

12 November 2008

**Draft Meeting Summary
Brook Stream 12 November 2008**

In Attendance

Les Basher	Landcare Research
Michael Booker	NCC
Kati Doehring	Canterbury University
Joe Hay	Cawthron Institute
Ron Hay	NCC
Shine Kelly	Brook Sanctuary
Tom Kroos	Fish and Wildlife Services
Dugald Ley	TDC
John McCartin	Natural System Design (PM only)
Phil Ruffell	NCC
Martin Rutledge	DoC
Paul Sheldon	NCC
Rowan Strickland	Cawthron Institute

Apologies

Trevor James	TDC
Chris Hemi	Ngati Kuia
Ann Sheridan	Tiakina
Keryn Squires	Nelson Environment Centre
Gavin Udy	DoC
Phil Hamblin	NCC
Debra Bradley	NCC
Mel McColgan	Waimaori Streamcare

Nile Street Culvert 0915 hours

1. Introduction -Sheldon

The issue was restoration of fish passage through the lower reaches of the Brook Stream. Linking the modified urban reach to the upper catchment and Sanctuary would support the biodiversity forum and community initiatives and enhance biodiversity values.

The objective of this exercise is to discuss restoration options with the view to progress to more specific pre-feasibility studies in the future. NCC engineers have proposed an allocation of \$100,000.00 in the LTCCP round for future works on the Brook Stream but this has not been approved yet.

2. Introduction of participants

3. Status of Brook Stream fishery-Rutledge

The Brook Stream fishery has been relatively well surveyed. Barriers have been identified at Nile Street culvert, Manuka Ford and the concrete open channel section. Inanga is a whitebait species not known for its climbing ability but has been found downstream of the Manuka Street Ford. Upland bully and brown trout have been observed up to Big Dam (i.e. the large dam at Brook Sanctuary). Koaro and longfin eels are the most successful migrants and are present from the

Maitai confluence to below Top Dam (the furthest upstream dam) in the upper reaches. Banded kokopu have had minimal success in the system despite excellent climbing abilities. Migratory bullies are thought to be unable to pass the first obstacle at Nile Street, although there are non-migratory upland bullies upstream. The Brook Stream fishery would benefit greatly by providing for fish passage in the lower reaches.

4. Nile Street downstream of road culvert

The major barrier to fish passage at this site is the ramp up from the energy dissipator. It was agreed that a low gradient ramp type fish pass could be fitted on the true left of the ramp/dissipator, as this is the side that acts as a low flow channel. Ron Hay believes this is not a big job and could possibly be accommodated within the 2009-2010 operational budget.

Other topics of discussion included;

- Engineering maintenance of the site
- Placement of baffles/rock inserts on the true left channel bed to reduce water velocity, and it was suggested by the NCC engineers that this was feasible if necessary.
- The debris trap within the culvert and the good fish habitat at this structure due to accumulation of debris.

5. Nile Street upstream of road culvert

- The rock placement on the true left is good fish habitat and looks aesthetically pleasing. This work could potentially be continued downstream into the culvert with minor rock inserts but could be expensive.
- Rowan Strickland advised that putting a low angle bottom edge to the culvert (rather than the right angle edge it currently has) would be as effective as the rock work as this would provide a more wetted perimeter. The rock work would look better but it would cost more and not necessary perform any better for fish passage.
- There are further planting opportunities along the true left riparian margins.
- There are educational opportunities in educating adjacent landowners about lawn mowing to the stream edge and planting.
- The above two bullet points could be facilitated by the Brook Stream Care Group.

6. Manuka Street Ford

- Engineering maintenance at this site includes removal of gravel after every flood with an annual budget allocation of ~\$5,000.00.
- The cost of replacing the ford with a bridge would range \$100,000.00-\$500,000.00.
- The ford is closed to traffic when the water goes over the top and this is managed by Nelmac. Safety concerns were expressed.
- The three culverts under the ford present a velocity barrier to fish passage at normal flow. However, several fish species are presumably able to gain upstream access over the top of the ford during freshes that over-top the ford, probably as the flood recedes and water velocities decline. Fish recorded upstream of this structure, and by implication capable of negotiating this structure at times includes; longfin and shortfin eel, brown trout and koaro.
- Several options to facilitate fish passage were discussed. The favoured option was removal of a three metre section of the ford (approximately), which would include the three culverts and placing a pre-cast slab over the top of the opening for continued vehicle access. The opening in the ford would allow the stream to revert to natural bed level and with a reduction in velocity at this point, due to increased cross-sectional area, would allow fish passage at low and normal flows. The opening would also allow gravel

movement during high flows and reduce the necessity for regular gravel removal potentially reducing maintenance expenditure on digging gravel out from above this ford.

7. Top of concrete open channel section upstream bridge

- Previous attempts to place rock on the channel bed were discussed.
- The ramp angle at the channel entrance was estimated at an approximate 25-30° slope. The ramp could be made more fish friendly by changing the camber (elevate) and gluing in some rock on the true right. The ramp could be made more fish friendly by retrofitting a thin sloping fillet across the weir crest, to concentrate low flows on the true left of the ramp, and fitting an angled fillet running down the ramp against the wall on the true left, to increase the area of splash zone under normal to low flow conditions.

8. Top of concrete open channel section looking 600m downstream

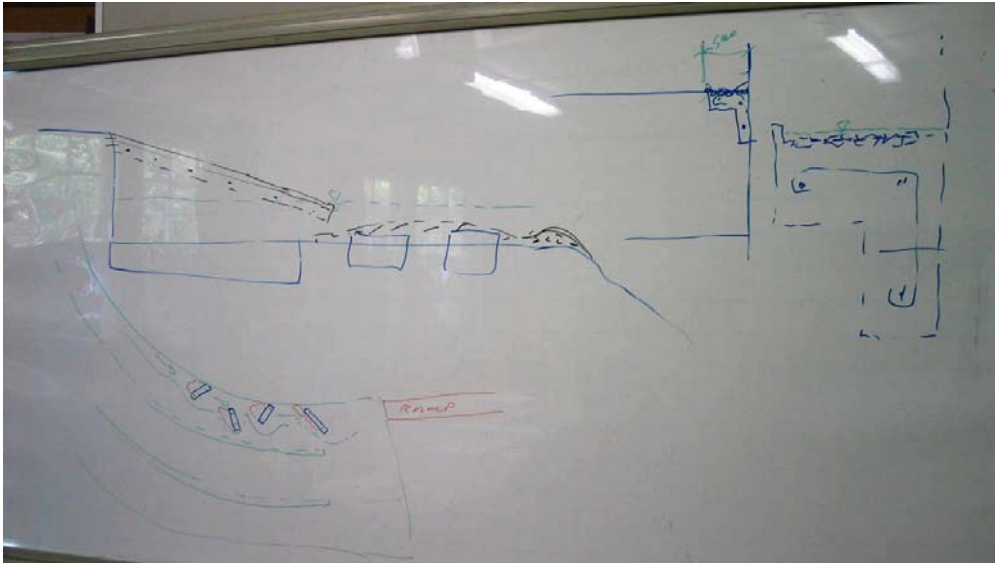
- The bed of this channel has been resurfaced and a meandering low flow channel installed. The work was completed last year at a cost of \$40,000/100m or \$240,000.00 for the job.
- A long-term option was identified by Les Basher that included the removal of the concrete base but it would be necessary to conduct remedial work to ensure the stability of the walls.
- Planting opportunities are marginal with no soil, or very poor soil conditions. Shade sails could be an option, if it was shown that water temp is enough of an issue.
- Fish passage is possible through this section but there are no large resting/cover areas. Rat predation and high water temperatures were identified as possible issues though NCC currently undertakes rat poisoning operations. .
- Placement of rocks in the low flow channel would be expensive and could compromise the design hydraulics of the channel

9. Concrete open channel outlet / gravel trap

- Engineering maintenance at this site includes periodic removal of gravel.
- Large eels (~50-60cm) are apparently common at this site.
- The existing structure is unlikely to impede fish access for stronger migratory species such as eels and the climbing galaxiids.
- All streams within the NCC are walked by engineers every year and participants were invited to attend over the next 4-5 weeks. There was interest in fish observed by river maintenance teams near the *OK Corral*.
- Martin Rutledge captured a species of mayfly known for its intolerance of pollution, indicating that water quality was still good at this site.

10. Workshop-Nile Street

- Ron Hay reiterated that NCC could provide fish passage below the true left channel at the ramp / energy dissipator by placing a fixing pre-cast concrete or rock ramp type fish pass to the wall. The design would have to avoid the ramp becoming a high velocity chute, and would ideally be no steeper than a slope of 1 in 15. The concept is to keep the gradient low as possible.

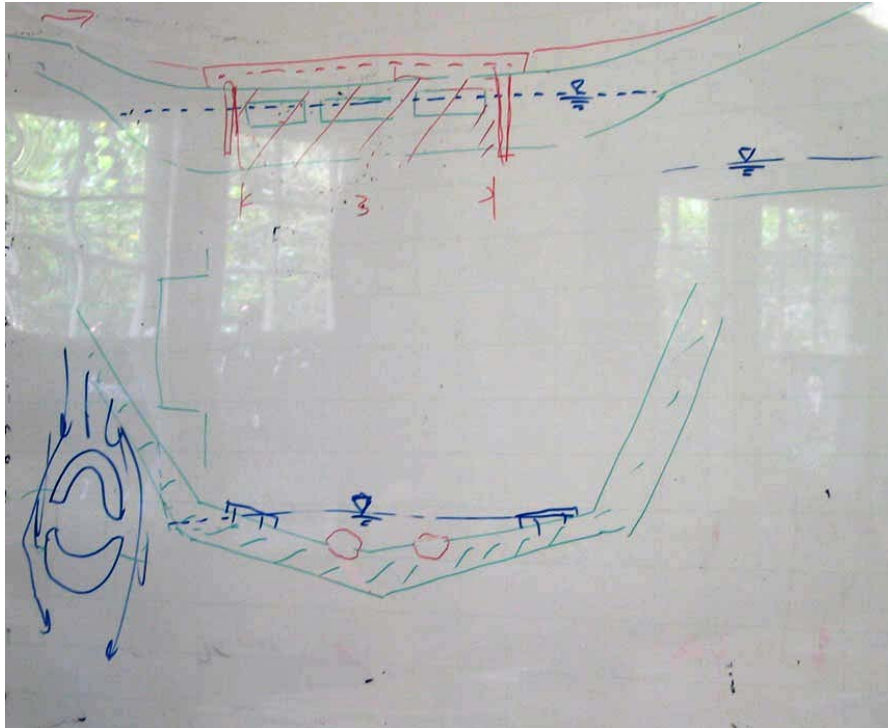


Nile Street True Left Channel

- Ron Hay estimated this work to cost approximately \$5,000.00 and could be completed next year (conditional on maintenance expenditure required in the meantime due to floods etc). Resource consent is required for this work.
- Martin Rutledge noted that the lower the slope of the ramp the easier it would be for inanga and less able climbing species such as migratory bullies (i.e. redfin) to get upstream. The amount of inanga habitat available upstream of this site could be limited and Martin suggested their passage at Nile Street may not be critical but overall the full compliment of migratory species would be a good thing.
- Tom Kroos spoke about a recent study (Macdonald & Davies) where baffle sequences were attached into smooth –walled culverts and their applicability for consideration of placement on the low flow true left channel ramp (to provide some resting opportunity for fish after ascending the ramp). (Copy of report sent to Ron Hay).
- Continuation of rocking the channel bed under the road to the debris trap within the culvert or increasing the wetted perimeter by placing a low angle bottom edge to the culvert should be considered further.
- The general aim of providing for fish passage was to increase the biodiversity of the more robust native species into all reaches of the catchment, and to increase fish densities in the upper catchments. The need to monitor the fish population (following provision of fish passage) is necessary and will require professional sampling techniques.

11. Workshop-Manuka Street Ford

- There was agreement to remove the three existing culverts and the central portion of the ford and replace it with a pre-cast slab to form a low bridge. The estimated cost would be in the neighbourhood of \$15,000-\$30,000 pending the amount of reinforcement required at each end and the cost of a pre-cast bridging slab. Resource Consent is required for this work.
- This would be an ideal project if the proposed \$100,000.00 allocation for engineering works on the Brook Stream was approved.
- Fish monitoring would be required prior to and after installation.



Manuka Street Ford & Open Channel

12. Workshop-Open Channel

- There was agreement that the crest at the top of the open channel entrance could be manipulated to concentrate flow on the true left, during normal and low flows by the addition of a fillet glued into the existing structure with a marine epoxy, and inserting an angled fillet against the wall on the true left to increase the area of splash zone. The possibility of reducing the ramp slope on the true left using a rock ramp insert was also discussed. There was some discussion of utilising a similar design to that of Orphanage Creek with the use of rock for cover and resting or the advantages of a simple smooth surface that is preferred by native fish when migrating through difficult structures.
- Ron Hay stated that following completion of the low flow channel at \$240,000.00 it would be unlikely NCC would favour any major developments to the status quo (with exception to the ramp slope at the channel entrance).
- Rowan Strickland advised that much of the native fish movement through the 600m channel would be post whitebait run during the summer low flow period and wet margins would be used for resting.
- Martin Rutledge suggested that rat control within this section would likely benefit the native fishery.
- There was agreement that this site was not as high a priority as the lower sites at Nile Street and Manuka Ford. This area should be monitored following completion of works at the lower sites.

13. Recommendations

- Initiate works at Nile Street during the 2009-2010 financial year;
 - a) Fish passage on true left at culvert outlet ramp to energy dissipator
 - b) Continuation with rocking the channel bed into the culvert on the true left
or
Placing a low angle bottom edge to the culvert
 - c) Liaise with NCC Parks and Reserves/community groups about additional planting opportunities
 - d) Liaise with other interested parties not in attendance at this workshop (Fish and Game, iwi, community)
 - e) Photos/article for NCC to advise ratepayers

- Application for a further Envirolink small or medium advice grant to obtain further scientific input to the engineering design for;
 - a) Bolt on ramp fish pass at ramp below Nile Street culvert
 - b) Baffles within Nile Street culvert, if necessary
 - c) Continuation with rocking the channel bed into the culvert on the true left
 - d) Manuka Street Ford –removal of existing culverts
 - e) Ramp modifications at entrance to concrete open channel section
 - f) Rocks or other structures on 600m concrete channel bed to provide escape cover and resting opportunities for fish
 - g) Fish monitoring plan