

Case study: Darawakh Creek / Frogalla Swamp wetland rehabilitation: sharing success with the local community – Great Lakes Council

(Source: images Great Lakes Council. Text modified from Great Lakes Council and *Darawakh Creek & Frogalla Swamp Wetland Management Plan, 2003, WetlandCare Australia*)

The site

The Darawakh Creek / Frogalla Swamp Wetland complex is located on the mid north coast approximately 6 km north of the townships of Forster/Tuncurry on the coastal strip behind Nine Mile beach.

The 929 ha wetland lies to the west of the Darawank Nature Reserve and covers nearly half of the 2,224 ha Darawank Creek catchment. Darawank Creek flows into the Wallamba River, a major tributary of the larger Wallis Lake catchment. Wallis Lake and the wider region support a vibrant tourism industry, in addition to significant oyster farming, recreational fishing and inshore and offshore commercial fisheries.

The entire wetland complex is underlain by highly reactive acid sulphate soils (ASS), from as little as 0.5 m below the surface. In the 1950s the construction of floodgates at the mouth of Darawakh Creek, a 7 km main drain and 20 km of secondary drains resulted in the extensive drainage of the wetland significantly altering the hydrology and biodiversity in the area. Drains were up to 10 m wide and 2 m deep in some areas. These works combined with lift pumps dried out the wetland and lowered the groundwater sufficiently to generate the release of severely acidic groundwater.

Other issues such as farm crossings and levees which caused the acid water to pond; the loss of native wetland plants such as reeds and rushes, which help immobilise the acid; the grazing of the wetland by hard-hoofed stock and burning of the wetland exacerbated the acid problems at the wetland complex. At its most severe, the outflows from the wetland complex were compared to those of a 'toxic waste dump'.



An iron plume from the wetland complex.

In its natural, pre-disturbance state, this wetland would have been a highly functional and productive landscape, generating significant environmental services provisions for the lower Wallamba River/ Wallis Lake and providing habitat for a range of plants and animals.

The project

Effects of acid discharge such as incidences of Epizootic Ulcerative Syndrome (red-spot disease) in fish and oyster mortality had been noticed by users of the Wallamba River for many years. Then, in 1998, professional fishers noticed a severe iron plume extending from the mouth of Darawank Creek into the Wallamba River and brought this to the attention of Great Lakes Council. Council conducted water quality monitoring in the late 1990s and in 2002, the severity of the problem was defined in a Scoping Study report. This Study identified the severity of the acid sulphate soils (pH readings as low as 2.77 were detected in drains in the wetland) in the landscape. It also defined the issue of acid and toxic metal outflows into the Wallamba River and the knock-on social and economic effect this was having on recreational and commercial fisheries and oyster production.



Affected fish with skin ulcers.

Upon identifying the scale of the problem, Council commissioned WetlandCare Australia to prepare the *Darawakh Creek & Frogalla Swamp Wetland Management Plan* to ascertain the range of management solutions to this severe water quality problem. The plan clearly identified that doing nothing was not an option, as an estimated 1,000-years of acid generating material was expected to occur in the landscape. The plan identified that to reduce acid outflows from the wetland and remediate the land degradation that had occurred, there was a need to reinstate the natural, pre-disturbance hydrology of the landscape (ie. by infilling and decommissioning the excavated drainage network and removing levees). By doing such, and fostering a return of functional native wetland vegetation, an 80 % reduction in acid sulfate outflows was predicted.

It was proposed that drain infilling would significantly reduce the pace at which water moves through the wetland. The result of which would be an increase in the water retention capacity of the wetland and a corresponding increase in the water table height. Increasing the water table height would provide the most effective means of reducing the exposure of acid producing soil horizons to the atmosphere and the subsequent oxidation and production of acid leachate and its movement into the surrounding waterways.

In 2004, Council, with its partnering agencies, commenced the implementation of this Strategy.



To reinstate the wetland's natural hydrology the acquisition of 23 private properties and active management of the area was required. In partnership with a range of stakeholders including state and commonwealth government agencies, Greater Taree City Council, MidCoast Water, Hunter Central Rivers CMA and the NSW Recreational Fishing Trusts, and with a number of external grants, Great Lakes Council has achieved major success with regards to the recommendations in the management plan.

All but two of the 23 original private properties have now been acquired, over 80 % of the artificial drains have been infilled or de-commissioned, two of the five major levees have been removed and large-scale ecological restoration has commenced. The tidal floodgate has been removed, grazing cattle have been removed, invasive weeds controlled and native plant species planted. Natural regeneration of native wetland plants has also occurred, further displacing exotic pasture grasses. An instream water quality meter shows very stable pH in Darawank Creek of approximately 6.0 which once displayed dramatic fluctuations in pH values.

In recognition of its' success the project was awarded the Local Government and Shires Associations 2007-2008 Biodiversity Management Award. Once the land has been restored adequately, it will be transferred to the Department of Environment, Climate Change and Water as an extension to Darawank Nature Reserve.



Community members attending the Darawakh Wetlands to coincide with World Wetlands Day 2008

The program has benefited from significant support from partnering agencies, funding bodies and the wider community. To share in the success of the project and to educate and raise awareness, Council has engaged with the local community and relevant stakeholders through a variety of avenues. Community open days to coincide with World Wetlands Day have been conducted in the wetland in 2007, 2008 and 2010 and Year 11 Geography students from nearby Tuncurry and Wingham High Schools have accessed the wetland as part of their studies. Over 200 people have now been guided through the wetland. The wetland has also hosted field days and inspections by NRM agency boards (CMA and DECCW) and NRM volunteer groups (Coastcare networks and bird-watching groups). There has been a commitment to media reports focussing on the specific project, but also to

espouse the values of wetlands generally. Council is also investigating options for appropriate future access, interpretive signage and nature-based recreation across the wetland. There is also increasing commitment to research and publications of methods and results from this project to the scientific community, Notably, the recreational and commercial fishing sectors and the local (now booming) oyster industry have been significant supporters of and advocates for this project and have been kept informed of project progress through the Wallis Lake Estuary Management Committee.



The complex is now a thriving wetland providing nursery habitat for juvenile fish and prawns and a future public conservation reserve for the general community.



‘This is a fantastic project to be involved in. We have demonstrated that serious artificial degradation of an acid sulfate, coastal floodplain wetland can be reversed and that functional natural landscapes can be reinstated. This has been achieved by sound science, effective practical applications and genuine partnerships of committed stakeholders and funding providers.

While this restoration is physically, logistically and technically complex, it is not impossible. Where we have provided the appropriate physical conditions of reinstated hydrology, the wetland landscape has shown amazing natural resilience and recovery. There is evidence that this system is on the road to once again becoming productive and beneficial, with regards to environmental services functions and biodiversity.

We see the works as an investment. While there has been a significant upfront cost associated with land acquisition and drain infilling, the works will result in vastly enhanced estuarine quality and productivity (particularly fish, prawns and oysters) that will outweigh these costs. The works will also result in lasting benefits with regards to nature conservation. In that respect, there are important social and economic elements to the project.

We believe that this project should be used to inform the management, remediation and restoration of degraded ASS coastal floodplain wetlands across NSW.’

Mathew Bell - Great Lakes Council Senior Ecologist