

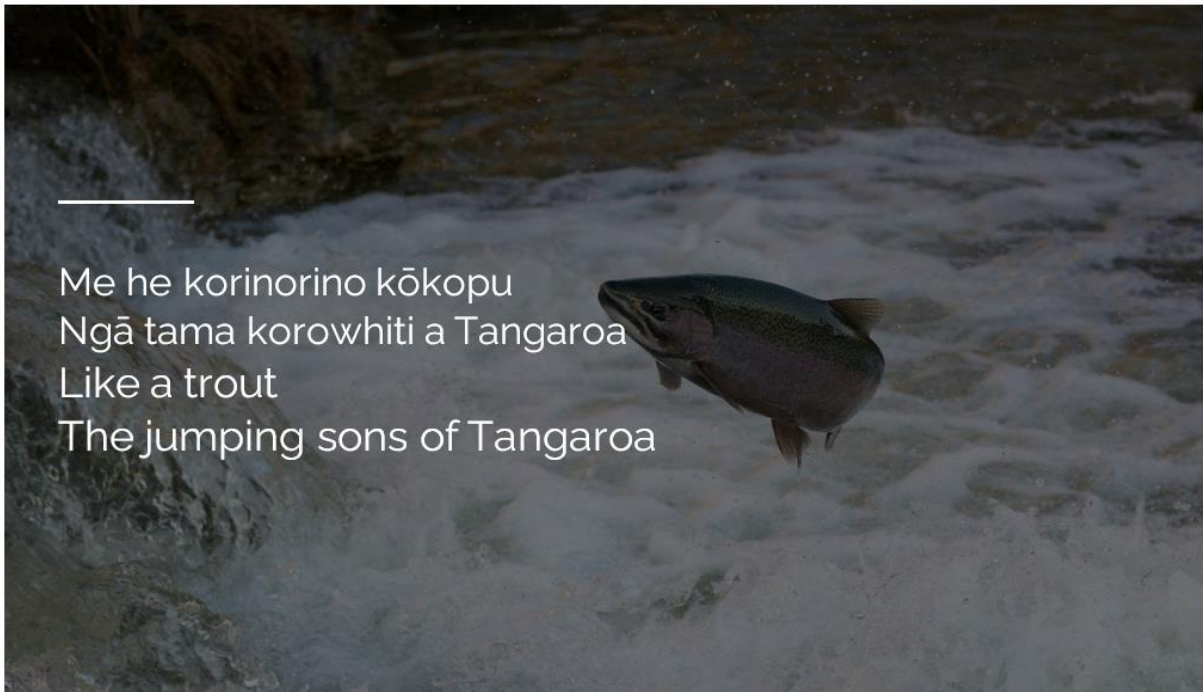


Horizons Regional Council: Fish Passage



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Lesson 1 – Fish Passage Introduction



This Fish Passage document contains critical information for Freshwater Farm Plan (FWFP) Certifiers wanting to provide appropriate feedback on a FWFP's fish passage assessment and strategy.

It will provide:

1. A basic understanding of the native fish species in the Horizons Region, and migration requirements.
2. An understanding of the key factors that need to be considered for fish passage.
3. An understanding of the NES-Freshwater Fish Passage and requirements on farm.
4. An explanation of strategies or mitigation that can be taken for existing barriers (before 3 Sept 2020).
5. Use of the NIWA Fish Passage Assessment Tool.

Why is fish passage important, what is it and who manages it?



Fish passage is the ability for fish to move unobstructed through waterways. Conversely, barriers to fish passage are any instream structures that may block or impede passage. Many of our native fish, such as inanga (whitebait) and tuna (eels), need to move between habitats to complete their lifecycles.

Culverts, weirs, fords, dams and flood gates are common in rivers and streams throughout New Zealand and if not designed and installed correctly, can hinder fish passage. The freshwater regulations aim to maintain and improve fish passage, except when it is desirable to prevent the passage of some fish species to protect another fish species from predation (e.g., maintaining a weir to protect non-migratory native fish where they would otherwise be preyed on by trout).

The improvement and maintenance of instream structures will open up additional habitat facilitating population growth within our already threatened native fish populations.

The Department of Conservation (DOC) and regional councils have specific responsibilities to manage fish passage in New Zealand waterways under the Freshwater Fisheries Regulations 1983 and Resource Management Act 1991, respectively. Both pieces of legislation must be considered when undertaking activities that may impede fish passage. Horizons Regional Council is responsible for issuing resource consents and for enforcing the requirements of the NES-FW and One Plan (Horizons combined Regional Policy and Regional Plan) when required.



For the most part, the One Plan already includes what is required by the fish passage regulations, however some changes are needed to give effect to the new national directions. In some cases where the One Plan is more stringent than the NES-FW, the most stringent regulation will apply. You can confirm this with a Consent Planner or Freshwater Team member. The NES-FW also contains information requirements for activities that must be provided to the regional council even when they may not need a consent.

Common Fish Species within the Horizon Region



Fishes of the Horizons region

The role of Horizons is to protect the habitat. The role of DOC is to then protect the various fish species. 75% of our native species fall into a threatened classification

Fish species	Threatened classification	Migration status
Banded kōkopu <i>Galaxias fasciatus</i>		Migratory
Black flounder <i>Rhombosolea retiaria</i>	Uncommon	
Bluegill bully <i>Gobiomorphus hubbsi</i>	Uncommon	Non-migratory
Brown mudfish <i>Neochanna apoda</i>	At risk	Non-migratory
Common bully <i>Gobiomorphus cotidianus</i>		Non-migratory
Common smelt <i>Retropinna retropinna</i>		Migratory
Dinah's bully <i>Gobiomorphus dinae</i>		Non-migratory
Dwarf galaxias <i>Galaxias divergens</i>	At risk	Non-migratory
Giant bully <i>Gobiomorphus gobioides</i>		Unknown
Giant kōkopu <i>Galaxias argenteus</i>	At risk	Non-migratory
Grayling <i>Prototroctes oxyrhynchus</i>	EXTINCT	Migratory
Grey mullet <i>Mugil cephalus</i>	Uncommon	
Inanga <i>Galaxias maculatus</i>	At risk	Migratory
Kōaro <i>Galaxias brevipinnis</i>	At risk	Migratory
Lamprey <i>Geotria australis</i>	At risk	Migratory
Longfin eel <i>Anguilla dieffenbachii</i>	At risk	Migratory
Redfin bully <i>Gobiomorphus huttoni</i>	At risk	Migratory
Shortfin eel <i>Anguilla australis</i>	Declining	Migratory
Shortjaw kōkopu <i>Galaxias postvectis</i>	At risk	Migratory
Torrent fish <i>Cheimarrichthys fosteri</i>	At risk	Migratory
Kaharore bully <i>Gobiomorphus mataaraerore</i>		Non-migratory
Yellow-eyed mullet <i>Aldrichetta forsteri</i>	Uncommon	

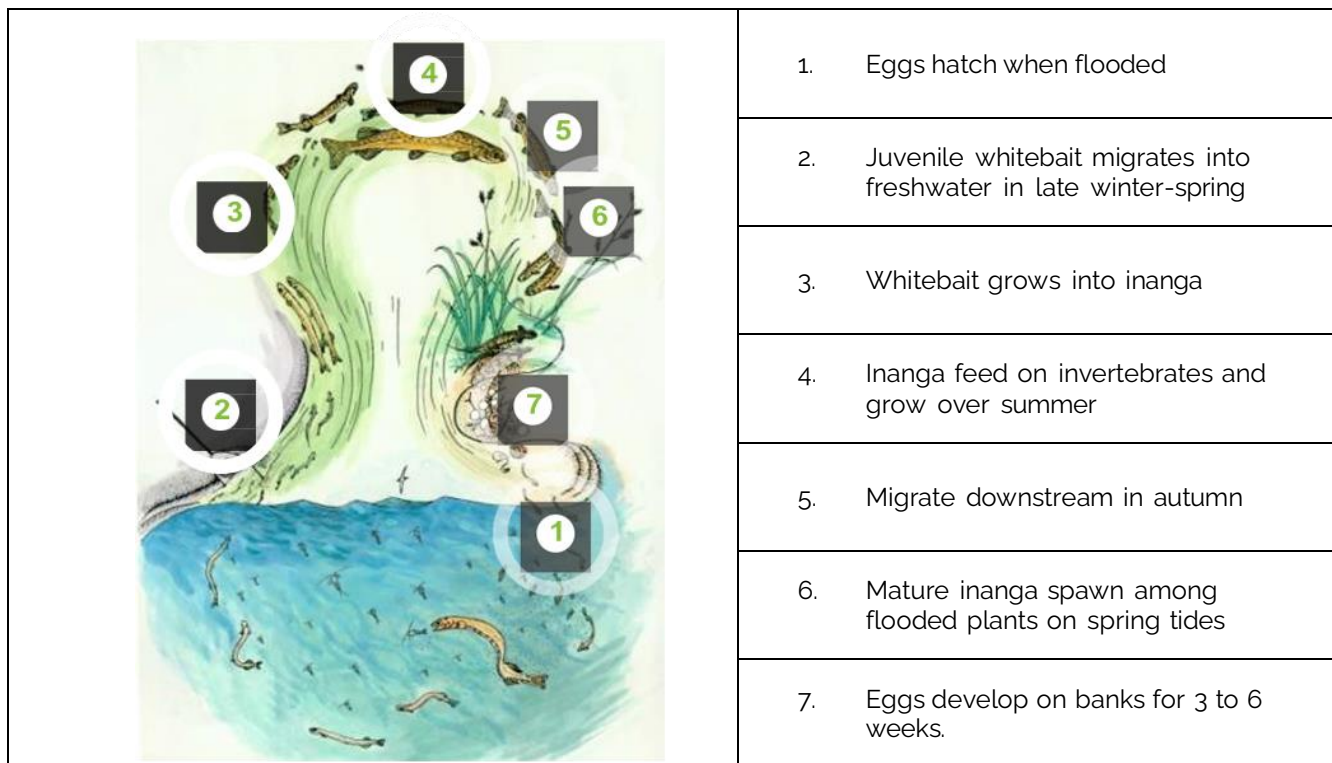
Along with the native species above, the following introduced and naturalised game fish are also present in Horizons rivers and streams:

- **Brown trout** - *Salmo trutta*
- **Perch** - *Perca fluviatilis*
- **Rainbow trout** - *Oncorhynchus mykiss*
- **Tench** - *Tinca tinca*

Lifecycle

Many of our species are diadromous which require both saltwater and freshwater to complete their lifecycle, so the connectivity between these habitats is vital for their survival. Some of our fish species spawn further upstream in rocky bottom streams in forested areas and the larvae go out to sea and return as juveniles, making their way upstream to suitable habitat.

The lifecycle of inanga which spawn near the saltwater wedge is:



Native fish habitat is decreasing due to land use changes, wetland degradation, removal of riparian vegetation and structures in waterways, that create barriers to their movement up or downstream.

This document focuses on barriers to fish migration and highlights the most common barriers likely to be found on farm. This includes the requirements for installing new structures and how to remediate existing structures if required.

**The average lifespan for most species:
7-8 years, eels/tuna up to 80 years, kōkopu up to 20-30 years, and inanga 1-2 years.**

Requirements for fish passage



For fish to be able to pass through a structure, it is essential that the streambed is kept as similar to its natural state as possible. To do so, you must ensure:

- The habitat is maintained (similar to nearby reaches and with little impact on alignment)
- The gradient is maintained (i.e., not too steep)
- The water velocity is maintained (i.e., not too fast)
- The water depth is maintained

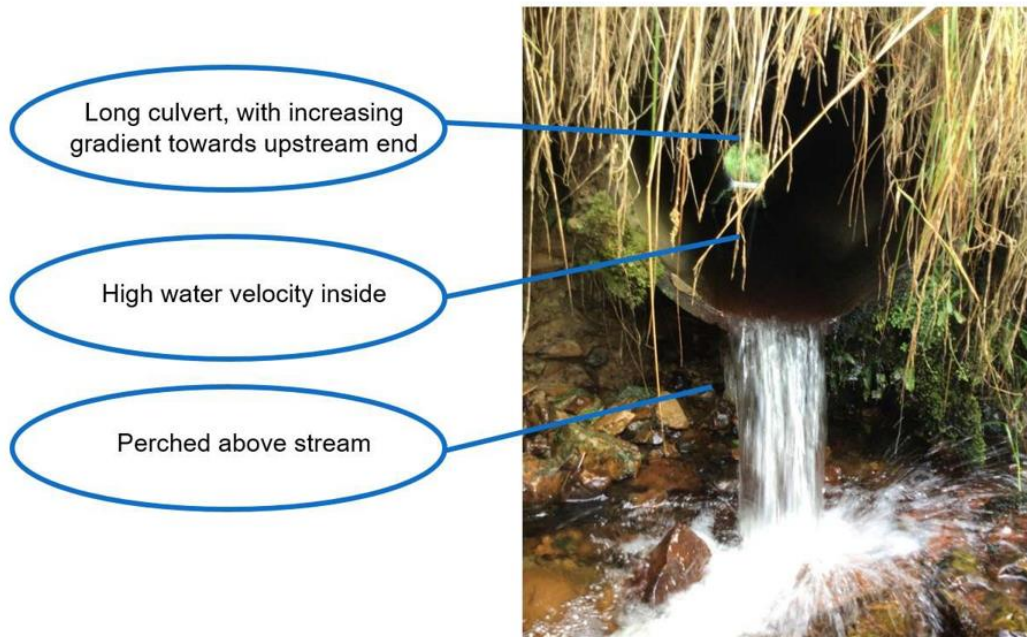
Examples of barriers to fish migration



Shallow water

Vertical drop

Turbulent water



Regulation

The regulations apply to watercourses that are defined as a 'river or connected area.' These are a continually or intermittently flowing body of freshwater that includes a stream and modified watercourse and are any part of the coastal marine area and upstream from the mouth of a river, and have suitable habitat available upstream for native fish populations. For more on habitat, contact the Horizons Freshwater team.

For structures installed on or after 3 September 2020, please refer to both the One Plan (2018) and the NES-FW (2020). In the case that one rule has more stringent requirements than the other, the more stringent requirements will apply.

From 3 September 2020, under the NES-FW, Horizons will be assessing the placement, alteration, extension, or reconstruction of new culverts, weirs, flap gates, dams, and fords to ensure they meet the requirements for fish passage. If the proposed activity cannot meet the conditions outlined in the NES-FW or One Plan, it becomes a discretionary activity and will require resource consent.

The resource consent will impose conditions that:

- require monitoring and maintenance of the structure to ensure passage of fish does not reduce over its lifetime
- require a plan for monitoring and maintenance and the steps taken to avoid adverse effects on the passage of fish, and
- require an updated version of the information relating to the structure that was required for the original resource consent to be provided to the consent authority at the following times:
 - At the intervals required by the monitoring plan, and
 - Each time a significant natural hazard affects the structure.



Existing barriers (pre- 3 September 2020)

For structures constructed prior to 3 September 2020, the One Plan has several general conditions that contribute to the protection of game and native fish species and their habitat. This is most commonly a condition of a Permitted Activity – where consent may not be required. The most explicit for fish passage is condition (h) of Table 17.2, General Conditions for Permitted Activities and Controlled Activities involving the Beds of Rivers and Lakes, which requires all activities and structures (new or altered) in the beds of rivers to provide ongoing safe fish passage. Horizon’s staff can provide free advice on how to meet condition (h).

Barriers commonly found on a farm



The most common barriers to fish migration are perched or undersized culverts and dams. A perch is when there is a drop from the pipe outlet to the waterbody, native fish cannot climb upside down or jump into the culvert to continue their journey upstream. As native fish are boost swimmers, the speed of the water through a structure can cause a velocity barrier (these usually become perched as the water blasts from the outlet) that exceeds a fishes swimming capability. An undersized culvert can choke the waterway and become clogged with debris making migration difficult.

It is important to embed/place the correct sized culvert so that it is parallel to the slope of the natural stream bed and substrate can accumulate on the bottom to form a continuation of the bed.

Example of barriers

<p>Perched culvert</p>	<p>Undersized culvert</p>

Check existing structures

Stock take and assess the instream structures on the property for fish passage. The NIWA Fish Passage Assessment Tool (FPAT) or a similar data collection method can be used to help assess whether each structure is fish passable. If there is any uncertainty, contact the Horizons Freshwater team who may be available to assist. As with all farm related assets, it is best practice to do an annual assessment on your instream structures, note any new damage or risk and undertake any maintenance that is required – this can be incorporated into your Fish Passage Assessment or vice versa.

Refer to the One Plan when planning any maintenance on existing structures. Often a barrier can be easily remediated at a small cost by using baffles, artificial ramps and/or spat rope.



Baffle



Fixed ramp



Flexi-ramp



Fish friendly flood gate



Spat rope



Rock ladder

Future works



When planning for the placement, alteration, extension, or reconstruction of culverts, weirs, flap gates, dams, and fords, it is important to know if your plans align with the NES-FW Fish Passage and the Horizons One Plan, notably (but not limited to) Chapters 14 and 17, and Objective 5. If you can meet all of the permitted activity conditions (of both the NES-FW and One Plan) you may install a structure without a resource consent. You can find the One Plan [here](https://www.horizons.govt.nz/publications-feedback/one-plan-documents/one-plan-as-amended-by-plan-amendment-1) (<https://www.horizons.govt.nz/publications-feedback/one-plan-documents/one-plan-as-amended-by-plan-amendment-1>) and NES- FW [here](https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364099.html) (<https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364099.html>) or speak to a Horizons Consent Planner for advice. Click the structure name for the permitted activity standard for [culverts](https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364306.html) (<https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364306.html>) and [weirs](https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364310.html) (<https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364310.html>).

Minimum design standards for fish passage will achieve:

- Effective and safe passage of all aquatic organisms and life stages with minimal delay, except where specific provisions are required to limit the movement of undesirable exotic species.
- Diversity of physical and hydraulic conditions leading to a high diversity of passage opportunities for aquatic organisms.
- A structure that will provide no greater impediment to fish movements than adjacent stream reaches.
- Structures that have minimal maintenance requirements and are durable.

Important notes

Note 1: Passive flap gates

Passive flap gates are a non-complying activity, unless all of the conditions imposed in regulations 62, 65 and 69 of the NES-FW are met



Note 2: NES-PF takes precedence

Where there is conflict between the National Environmental Standards for Commercial Forestry (NES-CF) and the NES-FW, the NES-PF takes precedence. The NES-PF covers harvesting and plantation forestry and associated activities including temporary crossings and culverts

Note 3: Size

A correctly sized culvert that is well placed will last longer and is better than any retrofit solution.



- Other things you can do to help our native fish:
- Protect stream side vegetation by excluding stock and enhancing the riparian by planting native species to create additional shading and habitat.
 - Protect wetlands as they are often fish breeding grounds.

Using the NIWA Fish Passage Assessment Tool



The [Fish Passage Assessment Tool](https://fishpassage.niwa.co.nz/) (<https://fishpassage.niwa.co.nz/>) has been developed to provide an easy to use, practical tool for recording instream structures and assessing their likely impact on fish movements and river connectivity.

Anyone can use the Fish Passage Assessment Tool (FPAT) and provide data by using the Fish Passage Assessment Survey available in the NIWA Citizen Science app. The Survey/app provides a standardised way to record data on the characteristics of instream structures and rates the risk of the structure for fish passage. The information collected using the app is automatically uploaded to a national database and can be viewed and downloaded from the webpage (<https://fishpassage.niwa.co.nz/>) currently maintained by NIWA. Each structure is assigned a fish passage risk class and an ecological prioritisation score.

The information collected using the FPAT aims to help us to understand and visualise the connectivity of New Zealand's rivers and track progress of work intended to restore fish passage. This information is collected in accordance with the [NIWA Fish Passage Guidelines \(https://webstatic.niwa.co.nz/static/web/freshwater-and-estuaries/NZ-FishPassageGuidelines-upto4m-NIWA-DOC-NZFPAG.pdf\)](https://webstatic.niwa.co.nz/static/web/freshwater-and-estuaries/NZ-FishPassageGuidelines-upto4m-NIWA-DOC-NZFPAG.pdf).

Recording within the app

- Make sure 'Organisation' is recorded correctly. Consistency when naming entries is important for future data retrieval and use.
- Asset numbers can be found on bridges/structures OR relevant GIS/Local Maps layers. Not all structures will have an asset number.
- Take at least two photos from both the upstream and downstream vantage points but if able, take four (Ideally two upstream – one facing structure and one facing upstream; and two downstream – one facing structure and one facing upstream).

If you are using more photos, it is best practice to save the entry before uploading as the app can freeze and you may lose your data.


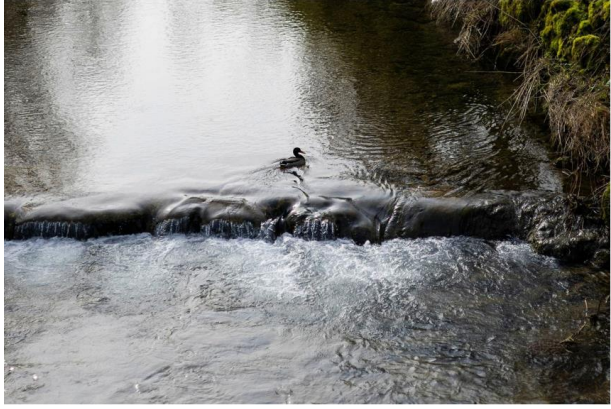
Examples of what to include:

- Any observations of fish or other aquatic organisms that are unique
- Any information that details how significant a barrier is to fish passage
- If access is unusually difficult or any major hazards on site
- Rainfall events and site characteristics (i.e., stream on farmland or native riparian plantings on river banks)
- If the edge of the barrier is particularly square/sharp (this is particularly challenging for fish to cross)
- If details have been estimated due to lack of access i.e., culvert more than >50m in length
- If the bottom of the culvert/structure is particularly full of debris (which impedes water flow)
- **Culverts** - measure water depth at the deepest point (usually in the centre of the culvert opening)
- **Weirs** - measure the full width of the structure not just the wetted width of the structure

Ideally all entries are saved on site and then submitted from a reliable internet source. This allows for time to double-check details and add missing information. Quality checking before submission is essential. Once an entry is submitted you cannot retrieve and edit it again (you can ask NIWA to edit it for you but is not ideal).

Structures considerations

If you are unsure about a structure's characteristics speak with the Horizons Fish Passage or River Management team and/or check the NIWA fish passage guide.

Culverts	Weirs
	
<p>Measure the water depth of a culvert at the deepest point (usually in the centre of the culvert opening).</p>	<p>Measure the full width of the structure not just the wetted width of the structure.</p>



Technology issues - Have backup options for when technology fails!

Save often, particularly when entry is complex and there are several previous saved entries.
Save before uploading images as they can cause the system to crash and data will be lost.

Links to key documents

[Fish in our awa:](#)

<https://www.horizons.govt.nz/HRC/media/Media/Environmental%20Ed/MRLA-Native-Fish-Factsheet.pdf?ext=.pdf>

[Fish Passage Assessment Form:](#)

<https://niwa.co.nz/freshwater/fish-passage-assessment-tool>

[Fish Passage Fact Sheet:](#)

<https://environment.govt.nz/assets/Publications/Files/essential-freshwater-fish-passage-factsheet.pdf>

[Hooked on Native Fish](#)

<https://landcare.org.nz/wp-content/uploads/2022/06/English-Native-Fish-Fact-Sheet.pdf>

[Horizons NES-FW Fish Passage](#)

<https://www.horizons.govt.nz/HRC/media/Media/Water/Freshwater%20Future/Freshwater-Fish-Passage-Brochure-WEB.pdf>

[Horizons One Plan](#)

<https://www.horizons.govt.nz/publications-feedback/one-plan/one-plan-as-amended-by-plan-amendment-1>

[NES-FW](#)

<https://www.legislation.govt.nz/regulation/public/2020/0174/latest/LMS364099.html>

[NIWA Fish Passage Assessment Tool](#)

<https://niwa.co.nz/fish-passage/fish-passage-assessment-tool>

[NIWA Fish Passage Guidelines](#)

<https://webstatic.niwa.co.nz/static/web/freshwater-and-estuaries/NZ-FishPassageGuidelines-upto4m-NIWA-DOC-NZFPAG.pdf>

[NZ Fish Passage Guidelines. Appendix G minimum design standards for fish passage at instream structures](#)

<https://webstatic.niwa.co.nz/static/web/freshwater-and-estuaries/NZ-FishPassageGuidelines-upto4m-NIWA-DOC-NZFPAG.pdf>

Guidance and advice on monitoring, maintenance, targeted remediation, habitat and effective fish passage can be provided by the Horizons Consent Planning and Freshwater teams. Please contact us on freephone 0508 800 800

If you would like to provide feedback on this document, please email:

freshwaterfarmplans@horizons.govt.nz