Culvert remediation - case studies

Auckland Council Biodiversity Team

27th November 2013

Culverting - the issue

- **Auckland has few non-diadromous native fish populations.**
- Numerous short, small streams that climb steepy from coast and contain limited low elevation habitat.
- **But still share national phenomenon – poorly configured culvert crossings result in catchment-scale impacts on stream ecology.**

FP barriers – Auckland's built environment

- Stream walks started by NSCC continued by AC.
- **Less than ½ urban streams have been surveyed.**
- Estimate - 700 existing barriers in Auckland's built environment alone
- **Assuming an average cost of $2500 to mitigate each barrier, cost to council $1,750,000 to rehabilitate existing barriers.**

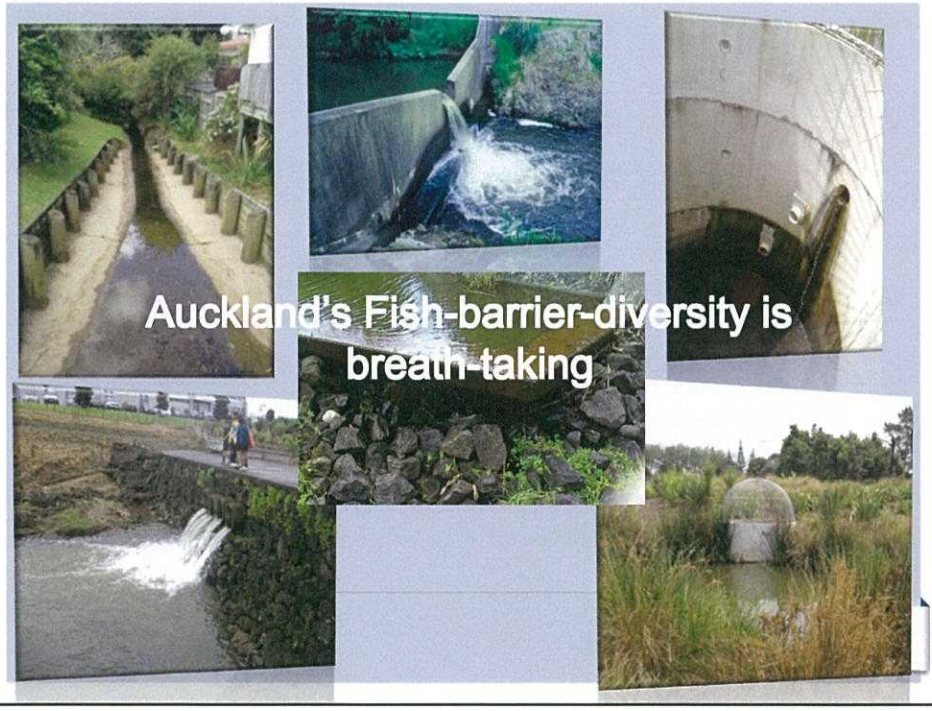
Future barriers – Auckland's built environment?

Even if best practise approaches to culvert installation complied with, unlikely to compensate for:

- **The annual loss of 10km stream habitat to consented stream reclammations.**
  - **Where remaining open sections are progressively infilled to create unavoidably long and unscalable culverts (Waipapa).**
- The presently incalculable stream length lost to culvert crossings covered by permitted activity rules.

The problem with culverts

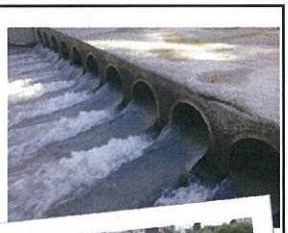
- Depths held constant & daytime refugia diminished.
- Addition of a ceiling prevents light and terrestrial inputs disrupting energy base.
- Permanent habitat absent.
- Fish passage: velocity barriers and physical barriers often develop (perches).
- SEV typically score 0.2.



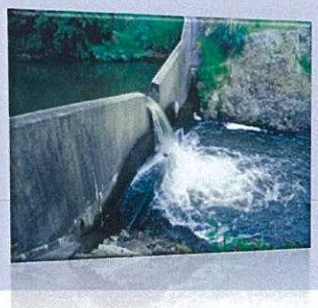
Enabling culverting rules

- Under (ALWP), culverting of 10-30m stream lengths a PA with conditions.
- **But poor compliance with conditions has ltd opportunity for Council oversight especially in rural areas.**
- Not only does PA make deriving absolute no.s of barriers problematic..
- **But Council have little recourse for ensuring culverts are sized/installed appropriately.**

Remediation approaches.



- Begin with the low hanging fruit & the easy wins e.g. where barriers sit within reserves or parkland.
- **Or with redundant or outmoded private & council owned structures....**

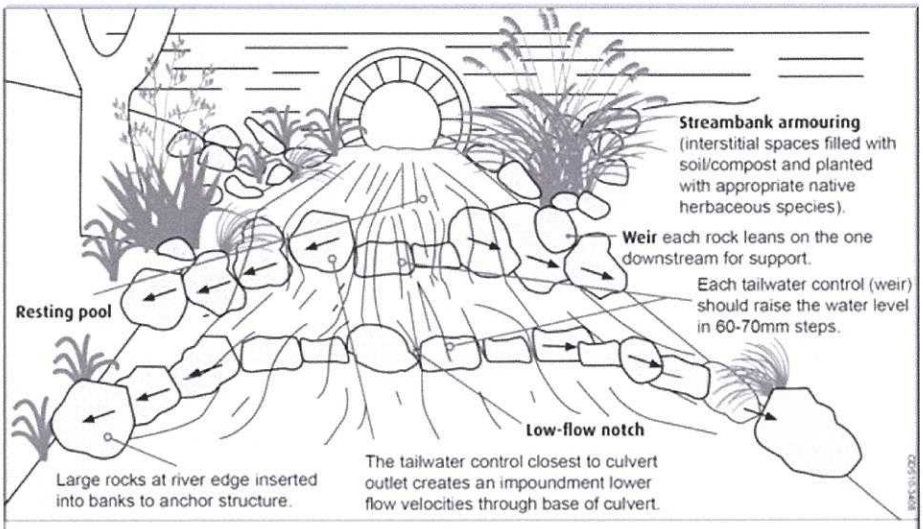


Remediation approaches cont...

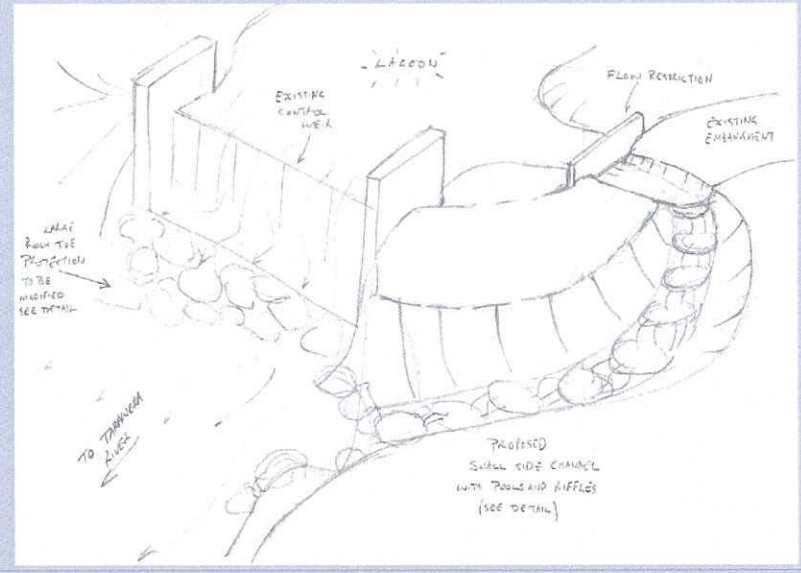
- **...Or where assoc. with roading networks – Waiheke and Great Barrier Island.**
- Great Barrier island – reasonable expectation that few barriers exist upstream of roading network.
- **24 out of 71 culverts (34%) assessed formed partial or complete fish passage barriers.**
- Their remediation will regain just under 40km upstream habitat.

Remediation approaches cont...

- **Survey requires completion of a standard AC evaluation sheet for fish passage.**
- Main areas of interest is the perch height & flow attributes.
- **Remediation approaches decided on by surveyors at the time of investigation.**
- As well expediting the process, gives contractors certainty over resourcing requirements.
- **There is flexibilty on technical design details – but also an expectation that basic approach will be adhered to.**



A succession of weirs helps raise the water level so it creates an impoundment through the culvert



Remediation approaches cont.

- If gradient too steep, or downstream section too short, a fish ladder generally optioned.
- **Preference is to:**
  - **Pair ladders with baffles and spat rope.**
  - **Use simple baffles that create mini impoundments not just high flow refugia**
- Exit velocities still an issue without starter baffle situated beyond the outlet.

- A case may be made for installing spat rope to help climbers exploit last 200 metres of a stream as cost is relatively small.
- **Fitting spat rope as the only solution to all culverts will lead to non-climbers being compromised in some systems.**
- In yet it in spat rope there is a certainty re costings.
- **Agencies more likely to commit budget if the 'solution' can be tendered competitively and fairly.**

Last word...

- Fish passes and baffles available take radically different approaches.
- **Need proper design standards so that can be tendered competitively.**
- Auckland Council spends $80K on fish passage remediation.
- **Could potentially spend more but not without greater design certainty and standardised approaches.**