response to an evaluation question—*what had the most positive impact on students understanding of the Wetlands?*—a Ballina high school teacher evaluation noted:

> "…I think seeing the comparison was mind-blowing and comparing the statistics backed this…"

This reaction demonstrated the positive effect of teaching at the wetland site.

After seeing and comparing the two wetlands, many of the students were keen to spread the message about keeping wetlands healthy.

OzFish, along with other organisations, are fighting to save the Tuckean wetland. After this project they will also have many new young supporters.

Our sponsors were, Summerland Credit Union, Richmond Landcare and OzFish.

For more details, you can view the full report and other information at: http://ozfish.org.au under the heading Top Stories.

*Ballina Coast High School students at Tuckean Wetland* (Richmond Landcare Inc)

# Ramsar wetland infotainment

Kandy Curran, Roebuck Bay Working Group Project Manager

## A short film festival and science series are new ways to 'infotain' the public about Ramsar wetlands in the Kimberley town of Broome, WA.

The majority of films in the annual *Mud and Saltwater Short Film Fest* are about Roebuck Bay, and rightly so, with the calm cerulean bay on the shores of Broome, being an internationally-listed Ramsar site, National Heritage site and Yawuru Nagulagun Roebuck Bay Marine Park. Furthermore, Roebuck Bay is the best place in Australia to see 30 species of wintering migratory shorebirds and the endemic snubfin dolphin, as shown by David Attenborough on *Blue Planet II.*

Getting Australian actor Steve Bastoni to provide filmmaking and acting workshops has been a game changer, with a growing number of films being made about the values and issues of the Ramsar-listed wetland and interconnecting waters.

The second dynamic initiative, run by the Roebuck Bay Working Group and Yawuru Land and Sea Unit, is the *Science on the Broome Coast* series. In years gone by, researchers would only transit in Broome for essential supplies. The innovative series now allows scientists to share their research and contribute to better management and understanding of the values of the Kimberley coast while, at the same time, promoting science as a career.

The Roebuck Bay Working Group is proactively addressing issues that impact Roebuck Bay. With blooms of *Lyngbya majuscula*—a toxic form of algae—worsening in Roebuck Bay in recent years, the working group ran a drain stencil project. Yawuru Rangers, Shire Councillors, business owners, students and sportspeople painted stencils of dugongs and salmon on footpaths in Broome to remind the community to 'Keep Our Bay Clean'. The enthusiastic response from the 64 people who participated, shows the community is keen to see Roebuck Bay's productive waters free from stormwater pollution and toxic blooms of Lyngbya which impact seagrasses and the marine life that shelter and feed there.

*Left: Keep our bay clean stenciling project* (Kandy Curran) *Right: The Mud and Saltwater Short Film Fest, screening in Broome* (Kevin Smith)

With housing blocks in Broome contoured toward roads and most of Broome's stormwater drains discharging into Roebuck Bay, everyday pollutants find their way into Broome's stormwater drains. The main culprits are garden waste, fertilisers, sewage, pet faeces and carwash detergents. With a heavy shower of rain, these pollutants are carried off properties onto the roads then into roadside stormwater drains which discharge into Roebuck Bay.

Roebuck Bay Working Group raises awareness and promotes responsible management and protection of Roebuck Bay's values and status as a Ramsar site and National Heritage listed wetland and Yawuru Nagulagun Roebuck Bay Marine Park. The group is funded by State NRM supported by Royalties for Regions, Rangelands NRM through funding from the Australian Government's National Landcare Program and Inspiring Australia.

For more information, contact Kandy Curran at info@roebuckbay.org.au or visit www.roebuckbay.org.au/science-on-the-broome-coast-series/ or www.mudandsaltwater.org.au/

*Top: Roebuck Bay rock platform* (Kandy Curran) *Bottom: Roebuck Bay* (Murranji Photography)

# Scout Group does regular beach clean-up at Cobourg Peninsula Ramsar Wetland, Northern Territory

George Kasparek, Branch Commissioner, Scouts and Cubs in the Northern Territory

Garig Gunak Barlu National Park occupies the Cobourg Peninsula in Northern Territory and the whole of the Peninsula is listed under the Ramsar Convention as a Wetland of International Importance. Many people visit the area for the beaches, the sea and incredible fishing.

Europeans first settled on Cobourg Peninsula in the 1800s, at Fort Wellington and Victoria Settlement. Aside from a rough coastal track, the feral buffalo and pigs, and one of the biggest wild herds of banteng (wild cattle that came from Indonesia with the Macassan traders) in the world, not much has changed since then.

Cobourg is remote—access is restricted and the area is cut off for six months of the year during the wet season. If you have not brought enough supplies with you any essentials would have to be flown in by light aircraft.

*Top and bottom: Humpty Doo Scouts loading boats to transport the rubbish away* (G Kasparek)

Since 2010, the Humpty Doo Scout Group has conducted a yearly, week-long trip to clean up the beaches and generally help the park rangers. Each year there are significant challenges, such as the difficulties of transporting a group of about 15 young people, six adults, three power boats, 600 litres of fuel and a trailer full of equipment and food over rough and remote roads, and working in very testing and hot conditions. Despite the challenges the participants find the work to be very worthwhile, especially when they see the results at the end of each day. Some great outcomes have been achieved, including:

- cleaning about 30 kilometres of beaches each year, which translates to the removal of 2 to 3 cubic metres of flotsam and jetsam from the beaches
- annually dealing with four or more commercial fishing nets embedded in sand, either by pulling them off the beach or by cutting them, strand by strand, below ground level
- hanging pig wire on 3 km of fence to keep feral animals out of the wetlands
- cross-cultural and community interactions, with members of the Scout community meeting local Traditional Owners, sharing some local cultural knowledge and skills. Scouts talking to visitors and yachtsmen, many from overseas, spreading the message of community, environment and all being part of this world together
- scouts (both young and old) gained intimate knowledge of conservation issues in the national park and Tropical Top End in general.

*Top: Humpty Doo Scouts picking up beach rubbish* (G Kasparek)

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