

New Zealand

Whangamarino Wetland

Offline RIS Word form

[Copy of online form submitted through RSIS portal on 2 February 2022.]

All fields marked with an asterisk (\*) are required.

 For more information on how to use this form, please refer to the document
 [How to use the offline RIS Word form.](http://www.ramsar.org/document/how-to-use-the-offline-ris-word-form)

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Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a ‘full’ Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

Summary

1.1 Summary description

Please provide a short descriptive text summarising the key characteristics and internationally important aspects of the site. You may prefer to complete the four following sections before returning to draft this summary.

Summary (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  | Whangamarino Wetland is located in the Waikato Region of New Zealand, 62 km south of Auckland City. At over 6700 ha, it is the second largest raised bog and swamp complex in the North Island of New Zealand. The Ramsar Site occupies over 85% of the wetland.  The wetland is largely contiguous and occupies three large, shallow basins drained by the Maramarua and Whangamarino Rivers and the Reao Stream, separated by farmed ridges. It is bounded to the east by the Maungaroa fault and to the west by a range of low hills. Clays eroded from the Upper Jurassic Hapuakohe Range to the east form the base of the wetland. The area is fed by a catchment area of some 48,900 ha.  The complex comprises intact sequences of open water and river systems to low-lying swamp/marsh transitions through fens to elevated domed bogs. The bog areas are of high natural character and dominated by indigenous species. The mineralised wetland is dominated by non-native plant species, but is still ecologically significant, particularly as habitat for threatened species such as the matuku/Australasian bittern (Botaurus poiciloptilus).  The wetland supports an estimated 143 native vascular plant species and is a national stronghold for three threatened plants, Corybas carsei, Schoenus carsei and Myriophyllum robustum, and two native animals, the endemic black mudfish Neochanna diversus, and matuku/Australasian bittern. Twenty five nationally threatened or at risk species (ten plants, four fish, and ten birds) have been recently recorded here. Whangamarino is rich in moss species and in 1981 thirteen species were added to the NZ flora from this area, including three that had previously only been known from the Northern Hemisphere.  At least 35 indigenous bird species use Whangamarino Wetland regularly. The large size of the wetland, and its extensive areas of swamp and ecotone environments, ensures that it can provide habitat for very large numbers of wetland bird species and a diverse range of species. Bird guilds include open water divers, deep-water waders, shallow water waders, dabbling waterfowl, aerial hunting gulls and terns, swamp birds and riparian wetland birds. Some tens of thousands of waterfowl use the wetland from late autumn to spring depending on water levels.  |

Data & location

2.1 Formal data

2.1.1 Name and address of the compiler of this RIS

Responsible compiler

Name

|  |  |
| --- | --- |
|  | Karen Denyer |

Institution/agency

|  |  |
| --- | --- |
|  | Consultant |

Postal address (This field is limited to 254 characters)

|  |  |
| --- | --- |
|  | 27 Grey St, Cambridge 3434, New Zealand |

E-mail (The online RIS only accepts valid e-mail addresses, e.g. example@mail.com )

|  |  |
| --- | --- |
|  | karen.denyer@wetlandtrust.org.nz |

Phone (The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )

|  |  |
| --- | --- |
|  | +64210312716 |

Fax (The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )

|  |  |
| --- | --- |
|  |  |

National Ramsar Administrative Authority

Name

|  |  |
| --- | --- |
|  | Kaitlin Morrison |

Institution/agency

|  |  |
| --- | --- |
|  | Department of Conservation |

Postal address (This field is limited to 254 characters)

|  |  |
| --- | --- |
|  | PO Box 20025, Te Rapa, Hamilton 3241, New Zealand |

E-mail (The online RIS only accepts valid e-mail addresses, e.g. example@mail.com )

|  |  |
| --- | --- |
|  | kmorrison@doc.govt.nz |

Phone (The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )

|  |  |
| --- | --- |
|  | +64 7 858 1000 |

Fax (The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )

|  |  |
| --- | --- |
|  | +64 7 858 1001 |

2.1.2 Period of collection of data and information used to compile the RIS

From year (The online RIS only accepts numeric values)

|  |  |
| --- | --- |
|  | 1989 |

 Period when the data and information for the sheet for a newly designated site was compiledFor updated RIS: Period when the data and informationfor revision of an existing sheet was updated

To year (The online RIS only accepts numeric values)

|  |  |
| --- | --- |
|  | 2017 |

2.1.3 Name of the Ramsar Site

Official name (in English, French or Spanish)\* (This field is mandatory)

|  |  |
| --- | --- |
|  | Whangamarino Wetland |

Unofficial name (optional)

|  |  |
| --- | --- |
|  |  |

2.1.4 Changes to the boundaries and area of the Site since its designation or earlier update

A. Changes to Site boundary (Update)

 [x] Yes / [ ] No

.

 [x] The boundary has been delineated more accurately

 [ ] The boundary has been extended

 [ ] The boundary has been restricted

B. Changes to Site area (Update)

|  |  |
| --- | --- |
|  | the area has decreased[[1]](#footnote-1) |

 [x] The Site area has been calculated more accurately

 [x] The Site has been delineated more accurately

 [ ] The Site area has increased because of a boundary extension

 [ ] The Site area has decreased because of a boundary restriction

Important note: If the boundary of the designated site is being restricted/reduced, before submitting this updated RIS to the Secretariat the Contracting Party should have followed: - the requirements in Article 2.5 of the Convention; or - the procedures established by the Conference of the Parties in the annex to Resolution VIII.20 (2002); or - where appropriate instead, the procedures in the annex to Resolution IX.6 (2005). Contracting Parties should also have provided to the Secretariat a report on changes prior to the submission of an updated RIS.

 [ ] For secretariat only: This update is an extension

2.1.5 Changes to the ecological character of the Site

6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS? (Update)

|  |  |
| --- | --- |
|  | Yes -actual-[[2]](#footnote-2) |

Are the changes (Update)

 [ ] Positive / [ ] Negative / [x] Positive & Negative

.

.

What extent of the Ramsar site is affected (%)

Positive % (Update)

|  |  |
| --- | --- |
|  |  |

Negative % (Update)

|  |  |
| --- | --- |
|  |  |

Optional text box to provide further information (Update)

|  |  |
| --- | --- |
|  | The site is large and complex and has experienced many changes at a range of scales. Therefore it is not possible to estimate a single % figure for the extent of the wetland subject to change. |

 [x] No information available

Are changes the result of (tick each category which applies):

 [x] Changes resulting from causes operating within the existing boundaries?

 [x] Changes resulting from causes operating beyond the site’s boundaries?

 [ ] Changes consequent upon site boundary reduction alone (e.g., the exclusion of some wetland types formerly included within the site)?

 [ ] Changes consequent upon site boundary increase alone (e.g., the inclusion of different wetland types in the site)?

Please describe any changes to the ecological character of the Ramsar Site, including in the application of the Criteria, since the previous RIS for the site. (Update)

|  |  |
| --- | --- |
|  | Positive [actual and likely]  • Re-instatement of minimum summer water levels following maintenance works on a damaged rock rubble weir in 2010. The weir was constructed in 1994 to reverse the drop of 1 m in minimum water levels following river-training and sand abstraction. The weir maintenance works appear to be having a positive effect with evidence of recent reversion of induced tall Leptospermum scoparium (manuka) scrub to bog communities. Vegetation mapping has shown a net 71 ha change from manuka to sedges and rushes between 2008 and 2014, reversing an earlier trend of >300 ha net loss of sedges and rushes to manuka 2002 and 2008.  • A decrease in stock incursion rates and impacts following an additional 30 kilometre of boundary fencing.  • Natural regeneration or restoration of 80 hectares of native vegetation on land following retirement of historic grazing leases to local farmers.  • Decrease in the extent and distribution of invasive crack willow (Salix fragilis).  • A net 40 hectare increase in the extent of native sedgeland communities, and 140 ha increase of manuka scrub as a result of invasive grey willow control.  • Sustained control of some mammalian pest species in the northern part of the site (mustelids, rats, cats, deer, pigs, hedgehogs) and a decrease in the population of red deer and feral pigs. A predator-trapping network installed covering some 2000 ha to target mustelids and cats.  • Increase in the population of the rare orchid Corybas carsei following species management and habitat manipulation (small-scale vegetation clearance to promote growth)  • Improved protection for the threatened longfin eel through fisheries bylaws, comprising commercial harvest weight limits, seasonal bans in specific areas of the wetland during the tuna heke (eel migration), and a ban on taking female migrant longfin eels. These were enacted in 2014 by Waikato-Tainui, exercising their right to traditional management practices that prohibit or restrict fishing for sustainable utilisation or cultural reasons.   Negative [actual]  • Increase in distribution of some weed species, e.g. Osmunda regalis, Alternanthera philoxeroides, Iris pseudacorus, Salix cinerea, and Cuscuta campestris.  • Continued transport and deposition of elevated levels of sediment and nutrient within the wetland, estimated at about 192,500 tonnes recorded between 2005 and 2012. Sediment is accumulating in the mineralised wetland at rates higher than occurred under natural conditions. Sediment accumulation is also occurring in the Whangamarino River upstream of the Maramarua confluence and in front of the weir, and in the lower reaches of the Maramarua River. At least 30% of the annually deposited sediment within the mineralised swamp is transported from the Lake Waikare catchment (discharged via operation of a flood control gate). Increased sediment and associated nutrients (mainly N and P), and increased water fluctuations disrupt bog development, causing a shift towards plants better adapted to high-fertility and water level fluctuations.  • Between 2002 and 2014 the site experienced a >300 hectare loss of sedgeland and wirerush through a shift to indigenous Leptospermum scoparium (manuka) scrub.  • Australasian bittern numbers have fallen since 2011 and, although now stable, remain relatively low (Bittern call rate index is <5). Mammalian predators contribute greatly to the decline of wetland bird species, although a corresponding increase in bittern numbers at nearby Kopuatai wetland may indicate a re-distribution rather than regional decline. Loss of bittern nesting and feeding habitat due to fluctuating water levels is also a potential driver of bittern population decline.   Negative [likely]  • Impacts of exotic mammalian predators over parts of the wetland continue to threaten populations of native species  • Possible local extinction of grey duck (Anas superciliosa) through hybridisation with introduced mallards (Anas platyrhynchos) No pure grey ducks have been noted at this site in the last decade.  • The population of inanga (Galaxias maculatus) may have been reduced following installation of the weir, these fish are poor climbers and the weir may pose a barrier to them at times of low flow, restricting upstream migration. There is currently insufficient trend data available to confirm this.  • Possible local extinction of the orchid Gratiola concinna which was reported in 1989 but not relocated in a targeted re-survey in 2009. Changes in vegetation cover may have rendered the original site unsuitable for this light-demanding species.  Note: Waikato Regional Council has developed a catchment management plan for Lake Waikare and the Whangamarino wetland. A Catchment Leadership Partners Group was formed in 2017 to ensure involvement of all stakeholders including indigenous people, local farmers, recreational users and conservationists.  The Waikato River Clean-up Trust has funded six projects to a value of nearly NZ$1 M to contribute to restoration projects in the Whangamarino wetland and its major contributory waterbody, Lake Waikare.   |

Is the change in ecological character negative, human-induced AND a significant change (above the limit of acceptable change) (Update)

 [ ] Yes / [x] No

.

Has an Article 3.2 report been submitted to the Secretariat? (Update)

 [ ] Yes / [x] No

.

2.2 Site location

2.2.1 Defining the Site boundaries

The site boundaries must be clearly delineated on both: a) a GIS shapefile and b) a digital map/image:

-> To define the site boundaries please complete field 2.2.1 a1), 2.2.1 a2) and 2.2.1 b) via the online form.

-UPLOAD via online form-

Boundaries description (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  | The Ramsar Site encompasses the external boundary of all contiguous areas of public conservation estate (managed by the Department of Conservation), three blocks of land owned and managed by the Auckland/Waikato Fish and Game Association, and areas of river bed vested with Land Information New Zealand (a New Zealand government department) that combined comprise approximately 83% of the Whangamarino Wetland.  |

2.2.2 General location

a) In which large administrative region does the site lie?

|  |  |
| --- | --- |
|  | Waikato Region |

b) What is the nearest town or population centre?

|  |  |
| --- | --- |
|  | Te Kauwhata |

2.2.3 For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries?

 [ ] Yes / [x] No

.

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party?

 [ ] Yes / [x] No

.

c) Is the site part of a formal transboundary designation with another Contracting Party?

 [ ] Yes / [x] No

.

d) Transboundary Ramsar Site name:

|  |  |
| --- | --- |
|  |  |

Sites part of transboundary designation

2.2.4 Area of the Site

If you have not established an official area by other means, you can copy the area calculated from the GIS boundaries into the 'official area' box.

Official area, in hectares (ha): (The online RIS only accepts numeric values)

|  |  |
| --- | --- |
|  | 5857 |

Area, in hectares (ha) as calculated from GIS boundaries

|  |  |
| --- | --- |
|  | 5856.072 |

2.2.5 Biogeography

Please provide the biogeographic region(s) encompassing the site and the biogeographic regionalization scheme applied:

Biogeographic regions

|  |  |
| --- | --- |
| **Regionalisation scheme(s)**[[3]](#footnote-3) | **Biogeographic region**  |
| Freshwater Ecoregions of the World (FEOW) | New Zealand |
|  |  |

Other biogeographic regionalisation scheme (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

Why is the Site important?

3.1 Ramsar Criteria and their justification

Tick the box against each criterion applied to the designation of the Ramsar Site. All criteria which apply should be ticked. Please explain why you selected a criterion by filling in the relevant fields on this page, on the three other pages of this section 'Criteria & justification' and on the 'Wetland types' page of the section 'What is the site like?'.

 [x] Criterion 1: Representative, rare or unique natural or near-natural wetland types

 To justify this Criterion, please select at least one wetland type as representative, rare or unique in the section What is the site like? > Wetland types and provide further details in at least one of the three boxes below.

Hydrological services provided (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Whangamarino wetland is connected to the flood control scheme of the Lower Waikato River, protecting livelihoods, infrastructure and farmland. The Waikare-Whangamarino system provides important flood storage and attenuation and effectively reducing peak flood levels in the Waikato by 40-80cm.  However the use of the wetland for flood management (including the diversion of Lake Waikare water into the wetland) and water level controls has impacted ecological health and character through the diversion of excess sediment and nutrient input to the system. River training and sand abstraction from the bed of the Waikato River has also caused a drop in the minimum water table. This, along with input of increased nutrients associated with the diversion of flood waters, has promoted peat degradation, facilitated invasion of exotic species and reduced the quality of wetland habitat.  |

Other ecosystem services provided (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | The wetland is culturally significant to local Waikato/Tainui people for mahinga kai (traditional food) and tuna (eel) fishery. Local hapu (Nga Muka) identify the protection, quantification and restoration of the life force (mauri) of the wetland and its surrounds as a key concern.  Other ecosystem services include supporting biodiversity (providing habitat for over 20 nationally rare or threatened species), carbon sequestration, nutrient/sediment filtering, recreation, and supporting Manuka honey production.  Whangamarino is a popular duck hunting location, with 748 hectares of the wetland owned by the Auckland/Waikato Fish and Game Council renowned for its recreational fishing (of exotic species) and duck shooting. Whangamarino Wetland is used by most New Zealand gamebird species at some time of the year, because of its size and diverse habitats. Game species present include: introduced mallard, Canada goose, pheasant and California quail; and native species, grey duck-mallard hybrid; New Zealand shoveler, pukeko, black swan, and paradise shelduck.   |

Other reasons (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | The Whangamarino wetland is the second largest raised bog and swamp complex in the North Island of New Zealand. The complex comprises representative examples of bog, fen, marsh, swamp, open water and river systems. Habitat and indigenous species diversity within the wetland is driven primarily by nutrient status and hydrology.  The bog and fen wetland types are dominated by indigenous species. Nine of the nationally threatened plant species recorded in the wetland occur within these wetland types.  The wetland also supports a diverse bird fauna, typical of a representative lowland swamp-fen-bog wetland.  |

 [x] Criterion 2 : Rare species and threatened ecological communities

 To justify this Criterion, please give details below on:

 - relevant plant species in the section Criteria & justification> Plant species (3.2)

 - relevant animal species in the section Criteria & justification> Animal species (3.3)

 - relevant ecological communities in the section Criteria & justification> Ecological communities (3.4)

Optional text box to provide further information (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Of the threatened plant species found at Whangamarino Wetland, the most significant is Corybas carsei. The only remaining population in New Zealand of this tiny orchid is found within the Ramsar site. Approximately 200 known plants remain and are managed intensively by Department of Conservation. The wetland is also a national stronghold for Schoenus carsei and Pterostylis paludosa and therefore provides critical habitat for these species at all stages of their life cycle.  The wetland provides significant habitat for at least 10 threatened or at-risk bird and fish species including North Island fernbird, spotless crake and marsh crake. Whangamarino is considered to be a national stronghold for the nationally critical Australasian bittern (matuku, Botaurus poiciloptilus). A further three threatened or at-risk species - brown teal (Anas chlorotis), banded rail (Gallirallus philipensis assimillis) and banded dotterel (Charadrius bicinctus) have not been confirmed in recent years.  The site is a stronghold for black mudfish (Neochanna diversus), representing about 30% of the remaining habitat for this at-risk species.    |

 [x] Criterion 3 : Biological diversity

 To justify this Criterion, please give details in the box below. If you want to name any specific species, please give details on:

 - relevant plant species in the section Criteria & justification> Plant species (3.2)

 - relevant animal species in the section Criteria & justification> Animal species (3.3)

Justification (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Whangamarino is more diverse botanically than any other large lowland peatland in the North Island, supporting at least 140 indigenous vascular plant species. The wetland contains four areas of typically rainwater-fed bog (1740 ha) which lie in three contiguous valleys. Fens (1640 ha) border the bogs, while swamps (1490 ha) and marshes (470 ha) generally occur between fens and the rivers and streams that dissect the wetland.  The variation between the extremes of the acidic nutrient-poor bogs, and nutrient enriched swamps, provides diverse habitat to support a high diversity of plant species and a number of regionally rare plant communities.  Bogs have a combination of very specialised plants that no longer occur elsewhere in the Waikato region or beyond. They are the least species diverse, but have >99% average cover of indigenous plants. Dominant species are wirerush (Empodisma robustum), sedges (e.g. Machaerina, Schoenus and Tetraria species), umbrella fern (Gleichenia dicarpa) and stunted manuka shrubs (Leptospermum scoparium).  Fens (semi-mineralised swamps) are the most species diverse and also have a relatively high cover of indigenous plants (74%). The dominant indigenous vegetation class is tall manuka (>2 m) associated with grey willow (Salix cinerea), swamp coprosma (Coprosma tenuicaulis), kiokio fern (Blechnum minus), ti kouka/cabbage tree (Cordyline australis), invasive royal fern (Osmunda regalis), sedges (e.g. Machaerina, Carex species), wirerush, harakeke (Phormium tenax) and umbrella fern. Fens also include areas invaded by exotic grey willow which forms a canopy over many of the species listed above.  Swamps and marshes are dominated by introduced species (34% and 31% indigenous cover respectively) and have very similar species compositions. The dominant vegetation class is seasonal adventive herbs (e.g. Persicaria, Ludwigia, Bidens) and grasses (e.g. Glyceria maxima, Phalaris arundinacea, Paspalum distichum and Agrostis stolonifera). Other vegetation types include invasive crack willow forest, and indigenous-dominated Carex sedgeland, harakeke flaxland, kahikatea (Dacrycarpus dacrydioides) forest and reedlands (Eleocharis, Typha and Machaerina species). The site includes a diversity of transitional habitat types and good connectivity with other freshwater rivers and lakes in the region.  The large size and diversity of Whangamarino affords a rich diversity of wetland bird habitat types, including the full range of species representative of the wetland types present. The wetland regularly supports 38 indigenous bird species and thousands of wetland birds, including a large proportion of the national populations of some species. It is particularly notable for specialist swamp bird species (Australasian bittern, crakes, fernbirds) and waterfowl (ducks, swans and geese). The wetland supports 15% of the freshwater native fish species recorded in New Zealand, thus contributing to the region’s piscine biodiversity.  |

 [x] Criterion 4 : Support during critical life cycle stage or in adverse conditions

 To justify this Criterion, please give details below on:

 - relevant plant species in the section Criteria & justification> Plant species (3.2)

 - relevant animal species in the section Criteria & justification> Animal species (3.3)

 and explain the life cycle stage or nature of adverse conditions in the accompanying 'justification' box.

Optional text box to provide further information (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | The wetland is a permanent residence and national stronghold for a number of threatened species including Australasian bittern, swamp helmet orchid and black mudfish, therefore it provides critical breeding habitat upon which the long-term conservation of these species depends. |

 [ ] Criterion 5 : >20,000 waterbirds

 To justify this Criterion, please give details below on:- the total number of waterbirds and the period of data collection - relevant waterbird species, and if possible their population size, in the section Criteria & justification> Animal species (3.3)

Overall waterbird numbers\* (This field is mandatory)

|  |  |
| --- | --- |
|  |  |

Start year\* (This field is mandatory)

|  |  |
| --- | --- |
|  |  |

End year\* (This field is mandatory)

|  |  |
| --- | --- |
|  |  |

Source of data:

|  |  |
| --- | --- |
|  |  |

Optional text box to provide further information (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  |  |

 [x] Criterion 6 : >1% waterbird population

 To justify this Criterion, please give details on relevant waterbird species and their population size in the section Criteria & justification> Animal species (3.3)

Optional text box to provide further information (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Whangamarino has, since 1981, been considered a national stronghold for the endangered Australasian bittern (matuku, Botaurus poiciloptilus). In 1981, about 145 birds (an estimated 25% of the national population) were estimated to live in Whangamarino, by far the single most important population known in New Zealand at the time. Population estimates for Australasian bittern in New Zealand vary, but recent analysis identified a substantial reduction in the frequency, number and distribution of bittern records from the 1970s until present in New Zealand, and there may now be fewer than 25 males and an unknown number of females. The national population is also unknown but thought to be fewer than 1000. Therefore the Whangamarino population may represent at least 2.5 % of the bio-regional population of Australasian bittern. |

 [x] Criterion 7 : Significant and representative fish

 To justify this Criterion, please give information in the box below and details of relevant fish species in the section Criteria & justification> Animal species (3.3)

Justification (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | The wetland supports 9 native freshwater fish species, 15 % of New Zealand’s total freshwater fish fauna. |

 [x] Criterion 8 : Fish spawning grounds, etc.

 To justify this Criterion, please give information in the box below. Completion of details on relevant fish species in the section Criteria & justification> Animal species (3.3) is optional.

Justification (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Whangamarino is a large wetland so it has extensive habitat and a good fish biomass of recreationally harvested inanga (adult habitat, migratory route), and recreationally and commercially harvested long and shortfin eels (juvenile to adult habitat, migratory route). |

 [x] Criterion 9 : >1% non-avian animal population

 To justify this Criterion, please give details on relevant non-avian species and their population size in the section Criteria & justification> Animal species (3.3)

Optional text box to provide further information (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | The Whangamarino represents about 30% of remaining habitat for black mudfish (Neochanna diversus) and is therefore expected to support at least that proportion of the remaining population. Because of its large size the wetland is less susceptible to a range of diverse impacts such as sediment and nutrient inputs and drainage than a lot of the remaining highly fragmented habitat in the Auckland and Northland provinces where black mudfish occur.  |

3.2 Plant species whose presence relates to the international importance of the site

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Phylum** | **Scientific name**\* | **Criterion 2** | **Criterion 3** | **Criterion 4** | **IUCN Red List**[[4]](#footnote-4) | **CITES Appendix I** | **Other status** | **Justification** |
| Birds |
| Tracheophyta / Liliopsida | Corybas carsei |  [x]  |  [ ]  |  [x]  |  |  [ ]  | Nationally Critical | National stronghold (only known location in New Zealand).  |
| Tracheophyta / Magnoliopsida | Myriophyllum robustum |  [ ]  |  [x]  |  [ ]  |  |  [ ]  | At Risk (Declining) | Endemic species (NZ) |
| Bryophyta / Bryopsida | Physcomitrella patens |  [x]  |  [ ]  |  [ ]  |  |  [ ]  | Nationally Critical |  |
| Bryophyta / Bryopsida | Physcomitrium pusillum |  [x]  |  [ ]  |  [ ]  |  |  [ ]  | Nationally Critical |  |
| Tracheophyta / Liliopsida | Prasophyllum hectori |  [ ]  |  [x]  |  [ ]  |  |  [ ]  | At Risk (Declining) | Endemic species (NZ) |
| Tracheophyta / Lycopodiopsida | Pseudolycopodiella serpentina |  [x]  |  [ ]  |  [ ]  |  |  [ ]  | Nationally Vulnerable |  |
| Tracheophyta / Liliopsida | Pterostylis paludosa |  [ ]  |  [x]  |  [x]  |  |  [ ]  | At Risk (Declining) | Endemic species (NZ). Probable national stronghold |
| Tracheophyta / Liliopsida | Schoenus carsei |  [x]  |  [ ]  |  [x]  |  |  [ ]  | Nationally Critical | National stronghold for this species. |
| Tracheophyta / Magnoliopsida | Utricularia australis |  [x]  |  [x]  |  [ ]  | LC  |  [ ]  | Nationally Critical | Endemic species (NZ) |
|  |  |  [ ]  |  [ ]  |  [ ]  |  |  [ ]  |  |  |

GBIF Secretariat (2019). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2020-07-15.

Optional text box to provide further information on plant species of international importance:

 (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Lycopodiella serpentina is a Nationally Vulnerable clubmoss species that in New Zealand is largely restricted now to a few peatlands in the Auckland, Waikato and Northland regions.  The wetland is a national stronghold for Corybas carsei, Schoenus carsei and Pterostylis paludosa and therefore provides critical habitat for these species at all stages of their life cycle, triggering Criterion 4.  Threatened species status (other status) for qualification under Criterion 2 is based on the New Zealand Threat Classification System administered by the NZ Department of Conservation. This classification system defines the Threatened (Nationally Critical, Nationally Endangered and Nationally Vulnerable) species in New Zealand that qualify under Criterion 2. The classification system also defines the At Risk (Declining, Naturally Uncommon, Relict) species that are near-threatened. For details on the classification system refer to: Townsend et al (2008): New Zealand Threat Classification System Manual. Department of Conservation, Wellington. 35 p.  Endemic species status for qualification under Criterion 3 is based on the New Zealand Plant Conservation Network database.   |

3.3 Animal species whose presence relates to the international importance of the site

Animals are listed in the following order: birds; fish, mollusc and curstaceen; other animals

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Phylum** | **Scientific name**\* | **Species qualifies under criterion** | **Species contributes under criterion** | **Pop. Size**[[5]](#footnote-5) | **Period of pop. Est.**5 | **% occurrence**5 | **IUCN Red List**[[6]](#footnote-6) | **CITES Appendix I** | **CMS Appendix I** | **Other Status** | **Justification** |
| **2** | **4** | **6** | **9** | **3** | **5** | **7** | **8** |
| Fish, Mollusc and Crustacea |
| Chordata / Actinopterygii | Anguilla dieffenbachii |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [x]  |  [x]  |   |  |   | EN  |  [ ]  |  [ ]  | At Risk (Declining) | Contributes to fish diversity and fish stocks |
| Chordata / Actinopterygii | Galaxias maculatus |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [x]  |  [x]  |   |  |   | LC  |  [ ]  |  [ ]  | At Risk (Declining) | Contributes to fish diversity and fish stocks |
| Chordata / Actinopterygii | Gobiomorphus huttoni |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [x]  |  [ ]  |  [x]  |  [ ]  |   |  |   | NT  |  [ ]  |  [ ]  |  | Endemic species (NZ) and contributes to indigenous fish diversity |
| Chordata / Actinopterygii | Neochanna diversus |  [x]  |  [x]  |  [ ]  |  [x]  |  [x]  |  [ ]  |  [x]  |  [ ]  | 0 | 2017 | 30 | EN  |  [ ]  |  [ ]  | At Risk (Declining) | Site is a national stronghold for species, contributes to fish diversity and >1% of population in Ramsar site |
| Birds |
| Chordata / Aves | Ardea modesta |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |   |  |   |  |  [ ]  |  [ ]  | Nationally Critical | Vagrant |
| Chordata / Aves | Botaurus poiciloptilus |  [x]  |  [x]  |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  | 25 | 2018 | 2.5 | EN  |  [ ]  |  [ ]  | Nationally Critical | Site is a national stronghold for species, breeding ground |
| Chordata / Aves | Hydroprogne caspia |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |   |  |   | LC  |  [ ]  |  [ ]  | Nationally Vulnerable |  |
| Chordata / Aves | Poliocephalus rufopectus |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |   |  |   | NT  |  [ ]  |  [ ]  | At Risk (Recovering) |  |
| Chordata / Aves | Porzana pusilla affinis |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |   |  |   | LC  |  [ ]  |  [ ]  | At Risk (Declining) |  |
| Chordata / Aves | Porzana tabuensis |  [x]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |   |  |   | LC  |  [ ]  |  [ ]  | At Risk (Declining) |  |
|  |  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  [ ]  |  |  |  |  |  [ ]  |  [ ]  |  |  |

GBIF Secretariat (2019). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2020-07-15.

Optional text box to provide further information on animal species of international importance:

 (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Whangamarino is considered to be significant as a national stronghold for the nationally critical Australasian bittern (matuku, Botaurus poiciloptilus). In 1981, about 145 birds (an estimated 25% of the population) were estimated to live in Whangamarino, making the wetland by the most important population known in New Zealand at the time. Population estimates for Australasian bittern in New Zealand vary, but recent analysis identified a substantial reduction in the frequency, number and distribution of bittern records from the 1970s until present in New Zealand, and there may now be fewer than 25 males and an unknown number of females. While this is a significant drop in population at the wetland, the site is still likely to support a significant proportion of the national population. This species also occurs in south-east and south-west Australia where regional declines in reporting rates of > 90% are thought to represent genuine population declines.  The North Island fernbird (Bowdleria punctata vealeae), is an at-risk species for which the wetland provides critical habitat, being a year-round resident bird that nests in the wetland.  No full counts of waterfowl have been undertaken recently, and many population records are now over 30 years old. In 1981 an estimated 2000-3000 endemic NZ shoveler (Anas rhynchotis variegata) were recorded, representing about 2% of the national population at that time. Similarly, numbers of black swans (Cygnus atratus) peaked at 1500-3000 birds, which represented approximately 5% of the national population, grey duck (Anas superciliosa) peaked at 6000-7000 birds or about 7% of the national population, and grey teal up to about 1000 birds or about 1% of the national population. More recent population data are not available and there is speculation that hybridisation with introduced mallards may have eradicated the population of pure grey ducks from Whangamarino.  The wetland supports 15% of the freshwater native fish species recorded in New Zealand, thus contributing to the region’s piscine biodiversity. The site is also a stronghold for the at-risk black mudfish (Neochanna diversus), representing about 30% of the remaining habitat for this species.  |

3.4 Ecological communities whose presence relates to the international importance of the site

|  |  |  |  |
| --- | --- | --- | --- |
| **Name of ecological community** | **Community qualifies under Criterion 2?** | **Description** | **Justification** |
| Phormium tenax (flax/harakeke) flaxland  |  [x]  |  Harakeke flaxland is dominated by Phormium tenax with scattered emergent Cordyline australis and Dacrycarpus dacrydioides trees.  | Swamps are nationally rare wetland communities |
| Dacrycarpus dacrydioides (kahikatea /white pine) forest |  [x]  | Only a few small remnants of kahikatea forest remain within Whangamarino Wetland. Associated species include Machaerina species, Coprosma propinqua Blechnum minus, Cordyline australis, Phormium tenax, Carex virgata, and Sophora microphylla. | Swamps are nationally rare wetland communities |
| Carex sedgeland |  [x]  | Areas where swards of Carex gaudichaudiana and C. subdola collectively make up more than 50% of the canopy. Other native species occurring with this vegetation type include native rushes and sedges, along with exotic herbs and shrubs, | Swamps are nationally rare wetland communities |
| Eleocharis reedland  |  [x]  | This vegetation class mainly comprises monospecific stands of the native sedge Eleocharis sphacelata. It generally occurs surrounded by Carex sedgeland. | Swamps are nationally rare wetland communities ( |
| Eleocharis-Baumea reedland |  [x]  | This vegetation class comprises the native sedges Eleocharis sphacelata and Machaerina articulata. It is often surrounded by Carex sedgeland. | Swamps are nationally rare wetland communities |
| Raupo reedland |  [x]  | This vegetation class is low in floristic diversity, dominated by Typha orientalis with few other species present. | Swamps are nationally rare wetland communities |
| Bolboschoenus reedland |  [x]  | This vegetation class is comprised of the native sedge Bolboschoenus fluviatilis. Common associates include Glyceria maxima, and Persicaria species. | Swamps are nationally rare wetland communities |
| Tall Leptospermum scoparium (manuka) scrub |  [x]  | This vegetation class occurs in fens. It is dominated by tall manuka (>2 m) within the canopy. Other species include Salix cinerea, Coprosma tenuicaulis, Blechnum minus, Cordyline australis, Empodisma robustum, Phormium tenax and Gleichenia species | Fens are nationally rare wetland communities |
| Empodisma robustum rushland |  [ ]  | Wirerush (Empodisma minus) dominates with, umbrella fern (Gleichenia dicarpa), Baumea teretifolia, Schoenus brevifolius, bladderworts, orchids and sundews. |  Representative and naturally rare ecosystem type and contributes to biological diversity |
|  |  [ ]  |  |  |

Optional text box to provide further information (This field is limited to 4000 characters)

|  |  |
| --- | --- |
|  | Swamps are wetland types that are nationally rare because they have become severely depleted (<5% remains nationally) over much of their range compared to their original extent. Fens are wetland types that are nationally rare because they have become moderately depleted (<20% remains nationally) over much of their range compared to their original extent or condition. This site contains good representative examples of these rare wetland types.  |

What is the Site like?

4.1 Ecological character

Please summarize the ecological components, processes and services which are critical to determining the ecological character of the site. Please also summarize any natural variability in the ecological character of the site, and any known past or current change

 (This field is limited to 4000 characters)

|  |  |
| --- | --- |
|  | The Whangamarino raised bog and fen ecosystems are among the largest, most diverse and most intact examples of these wetland types in New Zealand, and they support the nation's second largest area of the endemic, peat-forming wirerush, Empodisma robustum. The mineralised swamps and marshes, while degraded by invasive plant species, have high biodiversity and recreational values.  Vegetation diversity within the wetland is closely linked to the pattern of acidic peat bog and mineralised swamp, and the ecology is driven primarily by nutrient status and hydrology. The wetland contains four areas of young bog which lie in three contiguous valleys intersected by Whangamarino River, Maramarua River and Reao Stream. These bogs, with shallow peat up to 3.5 m deep, date from the c. 232 AD Taupo eruption. Fens occur on the flanks of bogs, or at the base of slopes, where water is received from both precipitation and ground water sources. Swamps and marshes generally occur between fens and the rivers and streams that dissect the wetland.  In its natural state, flood waters would have regularly inundated the low-lying marshes and swamps, with domed bogs rarely inundated. During high flows, water from the Waikato River backed up into the Whangamarino and also into Lake Waikare, a shallow riverine lake at the wetland’s southern end. The lake acted as a major ponding area and once water levels reached the low ridge on its northern bank, it flowed overland into the Whangamarino Wetland. From there the waters eventually drained back into the Waikato River via the Whangamarino Wetland and River.  From the mid 1960s the hydrology was significantly altered by construction and operation of the lower Waikato-Waipa Flood Protection Scheme. The scheme was developed to reduce the impact of flood events across a large catchment area to protect damage to land, the livelihood of people and disruption to the national land transport network. This involved isolation of Lake Waikare and Whangamarino Wetland from the Waikato River by stopbanks and control gates, lowering and controlling Lake Waikare levels to increase flood storage, and diverting lake discharges into Whangamarino Wetland back via a control gate and the Pungarehu Canal. The gate is opened when lake water levels are exceeded a specified level, discharging water that has high sediment and nutrient content into the wetland.  River-training and sand abstraction from the bed of the Waikato River near Mercer caused minimum water levels in the wetland river system to drop by more than 1 m from the late 1960s to the 1990s, based on channel profile data from the lower Waikato. The drop in minimum water table, and input of excess nutrient associated with the flood control scheme, has promoted peat degradation and reduced the quality of wetland habitat.  In 1994 a rock rubble weir was constructed below the confluence of the Maramarua and Whangamarino rivers to improve minimum water levels across the mineralised areas of the wetland. The weir is set at 3.2 m minimum summer levels and has raised average minimum water tables by more than 1 m (to reverse the water table reduction caused by the sand dredging and river-training works). At 3.2 m water is largely confined to the channels, swamps and marshes which protects the bog from inundation of nutrient rich water while maintaining their near-surface groundwater level.  Despite these hydrological modifications, and threats from invasive plants and animals, the wetland still supports a high diversity of indigenous plants and many threatened species, being a national stronghold for several of them. It also retains high cultural and recreational values.   |

4.2 What wetland type(s) are in the site?

Please list all wetland types which occur on the site, and for each of them: - rank the four most abundant types by area from 1 (greatest extent) to 4 (least extent) in the third column, - if the information exists, provide the area (in ha) in the fourth column - if this wetland type is used for justifying the application of Criterion 1, indicate if it is representative, rare or unique in the last column - you can give the local name of the wetland type if different from the Ramsar classification system in the second column

Marine or coastal wetlands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wetland types (code and name)**[[7]](#footnote-7) | **Local name** | **Ranking of extent (1: greatest - 4: least)** | **Area (ha) of wetland type** | **Justification of Criterion 1**[[8]](#footnote-8) |
|  |  |  |  |  |

Inland wetlands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wetland types (code and name)**[[9]](#footnote-9) | **Local name** | **Ranking of extent (1: greatest - 4: least)** | **Area (ha) of wetland type** | **Justification of Criterion 1**8 |
| Fresh water > Flowing water >> M: Permanent rivers/ streams/ creeks |  | 0 |  |  |
| Fresh water > Marshes on inorganic soils >> Tp: Permanent freshwater marshes/ pools |  | 0 |  |  |
| Fresh water > Lakes and pools >> Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils |  | 3 |  |  |
| Fresh water > Marshes on peat soils >> U: Permanent Non-forested peatlands |  | 1 |  | Representative |
| Fresh water > Marshes on inorganic soils >> W: Shrub-dominated wetlands |  | 4 |  |  |
| Fresh water > Marshes on inorganic soils >> Xf: Freshwater, tree-dominated wetlands |  | 2 |  |  |
| Fresh water > Marshes on peat soils >> Xp: Permanent Forested peatlands |  | 0 |  |  |
|  |  |  |  |  |

Human-made wetlands

|  |  |  |  |
| --- | --- | --- | --- |
| **Wetland types (code and name)**[[10]](#footnote-10) | **Local name** | **Ranking of extent (1: greatest - 4: least)** | **Area (ha) of wetland type** |
| 2: Ponds |  | 0 |  |
|  |  |  |  |

What non-wetland habitats are within the site?

Other non-wetland habitat

|  |  |
| --- | --- |
| **Other non-wetland habitats within the site** | **Area (ha) if known** |
| Pasture (grazing land) |  |
| Terrestrial habitat (exotic self-established vegetation and replanted or naturally revegetated areas) |  |
|  |  |

Habitat connectivity (ECD)

|  |  |
| --- | --- |
|  |  |

4.3 Biological components

4.3.1 Plant species

GBIF Secretariat (2019). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2020-07-15.

Other noteworthy plant species

|  |  |  |
| --- | --- | --- |
| **Phylum** | **Scientific name** | **Position in range / endemism / other** (optional) |
| Tracheophyta / Liliopsida | Empodisma robustum | Keystone species (peat-former) |
| Bryophyta / Sphagnopsida | Sphagnum cristatum | Keystone species (peat-former) |
| Tracheophyta / Magnoliopsida | Utricularia delicatula | Relict (restricted range) |
|  |  |  |

Invasive alien plant species

|  |  |  |  |
| --- | --- | --- | --- |
| **Phylum** | **Scientific name** | **Impacts**[[11]](#footnote-11) | **Changes at RIS update**[[12]](#footnote-12) |
| Tracheophyta / Magnoliopsida | Alnus glutinosa | Actual (minor impacts) | increase |
| Tracheophyta / Magnoliopsida | Alternanthera philoxeroides | Actual (minor impacts) | increase |
| Tracheophyta / Magnoliopsida | Araujia sericifera | Actual (minor impacts) | decrease |
| Tracheophyta / Liliopsida | Cortaderia selloana | Actual (minor impacts) | increase |
| Tracheophyta / Magnoliopsida | Cuscuta pentagona | Actual (minor impacts) | increase |
| Tracheophyta / Liliopsida | Glyceria maxima | Actual (major impacts) | increase |
| Tracheophyta / Liliopsida | Iris pseudacorus | Actual (major impacts) | increase |
| Tracheophyta / Magnoliopsida | Ludwigia peploides montevidensis | Actual (minor impacts) | unknown |
| Tracheophyta / Magnoliopsida | Myriophyllum aquaticum | Actual (minor impacts) | unknown |
| Tracheophyta / Polypodiopsida | Osmunda regalis | Actual (minor impacts) | increase |
| Tracheophyta / Magnoliopsida | Paraserianthes lophantha | Actual (minor impacts) | No change |
| Tracheophyta / Magnoliopsida | Persicaria hydropiper | Actual (major impacts) | increase |
| Tracheophyta / Magnoliopsida | Persicaria maculosa | Actual (major impacts) | increase |
| Tracheophyta / Magnoliopsida | Persicaria salicifolia | Actual (major impacts) | increase |
| Tracheophyta / Liliopsida | Phalaris arundinacea | Actual (minor impacts) | decrease |
| Tracheophyta / Magnoliopsida | Salix cinerea | Actual (major impacts) | increase |
| Tracheophyta / Magnoliopsida | Salix fragilis | Actual (major impacts) | decrease |
| Tracheophyta / Magnoliopsida | Ulex europaeus | Actual (minor impacts) | unknown |
| Tracheophyta / Magnoliopsida | Utricularia gibba | Actual (minor impacts) | increase |
|  |  |  |  |

GBIF Secretariat (2019). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2020-07-15.

Optional text box to provide further information (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  | Also Rubus fruticosus agg., Actually (minor impacts), increase |

4.3.2 Animal species

Other noteworthy animal species

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Phylum** | **Scientific name** | **Pop. size** (optional) | **Period of pop. est.** (optional) | **% occurrence** (optional) | **Position in range /endemism/other** (optional) |
| Chordata / Aves | Anas platyrhynchos |  |  |  | Important recreational game bird species (introduced) |
| Chordata / Aves | Anas rhynchotis |  |  |  | Important recreational game bird species (native) |
| Chordata / Actinopterygii | Anguilla australis |  |  |  | Important cultural and commercial fish species (native) |
| Chordata / Aves | Callipepla californica |  |  |  | Important recreational game bird species (introduced) |
| Chordata / Aves | Coturnix ypsilophora |  |  |  | Important recreational game bird species (introduced) |
| Chordata / Actinopterygii | Galaxias fasciatus |  |  |  | Important recreational fish species, part of the whitebait harvest (native) |
| Chordata / Actinopterygii | Mugil cephalus |  |  |  | Important cultural and recreational fish species (native) |
| Chordata / Aves | Phalacrocorax carbo novaehollandiae |  |  |  | Naturally Uncommon |
| Chordata / Aves | Phalacrocorax sulcirostris |  |  |  | Naturally Uncommon |
| Chordata / Aves | Phasianus colchicus |  |  |  | Important recreational game bird species (introduced) |
| Chordata / Aves | Platalea regia |  |  |  | Naturally Uncommon |
| Chordata / Aves | Tadorna variegata |  |  |  | Important recreational game bird species (native) |
|  |  |  |  |  |  |

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Invasive alien animal species

|  |  |  |  |
| --- | --- | --- | --- |
| **Phylum** | **Scientific name** | **Impacts** | **Changes at RIS update**11 |
| Chordata / Actinopterygii | Ameiurus nebulosus | Actual (major impacts) | No change |
| Chordata / Mammalia | Bos taurus taurus | Actual (minor impacts) | decrease |
| Chordata / Aves | Branta canadensis | Actual (minor impacts) | decrease |
| Chordata / Actinopterygii | Carassius auratus | Actual (minor impacts) | unknown |
| Chordata / Mammalia | Cervus elaphus | Actual (minor impacts) | decrease |
| Chordata / Actinopterygii | Cyprinus carpio | Actual (major impacts) | No change |
| Chordata / Mammalia | Erinaceus europaeus | Actual (minor impacts) | No change |
| Chordata / Mammalia | Felis catus | Actual (major impacts) | unknown |
| Chordata / Actinopterygii | Gambusia affinis | Actual (major impacts) | increase |
| Chordata / Mammalia | Lepus europaeus | Actual (minor impacts) | No change |
| Chordata / Mammalia | Mus musculus | Actual (minor impacts) | No change |
| Chordata / Mammalia | Mustela erminea | Actual (major impacts) | No change |
| Chordata / Mammalia | Mustela nivalis | Actual (major impacts) | No change |
| Chordata / Mammalia | Mustela putorius furo | Actual (major impacts) | unknown |
| Chordata / Mammalia | Oryctolagus cuniculus | Actual (minor impacts) | No change |
| Chordata / Actinopterygii | Perca fluviatilis | Actual (major impacts) | unknown |
| Chordata / Mammalia | Rattus norvegicus | Actual (major impacts) | No change |
| Chordata / Mammalia | Rattus rattus | Actual (major impacts) | No change |
| Chordata / Actinopterygii | Scardinius erythrophthalmus | Actual (major impacts) | unknown |
| Chordata / Mammalia | Sus scrofa | Actual (minor impacts) | decrease |
| Chordata / Mammalia | Trichosurus vulpecula | Actual (minor impacts) | No change |
|  |  |  |  |

GBIF Secretariat (2019). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2020-07-15.

Optional text box to provide further information (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  | Anas platyrhynchos (mallard duck) are considered to be an invasive species that has had a major impact through hybridising with and likely rendering grey duck functionally extinct in the Whangamarino wetland. However it is also a noteworthy species for its significant recreational value as a gamebird. |

4.4 Physical components

4.4.1 Climate

Please indicate the prevailing climate type(s) by selecting below the climatic region(s) and subregion(s), using the Köppen-Gieger Climate Classification System.

|  |  |
| --- | --- |
| **Climatic region**[[13]](#footnote-13) | **Subregion**[[14]](#footnote-14) |
| C: Moist Mid-Latitude climate with mild winters | Cfb: Marine west coast (Mild with no dry season, warm summer) |
|  |  |

If changing climatic conditions are affecting the site, please indicate the nature of these changes:

 (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  |  |

4.4.2 Geomorphic setting

a) Minimum elevation above sea level (in metres) (The online RIS only accepts numeric values)

|  |  |
| --- | --- |
|  | 3 |

a) Maximum elevation above sea level (in metres) (The online RIS only accepts numeric values)

|  |  |
| --- | --- |
|  | 80 |

b) Position in landscape/river basin:

 [ ] Entire river basin

 [ ] Upper part of river basin

 [ ] Middle part of river basin

 [ ] Lower part of river basin

 [x] More than one river basin

 [ ] Not in river basin

 [ ] Coastal

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean. (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | Waikato River Basin Whangamarino River (sub-basin) Maramarua River (sub-basin) Reao Stream (sub-basin) Lake Waikare catchment (sub-basin, via an engineered spillway into and canal out of Lake Waikare)  |

4.4.3 Soil

 [x] Mineral

Changes at RIS update (Update)

 [ ] No change / [x] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Organic

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] No available information

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)?

 [ ] Yes / [x] No

.

Please provide further information on the soil (optional) (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | The predominant soils of the wetland are young (~1750 years old), shallow peat (up to 3.5 m deep), with increased alluvial sediment near the river deposited during flooding. Across a representative sequence from raised bog to the river-influenced wetland margin in the southern bog, substrate changes from peat with a dry bulk density of 0.05–0.10 grams per cubic centimetres in the domed bog to 0.28 g per cubic centimetres towards the river. Peat chemical measurements showed similar trends, with TN and TP ranging from 0.37 and 0.01 mg per cubic centimetre respectively in the bog, peaking at 3.97 and 0.21 mg per cubic centimetre near the river. Mineral content also increased, changing from 3% in the bog to a maximum of 70% near the river. The artificial discharge of water from Lake Waikare is a significant source of sediment to the Whangamarino wetland and is the principal source of sediment to the southern section of the wetland around the Pungarehu Stream.  |

4.4.4 Water regime

Water permanence

|  |  |
| --- | --- |
| **Presence?**[[15]](#footnote-15) | **Changes at RIS update**12 |
| Usually permanent water present | increase |
|  |  |

Source of water that maintains character of the site

|  |  |  |
| --- | --- | --- |
| **Presence?**[[16]](#footnote-16) | **Predominant water source** | **Changes at RIS update**12 |
| Water inputs from groundwater |  [ ]  | No change |
| Water inputs from surface water |  [ ]  | No change |
| Water inputs from precipitation |  [ ]  | No change |
|  |  [ ]  |  |

Water destination

|  |  |
| --- | --- |
| **Presence?**[[17]](#footnote-17) | **Changes at RIS update**12 |
| Feeds groundwater | No change |
| To downstream catchment | No change |
|  |  |

Stability of water regime

|  |  |
| --- | --- |
| **Presence?**[[18]](#footnote-18) | **Changes at RIS update**12 |
| Water levels fluctuating (including tidal) | No change |
|  |  |

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology: (This field is limited to 2000 characters)

|  |  |
| --- | --- |
|  | In non-flood conditions the wetland is fed by a 48,900 ha catchment. During floods the swamps and marshes would have also receive water backing up the Waikato River, and some limited overland flow from Lake Waikare. Since the development of the flood control scheme (1960s) the wetland now also receive floodwater from the greater Waikato River catchment, via Lake Waikare and directly via the Pungarehu Canal.  A weir was installed within the Whangamarino Wetland by the Department of Conservation and Auckland/Waikato Fish and Game, initially in 1994, to help restore minimum water levels and support wetland functioning at 3.2 m, at which water is largely confined to the channels, swamps and marshes.  Water levels in the bogs fluctuate by about 50 cm but generally remain below the peat surface year round. The fen water table is below ground surface in summer-autumn and at or above during winter-spring, rising to 0.5 m above the surface during flood events. Water levels in the mineralised zone fluctuate and can vary by up to 2.5 m during a year.  |

Connectivity of surface waters and of groundwater (ECD)

|  |  |
| --- | --- |
|  |  |

Stratification and mixing regime (ECD)

|  |  |
| --- | --- |
|  |  |

4.4.5 Sediment regime

 [x] Significant erosion of sediments occurs on the site

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Significant accretion or deposition of sediments occurs on the site

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Significant transportation of sediments occurs on or through the site

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Sediment regime is highly variable, either seasonally or inter-annually

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Sediment regime unknown

Please provide further information on sediment (optional): (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | Most of the waterways of Whangamarino are highly turbid, due to high sediment concentrations in tributary catchments including Lake Waikare and other catchment sources such as the Whangamarino River. Median turbidity (1995-2013) is 95 NTU in the Pungarehu Canal, and 42 NTU in the Whangamarino River.  Lake Waikare is shallow, supertrophic and highly turbid. Exotic koi carp and other bottom-feeding fish, wind action, and a lack of macrophyte cover contribute through regular re-suspension of particles.  The Lake Waikare discharge can contribute >20,000 tonness of sediment annually (Jacobs 2015, PDP 2018) and >20 metric tonnes of Total Phosphorus. This represents over >30% of the total loads to the wetland (Jacobs 2015).  Sediment is accumulating in the mineralised wetland at rates of 2 mm/yr to 16 mm/yr. Several sites have sediment accumulation rates 4-5x higher than that observed prior to the development of the flood management (Reeve et al. 2010).  |

Water turbidity and colour (ECD)

|  |  |
| --- | --- |
|  |  |

Light - reaching wetland (ECD)

|  |  |
| --- | --- |
|  |  |

Water temperature (ECD)

|  |  |
| --- | --- |
|  |  |

4.4.6 Water pH

 [x] Acid (pH<5.5)

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Circumneutral (pH: 5.5-7.4 )

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Alkaline (pH>7.4)

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Unknown

Please provide further information on pH (optional): (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  |  |

4.4.7 Water salinity

 [x] Fresh (<0.5 g/l)

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Mixohaline (brackish)/Mixosaline (0.5-30 g/l)

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Euhaline/Eusaline (30-40 g/l)

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Hyperhaline/Hypersaline (>40 g/l)

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Unknown

Please provide further information on salinity (optional): (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  |  |

Dissolved gases in water (ECD)

|  |  |
| --- | --- |
|  |  |

4.4.8 Dissolved or suspended nutrients in water

 [x] Eutrophic

Changes at RIS update (Update)

 [ ] No change / [x] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Mesotrophic

Changes at RIS update (Update)

 [ ] No change / [x] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [x] Oligotrophic

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Dystrophic

Changes at RIS update (Update)

 [x] No change / [ ] Increase / [ ] Decrease / [ ] Unknown

.

.

.

 [ ] Unknown

Please provide further information on dissolved or suspended nutrients (optional): (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | The rain-fed bog has a relatively low nutrient status while sites impacted by floodwater inundation have high levels of phosphorus related to high sediment loads from the catchment.  Floodwaters are a major source of externally-derived nutrients (including P) into Whangamarino Wetland. Lake Waikare catchment contributes approximately 35% of the total suspended sediment (TSS), 40% of the total phosphorus (TP) load and 49% of the total nitrogen (TN) load to the Whangamarino wetland. Continued inputs of nutrients and sediments from floodwaters, including the Lake Waikare discharges, are predicted to have cumulative and negative effects on sensitive bog areas. In particular, elevated P is likely to reduce peat formation in bogs and hasten retrogression to fens. In addition, inputs of both N and P favour strongly competitive species (e.g. manuka and weed species) and reduce species richness.  |

Dissolved organic carbon (ECD)

|  |  |
| --- | --- |
|  |  |

Redox potential of water and sediments (ECD)

|  |  |
| --- | --- |
|  |  |

Water conductivity (ECD)

|  |  |
| --- | --- |
|  |  |

4.4.9 Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself:

 [ ] i) broadly similar / [x] ii) significantly different

.

If the surrounding area differs from the Ramsar Site, please indicate how: (Please tick all categories that apply)

 [x] Surrounding area has greater urbanisation or development

 [x] Surrounding area has higher human population density

 [x] Surrounding area has more intensive agricultural use

 [x] Surrounding area has significantly different land cover or habitat types

Please describe other ways in which the surrounding area is different: (This field is limited to 2000 characters)

|  |  |
| --- | --- |
|  | Areas of plantation forest to the east, also quarrying and open cast coal mining. |

4.5 Ecosystem services

4.5.1 Ecosystem services/benefits

Please select below all relevant ecosystem services/benefits currently provided by the site and indicate their relative importance in the right-hand column.

Provisioning Services

|  |  |  |
| --- | --- | --- |
| **Ecosystem service**[[19]](#footnote-19) | **Examples**[[20]](#footnote-20) | **Importance/Extent/Significance**[[21]](#footnote-21) |
| Food for humans | Sustenance for humans (e.g., fish, molluscs, grains) | Medium |
| Fresh water | Drinking water for humans and/or livestock | Low |
| Wetland non-food products | Livestock fodder | Low |
| Biochemical products | Extraction of material from biota | Low |
|  |  |  |

Regulating Services

|  |  |  |
| --- | --- | --- |
| **Ecosystem service**[[22]](#footnote-22) | **Examples**[[23]](#footnote-23) | **Importance/Extent/Significance**21 |
| Maintenance of hydrological regimes | Groundwater recharge and discharge | High |
| Erosion protection | Soil, sediment and nutrient retention | Low |
| Pollution control and detoxification | Water purification/waste treatment or dilution | Medium |
| Climate regulation | Local climate regulation/buffering of change | Medium |
| Climate regulation | Regulation of greenhouse gases, temperature, precipitation and other climactic processes | High |
| Biological control of pests and disease | Support of predators of agricultural pests (e.g., birds feeding on locusts) | Low |
| Hazard reduction | Flood control, flood storage | High |
|  |  |  |

Cultural Services

|  |  |  |
| --- | --- | --- |
| **Ecosystem service**[[24]](#footnote-24) | **Examples**[[25]](#footnote-25) | **Importance/Extent/Significance**21 |
| Recreation and tourism | Recreational hunting and fishing | High |
| Recreation and tourism | Picnics, outings, touring | Low |
| Recreation and tourism | Water sports and activities | Low |
| Recreation and tourism | Nature observation and nature-based tourism | Low |
| Spiritual and inspirational | Cultural heritage (historical and archaeological) | High |
| Spiritual and inspirational | Contemporary cultural significance, including for arts and creative inspiration, and including existence values | High |
| Spiritual and inspirational | Aesthetic and sense of place values | Low |
| Scientific and educational | Educational activities and opportunities | Medium |
| Scientific and educational | Important knowledge systems, importance for research (scientific reference area or site) | High |
| Scientific and educational | Long-term monitoring site | High |
| Scientific and educational | Major scientific study site | High |
|  |  |  |

Supporting Services

|  |  |  |
| --- | --- | --- |
| **Ecosystem service**[[26]](#footnote-26) | **Examples**[[27]](#footnote-27) | **Importance/Extent/Significance**21 |
| Biodiversity | Supports a variety of all life forms including plants, animals and microorganizms, the genes they contain, and the ecosystems of which they form a part | High |
| Soil formation | Sediment retention | High |
| Soil formation | Accumulation of organic matter | High |
| Nutrient cycling | Storage, recycling, processing and acquisition of nutrients | High |
| Nutrient cycling | Carbon storage/sequestration | High |
| Pollination | Support for pollinators | High |
|  |  |  |

Optional text box to provide further information (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

Other ecosystem service(s) not included above: (This field is limited to 2000 characters)

|  |  |
| --- | --- |
|  | The economic value of “ecosystem services” provided by Whangamarino Wetland has been estimated to be $US 9.9 million/year.  |

Please make a rough estimate of the approximate number of people (distinguish between residents and visitors if possible) who directly benefit from the ecological services provided by this site (estimate at least in orders of magnitude: 10s, 100s, 1000s, 10 000s etc.):

Within the site:

|  |  |
| --- | --- |
|  | 1000 |

Outside the site:

|  |  |
| --- | --- |
|  | 10,000 |

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site?

 [x] Yes / [ ] No / [ ] Unknown

.

.

Where economic studies or assessments of economic valuation have been undertaken at the site, it would be helpful to provide information on where the results of such studies may be located (e.g. website links, citation of published literature): (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  | The Economic Values of Whangamarino Wetland (2007). Department of Conservation http://www.doc.govt.nz/Documents/conservation/threats-and-impacts/benefits-of-conservation/economic-values-whangamarino-wetland.pdf  |

4.5.2 Social and cultural values

Is the site considered internationally important for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? If so, please describe this importance under one or more of the four following categories. You should not list here any values derived from non-sustainable exploitation or which result in detrimental ecological changes.

 [ ] i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland

Description if applicable (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

 [ ] ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland

Description if applicable (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

 [ ] iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples

Description if applicable (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

 [ ] iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland

Description if applicable (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

4.6 Ecological processes

This section is not intended for completion as part of a standard RIS, but is included for completeness as part of the agreed format of a ‘full’ Ecological Character Description (ECD) outlined by Resolution X.15

Primary production (ECD)

|  |  |
| --- | --- |
|  |  |

Nutrient cycling (ECD)

|  |  |
| --- | --- |
|  |  |

Carbon cycling (ECD)

|  |  |
| --- | --- |
|  |  |

Animal reproductive productivity (ECD)

|  |  |
| --- | --- |
|  |  |

Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc. (ECD)

|  |  |
| --- | --- |
|  |  |

Notable species interactions, including grazing, predation, competition, diseases and pathogens (ECD)

|  |  |
| --- | --- |
|  |  |

Notable aspects concerning animal and plant dispersal (ECD)

|  |  |
| --- | --- |
|  |  |

Notable aspects concerning migration (ECD)

|  |  |
| --- | --- |
|  |  |

Pressures and trends concerning any of the above, and/or concerning ecosystem integrity (ECD)

|  |  |
| --- | --- |
|  |  |

How is the Site managed?

5.1 Land tenure and responsibilities (Managers)

5.1.1 Land tenure/ownership

Please specify if this category applies to the Ramsar Site, to the surrounding area or to both, by ticking the relevant option(s).

Public ownership

|  |  |  |
| --- | --- | --- |
| **Category**[[28]](#footnote-28) | **Within the Ramsar Site** | **In the surrounding area** |
| National/Federal government |  [x]  |  [ ]  |
| Provincial/region/state government |  [ ]  |  [x]  |
| Local authority, municipality, (sub)district, etc. |  [ ]  |  [x]  |
|  |  [ ]  |  [ ]  |

Private ownership

|  |  |  |
| --- | --- | --- |
| **Category**[[29]](#footnote-29) | **Within the Ramsar Site** | **In the surrounding area** |
| Foundation/non-governmental organization/trust |  [x]  |  [ ]  |
| Other types of private/individual owner(s) |  [x]  |  [x]  |
|  |  [ ]  |  [ ]  |

Other

|  |  |  |
| --- | --- | --- |
| **Category**[[30]](#footnote-30) | **Within the Ramsar Site** | **In the surrounding area** |
|  |  [ ]  |  [ ]  |

Provide further information on the land tenure / ownership regime (optional): (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | Public land (unspecified) = LINZ e.g. riverbed Local authority, municipality, (sub)district, etc. = Legal roads  |

5.1.2 Management authority

Please list the local office / offices of any agency or organization responsible for managing the site: (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | Department of Conservation |

Provide the name and/or title of the person or people with responsibility for the wetland:

|  |  |
| --- | --- |
|  | Ray Scrimgeour, Operations Manager |

Postal address: (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | PO Box 20025 Te Rapa Hamilton 3241 New Zealand  |

E-mail address: (The online RIS only accepts valid e-mail addresses, e.g. example@mail.com )

|  |  |
| --- | --- |
|  | rscrimgeour@doc.govt.nz |

5.2 Ecological character threats and responses (Management)

5.2.1 Factors (actual or likely) adversely affecting the Site’s ecological character

Please specify if this category applies to the Ramsar Site, to the surrounding area or to both, by ticking the relevant option(s).

Human settlements (non agricultural)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[31]](#footnote-31) | **Actual threat**[[32]](#footnote-32) | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Housing and urban areas | Low impact |  |  [ ]  | No change |  [x]  | increase |
| Commercial and industrial areas | Medium impact |  |  [ ]  | No change |  [x]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Water regulation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[33]](#footnote-33) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Drainage | Medium impact | Medium impact |  [ ]  | No change |  [x]  | No change |
| Water abstraction | Low impact |  |  [ ]  | No change |  [x]  | No change |
| Water releases | High impact |  |  [x]  | No change |  [x]  | No change |
| Canalisation and river regulation | High impact |  |  [x]  | No change |  [x]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Agriculture and aquaculture

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[34]](#footnote-34) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Wood and pulp plantations | Medium impact |  |  [ ]  | No change |  [x]  | No change |
| Livestock farming and ranching | Low impact |  |  [x]  | decrease |  [x]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Energy production and mining

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[35]](#footnote-35) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Mining and quarrying | Low impact |  |  [ ]  | No change |  [x]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Transportation and service corridors

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[36]](#footnote-36) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Roads and railroads | Low impact |  |  [ ]  | No change |  [x]  | No change |
| Utility and service lines (e.g., pipelines) | Low impact |  |  [x]  | No change |  [x]  | No change |
| Aircraft flight paths | Low impact |  |  [ ]  | No change |  [x]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Biological resource use

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[37]](#footnote-37) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Fishing and harvesting aquatic resources | Medium impact |  |  [x]  | decrease |  [x]  | decrease |
|  |  |  |  [ ]  |  |  [ ]  |  |

Human intrusions and disturbance

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[38]](#footnote-38) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Recreational and tourism activities | Medium impact |  |  [x]  | increase |  [x]  | No change |
| (Para)military activities | Low impact |  |  [x]  | No change |  [ ]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Natural system modifications

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[39]](#footnote-39) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Fire and fire suppression | Medium impact | High impact |  [x]  | No change |  [x]  | No change |
| Dams and water management/use | Low impact |  |  [x]  | No change |  [x]  | No change |
| Vegetation clearance/ land conversion | Low impact |  |  [x]  | increase |  [x]  | unknown |
|  |  |  |  [ ]  |  |  [ ]  |  |

Invasive and other problematic species and genes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[40]](#footnote-40) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Invasive non-native/ alien species | High impact | High impact |  [x]  | No change |  [x]  | No change |
| Problematic native species | Low impact | Medium impact |  [x]  | increase |  [ ]  | No change |
| Introduced genetic material | Medium impact |  |  [x]  | increase |  [ ]  | No change |
|  |  |  |  [ ]  |  |  [ ]  |  |

Pollution

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[41]](#footnote-41) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Household sewage, urban waste water | Low impact |  |  [ ]  | No change |  [x]  | increase |
| Industrial and military effluents | Low impact |  |  [ ]  | No change |  [x]  | unknown |
| Agricultural and forestry effluents | Medium impact |  |  [ ]  | No change |  [x]  | increase |
| Garbage and solid waste | Low impact |  |  [x]  | No change |  [x]  | No change |
| Air-borne pollutants | Medium impact |  |  [ ]  | No change |  [x]  | unknown |
|  |  |  |  [ ]  |  |  [ ]  |  |

Geological events

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[42]](#footnote-42) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
|  |  |  |  [ ]  |  |  [ ]  |  |

Climate change and severe weather

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors adversely affecting site**[[43]](#footnote-43) | **Actual threat**32 | **Potential threat**32 | **Within the site** | **Changes**12 | **In the surrounding area** |  **Changes**12 |
| Droughts | Medium impact | Medium impact |  [x]  | unknown |  [ ]  | No change |
| Storms and flooding | Medium impact | Medium impact |  [x]  | increase |  [x]  | increase |
|  |  |  |  [ ]  |  |  [ ]  |  |

Please describe any other threats (optional): (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Ponds and associated access tracks have been constructed for recreational game bird harvest, involving clearance of some areas of indigenous vegetation beneath a grey willow canopy.  Farm stock (cattle) impact the wetland in unfenced or poorly fenced areas, however improved and additional fencing is reducing this threat.  Continued input of sediment and associated nutrients (mainly N and P) from tributary catchments, and increased water fluctuations associated with flood discharge, will potentially disrupt bog development and result in the spread of more nutrient-requiring species adapted to large water fluctuations (including invasive plants such as Alternanthera philoxeroides).  Impacts associated with climate change are also a key potential threat at the site, projected changes in temperatures and flood/dry cycles may trigger an increase in 'blackwater' (low dissolved oxygen) events associated with fish mortality.  Invasion by plant pests in particular Salix cinerea, Osmunda regalis, Phalaris arundinacea, Glyceria maxima, Alternanthera philoxeroides, Iris pseudacorus and Myriophyllum aquaticum is displacing indigenous species and reducing natural character. The operation of the Lake Waikare discharge provides a key pathway for the transfer of invasive aquatic weeds into Whangamarino Wetland, particularly Alternanthera philoxeroides and Iris pseudacorus.  Red deer are culled by aerial operations and have been reduced to very low numbers. Other pest animals including pest fish, ungulates, mustelids and rodents will continue to affect the native vegetation and fauna communities that evolved in the absence of ground-based predators. There has been an increase in koi carp populations (comprising over 80% of biomass in a 2007/8 survey), and they are now the dominant fish. Koi carp seek inundated wetland vegetation for spawning and recruitment. Exotic gambusia are also abundant and warming water temperatures may favour increased recruitment. A fish trap was previously installed to harvest koi carp migrating between Whangamarino Wetland and Lake Waikare. Introduced mallard ducks regularly breed with native grey ducks, which may be extinct as a pure species through hybridisation.  Some of the listed aliens may have major effects at local scale. Baseline monitoring has been established for predatory mammals but no time series data are yet available to assess trends. Where change (or lack of) is recorded this is based on local expert opinion/ observation.  |

5.2.2 Legal conservation status

Please list any other relevant conservation status, at global, regional or national level and specify the boundary relationships with the Ramsar Site:

Global legal designations

|  |  |  |  |
| --- | --- | --- | --- |
| **Designation type**[[44]](#footnote-44) | **Name of area** | **Online information url** | **Overlap with Ramsar Site**[[45]](#footnote-45) |
|  |  |  |  |

Regional (international) legal designations

|  |  |  |  |
| --- | --- | --- | --- |
| **Designation type**[[46]](#footnote-46) | **Name of area** | **Online information url** | **Overlap with Ramsar Site**45 |
|  |  |  |  |

National legal designations

|  |  |  |  |
| --- | --- | --- | --- |
| **Designation type** | **Name of area** | **Online information url** | **Overlap with Ramsar Site**45 |
| Conservation area | Kopuku Stream |  | whole |
| Marginal strip | Kopuku Stream |  | whole |
| Marginal strip | Whangamarino River |  | whole |
| Reserve | Whangamarino Government Purpose Reserve |  | whole |
| Reserve | Whangamarino Wetland Management Reserve |  | whole |
| Reserve | Whangamarino Wildlife Management Reserve |  | whole |
|  |  |  |  |

Non-statutory designations

|  |  |  |  |
| --- | --- | --- | --- |
| **Designation type**[[47]](#footnote-47) | **Name of area** | **Online information url** | **Overlap with Ramsar Site**45 |
| Other non-statutory designation | Whangamarino EMU (Ecological Management Unit) |  | partly |
| Other non-statutory designation | Whangamarino Wetland Site of Special Wildlife Importance, ranked Outstanding  |  | partly |
| Other non-statutory designation | Whangamarino Wetland WERI site Wetland of Ecological and Representative Importance (no date) |  | partly |
|  |  |  |  |

5.2.3 IUCN protected areas categories (2008)

 [ ] Ia Strict Nature Reserve

 [x] Ib Wilderness Area: protected area managed mainly for wilderness protection

 [ ] II National Park: protected area managed mainly for ecosystem protection and recreation

 [ ] III Natural Monument: protected area managed mainly for conservation of specific natural features

 [x] IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention

 [ ] V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation

 [ ] VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

5.2.4 Key conservation measures

Legal protection

|  |  |
| --- | --- |
| **Measures**[[48]](#footnote-48) | **Status**[[49]](#footnote-49) |
| Legal protection | Implemented |
|  |  |

Habitat

|  |  |
| --- | --- |
| **Measures**[[50]](#footnote-50) | **Status**49 |
| Catchment management initiatives/controls | Proposed |
| Improvement of water quality | Partially implemented |
| Habitat manipulation/enhancement | Partially implemented |
| Hydrology management/restoration | Implemented |
| Re-vegetation | Partially implemented |
| Soil management | Partially implemented |
| Land conversion controls | Implemented |
|  |  |

Species

|  |  |
| --- | --- |
| **Measures**[[51]](#footnote-51) | **Status**49 |
| Control of invasive alien animals | Partially implemented |
| Threatened/rare species management programmes | Partially implemented |
| Control of invasive alien plants | Partially implemented |
|  |  |

Human Activities

|  |  |
| --- | --- |
| **Measures**[[52]](#footnote-52) | **Status**49 |
| Management of water abstraction/takes | Implemented |
| Regulation/management of wastes | Implemented |
|  Livestock management/exclusion (excluding fisheries) | Partially implemented |
| Fisheries management/regulation | Implemented |
| Regulation/management of recreational activities | Implemented |
| Communication, education, and participation and awareness activities | Partially implemented |
| Research | Partially implemented |
| Harvest controls/poaching enforcement | Implemented |
|  |  |

Other: (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Many of the stated management activities (including control of alien species) are ongoing activities, so will never be fully "implemented". Activities are planned in various documents including annual business plans of the DOC and Waikato Regional Council.  A site-led weed management plan was developed in 2010 that identified key management areas within the wetland and recommended control methods. The plan also recommended further research on the environmental drivers of royal fern as evidence suggests this plant has the potential to become as widespread as grey willow. The Department of Conservation is currently focusing attention on preventing further incursion of grey willow into high value bog and fen areas rather than a more widespread approach. Effective methods for large-scale grey willow control in wetlands are currently being investigated. Some species (e.g. yellow flag, alligator weed) are being actively targeted for control.  The future management of Whangamarino Wetland is a key focus for iwi, many key stakeholders, landowners and the wider community. The Lake Waikare and Whangamarino Wetland Catchment Management Plan’ (CMP) was developed in 2018 to help implement a coordinated approach to management. The CMP identifies a number of options to enhance Whangamarino Wetland, including a catchment works programme to reduce erosion from agricultural land and decrease sedimentation in waterways, and other measures to improve water quality, and protect or enhance biodiversity.  Waikato Regional Council have also 1) amended the operation rules for one of the flood control scheme gate controls, in order to achieve a reduction in sediment discharge through reducing inputs from the Waikato River, 2) undertaken works to reduce bank erosion from Pungarehu Canal and 3) progressed a regional plan (policy) change to further reduce the contaminants entering Whangamarino Wetland.  The following research and monitoring has been undertaken in Whangamarino: • hydrological investigations to understand the wetland hydrological dynamics and develop forecasting ability • sediment deposition monitoring to identify the main areas and causes of deposition • monitoring of black mudfish and other native fish • research into effective monitoring protocols for cryptic birds (Australasian bittern, marsh crake, spotless crake, fernbird) and introduced mammalian predators • vegetation plot monitoring (permanent plots) and mapping to measure change in extent and distribution of key habitat types, distribution of key invasive plant species, and impacts of fire • research into the effects of herbicide spray for grey willow control on non-target vegetation and invertebrates • habitat manipulation trails using controlled fire to enhance populations of the orchid Corybas carsei  A wetland driving trail and interpretation plaques have been installed by the National Wetland Trust and the Department of Conservation.  |

5.2.5 Management planning

Is there a site-specific management plan for the site?

|  |  |
| --- | --- |
|  | Yes[[53]](#footnote-53) |

Is the management plan/planning implemented?

 [x] Yes / [ ] No

.

The management plan covers

|  |  |
| --- | --- |
|  | All of Ramsar Site[[54]](#footnote-54) |

Is the management plan currently subject to review and update?

 [x] Yes / [ ] No

.

Has a management effectiveness assessment been undertaken for the site?

 [x] Yes / [ ] No

.

Please give link to site-specific plan or other relevant management plan if this is available via the Internet or upload it in section 'Additional material': (This field is limited to 500 characters)

|  |  |
| --- | --- |
|  | http://www.doc.govt.nz/our-work/arawai-kakariki-wetland-restoration/ |

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party?

 [ ] Yes / [x] No

.

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site: (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  | A wetland driving trail and smartphone app have been developed by the National Wetland Trust, interpretation signage installed at Te Kauwhata by the Department of Conservation and at Lake Waikare by the National Wetland Trust. |

URL of site-related webpage (if relevant):

|  |  |
| --- | --- |
|  |  http://www.wetlandtrust.org.nz/Site/Visiting\_Wetlands.ashx |

5.2.6 Planning for restoration

Is there a site-specific restoration plan?

|  |  |
| --- | --- |
|  | Please select a value[[55]](#footnote-55) |

Has the plan been implemented?

 [ ] Yes / [x] No

.

The restoration plan covers:

|  |  |
| --- | --- |
|  | Please select a value[[56]](#footnote-56) |

Is the plan currently being reviewed and updated?

 [ ] Yes / [x] No

.

Where the restoration is being undertaken to mitigate or respond to a threat or threats identified in this RIS, please indicate it / them: (This field is limited to 1000 characters)

|  |  |
| --- | --- |
|  |  |

Further information (This field is limited to 2500 characters)

|  |  |
| --- | --- |
|  |  |

5.2.7 Monitoring implemented or proposed

|  |  |
| --- | --- |
| **Monitoring**[[57]](#footnote-57) | **Status**[[58]](#footnote-58) |
| Water regime monitoring | Implemented |
| Water quality | Implemented |
| Soil quality | Implemented |
| Plant community | Implemented |
| Plant species | Implemented |
| Animal community | Implemented |
| Animal species (please specify) | Implemented |
| Birds | Implemented |
|  |  |

Please indicate other monitoring activities:

 (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Hydrology is regularly monitored by the Waikato Regional Council.  The Department of Conservation has monitored soil using samples collected from vegetation plots and sediment accumulation rates measured in the southern part of the wetland.  The Department of Conservation has implemented vegetation community monitoring at 5-yearly intervals from a 2009 baseline, and undertakes some plant and animal pest monitoring. Plant species and communities monitored include Corybas carsei and invasive plant species. Animal community and species monitoring includes introduced mammalian predators, cryptic wetland bird species and fish species.  |

Additional material

6.1 Additional reports and documents

6.1.1 Bibliographical references

 (This field is limited to 3000 characters)

|  |  |
| --- | --- |
|  | Blyth, J. M. 2011. Ecohydrological characterisation of Whangamarino wetland (Thesis, Master of Science). University of Waikato, Hamilton, New Zealand  Cromarty, P. and Scott, D. A. 1996. A directory of wetlands in New Zealand. Department of Conservation, Wellington, New Zealand.  Department of Conservation 2014. Waikato Conservation Management Strategy 2014–2024. Department of Conservation, Hamilton.  Department of Conservation. 1989: Whangamarino Wetlands Management Plan.  Duggan, K, L. Roberts, M. Beech, H. Robertson, M. Brady, M. Lake, K. Jones, K. Hutchinson, S. Patterson. 2013. Arawai Kakariki Wetland Restoration Programme. Whangamarino Outcomes Report 2007-2011. Department of Conservation, Wellington.  Jacobs. 2015. Whangamarino Water Quality Modelling and Mapping using Source Catchments, Technical report for Department of Conservation. Jacobs NZ Ltd, Wellington  Lake M, Hicks B and Brijs 2011. Fish Survey of the Whangamarino Wetland 2007-2008. Department of Conservation, Hamilton  Ogle, C.C. and Bartlett, J.K. 1981. Flora of the Whangamarino swamp. In Whangamarino Swamp Resources. Study, pp.35-46. Waikato Valley Authority Technical Publication 20, Hamilton.  PDP. 2018. Lake Waikare and Whangamarino Wetland Sediment Monitoring Report, Pattle Delamore Partners Ltd, February 2018. WRC Doc# 11786823.  Reeve, G.; Gibbs, M.; Swales, A. 2010. Recent Sedimentation in the Whangamarino Wetland. Prepared for the Department of Conservation. NIWA Report: HAM2010-080, Hamilton.  Reeves, P., & Hancock, N. 2012. Ecological Impacts of the Flood Control Scheme on Lake Waikare and the Whangamarino Wetland, and Potential Mitigation Options. Prepared for Department of Conservation and Waikato Regional Council by Wildlands Consultants Ltd  Waikato Regional Council. 2014. Project Management Plan - Lake Waikare & Whangamarino Wetland Catchment Management Plan Project. Hamilton: Waikato Regional Council.  Wildland Consultants Ltd. 2009. Whangamarino Threatened Plant Surveys 2008-2009. Hamilton: Wildland Consultants Ltd Contract Report No. 2090. Prepared for Department of Conservation.  Wildland Consultants Ltd. 2011. Whangamarino Wetland Vegetation Map 2008: Methodology. Hamilton: Prepared for Department of Conservation.  Websites that prominently feature this Ramsar site http://www.doc.govt.nz/parks-and-recreation/places-to-go/waikato/places/whangamarino-wetland/ http://www.wetlandtrust.org.nz/Site/Ramsar\_Convention/Whangamarino.ashx downloaded August 2016  Water monitoring http://www.waikatoregion.govt.nz/Environment/Natural-resources/Water/Rivers/Our-other-rivers/Water-quality-monitoring-map/Whangamarino-river-at-Island-Block-Rd/  |

6.1.2 Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)

-UPLOAD via online form-

ii. a detailed Ecological Character Description (ECD) (in a national format)

-UPLOAD via online form-

iii. a description of the site in a national or regional wetland inventory

-UPLOAD via online form-

iv. relevant Article 3.2 reports

-UPLOAD via online form-

v. site management plan

-UPLOAD via online form-

vi. other published literature

-UPLOAD via online form-

Please note that any documents uploaded here will be made publicly available.

6.1.3 Photograph(s) of the Site

Please provide at least one photograph of the site:

|  |  |  |  |
| --- | --- | --- | --- |
| **File** | **Copyright holder** | **Date on which the picture was taken** | **Caption** |
| files/38455871/pictures/Whangamarino June 10 2010 (2).jpg | DOC | 10-06-2010 | Swamp habitat in Whangamarino Wetland Ramsar site  |
| files/38455871/pictures/IMG\_4122.jpg | DOC | 06-10-2011 | Aerial view of Whangamarino Wetland Ramsar site |
|  |  |  |  |

 [x] I certify that I am the photographer, the valid holder of rights over the photograph(s), or an authorized representative of the organization which is the valid holder of rights over the photograph(s), and I hereby assign an irrevocable, perpetual and royalty-free right to use, reproduce, edit, display, transmit, prepare derivative works of, modify, publish, affix logos to, and otherwise make use of the submitted photograph(s) in any way, to the Ramsar Convention Secretariat, its affiliates and partners, for non-commercial purposes in conjunction with the mission of the Ramsar Convention. This use includes, but is not limited to, internal and external publication and materials, presentation on the websites of the Ramsar Convention or any affiliated body, and any and all other communication channels with copyright attributed to the holder in all published forms. The full accuracy of all data submitted rests with the submitter, or organization submitting the photograph(s). In submitting, I hereby agree to the aforementioned terms, personally or on behalf of the organization of which I am an authorized official, certifying that the Ramsar Convention Secretariat, its affiliates and partners are explicitly held harmless for any and all costs, expenses, or damages arising from use of the submitted photograph(s) and any additional information provided.

6.1.4 Designation letter and related data

Designation letter\*

-UPLOAD via online form-

Please upload a letter of designation from the Ramsar Administrative Authority. This letter must clearly state that the wetland is being designated for inclusion in the Ramsar List and specify the formal date of designation wished. The letter can be uploaded in two formats: Word document (doc); pdf Strategic Framework: 408. The RIS for a newly designated Site (or an update to the RIS for a previously designated site) must be officially transmitted to the Secretariat by the Ramsar Administrative Authority (AA) of the Contracting Party concerned, with a letter clearly stating that the wetland is being designated for inclusion in the Ramsar List and specifying the formal date of designation if wished. 413. The date of designation of a Ramsar Site is that indicated or requested by the Ramsar Administrative Authority (AA). The designation date required should be indicated in the designation letter from the AA to the Secretariat that accompanies the RIS. 414. If no designation date is indicated to the Secretariat, the Secretariat assigns the date of the designation letter from the Administrative Authority as the designation date of the site. 415. If, following the receipt and review of the RIS by the Secretariat (see below), a significant time-period elapses before any problems with the RIS content are resolved with the Administrative Authority, the Secretariat may propose that, with the agreement of the AA, the date of designation is that on which the RIS is finalised.

Transboundary Designation letter

-UPLOAD via online form-

Date of Designation

|  |  |
| --- | --- |
|  | 1989-12-04 |

Number of certificates wished (The online RIS only accepts numeric values)

|  |  |
| --- | --- |
|  | 0 |

1. No change to area | the area has increased | the area has decreased [↑](#footnote-ref-1)
2. Not evaluated | No | Uncertain | Yes -likely- | Yes -actual- [↑](#footnote-ref-2)
3. Marine Ecoregions of the World (MEOW) | Udvardy's Biogeographical Provinces | Bailey's Ecoregions | WWF Terrestrial Ecoregions | EU biogeographic regionalization | Freshwater Ecoregions of the World (FEOW) | Other scheme (provide name below) [↑](#footnote-ref-3)
4. [↑](#footnote-ref-4)
5. Percentage of the total biogeographic population at the site. These fields are only compulsory to justify criteria 6 & 9 [↑](#footnote-ref-5)
6. [↑](#footnote-ref-6)
7. A: Permanent shallow marine waters | B: Marine subtidal aquatic beds (Underwater vegetation) | C: Coral reefs | D: Rocky marine shores | E: Sand, shingle or pebble shores | G: Intertidal mud, sand or salt flats | Ga: Bivalve (shell-fish) reefs | H: Intertidal marshes | I: Intertidal forested wetlands | J: Coastal brackish / saline lagoons | F: Estuarine waters | Zk(a): Karst and other subterranean hydrological systems | K: Coastal freshwater lagoons [↑](#footnote-ref-7)
8. | Representative | Rare | Unique [↑](#footnote-ref-8)
9. M: Permanent rivers/ streams/ creeks | L: Permanent inland deltas | Y: Permanent Freshwater springs; oases | N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks | O: Permanent freshwater lakes | Tp: Permanent freshwater marshes/ pools | P: Seasonal/ intermittent freshwater lakes | Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils | Tp: Permanent freshwater marshes/ pools | W: Shrub-dominated wetlands | Xf: Freshwater, tree-dominated wetlands | Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils | U: Permanent Non-forested peatlands | Xp: Permanent Forested peatlands | Va: Montane wetlands | Vt: Tundra wetlands | Q: Permanent saline/ brackish/ alkaline lakes | R: Seasonal/ intermittent saline/ brackish/ alkaline lakes and flats | Sp: Permanent saline/ brackish/ alkaline marshes/ pools | Ss: Seasonal/ intermittent saline/ brackish/ alkaline marshes/ pools | Zg: Geothermal wetlands | Zk(b): Karst and other subterranean hydrological systems [↑](#footnote-ref-9)
10. 1: Aquaculture ponds | 2: Ponds | 3: Irrigated land | 4: Seasonally flooded agricultural land | 5: Salt exploitation sites | 6: Water storage areas/Reservoirs | 7: Excavations | 8: Wastewater treatment areas | 9: Canals and drainage channels or ditches | Zk(c): Man-made subterranean hydrological systems [↑](#footnote-ref-10)
11. Potential | Actual (minor impacts) | Actual (major impacts) [↑](#footnote-ref-11)
12. No change | increase | decrease | unknown [↑](#footnote-ref-12)
13. A. Tropical humid climate | B. Dry climate | C. Moist Mid-Latitude climate with mild winters | D. Moist Mid-Latitude climate with cold winters | E. Polar climate with extremely cold winters and summers | H. Highland [↑](#footnote-ref-13)
14. Af: Tropical wet (No dry season) | Am: Tropical monsoonal (Short dry season; heavy monsoonal rains in other months) | Aw: Tropical savanna (Winter dry season) | BWh: Subtropical desert (Low-latitude desert) | BSh: Subtropical steppe (Low-latitude dry) | BWk: Mid-latitude desert (Mid-latitude desert) | BSk: Mid-latitude steppe (Mid-latitude dry) | Csa: Mediterranean (Mild with dry, hot summer) | Csb: Mediterranean (Mild with dry, warm summer) | Cfa: Humid subtropical (Mild with no dry season, hot summer) | Cwa: Humid subtropical (Mild with dry winter, hot summer) | Cfb: Marine west coast (Mild with no dry season, warm summer) | Cfc: Marine west coast (Mild with no dry season, cool summer) | Dfa: Humid continental (Humid with severe winter, no dry season, hot summer) | Dfb: Humid continental (Humid with severe winter, no dry season, warm summer) | Dwa: Humid continental (Humid with severe, dry winter, hot summer) | Dwb: Humid continental (Humid with severe, dry winter, warm summer) | Dfc: Subarctic (Severe winter, no dry season, cool summer) | Dfd: Subarctic (Severe, very cold winter, no dry season, cool summer) | Dwc: Subarctic (Severe, dry winter, cool summer) | Dwd: Subarctic (Severe, very cold and dry winter, cool summer) | ET: Tundra (Polar tundra, no true summer) | EF: Ice Cap (Perennial ice) | H: Highland (-) [↑](#footnote-ref-14)
15. Usually permanent water present | Usually seasonal, ephemeral or intermittent water present | Unknown [↑](#footnote-ref-15)
16. Water inputs from precipitation | Water inputs from surface water | Water inputs from groundwater | Marine water | Unknown [↑](#footnote-ref-16)
17. Feeds groundwater | To downstream catchment | Marine | Unknown [↑](#footnote-ref-17)
18. Water levels largely stable | Water levels fluctuating (including tidal) | Unknown [↑](#footnote-ref-18)
19. Food for humans | Fresh water | Wetland non-food products | Biochemical products | Genetic materials [↑](#footnote-ref-19)
20. Sustenance for humans (e.g., fish, molluscs, grains) | Drinking water for humans and/or livestock | Water for irrigated agriculture | Water for industry | Water for energy production (hydro-electricity) | Timber | Fuel wood/fibre | Peat | Livestock fodder | Reeds and fibre | Other | Extraction of material from biota | Medicinal products | Genes for tolerance to certain conditions (e.g., salinity) | Genes for resistance to plant pathogens | Ornamental species (live and dead) [↑](#footnote-ref-20)
21. not relevant for site | Low | Medium | High [↑](#footnote-ref-21)
22. Maintenance of hydrological regimes | Erosion protection | Pollution control and detoxification | Climate regulation | Biological control of pests and disease | Hazard reduction [↑](#footnote-ref-22)
23. Groundwater recharge and discharge | Storage and delivery of water as part of water supply systems for agriculture and industry | Soil, sediment and nutrient retention | Water purification/waste treatment or dilution | Local climate regulation/buffering of change | Regulation of greenhouse gases, temperature, precipitation and other climactic processes | Support of predators of agricultural pests (e.g., birds feeding on locusts) | Flood control, flood storage | Coastal shoreline and river bank stabilization and storm protection [↑](#footnote-ref-23)
24. Recreation and tourism | Spiritual and inspirational | Scientific and educational [↑](#footnote-ref-24)
25. Recreational hunting and fishing | Water sports and activities | Picnics, outings, touring | Nature observation and nature-based tourism | Inspiration | Cultural heritage (historical and archaeological) | Contemporary cultural significance, including for arts and creative inspiration, and including existence values | Spiritual and religious values | Aesthetic and sense of place values | Educational activities and opportunities | Important knowledge systems, importance for research (scientific reference area or site) | Long-term monitoring site | Major scientific study site | Type location for a taxon [↑](#footnote-ref-25)
26. Biodiversity | Soil formation | Nutrient cycling | Pollination [↑](#footnote-ref-26)
27. Supports a variety of all life forms including plants, animals and microorganizms, the genes they contain, and the ecosystems of which they form a part | Sediment retention | Accumulation of organic matter | Storage, recycling, processing and acquisition of nutrients | Carbon storage/sequestration | Support for pollinators [↑](#footnote-ref-27)
28. Public land (unspecified) | National/Federal government | Provincial/region/state government | Local authority, municipality, (sub)district, etc. | Other public ownership [↑](#footnote-ref-28)
29. Cooperative/collective (e.g., farmers cooperative) | Commercial (company) | Foundation/non-governmental organization/trust | Religious body/organization | Other types of private/individual owner(s) [↑](#footnote-ref-29)
30. Unspecified mixed ownership | No information available | Commoners/customary rights [↑](#footnote-ref-30)
31. Housing and urban areas | Commercial and industrial areas | Tourism and recreation areas | Unspecified development [↑](#footnote-ref-31)
32. Low impact | Medium impact | High impact | unknown impact | [↑](#footnote-ref-32)
33. Drainage | Water abstraction | Dredging | Salinisation | Water releases | Canalisation and river regulation [↑](#footnote-ref-33)
34. Annual and perennial non-timber crops | Wood and pulp plantations | Livestock farming and ranching | Marine and freshwater aquaculture | Non specified [↑](#footnote-ref-34)
35. Oil and gas drilling | Mining and quarrying | Renewable energy | Unspecified [↑](#footnote-ref-35)
36. Roads and railroads | Utility and service lines (e.g., pipelines) | Shipping lanes | Aircraft flight paths | Unspecified [↑](#footnote-ref-36)
37. Hunting and collecting terrestrial animals | Gathering terrestrial plants | Logging and wood harvesting | Fishing and harvesting aquatic resources | Unspecified [↑](#footnote-ref-37)
38. Recreational and tourism activities | (Para)military activities | Unspecified/others [↑](#footnote-ref-38)
39. Fire and fire suppression | Dams and water management/use | Vegetation clearance/ land conversion | Unspecified/others [↑](#footnote-ref-39)
40. Invasive non-native/ alien species | Problematic native species | Introduced genetic material | Unspecified [↑](#footnote-ref-40)
41. Household sewage, urban waste water | Industrial and military effluents | Agricultural and forestry effluents | Garbage and solid waste | Air-borne pollutants | Excess heat, sound, light | Unspecified [↑](#footnote-ref-41)
42. Volcanoes | Earthquakes/tsunamis | Avalanches/landslides | Unspecified [↑](#footnote-ref-42)
43. Habitat shifting and alteration | Droughts | Temperature extremes | Storms and flooding | Unspecified [↑](#footnote-ref-43)
44. World Heritage site | UNESCO Biosphere Reserve | Other global designation [↑](#footnote-ref-44)
45. whole | partly [↑](#footnote-ref-45)
46. EU Natura 2000 | Other international designation [↑](#footnote-ref-46)
47. Important Bird Area | Important Plant Area | Other non-statutory designation [↑](#footnote-ref-47)
48. Legal protection [↑](#footnote-ref-48)
49. Proposed | Partially implemented | Implemented [↑](#footnote-ref-49)
50. Catchment management initiatives/controls | Improvement of water quality | Habitat manipulation/enhancement | Hydrology management/restoration | Re-vegetation | Soil management | Land conversion controls | Faunal corridors/passage [↑](#footnote-ref-50)
51. Threatened/rare species management programmes | Reintroductions | Control of invasive alien plants | Control of invasive alien animals [↑](#footnote-ref-51)
52. Management of water abstraction/takes | Regulation/management of wastes | Livestock management/exclusion (excluding fisheries) | Fisheries management/regulation | Harvest controls/poaching enforcement | Regulation/management of recreational activities | Communication, education, and participation and awareness activities | Research [↑](#footnote-ref-52)
53. No | Yes | In preparation [↑](#footnote-ref-53)
54. All of Ramsar Site | Part of Ramsar Site [↑](#footnote-ref-54)
55. No need identified | No; the site has already been restored | No; but restoration is needed | No; but a plan is being prepared | Yes; there is a plan [↑](#footnote-ref-55)
56. All of Ramsar Site | Part of Ramsar Site [↑](#footnote-ref-56)
57. Water regime monitoring | Water quality | Soil quality | Plant community | Plant species | Animal community | Animal species (please specify) | Birds [↑](#footnote-ref-57)
58. Implemented | Proposed [↑](#footnote-ref-58)