

Works Within a Watercourse

Fish Passage

The importance of maintaining fish passage

Auckland streams contain a number of native New Zealand species (15), the majority of which are diadromous (13), meaning they migrate between fresh and saltwater. However potential migration barriers such as overhanging culverts and dams have an undesirable effect on fish passage and migration in the Auckland Region. Any object in a stream that stops fish passage is affecting the populations of these species. By maintaining fish passage when placing a crossing or any structure in a stream it allows fish to follow their natural migratory movements and access parts of the stream where they can spawn and develop.

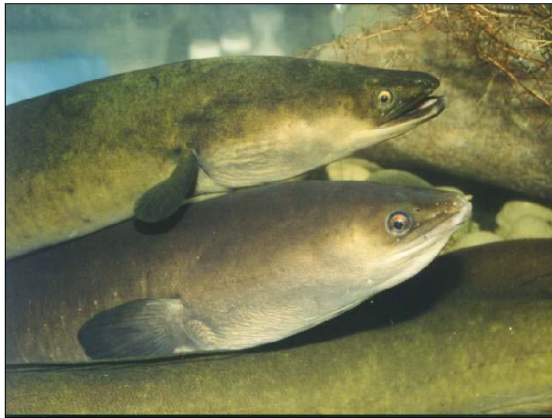


Photo 1: Longfin and shortfin eels



Photo 2: Short jaw kokopu

What are the main barriers to fish passage?

In the Auckland Region there are a number of barriers to fish passage, some natural such as waterfalls and rapids, while others are due to artificial instream structures such as culverts, dams, fords and weirs. This is inappropriate, as there are means of preventing these barriers at the time of construction and through retrofitting on established structures. Stream structures such as culverts and weirs can be designed so that fish passage is maintained.

Fish passage has been blocked in these structures for the following reasons:

- Culvert outlet is above stream causing water to cascade out of culvert.
- Flow velocities through structures are too high or too low.
- Flows out of structure are too shallow for fish passage.
- Streambank provides no shade or vegetation.
- No instream cover provided by structure. i.e. streambed roughness.
- Weir allows only climbing species passage.
- Apron at outlet of structure causes shallow flow.

All of these problems can be repaired by retrofitting further controls or before construction by properly designing and constructing any instream structure.

When should fish passage be considered?

Fish passage is a requirement, which needs to be considered for most works within watercourses in the Auckland region. When considering the need to implement fish passage it is essential that the following points be considered:

- Fish species present and distribution within the catchment.
- The size and type of habitat available upstream.
- The presence of other migration barriers both upstream and downstream of structure.
- The timing of fish migrations, durations and their flow requirements.
- Altitude and distance of site from the sea.

Solutions

Barriers to fish passage are a problem but can be remedied by making changes to an existing structure or to the final design of the proposed structure. Using some small but effective controls and design factors can remove the key barriers that prevent fish from migrating through these structures. These can include:

- Ensuring the invert (base) of culverts sit below the level of the streambed.
- Installing baffles, spoilers or control weirs to slow flow velocities through devices.
- Adding rocks or sediment to inside of culverts to increase roughness for bottom dwelling species.
- Retrofitting rock headwalls or rock weirs to devices with hanging outlets.
- Designing devices to correct sizing to ensure that shallow flows are not present.
- Stabilising the streambed around structures to stop erosion from affecting passage.
- Adding climbing material to allow climbing species passage.
- Adding suitable fish passage to dams that cause a barrier to migration.



Photo 3: ARC staff investigating aquatic life/fish species in Auckland stream

Further information and references

Further information on fish passage can be found on the arc website or through the Auckland Regional Council Technical Publication No. 131, *Fish Passage Guidelines for The Auckland Region*, There is also a series of fact sheets available on related topics including, *Culvert sizing and Design and Streamworks Methodology*. For further information contact Enviroline or the Sediment Management Team on (09) 366 2000.

Note: this factsheet does not constitute ARC approval; other consents and mitigative strategies may be required. The proponent is advised to contact all other appropriate regulatory agencies.