

# Wet & Wild

## MANAWATU ESTUARY - NEW RAMSAR SITE



Left & above: aerial views of Manawatu Estuary

**Wet & Wild** is published three times a year April to December. We seek contributions, though published at the editor's discretion. Each issue will be available on [www.wetlandtrust.org.nz](http://www.wetlandtrust.org.nz) within a month of publication, where they can be downloaded as pdfs. Submit articles to [slindsay@fishandgame.org.nz](mailto:slindsay@fishandgame.org.nz)

### New RAMSAR Site Greetings

The Secretariat is very pleased to announce that the Government of New Zealand has designated its sixth Wetland of International Importance, effective 25 July 2005.

Manawatu river mouth and estuary (~200 hectares, 40°29'S 175°14'E) is a moderate-size estuary on the southwest coast of North Island which retains a high degree of naturalness and diversity, important as a feeding ground for migratory birds - a diverse range of bird species can easily be seen, especially at high tide, including Wrybill *Anarhynchus frontalis*, Australasian bittern *Botaurus poiciloptilus*, Caspian tern *Sterna caspia*, Banded Dotterel *Charadrius bicinctus*, White-fronted Tern *Sterna striata*, and Shore Plover *Thinornis novaeseelandiae*.

The salt marsh-ribbonwood community is the largest in the ecological district and contains its southernmost and biggest population of fernbirds (*Bowdleria punctata*).

A high diversity of fish is supported, including some that are threatened, and the site has high fisheries values. Archaeological signs of the semi-nomadic Moa hunter culture date from A.D. 1400-1650, and present Iwi groups in the area, chiefly the Rangitane, Muaupoko, and Ngati Raukawa, support Ramsar designation. The main land uses include recreational activities such as sailing, boating, fishing, and seasonal duck shooting. Invasive plants (especially *Spartina anglica*) and off-road sport vehicles pose potential threats, but measures to address both in cooperation with stakeholders are progressing.

There are presently 1459 Wetlands of International Importance worldwide, covering a surface area of 125,397,780 hectares.

*Dwight Peck*  
Communications Officer  
Convention on Wetlands (Ramsar, Iran, 1971)

A grateful thanks to Mighty River Power for sponsoring **Wet & Wild**. Contact the NWT on [www.wetlandtrust.org.nz](http://www.wetlandtrust.org.nz)





## THE MANAWATU ESTUARY RAMSAR PROJECT

**By Joan Leckie, Chairperson, Manawatu Estuary Trust**

The local people were an important key to starting the project. To begin with some people thought the Iraqis wanted to get involved! Ramsar is a strange word that many had never heard of. But the video which the Ramsar Convention people sent out was very persuasive, and reassured folk that it was a worthwhile thing to do.

A letter to every household in Foxton and Foxton Beach produced 60 letters of support. Iwi are very supportive and have provided very interesting details about the Maori history of the area, indicating their significant sites. The local newspaper has also been very supportive in publishing lots of articles about the Manawatu Estuary Trust's promotional activities. Now most people are aware that there is a world class wetland out there.

The Manawatu Estuary covers about 250 ha of salt marsh, mud flats and sand dunes, and is the largest near natural estuary in the Foxton Ecological District. It supports 23 threatened species of birds, fish and plants. It is a shelter for many birds in times of adverse weather conditions, and the winter home of 1% of the world population of the NZ native wrybill, plus a stopover for many more travelling up the coast to Miranda from their braided river breeding grounds in Canterbury. It is also a vital migratory path for all the native fish in the Manawatu River catchment, as most native fish at some stage in their lives migrate out to sea. In all, it meets six of the eight Ramsar criteria.

The large salt marshes and salt meadows are difficult to access, (even to see) and this has allowed them to remain relatively natural, and provide an undisturbed place for the fernbirds, Australasian bittern and crane. Royal Spoonbills also nest in the area.

A study was recently commissioned by the Friends of Mana Island, to see if there were enough fernbirds to move some to a safe haven on Mana Island. Emilio Tobon, from Massey University, found 20 pairs of fernbirds. Although even with a kayak he was unable to penetrate to the very centre of the saltmarsh because of the dense vegetation and wet ground. So it was decided that the population was not large enough to move any.

Dr Jill Rapson, a lecturer at Massey University, spoke to Trust members recently about the plants of the estuary. She said it had been worked out that salt marsh and wetland plants provide services to the environment worth \$39,000 per hectare if the problems had to be sorted out by mechanical means!

There are very real threats to the Manawatu Estuary, such as 4wd vehicles, dogs, cats, rabbits, stoats, cattle, and water pollution. The Manawatu River has its source on both the eastern and western sides of the Ruahine ranges. It passes through 8 towns and 1 city, intensive dairy farms, sheep country scoured by slips, and several large industrial enterprises. So managing the estuary in a sustainable way with wise use will be a challenge. But Ramsar nomination will be a very useful tool to use to fight these problems, and regional and district councils will be required to respect this internationally significant wetland in their planning.

At this stage the proposal has been given the big tick by New Zealand's Ramsar agent, the Department of Conservation and received the support of the Ministers of Conservation, Foreign Affairs, Environment, Maori Affairs, and Lands. It has now been forwarded to the Ramsar Convention in Switzerland, and is probably going through the process all over again. The Manawatu Estuary Trust and Forest & Bird are planning a big celebration around the time of World Wetland Day in early February. **Manawatu Estuary Trust, PO Box 19, Levin. (06)368-1277**

### Letters to Wet & Wild contributors

Hi Keith

In your article in the latest NWT newsletter, you make the comment that advice on wetland restoration needs to be given by qualified wetland hydrologists/□

BIODIV. I think that this needs to be clarified - Jan Hoverd of 0800 BIODIV has not given specific wetland advice to landowners, because she recognises that it is not her field of expertise. Rather, she refers them to the EW wetland planting guide publication and to EW ecologists or consultants if necessary. Jan will advise on funding options as she has a comprehensive and regularly updated database of all of the grant programmes available. Therefore, I think that the statement in the newsletter is a bit dismissive of what is actually a very useful referral service on biodiversity □

restoration projects. We are doing our LTCCP at the moment and we will certainly do our best to make this happen. I'm happy to discuss this further with you if you like,

Kind regards

Judy van Rossem, Programme Manager - Biodiversity/Special Projects, Environment Waikato

# News Items

## Environment Waikato sponsors National Wetlands Centre

Environment Waikato's environment committee has authorised a \$40,000 grant from its environmental initiatives fund to go towards the design and architectural costs of building the National Wetlands Centre. The grant will provide about a third of the design costs of the \$3 million the centre is expected to cost.

Environment committee chairperson Paula Southgate said she was pleasantly surprised by the size and scale of the project. "It is a far-reaching and exciting concept and when it comes into being it will be a world-ranked site. People should recognize how important it is. Within 5-10 years we should really start to see it bloom."

National Wetlands Trust chairman Gordon Stephenson says he expects the proposed National Wetlands Centre at Rangiriri will enhance Waikato's image as a leading "nature destination" within New Zealand. He is optimistic that the innovative Rangiriri project could do for the north Waikato what the Maungatautari Ecological Island is doing for Waipa district in terms of eco-tourism.

"You have got to have a brand for tourism, and with the Waitomo Caves, west coast harbours, Maungatautari and the river trails, this is another piece of the nature jigsaw for the Waikato," says Stephenson. "Wetlands are a much neglected but very important part of our environment, scientifically, ecologically, hydrologically, and recreationally. But if you want to know something about wetlands, where do you go? We want to recreate examples of wetland types -- including geothermal, bogs and swamps -- found in New Zealand."

Although Waikato is the national stronghold for wetlands - three of New Zealand's five internationally important sites the Whangamarino, Kopuatai and the Firth of Thames are all within close proximity - but wetlands are far more challenging than the usual conservation estate as they are usually very difficult to access.

## NWT AGM

### Election of officers

**Chairman:** Gordon Stephenson

**Deputy Chairman:** Karen Denyer

**Secretary:** Don Scarlet and co-option as a trustee

**Treasurer:** David Lawrie and co-opt as Trustee

**Auditor:** Merv Baker (subject to his acceptance)



Guest speaker at our AGM, Chris Thomas, gave a well-attended talk about his iconic documentary *Waterfowl and Wetlands: A NZ Odyssey*. Seven years in the making, *Waterfowl and Wetlands* describes the various wetland types and shows the country's five Ramsar sites - wetlands of International Importance.

It also explains the natural history of the waterfowl and other birds that depend on different parts of a wetland habitat - from the brown teal of Northland to the flightless teal of the sub Antarctic Auckland Islands. It includes information on waterfowl predators, the role of Fish and Game Councils and the waterfowl species introduced for hunting as well as the work of Ducks Unlimited in creating waterfowl habitat.

Thomas has a long background in wildlife film making, although his career has essentially been that of a scientist. His first film was shot underwater in Australia's Great Barrier Reef where he had gone to help set up an Outward Bound school and teach seamanship. This was followed by work with CSIRO in fisheries oceanography and later work on elephant seals for the Australian National Antarctic Research Expeditions at Macquarie Island where he spent 15 months before coming to New Zealand to work for the Marine Department (later to become the Fisheries Division of the Ministry of Agriculture & Fisheries, and now NIWA).

He also made films throughout this time, one of which won the prestigious Conservation Award at the



Biennial Wildscreen Film Festival in Bristol. A self-taught filmmaker, Thomas is the producer, director, writer and cinematographer of *Waterfowl and Wetlands: A NZ Odyssey*. Now on DVD, it has chapters devoted to each waterfowl species - Maori, scientific and common names included - and links to relevant sites such as Ramsar and Fish & Game NZ. Indexed for quick access to a particular subject such as wetland type or one of the 29 bird species shown in the programme, it is an excellent educational resource.

Largely self-funded, Thomas' documentary also received financial support from Ducks Unlimited, the Pacific Development Conservation Trust - set up with French reparation monies from the invidious bombing of the Rainbow Warrior - and the Eastern and Central Community Trust.

**Waterfowl and Wetlands: A NZ Odyssey (67 minutes) can be bought directly from Chris Thomas for \$49.00 by emailing [c.thomas@paradise.net.nz](mailto:c.thomas@paradise.net.nz)**

## INTERNATIONAL NEWS

The United Nations Environment Programme (UNEP) has announced that ancient Iraqi marshlands drained by Saddam Hussein as punishment against their occupants are back to almost 40 percent of their former level.

UNEP said latest satellite imagery showed a "phenomenal" recovery rate for the southern marshlands, back to almost 3,500 square km after dwindling to just 760 in 2002. Some scholars view the marshlands, at the confluence of the Tigris and Euphrates River, as the site of the original "Garden of Eden" in the Bible.

Saddam began moving against the Marsh Arabs in the early 1990s, accusing them of supporting a Shiite Muslim uprising after the first Gulf War and harbouring criminals. A combination of dams and canals blocked water from the marshes, turning what was once a pristine, wetland ecosystem into semi-desert and forcing all but 40,000 of the area's 450,000 inhabitants to flee.

Since the Iraq war began in 2003, residents have been returning, breaking the barriers and letting water again flow freely in a region where people had lived on small islands and moved on small wooden boats for thousands of years. According to UNEP the marshlands totalled almost 9,000 square kilometres in the 1970s -- one of the world's largest wetlands with rare species like the Sacred Ibis bird. And that while satellite images show wetland cover back to nearly 40 percent of that

in August, the figure was closer to 50 percent back in the Spring thanks to winter rains and snow melt in the headwaters of the Tigris and Euphrates.

UNEP, however, warns that full re-flooding would still take "many years" and must be carefully nurtured. With funds from Japan, UNEP is running drinking water, sanitation and wetland management projects in the area where locals live an austere and deeply impoverished existence.

### **The NWT acting as a information clearing house for advice on wetlands.**

This is an idea that has been suggested to us, and that we are interested in starting in a small way by publishing a list of organizations along with specific individuals who have specialized knowledge about wetlands -from hydrology to restoration planting and from a regional to national level - on our website [www.wetlandtrust.org.nz](http://www.wetlandtrust.org.nz). Of course, everyone on this list would have to approve their entry. If you are interested in being included could you please write to [Keith Thompson at bogman@ihug.co.nz](mailto:Keith.Thompson@ihug.co.nz) with a brief outline of your area of expertise and providing your contact details.

## National Wetlands Centre Developments

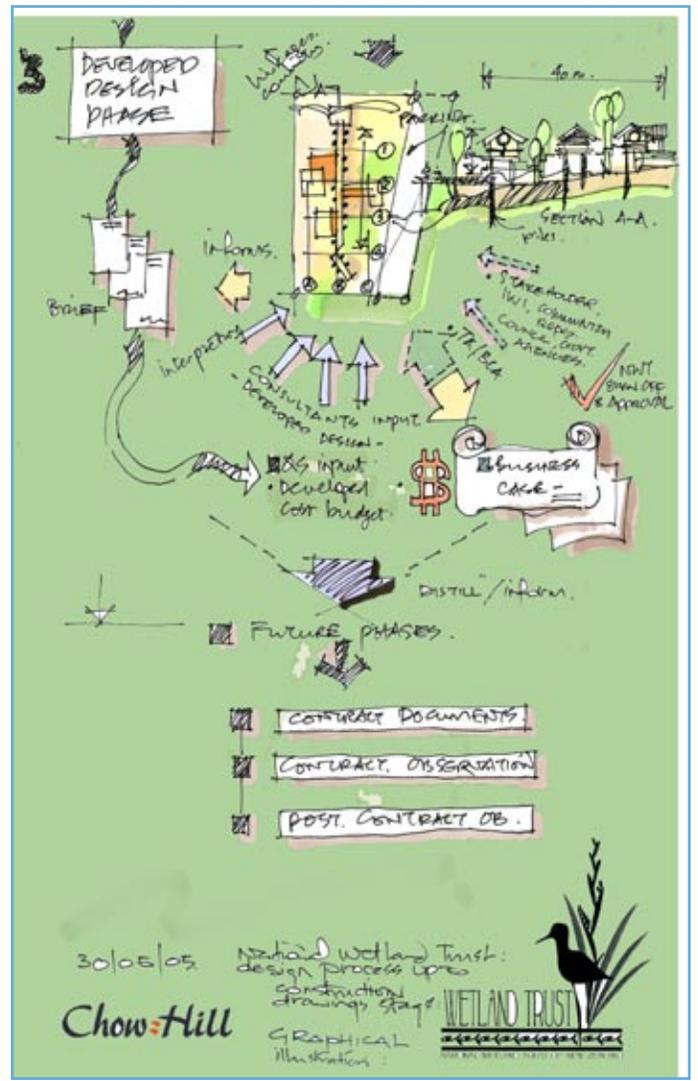
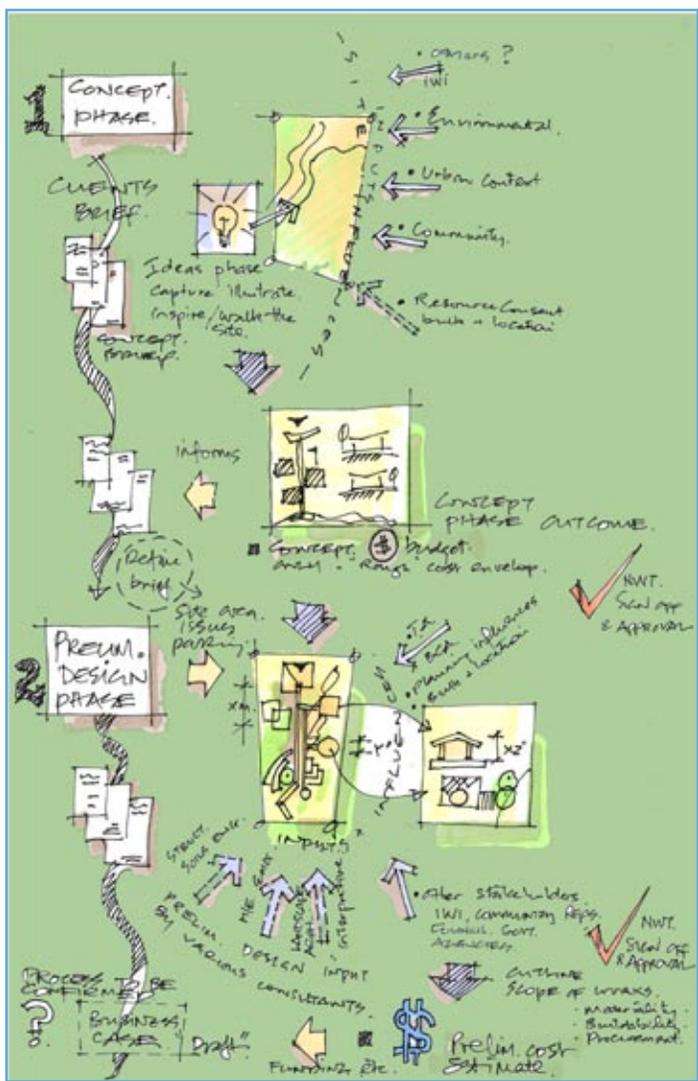
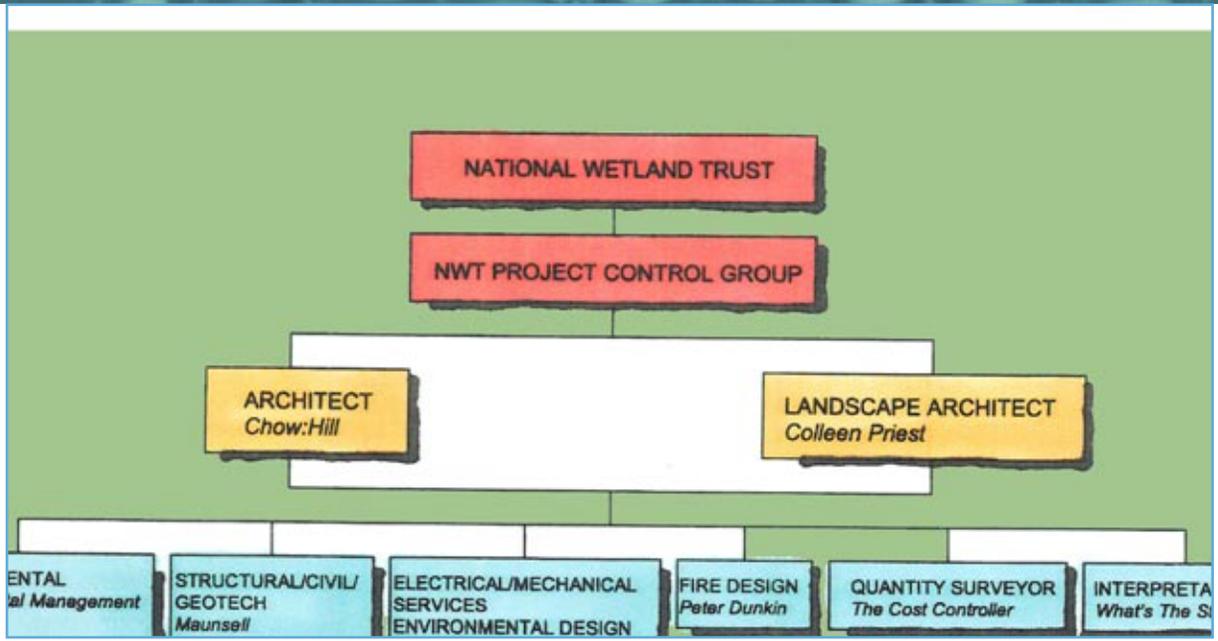
Detailed briefs have now been developed for Chow Hill and Richard Mansergh Priest ( project architects and landscape architects), which have broadly asked that they ensure the site's design is integrated, attractive, educational and in keeping with its surroundings and purpose. It will also be a world-class facility with state-of-the-art educational and interpretative services that are instructive, accessible, enjoyable and creative. It will recognise the cultural, ecological, social, landscape and hydrological values of wetlands.

*'There will be total sympathy and coordination between the building and surrounding landscaped gardens. The instant first impressions must say 'wetland' and 'that looks interesting'.*

### **The functions of the Centre as a whole include:**

- Enticing in the casual visitor, to enjoy and learn. An educational facility for wetland managers, schools, farmers and others who seek a deeper understanding of wetlands.
- A facility for furthering wetland research.
- A meeting place for wetland organisations and others with an interest in the natural environment.

**Opposite are the schematic concept and development phases roughly sketched out by the Centre's architects Chow Hill.**



# Wetlands to protect Lake Okaro from diffuse nutrient inputs



**Chris Tanner and Fouad Al-Momen (NIWA)**  
**Keith Caldwell, Stephen Watkins and Andrew Foulkes (Opus)**  
**John McIntosh and Vance Fulton (EBOP)**

Despite challenging weather conditions, construction of a 2.3 ha wetland designed to treat inflows to the Northern end of Lake Okaro was successfully completed in May 2005. NIWA teamed up with Opus International Consultants to design and supervise construction of a treatment wetland on the edge of Lake Okaro near Rotorua for Environment Bay of Plenty (EBOP). Construction involved excavation of areas of wet pasture on a nearby farm and in a lakeside area of Rotorua District Council reserve to form a two-stage, serpentine wetland. Planting with native species will be carried out over the coming spring by Wildland Consultants.

The wetland is designed to filter incoming flows to the lake from the surrounding agricultural catchment, focussing primarily on nitrogen removal. Sawdust from the Carter Holt Harvey Rainbow Mountain Sawmill has been incorporated into the soils of the wetland to provide an additional source of organic matter to promote bacterial conversion of nitrates to nitrogen gas (denitrification). As wetland plantings develop, they will provide additional supplies of organic matter to fuel ongoing bacterial denitrification.

Over the next few years, it is proposed to monitor the nitrogen removal performance of the wetland as vegetation establishes and the system matures. Information on performance will be used to corroborate performance estimates, and provide information on real development costs and benefits, which can be used to encourage appropriate application in other situations in the region. The wetland, which is part of a larger EBOP



environmental programme for the catchment, will also provide ancillary benefits such as wildlife habitat and landscape enhancement.

**Top above:** View from the north west of the nearly completed, but still unplanted, Lake Okaro wetlands (May 2005). The farm wetland (on right) intercepts water from the main stream on the far right-hand side of the photo. Bunds and islands direct through-flowing waters on a serpentine path though this wetland, and then via a channel and culvert under the road to the lakeside wetland. Extreme storm flows are diverted along a grassed swale (right foreground) created in the old stream channel.

**Below above:** A boardwalk and viewing platform (far side) have been provided at the lakeside wetland to encourage public access and provide a focal point for education on the roles of wetlands in protecting lake water quality.



# WETLANDS AND WINEMAKING

## Quarry Road Estate's new sponsorship of the National Wetland Trust demonstrates an exciting new synergy between wine making and wetlands.

Virtually surrounded by Lake Waikare and the Ramsar-listed Whangamarino Wetlands, Toby Cooper says his and partner Jenny Gander's Quarry Road Estate vineyard benefits from the microclimate these very large, shallow water bodies create.

"There is no hard evidence to prove this, but NIWA officials have suggested to me that in summer water temperatures in both wetlands and lake rise significantly, creating thermal updrafts which can divert inclement weather, particularly heavy clouds coming from the east."

"And looking at figures for national rainfall patterns, Te Kauwhata has a noticeably lower rainfall in summer and autumn than the rest of the Waikato with March and April predominantly dry, just perfect for our particular wine making."

Toby says he and Jenny always knew that if they were going to do any sort of environmental sponsorship it would be very close to home and have a very good synergy with their grape growing. Hence the Te Kauwhata vineyard becoming the National Wetland Trust's latest sponsor,

"It is a sponsorship based on sales volumes that will net the trust several thousand dollars per annum," says Toby.

Established in 1963, although of course vines have been replaced since then, the vineyard is so close to the Whangamarino Wetlands that Tony describes a boat being sailed in its back paddock 25 years ago. Since then the wetlands' water levels have dropped significantly, but the biodiversity they create seems to have continued to effect their grape growing.

Above: Panoramic view of the wetlands . Courtesy of the LEARNZ Archive [www.learnz.org.nz/highlights/index.php](http://www.learnz.org.nz/highlights/index.php)

The Estate's home vineyard (they also lease land for grape growing) is closest to the wetlands and Tony says they have not had to use a broad-spectrum insecticide on it since 1997. Again difficult to explain with hard data, but information which is reminiscent of another wine maker and NWT sponsor (see article on Banrock Station in December 2004 Wet & Wild) who are discovering great benefits, both environmentally and in terms of marketing, by aligning their wine making with wetlands.

"The wine industry is fiercely competitive," says Tony. "In New Zealand alone there are several reputable wine competitions at least five of which are of an international standard awarding in the region of 600 medals - Bronze, Silver and Gold - per show."

So support of a well-aligned environmental cause, demonstrated as Banrock Stations is and Quarry Road Estates will be with a sticker on each bottle sold, can be just the point of difference that gets you noticed when you are equal on price and quality with a dozen other wines in your field.

The Coopers' interest in the NWT also has the added advantage of being truly local. The National Wetlands Centre will be a major eco-tourism draw card in their vicinity, somewhere to take visitors, both Kiwis and from overseas, adding interest to their district.

Wine makers since 1996, when they initially bought Quarry Road as a family group, the Coopers used a wine consultant to help with the wine making process at first and got great support from the Wine Growers Council. Since then they followed the guidelines promulgated by the Sustainable Viticulture Group, which Tony says doesn't award a Bio-Grow label but encourages sustainable standards for members to aspire to.

In the first year of their purchase of Quarry Road Estate, Toby and Jenny called on assistance from his sister, a winemaker in Cotes de Provence, France to provide a point of difference in their wine style.



## It's the little things that count...

**Brian Sorrell, Alastair Suren & Donna Sutherland  
(NIWA Christchurch)**

Why do we want to conserve and restore wetlands? Ask any of us to make a list, and it's a fair bet that the word 'biodiversity' will be in there somewhere. But how do we know we're looking after biodiversity properly, if we don't even know what lives in wetlands, why it's there, and whether human activities make it disappear? For the past two years, the Department of Conservation has been funding us to take a closer look at biodiversity in our lowland wetlands - the ones most under threat.

Biodiversity in wetlands: you think of eels, you think of bullies and whitebait, of bittern booming in summer evenings, of tuis in flax bushes, maybe of sedges and mosses, dracophyllums and droseras. All of the species found here and nowhere else, unique to these islands. The things that will disappear if we continue to lose our wetlands to drainage, if willows continue their dehydrating march into our lowland swamps and marshes, and if catchment run-off keeps cranking up nutrient levels, so that diverse native vegetation is replaced by monospecific meadows of weeds like glyceria and phalaris. There is another level of biodiversity, though, that we mostly don't think about, that hides at the bottom of wetlands, but which everything else depends on.



Small, microscopic organisms are more important for holding ecosystems together than big, charismatic ones. Biologists have known for a long time that most of the diversity in any environment is found in its insects,

worms, bugs, and bacteria, not in its fish, birds and mammals. Tiny, creeping things with horror-movie appendages might not be as easy to love as pandas or kiwis, but they're where the action is. Not only are there lots more of them, but they're also doing all the important jobs for the rest of us. They break down our waste - chowing down on all the complex organic matter that big plants and animals excrete when they're alive, and leave behind when they're dead, turning it into simple nutrients that drive the next generation of growth. All that, before we even think about the terrors of life at the business end of the food chain.

Small things are also destined to be eaten by big things. It sounds obvious, and it's why we need to know about the less lovable critters in our wetlands. However squeamish you might be about 'creepy crawlies', they've got far more reason to dodge us than we them. Every fish, bird and person that gets sustenance out of a wetland only does so because of a huge cast of smaller organisms, all linked together in food webs of often baffling complexity. If we lose the small food web organisms from wetlands, it's a fair bet that the bigger ones will follow. So our project is looking at two groups of organisms that we know are very important for aquatic food webs, but about which we know very little in wetlands - algae and invertebrates. In wetlands, algae are the plants that usually provide most of the food for herbivores, and invertebrates make the link between them and bigger animals such as fish.

We have three questions to answer. What kind of algae and invertebrates live in different kinds of wetlands, and different habitats within wetlands? What are the important factors controlling their distribution? And finally, how do the populations differ between pristine wetlands and ones with greater levels of human impact? If we know that, then we have a basis for some management decisions - where our conservation priorities should be, what precautions we should be taking if we want to sustain a healthy food web.

We started last year by collecting algae and invertebrates from just four relatively undisturbed wetlands on the West Coast, but taking lots of samples from a wide range of different habitats in each - open water leads, small pools, on and amongst different plant species. The point of this was to find out at what scale the biggest differences occur. Do the same habitats in different wetlands all have the same things in them, or is there big variation between wetlands, and not much variation within each? This sort of question helps us make conservation decisions such as how many sites need managing or protecting to provide some representative cover of the algae and invertebrates, and



the environmental requirements of the different species.

The samples from the four wetlands showed that there is a surprisingly large variation between sites, with each

of the four having its own mix of species, most likely controlled by differences in water chemistry. This year, we've been spreading our collecting net much wider, to more wetlands in different regions. There's lots of work still to be done before we understand the role of the little things in our wetlands properly, but at last they're getting the attention they deserve.

**Captions: Left** - Chlorococcus, a cyanobacterium (blue-green alga) from the Kakapotahi Swamp, West Coast.

**Above** -Alastair Suren collecting invertebrates from a fen pond in Southland

## Research into the light climate of a large, shallow, hyper-eutrophic lake in North Waikato

Alex Hopkins

### Introduction

Many lakes in the Waikato region are suffering the effects of cultural eutrophication. An increase in nutrients from the land catchment ultimately leads to a decline in aquatic plants that impact on the aesthetic and cultural values of the lakes. Lake Waikare, near Te Kauwhata in North Waikato, is a large, shallow lake, affected in this way. With the loss of aquatic plants, sediments are stirred from the lake bottom during wind events and become suspended in the water column.

Such sediments reduce the amount of light able to penetrate through the water column, preventing the re-establishment of plant growth that would stabilize the lake bed and reduce re-suspension. This study will focus on examining potential methods for reducing the re-suspension of lake-bottom sediments in Lake Waikare, with the ultimate aim of being a potential method for improving the lakes' light climate, water quality, and allowing aquatic plant regrowth.

### Methods

Large, shallow eutrophic lakes require novel approaches to facilitate their sustainable restoration. Lake-water drawdown to consolidate these sediments has been deemed unsuitable in this lake without the use of other complimentary methods. I will therefore examine alternative methods. I will examine the potential use of alum (Aluminium Sulphate) to flocculate (bind) the sediments in the water column together.

By increasing the sediment particle sizes through flocculation, these sediments should settle from the water column more quickly, and subsequent re-suspension of particles should require greater force (i.e., higher winds). Doing so will allow a greater quantity and quality of light to pass through the water column which is required for plant growth.

This hypothesis will be tested. I will also investigate whether bio-manipulation, an altering of the current fish species abundance, will be required for plants to re-establish. A mix of native and introduced fish currently resides in Lake Waikare that may both disturb, or consume plant growth. Results of a study from Lake Rotoroa (Hamilton Lake), where fish were unable to access plants housed inside cages, have shown fish exclusion will allow plants to grow in algae-dominated lake.

The framework used by this research will be the phenomenon of alternate stable states and lake restoration. Large shallow lakes can assume one of two alternate stable states: either 1) algae and sediment-, or; 2) plant-dominated. Both states may be extremely stable over time. As such, great effort is required to return lakes to a state, which is plant dominated with high water quality, if it has been changed to an alternative state. Algal dominated lakes (e.g. Lake Waikare) are characterized by poor water quality due to high concentrations of nutrients, plankton (algae) and sediments.

Aquatic plant growth depends on sunlight reaching bottom waters for growth. Sediments and algae in the water column reduce the amount of light that can reach the aquatic plants, leading to their decline. With the loss of aquatic plants, sediments are stirred from the lake bottom during wind events and become suspended in the water column. Such sediments reduce the amount of light able to penetrate through the water column, preventing the re-establishment of plant growth that would stabilize the lake bed and reduce re-suspension.

The current high nutrients, sediment and algae dominated nature of Lake Waikare has been due to





human influences in the catchments beginning in the 1940's, culminating in a collapse of the aquatic plants in the late 1970's. This study will focus on examining potential methods for reducing the re-suspension of lake-bottom sediments in Lake Waikare, with the ultimate aim of being a potential method for improving the lakes' light climate, water quality, and allowing aquatic plant growth.

### Experimental Design

The exact nature of the experiments for Alum flocculation trials are yet to be determined. However, initial small-scale laboratory experiments will be run on suspended sediments collected from Lake Waikare to determine the concentrations of Alum required to effectively settle sediments from the water column. Once this has been determined, larger scale replicated experiments will be run to compare the settlement rates of sediments in large tubs that have or have not been treated with Alum. Sediments in the tubs will be suspended by stirring prior to Alum addition. Sediment concentrations in the water column will be determined over time by removing known volume water samples from different depths in the tubs, which will be passed through fine glass fibre filters.

These filters will be oven dried and weighed to compare sediment loads treatments and different depths. Light concentrations will also be compared down the water column using automated meters and penetration using a Secchi disk. Specifically, greater sediment settlement rates in tubs with Alum will be tested for. Sediments in tubs will be resuspended at several subsequent time intervals to assess the longevity of the effectiveness of Alum treatment, and to assess if a single dosage is adequate or whether re-applications will be required. Sediment and light conditions in tubs will be compared using t-tests or ANOVA depending on the number of treatments.

The effects of fish on plant re-establishment will be carried out using similar methods as used by de Winton et al. (2002) for Lake Rotoroa (Hamilton Lake). Native aquatic plants (charophytes) will be germinated in pots and grown in the laboratory. Plants will be selected and placed in the pots (in Lake Waikare) at two sites that differ in their exposure to the wind (an exposed site and one in a sheltered embayment).

At each site, pots will be placed inside and outside mesh cages designed to exclude fish at depths of approximately 1 m. After three weeks, plants will be retrieved from the enclosures in the lake and biomass (dry weight) will be compared between the control (outside) and caged treatments. If biomass in the uncaged treatments is significantly lower than those within the caged treatments, this will indicate that local

fish populations are responsible for preventing plant re-establishment rather than light climate.

Enclosures will be cleared of debris and algae through the three-week duration of experiments to ensure light reaches plants inside and outside of plants similarly. Similar experiments will be run on un-germinated oospores (resting stages) of charophytes, to determine whether the proportion of plants germinating differs in the absence or presence of fish. All experiments will be run in different seasons.

## Less damage to New Orleans if wetlands protected

**Sitting in a bowl below Lake Pontchartrain and the Gulf of Mexico and sinuously lapped by the flood-prone Mississippi River, New Orleans' flood devastation was a disaster waiting to happen.**

But the scale of the latest hurricane damage - and the damage suffered if a scale five hurricane hits the city directly - would be much less if the city's natural buffer, thousands of hectares of wetlands creating a protective fringe of marshes and barrier islands, hadn't been destroyed over the last decades.

Coastal Louisiana - a swath of marsh, islands, and swamp once covering more than 15,500 square kilometers - has been built from sediment carried out of the Mississippi River's immense catchment. In the 1930s huge levees were built along the Mississippi to prevent the enormity of its spring flooding, however it was this cyclic inundation that pumped in the vital sediments and nutrients sustaining the area's wetlands. Further destruction resulted in the 1960s when the U.S. Army Corps of Engineers dredged 14 major ship channels to inland ports and oil companies and created countless canals for pipelines and wells, increasing erosion and allowing lethal doses of salt water to infiltrate brackish and freshwater marshes, along with the toll from subsidence and sea-level rise.

In addition, it is now believed that the removal of millions of barrels of oil, trillions of cubic feet of natural gas, and tens of millions of barrels of saline formation water lying with the petroleum deposits caused a drop in subsurface pressure. A theory known as regional depressurization that it is posited led nearby underground faults to slip and the land above them to slump.

The end result is a loss to Louisiana of 4,900 square kilometers of wetlands since the 1930s, with another



freshwater spillway diversions in the Mississippi's levee system, which would bring nutrient loaded runoff from surrounding agriculture to reconstitute some of its previous natural processes. However, if this impacts on commercial enterprises - as it did in Caernarvon when fresh water timed to mimic spring floods wiped out the beds of nearby oyster farmers - it will also mean additional and significant compensation costs. And even negotiating these will be difficult given that various economic interests want different things: cities need an escape route for flooding waters but farmers, such as soybean growers, don't want that route to be over their fields.

And the mistakes go on at both state and national level. The recently passed Vitter Provision, in the Water Resources Development Act, gutted a key section of an 1899 law that had empowered the US Army Corps to

1,800 square kilometers likely to vanish by 2050, as, despite nearly half a billion dollars spent over the past decade to stem the tide, the state continues to lose about 65 square kilometers of land each year, roughly one acre every 33 minutes. Losing arguably the state's most significant protection against climate change and more devastating hurricanes.

Scientists, environmental groups, business leaders, and the U.S. Army Corps of Engineers have been aware of what this means for years, but restoring the wetlands would cost billions. An ambitious 14-billion-dollar plan to save the remaining wetland was proposed under the first Bush administration, unfortunately it chose the much cheaper option of spending up to two billion dollars over the next ten years to fund the most promising projects.

A decision - following New Orleans' devastation - now probably viewed as woefully inadequate, as well as short-sighted given the importance of the wetlands to the state's economy. Louisiana's wetlands are the most productive in the US, said to produce or transport more than a third of the nation's oil and a quarter of its natural gas, and to be second only to Alaska in commercial fishing, while still being the best protection its oil and gas pipelines have against hurricane damage.

To date restoration methods such as rebuilding marshes with dredge spoil and salt-tolerant plants or trying to stabilize a shoreline that's eroding 10 meters a year are said to have had limited success. One more successful model being proposed is that of creating

regulate activities in navigable waters that might destroy wetlands. The new Provision was enacted to serve timber interests wanting to cut down cypress trees in the swamps - and turn them into mulch - despite the fact that these old trees survive only because they can stand in water. It was a decision that appalled local environmentalists, here they were asking US coffers to spend \$15 billion on a plan to restore the Mississippi River delta - as their own politicians were further wrecking it.



# Creature Feature - Pukeko



**The Pukeko, *Porphyrio porphyrio*, also called the Purple Swamphen, Purple Gallinule, is a large bird in the family Rallidae.**

## **What countries are they found in?**

Their breeding habitat is usually warm reedbeds across southernmost Europe, Africa, tropical Asia, and Australasia. There are four subspecies, differing in the plumage colours. The races are; *P. p. porphyrio* in Europe, *P. p. madagascariensis* in Africa, *P. p. poliocephalus*, in tropical Asia and Australasia, and *P. p. pulverulentis* in the Philippines .

There is a similar but much smaller species in North America, the American Purple Gallinule, *Porphyrio martinica*.

## **Where do they like to live?**

Pukekos usually like to live near wetlands, but are also found living and nesting in any dense vegetation in damp environments such as lakes or rivers.

## **What do they like to eat?**

They eat a wide variety of swamp and pasture vegetation but also insects, frogs, small birds and eggs. They also particularly like the tender shoots of reeds.

## **What does it look like?**

It has huge feet, ideal for clambering through reeds,

bright plumage and a red bill. They walk and run vigorously on strong legs, and have long toes, which are well adapted to soft, uneven surfaces. It has a very loud explosive call.

## **Do they fly?**

In places where there is plenty of cover, Pukeko prefer to run or swim to safety but in more open spaces they do fly for short distances. Their take off is labored and they are awkward flyers, flying with feet dangling and often crash landing into a tree or scrub.

## **How do they nest?**

They usually nest from August to March but will sometimes nest as late as April and it is not unusual to see small chicks late in Autumn. They nest in groups of birds rather than just as pairs, which means there would usually be two laying females and at least two males in one nesting territory and they all share the incubation of the eggs. Groups can also have non-breeding helpers, these would be offspring from previous broods that help in the feeding and caring for chicks. Being able to cooperate so well is partly why they have become such a populous species.

## **As they are a native bird, why can we hunt them in NZ?**

Pukeko are protected nationally, but can be shot for sport during the shooting season because their population has grown to the extent that it is necessary to keep their numbers down. They often carry out marauding excursions at night to eat potatoes, kumara and other vegetables as well as considerable amount of grass and clover, so farmers consider them a pest.

They are also a major predator of Brown Teal ducklings, so the Department of Conservation has begun to cull their population in certain areas such as Great Barrier Island. Controlling one native species for the benefit of another is a very difficult decision to take, but sometimes it is the only way to maintain the numbers needed for a particular species to survive. Though Harrier hawks often attack Pukekos while rats and stoats plunder their nests. Harriers are dealt with by the Pukekos gathering together and driving them away with much shrieking and carrying on.

## **What do Maori say about the Pukeko arriving in NZ?**

East Coast Maori assert that the Pukeko was introduced by their ancestors on the Horouta canoe which reached NZ about twenty four generations ago, while the Aotea tribe of the West Coast say the Pukeko, the Kiore and the Karaka tree were all introduced by their ancestors in a boat called the Aotea.

## Post-Election - policies on sustainability

As public awareness advisor to Fish & Game NZ, I attended a pre-election talk titled Politicians Dialogue on Sustainability organized by the Sustainability Special Interest Group, Institute of Chartered Accountants NZ. As it will be post-election by the time you read this, it's being published as a summary reminder of our main parties pre-election policies on sustainability. Each environmental spokesperson was asked to state what they saw as the main issues, and from these I've selected those most pertinent to the work of the NWT.

**Nick Smith, National:** Good environmental outcomes are about getting the economic instruments right.

National has four principles in its environmental platform: sustainability, economic and environmental success go hand in hand; to provide choice and incentives rather than dictates as much as possible, and that policy needs to be science-based.

### Key issues:

- \* We need to deal with our freshwater quality by moving the focus from source point pollution to general agricultural discharge.

- \* The RMA needs major reform.

- \* We need to move to tradable water rights as Australia is beginning to do.

**Pete Hodgson, Labour:** Sustainability is a long-term endeavour, so long as there is some progress we should keep going with it, as to make it work you have to create an integrated system.

### Key issues:

- \* Water quality- this is all about sinks not sources, as we are running out of sinks, while in terms of quantity our rivers are finite and we already have water allocation issues.

- \* Climate change - using our Kyoto credits would be a good use of an economic instrument.

**Jeanette Fitzsimmons, Greens:** The question will always revolve around the rate at which we take resources from the environment as well as the rate at which we discharge our wastes. And so sustainability will always be an issue of scale: our population versus its consumption per capita and what our environment can cope with. Technology can vastly improve the amount we get from each resource unit but it cannot resolve issues of scale.

### Key issues:

- \* Water is an essential concern (more than 40 countries are already importing water) and here we have seriously altered our water cycle with deforestation, intensive agriculture and impacts on our water aquifers, with the signs being 95% of our lowland

rivers are not safe to swim in and our lakes have toxic algae blooms.

- \* Soil is as well though if we manage our watershed and issues properly much of our soil problems will be resolved.

- \* Fisheries - climate change is warming and acidifying our oceans, while our fishing methods and freshwater runoff is negatively impacting on our marine biodiversity

- \* All these are about our economic policy - what you value, how you measure and price - we need an overarching sustainability policy that all other policies fit into

**Gordon Copeland, United Future:** Does not agree with the Kyoto Protocol, and there are inexhaustible forms of energy that we will eventually develop the creative technologies to realistically access.

### Key issues:

- \* Hunting and fishing are finite resources that have to be husbanded carefully to fulfill the demand for their recreational use, which is very large in NZ, so is against the 1080 poisoning for pest control and want see families continue to have full access to the outdoors and the sustainable management of our game and fish stocks

**Ken Shirley, Act:** The issue of sustainability is vague: we need to define how much is enough and for how many generations. It's a concept that leaves no room for innovation.

### Key issues:

- \* RMA needs major reform

**Jim Peters, NZ First:** The story of environmental sustainability in NZ is like reading two great novels: the first is our pioneering development, the second our growing understanding of the environmental costs of how we use our resources.

### Key issues:

- \* Believes regional councils when they report an improved compliance from farmers, both in inspections and knowledge.

- \* Our farmers are realistic and appreciate the issues they have to deal with match their products to our clean, green branding, but established farmers can afford the investment in achieving better environmental outcomes than can emerging ones. **Shonagh Lindsay**

**Friends of Lake Hakanoa Walkway** have David Bellamy opening their walkway on February 26th 2006. Friends of Lake Hakanoa Walkway have an area adjoining the walkway of around 20 acres that they have begun planting with a "large number of bird enticing trees to cover all four seasons." Council Parks and Reserves say planting of appropriate plants around the wetlands could be started very soon once details are finalized.

## MEET THE NWT TRUSTEES

There is an enormous amount of knowledge, experience and credibility in our group of trustees. Several are leading wetland practitioners, with Gordon Stephenson one of the first advocates for wetlands in New Zealand. Read on for a brief summary of the talents, experience and skills of several more of our trustees.

### Brian Sorrell

Brian is a senior freshwater ecologist with NIWA in Christchurch, where he has been working on lake and wetland ecology and restoration since 1996. Before joining NIWA he spent six years in Australia studying the ecology of floodplain wetlands in the Murray- Darling Basin, and four years in Denmark, where he was involved in a multi-national EU project investigating die-back and restoration of reed wetlands in Europe. He is interested in all aspects of wetland functioning, biodiversity, and restoration, but has a special passion for deep-water wetland plants such as kuta, club rush, and raupo. He is currently the Secretary-Treasurer of the New Zealand Limnological Society, is a member of the Editorial Board of the international journal Aquatic Botany, and is particularly interested in public education about the functions and values of wetlands.

### Karen Denyer

Karen is Environment Waikato's terrestrial and wetland ecologist. Her job involves identifying information

needs for native forests, scrub and wetlands, to contract necessary research, obtain, store and manage information, and provide technical input to education products or events, policy development and review, and resource consent processing. Karen helped develop the wetland factsheets that Environment Waikato produced several years ago that were a huge success with over 2000 distributed. Karen brings to the Trust her enthusiasm for environmental education and the development of the wetland education centre.

### Phillipe Gerbeaux

Phillipe Gerbeaux came to New Zealand in the mid-eighties to do his Ph.D research on the ecology and management of aquatic macrophytes in Waihora (Lake Ellesmere). Philippe returned briefly to his native France before getting employed by the Hydrology Centre in Christchurch up until 1992, when DSIR was disbanded. Philippe then took up a contract with Tour du Valat, a leading research centre working on the conservation of mediterranean wetlands based in the south of France. In 1995 he took up his current position of wetland ecologist with the Department of Conservation in Hokitika. Among other things he is responsible for the coordination of the West Coast Conservancy freshwater/wetland programme, but he also contributes to projects at national level.



## MEMBERSHIP FORM

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