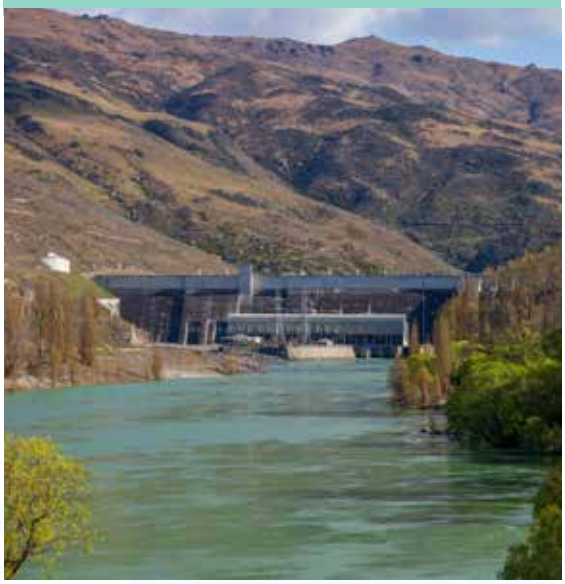
Tuna passage provision at hydroelectric power stations

SCIENCE REPORT SUMMARY

Longfin eel (*Anguilla dieffenbachii*). Photo: © EOS Ecology

This resource is an overview of a report produced for the Department of Conservation in 2022[1]. It's a summary of the current state of resource consent conditions for hydroelectric power schemes (HEPS) in relation to:

- tuna/freshwater eels
- fish
- fish passage
- provisions for tuna migration.



Clyde dam. Photo: © EOS Ecology

Why it's important

Our tuna (specifically shortfin and longfin eel species) have unique attributes which make them vulnerable to the impacts of HEPS, including:

- **Long-lived & females large in size** – Longfin eels are one of the largest and longest-lived species in the world. Females are mostly 750–1,800 mm long, males 480–740 mm. Female shortfins are mostly 500–1,100 mm, males 380–550 mm. The potential for injury or death when female longfin tuna pass through hydro turbines is high.
- **Travel large distances & are geographically widely spread** – Longfins can travel up to 300 km inland, and are distributed from sea level up to elevations of 1,150 m. Connectivity between habitats is critical to ensuring the success of populations. HEPS are barriers to tuna migration, restricting access to habitats required for foraging/feeding, predator avoidance, shelter, and access to the sea for spawning. Lack of access to these habitats can ultimately lead to population decline, and a loss of biodiversity.
- **Complex life cycle** – Changes to ecosystem connectivity and environmental conditions from HEPS impact different aspects of the tuna life cycle. Where HEPS compromise the tuna migration and timing, this reduces the chances of tuna successfully reaching their spawning grounds at the right time.

Iwi and hapū have long expressed the negative impacts that HEPS have had on their taonga species, including tuna. Iwi/Māori consider that on-going consenting and planning regimes give preference to HEPS at the expense of ecological and cultural values.

It's important we all engage with the report outcomes, so we understand the current situation with our HEPS – what works and what does not – to help tuna thrive. This means we can all work together towards a shared vision for the industry into the future.

TO VIEW THE FULL REPORT email Marine Richarson at **mricharson@doc.govt.nz**

Department of Conservation *Te Papa Atawhai*

[1] Full report citation:
Williams, E., Herangi, N., Boubée, J., Egan, E., Funnell, E., Crow, S., & Te Puni, K. (2022). Tuna passage provisions at selected hydroelectric power stations. Stocktake of current resource consent conditions and mitigation actions. NIWA Client Report No. 2022234WN.

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HEPS included in report

The map below shows which HEPS are included in the report, and summarises an abridged selection of data collated about them.

Type of power generation: run-of-river, storage/reservoir

Generation capacity: MW – Megawatts

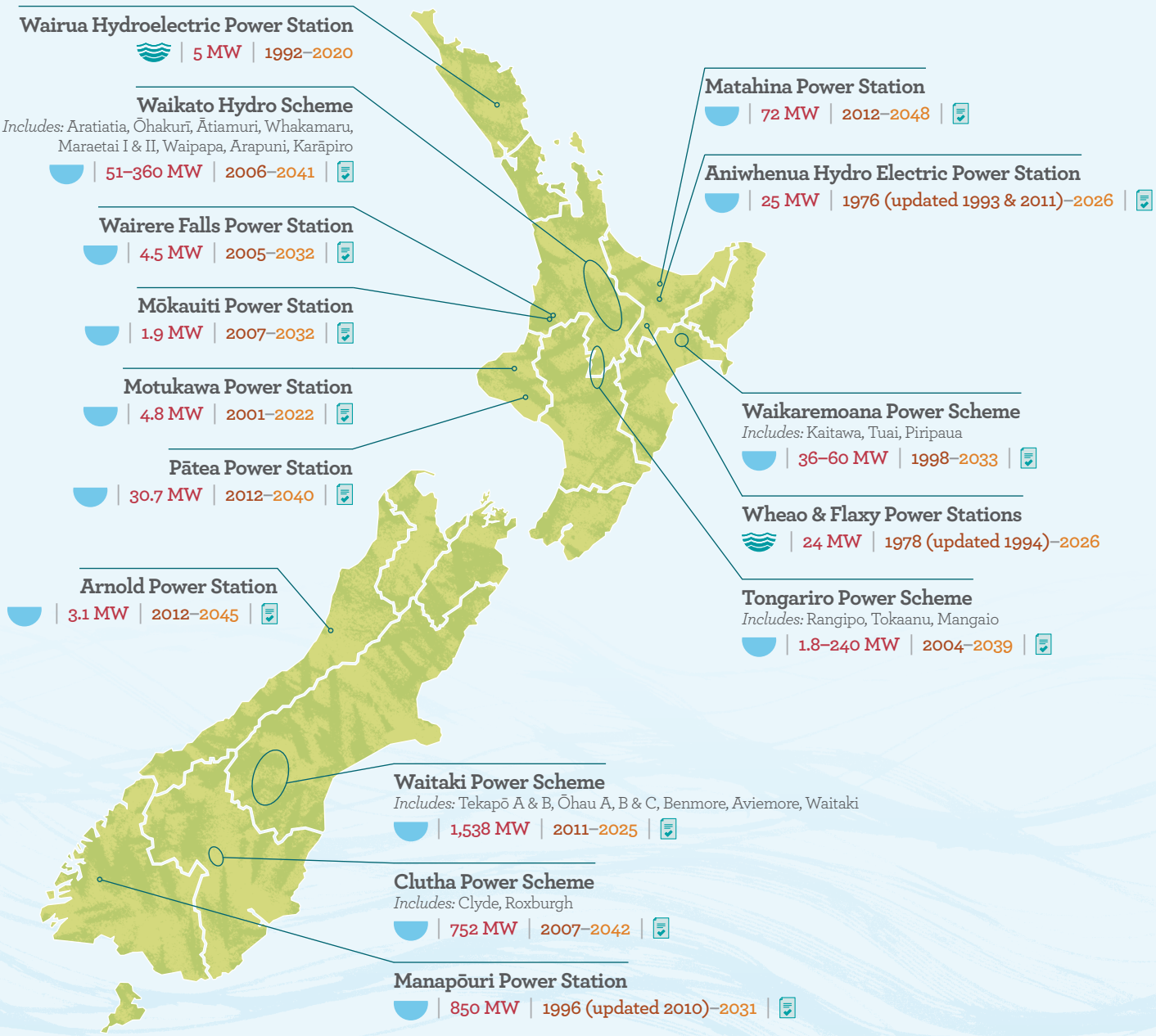
Resource consent dates: Year granted–Year expires

Any confirmed upstream (US) or downstream (DS) reporting currently available:

The report includes HEPS in the following priority order:

1. **Large HEPS** – (generating at least 100 MW) considered to be the highest risk to tuna mortality.
2. **Significant secondary infrastructure associated with large HEPS** – such as lake control structures (where information was available).
3. **Medium & small HEPS** – where we know upstream elver trap-and-transfer activities have occurred (based on sites included in the Fisheries NZ-funded 'Recruitment of freshwater eels' programme).

Map shows regional council boundary lines.



Current activities and resource consent conditions summary

HEPS owners/operators are granted a variety of permissions to support their activities. The following table summarises the resource consent conditions relating to tuna passage, and tuna passage activities (US for elvers and DS for migrant tuna) currently in place for each HEPS structure included in the report.

Y = It's confirmed...
- resource conditions are in place
- permanent tuna passage mitigation actions are in place
- monitoring/ compliance reporting is available and accessible to the public.

! = We understand...
- tuna passage mitigation investigations are underway, but no permanent solution is in place
- monitoring/compliance reporting is only available with the permission of the partnerships involved.

N = It's confirmed...
- no resource conditions are in place
- no tuna passage mitigation actions are in place, and therefore...
- no monitoring/ compliance reporting is available.

? = It's not known if...
- resource conditions are in place (e.g., maybe recently expired, or current conditions aren't explicit)
- tuna passage mitigation investigations are underway, or a permanent solution is in place
- monitoring/compliance reporting is available/accessible to the public (although website searches conducted during this study could not source any monitoring data or reporting).

NR = Not required

		Tuna passage activities underway				Resource consent conditions included					
		US (elvers)		DS (migrants)		Tuna passage provisions		Monitoring required	Effectiveness assessment	Partnerships to be engaged	Site specific DS tuna passage research
						US	DS				
NORTH ISLAND HEPS											
Wairua Falls Power Station		Y	Elver trap-&-transfer programme in place.	!	Migrant behaviour studies completed.	?	?	N	N	N	Y
Wheao & Flaxy Power Stations		N		!	Ngāti Manawa undertaking tuna trap-&-transfer.	N	N	N	N	N	N
Aniwhenua Power Station		Y	Elver trap-&-transfer programme in place.	!	Migrant behaviour studies completed.	N	N	N	N	N	Y
Matahina Power Station Bay		Y	Elver trap-&-transfer programme in place.	Y	Mitigation actions tested include trap-&-transfer.	Y	Y	Y	Y	Y	Y
Waikato Hydro Scheme	Aratiatia	!	Excluded.	N		N	N	N	N	N	N
	Ōhakurī	!	Excluded at request of Ngāti Tahu-Ngāti Whaoa Rūnanga Trust in 2017/18.	N		N	N	N	N	N	N
	Ātiamuri	Y	Elver trap-&-transfer programme in place.	N		N	N	N	N	N	N
	Whakamaru	Y		N		N	N	N	N	N	N
	Maraetai I & II	Y		N		N	N	N	N	N	N
	Waipapa	Y		N		N	N	N	N	N	N
	Arapuni	Y		!	Migrant behaviour studies completed.	N	Y	N	N	N	Y
	Karāpiro	Y		!	Siphon bypass tested/in place.	Y	Y	N	N	N	N
Tongariro Power Scheme	Rangipo	NR	Elver trap-&-transfer programme in place at Lake Ōtamangakau valve.	NR	Migrant trap-and-transfer at Wairehu drum screen tested/in place.	N	N	N	N	N	NR
	Tokaanu	Y		Y		N	N	N	N	N	Y
	Mangaio	NR		NR		N	N	N	N	N	NR
Wairere Falls Power Station		Y	Elver trap-&-transfer programme in place.	Y	Migrant behaviour studies complete.	Y	Y	Y	Y	Y	Y
Mōkauiti Power Station		Y	Elver trap-&-transfer & fish pass in place.	Y	Migrant behaviour studies complete.	Y	N	Y	Y	Y	Y
Motukawa Power Station		Y	Elver trap-&-transfer programme in place.	Y	Screen deterrents, & trap-&-transfer tested/in place.	Y	Y	N	N	N	Y
Pātea Power Station		Y	Elver trap-&-transfer programme in place.	Y	Migrant behaviour studies complete. Spillway gate openings & bypass mitigation actions tested/ in place.	Y	Y	N	Y	Y	Y
Waikaremoana Power Scheme	Kaitawa	NR		NR	Migrant behaviour studies complete. Deterrents, a siphon/bypass & counting system, & trap-& transfer mitigation actions tested/in place.	Y	Y	Y	Y	N	?
	Tuai	Y		Y		Y	Y	Y	Y	N	?
	Piripaua	Y	Elver trap-&-transfer programme in place.	Y		Y	Y	Y	Y	N	Y

South Island HEPS continued over page...

		Tuna passage activities underway				Resource consent conditions included					
		US (elvers)		DS (migrants)		Tuna passage provisions		Monitoring required	Effectiveness assessment	Partnerships to be engaged	Site specific DS tuna passage research
						US	DS				
SOUTH ISLAND HEPS											
Arnold Power Station		Y	Elver trap-&-transfer programme in place.	?		Y	Y	Y	Y	Y	?
Waitaki Power Scheme	Tekapō A	N		!	Migrant trap-&-transfer undertaken in 2015–20. Migrant 'rescues' occurred in the past during canal maintenance.	N	N	N	N	N	NR
	Tekapō B	N		!		N	N	N	N	N	NR
	Ōhau A	N		!	Migrant trap-&-transfer undertaken in Lake Ōhau and surrounding waterways in 2009–20.	N	N	Y	N	Y	N
	Ōhau B	N		!		N	N	Y	N	Y	N
	Ōhau C	N		!		N	N	Y	N	Y	N
	Benmore	Y	Elver trap-&-transfer programme in place.	!	Migrant trap-&-transfer undertaken in 2015–20.	Y	Y	Y	N	Y	N
	Aviemore	N		!		Y	Y	Y	N	Y	N
	Waitaki	Y	Elver trap-&-transfer programme in place.	!		Y	Y	Y	N	Y	N
Clutha Power Scheme	Clyde	Y	Elver trap-&-transfer programme in place.	Y	Behaviour studies completed. Migrant trap-&-transfer programme from selected locations.	N	N	N	N	N	Y
	Roxburgh	Y		Y	Behaviour studies completed. Mitigation actions tested include trap-&-transfer.	Y	Y	Y	Y	Y	Y
Manapōuri Power Station		Y	Elver trap-&-transfer programme in place.	Y	Behaviour studies completed. Mitigation actions tested include trap-&-transfer.	Y	Y	Y	Y	Y	Y

Key report highlights:

- **A tuna passage management strategy centred on upstream migration of elvers is needed.**
  Elver trap and transfer programmes are widely embedded at most structures assessed in this report. However, there is broad scope for better monitoring and management of downstream migration of migrant adults.
- **More uptake in monitoring the effectiveness of consent conditions and mitigation is needed.**
  Lack of monitoring impedes our understanding of the spatial and temporal impacts of HEPS on tuna populations nationwide, and the effectiveness of mitigation measures. Expanding the understanding is important to reduce mortality rates of adult migrant tuna.

Recommendations:

NATIONAL CONSISTENCY – A nationally consistent, collaborative management approach would benefit all.

MONITORING – Implementing consistent monitoring programmes will provide measures for understanding method efficacy.

TRANSPARENCY – Part of the consistent national approach should include transparency from all HEPS to aid with gaining a better understanding of the effectiveness of the methods implemented.

COLLABORATION – Fostering trust and common goals between stakeholders is needed to develop sustainable solutions to safeguard tuna at large HEPS.

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