

## Memo

From	Amy Whitehead, NIWA
To	Dave Herrick, Meridian Energy Ltd
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Subject	Freshwater birds at the Manapōuri Lake Control
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This memo provides a summary of the freshwater bird community present at the Manapōuri Lake Control (MLC) Structure in the Lower Waiau River, along with the existing bird mitigations and consent conditions linked to structural maintenance, gravel removal and river protection works at the MLC (Consent No: 204160).

### 1. Approach

Bird observation data were obtained from the Department of Conservation, the [eBird](#) website (Sullivan et al. 2009) and the grey literature. We identified three key datasets containing abundance data from formal freshwater bird surveys at the MLC between 2000 and 2020 (Table 1). Geo-located observations were obtained from eBird (GBIF.org 2021; Sullivan et al. 2009) and include records collected by members of Birds New Zealand (Scofield et al. 2012) and the general public. We downloaded all available bird observations for New Zealand and clipped the dataset to within a 1.5 km radius of the MLC. All available bird observation data, including formal surveys and eBird data, were pooled to identify bird species recorded as present at the MLC.

**Table 1: Summary of available freshwater bird survey data for the Manapōuri Lake Control.** Survey type: site surveys = ground-based surveys at a localised site; walk-through surveys = longitudinal transects along the river corridor (e.g., O’Donnell and Moore 1983).

Location	Period	Survey type	Source
Key sites in Lower Waiau River	2000 – 2001 2020	Site surveys	McClelland (2001, 2002) NIWA (Amy Whitehead, <i>Pers. comm.</i> )
Upper and Lower Waiau River	2009	Walk-through surveys	Department of Conservation (Colin O’Donnell, <i>Pers. comm.</i> )

### 2. Freshwater birds associated with the Manapōuri Lake Control

The bird fauna observed at the MLC is characteristic of South Island freshwater habitats, with 20 freshwater bird species identified (Table 2). Three species are listed as threatened (black-billed gull - critically endangered; black-fronted tern - nationally endangered; banded dotterel - nationally vulnerable) on the New Zealand Threat Classification (Robertson et al. 2017). Twelve bird species not dependent on freshwater habitats have also been recorded at the MLC.

Black-billed gulls are the world's most threatened gull and are listed as critically endangered (Robertson et al. 2017). An intensive national survey in 2016-17 found approximately 60,000 nests, with the majority of these in Southland and Canterbury (Mischler 2018). Black-billed gulls utilise braided river habitats for feeding and breeding during the summer, with lake habitats more commonly used in the winter. They typically feed on invertebrates in riverine habitats and adjacent paddocks during the breeding season, migrating to coastal areas in the winter. Black-billed gulls are colonial nesters that primarily breed on sparsely-vegetated gravel bars on inland rivers, and their nests are typically shallow scrapes in coarse gravel (McClellan 2009). However, they will sometimes nest in adjacent farmland after flood events. Colonies often change location and densities from year to year (McClellan and Habraken 2019). Declines of black-billed gulls have been attributed to mammalian predation, habitat loss and human disturbance. Black-billed gulls are the most abundant freshwater birds species observed at the MLC, with large breeding colonies of up to 3250 adult birds present (Table 3).

Black-fronted terns are endemic and listed as nationally endangered (Robertson et al. 2017), with an estimated population of 5,000 to 10,000 individuals (Bell 2013). They feed by taking aquatic and terrestrial invertebrates and fish on the wing over riverine habitats, as well as from terrestrial habitats adjacent to the river. They are colonial breeders that predominantly breed on river terraces and gravel bars of braided riverbeds of the eastern South Island. Colonies typically form on non-vegetated, gravel bars, and nests are scrapes in the sand or between river stones and may be lined with fine twigs. Black-fronted terns migrate to the coast after the breeding season, where they roost in sheltered harbours, estuaries and lagoons (Bell 2013). Black-fronted terns have been recorded in low numbers at the MLC, with typically 20 or fewer individuals observed at a time in the eBird database, but have not been recorded during formal surveys. However, breeding colonies have been recorded at downstream sites in the Lower Waiau River (e.g., McClelland 2001, 2002).

Banded dotterels are listed as nationally vulnerable (Robertson et al. 2017), with a total declining population of approximately 50,000 birds (Pierce 2013). They only breed in New Zealand, with breeding habitat predominantly in riparian areas, river terraces and gravel bars of braided rivers. After breeding, most birds flock together and migrate to coastal New Zealand or Australia for the winter. Banded dotterels preferentially feed in shallow pools and riffles associated with minor channels, typically on sand and fine gravel substrates in water less than 10 mm deep. They also feed in terrestrial habitats. Banded dotterels have been recorded at the MLC in low numbers (six or fewer) in the eBird database but have not been recorded during formal surveys. They are also present elsewhere in the Lower Waiau river in low numbers (e.g., McClelland 1996; Sagar 1994).

Ten freshwater bird species have been recorded at the MLC during formal surveys conducted over the breeding season (October – December). Black-billed gulls were the most abundant species, with large breeding colonies present in most surveyed years (Table 3). The low number of black-billed gulls observed in 2020 is likely the result of high lake levels and river flows in the Waiau catchment which meant that key breeding habitat (e.g., the artificial bird island) at the MLC was submerged at the beginning of the nesting period.

**Table 2: Bird species observed at the Manapōuri Lake Control.** Species are ordered by family, threat status and common name, with data based on a compilation of observations from eBird and formal surveys undertaken by the Department of Conservation, McClelland (McClelland 2001, 2002) and NIWA (Table 1). Nomenclature and threat status from Robertson et al. (2017). Species typically associated with freshwater habitats (Storey et al. 2018) and those observed at the MLC during formal surveys are indicated in the two right hand columns.

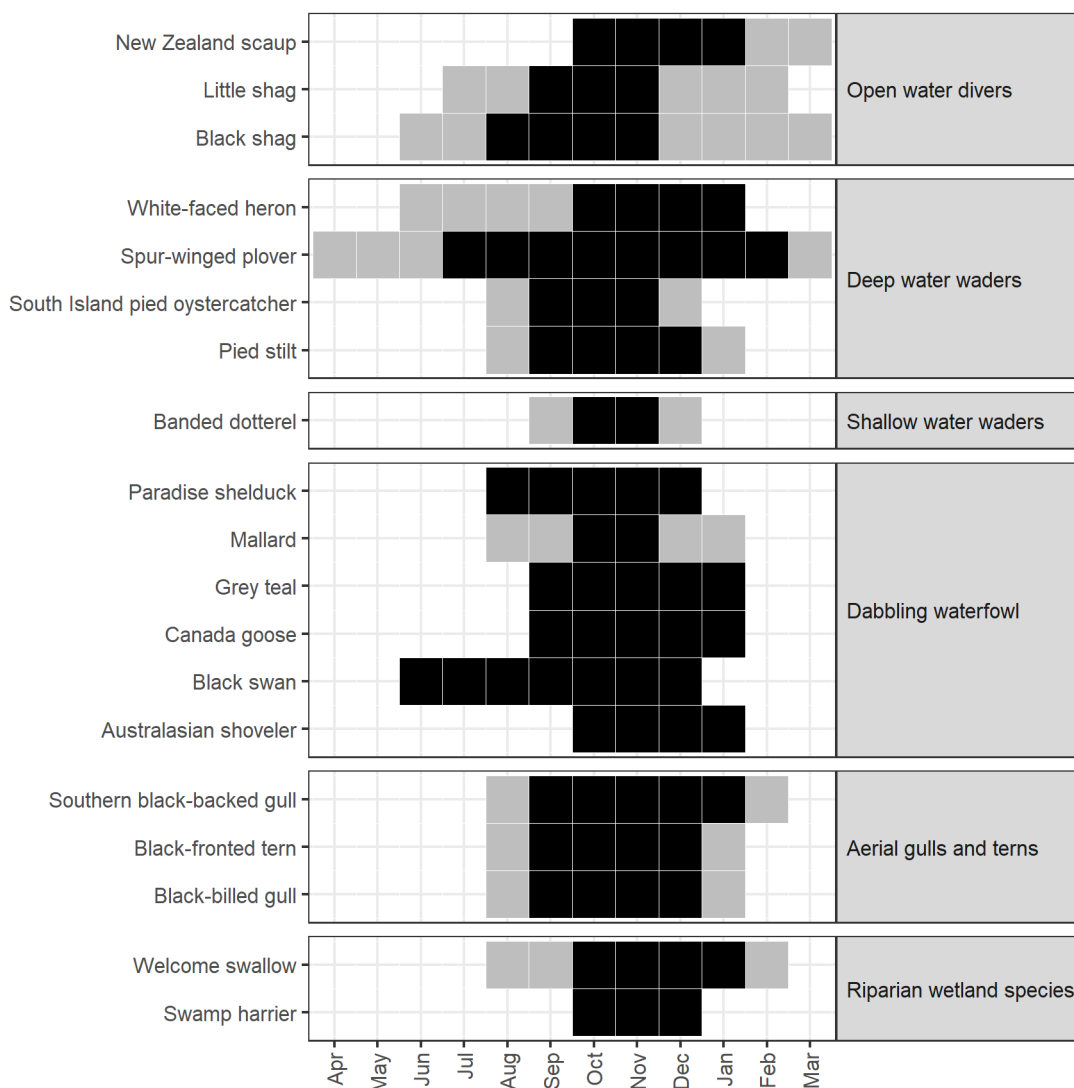
Family	Common Name	Species	Threat Status	Freshwater Survey	
Acanthizidae	Grey warbler	<i>Gerygone igata</i>	Not threatened		
Accipitridae	Swamp harrier	<i>Circus approximans</i>	Not threatened	X	X
Alaudidae	Skylark	<i>Alauda arvensis</i>	Introduced & Naturalised		
Anatidae	Australasian shoveler	<i>Anas rhynchos</i>	Not threatened	X	
	Black swan	<i>Cygnus atratus</i>	Not threatened	X	
	Grey teal	<i>Anas gracilis</i>	Not threatened	X	X
	New Zealand scaup	<i>Aythya novaeseelandiae</i>	Not threatened	X	
	Paradise shelduck	<i>Tadorna variegata</i>	Not threatened	X	
	Canada goose	<i>Branta canadensis</i>	Introduced & Naturalised	X	
	Mallard	<i>Anas platyrhynchos</i>	Introduced & Naturalised	X	X
	Ardeidae	White-faced heron	<i>Egretta novaehollandiae</i>	Not threatened	X
Artamidae	Australian magpie	<i>Gymnorhina tibicen</i>	Introduced & Naturalised		
Charadriidae	Banded dotterel	<i>Charadrius bicinctus bicinctus</i>	Nationally vulnerable	X	X
	Spur-winged plover	<i>Vanellus miles novaehollandiae</i>	Not threatened	X	X
Emberizidae	Yellowhammer	<i>Emberiza citrinella</i>	Introduced & Naturalised		
Fringillidae	Chaffinch	<i>Fringilla coelebs</i>	Introduced & Naturalised		
	Goldfinch	<i>Carduelis carduelis</i>	Introduced & Naturalised		
	Redpoll	<i>Carduelis flammea</i>	Introduced & Naturalised		
Haematopodidae	South Island pied oystercatcher	<i>Haematopus finschi</i>	Declining	X	X
Hirundinidae	Welcome swallow	<i>Hirundo neoxena neoxena</i>	Not threatened	X	
Laridae	Black-billed gull	<i>Larus bulleri</i>	Critically endangered	X	X
	Southern black-backed gull	<i>Larus dominicanus dominicanus</i>	Not threatened	X	X
Phalacrocoracidae	Black shag	<i>Phalacrocorax carbo novaehollandiae</i>	Naturally uncommon	X	X
	Little shag	<i>Phalacrocorax melanoleucos brevirostris</i>	Not threatened	X	X
Prunellidae	Dunnock	<i>Prunella modularis</i>	Introduced & Naturalised		
Recurvirostridae	Pied stilt	<i>Himantopus himantopus leucocephalus</i>	Not threatened	X	X
Rhipiduridae	South Island fantail	<i>Rhipidura fuliginosa fuliginosa</i>	Not threatened		
Sternidae	Black-fronted tern	<i>Chlidonias albobriatus</i>	Nationally endangered	X	
Sturnidae	Starling	<i>Sturnus vulgaris</i>	Introduced & Naturalised		
Turdidae	Blackbird	<i>Turdus merula</i>	Introduced & Naturalised		
	Song thrush	<i>Turdus philomelos</i>	Introduced & Naturalised		

**Table 3: Abundance of freshwater bird species observed during formal surveys at the Manapōuri Lake Control.**

Columns represent data from the individual surveys identified in Table 1. Note that the McClelland surveys (2000, 2001) only recorded black-billed gulls at the MLC and it is unknown whether other species were present.

Species	October 2000	October 2001	December 2009	November 2020	December 2020
Black-billed gull	1435	1255	3250	37	107
Black shag			1	0	0
Grey teal			5	0	0
Little shag			0	0	0
Mallard			0	0	30
Pied stilt			2	0	10
South Island pied oystercatcher			54	0	0
Southern black-backed gull			2	0	0
Spur-winged plover			4	0	0
Swamp harrier			1	0	0

The breeding season for most freshwater birds present at the MLC occurs from September – December (Figure 1, O’Donnell 2000). Freshwater birds are susceptible to disturbance by human activities within the riverbed during the breeding season. Highly camouflaged nests and chicks may be crushed by people walking or driving vehicles on the riverbed and birds may abandon nests or colonies if disturbed. Also, chicks may become separated from adults and breeding success can decline if brooding adults frequently leave the nest for extended periods of time (O’Donnell et al. 2016). Hydrological alterations during the breeding season may also reduce nesting success. For example, floods or high lake levels may drown nests or chicks, while periods of low flow may allow mammalian predators to access nesting sites on islands. The effects of disturbance and hydrological fluctuations outside the breeding season are likely to be minimal, with many of the freshwater species observed at the MLC, including the threatened species, migrating outside the Waiau catchment.



**Figure 1: Breeding seasons of freshwater birds associated with the Manapōuri Lake Control.** Black squares indicate primary breeding season, while grey squares represent months in which some breeding occurs in most years. Adapted from O'Donnell (2000).

### 3. Existing consent conditions and mitigations

The existing consent (Consent No: 204160) allows for gravel excavation, dam safety protection works, general maintenance, rock rip rap, vegetation clearance and construction and maintenance of a gravel island to provide bird habitat. Consent conditions specifically relevant to birds include:

- 7(a). *To avoid disturbance of the roosting and nesting areas of the black-fronted tern, black-billed gull, the works specified in Conditions 2(a), 2(b), 2(c)<sup>1</sup> shall not occur during the period 15 September to January, if that works would disturb any colonies of the above birds.*

<sup>1</sup> 2(a) the reclamation of Mararoa Diversion Cut, including the use of bunds, to narrow the channel to an average width of 50 m; 2(b) placement of riprap revetment, up to the average annual flood level, along both banks of the Mararoa Diversion Cut; 2(c) construction of a 150 m long rock groyne out from the true right bank of the Mararoa Diversion Cut; 2(d) extraction of gravel and other sediments from the bed of the Waiau River.

7(b). *Other than the works specified in Conditions 2(a), 2(b), 2(c) and 2(d), there shall be no disturbance of the roosting and nesting sites of the black-fronted tern, black-billed gull, and banded and black-fronted dotterel, or the feeding areas of the banded and black-fronted dotterel, during excavation works.*

These two conditions ensure that works avoid potential disturbance of freshwater bird species, particularly during the breeding season. The species named in the consent conditions include the three threatened species known to occur at the MLC, along with the black-fronted dotterel (*Euseyornis melanops* - naturally uncommon; Robertson et al. 2017). Based on the available data, no black-fronted dotterels have been observed at the MLC. However, two individuals were recorded on the Lower Waiau River somewhere between the MLC and the confluence with the Wairaki River in the 2009 Department of Conservation survey, although the exact location was not recorded. The named species are unlikely to be present in significant numbers at the MLC between February – August as they typically migrate to coastal regions. Potential disturbances to other freshwater bird species (e.g., waterfowl) present during periods of consented works are likely to be minor, with individuals expected to temporarily move to nearby habitat. No impacts of works are anticipated outside the works period.

A bird habitat island was created as mitigation under the existing consent to provide vegetation-free gravel habitat for roosting and nesting freshwater birds. The physical characteristics of the island were designed in conjunction with the Department of Conservation, with the surface of the island maintained at least 0.5 m above Lake Manapōuri's highest operating level (RL 180.5 masl). Works to maintain and enhance this island habitat, including removal of vegetation, will benefit freshwater birds provided that they are undertaken with consideration to the existing consent conditions 7(a) and 7(b).

Based on the available evidence, I believe that Conditions 7(a) and 7(b) in the existing consent are appropriate for avoiding and/or mitigating any potential effects of works on the freshwater bird community at the MLC and should be transferred to the replacement consent.

#### 4. References

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