

# Coverage of protected freshwater wetlands

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# Abstract

This technical report documents the extent of legally protected freshwater wetlands in the Waikato Region based on 2018 land cover and 2022 legal protection overlays.

In total, 55 per cent of the region's 33,269 hectares of remaining freshwater wetlands are in some form of legal protection. Reserves protect 63 per cent of the total current extent of Herbaceous Freshwater Vegetation, 38 per cent of the Flaxland, 53 per cent of wet Mānuka &/or Kānuka, and 42 per cent of the wet Deciduous Hardwood forest (usually exotic willow with indigenous understorey).

Department of Conservation reserves account for 97 per cent of the protected freshwater wetlands, while private protected land and district council reserves each hold just over 1 per cent of the total amount of protected freshwater wetlands. Every year since 1996, an average of 9 hectares of privately owned freshwater wetland in the region has been protected under QEII covenants or Ngā Whenua Rāhui kawenata. As of January 2021, a total of 272 hectares of freshwater wetland were protected on private land.

Over 83 per cent of all of the remaining areas of freshwater wetland in the Waikato Region occurs within Category 1 & 2 Threatened Environments. Across the region almost over 10,550 hectares of freshwater wetland remain unprotected in these depleted environments.

Freshwater wetlands occur mostly in lower elevations, with 85 per cent of the current extent found in the lowland bioclimatic zone, of which 61 per cent is protected. Wetlands in submontane and coastal areas are the least well-protected with less than a quarter of their remaining wetlands in some form of reserve or on private protected land.

Within the district council areas, Matamata-Piako, and Hauraki districts have the highest proportion of their remaining wetland areas protected (more than 80 per cent each). One third of the region's total area of unprotected freshwater wetlands lies in the Taupo and Waikato district council areas.



# 1 Introduction

Waikato Regional Council monitors changes in the amount and proportions of freshwater wetland that is in some form of legal protection, including government reserves and private protected land. This document reports on what wetland types are the best protected, who is protecting them, and where they are protected.

The Waikato Regional Policy Statement has a policy to provide for (among other things) the promotion of voluntary legal protection, restoration or enhancement of indigenous biodiversity. Wetlands are a severely depleted and often degraded ecosystem type. Nationally, an estimated 90 per cent of the pre-human extent of wetlands has been cleared and drained (Ausseil et. al 2006).

Legal protection in a gazetted reserve or other legal instrument is one method to protect wetlands and their associated biodiversity from deliberate destruction.

Waikato Regional Council has analysed the extent of freshwater wetlands in the region (including those dominated by invasive deciduous trees) that are in a form of legal protection (for example gazetted as a reserve or identified as an open space covenant on land title). We also analyse protection of wetlands within bioclimatic zones and within National Priority 1 Environments (Ministry for the Environment and Department of Conservation 2007).

Monitoring trends in the type, location, and extent of protected wetland areas gives us valuable information on how much protection we are giving to our region's unique biodiversity and whether our reserves network is representative across wetland type and geographic spread.

Monitoring protected wetlands helps us to:

- assess overall progress of the total area protected, as a measure of policy response to biodiversity loss
- track changes in extent of protected areas in relation to geographical and political units, and to different measures of biodiversity (such as priority areas, ecosystem or habitat maps and species distributions)
- ensure a full range of habitats are protected to maintain biodiversity
- find out what geographic areas or wetland types are under-represented in the current reserves system.
- identify priority areas for conservation.

The monitoring outcomes can therefore guide adaptive management and policy decisions for biodiversity management planning.

## 2 Definitions

### 2.1 Freshwater wetlands

For this indicator, freshwater wetland refers to areas of land dominated by plant species that grow in freshwater saturated soils or grow tall enough to emerge above areas of shallow freshwater. These include areas of bog, swamp and fen, but do not include open water, flowing water, or salty (saline or brackish) water. We use classes from the Land Cover Database<sup>1</sup> to

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<sup>1</sup> The Land Cover Database (LCDB) uses satellite imagery to map land cover in New Zealand. This indicator draws upon version 5, which was released in 2018 and includes corrections to all LCDB version time steps 1996/97, 2001/02, 2008/09 2012/13 and 2017/18. <https://iris.scinfo.org.nz/layer/104400-lcdb-v50-land-cover-database-version-50-mainland-new-zealand/>

identify areas that are predominantly freshwater wetlands: all Herbaceous Freshwater Vegetation, all Flaxland, Mānuka and/or Kānuka where Wetland Context = Yes and Deciduous Hardwoods where Wetland Context = Yes).

Herbaceous Freshwater Vegetation includes areas dominated by herbaceous aquatic vegetation as a component of freshwater wetlands. Common plants include sedges, rushes, or grasses, herbs or moss species.

We include Deciduous Hardwoods that have a wetland context, because an estimated one third of the freshwater wetlands remaining in the Waikato Region have been invaded by willow or alder species<sup>2</sup>. Willow and alder stands often mask diverse understories with abundant native wetland species and are important habitat for many wetland fauna. When reporting on the extent and condition of freshwater wetlands at the regional scale it is important therefore to consider and report on the extent of all wetland types, including areas dominated in the canopy by non-native deciduous hardwoods. Such sites are important repositories of indigenous biodiversity and can be priority areas for wetland restoration.

Terrestrial and saltwater (saline) habitat protection is covered by other indicators in the State of the Environment Indicator series. Some vegetation types in the Land Cover Database can establish in wetland or terrestrial habitats, such as Flaxland, Fernland, and Mānuka and/or Kanuka scrub. For the purpose of this indicator the following land cover classes have been allocated to the terrestrial State of the Environment Indicators: all Fernland; and Mānuka and/or Kanuka where “Wetland Context = No”.

## 2.2 Protected areas

Legally protected areas are defined as: places where natural or cultural resources and biodiversity are protected, maintained and managed, usually by law (Molloy 2015)

- In New Zealand, legally protected areas can be on publicly or privately owned land, and include;
- Department of Conservation reserves
- QEII covenants (private protected land)
- Ngā Whenua Rāhui Kawenata (protected Māori-owned land)
- other areas protected by territorial authorities or state-owned land

Some areas are legally protected for the express purpose of protecting natural features from deliberate destruction or development. In other cases, land has been set aside for another purpose, e.g., for recreation or future use for cemeteries or other public amenity. If such land has been gazetted under the Reserves Act, there is a secondary requirement to protect natural features in that parcel, to the extent compatible with the reserve’s stated purpose.

We have limited our definition of legal protection to areas protected in perpetuity or for a specified period under one of the following acts:

- Conservation Act 1987
- National Parks Act 1980
- Reserves Act 1977
- Wildlife Act 1953
- Queen Elizabeth the Second National Trust Act 1977
- Local Government Act

The Reserves Act 1977 and Conservation Act 1987 offer the most common methods for protecting public land in perpetuity, particularly with a focus on biodiversity protection. Either act can be used to register land as a conservation covenant or Ngā Whenua Rāhui (with the same text appearing in each act).

Land under legal protection for conservation purposes is managed in New Zealand by a number of agencies. The main tenure types are described below.

The Department of Conservation (DOC) is the central government organisation charged with conserving the natural and historic heritage of New Zealand. DOC is responsible for protecting and preserving the majority of legally protected public land in New Zealand. Most of the DOC reserves come under the Conservation Act 1987, with some under the Reserves Act 1977. They include areas of Stewardship land which are subject to potential disposal but until such time are to be managed for their natural and historic values (Conservation Act 1987).

The Queen Elizabeth the Second National Trust (QEII Trust) works with private landowners who wish to have some or all of their land legally protected. A covenant is registered on the title to the land, providing legal protection that binds the current and all subsequent landowners. The Trust generally contributes to the establishment of the covenant and regularly monitors the land to ensure it is managed in accordance with the covenant conditions. The first covenant was registered in 1979.

Ngā Whenua Rāhui was established in 1991 to provide a vehicle for protection of Maori-owned land in multiple titles. Ngā Whenua Rāhui kawenata can be registered under the Reserves Act 1977 (s77a) or the Conservation Act 1987 (s27a). Kawenata are vested for 25 years and are renewable. Trend reporting will indicate the extent to which such protected areas remain protected after their renewal period ends. To date no kawenata have reached the end of their vesting period in the Waikato region. Kawenata Management Agreements are not treated as protected land for the purposes of this indicator.

Local authority reserves are a range of reserve types protected under the Reserves Act 1977, including Esplanade Reserves, Scenic Reserves and Recreation Reserves. Local purpose reserves may be set aside for specific purposes such as drainage, water supply or sewage management. Local purpose road reserves were treated as "Indeterminate" for the purpose of this indicator, as the assumption is that this land is set aside for future road widening purposes.

Regional parks were established under the Local Government Act 2002. In the Waikato region, as of 2016, this was limited to the section of the Hunua Ranges and other regional parks inherited as part of the local authority boundary adjustments in 2012.

The following types of land designations are not included in this indicator:

- District Council Covenants issued as consent notices under the Resource Management Act 1991 (s108) or Conservation covenants on private land established under the Reserves Act 1977 (s77) or the Conservation Act 1987 (s27). The data sets for these areas are incomplete and many have not been digitised.
- Māori reserves and Māori reservations. The relevant Acts do not specifically require protection of biodiversity or natural values, although it is noted that many such sites are effectively managed for those values.
- Parcels in the Ngā Whenua Rāhui Kawenata (NWRK) database classified as "management agreements" - these are not registered on the title, or binding on future owners.
- Private covenants entered as consent notices on land titles (e.g. Forest and Bird land). The data for private covenants other than those registered through the QEII National Trust is inconsistent and difficult to extract as many had not been digitised at the time of the indicator development.
- Areas of land classified in the CRS (Core Record System) as declared a reserve as such land is presumed to be pending registration in the Gazette, and therefore not formally reserved at the time the indicator was published. These will be incorporated in future updates of this indicator once they have been gazetted, assuming their CRS\_Purpose field is updated.

The following were treated as having an "Indeterminate" level of protection for the purpose of this indicator:

- Parcels that are classified as potential reserve types in the Core Record System attribute CRS Purpose (e.g. scenic reserve) but are not included in either the DOC, QEII or NWRK data layers, and are not listed as being owned or occupied by a local authority. Such areas are treated as "Indeterminate" in terms of legal protection.
- Parcels where CRS purpose is not clear regarding reserve status, e.g. water supply, are treated as "Indeterminate".

## 2.3 Threatened environments

In 2007, the Government released a statement of national priorities for protecting rare and threatened biodiversity on private land (Ministry for the Environment & Department of Conservation, 2007). The priorities are also relevant to public land.

Protecting biodiversity in Category 1 and 2 threatened land environments (see Table 1) is a National priority (Ministry for the Environment & Department of Conservation, 2007). Here, 20 per cent of remaining habitat is a critical threshold for measuring ecosystem vulnerability - the rate of biodiversity loss increases dramatically when the amount of available habitat drops below 20 per cent of its original extent. Therefore, National Priority 1 Environments are the habitats most in need of protection.

**Table 1. Threatened Environment Classification description for National Priority 1 Environments**

| Category | Category criteria            |
|----------|------------------------------|
| 1        | <10% indigenous cover left   |
| 2        | 10-20% indigenous cover left |

## 3 Methods

### 3.1 Monitoring area

This indicator covers the entire Waikato region, 2012 boundary using: GIS\_ALL.POL\_2012\_REGIONAL\_AUTH\_EW\_L1 regional boundary (2012)

Data are reported within four spatial frameworks:

- Region (2012) - GIS\_ALL.POL\_2012\_REGIONAL\_AUTH\_EW\_L1
- District/city councils (2012) – GIS\_ALL.POL\_2012\_TERR\_AUTHORITY\_EW\_L1
- Bioclimatic zones (1994) – GIS\_ALL.BIOCLIMATIC\_ZONES
- Threatened environments (2007) – GIS\_ALL.SNA\_LENZ\_TEC

### 3.2 Monitoring frequency

Updates will happen as new (region-wide) vegetation/cover spatial layers become available. It is estimated that this will be updated every five years.

### 3.3 Monitoring history

Information in this indicator is now separate to an indicator on Protected Coverage of Indigenous Land published on the Waikato Regional Council's website in 2017 because:

- The 2017 Indicator used an older land protection layer which is no longer in use.
- The Landcover Databases layer which was used in the previous indicator had some dataset errors and a corrected version was released in 2018.

- The 2017 Indicator included terrestrial and freshwater wetland ecosystem types, which have now been separated into their own indicators

## 3.4 Measurement technique

We use the Land Cover Database (LCDB v5) to calculate the regional extent of freshwater wetlands. The LCDB (Land Cover Database) minimum mapping unit is 1 hectare and the data are suitable for applications down to 1:25,000 scale.

We use the following databases to determine areas that are legally protected:

- Core Record System (CRS) layers, provided by CoreLogic to identify areas owned or occupied by local authorities where their purpose is stated as a form of reserve in PURPOSE column.
- DOC layer – GIS\_ALL.DOC\_CONSERVATION\_AREA\_WRC – Derived from data sourced from the Department of Conservation.
- QEII layer – GIS\_ALL.QEII\_TRUST\_COVENANT – Provided by QEII Trust.
- NWRK layer – GIS\_ALL.DOC\_NGA\_WHENUA\_TRUST\_COVENANT – Provided by the Department of Conservation.

The statistics are compiled using Feature Manipulation Engine (FME) software. Relevant land cover classes are selected from the Land Cover Database. See Waikato Regional Council document #2991195 for a description of the processes we use to calculate the statistics in FME.

Legally protected areas in New Zealand for this indicator include:

- Department of Conservation Reserves (DOC\_SOURCE)
- QEII Covenants (QEII\_SOURCE)
- Ngā Whenua Rāhui Kawenata, excluding management agreements (NWRK\_SOURCE)
- Other - typically protected under the Reserves Act by local authorities or other state owned entities identified from the Core Record System using the PURPOSE attribute from GIS\_ALL.CRS\_PARCEL, and Owner or Occupier attributes from GIS\_ALL.CRS\_PROPERTY\_WHOLE\_REGION. Note, that an occupier is defined as the legal ratepayer which in the majority of cases is also the owner.

We use Feature Manipulation Engine (FME) software and Excel to calculate the extent of freshwater wetland protected within the Waikato region, and by district council, bioclimatic zone and Threatened Environment.

## 3.5 Guidelines and standards

### 3.5.1 Regional boundary

The total land area of the regional boundary has been estimated using data from both the Land Cover database as well as the GIS\_ALL.POL\_2012\_REGIONAL\_AUTH\_EW\_L1 layer.

For this indicator, the 2012 regional boundary was used a baseline for all time periods reported on. In future updates of this indicator, any change in the size or shape of the regional boundary will affect the total area of indigenous coverage, due to areas of indigenous cover being included or excluded from the new boundary. To account for this issue either all previous results need to be recalculated or the update should retain the 2012 boundary as a baseline rather than any new regional boundary layer.

The same holds true for the indicator results pertaining to territorial authorities in which the 2012 territorial boundaries (POL\_2012\_TERR\_AUTHORITY\_EW\_L1) have been clipped to the 2012 regional land boundary. Retaining these boundary layers will enable consistent change

analysis to be conducted. This indicator is a regional analysis and as such does not cover the Waitomo, Taupō and Rotorua territorial authorities in their entirety.

### 3.5.2 LCBD 5 classes

For the current extent of freshwater wetlands in the Waikato region, we use the LCDB 5 classes and wetland context attributes listed in Table 2.

**Table 2. Target land cover groups and names from LCDB 5**

| Land cover group                   | Freshwater wetland land cover name                                                                        |
|------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Grassland, Sedgeland and Marshland | Herbaceous Freshwater Vegetation (where Wetland Context = Yes or No or Blank)                             |
| Scrub and shrubland                | Mānuka &/or Kānuka (where Wetland Context = Yes)<br>Flaxland (where Wetland Context = Yes or No or Blank) |
| Forest                             | Deciduous Hardwoods (where Wetland Context = Yes)                                                         |

## 3.6 Quality control procedures

This indicator is primarily created using Feature Manipulation Software (FME). However, a sample of queries were tested in GeoMedia to ensure that results from both are aligned.

For information on data quality (lineage, positional accuracy, attribute accuracy, logical consistency and completeness) see the updated metadata for the LCDB, available on the Terralink International Limited website.

## 3.7 Limitations

1. Freshwater wetland extent and protection is based on LCDB Version 5 data. The LCDB gives a 'snapshot' of vegetation at the time when the data were collected and should not be considered as a definitive measure of present-day vegetation cover.
2. Some vegetation types are incorrectly identified in LCDB 5 which may result in errors in extent of freshwater wetland that is legally protected.
3. The Lake and Pond land cover group is excluded from this analysis, however a significant component of this ecosystem type (which can support indigenous submerged macrophyte communities in addition to indigenous fauna communities) is in legal protection. Lake margins with emergent vegetation are included in the assessment where they are mapped by LCDB as one of the target classes.
4. Flax is a hardy species capable of thriving in wet or dry conditions. The LCDB class Flaxland is described in the Illustrated Guide to Target Classes for LCDB7 as predominantly a wetland class dominated by the swamp flax *Phormium tenax*. Therefore, Flaxland is treated as a wetland class for the purpose of Waikato Regional Council SOE reports.
5. Fernland and Grey Scrub vegetation classes can occur in wetland systems but are more frequently encountered in terrestrial systems. Wetland context attributes in LCDB are considered too unreliable for these classes to allow for a separation of terrestrial and wetland polygons. These LCDB classes were included as scrub classes in the terrestrial State of the Environment (SOE) indicators, and therefore are not included in the wetland SOE indicators.
6. Mānuka can also occur in a wet or dry hydrosystems. The LCDB Wetland Context attribute was used to select wetland areas of Mānuka and/or Kānuka for this indicator.
7. Deciduous hardwoods are described in the Illustrated Guide to LCDB Classes (Thompson et al. 2003 as being "typically willow and poplar species growing adjacent to inland water and rivers, this class also includes stands of planted exotic deciduous hardwoods, such as oak (*Quercus* spp.), ash (*Fraxinus excelsior*) and elm (*Ulmus* spp.)". An estimated 1/3rd of Waikato wetlands have a canopy of invasive deciduous hardwoods - primarily grey willow, crack willow and, to a lesser extent, alder (Leathwick et al. 1995). Excluding this land cover will greatly underestimate the total area of freshwater wetland and proportion in legal

- protection. The Wetland Context attribute offers a method to separate out DH polygons that represent wetlands. A visual check using Google Earth of 120 Deciduous Hardwood polygons from the LCDB found a high degree of accuracy where wetland context = Yes (over 90 per cent agreement) but a lower degree of accuracy where wetland context = No (62 per cent agreement). This indicates that the extent of deciduous hardwoods with a wetland context is under-estimated in the LCDB. This may be partly offset by loose polygon boundaries that often include areas of terrestrial vegetation, particularly in narrow gullies.
8. District Council reserves data is derived from data provided by CoreLogic as well as District Councils and is based on the PURPOSE field in GIS\_ALL.CRS\_PARCEL layer. That field is not comprehensive or consistent and may not include all local purpose reserves.
  9. Some local purpose reserves may have a lesser requirement for protection of biodiversity where it is inconsistent with the purpose of the reserve type (e.g. road reserve, water supply) and have been treated as indeterminate protection status in the analysis of the extent of legally protected freshwater wetland cover.
  10. There are some areas of overlapping protection status. Where this occurred, the parcel was allocated to a single entity using the best information available. Two DOC reserves in the region are also QEII covenants, these parcels were treated as DOC land, being the most recent legal status. Some minor areas of overlap are the result of digitising discrepancies between GIS layers sourced from different agencies.
  11. The 2012 district council boundaries clipped to the regional land boundary were used for this indicator. Some district councils extend beyond the regional boundary, and statistics compiled at the district scale for the Waikato Region may not reflect the pattern for those districts as a whole.
  12. Trend analysis has been conducted on the basis of change in reserve status over time, rather than change in the underlying vegetation cover. Data layers accessible to the Waikato Regional Council do not have date registered for Department of Conservation or local authority reserves. Gazette notice dates reference only the most recent gazette notice and so may not reflect the date of original registration. Therefore, trend data is presented only for QEII covenants and Ngā Whenua Rāhui Kawenata for which reliable registration dates are available.
  13. In April 2010, the Ministry for the Environment published a State of the Environment indicator for the extent of “Areas of native land cover under legal protection”. The data for the Waikato Region is based on the region’s boundary prior to boundary adjustments in 2011. For this reason, the MfE data are unable to be used to present temporal trends in extent of protection of freshwater wetland cover for the Waikato Region.

## 4 Results - data and trends

### 4.1 Types of wetland legally protected

Today just over 1.4 per cent of the region's land area remains in freshwater wetlands, totalling 33,269 hectares. This comprises 20,053 hectares of Herbaceous Freshwater Vegetation, 11,224 hectares of wet Deciduous Hardwoods, 1634 hectares of wet Mānuka &/or Kānuka, and 358 hectares of Flaxland.

Reserves currently protect 42 per cent of the total current extent of Herbaceous Freshwater Vegetation, 63 per cent of the Flaxlands, 38 per cent of wet Mānuka & Kānuka, and 53 per cent of the wet Deciduous Hardwood forest.

Figure 1 shows the location and protection status of freshwater wetlands in the Waikato region. Figure 2 shows the protection status of each freshwater wetland type.



**Figure 1. Protected freshwater wetlands in the Waikato region**

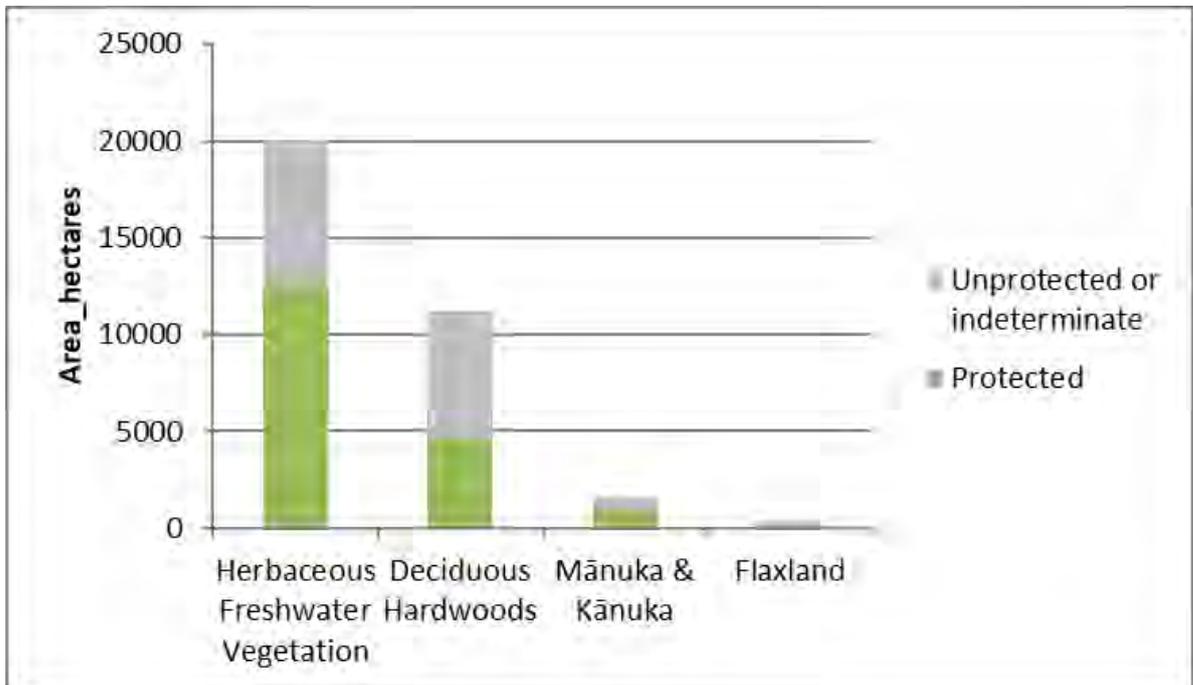


Figure 2. Amount of the region’s freshwater wetlands and protection status

## 4.2 Types of protection

Almost 55 per cent of the Waikato Region’s remaining areas of freshwater wetland are in some form of legal protection (Figure 3).

Most of the protected freshwater wetland cover is in Department of Conservation reserves (97 per cent) which protect 12,237 hectares of Herbaceous Freshwater Vegetation, 4,484 hectares of Deciduous Hardwoods, 829 hectares of Mānuka & Kānuka, and 126 hectares of Flaxland. On private land, QEII covenants protect 191 hectares of freshwater wetland, and Ngā Whenua Rāhui kawenata a further 80 hectares. Most of the protected wetland on private land is Herbaceous Freshwater Vegetation (156 hectares) and wet Deciduous Hardwoods (78 hectares), with just 31 hectares of wet Mānuka & Kānuka, and 7 hectares of Flaxland. Every year since 1996, an average of 9 hectares of privately owned freshwater wetland in the region has been protected under QEII covenants or Ngā Whenua Rāhui kawenata (Figure 4). This compares with an average of 1,200 ha of terrestrial indigenous vegetation protected per year in covenants or kawenata since 1996. In total, covenants and kawenata protect 0.8 per cent of the remaining areas of freshwater wetland in the region, compared with almost 5 per cent of the remaining areas of terrestrial indigenous land cover.

District Council reserves protect 232 hectares of freshwater wetland, mostly Herbaceous Freshwater Wetlands (120 hectares) and wet Deciduous Hardwoods (98 hectares).

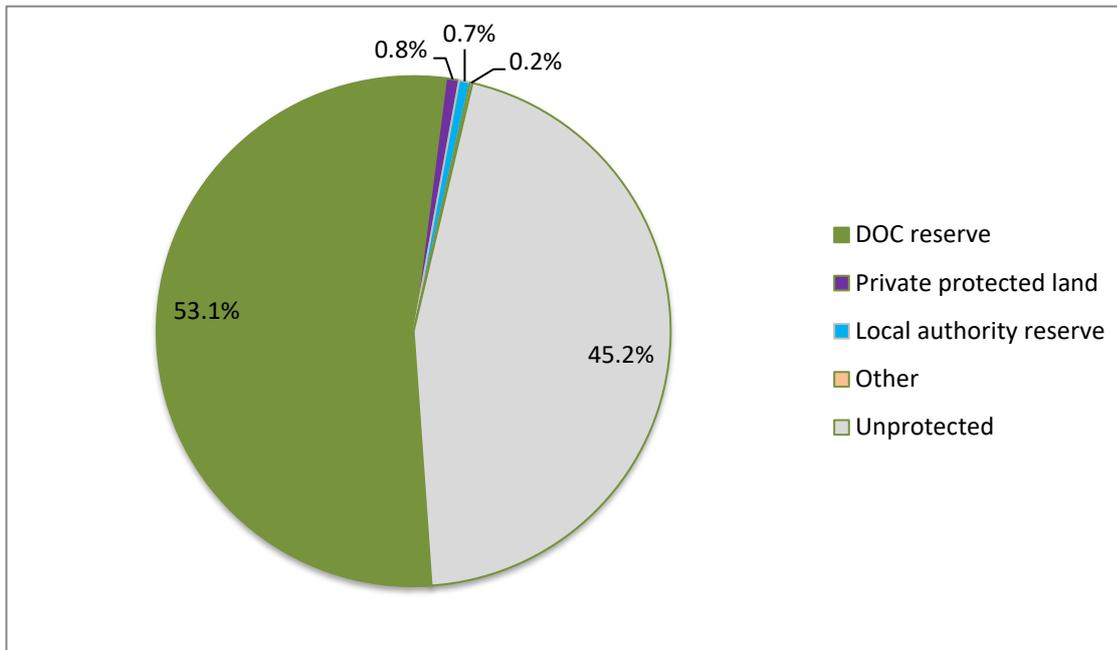


Figure 3. Freshwater wetland protection status in the Waikato region

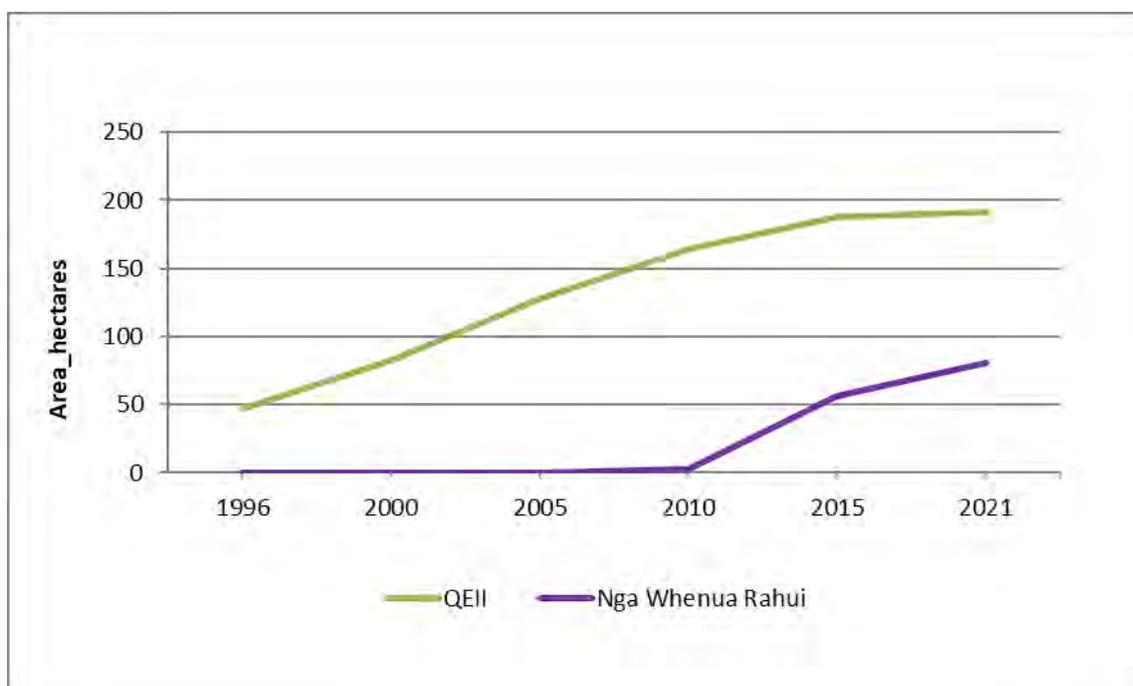


Figure 4. Change in amount of freshwater wetland protected by QEII covenants or Ngā Whenua Rāhui kawenata

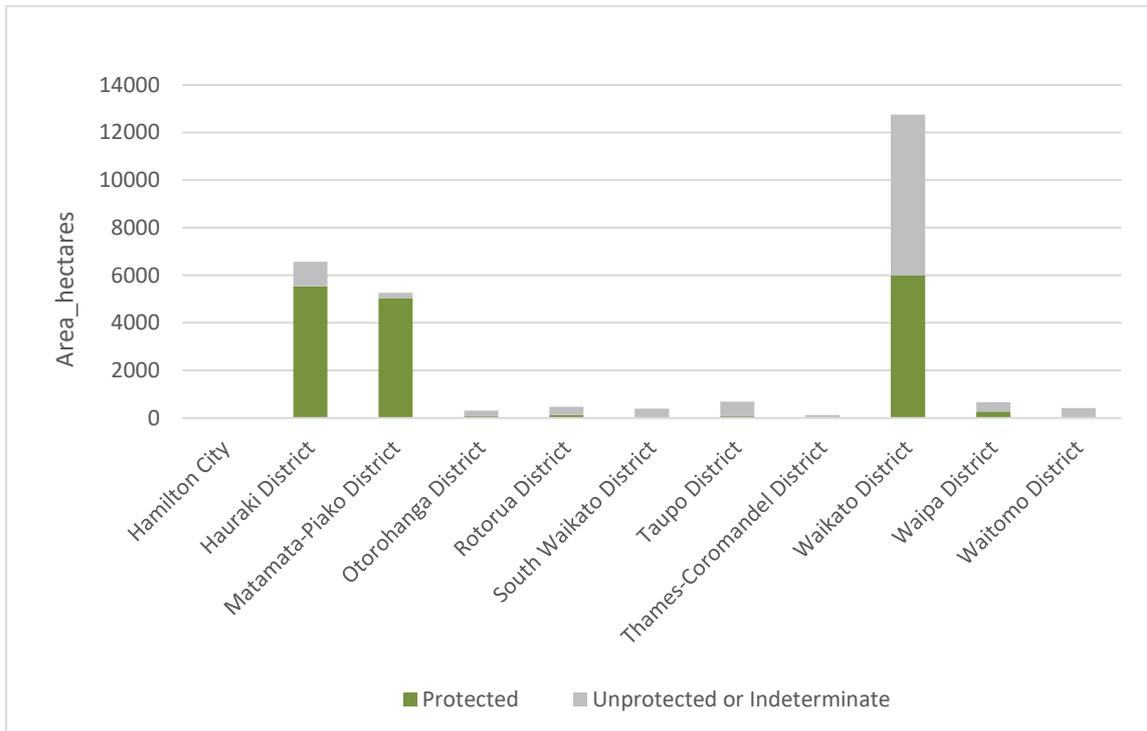
### 4.3 Protection within National Priority 1 Environments

Over 83 per cent of all of the remaining areas of freshwater wetland in the Waikato Region occur within National Priority 1 Environments. Wetlands are over-represented in these threatened environments because they tend to occur in lowland areas where much of the original native cover has been cleared. Often wetlands are the only natural features that remain in areas of intensively farmed lowlands.

As of 30 December 2021, the total area of freshwater wetland legally protected in Category 1 and 2 Environments was 17,129 hectares. That represents 62 per cent of all the freshwater wetland area that remains in those threatened environments.

Figure 5 shows that high proportions of the remaining wetlands in priority environments are already protected in Hauraki and Matamata-Piako districts. These districts are where one of New

Zealand’s Ramsar sites, the 10,000-hectare Kopuatai Peat Dome wetland, is located. However, across the region almost 10,550 hectares of freshwater wetland remains unprotected in our most threatened environments. Most of that is in the Waikato District.



**Figure 5. Amount of remaining freshwater wetland in National Priority 1 & 2 Environments by local authority**

## 4.4 Protection per Bioclimatic Zones

Figure 6 shows the proportion of freshwater wetlands protected in each bioclimatic zone. In the Waikato Region, freshwater wetlands are mainly confined to the lowland bioclimatic zone (below 300 m elevation), where 28,321 hectares (85 per cent of the current extent) of freshwater wetlands occur. No freshwater wetlands are mapped in the subalpine to alpine zones (> 1200 m elevation) in LCDB 5.

In the montane bioclimatic zone (800 to 1200 m elevation), all of the wet Mānuka &/or Kānuka and 95 per cent of the Herbaceous Freshwater Vegetation is in legal protection, however only 16 hectares of freshwater wetland are mapped in that zone.

In the lowland zone over 70 per cent of the remaining Flaxland and Herbaceous Freshwater Wetland, and around half of the wet Mānuka &/or Kānuka and Deciduous Hardwoods are legally protected.

In submontane areas (300 to 800 m elevation) and in coastal areas, less than 25 per cent of the remaining areas of freshwater wetland are in legal protection.

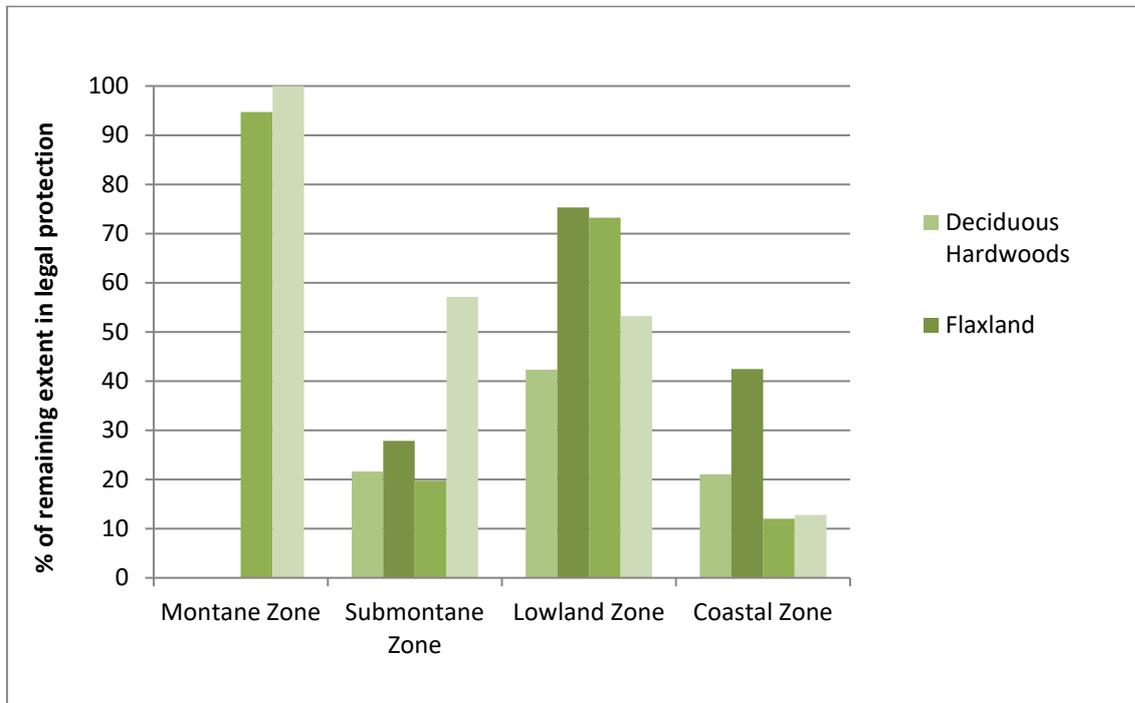


Figure 6. Proportion of remaining freshwater wetland protected in each bioclimatic zone

## 4.5 Protection per local authority

Within the district council areas, Matamata-Piako, and Hauraki districts have the highest proportion of their remaining wetland areas protected (Figure 7). These two districts share the 10,000-hectare Kopuatai Peat Dome, one of the Waikato Region's three Ramsar Wetlands, protected by the Department of Conservation (DOC). Another Ramsar site, the 7,000-hectare Whangamarino Wetland reserve, contributes to the large proportion of protected freshwater wetland in the Waikato District.

In the Waipa District, many of the peat lakes and the Moanatuatua Bog are protected by DOC or council reserves. Figure 7 shows that significant gains in wetland protection could be made by encouraging protection of wetlands on private land in the Taupo and Waikato districts. In these two districts over 10,000 hectares, one third of the region's total area of freshwater wetlands, remain outside the reserve network.

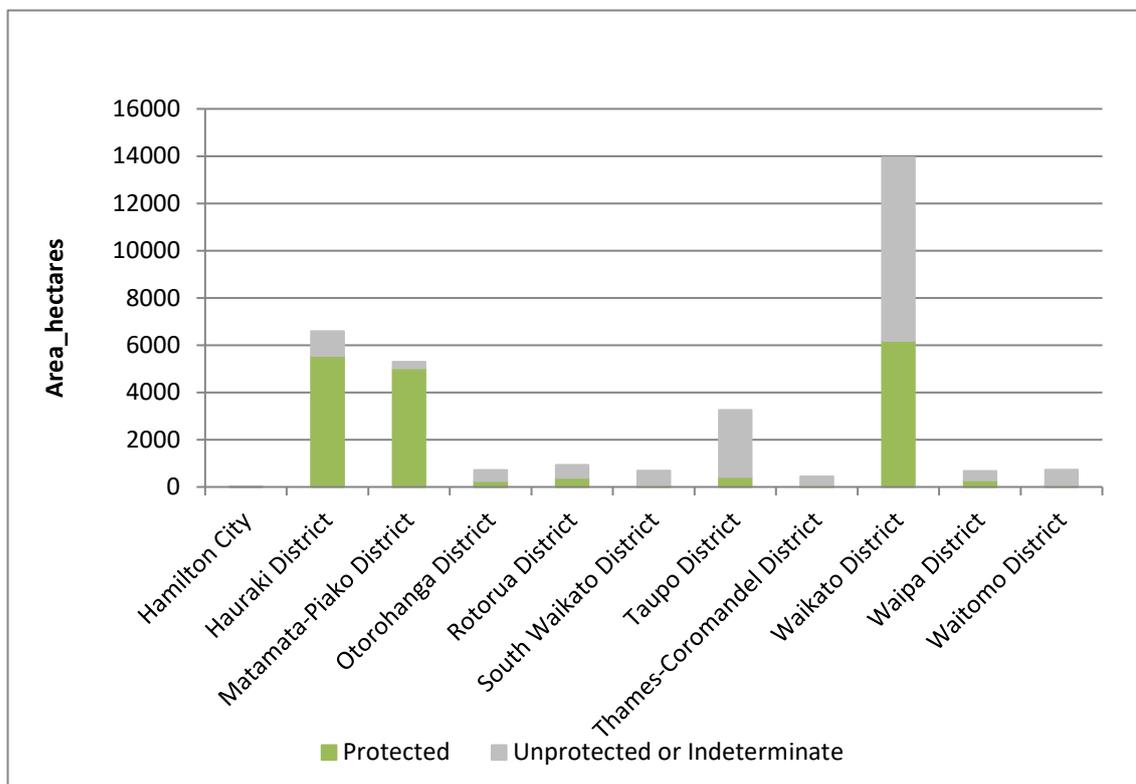


Figure 7. Area of remaining freshwater wetland and amount protected in each local authority

## 5 Further indicator developments

### 5.1 Updates

Updates will happen as new (region-wide) vegetation/cover spatial layers become available. It is estimated that this will be updated every five years. The last update was July 2017. The data presented in this report replaces the earlier indicator because of changes in extent of vegetation cover and some boundaries since 2017.

### 5.2 Future developments

Waikato Regional Council is in the process of creating a region-wide indigenous vegetation spatial layer (Bioveg). When Bioveg is completed, it is expected to be a high-quality layer which could be used as an alternative to the Landcover database. However, the scope of the Landcover database is broader than the Bioveg layer as the LCDB includes land cover classes that possibly may contain indigenous vegetation such as coastal sand and rock.

Changes to the Land Cover database classification scheme are likely to influence the indicator results. In addition, it is expected that the accuracy of the Land Cover database will increase with new technology, and this will influence the extent to which any change in indigenous cover can be accurately interpreted.

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