WORKING WATERS TRUST
Ngā manaaki ki ngā wahi Waimāori katoa

Native Fish in Braided Rivers

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Braided Rivers Workshop – 31 May 2016

Working Waters Trust

- Charitable Trust established in 2013 by freshwater ecologists and a resource planner
- Projects in Canterbury, Otago and Southland
- Restoration projects, education and advocacy
- Partner with locals for on-the-ground conservation wins for threatened fish
- Ngā manaaki ki ngā wāhi waimāori katoa

WORKING WATERS TRUST

Ngā manaaki ki ngā wahi Waimāori katoa

Introducing…….. ‘The Braidy Bunch’

- Torrentfish -‘Mr. Riffle’
- Longfin eel -‘Mrs. Big’
- Alpine galaxias -‘Little Pencil’
- Lowland Longjaw Galaxias – ‘Master Burrower’
- Canterbury galaxias -‘Ms. Confusing’ with a species complex
- Bluegill bully –‘Baby Blue’

……..and more

Torrentfish *(Cheimarrichthys fosteri)*

Photo credit : Stephen Moore

- Prefers riffles (strong flowing broken water)
- Larvae are washed to sea. Juveniles return upstream in spring

- Closely related to Blue Cod
- Strong pelvic fins and flatten form help the fish to stay pinned to the riverbed

'At Risk – Declining' (Goodman et al. 2014)

Tuna – longfin eel (*Anguilla dieffenbachii*)

- Females can grow up to 2m and live up to 80+ years – large size now very rare
- Need to migrate to sea to spawn at the end of their life
- Very important mahinga kai species
- Fished commercially

Art credit: Lemurkat

'At Risk – Declining' (Goodman et al. 2014)

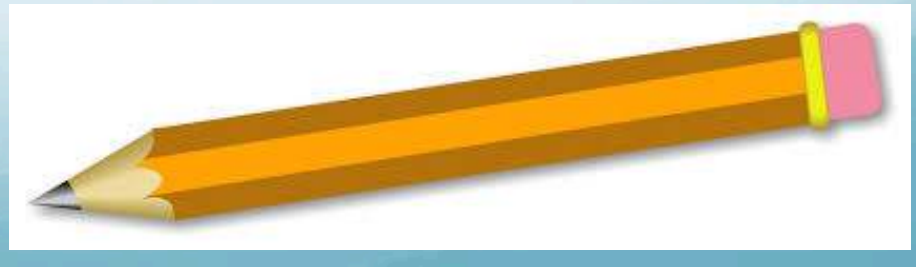
Alpine Galaxias (*G. paucispondylus*)

- From the galaxiid family – our largest freshwater family
- 'Pencil' galaxias – shape helps them burrow deep and avoid extreme changes in flow
- Often greyish colour due to 'glacial flour' camouflage
- Stable springs are better habitat than braided riffles

Photo credit: Bob McDowall

'At Risk – Naturally uncommon'

(Goodman et al 2014)



Lowland Longjaw Galaxias

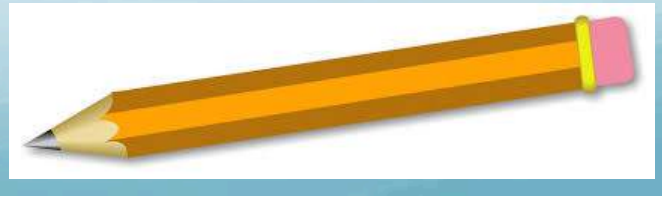
(*G. cobitinis*)

- Only a few sites – Kauru River, and upper Waitaki.
- Also a 'pencil' galaxias – shape helps them burrow deep during low flows and floods
- Was an intended Working Waters Trust translocation project with DOC
- Stable springs are better habitat than braided riffles

Art credit: DOC

'Nationally Critical'

(Goodman et al 2014)



Canterbury Galaxias *(G. vulgaris)*

- *Galaxias vulgaris* 'species complex' – is complex! There are a handful of un-described species- However in Canterbury it's mostly *G. vulgaris* Stokell
- Non-migratory (not whitebait)
- Easily confused with Koaro

Source: NZFFD

Photo Credit: Rod Morris

'At-Risk – Declining' (Goodman et al. 2014)

Bluegill Bully *(Gobiomorphus hubbsi)*

- Beautiful distinctive blue gill cover
- Tiny size – adults commonly only up to 70mm
- Migratory – larvae carried out to sea

Photo credit: Angus McIntosh

Plus many more species..... such as Bignose Galaxias, Koaro, Upland bully

'At-Risk – Declining' (Goodman et al. 2014)

Along came Europeans…

A very short history of what happened next

Story of Braided River

- Brown Trout were introduced, followed by salmon in the 19th century. They adapted quickly to a diet of native fish and invertebrates.
- The bed of the river has been greatly constricted from spreading out by flood protection works and stopbanks
- Farming and urbanisation upstream has increased the level of nutrients and environmental pollutants
- In the 1960's hydropower stations were build in the lower reaches without any allowance for fish passage. This regulated flows, created lakes and removed fast-flowing habitat
- Water is abstracted for irrigation
- Gravel is extracted regularly
- Didymo was accidentally introduced and blooms regularly

Devastating effect of salmonids

- Galaxiid family particularly susceptible. Large trout (150mm +) will eat adult galaxiids- McIntosh 2010
- Salmonids also eat galaxiid larvae, creating population 'sinks' where recruitment from outside the area is required to sustain a population.
- Brown trout have caused local extinctions of Galaxias species. Galaxiid populations have been retained above trout barriers like waterfalls. Some artificial barriers now in place- but need many more.
- Life history is a strong factor whether Galaxiid species can co-habit the waterway with salmonids. E.g. Canterbury galaxias can co-occur with salmonids due to their 'fast' life-history traits (e.g. high fecundity, small eggs) Jones and Closs 2015
- Not just predation, but also competition for invertebrate food. McDowall 2003

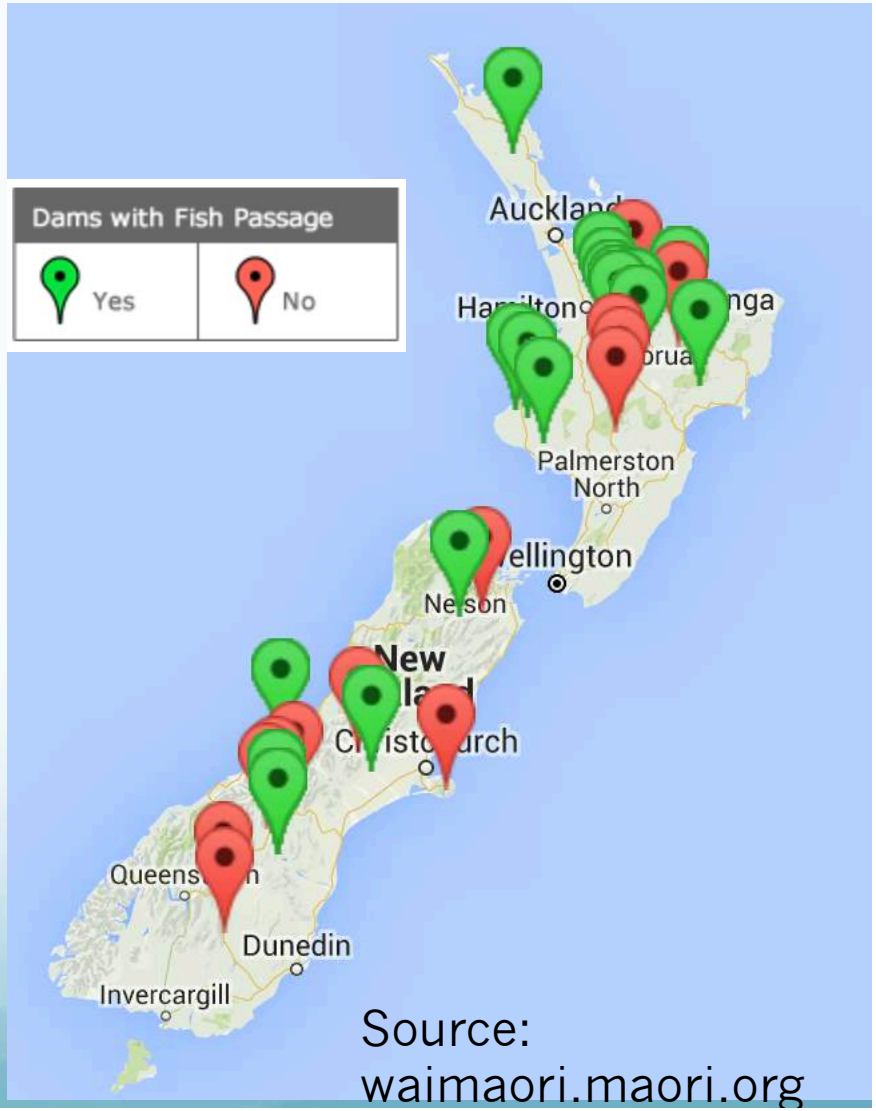
Damming

- Many of our native fish need to migrate to sea for their lifecycle to complete – so damming removes upstream habitat

- Not all dams have fish passage requirements as part of their resource consents (e.g. trap and transfer programmes or fish passes on the dam)

- Often leads to altered flows

Caution with modifying existing small dams and weirs in headwaters – might be protecting non-migratory galaxiid species



Source: waimaori.maori.org

Abstraction & Regulated flows

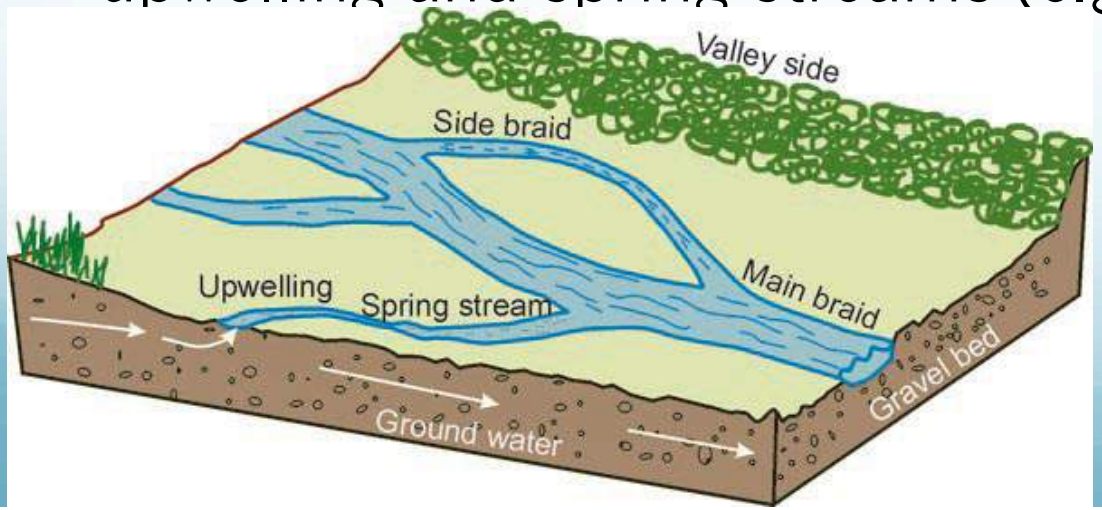
- No 'One-Flow-Fits-All' for native fish – some prefer lower levels, some higher. Jowett and Richardson 1998
- Floods: Lower biomass of large trout in high bed disturbance areas of upper Waimakariri (i.e. with more flooding). Hypothesis of less predation and competition for galaxiids. McIntosh 2000
- Low flows: Restrict habitat, high temperatures, low oxygen .....but may also benefit galaxiid species: Brown trout were prevented from eliminating galaxiid populations from sites in a low gradient part of the Manuherikia River where there is a high level of water abstraction. Leprieur et al. 2006

Flood control works

- Works constrict and channelise the main active stem. Cuts off a river from its floodplain – usually less habitat heterogeneity (e.g. side braids, wetlands and springs.)
  Young et al. 2004

➔less refuge for native fish from salmonids

- But flood control works can also create important upwelling and spring streams (e.g. lower Selwyn River)



Graphic source ; NIWA

Farming, industry…..declining water quality

- Increase in nitrate leaching from farming. Some nitrate toxicity effects on native fish in braided rivers (particularly for the invertebrates they eat), but worse for lowland streams and springs.
- Environmental pollutants e.g. heavy metals, PCBs less in braided rivers than in lowland lagoons, estuaries etc. Native fish not affected significantly in braided rivers

Gravel Extraction

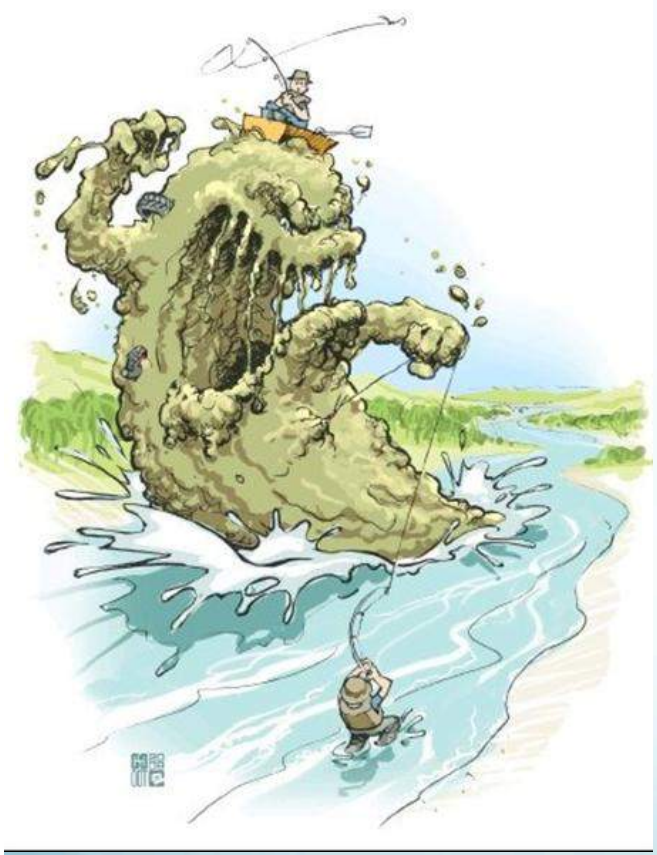
- Does destroy habitat and possibly spawning for native fish. Not as significant as for birds
- Lowland Longjaw galaxias shown to have restricted burrowing ability (to access drought refuges)- gravel extraction created less interstitial space as larger particles were removed. Dunn and O'Brien 2006

"Farmer, XX, said gravel build-up and erosion has been an issue for farmers on the river for the last five-seven years and the regional council has now come on board with what is hoped to be a 'common sense approach'. Mr XX said some gravel consents have been issued to appropriate businesses.

Oamaru Mail, 2014

Kauru River (North Otago)

Didymo



Source: Otago Daily Times

- GIS modelling predicted negative effects for benthic non-migratory species with limited distribution (e.g. longjaw galaxiids). Due to predicted decrease in invertebrate food source.

HOWEVER Small sample on the Oreti River found more galaxiids where there was a moderate Didymo bloom. Larned et. al. 2007

The near future: Climate Change as a stressor

- Climate change will effect flow regimes, bed disturbance, water temperature– but very complex interactions. What will happen to our native fish?
- Native fish are quite resilient to floods, low flows and temperature changes

But what will be the effect on the fish's invertebrate food species?

Protecting our 'Braidy Bunch'

- Improve legislation e.g. for Water Conservation Orders – make them easier to get and harder to remove. Give threat status classifications some legal backing
- Better management of freshwater fisheries (MPI for eels, DOC for whitebait)
- Managing irrigation takes, maintaining ecological flows, gravel extraction restrictions in some circumstances
- Biosecurity- best method is to prevent introductions of fish, algae or invertebrates. Clean Check Dry!
- Installation of trout barriers in braided river headwaters – e..g the planned barrier at Corbies Creek (Upper Waitaki) for Lowland Longjaw galaxias.
- Submit on Plan Changes to Land and Water Regional Plan
- MfE's National Policy Statement for Freshwater Management (under review in 2016) –Could have a fish indicator as a measure of waterway health, but would be expensive to implement

Or donate to charities such as BRaid and Working Waters Trust to advocate on your behalf

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THANK YOU