

# The economic values of Whangamarino Wetland

Department of Conservation, May 2007



Whangamarino Wetland, Reao Arm: Photo: Rachel Kelleher

## INTRODUCTION

In December 1989 a 5690 ha portion of Whangamarino Wetland became formally recognised under the United Nations convention on world wetland conservation (Ramsar, Iran 1971). The Ramsar designation was inspired by the native species and ecosystem values, in particular, the diverse and numerous water birds, including herons and bittern, rails, waders and waterfowl.

By legally protecting New Zealand's second largest wetland, society has recognised the "non-use" values of the native species and ecosystems therein. But there are other economic values to society that flow from this northern Waikato site.

Of particular importance is the role of Whangamarino Wetland within the flood control scheme on the Lower Waikato River. Its water storage function during peak flows has led to avoided costs in public works and reduced damage to surrounding farmland during large floods, of which there have been several in the last decade.

Other economic values include:

- Gamebird hunting;
- Cultural and commercial harvesting of eels/tuna;
- Habitat for whitebait/inanga;
- Recreational fishing centred on introduced species, such as catfish, rudd and koi carp;
- International and domestic birdwatching tourism;
- Demand for increased public access – the area is located within an hour's drive of half of New Zealand's population.
- Carbon sequestration by manuka/kanuka and peat bogs;
- Water for irrigation of farmland during dry periods.

An increasing appreciation of such values, known generally as “ecosystem services”, has inspired renewed interest in wetland conservation in New Zealand and worldwide, and in taking into account the broader values of wetlands when deciding for or against conversion to other uses, e.g. pasture for dairy farming, residential subdivision, port development.

There are also the impacts of farming and other activities on nutrient run-off and sediment inputs into wetlands to consider. Human-caused impoverishment of water quality is the major environmental issue faced by Whangamarino’s managers: the Department of Conservation and the Auckland/Waikato Fish & Game Council.

The wider cost-benefits of wetlands are a timely concern. Wetlands are among threatened ecosystems singled out in the UN-commissioned Millennium Ecosystem Assessment 2005. This is certainly true of New Zealand where more than 90 per cent of the wetlands existing 150 years ago have been drained, filled or otherwise destroyed.

Whangamarino Wetland was chosen for a study of its ecosystem services to show that this site, as a wetland, carries significant benefits for the regional economy.

The Department commissioned Ashburton hydrologist John Waugh to report on the role of the wetland in the Lower Waikato-Waipā Control Scheme, and to estimate the economic value of the floodwater storage capacity of the wetland during major floods. This work forms the bulk of this report.

Other values are discussed qualitatively.



Whangamarino Wetland, bounded between locations 4 and 7: National Wetland Trust

## **FLOODWATER STORAGE: LOWER WAIKATO-WAIPA CONTROL SCHEME**

Whangamarino Swamp, as it was originally called, once covered some 10,320 ha near the northern Waikato towns of Meremere and Mercer. The wetland complex and Lake Waikare, a shallow lake immediately to the south, were a natural reservoir of flood waters and helped dampen peak flows in the Lower Waikato River. As well, Whangamarino had always acted as storage for large-scale flooding from Lake Waikare and the wetland's own catchment.

Essentially, the flood control scheme managed by Environment Waikato reproduces the natural water storage functions of Lake Waikare and Whangamarino Wetland but in a more controlled way.

Artificial canals now speed the movement of water from Lake Waikare to Whangamarino Wetland. Control gates at the western outlet of Whangamarino Wetland (location 7, map on facing page) prevent backflow from the Lower Waikato into the wetland during floods. Conversely, once the peak has passed the gates are opened to allow water to flow from the Whangamarino into the Waikato.

In this way, the Waikare-Whangamarino system can store up to 94.8 million cubic metres of water, which exceeds the total live storage of the eight Waikato hydro dams (61 million cu.m.). The system lowers the flood peak in the Waikato by 40cm to 60cm, enough to reduce the chances of serious damage to surrounding land.

During a "100-year flood", as occurred on 12 July 1998, excess water from the Waikato River flowed across a spillway near Rangiriri into Lake Waikare. Peak flow was 1565 cumecs at Rangiriri during this event, of which 200 cumecs discharged into Lake Waikare.

Without the Whangamarino control gates, this event would have flooded an extra 73 square kilometres of land adjoining the wetland. At a farmland damage estimate of \$515 per hectare (1998 \$), total additional farm damage (over the 7300 ha) would have reached an estimated \$3.8 million (1998 \$) or \$5.2 million in 2007 dollars. (Unavoidable flooding did occur of 6700 ha of farmland.)

In the wet years of 1995 and 1996, there were nine flood events on the Lower Waikato where the peak flow at Ngaruawahia exceeded 793 cumecs, all of which would have resulted in the Whangamarino control gates being closed, and flood run-off being stored in the wetland until peak flows had passed.

The 29 February 2004 flood on the Waikato River almost spilled water over the Rangiriri Spillway and the Whangamarino control gates would have been closed during the flood peak.

Whangamarino Wetland contains enough storage capacity for a flood equivalent to the large, long-duration event of January 1907 (peak flow at Ngaruawahia of 1870 cumecs).

The capital cost of constructing the scheme was around \$16 million spent over 22 years (1961-1982), equivalent to a total replacement cost in 2007 dollars of \$195 million. Such works would include the Rangiriri Spillway and its stopbanks, the Lake Waikare and Whangamarino control gates, as well as other stopbanks and river-containment earthworks.

If Whangamarino wetland didn't exist, the regional council would be faced with constructing stopbanks along the lower course of the river at a cost of many millions of dollars.

## GAMEBIRD HUNTING

Of the 7290 ha current extent of the Whangamarino Wetland, around 730 ha are owned and managed by the Auckland/Waikato Fish & Game Council, with an equivalent area privately owned in which gamebird hunting opportunity is the management focus.

With tens of thousands of gamebirds using the swamps and river channels every year, the wetland is a significant site for recreational hunters. As well, Whangamarino offers relatively easy access for a large part of New Zealand's population to a wilderness experience. Hunters take pride in volunteer work to conserve wetland habitat to benefit the gamebird resource, as well as non-target wetland species.

The Fish & Game areas are: North Shepherd (68 ha), Central Shepherd (78 ha), Cocks (248 ha), and Eastern Whangamarino (354 ha), which are mainly fertile and seasonally inundated swamps adjoining peat bogs.

Each Fish & Game wetland has some day-to-day management delegated to a group of hunters (stand holders) who are required to maintain the areas of open water (ponds). These hunters have formed incorporated societies to enable collective management, and for financial transparency.

The Auckland/Waikato Fish & Game Council has boosted the volunteer commitment with a day-to-day management budget for capital works and general maintenance. In the last two decades, several hundred thousand dollars have been spent on restoring waterfowl habitat, which in turn expands hunter opportunities in the area. The work has included setting preferred, localised hydrological regimes, as well as willow control and planting of native and amenity trees.

The open water sites on Fish & Game land are publicly balloted; there are no exclusive hunting rights at Whangamarino. Itinerant hunters with a gamebird hunting licence and permit to enter are still able to hunt the sites at any time (as per the Game regulations), except for some early-season restrictions.

Whangamarino Wetland is used by most New Zealand gamebird species at some time of the year, because of its size and diverse habitats. Game species present include: mallard (>25,000 year round); grey duck (hybridised with mallard); New Zealand shoveler (<3000 in August), pheasant and California quail (on swamp fringes or rough farmland edges), pūkeko (large numbers on the swamp/farmland interface), black swan (in open water), paradise shelduck (some moulting sites, and resting spots near farmland), Canada goose (periodic use >300).

Also present in high numbers but not hunted are grey teal (<2000). This species has thrived at Whangamarino, partly thanks to nest-box breeding programmes carried out by hunters and conservationists in the northern part of the wetland.

Fish & Game has proposed to restore marginal farmland, where the long-term farming outlook is unsustainable, back into swamp to expand gamebird habitat and hunting opportunities. Such areas were once part of the Whangamarino Wetland complex.

Fish & Game is also looking into managing DOC grazing concession land by restoring water levels at these sites to encourage reversion to wetland. Any new hunting locations

may be publicly balloted, depending on: the level of interest, the scale of wetland restoration works required and availability of funding.

The Gamebird Habitat Trust distributes funds raised by collecting game bird habitat stamp fees - \$2 of every hunting licence sale - as well as the sale of game bird habitat stamps and associated products. More than 30,000 gamebird licences are sold each year, so gamebird habitat stamp fees alone bring in revenues exceeding \$60,000 a year. Funds from this source have been allocated previously to conservation work at two sites in Whangamarino Wetland.

Several hundred hectares of private wetland and farmland have been bought by individuals, principally for hunting, in which the farmland is allowed to revert to wetland, and existing wetlands maintained as fertile swamps. Such marginal lands tend to be transacted for considerably less than the value of dairying land in the Waikato, which can reach \$25,000 a hectare or more.



Mallard ducks at Whangamarino Wetland. Photo: John Greenwood

## Hydrology

DOC, with Fish & Game, built a rock-rubble weir on the outlet of the Whangamarino River to reinstate the hydrology of the 1960s. In so doing, a compromise was struck between reaching historic water levels and avoiding adverse effects on adjacent farmland that had been developed over the last 40 years.

The initial goal was to restore seasonal inundated swamps (covering at least 1400 ha) by ensuring they were wetter for longer periods, to maintain the wetland function, as well as preventing peat bog fringes from drying out.

The weir became operational in 2000 following repairs to the original structure built in 1994. It has worked much as expected, although further repairs are needed. As a requirement of the consent for the weir, DOC has been undertaking ground water monitoring to determine its effect on surrounding pasture land.

Besides the weir, Fish & Game has worked on projects to improve the hydrology at localised spots, to maintain the shallow, open waters that are preferred by waterfowl and other wading bird species.

## NATIVE SPECIES AND ECOSYSTEMS

Whangamarino Wetland occupies three shallow basins drained by the Maramarua and Whangamarino Rivers and the Reao Stream. It is bounded to the east by the Maungaroa fault and to the west by a range of low hills. The area is fed by a catchment area of some 48,900 ha.

It is made up of peat bog, mineralised and semi-mineralised swamplands along with open-water river systems. The variety of wetland ecosystems at Whangamarino was an additional criterion in support of the Ramsar designation.

The wetland offers important habitat for diverse native wetland birds, in particular, Australasian bittern/matuku. Historic surveys estimate that 20 per cent of New Zealand's breeding population resides at Whangamarino.

It is a significant site for other threatened or uncommon wetland bird species including marsh crake/koitareke, spotless crake/puweto, North Island fernbird/matatā, and New Zealand dabchick/weweia.

Brown teal/pāteke were historically present, and, with intensive pest control, may be able to be re-introduced.

A drawcard for overseas birdwatching tourism, Whangamarino is host also to occasional and unusual visitors, for example Japanese snipe.

The wetland has a diverse freshwater fish fauna, comprising eel species and galaxiids, including a key population of the threatened black mudfish.

Whangamarino is significant for its plant diversity with 239 wetland species of which 60 per cent are indigenous and a number rare or uncommon. The rare swamp helmet orchid *Corybas carseii* is found only at the wetland.

### **“Existence value”, or intrinsic value**

A 1988 study by WT Kirkland of Massey University found that Whangamarino Wetland is worth \$US9.9 million a year (2003 dollars, from a WWF International report on wetlands, see reference). Of this figure, 73 per cent resided in non-use values, that is, the value placed by society on its existence, even if no use is made of it.

Close to Whangamarino Wetland, the National Wetland Trust has bought land for a visitor centre to provide information nationally on wetlands and an education experience, a tangible expression of the value placed on wetlands for their intrinsic qualities.

In recognition of a need for more wetland conservation in New Zealand, new funding of \$2.2 million a year has been allocated in Budget 2007 to DOC to carry out new conservation work at Whangamarino Wetland and two other freshwater sites, the Upper Rangitata River/Ashburton Lakes in inland Canterbury, and Waituna Lagoon/Awarua wetland complex in the south of Southland.

## **OTHER ECOSYSTEM SERVICES**

This report has focused on ecosystem services such as flood water storage and gamebird hunting because of their relative significance and ease of study. But there are other economic values.

### **Harvesting, recreational fishing**

The wetland was traditionally a source of eels/tuna and flax/harakeke for tangata whenua. The rivers of the wetland are fished commercially for eels.

Extensive habitat for whitebait/inanga would benefit the species during the freshwater part of its life cycle, and, indirectly, whitebaiters active in the lower reaches of the Waikato.

Recreational fishing centres on introduced species, such as catfish, rudd and koi carp. While benefiting the people who derive value from this activity, there are few benefits for native biodiversity conservation. A campaign to remove these fish to benefit native species and ecosystems would impact on this fishery.

### **Sightseeing, birdwatching and other recreational activities**

Whangamarino Wetland is located within one hour's drive of half of New Zealand's population, principally the population centres of Auckland and Hamilton. While acceptable to gamebird hunters, public access to the wetland is generally limited.

In response to public demand, domestically and from international bird watching tourism, \$65,000 has been allocated for the planning and design of a walkway through the wetland and construction will be funded out of existing DOC budgets.

### **Carbon sequestration**

Based on science by Landcare Research, peat bogs may absorb up to 0.5 tonnes of carbon dioxide equivalent per hectare per year as part of the process of peat formation. While unimpressive compared to manuka/kanuka sequestration rates of up to 9 tonnes of CO<sub>2</sub>e a hectare a year, active peat bogs may persist in the landscape for thousands of years compared to native forests which grow for an average of 300 years to reach steady state.

### **Water for irrigation of farmland during dry periods**

The construction of a weir to restore water levels to its original state, prior to the wetland's incorporation into a floodwater storage scheme on the Lower Waikato River, has indirectly benefited farmers by some raising of the water tables upstream of Whangamarino. More water is available for affected farmers during dry periods.

## **ACKNOWLEDGEMENTS**

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