



Local Land  
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Hunter



## **“Kooragang Wetland Rehabilitation Project”: 21 years of ecosystem repair and management in the Hunter River estuary**

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Kooragang Wetland Rehabilitation Project (KWRP) was launched in 1993 to rehabilitate and create habitat for fish, shorebirds and frogs and other wildlife in the Hunter estuary. Kooragang City Farm is an integral part of KWRP and plays an active role in managing wetlands. It demonstrates sustainable agricultural practices that improve productivity while looking after the health of the river and its catchment.

KWRP strives to increase the economic, social and environmental viability of agriculture, fisheries and natural resources. This is achieved through the demonstration of managed grazing to not impact upon riverbanks and floodplain wetlands, the protection and creation of mangroves and saltmarsh, riparian revegetation, community and volunteer involvement and partnerships. Priority threats to agriculture and natural resources are managed by means of threatened species conservation, bank stabilisation, marine debris program, plant and animal pest control demonstration and monitoring, research support, education and communication.

### **Geographic location:**

KWRP works across the Hunter estuary with main areas of activity located 5-15km north and northwest of one of the world's largest coal ports at Newcastle, on the east coast of NSW, Australia.

Three sites of main activity in the Hunter estuary are included in KWRP due to their suitability to be restored as fisheries, shorebird and other wildlife habitat: Ash Island (780ha), Tomago Wetlands (800ha) and Stockton Sandspit (10ha). By establishing partnerships and taking a collaborative approach, KWRP has been able to implement restoration activities on a landscape basis, working across land ownership and management boundaries at each of the sites.

### **ECOSYSTEM AND IMPACTS**

#### **Impact on the ecosystem:**

Records show that, in the Hunter estuary over the past 200 years, there has been a decrease of 80% of saltmarsh and floodplain forest, 13% of open water, 50% of shoreline length and 50% of shorebird numbers. Numbers of deltaic islands in the estuary have been reduced from 20 to 4. Hydrological regimes have been significantly altered resulting in reduced tidal flushing and fragmented habitat.

As early as 1973, the NSW Government acknowledged that areas of the Hunter estuary were being degraded and identified an optimal ecological unit that could be preserved. This recommendation formed the basis for much of the large scale restoration that has taken place.

### Causes and duration of impact:

Clearing, draining, filling and dredging have extensively modified the Hunter estuary. Modifications have assisted with the expansion of industrial, agricultural and urban areas in the Hunter and include flood mitigation works to protect those areas. *Table 1* illustrates the impacts on particular habitat types as well as some of the causes for those losses.

In spite of these modifications, Kooragang Wetlands form part of the internationally significant Ramsar-listed Hunter Estuary Wetlands. These wetlands are considered the most important locality in NSW for migratory shorebirds whose habitat is protected by treaties with Japan, China and South Korea. As such, the project includes a range of elements centred around the restoration of saline and freshwater wetlands. The site contains at least two endangered ecological communities and 27 threatened species. It provides habitats for 341 plant, 191 bird, 67 fish/decapod crustacean, 15 frog and 12 mammal species.

Habitat Type	Loss of Habitat		Cause	Comments
Shoreline length	50%		Filling to create and maintain port facilities	Started in 1951 with the Hunter River Islands Reclamation Scheme to create Kooragang Island
Non-tidal Forests	81%	275km <sup>2</sup>	Red cedar harvested	Harvested from 1804 to 1822
			Agricultural clearing	Clearing started in the mid 1800's
Saltmarsh	84%	27km <sup>2</sup>	All affected by the installation of floodgates and levees as well as industry clearing, draining, filling and dredging.	Between 1801 to 1994, structures affecting hydrology increased from zero to include;
Mangroves	21%	6km <sup>2</sup>		<ul style="list-style-type: none"><li>• 112 culverts, bridges and floodgates</li><li>• 77km of drains and levees</li></ul> Dredging began in 1845 to maintain port facilities and boat passage.

**Table 1:** *Decrease of habitat types, in the Hunter estuary, over the past 200 years*

### RESTORATION GOALS AND PLANNING

The vision for KWRP is for *an estuary in which healthy, restored fisheries, shorebird, threatened species and other wildlife habitat is in balance with a thriving port, the whole providing opportunities for research, education and recreation.*

### Project aims and objectives

KWRP aims are to:

- help redress the loss of fisheries, shorebird, threatened species and other wildlife habitat in the Hunter Estuary due to clearing, draining and filling

over the past 200 years by conserving, restoring and continuously improving Kooragang and Tomago wetlands for nature conservation;

- maintain viability of the estuarine ecosystems including threatened ecological communities and critical habitat for migratory waders and threatened species; and
- link applied research to wetland management and develop and promote complementary opportunities for environmental education, outdoor recreation and nature-based tourism and demonstrate that environment conservation and local industry can work together to their mutual benefit.

KWRP restoration objectives are to:

- protect threatened/protected species and communities along with other species and communities of conservation significance;
- enhance habitat for estuarine flora, in particular saltmarsh, fauna, migratory shorebirds, fish and crustaceans;
- increase flushing of tidal creeks which have become stagnant and restore creek beds, taking into account habitat requirements for threatened and protected species and maintaining saltmarsh;
- manage floodgates at Tomago Wetlands to reinstate shorebird roost and feeding habitat;
- enhance riverine corridor vegetation for biodiversity and riverbank stability;
- manage pest and weed species;
- develop Kooragang City Farm as a demonstration site and training facility for farming in harmony with wetlands and management based on holistic decision-making;
- consider the contribution of KWRP to the larger estuarine wetland complex of the Hunter estuary in the development a long-term management framework for the Green Corridor and regional network of protected natural areas;
- assist research initiatives through facilitating collaborative projects and providing research sites;
- assess rehabilitation/creation success and guide management actions of this and other rehabilitation projects through applied research;
- protect Aboriginal and European cultural heritage values;
- contribute to the promotion of the value of the Lower Hunter estuary wetlands;
- facilitate community involvement and training activities through an education and extension program that features Kooragang City Farm;
- encourage use of Kooragang and Tomago wetlands for educational purposes;
- enhance opportunities for passive outdoor recreation and nature appreciation;
- promote the Hunter estuary as a centre of excellence in sustainable wetland management;
- maintain international profile of wetlands of the Hunter River estuary.

## **PROJECT IMPLEMENTATION**

Implementation of restoration works for KWRP is guided by detailed landscape plans designed from 1993 to 1996. Major restoration works were instigated during the establishment phase from 1997 to 2007. In 2008, KWRP entered a maintenance, monitoring and improvement phase for the initial project areas.

## PROGRESS TO DATE

Since the project was launched in 1993 it has protected riverbanks, ephemeral swales and fisheries habitat, such as mangroves, saltmarsh and open water. Saltmarsh has also been created at higher elevations likely to be viable given expected sea level rise. An extensive wildlife corridor network has now been established with conservation and revegetation of the floodplain rainforest and woodland remnants.

Planning initiatives have seen the rezoning, in 2000, of over 500ha of estuarine wetlands and associated floodplain ecosystems from general industrial to environmental conservation, leading to gazettal as National Park estate in 2010. KWRP has also provided planning, designing and monitoring for the opening of floodgates by Department of Environment and Climate Change at the nearby Tomago Wetlands to re-establish coastal saltmarsh as shorebird habitat. Partnerships have been established for on-going management and monitoring; with a high level of community involvement and ownership.

A partnership with Awabakal and Worimi LALCs has produced an Aboriginal Cultural Heritage Management Plan for Kooragang Wetlands and Hexham Swamp which will further integrate both traditional and contemporary Aboriginal culture with the project's objectives.

Action	Habitat Type	Progress
<b>Protected</b>	Fisheries Habitat	Saltmarsh Mangroves Open Water <i>350ha</i>
	Ephemeral swales	freshwater/brackish <i>32ha</i>
<b>Revegetated</b>	Riverbank	<i>5km</i>
	Rainforest and Riparian	<i>200,000 Plants</i>
<b>Constructed</b>	Wildlife Corridor	<i>15ha</i>
	Coastal Saltmarsh	<i>10ha</i>

Table 2: Progress from 1993 to 2014

### Project review:

A diverse and extensive set of stakeholders participated in reviews of the KWRP management plan and development of the City Farm business plan (1999, 2000 and 2001) and research and monitoring outcomes with a revised management plan produced in 2010. In addition, an expert panel was convened to consult with key stakeholders and provide advice on management needs of a suite of threatened species and communities. Finally, the project team undertakes on-

going consultation with key community stakeholders in the planning, design and implementation of on-ground works.

### **PARTNERSHIPS:**

Partnerships on a local level are with Newcastle City and Port Stephens Councils; over 120 Kooragang volunteers who currently contribute over 12,000 hours per year; community groups, e.g. Hunter Bird Observers Club; and industry sponsors.

Central to KWRP is the establishment of long term partnerships with local, state, national and international agencies and organisations involved in natural resource management, agricultural extension (e.g. farm workshops), biosecurity (e.g. mosquitoes) and emergency management (e.g. floods). The Australian Government; University of Newcastle and other research institutions provide grants for specific components of the project.

KWRP is linked with the Hunter Estuary Wetlands Ramsar site and is part of an international sister wetlands affiliation with Kushiro Wetlands in Hokkaido Japan, which complements migratory shorebird treaties with Japan, China and South Korea.

Underpinning this collaborative approach is the development of a shared vision amongst major stakeholders based on extensive and on-going consultation. The resulting integrated project links wise recreational use of wetlands with habitat restoration, research and education. An essential element of effective implementation of restoration works and maintenance of restored sites is the engagement of the community - individuals and special interest groups - and fostering ownership of the restoration process by showing a willingness to listen, discuss and adapt activities based on new information.

State natural resource management and primary industry agencies play a central role in KWRP. Hunter Local Land Services, through the Hunter Catchment Contribution, provides the financial and administrative framework. State partners are NSW Department of Environment - Estuary Management Program; National Parks and Wildlife Service and NSW Department of Primary Industries - Fisheries.

### **Funding**

KWRP received a major capital works grant of \$4 million from the NSW Estuary Management Program to underpin a ten year integrated program of restoration and related works. State funding has been matched with major contributions from Hunter Catchment Contributions and Newcastle City Council, sponsorship and in kind labour from Kooragang volunteers. The current value of volunteer labour is over \$360,000 per year.

In-kind support has come from Hunter Bird Observers Club, Port Stephens Council, NSW DPI Fisheries, National Parks and Wildlife Service, Awabakal and Worimi Local Area Land Councils (LALC) and the University of Newcastle.

### **LESSONS LEARNT**

The project has demonstrated that wetland restoration is possible, given coordinated and ecologically informed approaches and has demonstrated to

landholders how properties can be managed for improved agricultural production whilst protecting and conserving wetlands and forest. This outcome has largely been achieved through managing hydrology in tidal and freshwater/brackish ephemeral swales and acknowledging the dynamic nature of tidal and floodplain systems. However, wetland restoration is a long term proposition with at least ten years of observation being required to begin to recognize the effect of a wetland's wetting and drying cycles. Reverting kikuyu paddock to floodplain rainforest and woodland is difficult, but not impossible. If enough canopy is established within five to ten years then shrub, vine and groundcover layers can be planted.

The project has found that effective communication of the project's objectives, progress and future is crucial to success. Links have been developed between the on-ground works and Kooragang's interpretation program for schools and the broader community. This has encouraged stakeholders to be involved in on-ground works and monitoring.

### **TAKE-HOME MESSAGES FOR FUTURE WORKS**

KWRP plans to maintain and expand on current work sites and activities focusing on estuary restoration, holistic management and agricultural extension, volunteer support and partnerships to implement priority works based on an estuary master plan which covers the whole estuary.

The essential first step for KWRP was to develop a shared vision amongst stakeholders to provide a good foundation for a long term restoration strategy. For this large area, planning documents identified high priority actions such as planting and managing hydrology that could be implemented immediately as approvals and resources would allow. One aim for the future is to review and re-establish a shared vision for the Lower Hunter estuary.

Fostering a sense of ownership and stewardship with members of the community and community groups assists greatly with maintenance, continued restoration and communication. Communication to the general public can help maintain support for on-going restoration, but importantly can help avoid damage of restored areas that would require precious time and scarce resources to repair.