

WELLINGTON CONSERVANCY

Taupo Swamp (37)

Location: 41°04'30"S, 170°53'E. 3 km north of Plimmerton and 20 km north-northeast of Wellington City, adjacent to State Highway One on its eastern boundary and the North Island Main Trunk Railway on its western boundary, North Island.

Area: c.25 ha.

Altitude: 15 m.

Overview: A nationally representative topogenous lowland freshwater mire created by the uplift of the ocean floor and developed from saltmarsh, with the predominant vegetative feature being an extensive New Zealand Flax *Phormium tenax* community. The mire has regionally unique and diverse vegetation and succession stages.

Physical features: A freshwater topogenous mire occupying the lower part of the Taupo Valley and fed by the Taupo Stream and its tributaries. The area was uplifted by the 1855 earthquake from a lagoon which was previously an inlet of Porirua Harbour. This uplift and subsequent siltation effectively excluded salt water, transforming the area into a topogenous mire. Taupo Swamp is classified as a topogenous mire because there is a topographical barrier preventing free and natural drainage, and water is supplied from a freshwater stream source. The swamp is covered by a silty peat, while the catchment area has a substratum of greywacke and sandstone overlain over much of the area by loess and sand. The Taupo Stream flows through the swamp in a watercourse one to two metres wide and over one metre deep, and is confined to a compacted soil channel stabilised by flax and other vegetation. The water table in the swamp is generally above the surface of the peat. The catchment area that drains into the swamp is approximately 665 ha. Water flow in the catchment in many instances filters through extensions of the swamp that are unprotected and cut off from the main swamp by the development of a road and a railway.

The nearest climate station to the swamp is 7 km to the south at Porirua, where the mean annual rainfall is 1,235 mm. Ground frosts occur on an average of 25 days per year, and air frosts on an average of five days per year; the average annual temperature is 12.8°C. Observations suggest that frosts occur at the swamp more frequently than observed at Porirua.

Ecological features: Taupo Swamp is one of only a few lowland topogenous mires in the Wellington District that have retained a largely indigenous vegetation cover. The original vegetation in the low areas was marine, but upon siltation this progressed through a succession of vegetation types as the depth of water and salinity altered. The area was used during the late 1880s for the growing of flax (with plants collected from a variety of sources) for later harvest for the Foxton flax mill. This planting of flax accelerated the natural process of plant succession. Domestic livestock from neighbouring farmland had access to the mire and grazed it until partial fencing of the wetland by the Queen Elizabeth II National Trust made the area secure from stock trespass.

Bagnall and Ogle (1981) identified seven major vegetation types in the swamp proper. These include:

- Sedgeland: especially *Carex lessoniana*, but also *Cortaderia toetoe*, *Typha orientalis* and *Glyceria maxima*.
- Flax tussockland: the most extensive community, made up largely of *Phormium tenax*.
- Fernland: with bracken *Pteridium esculentum*.
- Shrubland: with *Muehlenbeckia complexa*, *Leptospermum scoparium*, *Salix cinerea* and *Rubus fruticosus*.

- Treeland: with *Salix fragilis* and a pocket of *Dacrycarpus dacrydioides*.
- Herbfield: with mixed dicotyledonous and monocotyledonous herbs.
- Grassland: consisting predominantly of adventive grasses.

On higher ground to the west and the east of the swamp, native shrublands are present, with Manuka *Leptospermum scoparium*, Kanaka *Kunzea ericoides* and a variety of broad-leaved shrubs including *Coprosma* spp., Mahoe *Melicytus ramiflorus* and Rangiora *Brachyglottis repanda*. Some of this area has been affected by land clearance and fires, and has developed a shrubland cover of predominantly introduced shrubs of Gorse *Ulex europaeus* and Broom *Cytisus scoparius*.

Major weed species present within the swamp and on the higher ground include Blackberry, Gorse, Broom, Crack Willow, Pussy Willow and Japanese Honeysuckle. Darwin's Barberry has been found and constitutes a major potential threat. It was suggested in the late 1970s that exotic weeds such as Blackberry *Rubus fruticosus* and Pussy Willow *Salix atrocineria* were rapidly displacing the indigenous vegetation, that ecological succession would shortly lead to the current mosaic of vegetation types being replaced by a rather uniform mire forest, and that farming followed by urban development of the lower valley and surrounding hill slopes would destroy the mire. To address these questions, the mire was studied during 1977-78 (Bagnall & Ogle, 1981). The aim was to develop sufficient understanding of the structure, composition and ecological status of the mire vegetation to permit sound recommendations to be made on its future management.

The results of this study indicated that the general pattern of changes that emerges since the late 1940s (when Moar studied the area) is one of limited seral advance in the earlier successional stages, with stability leading to decline in the later stages. This seral reversal is evidently caused by a rising water table. The dense vegetation cover of the mire (in the continued absence of grazing by domestic livestock) will prevent further spread of Pussy Willow, although there will be a limited increase in cover from layering and the continued growth of existing plants. With a rising water table, the extensive areas of bracken will recede, rather than increase, in cover, as will the areas of grassland. Similarly, Broom and Gorse will diminish in importance, both as a consequence of the rising water table and the density of the vegetation cover. Blackberry appears to be stable, and should not show substantial changes in cover in the absence of grazing. In the medium-term, Beggar's Ticks will increase its cover in the lower area, with the continued rising of the water table. However, the flax should grow through to replace this species eventually. Japanese Honeysuckle also seems likely to continue its advance. The future of *Glyceria maxima* remains uncertain, and further examination was recommended.

In the event of a resumption in succession toward mire shrubland and forest, there are available local seed sources of component trees. Kahikatea *Dacrycarpus dacrydioides* is found in the gully on the northwest margin of the mire, and *Syzygium maire* and Pukatea *Laurelia novae-zelandiae* both occur within the Taupo catchment. Other species, such as Mahoe, Fuchsia *Fuchsia excorticata*, Kaikomako *Pennantia corymbosa*, Five-finger *Pseudopanax arboreus* and Cabbage Tree *Cordyline australis*, are also found beside or within the mire. Seed dispersal of these species should be adequate, as Blackbird *Turdus merula* and Silver-eye *Zosterops lateralis* are common, and the seedlings of several bird-dispersed trees are found in the mire, remote from seed sources, e.g. Five-finger, Kahikatea, Fuchsia, Kaikomako and mahoe.

Major deviation from the successional trends identified here would arise if there were substantial changes in the local conditions. In particular, the reintroduction of domestic livestock would permit the further establishment of exotics such as Pussy Willow and Blackberry, and any draining of the mire or substantial alluvial deposition would permit the development of mire shrubland and eventually forest (Bagnall & Ogle, 1981).

Land tenure: The mire is private land, owned, managed and administered by the Queen Elizabeth the Second National Trust. The mire is bounded on its western side by the North Island Main Trunk Railway, on its eastern side by State Highway One, in the north by Airlie Road (a local low-use road), and on its southern boundary by private land (a vacant industrial site in 1991, previously a ceramic pipe and tile factory). The rest of the catchment area is predominantly pastoral sheep and cattle farming in private ownership. A portion of the catchment includes a local authority cemetery.

Conservation measures taken: The area was purchased in 1986 by the Queen Elizabeth the Second National Trust. Following purchase, the National Trust established a management committee which was responsible for production of the "Taupo Swamp Plimmerton Management Plan". The aim of the management plan is to provide for the protection, maintenance and enhancement of the natural values of the swamp and surrounding high ground (collectively referred to as Taupo Swamp) for the benefit and enjoyment of the public. Objectives of the plan are as follows:

- to protect and maintain the swamp and surrounding land as a natural landscape feature;
- to protect the hydrological system and dependent ecological systems;
- to protect and enhance the existing native vegetation;
- to encourage appropriate public use and enjoyment of the swamp where this does not conflict with the above;
- to ensure that the significance of the swamp to the local Maori community is given due consideration.

Specific conservation measures outlined in the management plan include the following:

- to liaise with surrounding landowners, local authorities, government agencies and the Wellington Regional Council (which incorporates the former Wellington Regional Water Board) to ensure appropriate protection for the hydrological system upon which the swamp is dependent;
- to prohibit the lighting of fires within Taupo Swamp and to indicate this fact by signs;
- to allow controlled public access to parts of the reserve;
- to allow limited commercial exploitation of Taupo Swamp only where this is compatible with all other policies and as approved by the management committee (*e.g.* crafts based on the traditional use of flax, and eco-tourism);
- to control or eradicate noxious and adventive plants within the property (*i.e.* plants that can be controlled and are having or likely to have a major impact on the natural qualities of the swamp and its surrounds);
- to ensure that the property is secure from stock trespass and the unauthorised entry of motor vehicles;
- to negotiate with Power Direct (formerly the Hutt Valley Energy Board) with a view to the removal of the present transmission line through the swamp;
- to allow only those structures necessary for the efficient management of the reserve as determined by the Taupo Swamp Management Committee;
- to foster a "take-home" policy to rubbish;
- to allow controlled public use of the property when the appropriate minimum level of facilities has been provided;
- to provide information about and an interpretation of the values of Taupo Swamp to visitors using signs, interpretative displays, publications and other methods to encourage public appreciation and awareness of these values;
- to encourage studies of Taupo Swamp which are compatible with the management objectives;
- to encourage controlled use of the property for educational purposes;

- to coordinate all publicity concerning Taupo Swamp to establish a high standard in keeping with other National Trust publicity.

Considerable progress has already been made with many of these recommendations. Some of the railway border affected by a fire has been re-vegetated, and re-vegetation of the road border and other high ground is in progress.

Conservation measures proposed: See under "Conservation measures taken".

Land use: Protection of the wetland values and visual resource as viewed from the rail and road arteries. Land use in adjacent areas includes a State Highway and the Main Trunk Railway. The surrounding land is predominantly agricultural (pastoral hill country sheep farming). A local authority cemetery is situated in part of the catchment.

Possible changes in land use: Widening of the State Highway is a possibility. Agricultural land may become low intensity residential areas. Connected with this will be an increase in roads with resulting siltation during the construction phase and increased stormwater run-off from contaminated road surfaces thereafter.

Disturbances and threats: The proximity of the swamp to a major railway and road and the propensity for flax to burn indicate a moderately severe risk from fire. A fire in 1989 burnt several hectares of flax and surrounding border shrubland vegetation. The swamp is vulnerable to the spread of introduced plants, the most conspicuous being *Salix* species, *Rubus fruticosus* and *Lonicera japonica*. The former two, in particular, are common invasive plants of New Zealand wetlands. Other threats include: pollution from agricultural run-off and road usage; stormwater run-off contaminated by waste products from motor vehicles; and rubbish discarded by passing travellers. Vehicle mishaps have inadvertently allowed oil and petrol to be released into the reserve in the past, and some dumping of road-fill has occurred occasionally in the past. Urban development is occurring in the surrounding farmland. Changes in the water-table may eliminate certain species.

Hydrological and biophysical features: The wetland plays a general role in sediment trapping, maintenance of water quality and the support of aquatic and terrestrial food chains.

Social and cultural values: Prior to the earthquake in 1855, Taupo was the site of a principal "pa" (fortified settlement) of Ngati Toa Rangatira. The "pa" was situated on the head of land to the north of Plimmerton beach and at the sea end of Taupo Swamp. This "pa" was strategic because it produced a landing and leaving base for canoes to travel in all directions, but particularly to the island of Te Mana-O-Kupe-O-Aotearoa. All the leading chiefs used the "pa", and it was here that Te Rauparaha was captured in 1846. The subterranean upheaval of 1855 came as a frightening experience; many of the people moved north, and the prominent "pa" of Taupo, once situated on a point of land surrounded by water, no longer had the defence of water, as the sea bed had lifted producing the present day Taupo Swamp.

The area was used during the late 1880s for the growing of flax, and domestic livestock from neighbouring farmland had access to the mire and grazed it until partial fencing of the wetland by the Queen Elizabeth the Second National Trust made the area secure from stock trespass.

Scenic views are afforded to travellers on the road and railway. The swamp as such is well recognised, but interpretation in parking areas bordering the highway would improve traveller appreciation. This is, however, prevented by the road building authority. Service vehicle access to the railway is used as a walking and running route. Efforts to make this service access part of a larger walking trail have not been successful to date (1992).

Noteworthy fauna: The Taupo Stream channel is fully shaded by flax leaves in many places and flax stems grow out of the stream bed itself, with the stem bases totally inundated by the water. The shelter afforded to fish by this dense growth of flax provides ideal habitat for fish, especially eels and the cryptic galaxiid species. Hicks (1980) notes the presence of the following species: Brown Mudfish *Neochanna apoda*, Giant Kokopu *Galaxias argenteus* (occasional), Banded Kokopu *G. fasciatus* (abundant), Inanga *G. maculatus*, Long-finned Eel

Anguilla dieffenbachii (abundant), Short-finned Eel *A. australis* (abundant), Red-finned Bully *Gobiomorphus huttoni* (common), Common Bully *G. cotidianus*, Giant Bully *G. gobioides* and Common Smelt *Retropinna retropinna*.

Birds observed or assumed to be present include a variety of waterfowl and terrestrial species, including Little Shag *Phalacrocorax melanoleucos*, Australasian Bittern *Botaurus poiciloptilus*, Mallard *Anas platyrhynchos*, Pukeko *Porphyrio porphyrio melanotus* and New Zealand Kingfisher *Halcyon sancta vagans*.

Noteworthy flora: Bagnall and Ogle (1981) provide a full list of plant species recorded at the swamp. Only 50% of the 165 vascular species recorded in the mire are indigenous, although most of the exotic species are of only minor importance in the vegetation. Succession was found to be advancing in the earlier stages towards a *Phormium* tussockland, the more advanced stands of which showed seral reversal under the influence of a rising water table, preventing the development of mire shrubland and forest.

Scientific research and facilities: Moar (1949) and Bagnall and Ogle (1981) have investigated the vegetation of the mire and surrounding areas. There are no facilities at the wetland. However, the swamp is within 20 km of Victoria University campus and other science institutions based in Wellington City.

Conservation education: The swamp is used occasionally by university and secondary schools for illustrative purposes and the collection of biological specimens.

Recreation and tourism: Present use of Taupo Swamp is primarily as a visual resource viewed from the rail and road arteries due to the difficult access to and through the swamp.

Management authority: The Queen Elizabeth the Second National Trust is responsible for management of land, while the Department of Conservation (Wellington Conservancy) is responsible for management of wildlife. Wellington Regional Council has responsibility for resource consents.

Jurisdiction: Functional: Queen Elizabeth the Second National Trust and the Department of Conservation. Territorial: Wellington Regional Council and Porirua City Council.

References: Anon. (1984, 1989); Bagnall & Ogle (1981); Dix *et al.* (1990); Hicks (1980); Moar (1949); Parish (1984).

Reasons for inclusion:

- 1a Taupo Swamp is a representative example of a topogenous lowland freshwater mire, a wetland type characteristic of New Zealand.
- 1d The swamp is also an example of an unusual type of wetland, having been formed by the uplifting of the seabed during an earthquake. It is one of only a few lowland topogenous mires in the Wellington Ecological District that have retained a largely indigenous vegetation cover.

Source: Phil Brady and Pam Cromarty.

Lake Wairarapa Wetlands (38)

Location: 41°16'30"S, 175°08'30"E. In the Ruamahanga Valley in the southern Wairarapa. Lake Onoke (part of the Lake Wairarapa Wetlands) bounds the southern coast of the North Island, and the settlement of Lake Ferry is situated on the lake edge. Lake Wairarapa is approximately 5 km south of the town of Featherston.

Area: c.9,350 ha. Lake Wairarapa, 7,800 ha; Lake Onoke, 650 ha; lakes and wetlands adjacent to Lake Wairarapa, c.900 ha.

Altitude: Near sea level.

Overview: The Lake Wairarapa Wetlands, comprising Lake Wairarapa and Lake Onoke and their associated wetlands, form the largest wetland complex in the southern North Island. The wetlands, a key feature of the Wairarapa Plains Ecological District, are considered to be of international importance for their flora and fauna. The wetlands regularly support in excess of 10,000 ducks, geese and swans (Anatidae) and hold over 1% of the New Zealand populations of at least 12 species of waterfowl. The Lake Wairarapa Wetlands have been ranked as outstanding on the basis of the habitat they provide for fish species, the rare and endangered species they are known to support, and the use of the fisheries resource. The wetlands also support a number of nationally threatened plants, or plants that are rare in the North Island.

The wetlands have been significantly modified over the last 150 years through uplift of the former lake-bed in the 1855 earthquake, drainage for agricultural development, the diversion of the Ruamahanga River in 1967 to by-pass Lake Wairarapa and flow direct to Lake Onoke, and the introduction of exotic flora and fauna.

Physical features: Lake Wairarapa (7,800 ha) is shallow (mostly less than 2.5 m deep), and is about 18 km long and 6 km wide. It receives water from the Tauherenikau River at the northeastern corner, several small streams along the western shores and, during flood conditions, from the Ruamahanga River via the Oporua Floodway in the middle of the eastern shore. The exit from the lake is regulated by six barrage gates operated by the Wellington Regional Council. The western and eastern shores of the lake are very different. The western side is close to the foothills of the Rimutaka Range and the shoreline margin is very narrow. By contrast, the shoreline margin on the eastern side is very wide as the shore slopes very gradually from open water through zones of different wetland vegetation types to farmland. Natural fluctuations in water level caused by rainfall and the effect of wind direction and speed create zones of vegetation with varying degrees of tolerance to inundation. In the past, when lake levels were very low, sandstorms deposited low dunes along the eastern shore, and these, together with changes in river courses, trapped a series of lakes and wetlands from just north of the Tauherenikau River to the former entrance of the Ruamahanga River at Willow Island. The largest of these wetlands are Boggy Pond and Mathews Lagoon, several lagoons in the J.K. Donald Block, and Barton's Lagoon. Near the northwest corner of Lake Wairarapa, a small lagoon (Turner's Lagoon) was similarly formed. These wetlands total some 900 ha.

Lake Onoke is a 650 ha brackish lake at the mouth of the Ruamahanga River. The lake is separated from Palliser Bay by a 3 km long shingle spit, which is naturally breached by rising lake levels or, more commonly in recent years, cut artificially to reduce the danger of flooding on nearby farmland. For long periods the lake is tidal, but in southerly conditions with a low river flow, the exit to the sea becomes blocked. The level of Lake Onoke can rise to such a height that there can be back-flow through the Barrage Gates into Lake Wairarapa. The nearby Pounui Lagoons have recently been separated from Lake Onoke by a stop-bank, and are fed by Battery Stream that flows from Lake Pounui. This deep lake formed in a drowned valley in the foothills of the Rimutaka Range.

Ecological features: Many of the native plant communities have been destroyed by agricultural development and drainage of wetlands, or have been taken over by exotic species. The various lakes and their shores have a complex and diverse pattern of plant communities, reflecting differences in physical conditions and influences by humans. Important native turf plant communities are found on the periodically dry shores along the eastern shore of Lake Wairarapa, in some backwaters and on seasonally dry beds of lagoons adjacent to Lake Wairarapa. Wetland plants that are nationally threatened, or that are rare in the North Island, include *Leptinella maniototo*, *Crassula ruamahanga*, *Carex cirrhosa*, *Pilularia novae-zelandiae*, *Hypsela rivalis* and *Amphibromus fluitans*.

Raupo *Typha orientalis* is the dominant native plant in most wetlands away from the main lakes, and has probably benefitted from an increase in the nutrient levels of the water in the

wetlands. The spread of Raupo in high-nutrient water is very rapid, and it tends to form a monoculture. In some places, further spread of this species is currently being controlled by chemical spraying and some mechanical pulling.

The original large areas of flax that were traditionally used by the Maori people and commercially harvested last century have all but disappeared. Some small remnants of native trees, dominated by Kahikatea, Ti (Cabbage Tree) and divaricating shrubs, which were probably typical of the area, persist among the wetlands on the eastern side of Lake Wairarapa, but particularly on the western shore of Allsops Bay.

The Lake Shore Scenic Reserve on the western shore of Lake Wairarapa contains a remnant stand of mainly Black Beech, with some patches of Titoki and Karaka, and shrubs closer to the lake margin. This is probably typical of the original forest between the Rimutaka Range and Lake Wairarapa. Lake Onoke has important divaricating shrub communities including good stands of *Plagianthus divaricatus*.

Willows and alders dominate the woody vegetation of the Lake Wairarapa wetlands, and continue to invade new areas of wetland. On the exposed shores of Lake Wairarapa and around the margins of the wetlands, introduced plants, especially Tall Fescue, *Juncus articulatus* and Mercer Grass, dominate the plant communities that are only partially covered by water. At Lake Onoke, *Spartina* sp. has the potential to be a serious weed problem, and this species is now being monitored by Noxious Plants Officers of the Wellington Regional Council.

The establishment of Tall Fescue on the eastern shore of Lake Wairarapa has been very rapid over the past 10 years, and is adversely affecting the native turf communities by invading and then altering the shoreline accretion processes by trapping suspended sediments and so changing the habitat characteristics. The spread of Tall Fescue also reduces the availability of feeding and roosting sites for shorebirds and waterfowl when lake levels rise above about 10.3 m, because these birds do not feed or roost amongst tall vegetation where they have difficulty moving and where they cannot see predators approaching.

In some of the ponds east of Lake Wairarapa, Mercer Grass has spread rapidly in the past five years; this forms a monoculture and replaces native turf communities that are intermittently exposed. The spread has been most rapid in lagoons that are suspected to receive high nutrient input, but this weed can now be controlled by chemical spraying and perhaps in the future by reducing the nutrient input to the lagoons.

Land tenure: The majority of the wetland area is Crown land in various status (Stewardship Area, Wildlife Management Reserve, Scenic Reserve), managed and administered by the Department of Conservation. The South Wairarapa District Council holds an area of wetland as Lake Reserve. There is also some private land, part of which is owned by the Wellington Fish and Game Council.

Land immediately surrounding the wetlands (*i.e.* valley floor) is largely in private ownership, with the surrounding hills being Crown land held as Forest Park (Rimutaka and Haurangi), managed and administered by the Department of Conservation.

Conservation measures taken: The majority of the wetland area is protected as Stewardship Area, Wildlife Management Reserve or Scenic Reserve (all Crown land), managed and administered by the Department of Conservation. The Wellington Fish and Game Council also owns and manages an area of wetland for game-birds. The wetland area held as Lake Reserve is under the control of the Southern Wairarapa District Council.

The National Water Conservation (Lake Wairarapa) Order of 1989 declares that the wildlife habitat created in part as a consequence of the natural fluctuations of water levels, particularly over the eastern shoreline, is an outstanding feature of Lake Wairarapa. The order also includes various provisions to preserve and protect wildlife habitat.

Due to the range of competing land uses and perceptions of the role of the wetland system, and the desire to integrate management around these fragile wetlands, a Coordinating Committee was set up to prepare guidelines for the management of the Lake Wairarapa wetlands. Members of the Coordinating Committee represented organisations with statutory responsibilities for the management of the wetlands, landowners, local Maori, user groups and scientific advisers. A report entitled "Lake Wairarapa Wetlands Management Guidelines" was produced as the result of the Committee's discussions during 1990 and 1991. The Committee's discussions focused on the common goal of reaching agreement on all fundamental aspects of the management of the Lake Wairarapa wetlands. The Co-ordinating Committee recognised that policy statements were required for two distinct areas:

- A core area, called the "Lake Wairarapa Wetlands", defined as Lake Wairarapa and Lake Onoke, and their associated wetlands and margins. This definition was based on ecological grounds rather than land tenure status, and so includes both Crown and private land. This is the area to which the management guidelines primarily apply.
- An advocacy zone, defined as the entire catchments of the rivers, streams, and drains that enter into the core management area. The interest of the committee in this zone is to advocate policies to ensure that land-use practices do not impact adversely on the intrinsic and cultural values of the core area, the Lake Wairarapa wetlands.

The guidelines are built around four goals:

- To manage the Lake Wairarapa wetlands to protect and enhance their intrinsic and cultural values.
- To integrate land-use management of the Lake Wairarapa wetlands and surrounding protective land.
- To promote enjoyment by the public and to provide for sensitive recreational, scientific and commercial use of the natural and historic resources.
- To promote public understanding of and foster support for the protection of the natural and historic heritage of the Lake Wairarapa wetlands.

The guidelines aim to provide a clear direction for the unified and balanced management of the Lake Wairarapa wetlands which protects and enhances the wildlife and conservation values of the wetlands while providing for the needs of the various users. If the guidelines are successfully implemented, the quality of the Lake Wairarapa wetlands should be maintained or even improved for the benefit of future generations of wildlife and people.

The guidelines are the product of deliberations of the Lake Wairarapa Co-ordinating Committee. They are an expression of the policies formulated by consensus after the presentation of information and then subsequent discussion by the Committee. They do not necessarily represent the views of the statutory authorities represented on the Committee, but these bodies are urged to adopt the guidelines and to incorporate appropriate goals, objectives and policies into their strategic, policy and operational plans for management of the wetlands and surrounding catchments. Private landowners are also urged to adopt the guidelines voluntarily as the basis for the management of their land in the wetland system.

The Lake Wairarapa Co-ordinating Committee recommended a change in policy regarding lake levels in Lake Wairarapa, including the concept of using minimum levels rather than average or target levels. The proposed regime allows for more fluctuation in seasonal levels with the aim of enhancing wildlife values and lowering the risk of farmland being flooded. These changes formed the basis for the water rights granted to the Wellington Regional Council in 1991.

Conservation measures proposed: See under "Conservation measures taken".

Land use: The wetland system is an integral part of the flood management scheme for the Ruamahanga River valley in the southern Wairarapa. Lake Wairarapa is used as a reservoir to store flood waters, and the lake level is regulated by barrage gates at its outlet. The exit of the

Ruamahanga River to the sea at Lake Onoke is periodically blocked, and this exit is artificially opened to lessen the danger of flooding. Because developed access points are limited, relatively few people visit the wetlands, but the wetlands are regionally important for several recreational pursuits, especially game-bird hunting, sailing, fishing and nature study.

Crown land is used for the conservation of flora and fauna, particularly waterfowl and fish; this includes the sustainable harvest of some species.

Most of the land surrounding the wetlands has been developed for pastoral production.

Possible changes in land use: None known.

Disturbances and threats: Increased nutrient input favours the expansion of exotic species such as Mercer Grass, which forms a monoculture and replaces native turf communities. This weed can now be controlled by chemical spraying and by reducing the nutrient input into the lagoons where the spread of the grass has been most noticeable. Increased nutrient levels in the water of wetlands (away from the main lakes) has favoured the spread of Raupo *Typha orientalis*, which also forms monocultures. Further spread is controlled through similar means to Mercer Grass, along with some mechanical pulling. The invasion of wetlands by exotic species of willows and alders is also a problem in some areas.

Hydrological and biophysical values: The wetlands play a significant role in flood control and sediment trapping, and are of great importance in supporting aquatic and terrestrial food chains. The wetlands play a general role in the recharge and discharge of groundwater.

Social and cultural values: The Lake Wairarapa wetlands have been traditionally important for the Ngati Kahungunu people of the southern Wairarapa as an area for food gathering, and the shores of the lakes are dotted with historical sites. In particular, the wetlands were a major Maori eel fishery; Lake Onoke was one of the most important sites in the North Island, especially when its exit to the sea was naturally blocked during the seaward migration of breeding adult eels in autumn. Dried eels were traded widely throughout southern North Island and northern South Island. The original large areas of flax were also used by the Maori.

Noteworthy fauna: Ninety-six species of birds have been recorded from the Lake Wairarapa wetlands in the last 15 years; of these, 41 species regularly use the wetland areas, 25 are irregular visitors or vagrants to the wetlands, and 30 are mainly associated with surrounding farmland and forest patches. Globally and nationally threatened species of waterfowl include New Zealand Dabchick *Poliiocephalus rufopectus*, Australasian Bittern *Botaurus poiciloptilus*, Variable Oystercatcher *Haematopus unicolor*, Banded Dotterel *Charadrius bicinctus* and Caspian Tern *Sterna caspia*. The Wrybill *Anarhynchus frontalis* has occurred as an occasional visitor. At least 12 species of waterfowl occur in numbers exceeding 1% of the New Zealand population.

The wetlands regularly support in excess of 10,000 ducks, geese and swans (Anatidae), with average maximum counts of 5,000 Black Swan *Cygnus atratus* (9.8% of the national population), 1,900 Paradise Shelduck *Tadorna variegata* (1.1% of the national population), 510 Grey Teal *Anas gracilis* (3.4% of the national population) and 3,600 New Zealand Shoveler *A. rhynchotis variegata* (2.8% of the national population). Average maximum counts of other waterfowl occurring in nationally important numbers (over 1% of the national total) include: 25 New Zealand Dabchick (1.7%), 15 Australasian Bittern (1.5%), 1,040 Pied Stilt *Himantopus leucocephalus* (3.5%), 70 Pacific Golden Plover *Pluvialis fulva* (10.0%), 400 Banded Dotterel (1.3%), 100 Black-fronted Dotterel *Charadrius melanops* (3.3%), 8 Sharp-tailed Sandpiper *Calidris acuminata* (8.0%) and 3 Pectoral Sandpiper *C. melanotos* (30.0%).

The eastern shore of Lake Wairarapa from the mouth of the Tauherenikau River to the northern end of Allsops Bay is important feeding or roosting habitat for shorebirds. Because of the variations in water levels caused by wind actions, rainfall and the operation of the barrage gates, the flat eastern shore is particularly favoured because the shoreline is constantly changing and new invertebrate prey is being exposed. Arctic shorebirds such as Pacific Golden

Plover and Bar-tailed Godwit *Limosa lapponica* arrive at the wetlands from October and remain until March or early April. Shorebirds that breed in New Zealand mostly visit the area during their non-breeding season, from January to August. Some may be present all year, and a few Variable Oystercatcher, Pied Stilt, Banded Dotterel and Black-fronted Dotterel nest around Lake Wairarapa. Lake Onoke Spit is an important breeding site for Banded Dotterel and a few Variable Oystercatcher. Many of the endemic shorebirds that visit Lake Wairarapa breed on the rivers of the Wairarapa or in the wetlands, but Banded Dotterel that breed in the South Island also regularly visit the lake in winter.

Anatidae breed on the small lakes and lagoons adjacent to Lakes Wairarapa and Onoke, while Black Swan also breed on Willow Island at the former mouth of the Ruamahanga River. The eastern shore and parts of the western shore of Lake Wairarapa and Allsops Bay are important feeding, loafing and moulting sites for Anatidae outside the breeding season. Other waterfowl such as New Zealand Dabchick, Australasian Bittern and crakes (Rallidae) are resident in the small lakes and lagoons adjacent to the main lakes, and only rarely venture out to the main lakes. A large and regionally important colony of Black Shag *Phalacrocorax carbo*, Little Shag *P. melanoleucos* and Little Black Shag *P. sulcirostris* is found in the southern part of the Mathews Lagoon complex. Lake Onoke Spit has the largest colony of Caspian Terns in southern North Island, with about 40 pairs nesting between October and January.

The wetlands were ranked by Davis (1987) as "outstanding" on the basis of the habitat they provided for fish species, the rare and endangered species that they were known to support, and the use of the fisheries resource. Species of fish present include whitebait (galaxiid species), Common Smelt *Retropinna retropinna*, Brown Mudfish *Neochanna apoda*, Giant Kokopu *Galaxias argenteus*, Short-finned Eel *Anguilla australis*, Long-finned Eel *A. dieffenbachii*, Yellow-eyed Mullet *Aldrichetta forsteri*, Perch *Perca fluviatilis* and flounders *Rhombosolea* spp. Several other fish species whose life-cycle includes stages in marine and freshwater environments, such as Short-jawed Kokopu *Galaxias postvectis*, Koaro *Galaxias brevipinnis* and Torrent Fish *Cheimarrichthys fosteri*, pass through the wetland system on their way between the sea and streams in the hill country. Marine fish such as Kahawai enter the Lake Onoke estuary to feed and spawn. Of the fish in the wetlands, Brown Mudfish, Giant Kokopu and Short-jawed Kokopu are regarded as threatened species. The eels are commercially exploited, as are flounders in Lake Onoke. Whitebait, flounders, eels, Perch and Brown Trout *Salmo trutta* all provide a significant recreational fishery.

Noteworthy flora: Important native turf plant communities are found on the periodically dry shores along the eastern shore of Lake Wairarapa, in some backwaters and on seasonally dry beds of lagoons adjacent to Lake Wairarapa. Wetland plants that are nationally threatened, or that are rare in the North Island, include *Leptinella maniototo*, *Crassula ruamahanga*, *Carex cirrhosa*, *Pilularia novae-zelandiae*, *Hypsela rivalis* and *Amphibromus fluitans* (now rather rare, but also found in Australia). The Lake Shore Scenic Reserve on the western shore of Lake Wairarapa contains a remnant stand of mainly Black Beech, with some patches of Titoki and Karaka, and shrubs closer to the lake margin. This is probably typical of the original forest between the Rimutaka Range and Lake Wairarapa. Lake Onoke has important divaricating shrub communities, including good stands of *Plagianthus divaricatus*.

Scientific research and facilities: Since November 1984, the Ornithological Society of New Zealand has made a continuous series of monthly counts of wetland birds (excluding Anatidae) on the eastern shore of Lake Wairarapa from the Oporua Floodway to the Tauherenikau River. Moore *et al.* (1984) carried out counts of Anatidae in 1982-83. A number of studies have been undertaken on the vegetation of the wetlands. There are no specific research facilities associated with the wetlands.

Conservation education: No information.

Recreation and tourism: The wetlands are important for recreational fishing (for flounder, eels, trout, whitebait, kahawai and perch), and are an important area in southern North Island for game-bird hunting. Half the hunters using the core area come from the Wairarapa and half from Wellington and further afield. The opening weekend of the hunting season often attracts hunters from Auckland. About 700 hunters visit the Lake Wairarapa wetlands during an average season, with 450 present during the opening weekend. The eastern wetlands have the greatest concentration of hunters. The total bag (catch) from the core managed area for the season is 8,000-10,000 ducks, 3,000 Black Swan, 500 Paradise Shelduck and 300 Canada Geese *Branta canadensis*. Before 1970, access for hunting was by arrangement with private landowners. The acquisition of land for public use has increased public access to the wetlands. Other activities include nature study, walking and sailing.

Management authority: The Department of Conservation (Wellington Conservancy) has responsibility for the management of Stewardship Areas, Wildlife Management Reserves, Scenic Reserves and wildlife. The Wellington Regional Council is responsible for resource consents. The Wellington Fish and Game Council manages sport fishing and game-bird hunting.

Jurisdiction: Functional: The Department of Conservation, Wellington Fish and Game Council and Wellington Regional Council. Territorial: Wellington Regional Council and South Wairarapa District Council.

References: Davis (1987); Department of Conservation (1989b); Moore *et al.* (1984); Robertson (1991).

Reasons for inclusion:

- 2a The Lake Wairarapa Wetlands support populations of two globally threatened species of birds, *Poliiocephalus rufopectus* and *Botaurus poiciloptilus*, and three threatened species of fish, *Neochanna apoda*, *Galaxias argenteus* and *G. postvectis*.
- 2b The wetlands are of special value for maintaining the genetic and ecological diversity of the region, particularly with respect to waterfowl, fish and wetland plant species (especially the native turf communities).
- 2c The wetlands are of special value as the habitat of plants and animals at a critical stage of their biological cycles, including waterfowl, fish and wetland plant species.
- 2d The wetlands are of special value for a number of species endemic to New Zealand, including several plants (*Leptinella maniototo*, *Crassula ruamahanga*, *Carex cirrhosa*, *Pilularia novae-zealandiae* and *Hypsela rivalis*), birds (*Poliiocephalus rufopectus* and *Haematopus unicolor*) and fish (*Neochanna apoda*, *Galaxias argenteus* and *G. postvectis*).
- 3c The wetlands regularly support 1% or more of the regional populations of *Poliiocephalus rufopectus* (1.7%), *Botaurus poiciloptilus* (1.5%), *Cygnus atratus* (9.8%), *Tadorna variegata* (1.1%), *Anas gracilis* (3.4%), *A. rhynchotis variegata* (2.8%), *Himantopus leucocephalus* (3.5%), *Charadrius bicinctus* (1.3%) and *C. melanops* (3.3%).

Source: Pam Cromarty.