

Temporary culverts and fish passage



Background

More than 70% of New Zealand's freshwater fish species are threatened or at risk of extinction. Many of these fishes are migratory and so need to be able to move within our waterways and/or from the ocean to fresh water (eg whitebait, eels). If temporary culverts that are installed primarily for construction purposes (eg for temporary access and/or gravel extraction) are not designed, installed and/or maintained properly, they can impede this movement, preventing fish from accessing key habitats and completing their life cycles.

Installation and design considerations

Before installing a temporary culvert in a waterway, check that you are consented and/or permitted to do so (note: approval needs to be obtained from the relevant council in addition to the landowner). Some councils have specific requirements in their plans – for example, in some regions, temporary culverts can only be in place for up to 2 weeks within any 6-month period or must accommodate certain-sized flood events.

When the main water channel needs to be crossed, you should use temporary bridges where practicable. In multi-channelled waterways, such as braided rivers, you should endeavour to cross a braid rather than the entire main channel to avoid the need for larger culverts and the risk of scour/dislodgement from elevated flows.

It is important that all temporary culverts are assessed for fish passage and installed and maintained to provide for this in line with council requirements. If fish passage is impeded, you will need to apply to the Department of Conservation (DOC) for a dispensation (www.doc.govt.nz/fish-passage-authorisations for further information).

What do good temporary culverts look like?

- › Culverts are sized appropriately to limit increased water velocity during base flow (ie when not in flood or a flood recession period, and not under drought conditions).
- › Culverts are as short as possible.

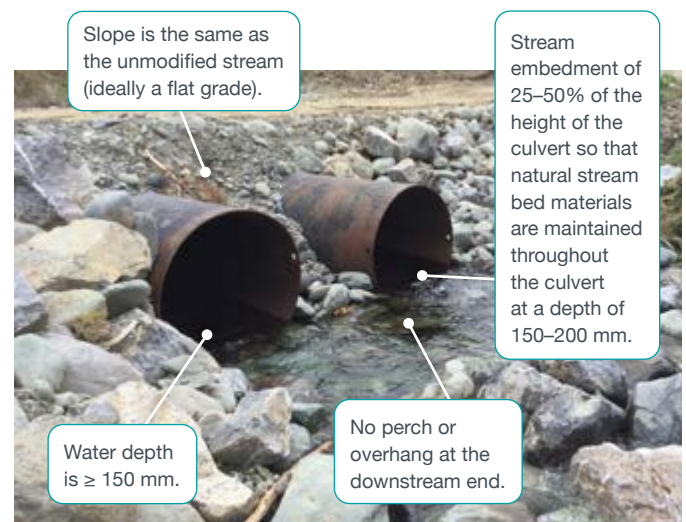


Photo: Boffa Miskell

A good temporary culvert providing fish passage.

Culvert water velocity should be equal to or less than the average water velocity in adjacent stream reaches. Refer to the illustration below for information on how to measure water velocity.

Water velocity measurement using the float method



If you don't have access to a flow meter, you can use the float method to measure water velocity with something as simple as a small stick.

Water velocity (m/s-1) = Culvert length (m) ÷ time taken for float to pass through culvert (seconds).



Baffles, spat ropes and/or stream bed materials pictured below can be used where velocities are too great to support fish passage (ie > 0.3 m/s).



Photo: NIWA

Spoiler baffle sheet installed into the base of a culvert to help fish passage through a culvert.



Photo: Bruno David

Mussel spat rope installed within the base of a culvert to help fish passage through a culvert.

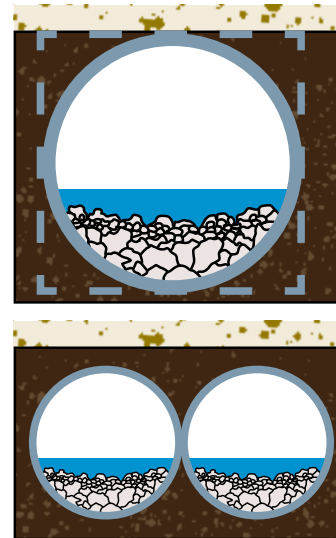


Diagram: NIWA

Natural substrate within the base of a culvert that helps fish passage.

Rock weirs/riffles can be used to raise water levels at culvert outlets where perches develop (this is known as backwatering). This will help to slow the water velocity, increase the water depth in the culverts and reduce any perch height/drop.



Photos: Boffa Miskell

Backwatering established downstream of culverts to raise the water level and ensure no perching of culverts and good passage upstream and downstream from the culverts. Inset shows downstream view of culverts with backwatering in place so no perching.

What do bad temporary culverts look like?

These culverts are likely to be impassable for all fish species.



Culverts are undersized, resulting in a high barrel velocity

Culverts have not been embedded at or below the bed of the river, resulting in perched culverts

High barrel velocity leads to the formation of a large scour pool downstream of the culvert

Photos: Boffa Miskell

An example of temporary culverts that do not provide fish passage.

For more information, see the *New Zealand Fish Passage Guidelines* and the relevant council's planning documentation

