Application for Ramsar status Wairarapa Moana Wetlands

RAMSAR APPLICATION FOR LAKE WAIRARAPA AND ITS ASSOCIATED WETLANDS (WAIRARAPA MOANA)

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2. Date of application

15 November 2012

3. Country

New Zealand

4. Name of the Ramsar Site

Wairarapa Moana

5. Designation of a new Ramsar site

6. RIS updates (not applicable)

7. Map of site

a. Map of site with delineated boundaries
   (i) A map of the site is shown on the following page (Figure 1)
   (ii) Electronic copy enclosed
   (iii) GIS file enclosed

b. Type of boundary delineation applied:

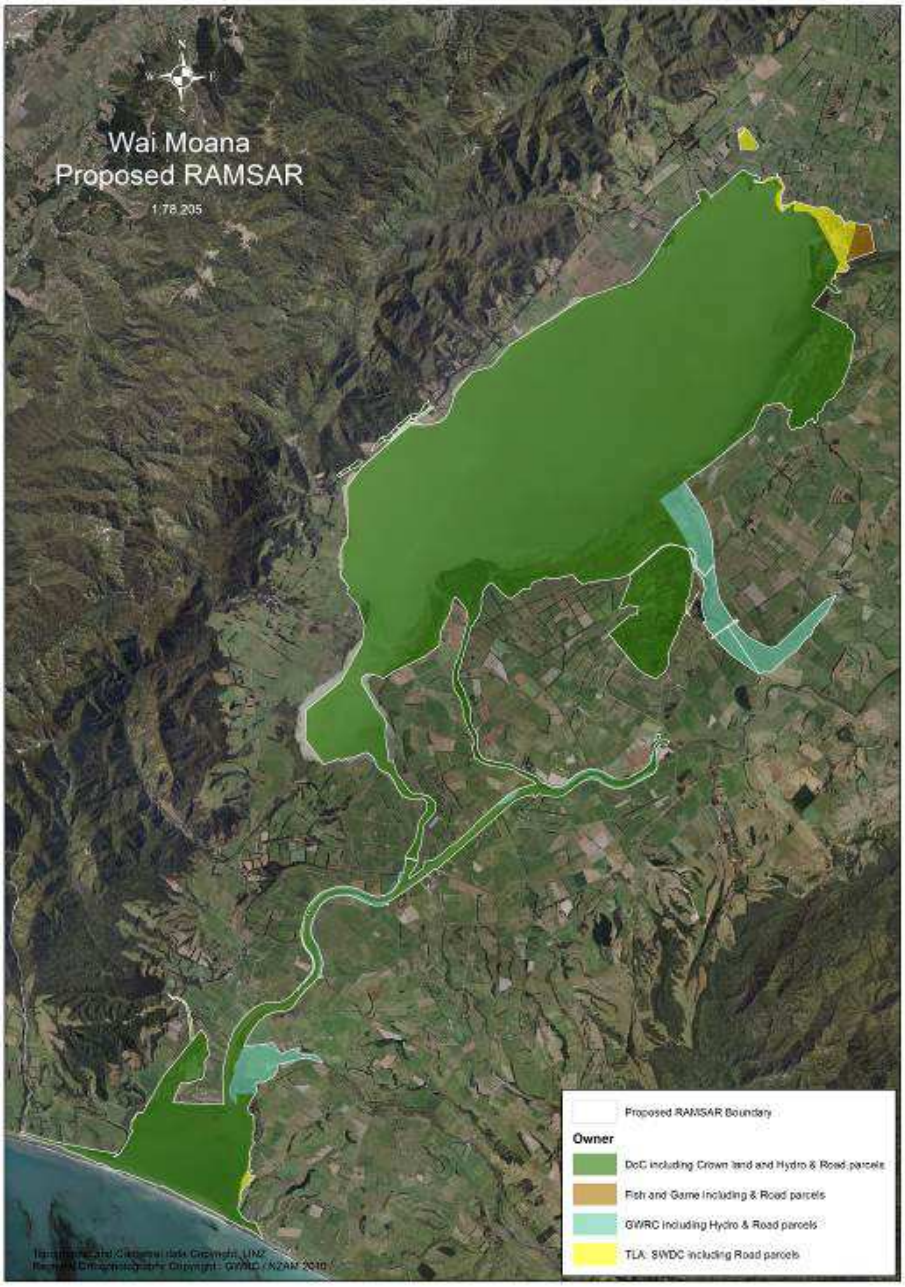
   The boundary of the Ramsar site covers the public land within the Wairarapa Moana area (land held by the Crown or public agencies).

8. Geographical Coordinates

Lake Domain (northern extent) is at S 41^{o} 9.660' E 175^{o}17.703'

Onoke Spit outlet (southern extent) is at S 41^{o} 23.861' E 175^{o} 8.420'

Figure 1: Map of the proposed Ramsar site for Wairarapa Moana



9. General Location

Wairarapa Moana and its associated wetlands are situated within a rural landscape on the Ruamahanga River floodplain in the southern Wairarapa Plains near Featherston, southern North Island, New Zealand. It comprises the large freshwater Lake Wairarapa, its associated wetlands and reserves, the Ruamahanga Cutoff, the estuarine Lake Onoke, plus the lower Ruamahanga River which links Lakes Wairarapa and Onoke along with Pounui Lagoon and the Onoke Spit (see Figure 1).

All of these features lie within the jurisdiction of South Wairarapa District Council and Greater Wellington Regional Council and are generally public conservation land, administered by the Department of Conservation (DoC). The western margins of Wairarapa Moana abut the base of the Rimutaka Range which largely retains its indigenous forest cover. The eastern margin is mostly bounded by the Ruamahanga River floodplain which extends to the forested Tuhirangi (Aorangi) Range. The floodplain of the Tauherenikau River has shaped much of the northern end.

Martinborough, the administrative centre for the South Wairarapa District Council lies 20 kilometres east of Wairarapa Moana, while Wellington, the administrative centre for the Greater Wellington Regional Council, is situated some 75 kilometres southwest of Wairarapa Moana. The Department of Conservation's Wairarapa Area Office is situated in Masterton, 35 kilometres north east of Wairarapa Moana, with its Conservancy Office based in Wellington.

In the wider catchment Carterton and Masterton District Councils contribute to the management of natural resources. Carterton and Masterton District Councils administer 20% and 39% of the wider catchment respectively, while South Wairarapa District Council administers 41% of the catchment area.

10. Elevation (in metres)

The entire complex is under 20m a.s.l.

11. Area (in hectares)

The total area of the proposed Ramsar site is 10,448 ha and is shown in Figure 1. It comprises public land within the Wairarapa Moana area, including crown land, land administered by the Department of Conservation, Greater Wellington Regional Council and South Wairarapa District Council plus any land parcels defined as road or hydro parcels within these public lands. There is also a wetland owned by Fish and Game included in the proposed Ramsar area.

Specifically Wairarapa Moana area is made up of the following:

Public conservation land administered by DoC

Lake Wairarapa Wetland Conservation Area totalling 9,664ha, which includes:

- Lake Wairarapa (6,931 ha)
- Lake Onoke and Onoke Spit (650ha),
- Pounui Lagoon (110ha) and the channel of the Ruamahanga River between the barrage gates, and
- Lake Onoke (160ha).

And the adjoining reserves totaling 709ha which includes:

- Allsop's Bay Wildlife Reserve (215ha)
- Ruamahanga Cutoff Wildlife Reserve (52ha)
- Wairarapa Lakeshore Scenic Reserve (27ha)
- Matthew's Lagoon and Boggy Pond Wildlife Reserve (415ha).

Public land administered by other parties

These lands total 7,842 ha and include:

- The downstream end of the Oporua Floodway and the Turanganui River delta area (583ha), administered by Greater Wellington Regional Council, and
- Lake Domain on the northern shores (100ha), administered by South Wairarapa District Council.
- Simmonds Lagoon administered by Fish and Game (42ha).

Adjacent conservation covenants on private land and DoC managed conservation units not directly connected to Wairarapa Moana are excluded from this application.

12. General Overview of Site

Wairarapa Moana is the largest wetland complex in the southern North Island and contains the second largest lake in the North Island. Significant ecological, cultural and recreational values are associated with the complex, which includes the tidal zone, an estuarine lake, a large freshwater lake and the associated wetlands. These ecological features are nationally and internationally significant in terms of the habitats they provide for fauna and flora, and the presence of threatened and migratory species.

The large permanent freshwater lake (Lake Wairarapa) is the most dominant feature of Wairarapa Moana. This lake is connected to a brackish lagoon (Lake Onoke) that is intermittently connected to the sea through a coastal spit. For long periods the lake is tidal, but in southerly conditions, with a low river flow, the exit to the sea becomes blocked. Shrub-dominated wetlands and seasonal intermittent marshes are found on the lake edges, providing a diversity of habitats for flora and fauna. Rare and threatened species and

ecosystem types are found within the complex. The lakes are fed by the major rivers of the Wairarapa floodplain.

Lake Wairarapa and Lake Onoke and their associated wetlands are traditionally and spiritually important to Maori as an area for food gathering, including eel, fish, waterfowl, and plant material, in particular *Phormiun tenax* (harakeke) and *Typha orientalis* (raupo). Lake Wairarapa and its wetlands are also important in the region for game bird hunting, boating, fishing and nature study. Though commercial eeling has been undertaken in the past currently there are no concessions issued for this activity.

13. Ramsar Criteria

Ramsar nomination criteria with relevance to Wairarapa Moana

Criterion	A wetland should be considered internationally important if:	Met?
1.	It contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.	✓
2.	It supports vulnerable, endangered, or critically endangered species or threatened ecological communities.	✓
3.	It supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.	✓
4.	It supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.	✓
5.	It regularly supports 20,000 or more waterbirds.	✓
6.	It regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.	✓
7.	It supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.	✓
8.	It is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	✓
9.	It regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependant non-avian animal species.	NA

14. Justification For The Application of Each Criterion Listed Above

Wairarapa Moana (as Lake Wairarapa wetlands) was identified as a potential Ramsar nominee in a national review of New Zealand wetlands completed in 1995. The Directory of Wetlands in New Zealand (Cromarty & Scott 1995) described the New Zealand wetlands that met the criteria then operative for inclusion under Article 2 of the Ramsar Convention. Wairarapa Moana was one of seventy-three wetlands identified nationally (and one of two in the region) as potential Ramsar nominees at that time.

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Analysis

Wairarapa Moana contains a number of representative natural and near-natural wetland types within the biogeographic region. The loss of wetlands in New Zealand has been greatest in the North Island with wetlands now largely absent from lowland alluvial flood plains (Ausseil et al., 2008). Wairarapa Moana is part of the Manawatu-Wairarapa FENZ (Freshwater Ecosystem of New Zealand) bioregion (see Figure 2), which only has 1.3% remaining of the historic extent of wetlands within its region. Wetland types (Johnson & Gerbeaux, 2004) within Wairarapa Moana include swamp, marsh and fen (see Figure 3). It contains 33% of the swamp and 19% of the marsh wetlands remaining in the Manawatu-Wairarapa region. Swamps, as a wetland type, have undergone the greatest loss nationally. Wairarapa Moana contains 2% of the national swamp wetlands.

Six of the eight wetlands surrounding the lake are listed in the eleven highest priority wetlands for protection in the FENZ bioregion. The lakes themselves in the Wairarapa Moana complex also feature in the FENZ ranking at a national level. Ponds in Barton's Lagoon, Pounui Lagoon, Matthews Lagoon, Boggy Pond and Lake Wairarapa are identified as being in the top 10% of lakes that should be protected (in terms of national accumulation).

The lake complex (L. Wairarapa, L. Onoke and associated wetlands) form the largest wetland complex in the southern North Island. The extensive wetlands on the eastern side support important areas of native turf plant communities (with species such as *Stuckenia pectinata , Lilaeopsis novae-zelandiae* and *Limosella lineata*), unique in the region. There are 55 species of these indigenous aquatic turf plants at Lake Wairarapa (Ogle et al., 1990), and the turf community is greater in area than in any other North Island lake. Wairarapa Moana is considered a stronghold for the rare swamp grass *Amphibromus fluitans*, which is abundant at a few sites in Boggy Pond and Matthew's Lagoon. Onoke Spit duneland is one of the national strongholds for sand tussock (*Poa billiarderi*).

The swamplands on the western side south of the Waiorongomai River support *Carex*/flax/cabbage tree/manuka wetlands that contrast with the turf field of the opposite shore. Much of the water here is seepage from the Rimutaka Ranges. This wetland complex also supports a rare community of

mixed vegetation dominated by *Baumea* tussocks. North of the Waiorongomai River is a thin band of wetland habitat fed by small streams and watercourses rising in the Rimutaka Range. These wetlands support good populations of *Lobelia carens* and *Crassula ruamahanga* in their wetter portions, and in the drier parts hawthorn trees (*Crataegus monogyna*), though exotic, have been colonised by the rare native mistletoe *Ileostylus micranthus*. In addition, the Wairarapa Lakeshore Scenic Reserve contains a black beech (*Nothofagus solandri* var. *solandri*)/nikau palm (*Rhopalostylis sapida*) association which is the only one of its kind in the region (Wassilieff et al., 1986).

A recent study by the Wellington Regional Council identified 169 wetlands in the Wellington Region comprising 13,300 hectares (pRPS, GWRC, 2010). Wairarapa Moana is over 10,000ha, while the rest of the wetlands vary in ecological status, size, and ownership. Fifty percent are less than 10 hectares and only 10 exceed 100 hectares. Approximately two-thirds are in private ownership. Fifteen of the wetlands are considered to be either nationally or regionally important by the Department of Conservation. Only one is protected by a national conservation order (Lake Wairarapa).

Lake Wairarapa itself, along with the surrounding wetlands are identified in the Regional Freshwater Plan (RFP,WRC, 1999) as having a high degree of natural character and as places where surface water will be managed for aquatic ecosystem purposes. The operative and proposed Regional Policy Statements identify Lake Wairarapa and its associated streams and rivers as having significant indigenous ecosystems, while Lake Wairarapa itself is mentioned for its heritage, recreation and other amenity values (pRPS, GWRC, 2010).

Wairarapa Moana is identified in the Wellington Conservation Management Strategy (Wellington Conservancy CMS, 1996) as a special wildlife habitat, along with Kapiti Island and Mana Island, and as a key recreation and tourist attraction. The recognition of the wetlands as being internationally important lead, in 1989, to the granting of a National Water Conservation Order (NCO) over Lake Wairarapa (upstream of the Barrage Gates) and the Ruamahanga cut-off.

Figure 2: Manawatu- Wairarapa Biogeographic Unit

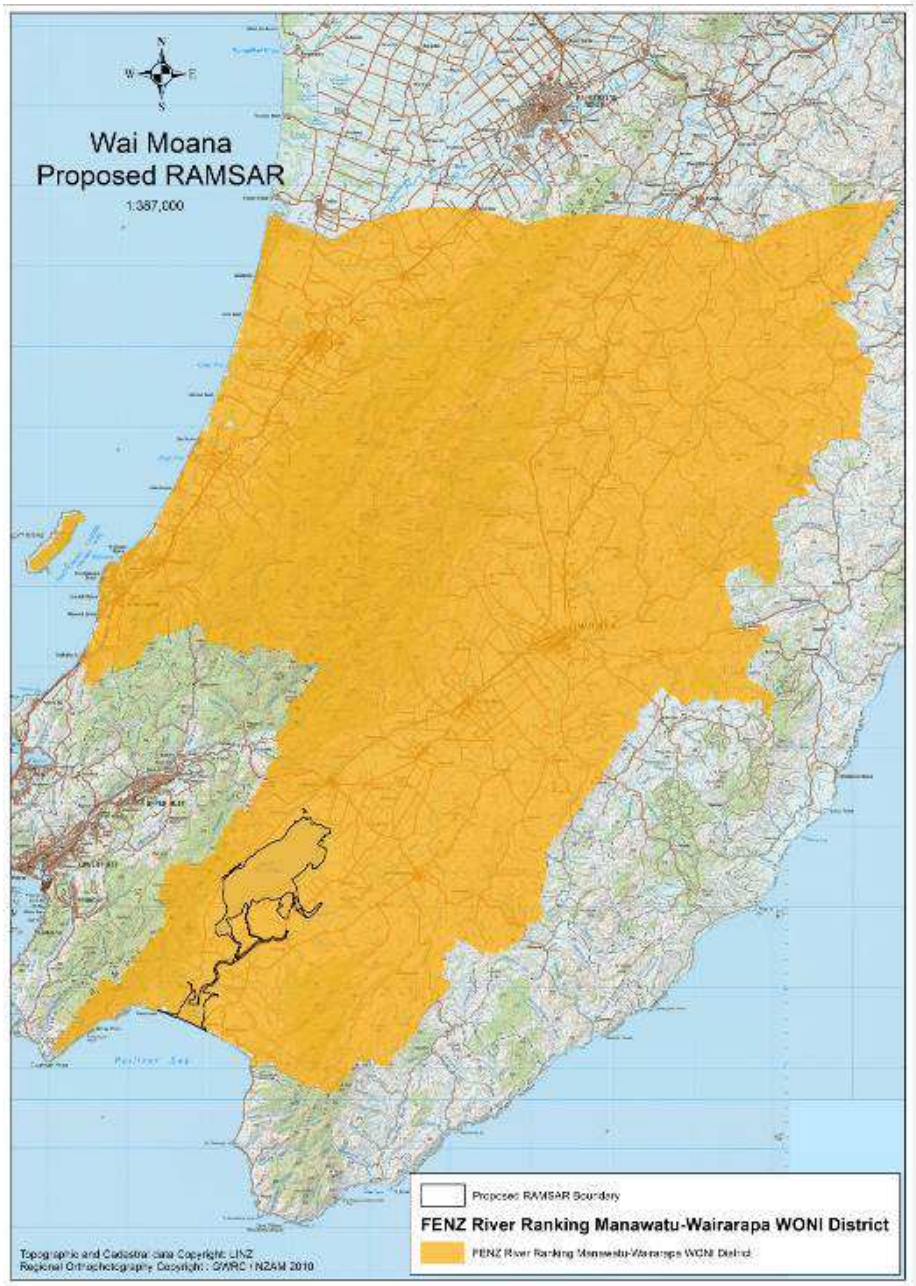


Figure 3: Wetland types within the Wairarapa Moana proposed Ramsar site

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Analysis

Lake Wairarapa and associated wetlands support a number of threatened plants and animals, as shown in Table 1, (see Figure 4 for some pictorial examples). In many cases, the habitat that these species require has been lost both regionally and nationally. There are a wide range of threatened species present, reflecting the diverse range of habitats that Wairarapa Moana supports. Threatened ecological communities have not been identified for Lake Wairarapa, and more work is required to investigate this thoroughly. However, the site does support nationally defined rare ecosystems (Williams et al. 2007) such as;

Shingle beaches, Stony beach ridges, Lake margins, Ephemeral wetlands, Estuaries and Lagoons

Table 1: Threatened and uncommon species supported by Wairarapa Moana

Species	Threat Status *, **
Bryophytes	
Ricciocarpos natans	Nationally Endangered
Fissidens berteroi	Nationally Vulnerable
Vascular plants	
Pterostylis micromega	Nationally Critical
Amphibromus fluitans[#]	Nationally Endangered
Isolepis basilaris	Nationally Endangered
Lobelia carens	Nationally Endangered
Carex cirrhosa	Nationally Vulnerable
Centipeda aotearoana	Declining
Eryngium vesiculosum	Declining
Leptinella dispersa subsp. *dispersa*	Declining
Leptinella tenella	Declining
Mazus novaezeelandiae subsp. *novaezeelandiae*	Declining
Poa billardierei[#]	Declining
Ranunculus limosella	Declining
Urtica linearifolia	Declining
Crassula ruamahanga	Naturally Uncommon
Juncus pusillus	Naturally Uncommon
Korthalsella salicornioides	Naturally Uncommon
Lepilaena bilocularis	Naturally Uncommon
Lobelia perpusilla	Naturally Uncommon
Mimulus repens	Naturally Uncommon
Myriophyllum vostchii	Naturally Uncommon
Pilularia novae-hollandiae	Naturally Uncommon
Stuckenia pectinata	Naturally Uncommon
Eleocharis pusilla	Data Deficient
Leptinella maniototo	Data Deficient
Ranunculus macropus	Data Deficient

Fishes	
Lamprey *Geotria australis*	At risk (declining)
Longfin eel *Anguilla dieffenbachia*	At risk (declining)
Brown mudfish *Neochanna apoda*	At risk (declining)
Dwarf galaxias *Galaxias divergens*	At risk (declining)
Giant kökopu *Galaxias argenteus*	At risk (declining)
Shortjaw kokopu *Galaxias postvectis*	At risk (declining)
Inanga *Galaxias maculatus*	At risk (declining)
Koaro *Galaxias brevipinnis*	At risk (declining)
Bluegill bully *Gobiomorphus hubbsi*	At risk (declining)
Redfin bully *Gobiomorphus huttoni*	At risk (declining)
Torrentfish *Cheimarrichthys fosteri*	At risk (declining)
Birds	
Grey duck *Anas superciliosa superciliosa*	Nationally Critical
White heron *Egretta alba modesta*	Nationally Critical
Australasian bittern *Botaurus poiciloptilus*	Nationally Endangered
Black-billed gull *Larus bulleri*	Nationally Endangered
Banded dotterel *Charadrius bicintus bicintus*	Nationally Vulnerable
Caspian tern *Hydroprogne caspia*	Nationally Vulnerable
NZ dabchick *Poliocephalus rufopectus*	Nationally Vulnerable
Wrybill *Anarhynchus frontalis*	Nationally Vulnerable
Pied stilt *Himantopus himantopus leucocephalus*	At Risk – Declining
White-fronted tern *Sterna striata*	At Risk – Declining
South Island pied oystercatcher *Haematopus finschi*	At Risk – Declining
Variable oystercatcher *Haematopus unicolor*	At Risk – Recovering
Royal spoonbill *Platalea regia*	At Risk–Naturally Uncommon
Little shag *Phalacrocorax melanoleucos*	At Risk–Naturally Uncommon
Black shag *Phalacrocorax carbo*	At Risk–Naturally Uncommon
Little black shag *Phalacrocorax sulcirostris*	At Risk–Naturally Uncommon
Invertebrates	
Freshwater mussel (Kakahi) *Hyridella menziesi*	Gradual Decline
Koura *Paranephrops planifrons*	Gradual Decline

* NZ threat classification system – Townsend et al, 2008.

** Threat categories are from de Lange et al., 2009 (plants), Miskelly et al., 2008 (birds), Glenny et al., 2011 (bryophytes), Hitchmough et al., (2007) and Allibone et al., (2010). Some of fish the species listed here may only use Wairarapa Moana as migratory pathway between upstream habitat and the sea whereas others inhabit the lakes/wetland complex or its immediate tributaries.

National stronghold

Figure 4: Some threatened species and ecosystems found at Wairarapa Moana

Amphibromus fluitans

Carex cirrhosa

Caspian tern

Wrybill

Longfin eel

Koaro

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Analysis

One hundred and two species of birds have been recorded at the Wairarapa Moana wetlands since 1923 (GWRC, unpubl. data). This represents 23% of all bird species recorded from the New Zealand biogeographic region since human settlement (Gill et al., 2010); recorded in a wetland complex comprising only 0.03% of New Zealand's land area. These figures suggest that these wetlands play an extremely important role in helping to maintain avian diversity in the New Zealand biogeographic region.

Twenty species of freshwater fish, representing the main eight freshwater fish families found in New Zealand and that can be expected to occur here, have been recorded in Wairarapa Moana or its tributaries (such as the Ruamahanga River). A number of additional species considered estuarine and 'marine' have also been recorded from within Wairarapa Moana (eg, yelloweye mullet (*Aldrichetta forsteri*), yellowbelly flounder (*Rhombosolea leporine*), kahawai (*Arripis trutta*), stargazer (*Leptoscopus macropygus)* and estuarine triplefin (*Grahamina nigripenne*). The majority (16) of these 20 freshwater species exhibit diadromous life histories, which means they generally need to migrate between freshwater environments and the sea to complete their lifecycle. Wairarapa Moana is the (only) migratory pathway for these diadromous species and as such is integral in supporting and maintaining diadromous fish populations not only within Wairarapa Moana but the wider upstream catchment, which equates to over one third of the Wellington region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Analysis

The eastern shore of Lake Wairarapa is a key stopover site along the flyways for 17 species of migrating Arctic shorebirds including Pacific golden plover (*Pluvialis fulva*), sharp-tailed sandpiper (*Calidris acuminata*), pectoral sandpiper (*C. melanotos*) and eastern bar-tailed godwit (*Limosa lapponica baueri*) (Moore et al., 1984; Robertson & Heather, 1999). It is also an important wintering site for southern North Island populations of the nationally critical black-billed gull (*Larus bulleri*) and nationally vulnerable banded dotterel (*Charadrius bicinctus*) (Robertson & Heather 1999; GWRC unpubl. data). In 2011 almost the entire Wairarapa populations of both black-billed gulls (ca. 190 individuals) and banded dotterels (ca. 400-500 individuals) over-wintered along the eastern shoreline of Lake Wairarapa (A. Rebergen pers. comm.; GWRC unpublished data).

The shingle spit at Lake Onoke supports the only breeding colony of the nationally vulnerable Caspian tern (*Hydropogne caspia*) in the lower North Island. The colony has been present on the shingle spit since the 1930's and currently comprises around 25 breeding pairs (Challies & Scadden, 2010).

Several threatened bird species breed at Lake Wairarapa (e.g. New Zealand dabchick, Australiasian bittern). The eastern shoreline is important for shorebird loafing, moulting and feeding because lake level fluctuations regularly expose invertebrates.

As noted above, the majority of freshwater fish found in Wairarapa Moana (and its wider upstream catchment) are diadromous and so Wairarapa Moana is the (only) migratory pathway for these diadromous species. It is worth noting that in some cases some diadromous species (eg, common bully (*Gobiomorphus cotidianus*), common smelt (*Retropinna retropinna*), banded kokopu (*Galaxias fasciatus*), etc.) can complete their lifecycle entirely in freshwater. This can only occur when suitable larval rearing habitat is present and potentially the lakes of Wairarapa Moana (Onoke and Wairarapa) are providing this habitat for some species, although this requires further investigation. If Lakes Onoke and Wairarapa are providing some diadromous species with larval rearing habitat this further reinforces the importance of Wairarapa Moana to diadromous species in the immediate and wider upstream catchment.

Wairarapa Moana also provides important spawning habitat for diadromous species that spawn in estuarine environments such as inanga – a species considered to be declining throughout New Zealand (Hicks, 1993; Allibone et al., 2010). It is also provides significant habitat for non-diadromous species such as brown mudfish (another species considered to be in decline) whose entire lifecycle is completed in freshwater.

Specific criteria based on waterbirds

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Analysis

A waterfowl count carried out in Autumn 1983 produced a maximum count of >22 000 birds; the majority of these birds being species such as mallard (15 500 individuals), black swan (2748 individuals), New Zealand shoveler (2645 individuals) and paradise shelduck (1200 individuals) (Moore et al, 1984).

Between 1977 and 1978 monthly waterfowl counts were carried out along the eastern shoreline of Lake Wairarapa by the Wellington Acclimatisation Society. Waterfowl numbers counted peaked at 47 500 individuals during these surveys (Carlin et al., 1981).

Although these large-scale counts of waterfowl have not been repeated since this time, regular counts of wading birds and selected waterfowl species carried out along the eastern shoreline of Lake Wairarapa between 2009 and 2012 consistently record in excess of 7000 birds (GWRC, unpubl. data). Given that some of the most numerically abundant waterfowl species are excluded from these counts (eg. mallard, New Zealand shoveler and grey teal) and that the eastern shoreline makes up only a small proportion of the wader and waterfowl habitat in the Wairarapa Moana wetland complex it appears

that the total number of waterbirds using the Wairarapa Moana wetlands must still be in excess of 20,000 individuals.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Analysis

Lake Wairarapa is a nationally important site for at least six species of waders: Pied stilt (*Himantopus himantopus*), banded dotterel, black-fronted dotterel (*Elseyornis melanops*), Pacific golden plover, sharp-tailed sandpiper and pectoral sandpiper (*Calidris melanotos*). For each of these species, annual average maximum counts at Lake Wairarapa between 1984-1994 were greater than 1% of the estimated national population (Table 2), (Robertson & Heather, 1999). More recent surveys carried out between 2009 and 2012 have shown that average maximum counts for these species have not changed significantly in the intervening years (GWRC unpubl. data).

In the early 1980's Lake Wairarapa also supported >1% of the national populations of six species of waterfowl and wetland birds: New Zealand dabchick (*Poliocephalus rufopectus*), black swan (*Cygnus atratus*), paradise shelduck (*Tadorna variegata*), grey teal (*Anas gracilis*), New Zealand shoveler (*Anas rhynchotis*) and Australasian bittern (*Botaurus poiciloptilus*) (Table 2), (Moore et al., 1984). More recent surveys carried out between 2009 and 2012 have shown that populations of black swan, paradise shelduck and Australasian bittern remain very similar to these earlier population estimates (GWRC unpubl. data).

The shingle spit at Lake Onoke currently supports a breeding colony comprising between 1.7%-1.9% of the national population of Caspian terns, a species ranked as nationally vulnerable under New Zealand's threat classification system (Table 2) (Bell & Bell, 2008; Miskelly et al., 2008; Challies & Scadden, 2010)

Table 2. Species for which populations at Wairarapa Moana exceed 1% of the estimated national population. [1]Maximum counts by Moore et al., (1984); [2]mean annual maxima by Robertson and Heather (1999); [3]maximum counts by Challies & Scadden (2010).

Species	Maximum count	Estimated national population	Year of estimate	Lake W. % of total population
NZ dabchick[1]	25	1500	1982	1.7
Pied Stilt[2]	909	30,000	1984-94	3.0
Black swan[1]	5000	57000	1982	8.8
Paradise shelduck[1]	1900	120000	1981	1.6
Grey teal[1]	510	150000	1974	3.4
Black-fronted dotterel[2]	82	1700	1984-94	4.8
Pacific golden plover[2]	55	900	1984-94	6.1
Sharp-tailed sandpiper[2]	6.7	125	1984-94	5.4
Pectoral sandpiper[2]	2.9	15	1984-94	18.7
NZ shoveler[1]	3600	130000	1982	2.8
Australasian bittern[1]	15	1000	1981	1.5
Banded dotterel[2]	909	25000	1982	1.4
Caspian tern[3]	50	2600-2800	2005	1.7-1.9

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Analysis

Wairarapa Moana provides a wide variety of habitats for freshwater fish (and marine/estuarine species) and this high habitat diversity (eg, fresh and estuarine lakes and wetlands, and rivers/streams) within a relatively small geographical area means that Wairarapa Moana is an ecologically rich and diverse fish fauna. Twenty species of native freshwater fish species have been recorded within Wairarapa Moana or its upstream catchment (see Table 3). This includes species from all eight of the main freshwater families present in New Zealand (Geotriidae, Anguillidae, Retropinnidae, Galaxiidae, Pinguipedidae, Gobiidae, Pleuronectidae and Mugilidae)

As already mentioned, the majority of these freshwater species found within Wairarapa Moana and its upstream catchment are diadromous (16 of the 20), which means that Wairarapa Moana (specifically Lake Onoke) has the pivotal role of being the only entry/exit point for the entire Ruamahanga catchment and as such Wairarapa Moana is key in maintaining the fish values of the entire catchment. All four non-diadromous species have also been recorded from wetlands within Wairarapa Moana or its immediate river and stream tributaries. Estuarine/tidal environments such as Lake Onoke also support a number of estuarine/marine fish species (Table 3).

Table 3: Indigenous freshwater fish* records from surveys undertaken within Wairarapa Moana and its upstream habitat** from 1990 onwards, based on information in Hicks (1993), McEwan (2009, 2010a, 2010b) and NIWA's National Freshwater Fish Database (accessed in April 2011). Indigenous estuarine and marine species, as well as introduced freshwater species are also shown.

Common name	**Latin name**	**Year recorded**
Shortfin eel	*Anguilla australis*	1991, 1994, 1995, 1996, 1997, 1999, 2002, 2005, 2006, 2007, 2008, 2009, 2010
Longfin eel	*Anguilla dieffenbachia*	1991, 1994, 1995, 1996, 1997, 1998, 1999, 2002, 2005, 2006, 2008 2009, 2010
Lamprey	*Geotria australis*	1991, 1995, 2001, 2001, 2005, 2007
Common bully	*Gobiomorphus cotidianus*	1991, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2002, 2005, 2006, 2007, 2008, 2009, 2010
Redfin bully	*Gobiomorphus huttoni*	1991, 1994, 1995, 1996, 1997, 1999, 2000, 2002, 2005, 2006, 2007,2008, 2009
Bluegill bully	*Gobiomorphus hubbsi*	1991, 2002, 2002, 2007
Giant bully	*Gobiomorphus gobioides*	1998
Upland bully	*Gobiomorphus breviceps*	1991,1994, 1995, 1996, 1998, 1999, 2000, 2002, 2005, 2006, 2007, 2008, 2009
Crans bully	*Gobiomorphus basalis*	2001, 2002, 2006
Inanga	*Galaxias maculates*	1991, 2005, 2008, 2009, 2010
Banded kokopu	*Galaxias fasciatus*	1991, 1999, 2001, 2009
Koaro	*Galaxias brevipinnis*	1991, 1999, 2000, 2001
Giant kokopu	*Galaxias argenteus*	1991, 1992, 1994, 1996, 1999, 2000, 2009
Dwarf galaxias	*Galaxias divergens*	2001, 2005, 2009
Brown mudfish	*Neochanna apoda*	1990, 1992, 1994, 1995, 1996, 1997, 2005, 2009, 2010
Torrentfish	*Cheimarrichthys fosteri*	1991, 1994, 1995, 1996, 1998, 1999, 2002, 2005, 2006, 2007, 2009
Grey mullet	*Mugil cephalus*	1991, 2009, 2010
Common smelt	*Retropinna retropinna*	1991, 1997, 2005, 2007, 2008, 2009, 2010
Black flounder	*Rhombosolea retiaria*	2007, 2009, 2010

Common name	Latin name	Year recorded
Estuarine & marine species		
Yellow-eyed mullet	*Aldrichetta forsteri*	1991, 2005, 2008, 2009, 2010
Kahawai	*Arripis trutta*	1991
Estuarine triplefin	*Grahamina nigripenne*	1995, 2005, 2009, 2010
Yellow belly flounder	*Rhombosolea leporine*	1995, 2010
Stargazer	*Leptoscopus macropygus*	1995
Introduced species		
Brown trout	*Salmo trutta*	1991, 1994, 1996, 1997, 1998, 1999, 2000, 2002, 2005, 2007, 2008, 2009, 2010
Rainbow trout	*Oncorhynchus mykiss*	2006
Rudd	*Scardinius erythrophthalmus*	1996, 1998, 2002, 2005, 2007, 2009, 2010
Tench	*Tinca tinca*	1996, 1998, 2002
Goldfish	*Carassius auratus*	1999, 2002, 2005, 2009, 2010
Perch	*Perca fluviatilis*	1991, 2002, 2005, 2006, 2008, 2009, 2010

* Shortjaw kokopu (*Galaxias postvectis*) are not shown in the table as the only record for this species within Wairarapa Moana or its wider catchment is from 1973 (National Freshwater Fish Database). However, there have been several 'unconfirmed' sightings in recent years.

** As mentioned earlier in the text, not all of these species necessarily reside within Wairarapa Moana for their entire lifecycle. However, given that the majority are diadromous species and must migrate through Wairarapa Moana twice to complete their lifecycles, the persistence of these species within upstream habitat is directly related to Wairarapa Moana.

Eleven fish species classified as being 'At Risk (declining)' by Allibone et al., (2010) are found either within Wairarapa Moana or use Wairarapa Moana as migratory pathway to complete their lifecycles: bluegill bully, brown mudfish, dwarf galaxias giant kökopu, inanga, koaro, lamprey, longfin eel, redfin bully, shortjaw kokopu, torrentfish. Species such as giant kokopu and brown mudfish are regarded as wetland specialists (McDowall, 1990), longfin eels are also commonly associated with wetland type habitats and thus the wider wetland complex is extremely important to the maintenance of populations of these species. Two other aquatic species, kakahi and koura are also classified as threatened ('Gradual Decline').

Other species captured during fish surveys include kakahi (freshwater mussel), hairy-handed mud crab (*Hemigrapsus crenulatus*), mysid shrimp (*Tenagomysis* spp.), decapod shrimp (*Paratya curvirostris*) and koura.The lakes are an important habitat for kakahi, (a threatened species) and a recent survey across 8 different habitat types identified 123 adult kakahi (McEwan, 2012). Koura are also classified as a threatened species.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Analysis

There are at least eight species of exploited fishes in Wairarapa Moana, not including whitebait (Hicks, 1993). These are: black flounder *Rhomobosela retiaria*, yellowbelly flounder, lamprey, shortfin eel (*Anguilla australis*), longfin eel, grey mullet (*Mugil cephalus*), brown trout (*Salmo trutta*) and perch (*Perca fluviatilis*). Of these, eels and flounder maintain ongoing fisheries (although no concessions for commercial eel fishing in the lakes have been approved at present). Kakahi, koura and eels, as well as some of the other native fish species, have a high cultural value and are a traditional food source.

Figure 5: Black flounder

Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependant non-avian animal species.

Insufficient data is available to assess the 1% thresholds of wetland-dependant non-avian animal species.

15. Biogeography

a. The biogeographic region that encompasses the Ramsar site is the Manawatu-Wairarapa freshwater biogeographic unit (Leathwick et al., 2007), (see Map 2).

b. The biogeographic units were originally developed as a freshwater biogeographic framework for riverine biodiversity assessment (Leathwick at al., 2008), but have been further developed for use in assessing wetland biodiversity. Boundaries have been based on catchment units and were derived using data describing river biota. It was considered that the freshwater biogeographic units could adequately account for historic variation in wetland biodiversity (Ausseil et al., 2008).

16. Physical Features of the Site

16.1 Origins, geology and geomorphology

Approximately 6,000 years ago Wairarapa Moana was an ocean embayment. During the Holocene an alluvial plain, on which Wairarapa Moana is located, was formed. Today there are extensive flats of mud and sand on the eastern side of the lake. In conditions of low lake levels these flats can be over 1km in width. There are also a series of non-coastal dunes formed by wind-deposited fine sediments exposed through fluctuating lake levels *(*Beadel et al., 2000). By trapping water left by changing river courses, the dunes helped form small lakes and wetlands such as Boggy Pond, Matthew's Lagoon, Barton's Lagoon and several lagoons in the JK Donald Reserve *(*Airey et al., 2000).

Lake Wairarapa itself covers a large surface area (c.18km x 6km), similar in size to Wellington Harbour. It is only 2.5m in depth at its deepest point, (Perrie, 2005) and, as a result of this and its large surface area, is isothermal. The eastern shoreline is gently shelving meaning small fluctuations in water level can either expose or inundate extensive areas. In contrast the western shore generally comprises a series of connecting deltas formed by relatively small streams. The steeper profile of these deltas, combined with the lack of the seiche effect, so much a part of the eastern side, means there are no extensive exposed flats. Forest vegetation still extends to the lake edge in the vicinity of the Wairarapa Lake Shore Scenic Reserve, and in the recent past, would have been much more widespread as the remnants near the Waioirongomai River attest. Lake Wairarapa itself is predominantly fresh water, though in certain conditions saline water can extend into Allsop's Bay at its southern end. Large barrage gates now straddle the outlet of the lake and control its level.

Lake Onoke is a 650ha, brackish, generally tidal lagoon at the mouth of the Ruamahanga River. It is separated from Palliser Bay by a 3km long shingle spit. The lake is open to the sea for long periods but in southerly conditions with a low river flow, the exit to the sea becomes blocked by suspended gravels thrown back to the shore by the force of the sea. This led to the phenomenon that Maori called hinurangi, when the level of Lake Onoke rose to such a height that there was backflow along the channel of the Ruamahanga River. As there is such little fall in the catchment of the lower Ruamahanga River valley, relative to its width, the hinurangi inundated a huge area before pressure behind the gravels overcame the ameliorating effect of flow through them and released the impounded waters. Even now, if a blockage in the exit of Lake Onoke lasts more than a few days, the result can be a pulse of brackish water flowing up the Ruamahanga River and through the barrage gates into Lake Wairarapa itself (Robertson, 1991).

Pounui Lagoon was once an arm of the extensive saltmarsh that fringed Lake Onoke. The lagoon now drains into Lake Onoke via two culverts through a stop bank known locally as Paul's Bank. Pounui Lagoon is fed by Battery Stream, which rises in the Rimutaka Range and supplemented by water from

Lake Pounui. This lake has an essentially unmodified catchment. The combined catchments of these streams cover some 1,500ha.

The Ruamahanga River connects Lake Wairarapa to Lake Onoke. This section of the river was deepened by dredge in the mid to late 1960's in a reclamation that included the creation of long stopbanks. At this time, and as an integral part of the process, the Ruamahanga Diversion was constructed. This disconnected the Ruamahanga River from Lake Wairarapa and as a consequence some 97-98% of the Ruamahanga's flows now bypass Lake Wairarapa, flowing directly into Lake Onoke and thence to the sea in Palliser Bay. The river is up to 300 metres wide and is generally straight, with only slight meanders in its course.

The Tauherenikau River is now the main source of surface water to Lake Wairarapa, entering the lake at its northern end. The Tauherenikau River rises on the eastern flanks of Mount Hector, in the southern Tararua Ranges and is subject to the heavy rainfall that typifies these ranges and this, combined with its relatively short length, makes it a very high energy system. The river's entry into Lake Wairarapa was diverted to its current course in the 1960's with the consequence that the delta created where the river enters the lake is very active. Upstream of the delta the river bed is perched some 2-3 metres above the surrounding farmland, the result of a sudden slowing of the river flow and deposition of the huge amount of material that it carries from the Tararua Ranges.

The extensive lagoon and wetland complex of the JK Donald Reserve were formed as a result of the landscape created by the combination of the sediment laden, fast flowing Tauherenikau River and the seiche. This wetland complex is now fed by seasonal diversion of water from one of the smaller streams.

16.2 Winds

The prevailing wind is from the north-west, with strong westerlies and north westerlies a characteristic of the area. A seiche effect is commonly produced under these conditions and can elevate waters by up to a metre along the eastern shore line (Ian Gunn *pers com*). There is a daily cycle of wind which generally involves calmer
periods in the mornings and late afternoons/evenings with the strongest winds often being recorded in the middle of the day.

16.3 Soils

The soils of Wairarapa Moana are central recent soils are derived from alluvium. Kairanga soils and Manawatu soils occur to the north and east of Lake Wairarapa, while Manawatu and Esk soils occur to the south and south east of Wairarapa Moana. Sediment characteristics of material carried in the rivers is mostly greywacke detritus from the Tararua Ranges. In addition finer grained sediments from the eastern hill country within the Ruamahanga River catchment eg. Taueru, will have increased with the clearing of these hills in relatively recent times for farm land. Much of the swampy wetlands in the

vicinity of Wairarapa Moana have been converted to farmland. In recent times, with more intensive land use and management, dairy cattle have been the primary farming stock.

16.4 Hydrology

The principal inputs of water to Lake Wairarapa are derived from surface water, groundwater and precipitation. The primary surface water sources are the Tauherenikau River at the north eastern end of the lake, from several moderate sized tributaries along the western shore e.g. Abbott's Creek, Cross Creek, Waiorongamai River, and numerous smaller streams.

Natural fluctuations in lake levels are now largely controlled by the barrage gates situated at the southern end of Lake Wairarapa, though the state of the "opening" in the Onoke Spit still exerts a major influence. Though the fluctuations in lake levels are not as pronounced they were prior to human impact, there is still a large variation between high and low water levels. Under flood conditions, water from the Ruamahanga River once again enters the lake, though via the Oporua Floodway midway along the eastern shore. Originally the lower Ruamahanga River flowed into Lake Wairarapa at Jury Island, through and out at Allsop's Bay and on to Lake Onoke. Entry and exit were either side of a low peninsula separated by only 4km of land.

Springs have been mapped within Lake Wairarapa. They appear to make a significant contribution to the summer lake levels when input from the rivers is at its lowest and the barrage gates play a major role in keeping water in the lake. Evaporation during the summer steadily reduces the lake level.

16.5 History associated with physical changes to Wairarapa Moana

European settlers initially leased land from the local Maori from the 1840s. After 1865, government agents controversially purchased land from local Maori throughout the Wairarapa including lands adjacent to Wairarapa Moana for pastoral farming. This process is now the subject of a claim by local Maori to the Waitangi Tribunal. At that time the hinurangi was still operating and flooding occurred naturally over the entire area of the wetland system. Since then retaining the natural seasonal flooding of the river/lake/wetland system in the face of farming, which requires a regime of essentially permanently dry land, has been a source of ongoing contention.

In 1896, rangatira (chiefs) of the district gifted the lakes and surrounding disputed land to the Crown. Since then the shingle barring Lake Onoke to Palliser Bay (the Okorewa Outlet) has been artificially opened and flood control measures began to halt seasonal inundation, plus the drainage of existing permanent wetlands and lagoons to create more pasture.

The Soil Conservation and Rivers Control Act 1941 established the legal basis for river and flood control works. In 1947 a large flood exacerbated by a "blocked lake" at the Onoke Spit stimulated the creation of a comprehensive flood control scheme which included the Wairarapa Moana area. Prior to the

approval of the flood control scheme, though, the Tauherenikau River was diverted to the northern end of Lake Wairarapa. Previously it entered Lake Wairarapa through the JK Donald Reserve wetlands complex further south.

The Lower Wairarapa Valley Development Scheme (LWVDS) commenced in 1964 and was completed 20 years later. As stated in a previous section, this resulted in significant changes to the hydrology of Wairarapa Moana. This included the diversion of the Ruamahanga River so it now flows directly to the sea, the dredging and stopbanking of the lower Ruamahanga River, the construction of a set of barrage gates to control Lake Wairarapa lake levels, the separation of Pounui Lagoon from Lake Onoke by stopbanks and the routing of floodwaters into Lake Wairarapa via the Oporua Floodway. Associated with these developments extensive areas of wetland (some 1,237 hectares) were drained and converted to grazing land.

The LWVDS was not completed in its entirety. The option to develop "polders" (where low lying land is enclosed by embankments and subsequently drained) on the eastern shoreline of Lake Wairarapa did not obtain approval.

Today the Lower Wairarapa Valley Development Scheme protects the order of 40,000 hectares of intensively farmed land from flooding. Farmland which was previously inundated for weeks is now only impacted from floods for days, with one exception. The use of Lake Wairarapa for flood water storage results in high lake levels that can affect the eastern lakeshore until such time as Lake Wairarapa has been able to drain back into the Ruamahanga River. Despite the Scheme, in 2006, a local downpour of rain caused extensive flooding of farm land. In some places the Lake Wairarapa level was higher than the water level on the flooded farm land. Ironically the majority of the surviving wetlands today were those purchased from private landowners by central government to form the polder area and became, with the abandonment of the polder scheme, the largest area of wetlands remaining in the lower Ruamahanga River catchment. They have now passed into public ownership and control.

In 1984, the day after the decision was made to abandon the polders, the New Zealand Acclimatisation Societies (now the Fish and Game Council) with the support of the Department of Internal Affairs and the Royal Forest and Bird Protection Society applied for a National Water Conservation Order to cover Lake Wairarapa. A National Water Conservation Order can only apply to the beds of lakes and rivers and thus did not include the remaining wetlands adjacent to the main waterbodies. The application wished to protect the outstanding recreational and wildlife habitat features of Lake Wairarapa, its natural state in terms of water quality, level and flow and to set maximum and minimum lake levels. It sought to prohibit construction works associated with polders below the 10.3 metre datum and the damming of any contributing streams and rivers, plus the operation of the barrage gates to protect and enhance Lake Wairarapa's outstanding features.

The Wairarapa Catchment Board in May 1985 issued a draft policy statement accepting the national water conservation order with a number of amendments. In its conclusion the Board identified a number of other factors which influenced the quality of Lake Wairarapa's recreational uses and wildlife habitat such as "livestock grazing, the encroachment of exotic plants and the impact of hunters on the lake's wetland bird population".

A National Water Conservation (Lake Wairarapa) Order 1989 was granted on 6 March 1989. It declared that the wildlife habitat created in part as a consequence of the natural fluctuations of water levels, particularly over the eastern shoreline, was an outstanding feature of Lake Wairarapa. The Order placed some prohibitions and conditions on water rights and there was also a direction to the Wairarapa Catchment Board to obtain the necessary water rights for the operation of the barrage gates at the outlet of Lake Wairarapa. As a result of this direction further studies were made of the requirements for the wading birds by Dr Hugh Robertson, previously from the Ecology Division of the Department of Science and Industrial Research, then with the Department of Conservation. He worked with the Lake Wairarapa coordinating committee to develop a set of operating target lake levels.The agreed levels are a compromise between the desire to maintain the greatest capacity within the lake for flood storage and maintaining the habitat primarily for the wading birds that feed on the eastern shoreline of the lake.

The target lake level regime has resulted in fewer and less extreme fluctuations in the recorded lake levels. The maximum levels have decreased significantly. A water right was granted in March 1991 to dam and divert water at the barrage gates to provide flood control in the lower Wairarapa valley and to maintain seasonal water levels in Lake Wairarapa for environmental purposes. A new consent "to dam/divert water" was granted in October 1999. The target levels remained the same however there is an additional condition requiring the two lateral gates to be automatically opened to coincide with tides between January to March and August to November. This is to promote the migration of fish into and out of Lake Wairarapa and from there to the adjoining catchments. This water consent will expire in 2019 and will be reviewed in 2014.

Table 3: Lake Wairarapa target levels (Lower Valley Development Scheme datum)

Period	Target Height
Summer Minimum (December 1st to February 28th)	10.15 metres
Autumn minimum (March 1st to May 31st)	10.00 metres
Winter Minimum (June 1st to September 30th)	9.95 metres
Spring Minimum (October 1st to November 30th)	10.00 metres

Wairarapa iwi are currently involved in Treaty of Waitangi settlement claim negotiations with the Crown. The Wairarapa Ki Tararua report, dated 2010, provides extensive history of Wairarapa Moana outlining its importance to local Mäori. There are a number of recommendations regarding Wairarapa Moana, the most important being the return of the Moana to the ownership of local Mäori and their involvement of the management of the Wairarapa Moana Wetlands complex.

16.6 Water Quality

Water quality in Lakes Onoke and Wairarapa can be considered to be in a degraded state with typically elevated concentrations of nutrients, algal biomass and poor water clarity. Application of the Trophic Level Index classifies both lakes as 'supertrophic'. Examination of temporal trends in Lake Wairarapa (Lake Onoke data record is insufficient for trend analysis) indicates that since water quality monitoring began in 1994, this lakes has remained in a relatively stable, yet degraded state (Perrie & Milne 2012).

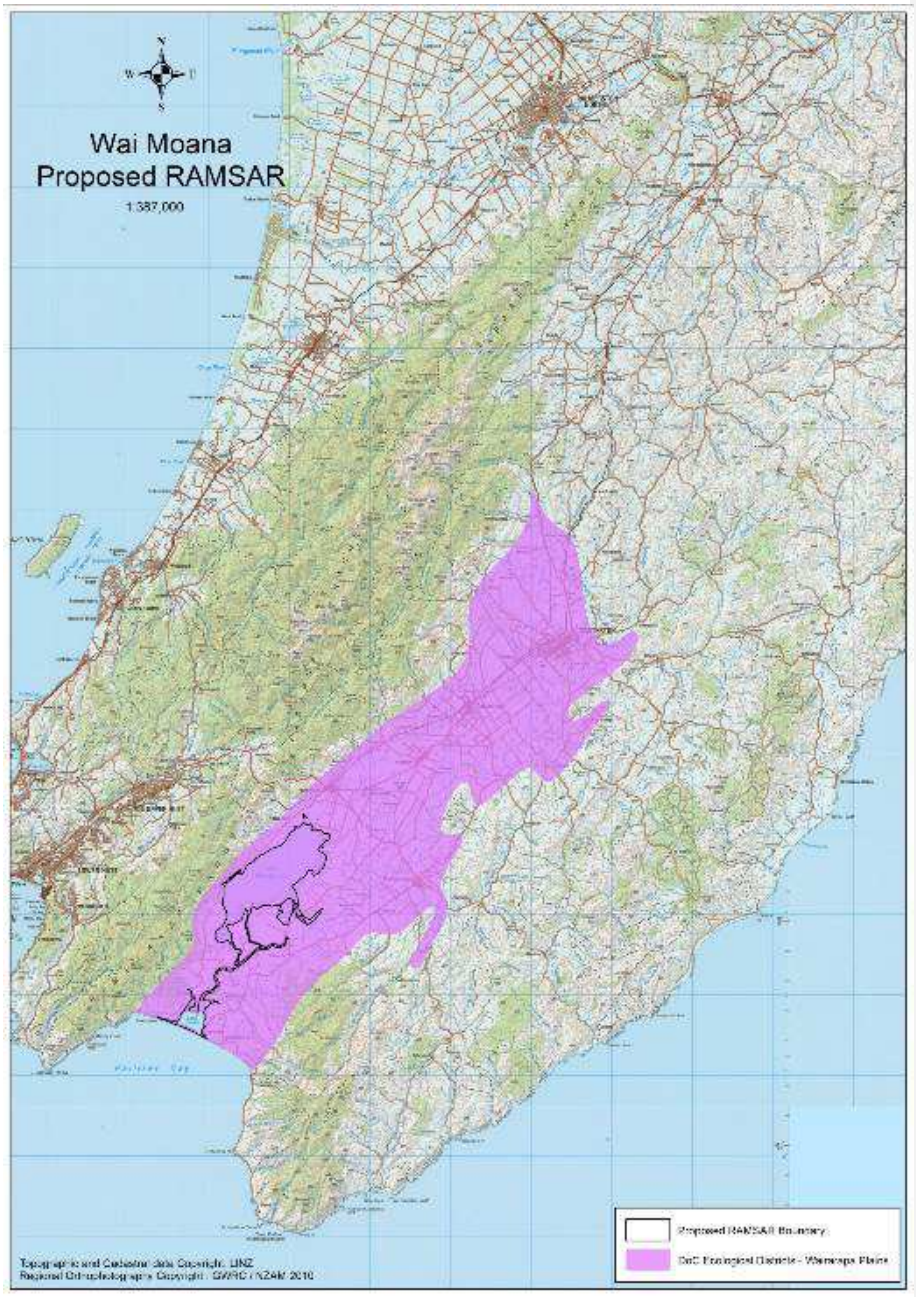
17. Physical Features of the Catchment Area

17.1 General

The Wairarapa Ecological District (see Map 4) is situated in the southern North Island bounded in the west by the Tararua and Rimutaka Ranges; in the east by the Maungaraki Hills and Aorangi Ranges; Palliser Bay in the south and narrowing in the north at Mount Bruce, where the Ruamahanga River emerges from the hill country. It is the sole ecological district in the Wairarapa Plains Ecological Region, the area totalling 117,803ha (Beadel et al., 2000). The Ecological District is primarily a sedimentary basin produced by marine and alluvial deposition. It also contains localised low hills with several gravel-bed streams draining the surrounding ranges through the Ruamahanga River.

Lake Wairarapa and the smaller Lake Onoke are distinctive features and their shorelines retain some of the extensive wetlands that previously dominated the district. The Ruamahanga River meanders down the eastern side of the plains receiving the flows of several rivers from the forested ranges to the west and drier grazed hills to the east. The relief is generally low and flat, remaining under 20m a.s.l. over a large area around Wairarapa Moana and reaching 300m at the district's northern edge.

Figure 6: Wairarapa Plains Ecological District



17.2 Soil types

The following soil types are present in the wider catchment:

- Ranges – greywacke
- Gravel terraces, fans and alluvial plains form the floor of the Wairarapa Basin

- This depression is 77km long and generally 20km wide
- Lines of wind blown sand dunes represent previous Lake Wairarapa boundaries.

Below the confluence of the Waiohine and the Ruamahanga rivers, the Ruamahanga winds on a shallow gradient over a floodplain up to 4km across and develops a bed of finer gravel, sand and silt. Further downstream a very shallow gradient produced a silt bed and encouraged widespread flooding of farmland on the low surrounds before river diversion work.

17.3 Climate

The annual rainfall at Featherston, at the northern end of Lake Wairarapa is 1,326mm and at the southern end, at Waiorongomai, closer to the Rimutaka Range, is 1,540mm.
Bull Mound, in the headwaters of the Tauherenikau River, has an a mean annual rainfall total of 4,600mm, while Angle Knob, at the head of the Waiohine River, one of the major tributaries of the Ruamahanga, annual rainfall in excess of 7,000mm is normal.

The Wairarapa Plains ED, by contrast, is generally sunny and has mean daily temperatures of $7 – 17^0$C (Beadel et al., 2000).Annual evaporation figures have been measured at 2000 millimetres per year.The weather is influenced to a large extent by the mountains of the Rimutaka and Tararua ranges.

18. Hydrological Values

a) Lake Wairarapa is one of the few large freshwater wetlands remaining in New Zealand. Every such wetland is unique in its importance for wildlife (Moore *et al.* 1984). A National Water Conservation Order (WCO) was placed over Lake Wairarapa in 1989. It recognises that the wildlife habitat, created in part as a consequence of the fluctuations of water levels in Lake Wairarapa, is an outstanding feature of Lake Wairarapa. These fluctuating water levels, manipulated through the operation of the barrage gates, create a unique habitat, (Airey et al., 2000).

b) Flood control – the National Water Conservation Order also provides for resource consent to be issued to operate the barrage gates for flood control. The ability to store floodwaters in Lake Wairarapa itself is an important factor in the economy of the lower Wairarapa Valley

c) Source of irrigation water – in recent years a number of landowners adjacent to Lake Wairarapa have applied for and been granted resource consents to take water from Lake Wairarapa for irrigation purposes.

d) Streams and even some drains in the vicinity of the Wairarapa Moana wetlands complex are important spawning areas for fish and provide access to the catchments clothed in native forests.

19. Wetland types

The wetland types present at Wairarapa Moana (see Figure 7) were defined as listed in the Ramsar Classification System for Wetland Type (Ramsar Convention Official Guidelines). Section (a) lists the different wetland types present, while section (b) provides information about the proportion in which the various wetland types are present (%). The types and proportions present were determined through aerial photography GIS-based maps and local knowledge obtained from Department of Conservation staff and GWRC hydrology officers.

(a) Presence

Marine/Coastal Wetlands
E – Sand, shingle or pebbles shores
F- Estuarine waters (Lake Onoke part of 44ha of estuarine wetlands).
J – Coastal brackish/saline lagoons

Inland Wetlands
L- Permanent inland deltas
M- Permanent rivers/streams/creeks
N- Seasonal intermittent/irregular rivers/streams/creeks
O – Permanent freshwater lakes (over 8ha).
Tp - Permanent freshwater marshes/pools (below 8ha)
Ts – Seasonal intermittent freshwater marshes/pools
W – Shrub-dominated wetlands

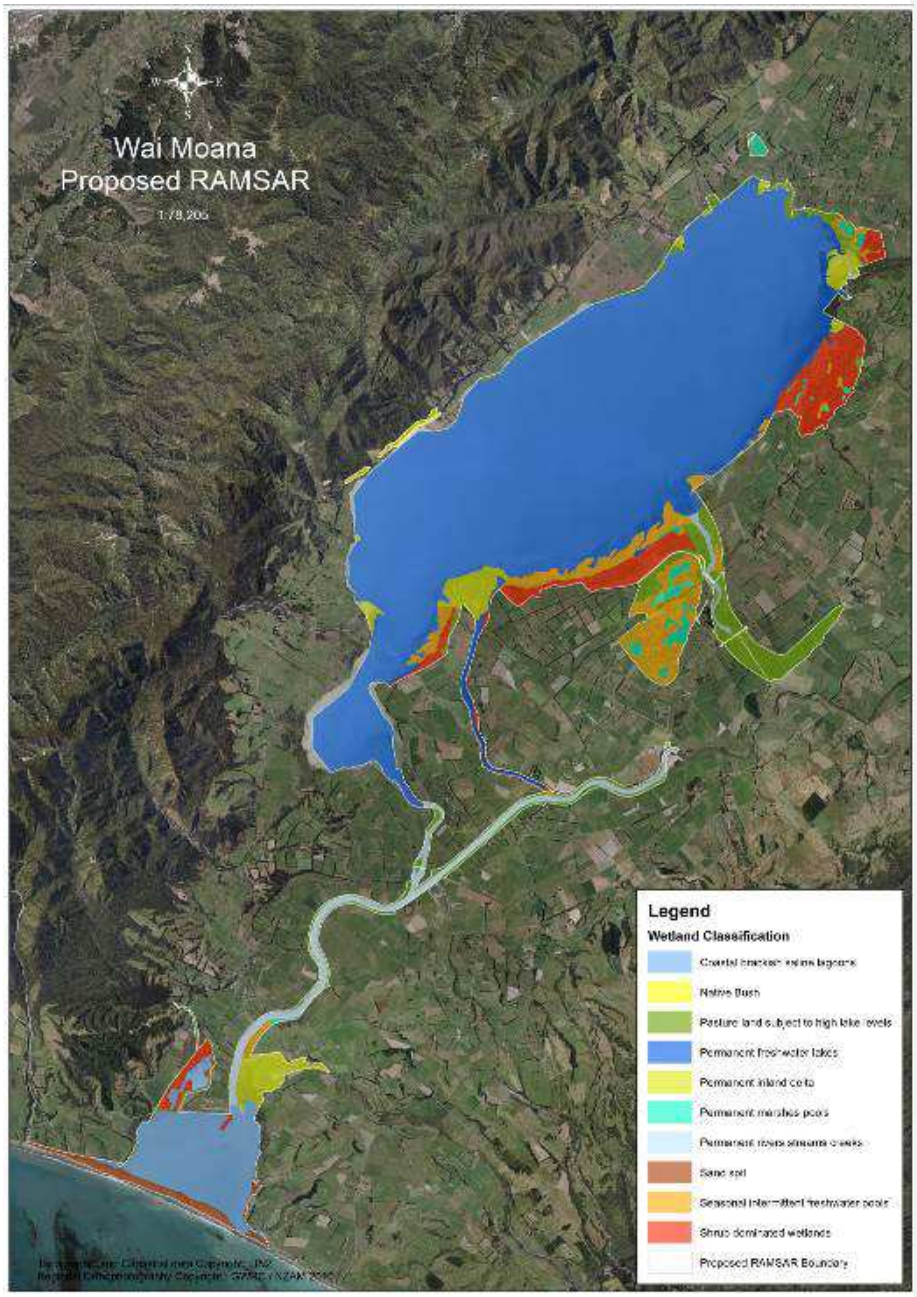
(b)

Dominance	Percentage of total area
Marine/Coastal Wetlands	
J – Coastal brackish/saline lagoons	7
E – Sand, shingle or pebbles shores	1
F- Estuarine waters	1
Inland Wetlands	
O – Permanent freshwater lakes (over 8ha)	67
W – Shrub-dominated wetlands	7
Ts – Seasonal intermittent freshwater marshes/pools	5
L- Permanent inland deltas	4
M- Permanent rivers/streams/creeks	3
N- Seasonal intermittent/irregular rivers/streams/creeks	1
Tp - Permanent freshwater marshes/pools (below 8ha)	1
Total	97

There is also 3% of the total area in pasture land subject to flooding and native forest.

Total hectares: 10,448 ha

Figure 7: Ramsar wetland types in Wairarapa Moana



20. General Ecological Features

Wairarapa Moana has a series of habitats that can comfortably be divided into the western and northern shores, the eastern wetlands and lagoons, all freshwater habitats and the more saltwater influenced margins of Lake Onoke and Pounui Lagoon. There is a high diversity of wetland habitats ranging from open water of the lake; shallow water, including many backwaters dividing the flats; bare sand flats; marshland, including extensive areas of native turf and short rushes; open water of ponds and emergent swamp vegetation, especially *Typha orientalis* (raupo). The wetland forest is now dominated by willows and extensive areas of mingimingi (*Coprosma propinqua* var. *propinqua*) and cabbage trees (*Cordyline australis*) dot the open areas between willow forests and give an indication of the more natural plant cover of these wetlands.

The eastern shoreline of Lake Wairarapa has a series of wetlands which extend up to 3km inland of the shoreline. Within this freshwater wetland are many zones that are available to wetland birds and plants. Ponds and swampland that lies adjacent to the northern and eastern shore provides habitat for wetland birds and aquatic life. Willows, though exotic trees and serious weeds, can also provide breeding and roosting habitat for black, little black and little pied shags. The water milfoils (*Myriophyllum* spp.) are prominent members of the aquatic community in the larger lagoons.

The marshland and mudflats are alternately flooded and exposed. The lake edge supports a submerged "turf community of small native plants". These communities are also found on the edges of some of the ponds cut off from the main lake, such as within JK Donald Reserve, Boggy Pond and Matthew's Lagoon. Generally the vegetated flats of the lake have a mud substrate which changes to sandy substrate in the more permanently submerged zone of shore and the major part of the lake bottom; on large bare areas on the eastern shore are sand flats; all ponds have a mud-substrate. Numerous invertebrates, including worms and aquatic snails, inhabit the flats. Bird species also loaf, moult and feed in these areas.

The main wetland plant communities represented at Wairarapa Moana are:

a) Marshland: more permanent mudflats are vegetated predominantly by short rushes, oioi (*Apodasmia similis*), being the most prominent. This vegetation covers some large areas. Scattered among the oioi clumps are sedges such as *Schoenoplectus pungens* and, rarely, *Carex buchananii*. Some areas have scattered tall rushes such as *Juncus edgariae* and *Juncus sarophorus*.

b) Native turf flats: A group of some 55 species of highly specialised tiny native plants occurs on a gently sloping lake shore that is regularly inundated and exposed. Representative species include *Crassula sinclairii*, *Glossostigma* spp., *Limosella lineata*, and *Lilaeopsis novae-zelandiae*.

c) Swampland: The main area with tall swamp vegetation is adjacent to the western shore in the vicinity of Allsop's Bay. Shrubs such as *Leptospermum scoparium* and sedges such as *Baumea rubiginosa* and *Carex secta* along with cabbage trees dominate the vegetation. This vegetation type grades into

lowland forest as soon as the substrate is freed from the extremes of seasonal flooding or seepage. In contrast on the eastern side of the lake, the swamps were dominated by rushes, sedges, raupo, and flax, though the latter is now a rare member of the association.

d) Toward the outer edges of the wetlands are plant associations, which include grassland, scrubland and some forest. The mistletoes *Ileostylus micranthus* and *Korthalsella clavata* are to be found in the extensive areas of *Coprosma propinqua* remaining at Boggy Pond and in the JK Donald Reserve.

There are also scattered stands of *Dacrycarpus dacrydioides*, *Cordyline australis*, and isolated incidences of species that prefer drier conditions, such as *Podocarpus totara*, *Plagianthus regius* subsp. *regius*, *Sophora microphylla* and *Hoheria sexstylosa* suggests that more extensive areas of these once existed (Ogle et al., 1990).

Lake Shore Scenic Reserve on the western shore represents forest once typical of the area between the Rimutaka Range and Lake Wairarapa. The forest vegetation includes *Nothofagus solandri* var. *solandri*, *Alectryon excelsus* ssp. *excelsus*, *Corynocarpus laevigatus*, none of which are tolerant of inundation, so rely on small rises in elevation to give them the dry ground that they require. On the northern shores of the lake a narrow ecotone supports *Carex buchananii* and its much rarer relative *C. cirrhosa* on a shallow terrace that is only a few centimetres above the lake level and regularly inundated.

Lake Onoke has extensive areas of divaricating shrub communities with saltmarsh ribbonwood (*Plagianthus divaricatus*) and oioi (*Apodasmia similis*) dominant. The Onoke Spit duneland (see Figure 8) has pingao (*Ficinia spiralis*), *Spinifex sericeus* and mat plant communities of *Rauolia* and *Pimelea* along with one of the national strongholds of sand tussock (*Poa billardieri*). Pounui Lagoon is an area of high botanical value, though the construction of the stopbank that now encloses this remnant of saltmarsh adjacent to Lake Onoke is slowly changing its character from a salt to a freshwater system.

21. Noteworthy Flora

Much of the flora of Wairarapa Moana has been desribed in previous sections. This area has a rich indigenous flora particularly of native turf species and numbers of threatened or biogeographically interesting plants among the 189 indigenous vascular species recorded (Ogle et al., 1990). A number of regionally threatened taxa also find their home in these wetlands (as well as the nationally threatened species), as would be expected from an ecosystem type that has been so severely reduced in area.

Introduced plant species now play an increasing role in the ecology of the Wairarapa Moana wetlands. Dominant trees at Lake Wairarapa are crack willow (*Salix fragilis*) and alder (*Alnus glutinosa*). Between them these trees have the ability to alter both the composition and functioning of large areas of the wetland system and are the subjects of an extensive control programme.

Figure 8: Onoke Spit

Tall fescue (*Schedonorus arundinaceus*) is an invasive exotic grass that has colonised the open eastern lake shore and has also had a major role in invading and reducing the swampy sedgelands adjacent. It shares a habitat preference with alder and, working in tandem, these two species have the ability to change the eastern lakeshore from turfland and swamp, to wet grassland and forest. Mercer grass (*Paspalum distichum*) thrives in seasonally saturated locations, such as the ephemeral wetlands as does *Bidens frondosa* (beggars' ticks). Both these species can form dense monocultures, suppressing and shading much of the native vegetation, especially those species of small stature. Control of these ecologically damaging adventive species is a major part of the future management of the wetlands at Wairarapa Moana.

22. Noteworthy Fauna

Migratory Birds:

The following Northern-hemisphere migrants not previously mentioned, have been recorded along the eastern shoreline of Lake Wairarapa during the austral summer:

- Curlew sandpiper (*Calidris ferruginea*)
- Lesser knot (*Calidris canutus canutus*)
- Greenshank (*Tringa nebularia*)
- Asiatic whimbrel (*Numenius phaeopus variegatus*)
- Little whimbrel (*Numenius minutus*)
- Black tailed godwit (*Limosa limosa*)
- Turnstone (*Arenaria interpres interpres*)
- Red-necked stint (*Calidris ruficollis*)
- Lesser yellowlegs (*Tringa flavipes*)
- Japanese snipe (*Gallinago hardwickii*)
- Great knot (*Calidris tenuirostris*)
- Hudsonian Godwit (*Limosa haemastica*)
- Marsh sandpiper (*Tringa stagnatilis*)

There are also threatened New Zealand-breeding migrants that over-winter at the Wairarapa Moana wetlands:

- White heron (*Egretta alba modesta*) Nationally critical
- Royal spoonbill (*Platalea regia*) Naturally uncommon

There are also a large number of game birds, such as black swan, mallard duck and paradise shelduck present, making the site the most popular duck shooting area in the Wellington region.

Exotic Fish:

Perch, (*Perca fluviatilis*), brown trout, (*Salmo trutta*) and tench (*Tinca tinca*) were introduced to Wairarapa Moana as sport fish. They are managed as a sporting resource by Fish and Game New Zealand. Rudd (*Scardinius erythropthalmus*), were illegally released and are regarded as pest fish. Goldfish and grass carp are also present (McEwan, 2010a).

23. Social and Cultural Values

Indigenous people of Wairarapa Moana

New Zealand's indigenous people originally migrated from Polynesia in many waves. Kupe, according to Wairarapa traditions was the original discoverer of New Zealand, living in the proximity of the wetland now known as Wairarapa Moana. The next wave of native people was the extended family of the first explorers. One leader from this group, Haunuiananaia named the wetland

Wairarapa or Glistening Water. The tribe or iwi living in this area after this was Rangitaane and before European discovery another related tribe negotiated occupation around the lakes and they are known as Ngati Kahungunu. These tribes are today considered the indigenous people of Wairarapa Moana.

These wetlands reflect the development of the native peoples from their arrival until European discovery and as such are of vital importance to them. The change of climatic conditions for the Polynesian migrants was an obvious learning opportunity and Wairarapa Moana was a focus area. Necessity meant that understanding the cycles of the flora and fauna in a temperate climate, the wetland became a test tube for controlled tuna (*eel*) harvesting. The skill of preserving tuna meant that surplus for seasons of little marked the progression from subsistence to trading, matched in thinking that moved from survival to tertiary thinking (Rawiri Smith, pers comm.).

Social and Cultural Values

The area has strong associations with European settlement history from 1844 on with the first sheep stations in the Wairarapa; the beginning of flood control measures; the relationships between early settlers and Maori and the effects of the 1855 earthquake (the ensuing raising of ground levels) were all particularly significant. Land use now in the area beyond the lakes and wetland complex is predominantly pastoral.

There are many recreational uses of the lake. These include water fowl hunting, motor boating (Ruamahanga cut-off), yachting, wind-surfing, kayaking, camping, picnicking, swimming, walking, studying nature and fishing.

Wairarapa Moana is identified in the Wellington Conservation Management Strategy as a special wildlife habitat along with Kapiti Island and Mana Island, and as a key recreation and tourist attraction. Lake Domain at the northern end of Lake Wairarapa is a focal recreation area (Airey et al., 2000).

24. Land Tenure / Ownership

Wairarapa Moana refers to land administered by the Department of Conservation, Greater Wellington Regional Council, South Wairarapa District Council, Wellington Fish and Game Council (see Figure 8). Note that private land is not included in the Ramsar application.

a) <u>Land administered by the Department of Conservation (DoC)</u>
The majority of Wairarapa Moana (the Lake Wairarapa Wetlands) administered by the Department under the Conservation Act 1987 and the reserves Act 1977

b) <u>Lands Administered by South Wairarapa District Council (SWDC)</u>
The Lake Domain Recreation Reserve is at the north end of Lake Wairarapa. It was classified as a recreation reserve under the Reserves

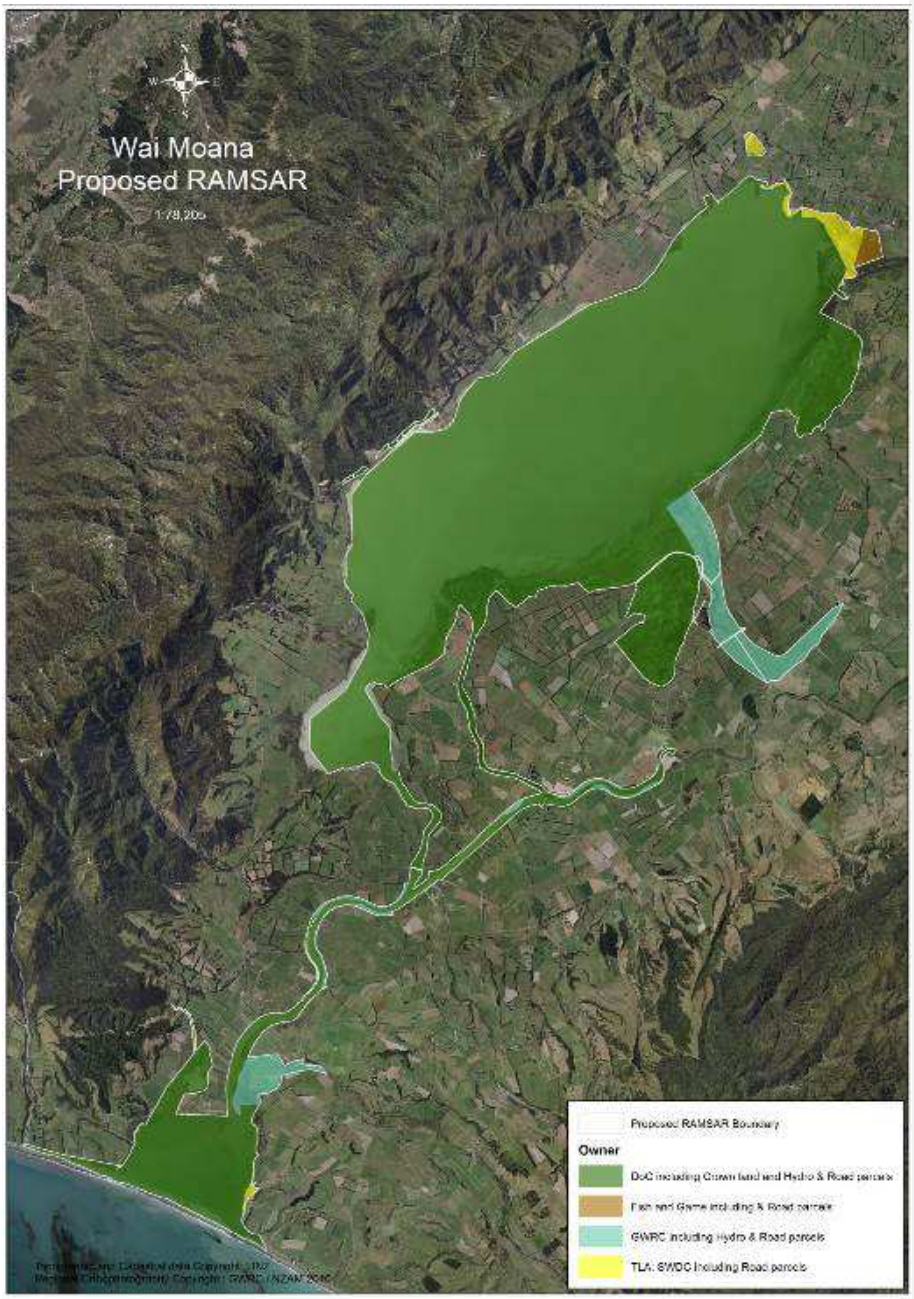
Act in 1979. SWDC has responsibility for preparing a management plan.

c) Lands Administered by the Greater Wellington Regional Council (GWRC)
The GWRC owns the area known as Oporua Floodway and administers the reserve at the junction of the Turanganui and Ruamahanga rivers.

d) Lands Administered by the Wellington Fish and Game Council (WFGC)
The WFGC owns the land at the northern end of Lake Wairarapa adjacent to the Lake Domain Recreation Reserve. It is known as Simmonds Lagoon.

Figure 8: Land tenure in Wairarapa Moana

Comment [j1]: Hi guys, the other map is out of date and this map from the front has all the tenure info



25. Current Land (including water) Use:

Human Activities

In the lower Wairarapa Valley flood plain catchment immediate to the Wairarapa Moana the main occupation of people is farming, with beef, sheep and dairying being the main forms of agriculture. There are grazing leases

issued by the Department of Conservation on the eastern shore of Lake Wairarapa primarily as a means of weed control. Greater Wellington Regional Council may issue resource consents for irrigation use of water from Lake Wairarapa.

Lake Wairarapa, Lake Onoke, Onoke Spit and the rivers associated with them are part of the Lower Wairarapa Valley Development Scheme, which was described in Section 16.5.

26. Factors (past, present or potential) Adversely Affecting the Site's Ecological Character, Including Changes in Land (including water) Use and Development Projects:

a) Nutrient Enrichment:

- Through direct discharge into waterways (point source discharges) –

Direct discharges require resource consents, e.g., the Featherston sewage system, where effluent enters Abbotts Creek prior to flowing into Lake Wairarapa after primary and secondary treatment. All the other Wairarapa towns discharge into the Ruamahanga River and their discharges are similarly treated. The eventual destination of these discharges is Lake Onoke, but during floods water from the Ruamahanga River enters Lake Wairarapa through the Oporua Floodway.

- Through non-direct discharges from general runoff from the land (non-point source discharges)

Dairy shed effluent is pre-treated in ponds and then sprayed onto the land and can eventually enter the water through runoff. Non-direct discharges from streams and drains entering the eastern part of the lake and wetlands; these traverse farmland and so have a higher nutrient load from waste from stock, sediment from earthworks and spray residue. On the western side there is a much smaller area of flat land under pasture, so a proportionatey lesser amount of runoff enters the system from this side.

b) Pest Plants:
More than 100 adventive plant species are present in the Wairarapa Moana *(*Ogle et al.,1990).

Of these, several are considered to be pests, and pose a threat to the ecological values at the Lake Wairarapa wetlands.

Those identified as being of the greatest concern are:

- *Festuca arundinacea*; Tall fescue – an invasive exotic grass which colonises the open eastern lake shore. A severe tall fescue infestation can completely displace the native turf beds (see Figure 9).

- *Paspalum distichum*; Mercer grass is a species that thrives in very wet conditions. It invades ephemeral wetlands and displaces smaller native species.
- *Salix* spp; All willow species at Wairarapa Moana are considered pests. Willow trees, mainly crack willow, *Salix fragilis*, now dominate the margins of many lagoons.
- *Alnus glutinosa*; Alder has the ability to colonise very wet sites and has changed the character of some lake edge habitats from swampy sedgeland to woodland and forest. Alder control is one of the priority actions at Wairarapa Moana.
- *Bidens frondosa*; Beggars' tick is an annual species that has recently become a serious threat to ephemeral wetlands.
- A number of aquatic species have colonised the waterways, including;
    - *Ceratophyllum demersum*. Hornwort is present in along the eastern shore line and most of the drains and waterways that feed Lake Wairarapa. Control is possible only in isolated lagoons such as Boggy Pond, where reinfestation poses a lesser threat.
    - *Lagarosiphon major* (Lagarosiphon) and *Elodea canadensis* (Canadian pondweed) are present as occasional infestations.

c) Pest Animals:

There have been programmes to control possums and ferrets as part of a project to eradicate bovine tuberculosis, but with the elimination of Tb infected herds, little has been done in recent years to control these species. Possums, at least, are thought to be in low numbers.

Recently DoC completed a survey of Onoke Spit as part of their protection of the Caspian tern colony. Feral cats were detected and caught. No presence of mustelids was recorded.

Canada geese were introduced by Wellington Fish and Game Council as a game bird. Farmers consider Canada geese to be an agricultural pest as they foul and graze farmland. Though the potential for Canada geese to become an environmental pest is, as yet, unknown, a policy for the control of Canada geese has been developed in association with the farmers.

Perch (see Figure 10) are considered to be having a major impact on the native fish populations (McEwen, 2010b), while rudd and tench are also pest fish.

Figure 9: Tall fescue invading mudflats

Figure 10: Exotic perch with native bullies removed from stomach

d) Other threats:

Non sustainable recreational activites have the potential to impact on the ecological values of Wairarapa Moana. Unlimited access for 4 wheel drive vehicles and trail bikes has the potential to be destructive. At the present time these activites are limited to the northern side of the Tauherenikau river delta.

Previously unlimited camping in the same area had created issues with fire. A change in access arrangements, ie. the removal of a vehicle bridge has reduced the camping options in this area. It is hoped by enhancing the opportunities for camping in the Lake Domain, currently underway, that the fire risk will be reduced. The widespread area of tall fescue is also a fire risk. Methodologies for the control of tall fescue are being investigated.

Longer term the threat of sea level rise due to climate change will have an impact on this low lying wetland complex.

27. Conservation Measures Taken

The wetlands were formally protected under the Reserves Act in 1975, and the National Water Conservation Order was put in place in 1991. The Department of Conservation prepared the Lake Wairarapa Wetlands Action Plan in 2000.

A Wairarapa Moana Wetlands Project was created in 2007 and formalised at the Kohunui Marae in June 2010. This group involves two local iwi - Ngati Kahungunu ki Wairarapa, Rangitane o Wairarapa, two local hapu, the Department of Conservation, South Wairarapa District Council and the Greater Wellington Regional Council in the joint management of all the public land within the designated area. A governance and management structure is in place mandated to operate to the following long term vision "Restoring our wetland treasure - Whakaora te repo, ka ora te toanga Wai".

The Governance Group also developed the following;

- Mission statement- We will work with the community to enhance the spiritual identity and ecology of Wairarapa Moana, and improve recreational and economic opportunities for the benefit of everyone.
- Goals-
    1. Wairarapa Moana is highly valued as a place of cultural and historical significance that inspires our future.
    2. Healthy water in Wairarapa Moana nurtures all native plants, animals and their ecosystems.

Wairarapa Moana underpins environmental, customary, recreational and commercial values that benefit the wider community.

The Governance Group (Figure 11) is committed to working with the adjacent farmers and the users of the moana. To recognise this it has formalised the Wairarapa Moana Coordinating Committee (Figure 12) which includes landowners, representatives from
the Lower Wairarapa Valley Development Scheme, Fish and Game, Forest and Bird, Ducks Unlimited, Wellington Conservation Board, local hapu, South Wairarapa District Council, plus staff from the above partners. This committee has a wide ranging terms of reference to provide advice to the Governance Group.

Figure 11: Members of the Wairarapa Moana Wetlands Governance Group.

Figure 12: Members of the Wairarapa Moana Co-ordinating Committee meeting on site.

A management team comprising staff from the partners supports the Governance Group. Each year funds from DoC and GWRC are combined to undertake the annual work programme approved by the Governance Group. This has included tasks within the following areas; recreation, marketing, relationships and biodiversity investigations and enhancement. A heritage report for the Wairarapa Moana area was completed in 2009 as this was a priority for iwi (Stirling and Barnett, 2009).

To date the Lake Wairarapa Wetlands Action Plan, developed by the Department of Conservation has been used as the base plan for guiding actions at the lake and its surrounding wetlands. There were moves to update that plan a couple of years ago, but iwi were clear (at that time) that they did not want another plan written until the Treaty settlement was completed.

The planning mechanisms used to prioritise actions taken at Wairarapa Moana in recent years include:

– A Wildland Consultants restoration report developed in 2007 for the eastern side of the lake (Wildland Consultants, 2007a), DoC had identified that area as being under the greatest ecological threat.

– The outcome of quarterly meetings of the Wairarapa Moana Environmental Portfolio Group which was formed to focus on ecological priorities on behalf of the collaborative in 2009.

As a result there had been a great deal of progress on ecological issues at the lake. Actions include large-scale pest plant control (primarily alder and willow spraying), volunteer and landowner plantings, hydrological isolation of Boggy Pond, pest animal control and threatened plant fencing at Onoke Spit. Research has been completed on fish, kakahi, birds and vegetation. The Wildland Consultants report was developed after mapping the vegetation complex on the eastern side of Lake Wairarapa, (Wildland Consultants, 2007b).

Wairarapa Moana is such a complex system we have had to learn as we go, so research has played an important role in guiding our actions. An analysis of the changes in the eastern shoreline vegetation since the start of the drainage scheme in 1985 was completed in 2007 (Wildland Consultants, 2007c). This study assessed the changes over time of eight monitoring transects and provided some useful information about the impacts of the drainage scheme on the vegetation (i.e. that the turf grasses were maintaining their habitat, but there were changes occurring in the reed-lands further away from the lake. These areas are being invaded by woody weeds and exotic grasses.

Other work program actions include;

- Improving recreational facilities and access, and
- Management of care groups and undertaking restoration plantings both on public and private land

The Lake Wairarapa bed and adjacent public conservation land is administered and managed by DoC, with the "Lake Wairarapa Wetlands Action Plan 2000-2010" as its core document.

The GWRC has a variety of responsibilities and functions at Wairarapa Moana. GWRC has a Wetland Action Plan which aims for healthy, functioning wetlands and an active restoration programme. GWRC is also a regulatory authority with responsibility for the Resource Management Act and consents issued under this Act. At present resource consents are being heard for discharge of treated effluent from Masterton, Carterton, Greytown, Featherston and Martinborough. The effect of these discharges on Wairarapa Moana is at the heart of mitigating their effects.

The council also manages the Lower Wairarapa Valley Development Scheme, including the operation of the barrage gates and opening of the Onoke Spit. GWRC manages highly erosion prone land to minimize its impact on the downstream waterways and is making steps toward large scale catchment management plans for the waterways that feed Wairarapa Moana.

Iwi currently do not manage specific functions or areas, but this situation is expected to change markedly when a treaty settlement is reached. Ngati Kahungunu ki Wairarapa recently funded an extensive exhibition on Wairarapa Moana at the local museum. This highlighted the issues associated with Wairarapa Moana and the ongoing challenges in its management.

Wairarapa Territorial Local Authorities have a role under the recently adopted combined district plan in its section 2.2.2. Wairarapa's Coastal and Freshwater Environments states "Waterbodies are important natural features in the Wairarapa, valued for their ecology, recreational opportunities, amenity,and cultural and historic associations". Lake Wairarapa and any waterbody in the Lake Wairarapa Wetlands, the Ruamahanga River and Lake Onoke are categorised as "significant water bodies".

The combined Wairarapa District Plan is to be implemented for freshwater environments in the following areas –indigenous biodiversity, historic heritage, landscape, natural hazards, subdivision, land development and urban growth, coastal environment and freshwater environment. In addition to this, SWDC has a direct involvement in managing Lake Domain, on the northern shore of Lake Wairarapa. Management of this area has a large conservation component and a landscape plan has been prepared for public assessment.

28. Conservation measures proposed but not yet implemented:

In the past year the Wairarapa Moana Wetland project has prepared bids for additional funds. One such bid was for funds from the Fresh Start for Freshwater Clean-up Fund administered by the Ministry for the Environment**.** This bid was successful so additional funds totalling one million dollars over three years will be spent in the Wairarapa Moana environment.

These funds will be directed at improving the water quality being delivered to the edge wetlands surrounding Wairarapa Moana ie. assessments will be undertaken on farms with the view to constructing wetlands or modifying drains to reduce the nutrient contribution and to improve biodiversity. Key edge wetlands will also be restored. Five wetlands have met the criteria for

restoration: Boggy Pond, Matthew's Lagoon, Wairio, JK Donald Reserve and Barton's Lagoon. The partners are currently developing restoration proposals for these wetlands. It is expected that an important outcome from this project will be the recognition of the importance of fully functioning wetlands to complement the intensively farmed land found on the lakeshore. Note that the partners for this project include Ducks Unlimited, Dairy NZ, DoC and GWRC.

A successful bid to the Enhanced Access Fund will result in the construction of a bridge which will for the first time allow easy public access to the eastern lakeshore of Lake Wairarapa. The Governance Group believe strongly that improved access to the eastern lakeshore will lift the public profile of Wairarapa Moana.

As outlined above the management of the Wairarapa Moana Wetlands is a joint agency arrangement. The project coordinator's role is to ensure that there is relevant input from the partners to the varying workstreams within the project. The partners work to deliver their specific legislative requirements within the annual work programme eg. recreational projects are typically lead by DoC while pest control assessments and delivery can be delivered either by DOC, GWRC and occasionally Fish and Game. Both DoC and GWRC manage their lands to the agreed grazing policy. Monitoring activities are collaborative, but in recent times, GWRC has focussed on fish, while DoC have completed work on vegetation, with both working on birds. Local Iwi are focussing on cultural health monitoring, while GWRC are involved in water quality assessments.

Groups such as Fish and Game manage their specific activities within the public land estate. Ducks Unlimited NZ Inc have an arrangement with DoC to restore a specific area of the lakeshore over a 20 year time period. The different agencies assist Ducks Unlimited on an "as required" basis.

A working party, using members of the Coordinating Committee, has been established to consider the problem of aquatic weeds management and their management within the lake edge environs.

Some possible activities are listed in the table below. Note while a lead agency is identified this project is a partnership which will involve all the partners plus the members of the Coordinating Committee

Possible Activities	**Lead agency**
Ramsar Management Plan	GWRC Biodiversity Dept/DoC
Ramsar Monitoring and Reporting	GWRC Environmental Science Dept/DoC
Development of a water balance model	GWRC Environment Science Dept
Research of Hydrological Replenishment	GWRC Environment Science/Flood Protection Depts.
Aquatic Weeds Management	GWRC Biosecurity Dept.
Recreational Node Development	DoC
Restoration of Wetlands	DoC/GWRC/Ducks Unlimited/Fish and Game
Research on tall fescue management	DoC/GWRC Environmental Science Dept

Possible Activities	Lead agency
Research on lake edge accretion	GWRC Environmental Science Dept
Cultural health monitoring	Local Iwi/GWRC/DoC
Native bird/fish assessments	DoC/GWRC
Ongoing research on water quality situation	GWRC Environmental Science/Land Management Depts
Development of regulations for the new regional plan	Coordinating Committee plus all partners.

29. Current Scientific Research and Facilities

Staff from all administering bodies and iwi are working together to undertake range of projects. Research that has been completed in recent years has provided information about future actions required.

Current research includes:

- control of pest plant species, especially alder and willow using techniques pioneered by a local dairy farmer
- regeneration pathways of native species following willow removal
- a survey of kakahi(freshwater mussels)
- research of otoliths of native fish species to ascertain if Wairarapa Moana performs the function of an inland sea
- ongoing bird surveys to update our knowledge of distribution, abundance and habitat use by waterfowl and wetland birds
- nest success monitoring of the Lake Onoke Caspian tern colony
- wading bird surveys along the eastern shoreline of Lake Wairarapa to examine the relationship between water level management at Lake Wairarapa and the diversity and abundance of shorebirds present.
- research on the restoration of Jury's Island
- developing practical and effective planting strategies on the Wairio Block where Ducks Unlimited are working with Victoria University
- ongoing monitoring of the native turf species on a series of cross sections
- spray trial to halt lake edge accretion
- sedimentation at Lake Wairarapa. A Victoria University student has completed a Master's thesis on this subject
- an updated bathymetry survey of Lake Wairarapa and Lake Onoke. The Lake Wairarapa survey confirmed the presence of springs in a number of locations within the lake
- assessment of the condition of Lake Onoke
- ongoing water quality and water level monitoring within the Wairarapa Moana complex.
- Impacts of pest fish on native fish abundance.

30. Current Communications, Education and Public Awareness (CEPA) Activities to or Benefiting the Site

The Wairarapa Moana Wetlands project has developed a relationship with the public and neighbouring landowners by creating a coordinating committee of

all the parties interested in Wairarapa Moana including formal representation of farmers. Information is shared with this group and they provide advice as required. Newsletters, meetings and public planting days are used to keep this diverse community involved and up to date.

Ngati Kahungunu ki Wairarapa, as outlined above, sponsored a comprehensive exhibition on Wairarapa Moana that attracted close to 50,000 visitors. As part of the exhibition the partners and specialists gave presentations in a well attended series of lectures. Community plantings occur annually throughout the project area to support restoration and landscape development projects at Onoke Spit, Ruamahanga River cutoff, Wairio and Lake Domain.

31. Current Recreation and Tourism

Fishing is a popular pastime within Lake Onoke and the lower part of Ruamahanga River. During the whitebaiting season many people travel long distances to their favourite spots. Floundering is also undertaken, though this fish is now less plentiful than in the past and consequently use of Wairarapa Moana has decreased.

Birdwatching has been another traditional activity and to support this a hide has been developed at Boggy Pond for the general public to use. Regular local ornithologists also have their favoured spots, though not as well developed, or advertised.

Duckshooting is the major seasonal activity, with Wairarapa Moana reputed to have the largest site for duck shooting in the lower North Island.

Waterskiing and boating are less common, largely as a result of the fickle and often hostile weather patterns. The Ruamahanga cutoff, being more sheltered, is a favoured waterskiing course.

On the Western Lake Road upgrades are occurring within the series of DoC reserves to encourage campervan visits and to augment a planned cycleway to the coast. An offshoot of this cycleway may incorporate a section at Lake Domain.

At Lake Domain facilities such as toilets, changes to the grazing policy and community plantings are enhancing this area and a development plan has been prepared for the local community to comment on future development of this part of Wairarapa Moana.

Improvements to the recreational opportunities over the whole Wairarapa Moana are ongoing.

32. Jurisdiction

Each partner administers its statutory obligations independently.

33. Management Authority

The bulk of Wairarapa Moana is administered by the DoC and is known as the Lake Wairarapa Wetland Conservation Area held as a Stewardship Area under s. 25, Conservation act 1987.

Wairarapa Lakeshore Scenic Reserve is a Scenic Reserve held under s. 29 (1) (a), Reserves Act, 1977.

Allsop's Bay Wildlife Reserve, Ruamahanga Cutoff Wildlife Reserve and the Boggy Pond Matthew's Wildlife Reserve are Government Purpose Reserves held under s.22, reserves Act 1977.

The Owahanga Landing Reserve is a Local Purpose Reserve held under s. 23, Reserves Act 1977.

Lake Domain is a Recreation Reserve held under s. 17, Reserves Act 1977. Management of this reserve is vested in the South Wairarapa District Council.

The Resource Management Act is the key piece of legislation in giving effect to the Water Conservation Order. GWRC administers this through its responsibilities for water management.

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