

Wetland restoration and conservation

Restoring wetlands of the upper Wannon River floodplain, south-west Victoria

Mark Bachmann, Nature Glenelg Trust

Following historic artificial drainage, wetlands are now bouncing back with the help of new partnerships and innovative wetland restoration techniques.



The Gooseneck Swamp Restoration Trial Structure was installed in August 2013 and is situated in the artificial outlet drain from the swamp (© Copyright, Mark Bachmann)

In a previous edition of *Wetlands Australia* (Issue 25, August 2014), readers were introduced to the initial results of a restoration trial undertaken at Gooseneck Swamp in the Grampians National Park, south west Victoria.

However, this wetland is just one of a series situated in the upper Wannon River floodplain that has been impacted by previous artificial drainage works. The early success of the Gooseneck Swamp Restoration Trial has led to a number of new partnerships across public and private land, resulting in some positive developments for other wetlands in this part of the catchment.

With the critical support of private landholders (Todd and Roger Burger, Doug Craig, Vanne and Judy Trompf, and Macquarie Forestry), Parks Victoria and the Glenelg Hopkins Catchment Management Authority (CMA), and funding provided by the Australian Government, Nature Glenelg Trust (NGT) has installed a further two restoration trial structures in 2014 at Brady and Walker Swamps.

The structure at Brady Swamp was constructed in March 2014 with the support of 25 community volunteers. In spite of below average rainfall in the winter/spring of 2014, the structure is already having a positive impact on the hydrology of the wetland by increasing the retention level of water (and hence the duration of inundation) in the swamp, as well as re-invigorating flows in the adjacent natural Wannon River flowpath.

The second trial at Walker Swamp commenced in August 2014, with another team of NGT staff and volunteers doing a fantastic job — only this time in flowing conditions. While this makes things a bit more logistically difficult, it does have the advantage of enabling us to make an immediate assessment of the structure operating in real time.



Oblique view of the Upper Wannon River in Victoria, showing the wetlands associated with the floodplain and the direction of flow where the river exits the Grampians, before heading west towards Dunkeld (© Copyright, Mark Bachmann)

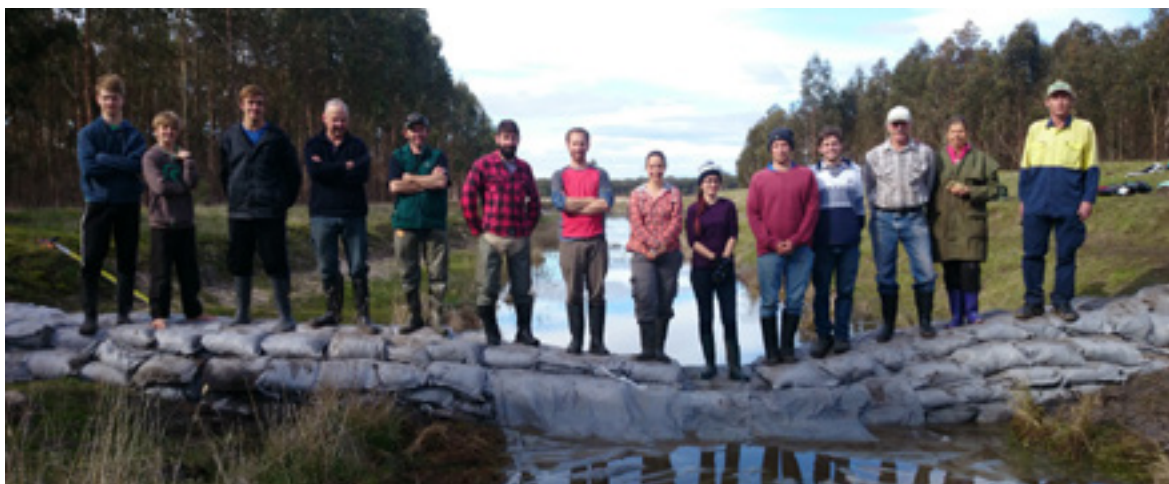
Although Walker Swamp receives catchment inflows and still certainly looks and behaves like a wetland for a short period each year, the drain that passes through the swamp (constructed in the 1950s) has caused the swamp to drain down rapidly every year as soon as inflows cease. The restoration trial at this site is therefore designed to prevent the swamp from emptying prematurely, but still enabling water to exit the swamp at the spillway height set for the structure, as negotiated with the private landowner. Importantly, during the trial phase planned for this site over the next couple of years, the spillway height can be adjusted to reflect a range of operating conditions. In the dry spring of 2014, the design of the structure worked perfectly by significantly extending the duration of inundation in Walker Swamp, long after catchment inflows ceased.

In a very positive footnote to this story, Nature Glenelg Trust has now received a Living Victoria Fund grant (awarded by the Office of Living Victoria) to permanently reinstate the natural banks of Gooseneck and Brady Swamp where they have been breached by artificial drains. This will capitalise on the results of the restoration trials by permanently protecting the re-instated hydrology of these important floodplain wetlands and restoring natural flow conditions to the upper Wannon River.

Nature Glenelg Trust will keep you up to date on the progress of its wetland restoration projects through our website: natureglenelg.org.au and future editions of the *Wetlands Australia* publication.



A restoration trial structure was installed on the outlet from Brady Swamp in March 2014. The site is shown here before construction in March and with the trial structure operational in August 2014 (© Copyright, Mark Bachmann)



The restoration trial structure at Walker Swamp, installed in August 2014 (© Copyright, Mark Bachmann)



The drain passing through the centre of Walker Swamp, August 2014 (© Copyright, Mark Bachmann)

Healthy Wetland Habitats program provides incentives to private wetland managers on the Swan Coastal Plain, Western Australia

Adam Turnbull, Healthy Wetland Habitats Coordinator, Western Australian Department of Parks and Wildlife

Healthy Wetland Habitats is a voluntary program giving technical and financial support to private landholders who manage wetlands on the Swan Coastal Plain.



Tony and Frances Reeve set up photopoints to monitor management progress at Ludlow, Western Australia

(© Copyright, Adam Turnbull)

The program is an initiative of the Western Australian Government and is administered by the Department of Parks and Wildlife.

Wetlands on the Swan Coastal Plain are under threat from a variety of pressures, including climate change and associated alteration of natural hydrology and water quality, weeds, feral animals and development. An estimated 80 per cent of all of the wetlands that were once present on the Swan Coastal Plain prior to European settlement have been cleared, filled or developed. 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 100 years.

The Healthy Wetland Habitats program aims to support those landholders who are managing their wetlands for biodiversity conservation and for the enjoyment of future generations.

The focus of Healthy Wetland Habitats is to contribute to the conservation of wetlands on the Swan Coastal Plain by helping 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, weed control and revegetation, 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 program also aims to foster an awareness of the ecological values that exist in wetlands on private land and to help members of the community develop the skill sets necessary to achieve conservation outcomes.

The scope of the project has recently been broadened to make incentives available to community groups managing crown land for conservation. If you are a member of such a group or you know of someone with a wetland of high ecological value, please refer them to the Healthy Wetland Habitats program.

For further information, please contact the Healthy Wetland Habitats Coordinator, WA Department of Parks and Wildlife, on (08) 9219 8788 or visit www.dpaw.wa.gov.au/management/wetlands/managing-wetlands-on-your-property.



Revegetation efforts by the Waterbird Conservation Group at Folly Pool, Baldivis, Western Australia

(© Copyright, Adam Turnbull)

Farmers go with the flow on the New South Wales North Coast

New South Wales Department of Primary Industries

Four farmers on the New South Wales North Coast have put life back into drained swamps on their properties by participating in a Department of Primary Industries (DPI) program that allows them to regulate the amount of water that enters wetland areas.

DPI Fisheries Manager, Simon Walsh said the 'Go with the Flow' program allows farmers to utilise once dry swamps for grazing land, while also improving natural wetland conditions on land along the Richmond River.

"Many privately owned artificially drained wetlands along the NSW coast suffer from poor quality thin soils, which produce sulfuric acid when they dry out," Mr Walsh said. "The acid from the soil then moves out into the river, where it can directly kill fish and oysters or reduce their ability to thrive."

"Dry swamps also encourage growth of unsuitable plants that decompose quickly once flooded, leading to blackwater events that in recent years have caused fish kills."

Mr Walsh said as part of the 'Go with the Flow' program, DPI installed simple structures on four properties near Coraki on the Richmond River.

"This gives farmers the opportunity to regulate the amount of freshwater in the swamp to meet their changing needs," Mr Walsh said.

"In very wet periods, these farmers will now be able to let excess surface water leave the swamp areas, while during dry seasons and droughts they will be able to hold more water in the area. By assisting farmers to maintain higher groundwater levels in swamp country, they can encourage the establishment of nutritious native grass species which cattle thrive on."

Mr Walsh said more water in swamps also has a range of environmental benefits for wildlife and water quality for the catchment.

"Around 300 hectares of wetland area now have higher surface water levels as a result of this program," Mr Walsh said. "This has seen significantly improved conditions for water dependent wildlife, including fish, prawns, frogs, insects and waterbirds."

This project has been implemented through a partnership which includes DPI, WetlandCare Australia and North Coast Local Land Services and has been funded by the NSW Environmental Trust, Catchment Action NSW and the Australian Government.

Landholders with drained swamp country that are interested in participating in the program should contact Simon Walsh on (02) 6626 1256.



Before and after: Boutells Lagoon on the New South Wales north-coast is inundated with water as a result of the 'Go with the Flow' program (© Copyright, Simon Walsh)

Protecting Wetlands in a new National Park in Sydney

Judith Bennett, President of Friends of Narrabeen Lagoon Catchment

Sydney's Northern Beaches contain an important collection of ecosystems and wetlands.

Friends of Narrabeen Lagoon Catchment report that within Sydney's Northern Beaches suburbs, there is a collection of endangered ecosystems which are not currently represented within the National Park system.

These lands are within the catchments of Narrabeen Lagoon and Middle Harbour and are recognised as being an important regional resource. A large proportion of the bushland is owned by the Metropolitan Local Aboriginal Land Council (MLALC).

Most of the remaining bushland is within Oxford Falls Regional Crown Reserve but is under claim by MLALC, who have proposed that their freehold land plus the crown lands under the claim be amalgamated into the Gai-mariagal Aboriginal-owned National Park under Part 4A of the *New South Wales National Parks and Wildlife Act 1974*.

MLALC is the first Aboriginal land council in NSW to propose a National Park on their lands following guidelines issued in 2008 for Aboriginal lands of high conservation value.

If approved, the proposal would provide Aboriginal training, employment and cultural tourism opportunities. Waratah Park, which was recently transferred to MLALC ownership, is proposed to be the "Gateway" to the Gai-mariagal National Park. An Aboriginal Cultural Centre will be developed there.

The proposed Gai-mariagal National Park would help to conserve an ecological corridor that links coastal/estuarine lagoon habitats such as dunes, seagrasses, reed-beds and mud flat habitats to floodplain ecosystems that contain swamp oak forests and swamp sclerophyll forest.



Hanging Swamp forms part of the proposed Gai-mariagal National Park (© Copyright, Judith Bennett)

The park would also contain a range of ecosystems types including palm forest, eucalypt forest, rainforest and gully forest, as well as the endangered Duffy's Forest, shrub-land, woodland, heath and hanging swamps that occur on lateritic ridges in the north, south and west.

Protecting such a complete progression of habitats is important, particularly with the projected impacts of global warming, to allow movement of a wide variety of fauna species such as gliders, honey eaters and tree snakes across vegetation types and up and down altitude gradients to utilise seasonal resources.

More information on the proposed Gai-mariagal National Park can be found at www.Gai-mariagal.land.



Sundews (Drosera macrophylla), red carnivorous plants, are located in the hanging swamp area of the proposed Gai-mariagal National Park (© Copyright, Judith Bennett)

Rehabilitation of a floodplain wetland in the Macquarie Marshes

New South Wales Office of Environment and Heritage

The Macquarie Marshes area of New South Wales is showing encouraging signs of restoration after a long agricultural history.

In 2008, the Macquarie Marshes in north-western New South Wales were in the grip of a severe drought. Many wetland plant communities were parched and iconic species such as river red gums (*Eucalyptus camaldulensis*) were dying. Despite the bleak outlook for the wetlands at the time, when a 2436 hectare portion of the property, Pillicawarrina was put up for sale it was purchased using funds from the Australian Government and the New South Wales Government through the Rivers Environmental Restoration Programme. The acquisition of the property included both the land and associated water licences. The NSW National Parks and Wildlife Service became the new land manager, while the water licences were added to the environmental water holdings for the Macquarie Catchment.

Pillicawarrina was a mixed cropping and grazing enterprise located on the southern boundary of the North Marsh Nature Reserve. The landscape of Pillicawarrina had been heavily modified for agricultural production. Over 80 per cent of the property had been cleared and infrastructure such as roads, levee banks and irrigation channels severely interrupted connectivity between the river channels and the surrounding floodplain. A strategy of “assisted natural regeneration” was employed for the regeneration of the vegetation on the new reserve. Initial rehabilitation activities included breaching levee banks, increasing the size of culverts under roads and filling in irrigation channels to allow floodwaters to travel across the floodplain and stimulate seeds in the soil seed bank. Next, what was needed was water.

In 2010, the drought finally broke and for the next two and a half years much of the reserve was inundated regularly from a combination of natural floods and environmental water deliveries. Now, six years after the acquisition of the land, regeneration of the native vegetation in the parts of the reserve covered by floodwaters has been impressive. River red gums, river cooba (*Acacia stenophylla*) and lignum (*Duma florulenta*) have re-colonised formerly cleared and laser-levelled paddocks. Revegetation on the non-flooded parts of the reserve, however, has not progressed as quickly and future active rehabilitation through tree planting and the introduction of native grasses may be considered to accelerate recovery.

In the six years since acquisition, the transformation of Pillicawarrina from an agricultural landscape to a floodplain wetland has been encouraging. The experience gained in the rehabilitation of the landscape has highlighted the critical role water plays as the driver of ecosystem processes in these ephemeral wetlands. It has also demonstrated the resilience of these wetland systems to both human and natural disturbance.

For further information, please contact Peter Berney (Peter.Berney@environment.nsw.gov.au) from the NSW Office of Environment and Heritage.



An upgraded culvert under the Pillicawarrina access road across the Macquarie Marshes State Conservation Area allows enhanced water movement across the floodplain (© Copyright, Peter Berney)



River red gum (Eucalyptus camaldulensis) saplings growing along a flow channel on the Pillicawarrina floodplain in the Macquarie Marshes State Conservation Area (© Copyright, Peter Berney)

Pin map project to record on-ground works for wetlands in Queensland

Queensland Department of Environment and Heritage Protection

The Queensland Department of Environment and Heritage Protection, through the Queensland Wetland Program, will pilot a project that links project summaries for on-ground works for wetlands to locations on a publically available 'pin' map.



Restoration work on the banks of John Quagliata's Lagoon, Airville Queensland is an example of the types of projects that will be mapped using the new publically available tool (© Copyright, Queensland Department of Environment and Heritage Protection)

The project is being funded through the Natural Resource Management Investment Program's Critical Reef Support Project and will initially focus on three geographical areas of the Great Barrier Reef catchments, South East Queensland and the Great Sandy catchment regional area. The project is being conducted with many partners and will attempt to harness data from multiple programs with minimal rehandling. The aim is to display the information in a consistent manner with key information.

Over many years, funding has been invested in on-ground works associated with wetlands in Queensland. There is no central tool showing the locations of where investment has occurred and the nature of the projects or the outcomes.

Some examples of on-ground works include revegetation, rehabilitation, removal of sediment accumulation, weed and feral animal control, construction of wetlands, construction of fish passage, removal of barriers, fire management, bank stabilisation and other measures to prevent or minimise erosion.

The pilot project will:

- aim to set up the technical capabilities to capture data historically, currently and into the future
- provide the spatial location (virtual pins on a map) and project summaries to record on-ground wetland activities so that the future funding of on-ground works for wetlands can be strategically planned and success of projects can continue to be built upon
- provide information on the success of projects, including lessons learnt
- work with partners to promote successes achieved through funded projects and partnerships
- provide a mechanism to gather information about on-ground wetlands activities for reporting and monitoring purposes.

There is great potential for the project to provide valuable information on what is happening where, and how successful the project has been. Data extraction and collection will be ongoing and project success will depend on stakeholder willingness to provide access or permission to access information. Based on the interest and success of the pilot the project may be expanded to others areas and partners.

Further information on the
Queensland Wetlands Program website:
wetlandinfo.ehp.qld.gov.au/wetlands.

Restoring the Lagoon of Islands in Tasmania

Tasmanian Department of Primary Industries, Parks, Water and Environment

Hydro Tasmania are undertaking restoration works in central Tasmania to return a previously flooded lagoon to a more natural state.

Originally a unique ecosystem characterised by floating islands of vegetation, Lagoon of Islands in central Tasmania was flooded in 1964 to provide water to downstream irrigators along the Ouse River. Hydro Tasmania explored and implemented a number of remedial actions to improve water quality and ecosystem health over 10 years, but these activities did not provide a long-term solution.

With irrigation needs now met from Great Lake, Lagoon of Islands has not been used for its intended purpose for a number of years. In response to the continually deteriorating ecosystem, Hydro Tasmania established an ambitious project to decommission the dam and rehabilitate the lagoon to a natural, healthy and self-sustaining state. In April 2013, the 320 metre long, six-metre high earth wall dam and associated infrastructure were removed and the area was replanted with native vegetation.

Comprehensive monitoring of water quality, vegetation, weeds and algae will track the progress of the lagoon's recovery. The lagoon re-wetted for the first time since decommissioning in July 2013, with an immediate improvement in water quality. Nutrient concentrations have dropped by an order of magnitude, light can now penetrate to the sediments of the lagoon and there has not been an algal bloom since the dam was decommissioned.

Since Lagoon of Islands was returned to a wetland ecosystem, strong vegetation growth has been observed across the lagoon, the algal assemblage is diverse, and an abundant and diverse zooplankton community has returned to the lagoon.

Further information on the Lagoon of Islands rehabilitation project can be found on the Hydro Tasmania website: www.hydro.com.au/lagoon-of-islands.



The Lagoon of Islands in Tasmania is undergoing restoration (© Copyright, Pete Harmsen)

Lake Wollumboola, New South Wales: A special lake for birds

Joy M Pegler

Lake Wollumboola on the Shoalhaven coast of New South Wales supports large numbers of waterbirds.



Flocks of mixed species on Lake Wollumboola, New South Wales in February 2014. Species include black swan (Cygnus atratus), royal spoonbill (Platalea regia), grey teal (Anas gracilis), chestnut teal (Anas castanea) and silver gull (Chroicocephalus novaehollandiae) (© Copyright, Joy M Pegler)

It was gazetted as a bird sanctuary in 1925, and in 2002 was included in the Jervis Bay National Park. To date more than 90 species have been recorded there, including 17 threatened species and 29 species protected under international treaties. It is now recognised as an Important Bird Area based on its populations of black swan (*Cygnus atratus*) and chestnut teal (*Anas castanea*).

The lake has many characteristics that make it particularly attractive to birds:

- It is one of the unique intermittently closing and opening lakes & lagoons of the New South Wales coast.
- It is a shallow, perched lake.
- Its salinity and water level vary depending upon its entrance status, local rainfall, groundwater input and evaporation, with the average salinity fluctuating around half that of seawater.¹
- The dense growth of sea tassel (*Ruppia maritima*) and the charophyte *Lamprothamnium succinctum* underpins the productivity and biodiversity of the lake.

There is an inverse relationship between the water level and species richness.² The black swan persists over all water depths, only leaving if the level suddenly rises. More than 13 000 black swans were recorded in one count in 2003. Ducks, fish eaters, large waders and shorebirds move in as the water level drops. At least 55 species were recorded in the year following the opening and closing of the entrance in 2013. These included 35 pied oystercatchers (*Haematopus longirostris*), 58 white-fronted chats (*Epthianura albifrons*), and a little tern (*Sternula albifrons*) breeding colony. These are all threatened species.

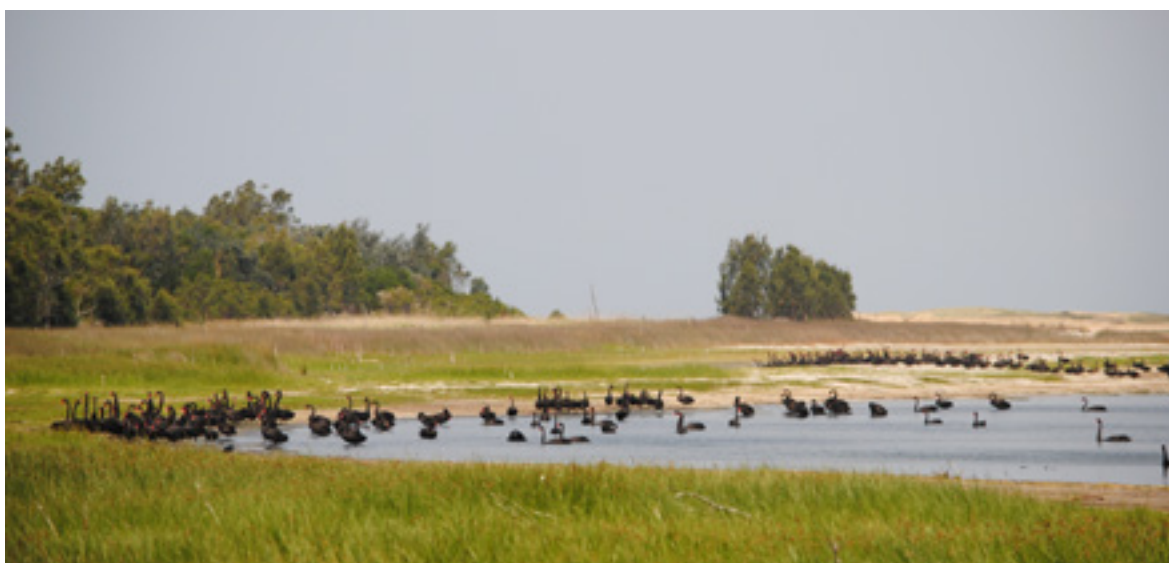
What are the unique values of Lake Wollumboola that have survived to the present day?

- Its catchment is still largely unmodified so nutrient pollution through surface and groundwater input is low.
- The very low concentrations of phosphate in the water column limit the production of destructive algal blooms.
- The *Lamprothamnium* takes up phosphate absorbed on the substrate.³
- Seepage of unpolluted groundwater provides fresh drinking water, especially for the black swan at low water and high salinity levels.²
- Low levels of human disturbance allow waterfowl to feed and moult in safety.

There have been continuing proposals over the last 20 years for urban and recreational development in the catchment. These have been vigorously opposed by local environmentalists. The two primary concerns have been nutrient pollution of the lake which would be catastrophic for the entire lake ecosystem, and increasing levels of human disturbance which would be unacceptable for most bird species.

References

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2. Keating J and Pegler J (2003): Patterns of waterbird assemblages in Lake Wollumboola. NSW NP&WS. Nowra.
3. Scanes P, Ferguson A and Potts J (2013) Environmental sensitivity of Lake Wollumboola: Input to considerations of development applications for Long Bow Point, Culburra. NSW Office of Environment and Heritage, Sydney



Black swan (Cygnus atratus) drinking at fresh groundwater soaks at Lake Wollumboola, New South Wales in October 2013
(© Copyright, Joy M Pegler)