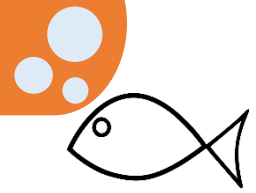


Fish-Passage Field Findings



Jan 12, 2020

Lessons Learnt 03: Floating ramp with mussel-rope

This case study is one in a series that provides key information and guidance about how to improve a fish passage.

What was the problem?

The Rangitaiki River is the primary waterway of the Rangitaiki Plains, situated within the Bay of Plenty Region.

This is a private culvert on a tributary of the lower Rangitaiki River where many native fish would be expected, including weaker swimmers such as inanga (*galaxias maculatus*)

The culvert is located approximately 12 km from the coast, with a diameter of 800mm, and is perched by 800mm with an undercut of 480mm.

The culvert was identified as likely causing a barrier to fish migration (Figure 1).

Flow exited the culvert into a deep plunge-pool, presenting with significant scouring of the bed material.

The culvert barrel had no bed material, indicating that it was possibly a velocity barrier.



Figure 1: Outlet prior to remediation

What was the aim?

We aimed to improve upstream passage for all fish species.

Improve the transition of migrating species into the culvert by addressing the perch was the primary goal.

The focus of the study was to determine the effectiveness of laying multiple strands of mussel-rope down a floating ramp would assist weaker swimming species.

What was the remediation?

A 2.4-meter floating ramp (ATS-Environmental) at approximately 30° gradient at time of installation.

The ramp was attached to the culvert with a flexible rubber coupling.

The ramp has a 15° “V” and a smooth surface i.e., not Miradrain® dimples as featured in the NZ Fish Passage Guidelines.

8 lengths of mussel-rope were fitted down the ramp in 2 bundles of 4 strands instead of using Miradrain®.

The mussel-rope passes over a 100mm high flexible v-baffle with 45° cut ends, fitted 300mm up from the outlet of the culvert (Figure 2).

There further three 100mm x 600mm flexible baffles were fitted evenly spaced throughout the pipe to create rest pools and complex flows with low velocity zones.



Figure 2: Outlet post-remediation

Results

A trapping survey was completed before (3 December 2019) and after (10 December 2019) the remediation was installed. Due to limited accessible reach and cross-section depth, five un-baited Gee-Minnow traps were set at 5m intervals upstream, and five un-baited Gee-Minnow traps were set at 5m intervals downstream of the culvert, being set at dusk and retrieved the following morning around 8am.

Survey results are presented as Capture per Unit of Fishing Effort (CPUE) above and below the barrier before and after remediation.

Pre-remediation survey found a total of 12 fish downstream of the barrier (8 inanga, 1 short-fin eel, 3 common bully), with no fish captured upstream of the culvert (Figure 3.).

After remediation, a total of 4 fish (1 common bully, 3 inanga) were captured downstream, while 125 fish were captured upstream of the culvert (3 common bully, 1 short-fin eel, 121 inanga) (Figure 3.).

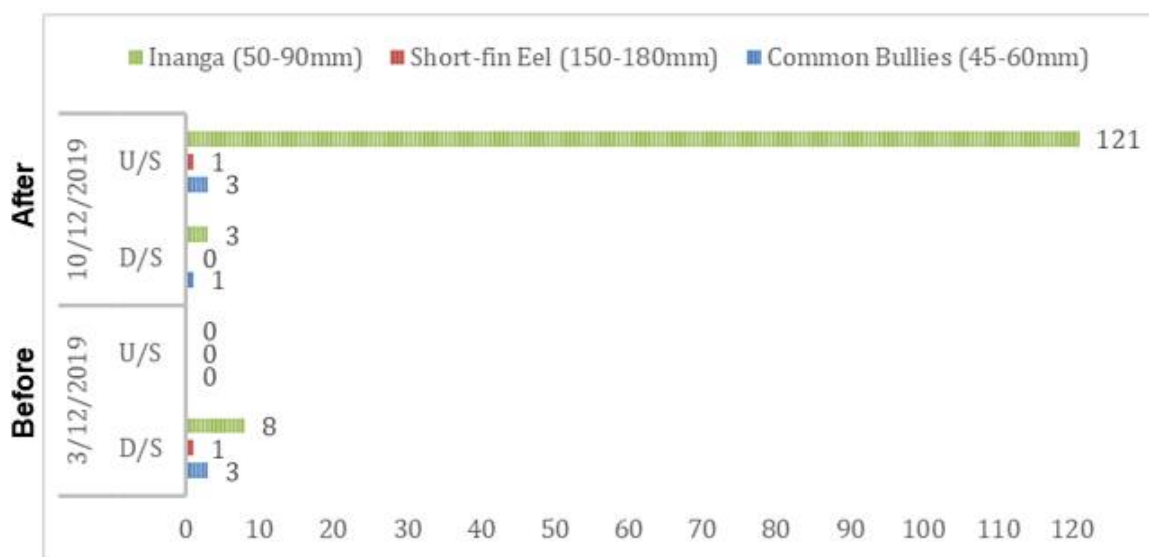


Figure 3: Data results

Lessons Learnt

- Floating ramp with only mussel-rope (no Miradrain-), improved upstream passage into an overhanging culvert for the range of fish captured downstream.
- The flexible baffles noticeably increased the depth and complexity of the flow through the culvert.
- After a period (following the study), the ramp appeared to have reduced scour at the outlet, resulting in a redeposition of bed-material thereby infilling the plunge-pool and reducing the gradient of the ramp.
- To date, there have been no reports of blockages within the culvert as a result of the installation and no maintenance of the ramp or baffles has been required.
- Fish migration by way of the remediation appears to occur quickly - surveys nightly may have proved an interesting insight into the timeframe and extent of species utilizing the ramp.
- The rope provided a foundation for aquatic vegetation and algae.
- The waterway characteristics limited the survey area for overnight trapping.

Further information

References: Fake, D. 2021: *Lesson Learnt 011 – Floating fish ramp provides passage for inanga on Irongate Stream*. Prepared for NZ Fish Passage Action Group.
<https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/fish/fish-passage/lessons-learnt-case-studies/lessons-learnt-011-floating-ramps-irongate-stream.pdf>

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