

Assessment of threatened species for inclusion in an avian influenza vaccination programme

December 2024

Caveat: There is one small transcribing error in appendix 2: tara iti, columns “single population” should be “Y” and dependant on captive breeding should also be “Y”. This doesn’t change anything about the risk assessment. Fixing the error would have involved redoing the spreadsheet.

Summary

This document provides the background rationale and process undertaken to assess New Zealand threatened birds species for potential inclusion in a vaccination programme to mitigate the risk of extinction from highly pathogenic avian influenza (HPAI).

An expert species and veterinary Technical Advisory Group (TAG) reviewed 80 threatened species and selected 45 for further consideration. A technical expert for each species led a process to develop a Species Protection Plan which includes the actions for readiness, response and recovery to mitigate the impacts of HPAI and prevent extinction.

The technical expert selected sites and cohorts where vaccination could be achieved in 28 of the original 45 species. This is presented in “H5 avian influenza emergency vaccination plan for New Zealand threatened species DOC-10347335”

Species assessment process

There are 80 avian species classed as threatened (18 nationally critical, 14 nationally endangered, 37 nationally increasing, 11 nationally vulnerable) (New Zealand Threat Classification System)

These species were reviewed using a qualitative assessment by a technical expert panel against a series of criteria to determine the risk of infection with HPAI and the overall risk to species survival, followed by a review of the feasibility of delivery of vaccination in those species.

- **Risk of infection** criteria were developed based on overseas reports of transmission pathways and susceptibility of genus or family.
- **Risk to species survival** criteria were developed based on the extent of reported mass mortality events overseas in similar species/genera or those with similar ecology, and species characteristics which might result in increased extinction risk in the event of a significant population decline from HPAI. E.g. small population size, long-lived species with slow reproduction rate
- **Feasibility** was assessed based on the ability to safely and effectively deliver a prime/boost vaccination to sufficient individuals to create an insurance population and/or protect valuable genetics. During this process, potential vaccination sites were also identified, but this was not an exhaustive list and requires additional refinement, in consultation with iwi and operational staff.

Criteria for assessment also included background information contained in Appendix 3.

Note: Iwi consultation has not been undertaken at this point in time but is being included in Species Protection Plan conversations.

Risk of infection qualifiers

Does the species:

- Colony nest
- Communal roost
- Communal feed
- Scavenge/Predate
- Inhabit seabird habitat
- Have waterfowl contact

Risk of infection was rated as low, moderate or high, with a half-step applied in some cases, dependent on the assessment of the extent to which the species demonstrated one or more of these qualifiers.

Risk to species qualifiers:

Is the species:

- Population size <250
- Limited to a single population
- Secure overseas
- Reliant on captive breeding
- Able to recover from 80% decline?

Risk to species was rated as low, moderate or high, with a half-step applied in some cases, dependent on the assessment of the extent to which the species demonstrated one or more of these qualifiers.

Vaccine programme feasibility

The panel then considered if it was logistically possible to undertake vaccination of individuals with a prime/booster protocol. This included consideration of risk of impacts of capture and handling on the individual, the population and the site. Feasibility was higher for species held in captivity or where holding birds captive temporarily to deliver vaccination is feasible.

A vaccination programme was considered feasible if:

- The majority of the individually marked target group can be captured twice, 4 weeks apart (3-6) for vaccination.
- A minimum of 40 individuals could be vaccinated to support genetic diversity. It was noted that this could occur across the species population, and did not need to be achieved in a single site.

Additional desirable, but not compulsory, features included:

- A subset of the target group (N=5) can be recaptured at 6-10 weeks post booster injection for an antibody blood test
- Monitoring and surveillance will detect morbidity or mortality in an outbreak
- Monitoring will detect significant population decline

These desirable features will be significantly dependent on species characteristics, location, time of year and resources. They are strongly desirable in order to understand the success of the vaccination programme and inform other species management actions, however due to the logistics of working with free-living wildlife, they may not be achievable in some cases. Therefore, they were considered desirable but not compulsory, as the over-riding goal is species protection in the immediate to short term.

Species priority

Based on assessment criteria, the list of 80 threatened avian species was divided into the following four categories: (as at October 2024)

Priority	Description	Number of species	Species (common name)
1	Highest priority for vaccination	13	black stilt, brown teal, Chatham Island yellow-crowned parakeet, Chatham petrel, hoiho, kākāpō, kea, northern New Zealand dotterel, orange-fronted parakeet, shore plover, South Island takahē, southern New Zealand dotterel, Whenua Hou diving petrel
2	Vaccinate if risk is raised	23	Auckland Island teal, black petrel, black robin, bush falcon, Campbell Island snipe, Campbell Island teal, Chatham Island oystercatcher, Chatham Island snipe, Chatham Island taiko, Chatham Island tit, Chatham Island tui, eastern falcon, great spotted kiwi, hihi/stitchbird, Hutton's shearwater, little spotted kiwi, northern royal albatross, rowi/Okarito brown kiwi, South Island kākā, southern falcon, southern Fiordland tokoeka, Stewart Island weka, whio/blue duck
3	Vaccinate if logistics allow	9	Antipodean wandering albatross, Caspian tern, Gibson's wandering albatross, Haast tokoeka, New Zealand fairy tern, Pitt Island shag, southern royal albatross, southern white-fronted tern, subantarctic skua
4	No vaccination recommended	35	Antarctic tern, Auckland Island shag, Australasian bittern, Australasian crested grebe, black-fronted tern, Chatham Island pigeon, Chatham Island shag, eastern rockhopper penguin, Foveaux shag, grey duck, grey-headed mollymawk, Kermadec petrel "summer", Kermadec white-faced storm petrel, king shag, lesser fulmar prion, light-mantled sooty albatross, long-tailed cuckoo, masked booby, New Zealand dabchick, New Zealand storm petrel, North Island kōkako, northern Fiordland tokoeka, Otago shag, Pacific white tern, red-tailed tropicbird, reef heron, Salvin's mollymawk, southern rock wren, spotted shag, Stewart island fernbird, white heron, while-bellied storm petrel, white-capped noddy, wrybill

Further refinement

This list of 45 species for potential vaccination was further refined following species expert advice during the development of Species Protection Plans. These plans contain the actions which will be undertaken readiness, response and recovery from H5 HPAI. Vaccination is one of the actions in 28 Species Protection Plans (as at June 2025).

List of Species Protection Plans which contain vaccination action:

Antipodean wandering albatross	Gibson's wandering albatross	Pāteke/ brown teal
Auckland Island Teal	Haast tokoeka	Rowi/ Okarito brown kiwi
Black petrel	Hoiho/yellow-eyed penguin	Shore plover/tuturuatu
Black robin	Kākāpō	South Island takahē
Campbell Island Teal	Kakī / Black Stilt	Southern NZ dotterel
Chatham Island Oystercatcher	Kea	Southern Royal albatross
Chatham Island taiko	NI kōkako	Subantarctic skua
Chatham Island tit	Northern Royal Albatross	Whenua Hou Diving Petrel
Chatham Island yellow-crowned parakeet	Orange-fronted kakariki/parakeet	Whio / blue duck
Chatham petrel		

Appendix 1 – Table of species, locations, ability to disperse

Highest priority for vaccination (n=13)

Preferred Common Name	Current Species Name	Location	Ability to disperse	Threat Status**
black stilt*	<i>Himantopus novaezelandiae</i>	Captive (Twizel & Christchurch) & offspring for release (Twizel)	Captive & mainland release sites	NC
brown teal	<i>Anas chlorotis</i>	Captive (multiple sites) & offspring for release (TBC)	Captive & mainland release sites	NI
Chatham Island yellow-crowned parakeet	<i>Cyanoramphus forbesi</i>	Mangere (Chatham Islands)	Remote island	NE
Chatham petrel	<i>Pterodroma axillaris</i>	Rangatira (Chatham Islands)	Offshore Island	NV
hoiho	<i>Megadyptes antipodes</i>	Northern population (Otago/Southland)	Nil	NE
Kākāpō*	<i>Strigops habroptilus</i>	Whenua hou, Anchor Island (Southland)	Flightless on islands	NC
kea	<i>Nestor notabilis</i>	Captive (multiple sites) & mainland sites (Canterbury, West Coast, Southland, Nelson)	Captive & mainland	NE
Northern New Zealand Dotterel	<i>Charadrius obscurus aquilonius</i>	Matakana Island	Offshore island	NI
orange-fronted parakeet*	<i>Cyanoramphus malherbi</i>	Captive (Christchurch) & mainland sanctuary (Nelson)	Captive & mainland release sites	NC
shore plover*	<i>Thinornis novaeseelandiae</i>	Captive (& island sites)	Captive & offshore islands	NC
South Island takahē*	<i>Porphyrio hochstetteri</i>	Captive (Te Anau) & island sites (offshore, multiple sites)	Captive & flightless on offshore islands	NV
southern New Zealand dotterel	<i>Charadrius obscurus obscurus</i>	Rakiura, Southland	Nil	NC
Whenua Hou diving petrel	<i>Pelecanoides whenuahouensis</i>	Whenua hou (Southland)	Nil	NC

*Species which were included in the Safety and Efficacy Trial (or a surrogate species).

**NC Nationally Critical, NE Nationally Endangered, NV Nationally Vulnerable, NI Nationally Increasing

Vaccinate if risk is elevated (n=23)

Preferred Common Name	Current Species Name	Location	Ability to disperse	Threat Status
Auckland Island teal	<i>Anas aucklandica</i>	Subantarctic (set up captive programme)	Captive	NV
black petrel	<i>Procellaria parkinsoni</i>	Aotea/Great Barrier Island	Nil	NV
black robin	<i>Petroica traversi</i>	Rangatira, Mangere (Chatham Islands)	Remote islands	NC
bush falcon	<i>Falco novaeseelandiae ferox</i>	Captivity	Captive	NI
Campbell Island snipe	<i>Coenocorypha aucklandica perseverance</i>	Subantarctic (Campbell Island)	Remote island	NV
Campbell Island teal	<i>Anas nesiotis</i>	Subantarctic & Whenua Hou (Southland) (set up captive programme)	Islands	NI
Chatham Island oystercatcher	<i>Haematopus chathamensis</i>	Chatham Islands	Remote islands	NC
Chatham Island snipe	<i>Coenocorypha pusilla</i>	Confined to Chatham Islands	Remote islands	NV
Chatham Island taiko	<i>Pterodroma magentae</i>	Not confined (main Chatham Island)	Nil	NC
Chatham Island tit	<i>Petroica macrocephala chathamensis</i>	Rangatira, Mangere (Chatham Islands)	Remote islands	NE
Chatham Island tui	<i>Prothemadera novaeseelandiae chathamensis</i>	Rangatira, Mangere (Chatham Islands)	Remote islands	NV
eastern falcon	<i>Falco novaeseelandiae novaeseelandiae</i>	Captivity	Captive	NV
great spotted kiwi	<i>Apteryx haastii</i>	Captive for release, mainland site	Mainland release site, localised	NV
hihi, stitchbird	<i>Notiomystis cincta</i>	Confined to offshore islands (Tiritiri Matangi, Hauturu, Kapiti) or sanctuaries	Islands	NV
Hutton's shearwater	<i>Puffinus huttoni</i>	Mainland	Nil	NV
little spotted kiwi	<i>Apteryx owenii</i>	Mainland sanctuary and offshore island	Fenced sanctuary and offshore island	NI
northern royal albatross	<i>Diomedea sanfordi</i>	Taiaroa Head (Otago) (& Chatham Islands)	Nil	NV
rowi, Okarito brown kiwi	<i>Apteryx rowi</i>	Okarito (West Coast), creche island (Marlborough)	Nil	NE
South Island kākā	<i>Nestor meridionalis meridionalis</i>	Captive breed for release	Captive and release site	NV

southern falcon	<i>Falco novaeseelandiae "southern"</i>	Captive (multiple sites)	Captive & mainland release sites	NE
southern Fiordland tokoeka	<i>Apteryx australis "southern Fiordland"</i>	Shy Lake Fiordland	Mainland localised site	NE
Stewart Island weka	<i>Gallirallus australis scotti</i>	Rakiura & islands (Southland)	Nil	NV
whio, blue duck	<i>Hymenolaimus malacorhynchos</i>	Captive (2 sites) & offspring for release	Captive & mainland release sites	NV

Vaccinate if logistics allow (n=9)

Preferred Common Name	Current Species Name	Location	Ability to disperse	Threat Status
Antipodean wandering albatross	<i>Diomedea antipodensis antipodensis</i>	Subantarctic (Antipodes Island)	Nil	NC
Caspian tern	<i>Hydroprogne caspia</i>	Bell Island, (Nelson)	Nil	NV
Gibson's wandering albatross	<i>Diomedea antipodensis gibsoni</i>	Subantarctic (Auckland Islands)	Nil	NC
Haast tokoeka	<i>Apteryx australis "Haast"</i>	Localised mainland sites (West Coast)	Nil	NV
New Zealand fairy tern	<i>Sternula nereis davisae</i>	Captive rearing	Nil	NC
Pitt Island shag	<i>Stictocarbo featherstoni</i>	Confined to Chatham Islands	Remote islands	NV
southern royal albatross	<i>Diomedea epomophora epomophora</i>	Subantarctic (Campbell & Auckland Islands)	Nil	NV
southern white-fronted tern	<i>Sterna striata aucklandornae</i>	Subantarctic (Auckland Islands)	Nil	NV
subantarctic skua	<i>Catharacta antarctica lonnbergi</i>	Subantarctic (Campbell & Auckland Islands)	Nil	NV

No vaccination planned (n=35)

Preferred Common Name	Current Species Name	Threat Status	Preferred Common Name	Current Species Name	Threat Status
Antarctic tern	<i>Sterna vittata bethunei</i>	NI	New Zealand dabchick	<i>Poliocephalus rufopectus</i>	NI
Auckland Island shag	<i>Leucocarbo colensoi</i>	NV	New Zealand storm petrel	<i>Fregetta maoriana</i>	NV
Australasian bittern	<i>Botaurus poiciloptilus</i>	NC	North Island kōkako	<i>Callaeas wilsoni</i>	NI
Australasian crested grebe	<i>Podiceps cristatus australis</i>	NV	northern Fiordland tokoeka	<i>Apteryx australis "northern Fiordland"</i>	NV
black-fronted tern	<i>Chlidonias albosriatus</i>	NE	northern rock wren	<i>Xenicus gilviventris</i>	NC
Chatham Island pigeon	<i>Hemiphaga chathamensis</i>	NV	Otago shag	<i>Leucocarbo chalconotus</i>	NI
Chatham Island shag	<i>Leucocarbo onslowi</i>	NV	Pacific white tern	<i>Gygis alba candida</i>	NC
eastern rockhopper penguin	<i>Eudyptes filholi</i>	NV	red-tailed tropicbird	<i>Phaethon rubricauda</i>	NI
Foveaux shag	<i>Leucocarbo stewarti</i>	NV	reef heron	<i>Egretta sacra sacra</i>	NE
grey duck	<i>Anas superciliosa</i>	NV	Salvin's mollymawk	<i>Thalassarche salvini</i>	NC
grey-headed mollymawk	<i>Thalassarche chrysostoma</i>	NV	southern rock wren	<i>Xenicus gilviventris rineyi</i>	NE
Kermadec petrel "summer"	<i>Pterodroma neglecta neglecta</i>	NE	spotted shag	<i>Stictocarbo punctatus</i>	NV
Kermadec white-faced storm petrel	<i>Pelagodroma albiclunis</i>	NC	Stewart Island fernbird	<i>Bowdleria punctata stewartiana</i>	NV
king shag	<i>Leucocarbo carunculatus</i>	NE	white heron	<i>Ardea modesta</i>	NC
lesser fulmar prion	<i>Pachyptila crassirostris flemingi</i>	NV	white-bellied storm petrel	<i>Fregetta grallaria grallaria</i>	NE
light-mantled sooty albatross	<i>Phoebetria palpebrata</i>	NV	white-capped noddy	<i>Anous minutus</i>	NV
long-tailed cuckoo	<i>Eudynamys taitensis</i>	NV	Wrybill	<i>Anarhynchus frontalis</i>	NI
masked booby	<i>Sula dactylatra tasmani</i>	NE			

Appendix 2 - DOC Species TAG HPAI risk assessment table

Vax priority	Common Name	Māori Name	Species Name	Threat Status	Risk of infection qualifiers						Risk to species qualifiers					Risk of infection	Risk to the species
					Colony nesting	Communa l roosting	Communa l feeding	Scavenger /Predator	Inhabits seabird habitat	Waterfowl contact	Low number <250 mature individuals	Single populatio n	Secure overseas (NE: No, Endemic)	Reliant on captive breeding	Recovery from 80% decline?		
1	black stilt	kakī	<i>Himantopus novaeseelandiae</i>	NC	N	N	N	N	N	Y	Y	N	NE	Y	Y	high	high
1	brown teal	pāteke	<i>Anas chlorotis</i>	NI	N	Y	Y	N	N	Y	N	N	NE	N	Y	high	moderate
1	Chatham Island yellow-crowned parakeet		<i>Cyanoramphus forbesi</i>	NE	N	N	N	N	Y	N	N	Y	NE	N	UNSURE	moderate/high	high
1	Chatham petrel	ranguru	<i>Pterodroma axillaris</i>	NV	Y	N	N	N	Y	N	N	N	NE	N	Y	high	high
1	hoiho	hoiho	<i>Megadyptes antipodes</i>	NE	N	N	N	N	Y	N	N	N	NE	N	N	moderate	moderate
1	kākāpō	kākāpō	<i>Strigops habroptilus</i>	NC	N	N	N	N	Y	N	Y	N	NE	N	Y	high	high
1	kea	kea	<i>Nestor notabilis</i>	NE	N	N	N	Y	N	N	N	N	NE	N	Y	moderate	individual infections
1	northern New Zealand dotterel		<i>Charadrius obscurus aquilonius</i>	NI	N	Y	N	N	S	N	N	N	NE	N	Y	high	low/moderate
1	orange-fronted parakeet	kākāriki karaka	<i>Cyanoramphus malherbi</i>	NC	N	N	N	N	N	N	Y	N	NE	Y	UNSURE	moderate/high	moderate/high
1	shore plover	tuturuatu	<i>Thinornis novaeseelandiae</i>	NC	N	N	N	N	Y	Y	Y	N	NE	Y	Y	high	high
1	South Island takahē	takahē	<i>Porphyrio hochstetteri</i>	NV	N	N	N	N	Y	N	N	N	NE	N	Y	moderate	individual infections
1	southern New Zealand dotterel	tuturuatu	<i>Charadrius obscurus obscurus</i>	NC	N	Y	Y	N	N	N	Y	Y	NE	N	N	moderate	high
1	Whenua Hou diving petrel		<i>Pelecanoides whenuahouensis</i>	NC	Y	N	N	N	Y	N	Y	Y	NE	N	UNSURE	moderate	high
2	Auckland Island teal		<i>Anas aucklandica</i>	NV	N	N	N	N	Y	Y	N	N	NE	N	Y	moderate	moderate
2	black petrel	taiko	<i>Procellaria parkinsoni</i>	NV	Y	N	N	Y	Y	N	N	N	NE	N	Y	moderate	individual infections
2	black robin		<i>Petroica traversi</i>	NC	N	N	N	N	Y	N	Y	N	NE	N	UNSURE	moderate/high	high
2	bush falcon	kārearea	<i>Falco novaeseelandiae ferax</i>	NI	N	N	N	Y	N	N	N	N	NE	N	N	moderate	individual infections
2	Campbell Island snipe		<i>Coenocorypha aucklandica perseverance</i>	NV	N	N	N	N	Y	Y	N	Y	NE	N	Y	moderate/high	moderate/high
2	Campbell Island teal		<i>Anas nesiotis</i>	NI	N	N	N	N	Y	Y	N	N	NE	N	Y	moderate	moderate
2	Chatham Island oystercatcher	tōrea tai	<i>Haematopus chathamensis</i>	NC	N	N	N	N	Y	N	Y	Y	NE	N	N	high	high
2	Chatham Island snipe		<i>Coenocorypha pusilla</i>	NV	N	N	N	N	Y	N	N	N	NE	N	Y	moderate/high	moderate/high
2	Chatham Island taiko	taiko	<i>Pterodroma magentae</i>	NC	N	N	N	N	Y	N	Y	Y	NE	N	UNSURE	moderate	high
2	Chatham Island tit		<i>Petroica macrocephala chathamensis</i>	NE	N	N	N	N	Y	N	N	N	NE	N	UNSURE	moderate	moderate
2	Chatham Island tui		<i>Prosthemadera novaeseelandiae chathamensis</i>	NV	N	N	N	N	Y	N	N	N	NE	N	Y	moderate	moderate
2	eastern falcon	kārearea	<i>Falco novaeseelandiae novaeseelandiae</i>	NV	N	N	N	Y	N	N	N	N	NE	N	N	moderate	individual infections
2	great spotted kiwi	roroa	<i>Apteryx haastii</i>	NV	N	N	N	N	N	N	N	N	NE	N	Y	low	moderate
2	hihi, stitchbird	hihi	<i>Notiomystis cincta</i>	NV	N	N	N	N	Y	N	N	N	NE	N	Y	moderate	moderate
2	Hutton's shearwater		<i>Puffinus huttoni</i>	NV	Y	N	N	N	Y	N	N	Y	NE	N	Y	moderate	low
2	little spotted kiwi	kiwi pukupuku	<i>Apteryx owenii</i>	NI	N	N	N	N	Y	N	N	N	NE	N	Y	low	moderate
2	northern royal albatross	toroa	<i>Diomedea sanfordi</i>	NV	Y	Y	Y	Y	Y	N	N	N	NE	N	N	high	high
2	rowi, Okarito brown kiwi	rowi	<i>Apteryx rowi</i>	NE	N	N	N	N	N	N	N	Y	NE	N	Y	moderate	moderate
2	South Island kākā	kākā	<i>Nestor meridionalis meridionalis</i>	NV	N	N	N	N	S	N	N	N	NE	N	Y	low	moderate
2	southern falcon		<i>Falco novaeseelandiae "southern"</i>	NE	N	N	N	Y	Y	N	N	N	NE	N	N	high	individual infections
2	southern Fiordland tokoeka	tokoeka	<i>Apteryx australis "southern Fiordland"</i>	NE	N	N	N	N	N	N	N	N	NE	N	Y	low	individual infections
2	Stewart Island weka	weka	<i>Gallirallus australis scotti</i>	NV	N	N	N	Y	Y	N	N	N	NE	N	Y	high	moderate
2	whio, blue duck	whio	<i>Hymenolaimus malacorhynchus</i>	NV	N	N	N	N	N	Y	N	N	NE	N	Y	low	moderate

Vax priority	Common Name	Māori Name	Species Name	Threat Status	Colony nesting	Communa l roosting	Communa l feeding	Scavenger /Predator	Inhabits seabird habitat	Waterfowl contact	Low number <250 mature individuals	Single populatio n	Secure overseas (NE: No, Endemic)	Reliant on captive breeding	Recovery from 80% decline?	Risk of infection	Risk to the species
3	Antipodean wandering albatross	toroa	<i>Diomedea antipodensis antipodensis</i>	NC	N	N	N	Y	Y	N	N	N	NE	N	N	moderate	low/moderate
3	Caspian tern	taranui	<i>Hydropragne caspia</i>	NV	Y	Y	N	N	Y	Y	N	N	Y	N	N	high	high
3	Gibson's wandering albatross	toroa	<i>Diomedea antipodensis gibsoni</i>	NC	N	N	N	Y	Y	N	Y	Y	NE	N	N	moderate	low/moderate
3	Haast tokoeka		<i>Apteryx australis "Haast"</i>	NV	N	N	N	N	N	N	N	Y	NE	N	Y	low	individual infections
3	New Zealand fairy tern	tara iti	<i>Sternula nereis davisae</i>	NC	N	Y	N	N	Y	N	Y	N	NE	N	N	high	high
3	Pitt Island shag		<i>Stictocarbo featherstoni</i>	NV	Y	Y	Y	N	Y	Y	N	N	NE	N	UNSURE	high	high
3	southern royal albatross	toroa	<i>Diomedea epomophora epomophora</i>	NV	N	N	N	Y	Y	N	N	N	NE	N	N	moderate	moderate
3	southern white-fronted tern	tara	<i>Sterna striata aucklandorn</i>	NV	Y	Y	Y	N	Y	N	N	N	NE	N	Y	moderate	moderate
3	subantarctic skua	hākoakoa	<i>Catharacta antarctica lonnbergi</i>	NV	N	Y	Y	Y	Y	Y	N	N	Y	N	N	high	high
4	Antarctic tern		<i>Sterna vittata bethunei</i>	NI	Y	Y	Y	N	Y	N	N	N	Y	N	Y	moderate	low
4	Auckland Island shag		<i>Leucocarbo colensoi</i>	NV	Y	Y	Y	N	Y	N	N	N	NE	N	UNSURE	moderate	high
4	Australasian bittern	matuku hūrepo	<i>Botaurus poiciloptilus</i>	NC	N	N	N	N	N	Y	Y	N	N	N	N	low	individual infections
4	Australasian crested grebe		<i>Podiceps cristatus australis</i>	NV	N	Y	N	N	N	Y	N	N	Y	N	Y	moderate	low
4	black-fronted tern	tarapirohe	<i>Chlidonias albostratus</i>	NE	Y	Y	N	N	N	N	N	N	NE	N	Y	high	moderate/high
4	Chatham Island pigeon	parea	<i>Hemiphaga chathamensis</i>	NV	N	N	Y	N	Y	N	N	Y	NE	N	Y	low	mod
4	Chatham Island shag		<i>Leucocarbo onslowi</i>	NV	Y	Y	Y	N	Y	N	N	N	NE	N	UNSURE	high	high
4	eastern rockhopper penguin		<i>Eudyptes filholi</i>	NV	Y	N	N	N	Y	N	N	N	Y	N	Y	moderate	low/moderate
4	Foveaux shag		<i>Leucocarbo stewarti</i>	NV	Y	Y	Y	N	Y	N	N	N	NE	N	UNSURE	high	moderate
4	grey duck	pāpera	<i>Anas superciliosa</i>	NV	N	N	Y	N	N	Y	N	N	Y	N	N	moderate	low
4	grey-headed mollymawk		<i>Thalassarche chrysostoma</i>	NV	Y	N	N	Y	Y	N	N	Y	Y	N	Y	low	mod/high
4	Kermadec petrel "summer"		<i>Pterodroma neglecta neglecta</i>	NE	Y	N	N	N	Y	N	N	N	NE	N	Y	low	low
4	Kermadec white-faced storm petrel		<i>Pelagodroma albiglunus</i>	NC	Y	N	N	N	Y	N	Y	N	NE	N	Y	low	moderate
4	king shag	kawau	<i>Leucocarbo carunculatus</i>	NE	Y	Y	N	N	Y	N	N	N	NE	N	N	high	high
4	lesser fulmar prion		<i>Pachyptila crassirostris flemingi</i>	NV	Y	N	Y	N	Y	N	N	Y	N	N	Y	high	high
4	light-mantled sooty albatross	toroa pango	<i>Phoebetria palpebrata</i>	NV	N	N	N	Y	Y	N	N	N	Y	N	Y	low	low
4	long-tailed cuckoo	koekoeā	<i>Eudynamys taitensis</i>	NV	N	N	N	N	Y	N	N	N	NE	N	Y	low	low
4	masked booby		<i>Sula dactylatra tasmani</i>	NE	N	Y	N	N	Y	N	N	N	Y	N	Y	moderate	low
4	New Zealand dabchick		<i>Poliocephalus rufopectus</i>	NI	N	N	Y	N	N	Y	N	N	NE	N	Y	moderate	low
4	New Zealand storm petrel		<i>Fregetta maoriana</i>	NV	N	N	N	N	Y	N	N	Y	NE	N	Y	low	low
4	North Island kōkako	kōkako	<i>Callaeas wilsoni</i>	NI	N	N	N	N	Y	N	N	N	NE	N	Y	low	low
4	northern Fiordland tokoeka		<i>Apteryx australis "northern Fiordland"</i>	NV	N	N	N	N	N	N	N	N	NE	N	Y	low	low
4	northern rock wren		<i>Xenicus gilviventris</i>	NC	N	N	N	N	N	N	Y	N	NE	N	UNSURE	low	individual infections
4	Otago shag		<i>Leucocarbo chalconotus</i>	NI	Y	Y	Y	N	Y	N	N	N	NE	N	UNSURE	high	moderate
4	Pacific white tern		<i>Gygis alba candida</i>	NC	N	N	N	N	Y	N	Y	Y	Y	N	UNSURE	low	low
4	red-tailed tropicbird		<i>Phaethon rubricauda</i>	NI	N	N	N	N	Y	N	N	N	Y	N	Y	low	low
4	reef heron	matuku moana	<i>Egretta sacra sacra</i>	NE	N	N	N	N	N	N	N	N	Y	N	N	moderate	low
4	Salvin's mollymawk	toroa	<i>Thalassarche salvini</i>	NC	Y	Y	Y	Y	Y	N	N	N	NE	N	Y	low	moderate/high
4	southern rock wren		<i>Xenicus gilviventris rineyi</i>	NE	N	N	N	N	N	N	N	N	NE	N	UNSURE	low	individual infections
4	spotted shag	kawau pāteketeke	<i>Stictocarbo punctatus</i>	NV	Y	Y	Y	N	Y	N	N	N	NE	N	UNSURE	high	moderate
4	Stewart Island fernbird		<i>Bowdleria punctata stewartiana</i>	NV	N	N	N	N	Y	N	N	N	NE	N	Y	low	low
4	white heron	kōtuku	<i>Ardea modesta</i>	NC	Y	N	N	N	N	Y	Y	Y	Y	N	N	moderate	individual infections
4	white-bellied storm petrel		<i>Fregetta gallaria gallaria</i>	NE	N	N	N	N	Y	N	N	N	Y	N	Y	low	low
4	white-capped noddy		<i>Anous minutus</i>	NV	Y	Y	Y	N	Y	N	N	N	Y	N	Y	moderate	low
4	wrybill	ngutu-pare	<i>Anarhynchus frontalis</i>	NI	N	Y	Y	N	N	Y	N	N	NE	N	Y	high	high

Appendix 3 Criteria for assessment

Criteria for vaccination used for HPAI Species TAG Assessment

These criteria were used by the Species expert to determine if AI vaccination would be included in the Species Protection Plan for species selected by the TAG for vaccine consideration

October 2024

Criteria for vaccination in a species to create an insurance population or protect a “high value” population.

Note: a vaccination program should be considered as an adjunct to other disease control measures and threat mitigation actions.

Species/Operational Unit (OU) selection

The species, or a subset called an Operational Unit (OU) is:

1. Under current management
2. At risk of extinction, local population loss, or significant impact on conservation/research if >50% decline occurs, or if a decline of >30% moves the species into a higher threat category
3. The vaccinated group will preserve genetics
4. The vaccinated group will represent an insurance population for the species

Susceptibility

The animals are considered susceptible based on

1. evidence of morbidity or mortality overseas in the Order/Family, and/or
2. habitat or behaviour increasing exposure risk, and/or
3. members of the species have died during outbreaks in NZ

Feasibility

Delivery of effective vaccination is compulsory, and follow-up monitoring is highly advantageous for determining efficacy, species impacts of disease, and ongoing vaccination/management protocols.

1. The majority of the individually marked target group can be captured twice, 4 weeks apart (3-6) for vaccination
2. To support genetic diversity, a target group of a minimum of 40 fully vaccinated individuals is recommended (this could be divided across populations/sites).

Preferred but not compulsory:

3. *A subset of the target group n=5 can be recaptured at week 10-14 for an antibody blood test*
4. *Monitoring will detect morbidity or mortality in an outbreak*
5. *Monitoring will detect significant population decline*

Triggers for commencing vaccination

1. Detection of HPAI 2.3.4.4b in Ross Sea region
 - a. Start vaccine planning for imminent delivery (if next trigger/s reached)
2. Detection of HPAI 2.3.4.4b in Australia if arrival is via wild birds or spread occurs within wild bird populations
 - a. Start vaccine planning for imminent delivery (if next trigger/s reached)
 - b. Consider vaccination of priority 1 species
3. Arrival of HPAI 2.3.4.4b in NZ subantarctic
 - a. Consider vaccinations in NZ subantarctic
 - b. Commence vaccination of priority 1 species
4. Arrival of HPAI 2.3.4.4b in Chatham Islands
 - a. Commence vaccinations in Chatham Island sites
 - b. Commence vaccination of priority 1 species
5. Detection of HPAI 2.3.4.4b in mainland NZ
 - a. Implement all species vaccination plans

Other considerations

1. Timing of vaccination may depend on species ecology e.g.
 - a. Accessibility due to migration, presence at breeding sites, flocking site access, etc
 - b. Risks of breeding disturbance, dispersal, handling during egg-laying etc
 - c. Probability of recapture for the second injection
 - d. Likelihood of need for an ongoing vaccination programme i.e. vaccinate closest to timing of outbreak risk to maximise protection
 - e. Species/OU location e.g. remote islands/flightless birds may present less concern to regulators if vaccinated early vs. species on mainland

*based on threat classification and feasibility

Background information on vaccination of wild birds for HPAI

(Brief summary of WOAHA guidelines)

HPAI control in free-ranging wild birds:

There are limited options for control and these are dependent on local context.

Biosecurity is the primary control method for HPAI.

- Reduce spread via restricted human access & reduced interactions with wild birds
- Wear appropriate PPE & disinfection actions when visiting wild bird habitat
- Restrict or suspend species management activities
- Carcass removal only with careful risk assessment
- Culling or habitat destruction is not beneficial
- Improve monitoring, surveillance, and biosecurity.

Vaccination considerations and vaccine use assumptions (old rules)

Vaccination is not a “magic bullet” and requires considerable risk analysis and planning, regulatory approvals, and in most contexts is not logistically feasible or likely to be significantly beneficial in free-ranging wild bird populations.

Regulatory issues (international regulations)

- Wild bird vaccination must comply with WOAHA Terrestrial Animal Health Code & Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.
- Post vaccination surveillance (sampling within the population) would be required.
- Emergency vaccination could be considered under specific situations for certain species e.g. those of high conservation value at risk of extinction (based on evidence of risk)

Logistical issues

- Widescale vaccination of free-ranging bird populations is considered impractical
- Requires MPI approval of the vaccination programme and release of vaccine
- Requires a vet to administer each dose
- Requires hands-on capture to administer two doses 1 month apart
- Not all bird species will produce protective antibodies from vaccination
- Duration of antibodies is variable
- Requires post-vaccination surveillance (catch, handling & sampling) including tracing of individual vaccinated wild birds until the end of their life or until the emergency response (including surveillance for proof of freedom) is complete.

Steps

- Undertake and evidence-based risk assessment and cost-benefit analysis of the vaccination programme for each species & location
- Identify and address logistical constraints as a first step
- Apply to MPI for access to vaccine - an appropriately matched vaccine (to the outbreak strain) is required
- Develop a biosecurity strategy, awareness programme, and communication plan