

9. THE WETLAND PADDLERS OF AOTEAROA DUCKS, SWANS AND GREBES

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NGĀTI APA), BRENDA GREENE

Ngā mihi

Manu hauora, repo hauora

Introducing our native wetland paddlers

The whitewater paddler – Whio

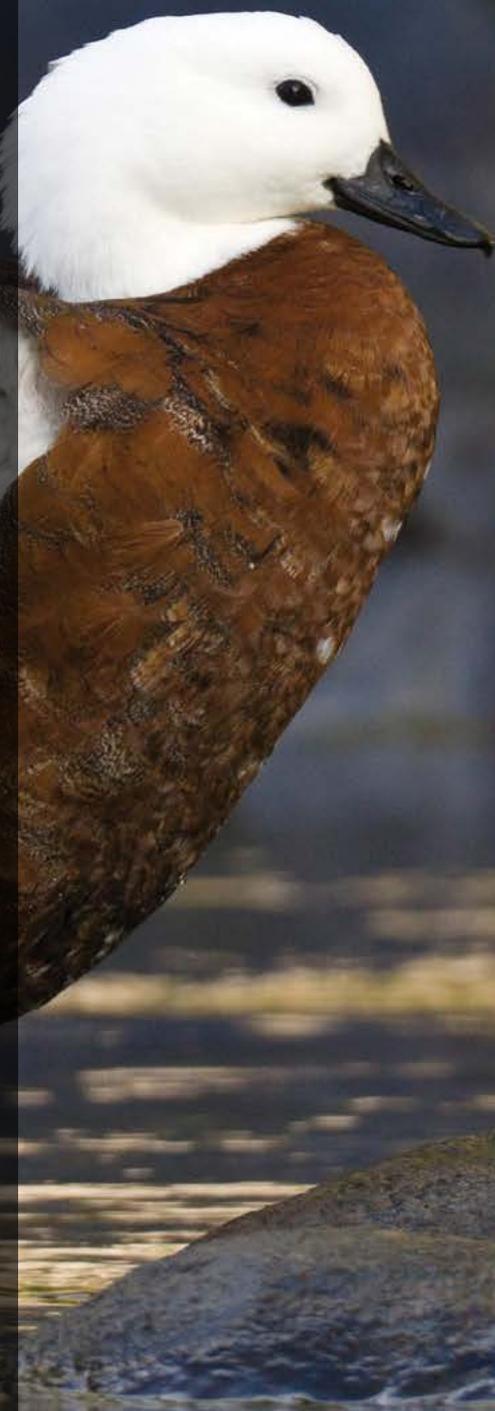
Our relationships with water birds

Rails, herons, and paddlers – wetland bird diversity as indicators of healthy whenua and wai

The sad story of the pāpera – on the brink?

Monitoring and returning our wetland paddlers

Want to learn more?



*Ko te pārerā e rakiraki ana, ko te pārerā e koēkoē ana***The calls of the duck – rakiraki, koēkoē**

Che Wilson (Ngāti Rangī)

We wish to thank Che Wilson (Ngāti Rangī), John Innes (Manaaki Whenua – Landcare Research), and all of the photographers who gave permission to use their images – Athena Rhodes, Bartek Wypych, Eddie van Uden, Neil Fitzgerald, Oscar Thomas and Raewyn Adams, NZ Birds Online, Te Papa Atawhai (Department of Conservation). A special thanks to tāngata tiaki from Te Tai Tokerau (Northland) who inspired us to give some attention to the pāpango and weweia.

– Ngā mihi, nā Cheri māua ko Brenda

**MANU HAUORA,
REPO HAUORA**

There is something about ducks paddling on a repo (wetland), roto and moana (lake), awa (river), and hāpua (lagoon). Their graceful and deliberate moves give many of us a sense of calm, as they appear to float effortlessly across the water surface. If their honks and quacks were absent in those spaces, it would feel odd. They are the sights we take for granted but would notice if they were no longer present.

Previous page: Female pūtāngitangi (paradise shelduck).
Photo: © Neil Fitzgerald



Canada geese swimming in a row. Photo: © Athena Rhodes



Kawau paka, little shag. Photo: © Athena Rhodes



Matuku, Australasian bittern. Photo: © Oscar Thomas



Kahu, Australasian harrier. Photo: © Oscar Thomas



Kotoreke, marsh crake. Photo: © Oscar Thomas

Once upon a time, before European colonisation took hold during the 19th century, our tūpuna (ancestors) would have been lucky enough to see a very different set of birdlife: at least seven species of native duck, a black swan, and one or two grebe species. A truly healthy repo would also have included shoreline birds such as: matuku (Australasian bittern), matuku-moana (white-faced grey heron), kōtuku (white heron), kōtuku-ngutupāpā (royal spoonbill), pūweto (spotless crake), and kotoreke/koitareke (marsh crake). Kawau (native cormorants, shags), kahu (Australasian harrier), ruru (morepork), and kōtare (kingfisher) would have flown above and around these waterbodies. However, in modern times, such diversity is a distant memory.

Today, the most common water birds we see are the introduced mallard (*Anas platyrhynchos*), white or mute swan (*Cygnus olor*), and Canada goose (*Branta canadensis*) all brought to Aotearoa by the early settlers from Europe during the late 1880s. It is not unusual to also see large, white male greylag geese (*Anser anser*), a feral goose introduced from Europe, with their grey-speckled female companions. Their presence is usually announced with a series of wild hissing noises targeted at unsuspecting humans venturing into their territory – not to mention the large deposits they tend to leave in their wake.

*Ka hauora ngā manu,
ka hauora ngā repo*

**When the birds are healthy,
the wetlands are healthy**



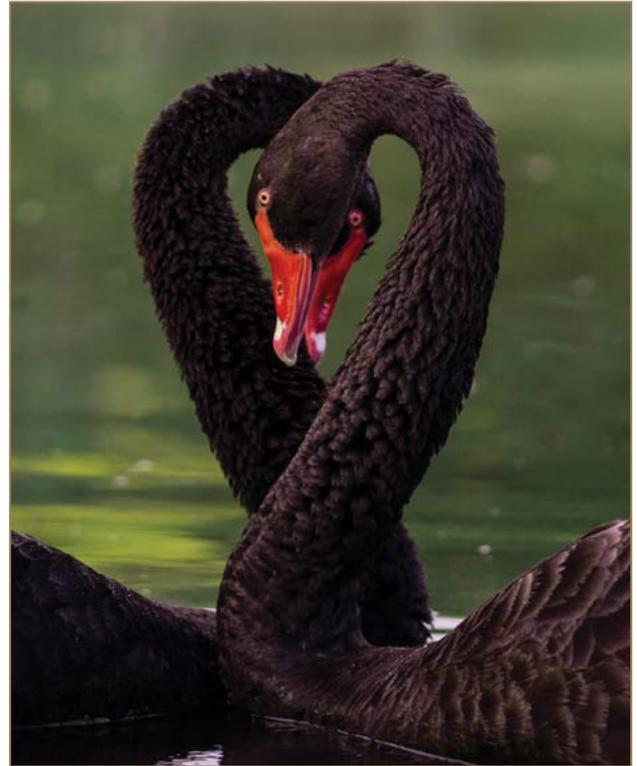
INTRODUCING OUR NATIVE WETLAND PADDLERS

An often under-appreciated reality is that Aotearoa has eleven species of native wetland paddlers: eight ducks, one swan (*Anatidae*), and two grebes (*Podicipedidae*) (Table 1). Of the eight duck species, seven are found in various swamp and estuarine wetlands, while the other, the kuruwengi (Northern shoveler) migrates here as an occasional visitor from the Northern Hemisphere.

The ninth wetland paddler is the native black swan (or wāna, wani, kakiānau). Archaeological finds in the middens and hangi pits of early Polynesian ancestors show that *Cygnus sumerensis*, a larger ancestor of our modern day native black swan, was an important part of their diets. Referred to as *pouwa* by tangata whenua (Indigenous people) of Rēkohu (Chatham Islands), this bird had disappeared by the time European settlers arrived to Aotearoa during the early 19th century. This suggests that hunting by our tūpuna had tipped the balance towards their extinction. The black swan has since been reintroduced by early European settlers and has re-established naturally throughout Aotearoa from Australia.

The remaining two of the eleven paddlers, are the unique aquatic birds from the grebe whānau (family) – the pūteketeke (Australasian crested grebe) and the weweia (New Zealand dabchick). The former is found mainly on South Island lakes and the latter mainly on North Island lakes.

Repo throughout the motu (country) were once home to this entire diverse collection of native water birds. Now, all but the pūtangitangi and wāna have declined



Wāna (black swans) courting. Photo: © Athena Rhodes

due to habitat modification and loss, introduced vertebrate and mammalian predators, hunting, and competition from other aquatic and land-based (terrestrial) species. Part of the toolkit for helping these water birds into the future is about raising awareness about them and their place in repo – as well as reviving our historical connections to them.



THE WHITEWATER PADDLER – WHIO

The whio (blue duck, *Hymenolaimus malacorhynchos*), is named after the whistle made by the male. Once found in all fast flowing, clean rivers from the mountains to the sea, it is now only found in forested headwaters and tributaries. The whio is endemic to Aotearoa and is nationally vulnerable. While this chapter will look at the native species found living only around repo, for those still lucky enough to have a good selection of native ducks and suitable habitat, we have also included websites about whio at the end of the chapter.

Whio (blue duck) pair.
Photo: Cheri van Schravendijk-Goodman

Table 1. Meet the paddlers – native water birds found in wetlands

Māori name	Common name	Scientific name	NZ & Conservation Status*	Image
Pāpango Matapōuri Raipo Titipōrangi	New Zealand Scaup, diving duck NZ's rubber duckie	<i>Aythya novaeseelandiae</i>	Endemic Not threatened Photo: © Neil Fitzgerald	
Pāpera	Grey duck	<i>Anas superciliosa</i>	Native Nationally critical Photo: © Neil Fitzgerald	
Pāteke	Brown teal	<i>Anas chlorotis</i>	Endemic Recovering Photo: © Neil Fitzgerald	
Tētē Tētē moroiti	Grey teal	<i>Anas gracilis</i>	Native Not Threatened Photo: © Neil Fitzgerald	
Kuruwhengi	Australasian shoveler	<i>Anas rhynchos</i>	Native Not Threatened Photo: © Oscar Thomas	
	Northern shoveler	<i>Anas clypeata</i>	Native Vagrant Photo: © Oscar Thomas	
Pūtangitangi Pūtakitaki Pari	Paradise shelduck	<i>Tadorna variegata</i>	Endemic Not threatened Photo: © Oscar Thomas	
Wāna Wani Kakiānau	Black swan	<i>Cygnus atratus</i>	Native Not threatened Photo: © Neil Fitzgerald	
Pūtekeke Kāha Kāmana	Australasian crested grebe	<i>Podiceps cristatus</i>	Native Nationally vulnerable Photo: © Neil Fitzgerald	
Weweia Taihoropī Taratimoho Totokipio	New Zealand dabchick	<i>Poliiocephalus rufopectus</i>	Endemic Recovering Photo: © Neil Fitzgerald	

* Information sourced from www.nzbirdsonline.org.nz

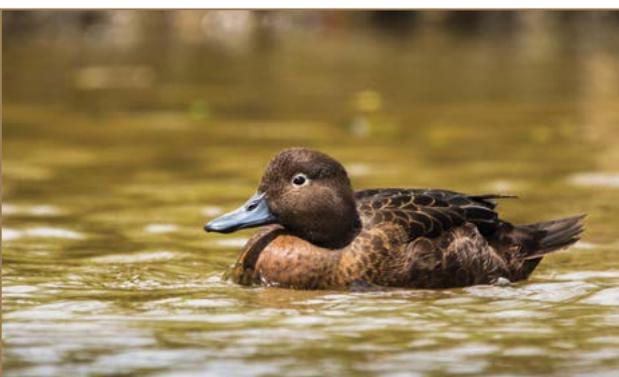


Pāpango (New Zealand scaup) adult female with her chicks.
Photo: © Athena Rhodes

Kia ora and G'day mate – where our water birds came from and their status today

Many of our native water bird species originally flew here from Australia. Some arrived many centuries ago and others more recently, such as pāpango (New Zealand scaup), pāpera (grey duck), kuruwhengi (Australasian shoveler), pūtangitangi (paradise shelduck), wāna (black swan), and pūteketeke (Australasian crested grebe). Tētē (grey teal) look pretty much the same in both countries. As all of these birds have established here by themselves (i.e. no human-assisted introductions), they are considered native to Aotearoa. Note that these birds were in Aotearoa prior to the arrival of our tūpuna.

The tētē, pūtangitangi and wāna, have increased in number as the area of agricultural land in Aotearoa has increased. Sadly, the pāpera, pāteke (brown teal) and pūteketeke are in trouble and deserve some attention. Changes in the way we manage our land have tipped the balance in favour of our generalist species. These water birds have better adapted to the open pastures associated with agriculture, while our birds that have more specialised food and habitat needs, are declining. This means the more impacted our repo and freshwater systems become (by drainage, pollution, and weed and pest infestations), the more our unique and specialist species will suffer.



Pāteke, brown teal. Photo: © Oscar Thomas

OUR RELATIONSHIPS WITH WATER BIRDS

As for all native and taonga (treasured) species, there is always a whakapapa (connection) that describes their genealogy and position in our world. For some hapū (subtribes) and iwi (tribes), our ducks are personified through a tupuna known as Moe-Tahuna – a reference also to the way they rest on the banks of lakes, and other freshwater and estuarine waterbodies. This is only one narrative, and it is likely that other hapū and iwi have additional unique accounts of the whakapapa of these native ducks, swans and grebes.

The broad regional diversity of ingoa Māori (traditional names) suggests a wide historical distribution of these water birds. Of the names recorded, however, not all are recognised by all hapū and iwi. We can only assume there was a wealth of in-depth knowledge about these water birds, how they interacted with each other, and their wider freshwater and estuarine environments. Sadly, locating this knowledge is difficult.

Much of our oral history has not been recorded, and existing recordings may only focus on specific hapū and iwi, thus overlooking narratives from elsewhere in Aotearoa. With the loss of kaumātua (elders) who hold the mātauranga (knowledge) in our communities, narratives become more difficult to source, requiring concentrated efforts to regather and piece information back together. Today, as the populations of rare water birds decline across the motu, we risk forever losing our connections to, and mātauranga about, these birds. The importance of their place within the wider whakapapa of our roto, awa, and hāpua, and their associated repo, has never been more real.

A lot of the published historical information about our relationship with native ducks focuses on their harvest. Pāpera, pāteke and pūtangitangi were important, and kuruwhengi (specifically the Australasian shoveler) and the weweia were also mentioned. More recently, shared kōrero (conversations) includes references to historical harvests of duck and swan eggs. Interwoven into harvesting were sustainable practices such as rāhui (temporary prohibition) that ensured populations were managed. Traditional responsibilities of hapū and iwi towards natural resources were, and still remain, wider than utility (use) – they also included taking care of the natural resource to ensure sustainability for future generations. Our wetland paddlers are no exception in this regard.

RAILS, HERONS, AND PADDLERS WETLAND BIRD DIVERSITY AS INDICATORS OF HEALTHY WHENUA AND WAI

Tangata whenua throughout Aotearoa have long focussed on the holistic management of catchments and freshwater systems, rather than on specific individual species or wetlands. All repo are part of the landscape sequence between whenua (land) and wai (freshwater) and provide important clues as to the health and wellbeing of the entire system.

Nationally, over 90% of repo throughout the motu have been drained in the last 150 years. As repo act like the kidneys of a freshwater system, declines in bird populations warn us that our waterways are no longer healthy enough to sustain populations or our practices associated with them. Repo, therefore, are

like a chapter in the bigger story about the landscape. When we experience connections to, and harvest, from healthy land and waterways can we see the full story. Only then can we really appreciate how the many parts of the system need to work together to achieve full health and wellbeing.

Realistically, our paddlers alone cannot confirm if a wetland system is doing well. The entire whakapapa of these water birds (along with plants, fish, and insects) is needed. The montage below illustrates a story of what a healthy whenua-repo-wai landscape should look like when viewed through the lens of greater wetland bird diversity. Across whenua, repo, and wai we have:

- rails, such as the pūweto (spotless crane, *Porzana tabuensis*), along the banks and swampy edges
- herons, such as the matuku (Australasian bittern, *Botaurus poiciloptilus*) and kotuku (white heron, *Ardea modesta*), which also interact within repo that lie between the spaces of whenua and wai
- pāpango and pāpera in the shallows close to shore
- weweia floating serenely on open water
- cormorants, such as the kawau (*Phalacrocorax carbo*) drying their wings near the shore.



Healthy whenua-repo-wai landscape as highlighted by greater wetland bird diversity. Montage created with permission from photographers. Ōkārito Lagoon, West Coast, South Island, with oioi (*Apodasmia similis*) in the background, matuku and kotuku © Eddie van Uden. Added: pūweto © Bartek Wypych; pāpango, pāpera, weweia © Neil Fitzgerald; and juvenile kawau © Raewyn Adams.

Water bird behaviours as indicators for presence of kai

Although there are no currently known published accounts of tūpuna observations of the behaviour of our ducks, it is likely that they were good tohu (environmental indicators of change) of seasonal, weather, and tidal changes, as well as of the presence of other kai (food sources). Table 2 outlines how the feeding behaviours of these wetland birds may have provided additional environmental cues for our tūpuna. The reality in different rohe (regions), however, would need to be confirmed with kaumātua, whānau, hapū, and iwi 'at place'.



Historic and current management regimes for native ducks in Aotearoa

Historically, sustainable practices such as rāhui and whakatipua (regeneration periods) were woven into harvesting practices. Traditional responsibilities of hapū and iwi included taking care of the natural resource as well as the spiritual dimensions and ensuring these connected future generations to a secure food source. Associated activities included the intergenerational exchange of reo me ona tikanga (language and practices) and mātauranga, agreeing on the harvest of other mahinga kai (cultivated foods), and guidance of the timing of harvest following traditional maramataka (traditional lunar calendars).

Despite the strong relationships between tangata whenua and our water birds, their management is no longer under traditional hapū and iwi authority. Their management instead sits with two key organisations: Te Papa Atawhai (Department of Conservation – DOC) and Fish and Game New Zealand. DOC manages all native species under key legislation such as the Conservation Act 1987 and the Wildlife Act 1953. Pārera, pūtangitangi, and wāna can be hunted during duck shooting season. Permits for hunting these ducks, along with bag limits for each species, are managed by Fish and Game under the Wildlife Act 1953. Today, pāteke, pāpango (New Zealand scaup), tētē (grey teal), and whio (blue duck) are the only ducks that are protected by law and cannot be hunted.

Table 2. Feeding behaviours of native wetland birds and environmental patterns

Food source	Wetland-water landscape	Environmental patterns potentially indicated by wetland bird behaviour	Water bird
Shellfish: Tuangi (cockles), kākahi and kāeo (freshwater mussels) on shorelines of estuaries and rivers Kōura (freshwater crayfish)	Estuarine wetlands, lagoons Freshwater wetlands and river systems recognised as being sources of kākahi kāeo and kōura	Feeding indicates availability of shellfish and locations of kōura. Abundance of bird populations indicates food source availability and suitable habitat for local bird communities. Can also indicate a healthy habitat if food sources are abundant	Pāteke and tētē
Fish	Most wetland types where water sources (both estuarine and freshwater) connect	Possible indicator of increased fish activity and spawning	Pūteketeke and weweia
Seed heads and new plant shoots	Most wetland types and riparian margins of water systems like rivers, lakes and lagoons	Possible indicator of the availability of plant materials for harvest, nesting and raising young chicks	Pārera, pāteke, pūtangitangi, and wāna



The difference between pāpera and mallard ducks – green speculum = pāpera; blue–purple = mallard. Photo: © Raewyn Adams

THE SAD STORY OF THE PĀPERA – ON THE BRINK?

There are many sad stories about our native water bird species. However, these can often be tempered with hopeful tales of reintroductions, successful breeding programmes, robust predator control, and wetland habitat restoration. There remains one sad tale, however, where all these elements of 'hope' are challenged – and that is the story of the pāpera (grey duck, *Anas superciliosa*).

Like our tūpuna, the European settlers had a penchant for hunting waterfowl. And so, along with introducing their pasture grasses, domestic stock, and trees, they also brought with them their own ducks for hunting, namely, the mallard (*A. platyrhynchos*). Acclimatisation Societies, established by European colonists during the 1860s, introduced a range of new species into Aotearoa and lobbied for control of hunting in the country. This allowed European-style regulations and hunting methods to be established and removed the management of duck harvest by tangata whenua along with the mātauranga accumulated over hundreds of years of pāpera interactions.

Pāpera and mallards share similarities in plumage (as seen in the image above) and behaviours. As the number of mallards increased, the competition and crossbreeding with pāpera also increased. This has caused a huge decline in the population of pāpera compared to the mallards. By the 1950s, pāpera made up less than 45% of the total population of mallards, hybrids, and pure pāpera. By the 1980s, this was less than 10%. Pure-bred pāpera is now considered one of the rarest water birds we have. As pāpera flock with the mallard they still remain on the list of species that can be hunted during duck shooting season.

As a bird with nationally critical status – more endangered than whio (blue duck) – we are witnessing a native duck slowly heading towards extinction. What we do about that is a question for all of us to ponder, as there are no easy answers. If anything, this challenge at least deserves to be discussed more among our communities.

MONITORING AND RETURNING OUR WETLAND PADDLERS

Long-term observations and monitoring were natural activities for our tūpuna. Mātauranga is just as relevant today and can help deepen our collective understanding of our natural resources, especially our birdlife, in our respective rohe.

Key actions we can take to build our understanding of our paddlers based on our collective mātauranga:

1. Kōrero with kaumātua and key whānau members about their memories of our ducks, swans, and grebes.

• Are they aware of any whakataukī or kōrero about these paddlers?

Whakataukī (proverbs) provide key guidance and life learning about a particular take (issue) or kaupapa (topic). They also provide important clues to the observations made by our tūpuna and their interactions with native wildlife and wetlands. Whakataukī from your hapū and iwi can help build an important cultural picture about:

- the presence of the different birds in the rohe throughout the year
- the different types of interactions between the hapū and iwi and the birds (both historically and currently).

• What are your local names for these paddlers?

If the names in this chapter are not the same for your hapū and iwi, it is important you record those names and the whakapapa of the names. This ensures the protection of your mita (dialect) and that restoration of your birds is relevant to your wetland-scape and mātauranga.

• What do these paddlers look or sound like?

Our senses are very good at detecting changes, provided we pay attention and know what to look for. Recording these sensory changes is just as important as collecting scientific data about our paddlers. This information can provide clues to their health as well as the health of wetland habitats:

- A change in colour and size might suggest that species of water birds have changed. This can be linked to environmental changes and human influences. If you can, share the photos of the different water birds in this book and see if your kaumātua and whānau recognise any.
- A change in sound might indicate changes in population size (louder if many, quieter if less), or changes in the timing of breeding cycles. Many of our water birds have distinctive calls during breeding, and some also put on incredible displays as males compete for females. This can also cause a bit of noise! Table 3 illustrates the months when many of these paddlers are breeding and laying eggs.

Table 3. Breeding season timetable for native wetland birds

Māori name	Common name	Age at fledgling (average)*	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Pāpango	New Zealand scaup	75 days old	E									E	E	E
Pāpera	Grey duck	65 days old								E	E	E		
Pāteke	Brown teal	55 days old							E	E	E			
Tētē	Grey teal	35 days old												
Kuruwhengi	Australasian shoveler	56 days old										E	E	
	Northern shoveler	Data deficient – travels to the Northern Hemisphere, and records are low in Aotearoa												
Pūtangitangi	Paradise shelduck	60 days old								E	E	E		
Wāna	Black swan	90 days old							E	E	E	E	E	
Pūtekekeke	Australasian crested grebe	Data deficient	E	E	E						E	E	E	E
Weweia	New Zealand dabchick	35 days old	E	E	E			E	E	E	E	E	E	E

Information sourced from www.nzbirdsonline.org.nz and relevant at the time of writing

Periods of breeding are indicated by the filled in months. Egg-laying periods (if known) are marked with 'E' inside the breeding timetable.

* Age at fledgling is the average time it takes for a chick to reach fledgling (i.e. preparing to leave the nest). Only the eggs of pāpera, pūtangitangi, and wāna can be harvested with a permit.

- **Where are/were these paddlers found and why do/did whānau seek them out?**

Places where these wetland birds might have been/are found can indicate their whakapapa as well as their relationship to other plants and animals. It is also important to consider any associated practices or observations of the birds as tohu, especially if their behaviour told our people something useful about other mahinga kai.

- **Can whānau remember if paddlers were found in certain areas of the rohe, or near any particular trees or plants?**

Again, this can help increase overall understanding about the habitat and whakapapa of wetland birds. Many of our ducks and grebes use specific plants to build nests, or provide material for their nests. Some, such as pūtangitangi and tētē, like to nest in tree hollows or holes. Pūteketeke and weweia, on the other hand, like to build nests that float.

There are many other occasions where kaumātua or whānau may have seen these water birds. People often make important observations unintentionally. These observations may seem insignificant at the time but can often provide an indication of the health of the wider ecological system. Noticing the presence of absence of our wetland birds in certain areas can provide clues about patterns and other cultural indicators (e.g. the fish, plants, and invertebrates they eat) that could also be monitored over time.



Weweia (New Zealand dabchick) in floating nest.
Photo: Dick Veitch CC-BY © DOC



Tētē (grey teal) nest in tree hollow. Photo: John Kendrick
CC-BY © DOC

2. **Some key points for wetland restoration to support our paddlers**

- **Animal/vertebrate pest control.**

Most of these water birds are susceptible to the jaws of a hungry predator (and that includes domestic cats and dogs along with introduced pests such as possums, rats, stoats and wasp nests). It is really important that all wetland restoration projects have very good vertebrate pest control in place to ensure our birds get a decent chance at settling down and raising a whānau.

- **Be clear about the water birds you want to encourage healthy populations of, and what they need in their wetland habitat.**

While all our birds need water, food, and shelter, not all of them access the same spaces or materials – that's why they can co-exist so well. It is important to do your homework about what each species needs to eat (which means building habitat to support their kai) and where they like to nest. This could be up a tree in a nest box; in the hollows of more mature trees, or inside a clump of sedges or raupō. You can get advice from bird, invertebrate and wetland scientists, DOC, your local Fish and Game Council representatives, and/or organisations like Ducks Unlimited NZ (see website link in reference section).

- **Build a long-term vision for all the paddlers you want to see return – but do it in bite-sized pieces.**

Trying to save every bird, fish, plant, and insect in your wetlands can be overwhelming. A good idea is to break your vision down into workable chunks. For example, choose a fish, plant (or mix of plants), wetland paddler, and insect that are connected. The insect might feed the fish, which feeds the paddler. And the plant (or mix of plants) might be valuable as nesting material for the paddler, provide shade for the fish, and habitat for the insect. A good idea is to draw this out like a picture, and then work with your whānau experts – and, where necessary, ecological experts – to help you build the appropriate restoration plans. You can then add more pictures with more connected species as you gain experience and confidence.

WANT TO LEARN MORE?

Note: If you are having problems with the hyperlinks below try copying and pasting the web address into your browser search bar.

References

Best E 1979. *Forest lore of the Māori*. New York, USA: AMS Press. 503 p. <http://nzetc.victoria.ac.nz/tm/scholarly/tei-BesFore-t1-body-d2-d6-d34.html>

Best E 1982. *Māori religion and mythology*. Wellington, New Zealand: Government Printer. <http://nzetc.victoria.ac.nz/tm/scholarly/tei-Bes02Reli-t1-body-d4-d4-d24.html>

Robert M 2013. *Ways of seeing whakapapa*. Sites: A journal of social anthropology and cultural studies, 10(1), 93–120. <https://sites.otago.ac.nz/Sites/article/viewFile/236/240>

Wright S, Nugent G, Parata H 1995. *Customary management of indigenous species: a Māori perspective*. New Zealand Journal of ecology, 83–86. <https://newzealandecology.org/nzje/1968.pdf>

Useful websites

Birds NZ (Ornithological Society of NZ)
<https://www.birdsnz.org.nz/contact>

Department of Conservation
<https://www.doc.govt.nz/footer-links/contact-us>

Ducks Unlimited NZ
<https://www.ducks.org.nz>

Fish and Game New Zealand
<https://fishandgame.org.nz/about/about-fish-and-game-council/contact>

Pārera – Grey duck
<https://www.stuff.co.nz/science/107234405/native-grey-ducks-mating-to-extinction>

Pouwa – Native black swan
<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2017.0876>
<https://wildfowl.wwt.org.uk/index.php/wildfowl/article/view/264/264>

New Zealand Birds Online – Wetland water birds

Adams L 2013. New Zealand scaup, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/new-zealand-scaup>

Melville DS 2013. Northern shoveler, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/northern-shoveler>

Mills JA 2013. Grey teal, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/grey-teal>

O'Donnell CFJ 2013. Australasian crested grebe, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/australasian-crested-grebe>

Szabo MJ 2013. New Zealand dabchick, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/new-zealand-dabchick>

Williams MJ 2013. Australasian shoveler, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/australasian-shoveler>

Williams MJ 2013. Black swan, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/black-swan>

Williams MJ 2013. Brown teal, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/brown-teal>

Williams MJ 2013. Grey duck, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/grey-duck>

Williams MJ 2013. Paradise shelduck, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/paradise-shelduck>

The odd duck out

Williams MJ 2013. Blue duck, New Zealand Birds Online. <http://nzbirdsonline.org.nz/species/blue-duck>
<https://www.doc.govt.nz/get-involved/conservation-education/resources/blue-duck-whio-fun-facts-posters>

Moe-Tahuna as part of a cultural monitoring framework

Walker DP 2019. *Toitū te Whenua, Matatū Ana te Wao nui o Tāne: A Cultural Health Monitoring and Assessment Approach for Indigenous New Zealand Forests*. Thesis submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy. Canterbury, New Zealand: Lincoln University.
<https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/11261/Walker%2C%20Dean%20PhD.pdf?sequence=4&isAllowed=y>

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