

Ngā Ika e Heke

Freshwater migratory species

Annual report 2022 / 23



Department of
Conservation
Te Papa Atawhai



Te Kāwanatanga
o Aotearoa
New Zealand Government

About the workstream

The goal of Ngā Ika e Heke is to secure populations of shortjaw kōkopu, īnanga, longfin eel/tuna and lamprey across Aotearoa New Zealand.

This workstream provides a coordinated approach to managing these migratory fish across the country. The team comprises regional rangers and two coordinators. The rangers have dual roles with the Ngā Riha Wai Māori freshwater pests workstream.

The work is underpinned by science and technical support from DOC's Freshwater Species Team. Rangers also work closely with staff contributing to our Arawai Kākāriki wetland restoration programme and Ngā Awa river restoration programme.

Ngā Ika e Heke provides long-term support to help protect and restore populations of these four migratory fish species in waterways across the country. The fish need to be able to move freely between different freshwater habitats and the sea to complete their lifecycles.

The work to secure populations must consider all the habitats the fish use throughout their lifecycle, from the mountains to the sea. Instream barriers like weirs and culverts also need to allow fish to move upstream and downstream.

These species were chosen because of their concerning conservation status, their importance to iwi as taonga species and their value to the wider community:

- shortjaw kōkopu: Threatened – Nationally Vulnerable
- īnanga: At Risk – Declining
- tuna/longfin eel: At Risk – Declining
- lamprey/kanakana/piharau: Threatened – Nationally Vulnerable.



Map of Aotearoa New Zealand showing the location of the workstream's rangers (dots) and indicative DOC regions.



Shortjaw kōkopu have a distinctive overbite. These fish are rare and secretive, and little is known about them and where they spawn. The new information we gather will be used to help secure populations across the country. Photo: Angus McIntosh, University of Canterbury

National overview

This is the 3rd year that Ngā Ika e Heke has been in operation.

Most existing information about the distribution and abundance of shortjaw kōkopu and lamprey is 15–20 years old and needed to be updated. This year we gathered data about the current distributions of these species and the pressures they face. Up-to-date information is essential to guide and inform our work to secure their populations.

We improved current methods and tested new methods to monitor lamprey populations and study shortjaw kōkopu spawning. The Freshwater Species Team designed the methods and trained rangers in their use during the field season.

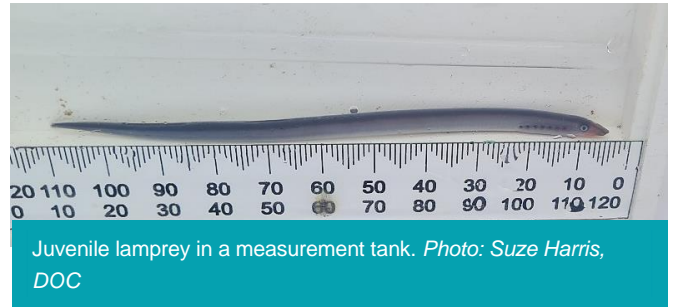
A long-term monitoring programme for shortjaw kōkopu was initiated in several regions.

Relationships with mana whenua and project partners were consolidated. Our collaborative work included improving security for migratory fish and supporting community initiatives to restore habitat for īnanga.

Providing free passage for migratory fish is a vital part of this workstream. This year we continued to assess, prioritise and remediate (improve) instream barriers with guidance from the Freshwater Species Team.



Hokitika-based ranger Suze Harris with a netted shortjaw kōkopu to be measured as part of the West Coast survey and monitoring work. *Photo: Teresa Wyndham-Smith, DOC*



Juvenile lamprey in a measurement tank. *Photo: Suze Harris, DOC*

Highlights at a glance

- **Shortjaw kōkopu eggs** were found at two sites in Northland and one site on the West Coast. Their identity was confirmed by DNA analysis. These are the only known finds since the eggs of this species were first identified in Taranaki in 2001.
- **A hui about lamprey** was organised by DOC, run by NIWA and hosted by Urenui Marae, Taranaki. Local iwi and hapū welcomed North Island DOC staff, regional council staff and consultants. Attendees learned about lamprey's fascinating lifecycle, how to design a survey and how to deploy pheromone samplers.
- High levels of **lamprey pheromone**, indicating good numbers of this species, were recorded at a number of sites in several North and South Island locations.
- This year **42 instream barriers were assessed**, with 36 in the Golden Bay and Motueka area. Fish passage at 3 sites was improved and plans were prepared for improvements in 2023/24 at a further 3 sites.
- Data collected by the Northland **Īnanga Spawning Habitat Restoration Project** informed increased protection for īnanga spawning zones in the Proposed Regional Plan for Northland.
- Reconnecting Te Pouaruhe wetland with Lake Ōnoke resulted in a **marked increase in the number of īnanga** and other fish in the wetland. This work supported the Wairarapa Moana Wetlands Project.
- Our **shortjaw kōkopu survey and monitoring work** on the West Coast was featured in local media and nationally in a DOC Conservation Blog and social media. Tuna research with Ngāti Apa ki te Rā Tō at Lake Rotoroa was promoted on World Fish Migration Day 2022.

Northern North Island

People, relationships and hui

We worked with kaitiaki to better understand the current state of the four focal fish species in Northland. Relationships with several new hapū were formed and others strengthened through hui and collaboration on a range of projects.

Team members ran a freshwater fish monitoring training hui with Me He Wai Te Rarawa in the Hokianga area. The Matihitihi Marae Taiao unit and Me He Wai Te Rarawa at Mititimiti joined us for a shortjaw kōkopu spotlighting survey.

We attended the Waitai Waimāori Wānanga with Ngāti Kuri in the Far North, and the Ngā Kaitiaki o Ngā Wai Māori fish passage workshop with NIWA at Ngararatunua Marae near Whangārei.

Other ongoing partnership work includes:

- fish passage working group led by Northland Regional Council
- the Northland Īnanga Spawning Restoration Project led by Whitebait Connection.

We also joined a number of community environmental organisations to run the Parihaka Bioblitz.

Surveys and monitoring work

A number of fish surveys were completed in Northland this year.

Shortjaw kōkopu

- 2 catchment distribution surveys
- 3 population monitoring surveys to gather national long-term state and trend data
- intensive spawning surveys from February to June at 2 sites to learn more about the timing and location of spawning

Shortjaw kōkopu eggs were found in the Waipoua and Waimamaku River catchments, and their identity was confirmed by DNA analysis. This is a first for Northland. Good numbers of adult fish were found in the Waipoua River but few in the Mangamuka River, which was previously considered a stronghold site.

Surveys at the long-term population monitoring sites found fish at two sites but in very low numbers.

Lamprey

- 3 species distribution and spawning habitat surveys



Underwater photo of the first shortjaw kōkopu 'nest' reported in Northland, located in mosses at the river's edge. The eggs are about 1 mm in diameter. Photo: Fern Donovan, DOC

Lamprey had been previously reported in the upper Kaihū River. Environmental DNA (eDNA) surveys at 3 sites in this catchment did not detect the species.

Īnanga

- repeat surveys of the saltwater wedge in 3 catchments from March to June

We carried out saltwater wedge (where fresh and saltwater meet) surveys in 3 river catchments to identify the extent of the Īnanga spawning zones. This work was part of the Northland Īnanga Spawning Habitat Restoration Project, carried out by Whitebait Connection, Ngā Awa, local iwi and Northland Regional Council.

The surveys found that spawning occurs during much of the year in Northland and highlighted the size of potential spawning areas. The findings resulted in a change to the Proposed Northland Regional Plan to increase protection for this species.

Fish barriers

Fish passage was assessed at 3 sites with instream barriers.

Restoration work

We supported a project to restore Īnanga spawning habitat in the Ruakaka River with Fonterra and Patuharakeke hapū. The project was led by Whitebait Connection.

A 2021 Deed of Grant provided for fencing and replanting a section of riverbank suitable for fish spawning. A further 350 m of fencing and 4,200 plants were added this year. Local DOC staff continued to support community planting days.

Hauraki-Waikato-Taranaki

Waikato

People, relationships and hui

Relationships with local iwi were established through appropriate DOC channels.

Connections with staff from Waikato Regional Council, NIWA and the University of Waikato were strengthened, and we identified opportunities to work together.

Surveys and monitoring work

Two fish passage surveys were completed. One site was the Mangauika Stream near Pirongia, which is a stronghold site for shortjaw kōkopu. Survey results showed that a weir used for water supply could be impeding fish passage. We therefore began discussions with Waipa and Waikato District Councils and NIWA about how it could be improved.

Restoration

Waikato District Council is trialling a fish-friendly Archimedes screw pump in the Waikato River catchment to reduce tuna deaths. We are looking to support monitoring its effectiveness in partnership with Ngāti Te Ata iwi.



Water intake weir, Mangauika Stream. Photo: Carol Nicholson, DOC

Taranaki

People, relationships and hui

We worked with Taranaki Regional Council on a Living Water project to develop a case study with advice for farmers on how to provide fish passage in waterways on their land.

We organised a hui with NIWA about lamprey at Urenui Marae in September. NIWA scientists described the species' fascinating lifecycle and showed attendees how to design a survey and deploy pheromone samplers. The hui was attended by local iwi and hapū, and staff from Taranaki Regional Council, local consultancies and DOC.

Surveys and monitoring work

A number of fish surveys were completed in Taranaki this year.

Shortjaw kōkopu

- 2 population monitoring surveys to gather long-term state and trend data
- intensive spawning surveys from March to May to learn more about the timing and location of spawning

Shortjaw kōkopu were found at both of the region's long-term monitoring sites: 33 fish in Kiri Stream and 3 in Wairau Stream. Spawning surveys in Kiri Stream found ripe (fertile) fish but no eggs.

Lamprey

- 3 distribution and spawning habitat surveys

Lamprey pheromone monitoring indicated high numbers of this species at 2 sites in a tributary of the Waitara River. These surveys were carried out with the support of Ngāti Maru and Ngāti Mutunga, for whom lamprey is a taonga species.

Fish barriers

In partnership with Te Atiawa iwi, we surveyed fish populations above and below a weir in the Mangorei River. The weir is scheduled for removal by New Plymouth District Council to improve fish passage.

The surveys will be repeated after the weir has been removed to document any changes in fish communities.



Monitoring fish populations in the Mangorei River before the weir removal. *Photo: Nathan Lightbourne, DOC*



Flexible baffles across this culvert in a tributary of the Whanganui River have improved fish passage by slowing the water flow across its base. *Photo: Carol Nicholson, DOC*



Fyke net in place to trap tuna in the Kakahi Stream near Taumarunui. *Photo: Aroha Greenhalgh, DOC*

Central North Island

People, relationships and hui

Work this year was focused on the upper Whanganui River catchment in partnership with Ngā Awa and Ngāti Hikairo, Ngāti Haaua and other iwi.

We joined with mana whenua and other agencies to investigate the cause of mass tuna death events in the river and create a response plan. These events have happened in the past 30 years, usually in summer. An advisory group, Te Mana O Ngā Tuna, was established this year. Representatives include Ngāti Hāua Iwi Trust, Ngā Tāngata Tiaki o Whanganui, Horizons Regional Council, the Ministry for Primary Industries, Genesis Energy and Fish & Game.

Connections with local DOC staff were strengthened during a visit of the programme's national team in April 2023. The team and a representative from Horizons Regional Council visited a culvert where improvements had been made to allow for fish passage. They also saw restoration work at an inanga spawning site on the banks of the lower Whanganui River.

Surveys and monitoring work

Stream health and lamprey monitoring work in the catchment was carried out with the Ngā Awa team this year.

Restoration work

We supported several restoration projects being led by Ngā Awa in the Whanganui River. They included improvements made to fish passage, and replanting inanga spawning sites at Te Ao Hou Marae and Tutaeika, Awarua and Matarawa streams.

The projects brought together hapū, Whanganui Pasifika Hub, Horizons Regional Council and Whanganui District Council.

Lower North Island

Hawke's Bay

People, relationships and hui

We established good connections with four post-settlement governance entities in this region and are working closely with two of them.

Collaborative projects with Hawkes Bay Regional Council include improvements to fish passage, restoring inanga spawning sites, eDNA surveys and monitoring for shortjaw kōkopu.

Surveys and monitoring work

Cyclone Gabrielle and other severe weather events in early 2023 affected spawning sites, destroyed habitat and significantly reduced the amount of field work we were able to do. Some survey work was completed before and after these events, as outlined below.

Shortjaw kōkopu

Shortjaw kōkopu are rare in this region. There is one eDNA record from Hawke's Bay and a few records from the East Cape area. We began work to confirm these sightings during the year.

Lamprey

- Distribution and spawning habitat surveys

Lamprey are uncommon in Hawke's Bay with very few existing records, so getting up-to-date information about their distribution is important. EDNA surveys detected lamprey at one of the two sites surveyed. Most previous sightings were of adult lamprey caught in whitebait nets.

Īnanga

- 1 saltwater wedge survey to identify potential spawning habitat
- 8 surveys at 5 sites to identify timing and extent of the spawning zone

After the severe weather events it became a priority to understand how the flooding had affected inanga spawning sites. Many sites were destroyed by flooding and covered in sediment. We monitored some sites to track their recovery.

Fish barriers

Fish passage was assessed at 2 sites with instream barriers.



Aerial view of the inanga spawning zone in the Tūtaekurī River before (top) and after (bottom) Cyclone Gabrielle. Photos: Hawkes Bay Regional Council

Restoration work

In the Tūtaekurī River, flooding scoured out riverbanks in the spawning zone and large amounts of sediment were deposited.

In an effort to provide temporary spawning habitat, about 30 straw bales were placed at the saltwater wedge. This project was in partnership with Mana Ahuriri and Hawkes Bay Regional Council. Unfortunately, no evidence of spawning was identified, and the bales became heavily laden with sediment.

Manawatū, Wairarapa, Wellington

People, relationships and hui

Our work in this region is supported by strong relationships with local iwi and hapū. Many local kaitiaki helped with the survey work and were involved in exploring how to work together.

Other important relationships are with Horizons Regional Council, Greater Wellington Regional Council, Wairarapa Moana Statutory Board, Rangitāne Ō Manawatū and Ngāti Kahungunu ki Wairarapa.

Surveys and monitoring work

A number of fish surveys were completed in the lower North Island this year.

Shortjaw kōkopu

- 1 catchment distribution survey
- 5 population monitoring surveys to gather long-term state and trend data

A survey in a tributary of the Manawatū River for example, found 10 shortjaw kōkopu, which is fewer than recorded in previous surveys. No shortjaw kōkopu were identified at any of the 5 long-term monitoring sites. The summer's unsettled weather and high river flows made it challenging to complete these surveys and is likely to have affected the number of fish found.

Lamprey

- 2 distribution and spawning habitat surveys in Gollans Stream, East Harbour Regional Park
- 12 fish distribution and spawning habitat surveys in Wainuiomata River

Lamprey pheromone samplers were used for these surveys and the work was a collaboration with the Hem of Remutaka Jobs for Nature team.

Three Wainuiomata River sites recorded high pheromone levels (indicating good numbers of juvenile lamprey). No pheromone was recorded in Gollans Stream.

Fish barriers

- 2 instream barriers to fish passage were assessed
- 3 fish barrier remediation plans were prepared

Restoration work

Our work supported the Wairarapa Moana restoration of Te Pouaruhe wetland, which is on the eastern edge of Lake Ōnoke in South Wairarapa. The area was cultivated by early Māori – te pouaruhe means ‘the place where the young fern root grows’.



A gap created in this stop bank allowed fish to access the upstream wetland (left). Photo: Carol Nicholson, DOC

The restoration reconnected 18 ha of wet pasture with Lake Ōnoke and the streams that once fed it. Fish passage, inanga spawning habitat and stream habitat were restored and predator control put in place.

Surveys of fish after the reconnection showed a marked increase in the number of fish in the wetland.



Lamprey is a mahinga kai species for Māori and an important traditional fishery. These fish are hard to find using standard survey methods. We are using eDNA and pheromone samplers to confirm the presence and extent of known populations and to identify new ones. Photo: Sjaan Bowie, DOC

Northern South Island

Tasman

People, relationships and hui

We supported the monitoring and cultural harvest of tuna at Lake Rotoroa led by Ngāti Apa ki te Rā Tō. Ten sites around the lake were sampled. Developing strong relationships with local iwi and hapū was a focus of our work.

Other relationships are with Tasman District Council (for fish passage remediation), Nelson City Council, Tasman Bay Guardians and Wai Connection (for inanga spawning and saltwater wedge surveys).

Surveys and monitoring work

A number of fish surveys were completed in the Golden Bay and Motueka area this year.

Shortjaw kōkopu

- 4 population monitoring surveys to gather long-term state and trend data.
- intensive spawning surveys at 2 sites from December to May to learn more about the timing and location of spawning.

Shortjaw kōkopu were found in the Anatori River (1 fish) and the Mārahau River (7 fish) but not at the 2 other long-term survey sites.

Spawning surveys in Tinline and Ruataniwha Streams found no ripe fish or eggs.

Lamprey

- 20 distribution and spawning habitat surveys
- 8 electric fishing juvenile lamprey density surveys

Lamprey pheromone samplers were used for the distribution surveys. Very high pheromone levels were recorded at 1 site, high levels at 2 sites and low levels at 1 site.

Juvenile lamprey were detected at 6 of the 8 sampled sites.

The results indicate that good numbers of lamprey are present in some parts of Golden Bay and Motueka.

Tuna

We supported ongoing tuna population monitoring by Ngāti Apa ki te Rā Tō at 10 sites around Lake Rotoroa.

Fish barriers

This year in the Motueka, Nelson Lakes and Golden Bay areas:

- 36 barriers to fish passage were assessed
- 3 fish barriers were improved to allow for fish passage

Restoration work

We made very good progress assessing and restoring passage for migratory fish in waterways in collaboration with Tasman District Council.

Marlborough



Assessing habitat for shortjaw kōkopu in a Nydia Bay stream.
Photo: Ruslan Baytemirov

People, relationships and hui

Developing relationships with local iwi and hapū was a focus of our work this year. We supported Ngāti Koata to restore Lake Moawhitu and its tuna population on D'Urville Island.

Marlborough District Council is also an important project partner.

Surveys and monitoring work

A number of fish surveys were completed in the Picton and South Marlborough area this year.

Shortjaw kōkopu

- 4 distribution surveys
- 4 population surveys to gather long-term state and trend data

The distribution surveys were at 4 sites where shortjaw kōkopu had been recorded previously, but none were found this year.

Two of the four long-term monitoring sites in this area had fish present: 1 fish in the Kaimiko Stream and 7 in the Ruataniwha Stream.

Lamprey

- 20 distribution and spawning habitat surveys
- 2 juvenile lamprey density surveys

Lamprey pheromone samplers were used for the distribution surveys. Pheromone was detected in 7 of the 14 streams surveyed with particularly high levels recorded at 2 sites in the Ōhinemahuta River. Moderate levels were recorded in Bartletts Creek and Are Are Stream, low levels of pheromone were found in the Waikākaho River and Te Hoiere Rivers.

Trial density assessments of juvenile lamprey were completed at 2 sites but no fish were detected.

Īnanga

- 4 surveys to identify timing and extent of spawning

We were involved in assessing Īnanga spawning activity at Rose's overflow in Wairau Lagoon. This work supported scoping an initiative with Rangitāne o Wairau and Marlborough District Council for spawning site restoration. Four surveys were completed at this site to identify the timing and extent of the spawning zone.



Īnanga spawn in thick vegetation on the side of riverbanks during high spring tides, hatch, and spend 4–6 months at sea before returning to the river as whitebait. Working with iwi, hapū and whānau, agencies, landowners and community groups to identify and protect Īnanga spawning sites is an important action for this workstream. *Photo: Angus McIntosh, University of Canterbury*

Western South Island

People, relationships and hui

We continued to develop relationships with local iwi and hapū this year and explore how we work together. Kaitiaki joined us to help with survey work in South Westland.

Other relationships are held with West Coast Regional Council, West Coast Fish & Game, QEII National Trust and New Zealand Landcare Trust.

Surveys and monitoring work

A number of fish surveys in West Coast waterways were completed this year to improve our knowledge of the species.

Shortjaw kōkopu

- 8 spotlight surveys to inform the current distribution of shortjaw kōkopu
- 6 eDNA surveys to inform current species distribution
- 3 population monitoring surveys to gather long-term state and trend data
- intensive spawning surveys at 1 site from December to May to learn more about the timing and location of spawning

The spotlight surveys repeated previous survey methods at the same sites to gauge changes over time. Shortjaw kōkopu were found at 4 of the 8 streams (2, 8, 7 and 14 fish were recorded).

The first shortjaw kōkopu egg from the South Island was discovered during a spotlight survey. Its identity was confirmed by DNA analysis.

eDNA surveys identified the presence of shortjaw kōkopu in 3 of the 6 streams surveyed.

Shortjaw kōkopu were identified at all 3 long-term monitoring sites in low numbers. A single fish was found at 2 of the sites.

We carried out spawning surveys from late summer to winter in a tributary of the Kaniere River but no eggs were found. The limits of shortjaw kōkopu occupancy in the catchment were also determined at this site.

Lamprey

- 22 eDNA surveys with West Coast Regional Council helped inform the current species distribution
- 7 electric fishing surveys to inform current species distribution and spawning habitat

- 20 lamprey pheromone distribution surveys

The eDNA and electric fishing surveys were to update previous records of lamprey distribution in these waterways.

Results from the pheromone samplers indicate that lamprey are well established in this area. Some very high levels of pheromone were recorded.

Tuna

Lake Brunner is a site of special significance to Ngāti Waewae. We sampled the tuna population at 14 sites around the lake. The information gathered adds to existing knowledge of how tuna use large lakes during their lifecycle.



Measuring and weighing tuna during the Lake Brunner survey.
Photo: Suze Harris, DOC

Restoration work

West Coast Regional Council used Jobs for Nature funding to fence and control weeds at īnanga spawning sites in the region.

A collaboration between Westland Milk Products and Westland District Council with Jobs for Nature funding began work to create new habitat for adult īnanga and improved spawning habitat at Wadeson Island on the banks of the Hokitika River.

More information about Ngā Ika e Heke

See Ngā Ika e Heke freshwater migratory fish workstream (www.doc.govt.nz/nga-ika-e-heke) for more information or to get in touch.

Cover image: Freshwater ranger Fern Donovan at a study site in the Waipoua River, Northland. *Photo: Sarah Wilcox*



Adult tuna leave New Zealand to spawn in ocean waters near Tonga. Their larvae return to rivers and streams as glass eels, migrate upstream and mature over several decades. Our work includes monitoring glass eels as they return to rivers and studying populations in lakes. *Photo: Aroha Greenhalgh, DOC.*