RAMSAR WETLANDS
INFORMATION SHEET

1. Country: New Zealand **2.Date**: November 1992 **3. Ref:** 5NZ003

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5. Name of Wetland: WHANGAMARINO WETLAND

6. Date of Ramsar Designation: 4 December 1989

7. Geographical Co-ordinates: 175°07'E long 37°18'S lat

8. General Location: (e.g. administrative region and nearest large town)
(a) 62km south of Auckland City in the North Island.
(b) Located in Waikato District.

9. Area: (in hectares)

Total area - 5690 hectares approximately.

10. Wetland Type: (see attached classification also approved by Montreux Rec. C.4.7)
M S T U W X
Manmade: 9 + duck ponds

11. Altitude: (average and/or maximum and minimum)
The average elevation of the wetland is 4.2m a.s.l.
Minimum - below 3.62m
Maximum -5.95

12. Overview: (general summary, in two or three sentences, of the wetland's principle characteristics)
The Whangamarino Wetland is the second largest bog and swamp complex in the North Island of New Zealand.

239 wetland plant species have been recorded from the area, of which 60% are indigenous, with several classified rare or vulnerable. It is a notable water bird habitat and some tens of thousands Anatidae (black swans, New Zealand shoveler, grey duck, mallard and grey teal) use the wetland from late autumn to spring, depending on water levels.

The Whangamarino Wetland is listed as a wetland of international importance under the Ramsar Convention.

13. Physical Features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

ORIGINS AND GEOLOGY

The Whangamarino Wetland is contained within three large shallow basins drained by the Maramarua and Whangamarino Rivers and the Reao Stream. The wetland is bounded to the east by the Maungaroa fault and to the west by a range of low hills from Te Kauwhata to Meremere. To the east is the Hapuakohe range, which dates from the Upper Jurassic age and clays eroded from these hills form the base of the wetland. A few small islands of siltstone, outcrop within the wetland. More recent Waitemata sediments form the base of the low hills on the other side of the wetland, and above this base are gravels, sands and clays from the Whangamarino formation. These materials also form emergent islands of high ground in the wetland.

The most significant geological factor in relation to management of the wetland is the presence of coal below the wetland. It is significant because of the potential commercial value of the coal resource and possible effects of extraction on the integrity of the wetland. The coal is some 400-500 metres below the surface of the Reao Arm and increases elsewhere to an average depth of 800 metres below the surface.

SOILS

The predominant soils of the wetland are organic peat soils which form in the hollows and on the low-lying flats where the water table is permanently high and anaerobic conditions have led to the accumulation of organic matter. Recent soils from alluvium have formed over the organic soils, or have mixed with organic soils, along the margins of the rivers and streams in the wetland where inorganic materials are periodically being added to the land surface.

CLIMATE

The climate resembles that of much of the lower Waikato basin with an average annual rainfall of 1200mm. Temperatures are mild with mean daily values ranging from 19°C in summer to about 9°C in winter. Frosts are infrequent and fogs common in the winter. Westerly winds prevail and average annual sunshine hours are about 2050-2150.

CATCHMENT

Whangamarino Wetland in non flood conditions is fed by a water catchment area of some 48,900ha. In a flood, the wetland also receives water from the greater Waikato River catchment, via lake Waikare.

HYDROLOGY

Uncontrolled State

In its uncontrolled state (pre 1959), during high flow conditions water from the Waikato River water moved into lake Waikare north of Ohinewai by means of reverse flows up Te Onetea and Rangiriri Streams. The lake acted as a major ponding area and once water

levels reached a certain point it flowed over land into the Whangamarino Wetland. From there the waters eventually drained back into the Waikato River via the Whangamarino Wetland and River. However, as the Waikato River rose flows reversed up the Whangamarino River and the wetland then acted directly as a ponding area for flow from the Waikato River as well as for lake Waikare overflow and catchment flow (Hannah 1981).

Protection Works

The lower Waikato-Waipa Flood Protection Scheme began in 1961. With regard to the Whangamarino wetland it aimed at permitting limited development of land for agriculture. Such land was to be protected by stopbanking and pumping. The remainder of the wetland was to act as a controlled flood-ponding area for the Whangamarino, Maramarua and Kopuku river catchments, with a capacity of 60 million cubic metres of water.

The controlled ponding function of the wetland was achieved in part by erecting a control structure at the confluence of the Whangamarino and Waikato Rivers, to prevent direct backflow by the Waikato River, and by installing an outlet control at lake Waikare.

Wetland Water Levels

Water levels in the peat bogs fluctuate by about 10 cm. Water levels in the mineralised zone fluctuate considerably and can vary by about 2-2.5 m during a year.

Water Quality: The majority of wetland waterways are highly turbid as a result of carrying high levels of silt from lake Waikare or due to the leaching of humic materials from the peat areas. The Maramarua arm carries high silt loads from the eastern hills and an adjoining open cast coal mining overburden dump.

14. Ecological Features: (main habitats and vegetation types)

The Ramsar site occupies much of the 7290 hectares of the overall wetland complex, which is made up of peat bog, swampland, mesotropic laggs, open water and river systems.

Botany

The vegetation within the wetland is closely linked to the pattern of bog and swamp. The variation between extremes of acidic peat bog and mineralised swamp is reflected in a diversity of plant associations (Ogle and Bartlett 1981).

A vegetation map drawn for the entire wetland (Strachan 1981), indicates that on the area subject to the management plan some 3000 hectares contain peat bog plant species and some 2600 hectares contain swampland vegetation. A simplified vegetation map is attached.

Vegetation Patterns

The peat bog contain relatively few plant species, almost all of them indigenous. Sedges *(Baumea, Schoenus* and *Tetraria* spp), wirerush *(Empodisma* spp), umbrella fern *(Gleichenia*

dicarpa), and manuka *(Leptospermum scoparium)* are the dominant species.

The most common peat bog plant associations are *Baumea* spp dominant with manuka present (40% approx); manuka dominant with some *Baumea* species (20% approx); and manuka with *Schoenus.* (Percentages relate to the peat bog area not the entire wetland).

The swampland support a more diverse range of plants, many of which are exotic species. Willows *(Salix* spp) dominate some areas, while other sites comprise herbaceous vegetation only. Water plantain *(Alisma plantago-aquatica),* willow weeds *(Polygonum* spp), water purslane *(Ludwigia palustris), Carex* sedges, *Juncus* rushes, buttercups (mostly *Ranunculus flammula),* and various grasses become abundant in summer and autumn as water levels drop. Seed production from these and other herbs is of great importance to species such as black swans, New Zealand shoveler duck, grey duck, mallard, and grey teal.

The most common swampland associations are dense pussy willow *(Salix atrocinerea,* (20% approx); tall manuka (18% approx), mixed herbaceous plants and grasses (15% approx); dense crack willow (11% approx), also mixed herbaceous plants and scattered willows; open crack and pussy willow and mixed plants. (Percentages are for swampland only).

The diversity of plant habitats is such that there are wide variety of species which are less common or conspicuous and are difficult to map.

In the past, larger areas of peat bog, kahikatea swamp forest and mesotrophic sedge swamp were present.

Aquatic Vegetation

Nineteen macrophyte species are found in aquatic habitats in the wetland. These include submerged and free floating plants. The vegetation of rivers, streams and flowing water around the wetland consists of extensive beds of submerged and semi-emergent plants, forming rafts of vegetation extending from the banks. Much of the water in main waterways is coloured by peat and supports various species able to withstand turbid water conditions. The introduced macrophytes *Egeria densa* and *Ceratophyllum demersum* are most widespread in these waters.

The large open water bodies contain submerged *Nitella* species, *Myriophyllum propinquum* and *Potamogeton* species etc. In areas protected from the wind free floating *Azolla rubra* is associated with semi-emergents. In small ponds and sheltered open water areas, often at the edges of swamp and in areas bordered by willows, free floating species known collectively as duckweed often form a complete coverage.

Glyceria maxima (floating sweet grass) is aggressively colonising large areas of shallow open water in channels and river margins.

Fauna

Eighteen species of fish have been recorded in the wetland. Both long and shortfinned eels *(Anguilla dieffenbachii* and *A. australis),* but especially shortfinned provide major commercial fisheries. The wetland provides valuable habitat for inanga downstream of the Waikato River thermal power stations. Inanga *(Galaxias maculatus,* whitebait) are

abundant in the lower reaches of rivers and as such the Whangamarino provides a vast habitat for these fish. Black mudfish *(Neochanna diversus* - status: indeterminate) is found throughout the wetland in permanent and temporary water bodies.

Common smelt *(Retropinna retropinna)* are found in the two rivers, and catfish *(Ictalurus nebulosus)* and goldfish *(Carassius auratus)* are abundant. Grey mullet *(Mugil cephalus)* run in the lower reaches of the two rivers in the early summer months.

A number of invertebrates occur in the wetland including seven species of molluscs, seven species of water flea, Amphipods, the common northern crayfish and a fresh water crab. Large numbers of shrimp *(Tenagomysis chiltoni)* and *Paratya curvirostris* appear periodically in the Whangamarino River. Aquatic insect life includes dragonflies, damselflies, water beetles, non-biting midges, craneflies, midges and water and a tiny water skate *Microvelia* is possibly the most abundant animal in the wetland.

The only species of moth in New Zealand with an aquatic larva *(Nymphyla nitens)* is common in the wetland.

Two species of Australian green bell frog *(Litoria aurea* and *raniformis)* have been found - mainly in fertile swamps in the wetland.

The wetland is an important habitat for a range of bird species including rare and endangered species (full details in Section 22).

The following species are present in significant numbers:

New Zealand Shoveler Duck *(Anas rhynchotis variegata)*
This endemic species is classified as a game bird. In the Whangamarino the maximum numbers present during winter and spring vary between 2,000-3,000 birds. They are widespread throughout the country, but favour fertile lowland swamps and this wetland is one of the species most significant Waikato habitats.

Grey Duck (Anas superciliosa)
This game bird is native to New Zealand and widely distributed. As with other species it uses the wetland on a seasonal basis, especially for wintering and breeding. They are less adaptable than the more common game bird, the mallard, favouring more inaccessible wetlands such as the Whangamarino The wintering population is estimated at 6,000 to 7,000.

Mallard (Anas platyrhynchos)
These game birds were introduced into New Zealand in the 1860's and are widespread. Mallards are the most common duck in the wetlands, where mineralised swamps provide a major wintering habitat for the Waikato population. Winter-spring can see bird numbers exceeding 20,000 to 25,000 (1965 some 40,000 were estimated). Birds move to nearby lakes during dry periods.

A number of introduced mammals are present in the wetland including possums, ferrets, stoats, weasels and cats. Domestic livestock often graze some parts of the wetland.

15. Land Tenure/Ownership of:

(a) site: Crown land held as Stewardship Area, administered by DOC (including 320ha above wetland margin): 4960ha approximately. Note: Some 565 hectares of Crown land are leased for grazing (on a temporary basis).

Private land owned by Auckland/Waikato Fish and Game Council (formerly the Auckland Acclimatization Society): 730ha approximately.

(b) surrounding areas: Privately owned wetland l600ha approximately.

16. Conservation Measures Taken: (national category and legal status of protected areas - including any boundary changes which have been made management practices; whether - officially approved management plan exists and whether it has been implemented

The Crown land is held as Stewardship Area administered by the Department of Conservation. It became Stewardship Area on allocation to the Department of Conservation on 1 April 1987.

Whangamarino wetland was listed as a wetland of international importance, under the Ramsar convention (a convention on wetlands of international importance especially for waterfowl habitat) on 4 December 1989.

Existing Management

At present conservation management of the wetland is currently undertaken by the Department of Conservation and the Auckland/Waikato Fish and Game Council. The latter have a statutory role to promote game and sports fish, and habitat protection. Some private adjoining land owners also manage their areas of wetland for conservation purposes although the majority of private land is farmed.

Programmes currently under action by the Department include willow control in selected areas, fire control, some recreation management (including licensing of huts for game bird shooting) issuing of licences and leases for grazing, general administration, monitoring wildlife, promotion of wildlife values and enforcement of the provisions of the Wildlife Act 1953.

Monitoring is being carried out on an area burnt during a fire in 1989 to determine recolonisation rates by various bird species, vegetation is also being monitored. The fire swept through vegetation, but did not burn into the underlying peat due to high water levels.

The Auckland/Waikato Fish and Game Council manages its own lands to provide game bird habitat and shooting stands. The Fish and Game Council also set quotas (bag limits) for the game season; sets the time of the game season; issues game hunting permits and carries out enforcement in relation to these functions.

Waikato Regional Council controls water levels in the wetland for flood protection purposes.

17. Conservation Measures Proposed But Not Yet Implemented: (e.g. management

plan in preparation; officially proposed as a protected areas etc)

General

The following are some of the main objectives for future management, as outlined in the Whangamarino Wetland Management Plan prepared by the Department of Conservation in 1989.

Water Levels

The management plan recommended that the water levels in the wetland be reinstated.

In order to achieve this the Department and the Auckland/Waikato Fish and Game Council have been pursuing a water right application to raise water levels in the wetland to a minimum water level of about 3.40 m.a.d, or a level sufficient to maintain a wetland ecosystem without adversely affecting adjoining land uses. The water right was granted by the Waikato Regional Council in 1992, but was appealed. The appeal was withdrawn prior to it being heard at an appeal hearing, after a negotiated settlement was reached between the parties concerned. Construction of the weir to enable the raising of the water level is scheduled to take place over the summer period 1992/93 (December/March).

Significant adjoining properties

In order to protect and maintain the wetland ecosystem it is critical that water levels be managed and held at a minimum level up to a metre higher than occurs on average at present. To do this it is necessary to acquire, or negotiate agreement with the owners of low lying portions of adjoining properties. For water level management and habitat protection the acquisition of or agreement over parts of one privately owned property will continue to be sought.

Management of the leased areas adjoining the wetland may also be required.

Land Status

To change the protective status of Whangamarino Wetland from 'Stewardship Area' to 'Government Purpose Reserve, Wetland Management' to acknowledge the value of the wetland.

Exotic Plant Control

As far as possible to control the spread of exotic plants from swampland into peat bog areas, and into mineralised wetland not presently infested.

In the long term to work towards replacement of exotic plants in selected places with indigenous species suited to a wetland location.

To continue research into the most cost effective method of controlling exotic plants and seek advice in vegetation management programmes.

Threatened Indigenous Species

Endangered, vulnerable or rare species of indigenous plants or animals will be protected throughout the Whangamarino Wetland, whether located in peat bogs or swampland

The protection of such species on adjoining wetlands will be actively promoted.

The protection and conservation of New Zealand indigenous species of plants and animals will also be a priority throughout the wetlands and any recreational or other developments will be assessed in terms of their impacts on these species.

A number of other management objectives relate specifically to the peat bogs and mineralised swamp areas and can be found in the management plan.

18. Current Landuse: Principal Human Activities in:

Causeway

A prominent topographical feature of the northern part of the wetland is a causeway, some 4-5 metres wide, constructed across the wetland between 1950 to 1958. The causeway carries the pylons which support the rope and bucket cableway carrying coal from the coal mines at Kopuku to the Meremere Power Station.

The causeway also provides direct road access between the mine and the power station and access to wetland/duck shooting areas adjacent. The causeway has effected water levels within the wetland. Assisting in maintaining water levels in the area of wetland upstream of the causeway. Exotic weed invasion is not as great in this area as water levels are higher and the area is subject to milder fluctuations in water level. Also refer to Section 20 for further details.

Grazing

Some 565 hectares of Crown land are leased for grazing (on a temporary basis) under 12 leases or licences. About 1700 stock units are carried, mostly dry cows or heifers.

There is some adverse impact on the wetland area by stock straying from several adjoining properties or leased areas.

Most grazing licences contain conditions regarding removal of stock prior to and during duck shooting.

Commercial Fishery

Eels
The wetland, including lake Waikare, forms part of an important eel fishery. Short finned eels are the favoured species. In 1979 some 78 tonnes of eels were taken from the Whangamarino and Maramarua Rivers. Peak eeling time occurs as high flood levels begin to drop and the eels begin to move back into the main waterways.

Grey Mullet
There is some commercial fishing for grey mullet from the Whangamarino River but quantities taken are not known.

The potential market for catfish was investigated in 1980 but was not found to be economically viable. Catfish far exceed eels by weight in fyke net hauls according to local fishermen.

Koi Carp

At present one fisherman is involved in Koi carp *(Cyprinus carpio)* harvesting and this number is likely to increase in the near future.

Other Uses

Some 73 hectares are leased for coalfield related purposes, including overburden dumping on the northeastern margin of the wetland.

Apiculturalists also utilise the wetland for the entire year.

ADJOINING LAND USES

These come into two categories - those below the wetland margin and those above it.

Below Wetland Margin

Use of the developed wetland varies from conventional sheep and beef cattle farming on poorer quality land to dairying.

Market gardening and cash cropping occurs on land which is part of the Motukaraka and Bell Road drainage schemes. The presence of timber in the peat has hindered developed, as has the soil's low-lying nature and low temperatures.

Above Wetland Margin

On these areas pastoral uses predominate, including sheep, beef, dairy, and goat farming. A forestry industry is established at Maramarua State Forest to the east of the wetland. To the west around Te Kauwhata horticulture and viticulture are important. At Kopuku, a large opencast coal mine exists, with overburden dumps adjoining and in part extending over the wetland creating a compression ground wave which has affected the adjoining peatland topography.

The general trend on adjoining land is towards more intensified management, especially on soils above the wetland margin.

Proximity of the Wetland to Centers of Population

The human population of the area around Whangamarino in a 10km radius would be approximately 2,500 but within a 60km radius there would be about 1,200,000 (including Hamilton and Auckland cities). The wetland is therefore accessible to approximately one third of the population of New Zealand.

19. Disturbances/Threats, Including Changes in Lauduse and Major Development Projects: (factors which may have a negative impact on the ecological character of the wetland)

ENERGY DEVELOPMENTS

Whangamarino Wetland is strategically located amidst several major energy developments or proposals.

To the west is the Meremere power station to which coal from the Kopuku mine (east of the wetland) is transported *via* the causeway which crosses the wetland immediately south of the Maramarua River.

A major new power station has been proposed at Clune Road, southeast of Meremere. It is likely to be supplied with coal from the Maramarua coalfield northwest of the Kopuku mine. This coal could be transported to the power station via the causeway. Truck, rail and bucket cableway are among the transport modes being evaluated, as is their likely impact on the wetland. Widening of the causeway is a possible option.

The Ohinewai coalfield southwest of lake Waikare is also being evaluated for coal production by opencast methods. The development of this coalfield could have considerable effect on the water quality of lake Waikare with consequences for the Whangamarino wetland. An opencast mine is proposed for farmland on the southern side of the Kopuku Arm of the wetland and expansion of the existing Kopuku mine is possible.

Liaison with development agencies and monitoring of proposals will be undertaken to ensure that wetland values are recognised and the impacts of any development carefully considered.

DISTURBANCES AND THREATS

Water Levels

The drop in water levels is the most significant threat to the wetland and is the principal management issue. Lower water levels have been noticeable to recreational hunters as well as wetland managers and have resulted in considerable interest in reinstatement of levels to what they were in 1967 (i.e. an average minimum level of 3.55-3.63 m.a.d.). This would not diminish the effectiveness of the flood control scheme as it was designed to a base level of 4.23 m.a.d with the subsequent increased storage capacity (due to falling levels) an added bonus.

While 3.62 m.a.d has been the preferred reinstatement level, possible peat shrinkage in intervening years indicates that a water level of 3.40 m.a.d may be sufficient to maintain a wetland ecosystem. Flooding in 1986, and subsequent survey work at key locations, tends to confirm the 3.40 m.a.d level. Levels for the six months until April 1988 have averaged about 2.0 m.a.d

The invasion of swampland mineralised areas by willows and other exotic species constitutes the second most significant management issue. Some 800 hectares have been

invaded by a dense willow jungle. Hand clearance has been undertaken in one area north of the causeway with other clearance techniques such as aerial spraying being currently evaluated. The practicality of clearance is also being considered, as is the question of replacement with native vegetation such as kahikatea (*Dacrycarpus dacrydioides*). *Glyceria maxima* and other aquatic weeds threaten to completely cover open water areas if not controlled.

In the peat bog and some semi-mineralised areas, rare, endangered and scientifically important plants require protection from stock, accidental fire, recreational use and from drying out of the peat.

Without reinstatement of water levels, or control of any further decline in water levels the ecological and recreational value of the wetland will be lost and large areas will dry out for extensive periods and perhaps fall prone to willow invasion.

Vegetation Management

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20. Hydrological and Physical Values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc)

The wetland has a significant role in flood control, sediment trapping; and is of great importance in supporting aquatic and terrestrial food chains - providing spawning habitat for inanga and habitat for large numbers of waterfowl.

The impact of the principal flood protection works (as described in Section 13) has been:

(1) increased ponding in lake Waikare at peak floods, but overall a lower lake level and more rapid drainage into and through the wetland, giving lower water levels in the lake.

(2) lower peak flood levels in the Whangamarino Wetland.

As well as the Whangamarino and lake Waikare works, there have been river 'training' works in the lower Waikato River and these, combined with sand abstraction and the possible prevention of sand replacement because of hydro dams up river, have had the effect of lowering river bed levels in the Meremere-Mercer reach of the Waikato River by an average of 1.3 metres.

The cumulative impact of this and the flood protection scheme, is as follows:

(1) lowering of Waikato River water levels by 0.74 metres over ten years (Hannah 1981) and the follow on effect of this on the Whangamarino and Maramarua Streams and on wetland water levels generally.
(2) more rapid receding of flood water and shorter duration of inundations, with some once permanently wet areas drying out in summer, resulting in diminished habitat value and possible peat shrinkage and encroachment of exotic plants such as willows.

While the rate of reduction of Waikato River levels is expected to decline, lower levels, pose a considerable threat to the wetland. Existing control structures cannot be used to hold water in the wetland. The granting of a water right to raise the water level in the wetland to 3.40 m.a.d. and scheduled construction of a weir to implement the water right, will alleviate this threat.

The causeway across the northern portion of the wetland has had some effect on hydrology: it appears to have restricted Maramarua Stream flooding and siltation, it has created an easterly drainage flow in the wetland south of it, and may have accentuated ground level differences to its north and south.

21. Social and Cultural Values: (e.g. fisheries production, forestry religious importance, archaelogical site etc)

HISTORY

Pre-1860
The pre-1860 (Maori) history of the wetland is not particularly well known. However, it is known that the area was important to early Maori inhabitants and extensively used by them as a source of food, plant materials and for transport. Hunting and fishing camps have been found in other wetland areas, as have eeling pa. It is possible that similar camps were also located on small hillocks in the wetland. There are at least nine former pa (Maori fortress) sites around the eastern margins of the wetland but on the western side pa sites appear to be in close proximity to the Waikato River. Such sites are located at or near present day settlements, for example Meremere, Horahora and Te Teokeo.

Post 1860
Post 1860 history of the Whangamarino is linked to early land policy beginning with the confiscation of land from the Waikato Maori following the Waikato Campaign of 1863-64.

Governments of the day (1860-1870) were under pressure to provide land for settlement and to raise revenue to retain the services of Imperial Regiments. This resulted in increased pressure to dispose of land and for many years Government policy was to settle what land could be settled.

The most suitable land for production was thus disposed of; the least desirable (wetland) remained Crown land.

Principal events appear to be:
- use of the waterways and wetland area for transport, as a source of food (eels, giant and handed kokopu, waterfowl, cabbage tree) and plant materials
- use of the waterways for access by the missionary Hamlin in 1834 and for stock

movement by barge and small boat
- planting of:
  willow stakes near Rangiriri in 1885
  wattles near Te Kauwhata for tannin
- flax farming on swamp areas near Kopuku Canal and Island Block Road. The flax was used for rope making
- use of waterway margins for wildfowl hunting
- Wildlife Service involvement with the management of the wetland from at least 1962 onwards
- allocation to the Department of Conservation as Stewardship Area on 1 April 1987
- a surface fire swept through about 2000 hectares of the wetland in 1989
- Listing as a Ramsar site on 4 December 1989

The conservation versus development debate over the wetland has taken place from the 1960's to the present day and culminated in a decision by the Planning Tribunal that drainage should not proceed on private properties in the Reao Arm because ownership of the land does not in itself carry the right to alter natural conditions in that way (ie divert natural water that is on the land). Protected area status has subsequently been recommended for adjoining land and largely achieved on a willing seller/willing buyer basis.

PUBLIC USE

Public use of the wetland today involves a wide variety of activities including education and recreation. The principal factor relating to existing or future public use is that about a third of the country's population i.e. 1 million live within a 100km radius of Whangamarino Wetland. While there are other areas offering competing 'attractions' the Whangamarino has unique features which may be of considerable interest to educational, conservation and specialist groups.

22 Noteworthy Fauna: (e.g. unique, rare endangered, abundant *or* biogeographically important species, include count data etc)

BIRDS

Species of particular note include:

Brown Teal *(Anas aucklandica chlorotis* - endemic, status: endangered)
The Brown Teal is one of New Zealand's rarest ducks and one of the five rarest ducks in the world. They have been recorded in the wetland and nearby water bodies. They are endemic and are absolutely protected. It is possible that a small breeding population still exists in the Whangamarino Wetland.

Australasian Bittern *(Botaurus poiciloptilus* - under threat in New Zealand)
The total New Zealand population of this native species is possibly less than 1,000, of which 200-250 may dwell in the wetland. This is the major breeding area in the Waikato. Bittern are recorded from most types of vegetation, but a high proportion occur in mineralised swamp areas.

A diversity of habitats and a large area of wetland are needed to sustain a breeding population. An investigation into habitat use and movement of Australasian bittern was carried out by a student as part of a masters thesis in the northern part of the wetland. This study was completed in 1992 and indicated that bittern are highly mobile within the wetland; and make seasonal but extensive use of it. Factors relating to use of an area are water depth - critical depth is 10 inches (relates to bill and neck length when birds are feeding); water quality and quantity are important in relation to food supply and visibility of prey**;** as is influx of water into areas for part of the year to provide appropriate feeding habitat.

Spotless Crake *(Porzana tabuensis plumbea)*
Eight-nine spotless crake were observed or heard during a brief survey in 1980. They are restricted largely to swamp margins, particularly between pasture land and peat bogs where vegetation standing in water enables them to avoid predators. Swamp drainage and predators are major threats to these birds.

North Island Fernbird *(Bowdleria punctata vealeae* - endemic, status: regionally vulnerable)
Some thousands of pairs of this endemic species have inhabited the wetland in the past, forming one of the largest populations in New Zealand. Of the 569 fernbird located in the 1981 survey most were located in areas with manuka usually associated with sedges, wire rush and ferns on acid peat. Since they are territorial and poor fliers fernbird are totally dependent on existing vegetation.

Changing water regimes which lead to enrichment of peat, or burning which removes the favoured two tier vegetation, are threats to the population, and since the 1989 fire the population has been reduced.

Grey Teal (Anas gracilis)
Swamp areas of the wetland are important wintering and breeding habitats for grey teal, a native and absolutely protected species. Winter-spring populations vary between 2-3,000 birds. Several breeding areas have been provided by waterfowl hunting groups such as Ducks Unlimited and some private individuals. The wetland has supported *5%* of the New Zealand population at times,

Black Swan (Cygnus atratus)
Introduced in 1864, this game bird is found throughout most of New Zealand. The wetland is important to the Waikato black swan population during winter and spring when water levels are high. Swan numbers vary between 1,5000 to 3,000 at peak times when some 7% of the national swan population use the wetland for wintering and feeding.

New Zealand shoveler duck, grey duck and mallard are present in large numbers in the wetland. Refer to section 14 for further details.

FISH

The black mudfish *(Neochanna diversus* - endemic, status: indeterminate) is found throughout the wetland *in* permanent and temporary water bodies. It occurs most abundantly in the wetland in still and gently flowing waters seeping from springs. Measuring up to 142mm, these small, endemic, galaxiid fish are swamp dwellers.

Whangamarino Wetland is one of the remaining strongholds for the black mudfish There is a general lack of information about the species, and so many of their habitats are under threat that they have been classified as status: indeterminate by IUCN, and are regarded as being of national importance.

23. Noteworthy Flora: (e.g. unique, rare, endangered, or biogeographically important species/communities etc)

The following species are of note:

1. *Fascia perscandens* (creeping New Zealand Fascia) - the northernmost record of this species in New Zealand is in an area of grazed remnant kahikatea forest near the Kopuku mine.
2. *Dracophyllum lessonianum* is near its southern limit in New Zealand at this location.
3. *Myriophyllum robustum* (water milfoil) - status: vulnerable, but recently recorded in several areas of the northern wetlands.
4. *Corybas carsei* (an orchid) - the only recent sighting being in the Reao Arm where there may be a reasonable population. An endangered species in very low numbers.
5. *Lycopodium serpentinum* (a club moss) - status: vulnerable. Whangamarino population now thought to be extinct.
6. *Utricularia laterifolia* (bladderwort) - status: indeterminate. Found growing with 3 above.
7. *Utricularia australis* (floating bladderwort) - status: indeterminate.
8. *Utricularia novae-zealandiae* - status: indeterminate.
9. *Cyclosorus interruptus* (a fern) - status: vulnerable
10. *Prasophyllum aff patens* - status: vulnerable, undescribed endemic orchid.

Mosses and Liverworts
Whangamarino Wetland is rich in mosses. Thirteen new species have been added to the New Zealand flora from this area. Some 23 species are considered to be of interest (Ogle and Bartlett 1981). Liverworts are abundant.

Lichens
Lichens are well represented in the Whangamarino Wetlands. A new, recently found species of *Pseudocyphellaria (P. sereciofulva)* is of interest.

24. Current Scientific Research and Facilities: (e.g. details of current projects; existence of field station etc)

A number of studies have been carried out at the wetland and these are listed in the reference section. The wetland has considerable potential for further research which could range from basic floral, faunal and wetland management research to peatland management for agricultural and horticultural use. Ongoing research on water levels, fire recovery monitoring and freshwater crabs is continuing.

There is considerable scope for further scientific research into the wetland and ecological processes.

25. Current Conservation Education: (e.g. visitor centres, hides, information booklet,

facilities for school visits etc)

The Department of Conservation runs interpretative summer programmes based around the wetland. These involve taking a barge load of people through the wetland looking at the flora and fauna, and discussing the history and management of the wetland.

POTENTIAL FOR EDUCATIONAL PROGRAMMES

Analysis of 1981 Census data indicates that almost 25 % of the population in an 80km radius of the wetland are students - some 240,000. (Harvey 1984).

Increasing interest in natural environment subjects suggests that the wetland could have a far greater educative role. There is potential for disused public buildings in the locality to be developed as a 'base camp' .

Provision of explanatory information on botany, wildlife, ecology, access points and energy development would assist visitor understanding, as might off season use of huts etc for overnight accommodation.

26. Recreation and Tourism: (state if wetland used for recreation/tourism; indicate type and frequency/intensity)

Duckshooting - This is the largest recreational activity in the Whangamarino A hunter survey (Cheyne 1981) in 1979 involved some 700 hunters who spent around 11,172 days in the wetland, both in preparing maimais (game bird hunting stands) and hunting. Ducks and swans are the main game birds of interest, although other game birds are occasionally hunted.

Swampland along stream margins are the places most used by duck shooters. Low water levels over recent years have reduced the quality of the duckshooting

Gundog Trials - Gundog trials are usually held monthly from July to April, near the junction of the Whangamarino and Maramarua Rivers. Some 600 days a year are spent in the wetland by participants involved in this activity.

Boating - Most boating is related to duckshooting Although, some power boating is carried out in the main water ways.

Fishing - Recreational fishing by local people occurs eg coarse angling at the WhangamarinoMaramarua confluence, and there is also eel and mullet fishing.

Cross bow hunting of koi carp is becoming a significant recreational activity in the Whangamarino

27. Management Authority: (name and address of body responsible for managing the wetland)

Management of Crown land and wildlife: Department of Conservation, Waikato Conservancy, Private Bag 3072, Hamilton, New Zealand.

Resource Consents: The Waikato Regional Council (Box 4010, Hamilton Fast) has statutory responsibilities under the Resource Management Act 1991 for water resources.

Management of the game bird hunting season and licences: The Auckland/Waikato Fish and Game Council, Brymer Road, RD 9, Frankton, New Zealand (refer to section 16 for more details) .

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture/Dep of Environment etc)

Territorial: Waikato District Council; Waikato Regional Council
Functional: Department of Conservation; Auckland/Waikato Fish and Games Council

29. Bibliographical References: (scientific/technical only)

Cheyne, J W. 1981: Game bird hunting and other recreational uses in the Whangamarino Wetland. New Zealand Wildlife Service Wellington. Unpublished Report.

Davoren, A; McCraw J P and Thompson, K. 1978 : Survey of New Zealand peatland resources. Water and Soil Technical Publication 14. University of Waikato for the National Water and Soil Conservation Organisation. ppl57.

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Fry, R G. 1976 : The Quaternary history of the Reao Arm of the Whangamarino Swamp. Unpublished MSc thesis, University of Waikato.

Hannah, C R. 1981: Hydrological resources. In Strachan 1981, pp 109-129.

Harvey, G W. 1984 : Whangamarino Land Use Study. Department of Lands and Survey Hamilton. Unpublished report. 268 pp.

Ogle, C C; Bartlett J K. 1981: The Flora of Whangamarino Wetlands, Lower Waikato Basin New Zealand. New Zealand Wildlife Service, Wellington. p6.

Ogle, C C; Cheyne, J. 1981: The wildlife and wildlife values of the Whangamarino Wetlands. Fauna Survey Unit Report 28. New Zealand Wildlife Service Wellington. p94.

Strachan, C (Editor). 1981: Whangamarino Swamp resources study. Waikato Valley Authority Tech Publn No 20. Hamilton p168.

Strickland, R R. 1980 : Fisheries aspects of the Whangamarino Swamp. Fisheries Environmental Report No. 7. MAF Turangi p37.

30. Reasons for Inclusion: (state which Ramsar criteria - as adopted by Rec.C.4.15 of the Montreux Conference - arc applicable)

1(b) The Whangamarino Wetland is an outstanding example of a wetland characteristic of its region - it is the second largest bog and swamp complex in the North Island of New Zealand.

2(a) The Whangamarino Wetland supports appreciable numbers of threatened plants:

- *Corybas carsei* (status: endangered).
- *Lycopodium serpentinum* (status: vulnerable)
- *Utricularia laterifolia* (status: indeterminate)
- *Cyclosorus interruptus* (status: vulnerable)
- *Myriophyllum robustum* (status: vulnerable) the largest known North Island populations are found here
- *Utricularia australis* (status: indeterminate)
- *Utricularia novae-zealandiae* (status: indeterminate)
- *Prasophyllum aff. patens* (status: vulnerable)

Fauna in the rare, threatened or endangered categories include black mudfish (endemic, status: indeterminate).

2(b) The Whangamarino Wetland is more diverse botanically than any other large lowland peatland in the North Island, and its oligotrophic portions have a combination of very specialised plants which no longer occur elsewhere in the Waikato region or beyond. This diversity gives it an ability to support a wide range of regionally rare communities.

2(d) The following species are endemic to New Zealand and in each case the Whangamarino Wetland is one of the remaining strongholds for the species:

- *Corybas carsei*
- *Myriophyllum robustum*
- black mudfish *(Neochanna diversus)*

3(b) When linked with the Waikato lakes and the Waikato River, Whangamarino Wetland provides the most important freshwater wildlife habitat in New Zealand.

3(c) The Whangamarino Wetland regularly supports approximately:

- 20% of the New Zealand population of Australasian bittern
- 7% of the New Zealand population of black swan
- 5% of the New Zealand population of grey teal

The Whangamarino Wetland regularly supports approximately:

- 20% of the breeding pairs of Australasian bittern in New Zealand

- at least 1.7% of the breeding pairs of grey teal in New Zealand

N.B. These are 1988 figures. Number are likely to be somewhat reduced, as a lowering of water levels in the subsequent period, has resulted in reduced habitat for wildlife. Reinstatement of water levels is planned for 1993 (refer to section 17).

31. Map of site: (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)