

# A monitoring protocol for the birds of Te Waihora/Lake Ellesmere

Ken Hughey  
Waihora Ellesmere Trust and Lincoln University  
July 2012

## 1. Introduction

Much effort has been exerted by multiple organisations in counting and/or otherwise monitoring<sup>1</sup> birds around Te Waihora/Lake Ellesmere. This work has ranged from:

- biannual trend counts of waterfowl by Fish and Game North Canterbury
- monthly trend counts of all observable birds in 1986/87 by the former NZ Wildlife Service (Hughey and O'Donnell unpublished data)
- seasonal wading bird counts by the Ornithological Society of NZ (OSNZ)
- bittern monitoring by Environment Canterbury (ECan)
- biannual trend counts by Christchurch City council (CCC).

While consistent methods have been used within some of these surveys there is no overall bird monitoring strategy for the lake that has clear aims and component parts and related methods. Moreover, none of the methods were designed to connect with management controls or drivers of change. This need was identified recently by Hughey and O'Donnell (2009) when they recommended a disciplined and targeted monitoring programme for the birds of Te Waihora/Lake Ellesmere. This paper provides a brief rationale for improved bird monitoring and calls for the key agencies to coordinate their efforts within the framework outlined here.

## 2. Rationale

All monitoring requires a rationale and clear connection to management needs. The lake is of national conservation significance for its birdlife (see Hughey and O'Donnell 2009), is a nationally recognised recreational gamebird hunting resource (see Booth 2009), and of course is hugely important for its cultural values (including taonga and mahinga kai species) (see Pauling and Arnold 2009). There are immense pressures on these values from 'development' related impacts that affect both water quantity and quality in the lake, and which affect the physical habitat also required by the many bird species. In summary then, monitoring is required to make sure that:

- species diversity is being maintained
- threatened and endangered species are being conserved
- the role of the lake as a core moulting, post-breeding flocking, migration refuelling and wintering site for waterbird populations is maintained
- harvest species are being sustainably managed
- pest species are being managed at numbers that minimise collateral damage.

The first two requirements have clear links also to habitat.

---

<sup>1</sup> It is acknowledged also that many individuals, especially OSNZ members but also research students and others, have made thousands of observations around individual species, individual sightings, and other records. These observations contribute to the total data set record and complement the formal monitoring strategy described here.

### 3. Aim and objectives

Based on the above the proposed aim is to:

*Develop and implement an integrated monitoring programme for the diverse range of birdlife and associated values of Te Waihora/Lake Ellesmere that provides timely, cost effective and relevant information for lake and birdlife managers, and other stakeholders.*

Specific objectives, given the diverse range of values and needs (see Hughey and O'Donnell 2009), are to have a monitoring protocol that:

- identifies spatial variation by guild, and where necessary within-guild (e.g., for black swan and Canada geese);
- uses geographically consistent spatial boundaries;
- incorporates standard recording practice, i.e., a standard data sheet;
- is undertaken at least annually for comparative purposes;
- provides data that can be readily compared to the 1980s baseline bird abundance data;
- incorporates the least possible resource and skill requirements;
- is management relevant;
- has results which can be readily and speedily distributed to interested parties; and
- links to state of the lake reporting.

### 4. Monitoring to date

The following is a very brief review of relevant current and historic bird monitoring.

#### 4.1. Gamebirds – Fish and Game North Canterbury

Consistency of method is vital. The existing F&G waterfowl monitoring method, i.e., annual aerial trend counts of paradise shelduck and black swan in January, dabbling duck aerial transects in April (M. Webb CSI), an aerial trend count of Canada geese in June (see also Section 5.3) and a black swan nesting survey at Kaitorete Spit in association with Ngai Tahu in September, albeit with some addition of a refined spatial scale (trying to roughly plot the birds by reference to the main bird survey areas), should continue.

#### 4.2. OSNZ

The OSNZ surveys normally occur annually and sometimes biannually and typically have the following characteristics (Paul Sagar pers. comm. 2009): the survey sections depended upon the number of people available and the height of the lake, and were typically focused on wading birds, and other notable species. However, in general the sections are: Kaitorete Spit end; Kaituna Lagoon-Greenpark Huts; Greenpark Huts-Wolfes Road if there were sufficient people, (this was usually split into 2) Greenpark Huts-Embankment Rd and Embankment Rd-Wolfes Road); Selwyn Huts-Taumutu (this involved driving down all the small access roads to the lake edge and counting along the shoreline where the water was not too deep, it also included Lakeside). So, the biggest effort went into Kaitorete Spit and Greenpark Huts to Wolfes Rd as this was where most waders were likely to occur.

#### 4.3. CCC

According to Andrew Crossland (pers. comm.) the CCC have combined with OSNZ for the whole lake. Some of the areas are bunched, e.g., in 2009 the OSNZ surveyors did the Halswell RM to Kaituna sections and thus all were combined, but from a CCC perspective, within their district the usual areas are:

- Halswell RM
- Motukarara Flats
- Kaituna Lagoon
- Lower Birdlings Lagoon
- Upper Birdlings lagoon (CCC Reserve)
- Mid Kaitorete Spit
- Crescent Island
- Kaitorete Spit tip

These areas are subsets of those defined and used by O'Donnell (1985) and others and can be upscaled to match his boundaries.

#### 4.4. Wildlife Service surveys of 1986/87

The Wildlife Service surveys undertaken on a monthly basis in 1986/87 were the most disciplined of all the comprehensive surveys to date. It is proposed to use the geographical units defined in those surveys, and their data recording methods as the basis for this survey protocol.

### 5. Survey method(s)

#### 5.1. Geographical units

All surveys will be geographically complementary, i.e., irrespective of the type of survey a basic requirement will be that they use the same geographic units – these geographic units are shown in Figure 1 and are based on those used by the Wildlife Service in 1986/87 when they undertook monthly surveys of the lake. (Note – finer level units can be used if necessary but they must be upwardly additive into the common units.)

Figure 1. Locations of bird survey boundaries – based on O’Donnell (1985)



### 5.2. Survey strategies

Hughey and O’Donnell (2009) proposed four main outcomes for future wildlife management of Te Waihora/Lake Ellesmere (Table 1). Their proposal also provides the basis for a monitoring regime.

Table 1. Proposed outcomes and suggested monitoring for birdlife of Te Waihora/Lake Ellesmere (Source: Adapted from Hughey and O’Donnell 2009).

Proposed outcome	Suggested monitoring programme related to indicator trend
1. <u>Species diversity</u> should be maximised with a target average level of 40 species from 7 guilds recorded per annum;	<ul style="list-style-type: none"> <li>▪ Total lake survey annually complemented by targeted surveying of secretive swampbird species, (see Appendix 1 for target list of 38 species and their guilds)</li> </ul>
2. Enhance the populations of <u>conservation and taonga species</u> whose total populations are at some defined conservation risk (see Hitchmough <i>et al.</i> 2007) and which rely on the lake for critical life stage requirements, e.g., Australasian bittern, banded dotterel, Caspian tern and grey teal;	<ul style="list-style-type: none"> <li>▪ Develop and implement monitoring of Harts Creek and Kaituna Lagoon for bittern</li> <li>▪ Other threatened or at risk species should be covered by monitoring of (1)</li> <li>▪ Taonga species should be covered by monitoring of (1)</li> </ul>

3. <u>Sustainably<sup>2</sup> manage harvestable species</u> , e.g., black swan and mallard duck, consistent with approved management plans;	<ul style="list-style-type: none"> <li>▪ Monitor as per (1) but also by Fish and Game’s aerial monitoring and by targeted black swan monitoring in association with Ngai Tahu</li> </ul>
4. Provide the <u>optimised range of habitat conditions</u> to provide for all of the above, especially in terms of lake level management, water quality, and riparian management.	<ul style="list-style-type: none"> <li>▪ Monitor (1), (2) and (3) on a geographically defined scale that is relevant to habitat</li> <li>▪ If the lake reaches a perceived critical point then institute a special targeted survey.</li> </ul>

### 5.3. Data gathering and recording

Surveys undertaken for (1) and (2) will use a standard data recording sheet (see for example Appendix 2) for consistency and ease of use in the field, and for data logging purposes. Note that despite the status change of Canada goose they will be counted in the two priority surveys outlined in section 5.5.

Fish and Game will continue its ongoing and standardised waterfowl trend counts and surveys, as listed in 4.1, but for consistency will try and map distribution according to the areas identified in Figure 1. This information will be transferred to the spreadsheet as soon as practicable following the completion of the surveys, and sent to the agencies concerned.

A bittern and marsh crake monitoring programme will be developed (by DoC and ECan) and others and implemented and reported as per section 6 below.

### 5.4. Surveyors and method

All surveyors for (1) and (2) will have binoculars and/or telescopes. Ideally all surveyors will be experienced with wetland bird species identification and counting, but where not they will be paired up with other experienced surveyors. When recording kingfisher observers will begin recording from the immediate access road to their survey section and then along the section as a whole.

Each survey will be undertaken over the period of one day, normally during the weekend or on a public holiday (so as to incorporate volunteer expertise).

The key wading bird areas, i.e., Yarrs, Embankment and Greenpark, will be surveyed by 4 people, working in paired groups.

The focused swamp bird species work will be undertaken by specialist staff in October of each year.

As well as counting birds, records will be kept of lake level and weather conditions.

### 5.5. Timing of surveys

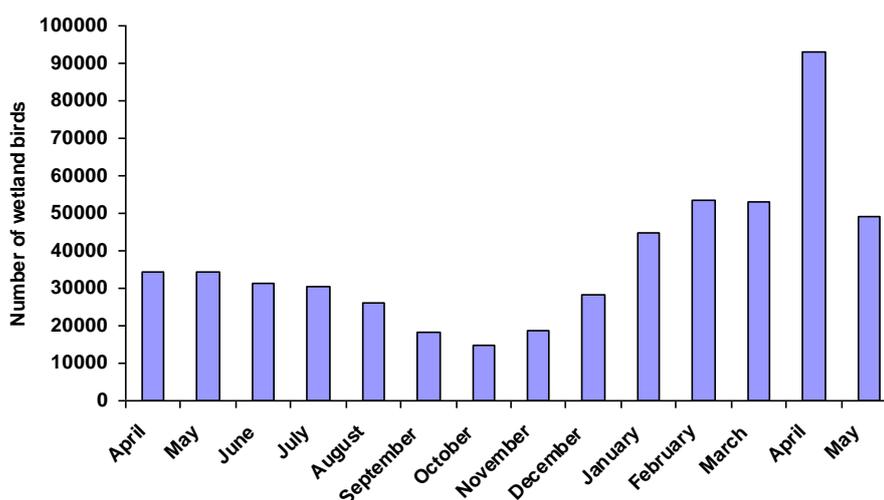
---

<sup>2</sup> Including consideration of the potentially detrimental effects of some species if present in very large numbers, i.e., black swan and Canada goose.

Figure 2 shows survey data from the only annual set of monthly counts undertaken for the lake – but counts alone should not be the single driving criterion for determining when surveys should be undertaken. Rather, given the contents of Table 1 above it is proposed that two surveys should be undertaken<sup>3</sup>:

1. Priority one, i.e., annual survey to occur in February to maximise wading bird diversity and post breeding numbers, ensure a broad diversity of species is recorded, and to pick up on post breeding waterfowl. This survey will complement other surveys occurring at or around this time in New Zealand and in Australasia generally and thus provides for comparability. Also annually, and to evaluate wetland bird breeding it is proposed to have specialist breeding season surveying of Australasian bittern and marsh crake in November;
2. Priority two, if resourcing allows, is to have a biennial survey in late March-early April, prior to the duck shooting season. Such a survey will identify peak bird numbers and should also overlap a time when high species diversity will occur.

Figure 2: The total wetland bird cycle of numbers for Te Waihora/Lake Ellesmere: 1986–87.



These surveys should cover all wetland bird species and should be jointly coordinated by Department of Conservation (primarily), the local authorities (probably Christchurch City Council and ECan in particular), the OSNZ, and Fish and Game North Canterbury.

## 6. Results reporting and communication strategy

There needs to be a data sharing protocol between the four principal survey organisations, i.e., F&G, DoC, CCC and OSNZ, using a standard Excel spreadsheet and verification process. DoC initially at least, will be the information repository.

<sup>3</sup> A meeting was held on 9 July 2012 to confirm the monitoring strategy and agree on the survey times. Attending that meeting were staff from Christchurch City Council, Department of Conservation, Environment Canterbury, Waihora Ellesmere Trust and Ken Hughey. Paul Sagar (OSNZ) of NIWA apologised but is supportive.

Information from the surveys will be shared immediately, fully and freely between all the participating organisations.

In terms of communication it should be agreed that a joint press release from DoC, ECan and CCC will be made following each of the annual surveys and that results will be posted on their websites and on that of the WET, and provided to OSNZ and Fish and Game.

## **ACKNOWLEDGEMENTS**

The inputs of data, editorial comment and meeting time from Andrew Crossland (CCC), Paul Sagar (OSNZ), Colin O'Donnell (DoC), Frances Schmechel (ECan) and Ross Millichamp (F&G) are gratefully acknowledged.

## **REFERENCES**

Heather, B.D., Robertson, H.A. 1996. *The Field Guide to the Birds of New Zealand*. Viking, Auckland.

Hughey, K.F.D., O'Donnell, C.F.J. 2009. Birdlife of the lake. Pp 57-76 in: K.F.D. Hughey, K.J.W. Taylor (Eds). *Te Waihora/Lake Ellesmere – State of the Lake and Future Management*. EOS Ecology, Christchurch.

O'Donnell, C.F.J. 1985. *Lake Ellesmere: a Wildlife Habitat of International Importance*. Fauna Survey Unit Report 40. NZ Wildlife Service, Department of Internal Affairs, Christchurch.

Pauling, C., Arnold, J. 2009. Cultural health of the lake. Pp 77-84 in: K.F.D. Hughey, K.J.W. Taylor (Eds). *Te Waihora/Lake Ellesmere – State of the Lake and Future Management*. EOS Ecology, Christchurch.

**Appendix 1.** The core 40 species selected for monitoring diversity of bird use at TeWaihora/Lake Ellesmere – note the list is indigenous bird species, their guilds and estimated population sizes for all species recorded at Te Waihora/Lake Ellesmere from c.1900–present. Nomenclature is from Heather and Robertson (1996). The contents of this table will be reviewed and updated following the first reporting period in 2013.

The list includes species that use the lake and its wetland margins. It **excludes** oceanic species and vagrants that occur at sea off the Kaitorete Spit, penguins that may moult along the Kaitorete Spit, introduced species (i.e., Canada goose in particular), and extinct species.

Key:

B = Breeding species,

F = Uses the lake for feeding only,

M = Regular international migrants that occur most years,

V = Vagrants, i.e., species that occur only very rarely on the lake

X = Locally extinct post European arrival (but still occur elsewhere in New Zealand)

Species common name, by guild	Maori name	Scientific name	Origin and breeding status	New Zealand wide conservation status - 2008 <sup>4</sup>	Typical numbers at one time 1985 and 1988 <sup>5, 6</sup>	Typical numbers at one time 2000-2007	Max at one time (1980-present)	National population (year estimated in) and approx. proportion of national total present at lake at one time (%) <sup>7</sup>
<b>1. Open water divers</b>								
Australasian crested grebe	Puteketeke	<i>Podiceps cristatus</i>	B	Nationally endangered	0-1	10-20	32	400 (2004) (8%)
Black cormorant	Kawau	<i>Phalacrocorax carbo</i>	B	Naturally uncommon	100-200	250	500	5-10000 pairs (3%)
Little cormorant	Kawaupaka	<i>P. melanoleucos</i>	B	Naturally	400-500	500	500	5-10000 pairs

<sup>4</sup> The conservation status of species was assessed against: Miskelly, C.M., Dowding, J.E., Elliott, G.P, Hitchmough, R.A., Powlesland, R.G., Robertson, H.A., Sagar, P.M., Scofield, R.P., Taylor, G.A. 2008. Conservation status of New Zealand birds, 2008. *Notornis*, 55: 117-135.

<sup>5</sup> Bird data for this period was collated from O'Donnell (1985) and NWASCA (1988), as reported in Taylor (1996: 191).

<sup>6</sup> Data from DoC unpubl. reports, Ornithological Society of NZ unpubl. reports and A. Crossland, Christchurch City Council, from the February 2006 survey, and from the February 2007 survey.

<sup>7</sup> Data from Heather and Robertson (1996) unless otherwise noted.

Species common name, by guild	Maori name	Scientific name	Origin and breeding status	New Zealand wide conservation status - 2008 <sup>4</sup>	Typical numbers at one time 1985 and 1988 <sup>5, 6</sup>	Typical numbers at one time 2000-2007	Max at one time (1980-present)	National population (year estimated in) and approx. proportion of national total present at lake at one time (%) <sup>7</sup>
				uncommon				(5%)
Pied cormorant			F	Nationally vulnerable	1-100	<200	20	10-50000 pairs (<1%)
NZ scaup	Papango	<i>Aythya novaeseelandiae</i>	B	Not threatened	0	100-200	235	20000 (1990s) (<1%)
<b>2. Deep water waders</b>								
White heron	Kotuku	<i>Egretta alba</i>	F	Nationally critical	1-15	1-15	19	100-120 (2000) (19%)
White-faced heron		<i>Ardea novaehollandiae</i>	B	Not threatened	100-200	100-200	421	Widespread & common
Royal spoonbill	Kotuku ngutu-papa	<i>Platalea regia</i>	B	Naturally uncommon	0-2	70-120	199	610 (1995) (30%)
South Island pied oystercatcher	Torea	<i>Haematopus finschi</i>	F	Declining	80	20-75	143	85000 (1995) (<1%)
Pied stilt	Poaka	<i>Himantopus himantopus</i>	B	Declining	1000-3000	Up to 2937	10000	30000 (1993) (33%)
Black stilt	Kaki	<i>Himantopus novaezelandiae</i>	B	Nationally critical	1-4	2	4	89 (2007) (4%)
Bar-tailed godwit	Kuaka	<i>Limosa lapponica</i>	M	Migrant	0-50	20-80	325	85-105000 (1995) (<1%)
<b>3. Shallow water waders</b>								
Banded dotterel	Tuturiwhatu	<i>C. bicinctus</i>	E, B	Nationally vulnerable	1000-3000	1000-2000	4846	50000 (1995) (10%)
Wrybill	Ngutu parore	<i>Anarhynchus frontalis</i>	F	Nationally vulnerable	50-200	50-200	459	4500 (2004) (10%)
Pacific golden plover		<i>Pluvialis fulva</i>	M	Migrant	50-70	122	122	600-1200 (1995) (10-20%)
Spur-winged plover		<i>Vanellus miles</i>	B	Not threatened	100-500	100-200	1052	Abundant & widespread

Species common name, by guild	Maori name	Scientific name	Origin and breeding status	New Zealand wide conservation status - 2008 <sup>4</sup>	Typical numbers at one time 1985 and 1988 <sup>5, 6</sup>	Typical numbers at one time 2000-2007	Max at one time (1980-present)	National population (year estimated in) and approx. proportion of national total present at lake at one time (%) <sup>7</sup>
Turnstone		<i>Arenaria interpres</i>	M	Migrant	0-10	0-10	34	5-7000 (1995) (<1%)
Lesser knot	Huahou	<i>Calidris canutus</i>	M	Migrant	5-90	10-35	85	50-70000 (1995) (<1%)
Curlew sandpiper		<i>C. ferruginea</i>	M	Migrant	5-70	10-20	86	50-150 (1995) (60%)
Sharp-tailed sandpiper		<i>C. acuminata</i>	M	Migrant	10-25	10-25	33	50-200 (1995) (17%)
Pectoral sandpiper		<i>C. melanotos</i>	M	Vagrant	1-3	0-6	10	<20 (1995) (50%)
Red-necked stint		<i>C. ruficollis</i>	M	Migrant	200	Up to 63	220	150-300 (1995) (70%)
<b>4. Dabbling waterfowl</b>								
Black swan	Wani	<i>Cygnus atratus</i>	B	Not threatened	6000-13000	Up to 10651	16000	63000 (1980) (25%)
Paradise shelduck	Putangitangi	<i>Tadorna variegata</i>	B	Not threatened	10-400	100-500	1635	120000 (1981) (1%)
Australasian shoveler	Kuruwhengi, Pateke	<i>A. rhynchotis</i>	B	Not threatened	500-15000	Up to 3405	>15379	150000 (1980s) (10%)
Grey teal	Tete	<i>A. gracilis</i>	B	Not threatened	500-7000	Up to 10979	10979	>50000 (1995) (22%)
<b>5. Torrent specialists</b>								
None present								
<b>6. Aerial hunting gulls &amp; terns</b>								
Black-billed gull		<i>Larus bulleri</i>	F	Nationally endangered	500-3000	Up to 1592	5000	<50000 (2007) (10%)
Red-billed gull	Tarapunga	<i>L. scopulinus</i>	F	Nationally	10-500	Up to 59	544	100000+ (2000)

Species common name, by guild	Maori name	Scientific name	Origin and breeding status	New Zealand wide conservation status - 2008 <sup>4</sup>	Typical numbers at one time 1985 and 1988 <sup>5, 6</sup>	Typical numbers at one time 2000-2007	Max at one time (1980-present)	National population (year estimated in) and approx. proportion of national total present at lake at one time (%) <sup>7</sup>
				vulnerable				(<1%)
Black-backed gull	Karoro	<i>L. dominicanus</i>	B	Not threatened	500-1000	Up to 648	1561	Abundant & widespread
Caspian tern	Taranui	<i>Sterna caspia</i>	B	Nationally vulnerable	10-40	Up to 63	70	3000 (1995) (2%)
White-fronted tern	Tara	<i>S. striata</i>	F	Declining	0-100	Up to 169	204	30000 (2000) (<1%)
Black-fronted tern	Tarapiroe	<i>S. albobriatus</i>	F	Nationally endangered	0-50	54	58	5000 (1995) (1%)
<b>7. Swamp specialists</b>								
Marsh crane	Koitareke	<i>Porzana pusilla</i>	B	Relict	?	n.c.	26	?
Pukeko	Pukeko	<i>Porphyrio porphyrio</i>	B	Not threatened	250-500	Up to 28	502	Abundant
Australasian bittern	Matuku	<i>Botaurus poiciloptilus</i>	B	Nationally endangered	20	n.c.	20	580-725 (3-5%)
<b>8. Riparian wetland species</b>								
Kingfisher	Kotare	<i>Halcyon sancta</i>	B	Not threatened	10-50	n.c.	20	
Cattle egret		<i>Bubulcus ibis</i>	M	Migrant	10-30	<10	94	<1000 (10%)
Australasian harrier hawk	Kahu	<i>Circus approximans</i>	B	Not threatened	?	58+	58+	Widespread & common

## Appendix 2: Example bird data recording sheet for Te Waihora/Lake Ellesmere

Date: \_\_\_\_\_ Survey section: \_\_\_\_\_  
 Lake level: \_\_\_\_\_ Weather conditions: \_\_\_\_\_  
 Surveyors: \_\_\_\_\_

Species name, by guild	Maori name	Scientific name	Number recorded
<b>1. Open water divers</b>			
Australasian crested grebe	Puteketeke	<i>Podiceps cristatus</i>	
Black cormorant	Kawau	<i>Phalacrocorax carbo</i>	
Little cormorant	Kawaupaka	<i>P. melanoleucos</i>	
Pied cormorant	Kahuhiruhi	<i>Phalacrocorax varius</i>	
NZ scaup	Papango	<i>Aythya novaeseelandiae</i>	
<b>2. Deep water waders</b>			
White heron	Kotuku	<i>Egretta alba</i>	
White-faced heron		<i>Ardea novaehollandiae</i>	
Royal spoonbill	Kotuku ngutu-papa	<i>Platalea regia</i>	
SI pied oystercatcher	Torea	<i>Haematopus finschi</i>	
Pied stilt	Poaka	<i>Himantopus himantopus</i>	
Black stilt	Kaki	<i>Himantopus novaezelandiae</i>	
Bar-tailed godwit	Kuaka	<i>Limosa lapponica</i>	
<b>3. Shallow water waders</b>			
Banded dotterel	Tuturiwhatu	<i>C. bicinctus</i>	
Wrybill	Ngutu parore	<i>Anarhynchus frontalis</i>	
Pacific golden plover		<i>Pluvialis fulva</i>	
Spur-winged plover		<i>Vanellus miles</i>	
Turnstone		<i>Arenaria interpres</i>	
Lesser knot	Huahou	<i>Calidris canutus</i>	
Curlew sandpiper		<i>C. ferruginea</i>	
Sharp-tailed sandpiper		<i>C. acuminata</i>	
Pectoral sandpiper		<i>C. melanotos</i>	
Red-necked stint		<i>C. ruficollis</i>	
<b>4. Dabbling waterfowl</b>			
Black swan	Wani	<i>Cygnus atratus</i>	
Paradise shelduck	Putangitangi	<i>Tadorna variegata</i>	
Australasian shoveler	Kuruwhengi, Pateke	<i>A. rhynchotis</i>	
Grey teal	Tete	<i>A. gracilis</i>	
<b>6. Aerial hunting gulls &amp; terns</b>			
Black-billed gull		<i>Larus bulleri</i>	
Red-billed gull	Tarapunga	<i>L. scopulinus</i>	
Black-backed gull	Karoro	<i>L. dominicanus</i>	
Caspian tern	Taranui	<i>Sterna caspia</i>	
White-fronted tern	Tara	<i>S. striata</i>	
Black-fronted tern	Tarapiroe	<i>Chlidonias albostratus</i>	
<b>7. Swamp specialists</b>			
Marsh crake	Koitareke	<i>Porzana pusilla</i>	
Pukeko	Pukeko	<i>Porphyrio porphyrio</i>	
Australasian bittern	Matuku	<i>Botaurus poiciloptilus</i>	
<b>8. Riparian wetland species</b>			
Kingfisher	Kotare	<i>Halcyon sancta</i>	
Cattle egret		<i>Bubulcus ibis</i>	
Australasian harrier hawk	Kahu	<i>Circus approximans</i>	
<b>Other significant species</b>			