Fish passage 101

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Why are freshwater fish important?

- Recreational
- Commercial
- Customary
- Ecological
- Conservation






Who are our freshwater fish?

- Native fish



- Sport fish

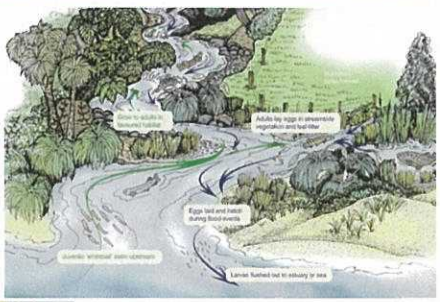

- Pest fish







- ⅔ native fish are migratory



- Remaining resident





- Landlocked populations



Our native fish

- Lamprey
- Eels
- Smelts
- Galaxiidae (Galaxias, kokopu, whitebait, mudfishes)
- Torrentfish
- Bullies
- Flounders

67% of native fish threatened or at risk in NZ
No legal protection

Lamprey, Eels, Flounder

Black Flounder

Whitebait

Inanga

Banded Kokopu

Giant Kokopu

Koaro

Shortjaw kokopu

Smelt

The whitebait that don't go to sea…residents

Canterbury Galaxias

Lowland Longjaw Galaxias

Dwarf galaxias

Brown mudfish

Canterbury mudfish

Bullies & Torrentfish

Common bully

Giant bully

Bluegill bully

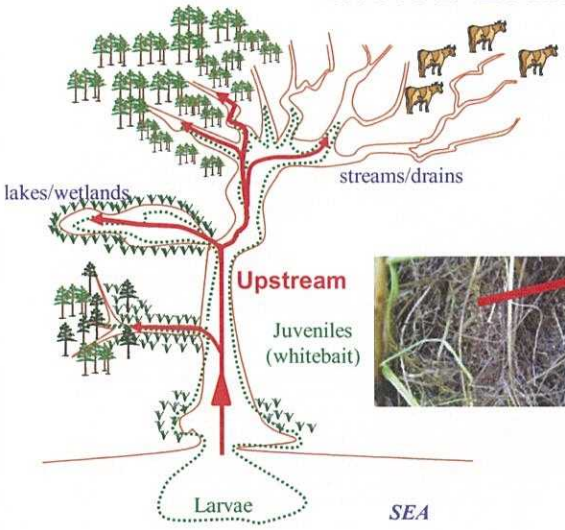
Redfin bully

Upland bully

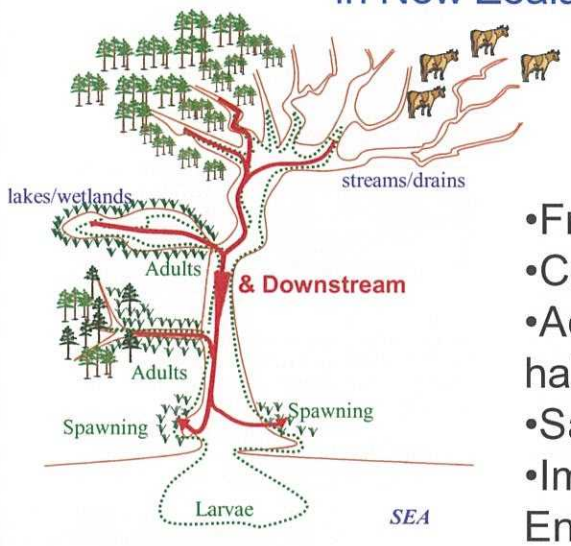
Tarndale bully

Cran's bully

Why is fish passage important in New Zealand

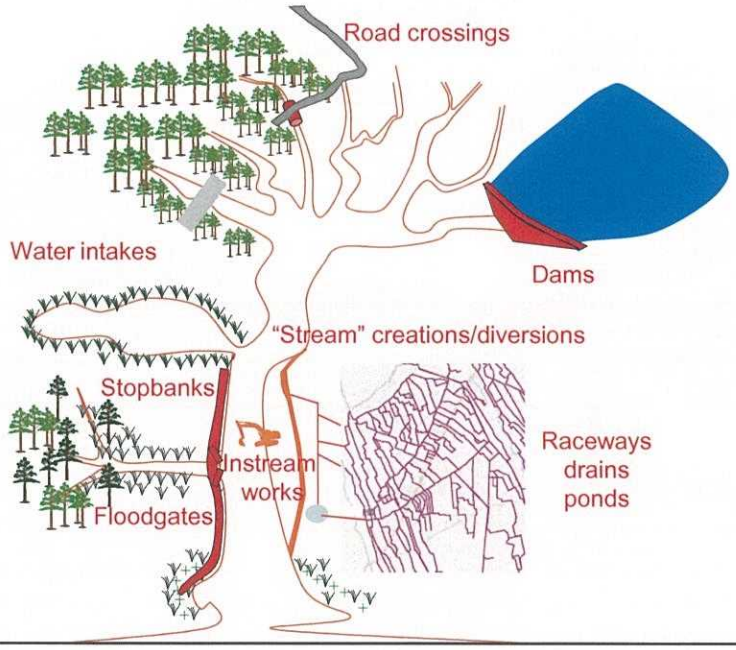


Why is fish passage important in New Zealand



- Free passage
- Connectivity
- Access to suitable habitat
- Safe areas
- Impingement/ Entrainment

We've changed our rivers…



Statutory obligations

- Freshwater Fisheries Regulations 1983
- Resource Management Act 1991
- Regional & District policies, plans and rules
- ? Future – FW RMA reforms, NOF

Activity	DOC	Other	Legislation
Allow for fish passage	√	RCs	r.41 & r.42 FFR s.14 RMA
Fish facility - allow fish and water to pass and associated management functions	√		r.43-50 FFR

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Freshwater Fisheries Regulations 1983

Part VI (Regulations 41-50)

- **Culverts & fords** may not be built in such a way as to impede fish passage, without a permit from the DG.

- The DG may require that **any dam or diversion structure has a fish facility** (fish pass, fish screen or similar) included & set conditions on their design and performance.

*Apply to all defined structures built after 1 January 1984

DOC Plans

- Agreed protocol
- National fish passage project established 2013
  - Develop application form and assessment process
  - Ensure DOC standards allow for fish passage
  - Collate best practice and guidance
  - Establish prioritisation process

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To understand what makes a barrier we need to understand the fish…

- Distribution
  - Available habitat
  - Recruitment potential
- Habitat preferences
- Migration & Spawning timing
- Swimming ability
  - Climbers
  - Jumpers
  - Swimmers
- Behaviour
  - Access provision
- Size

NIWA's experimental ramps to test fish swimming abilities (source NIWA)

Fish physiology, behaviour, size, life-history

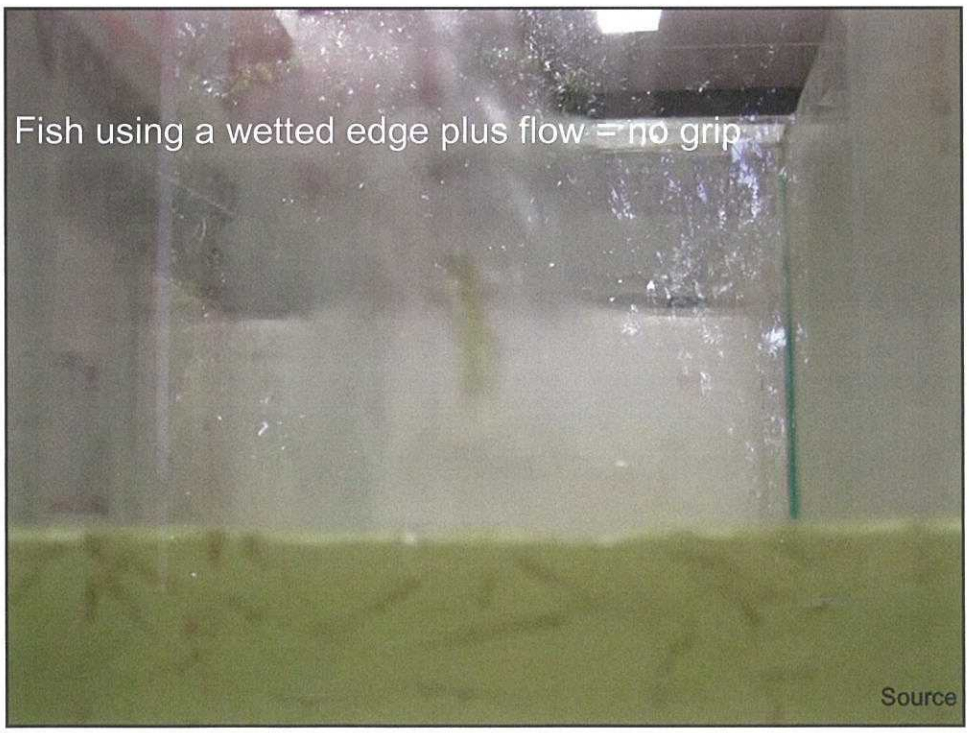
Climbers

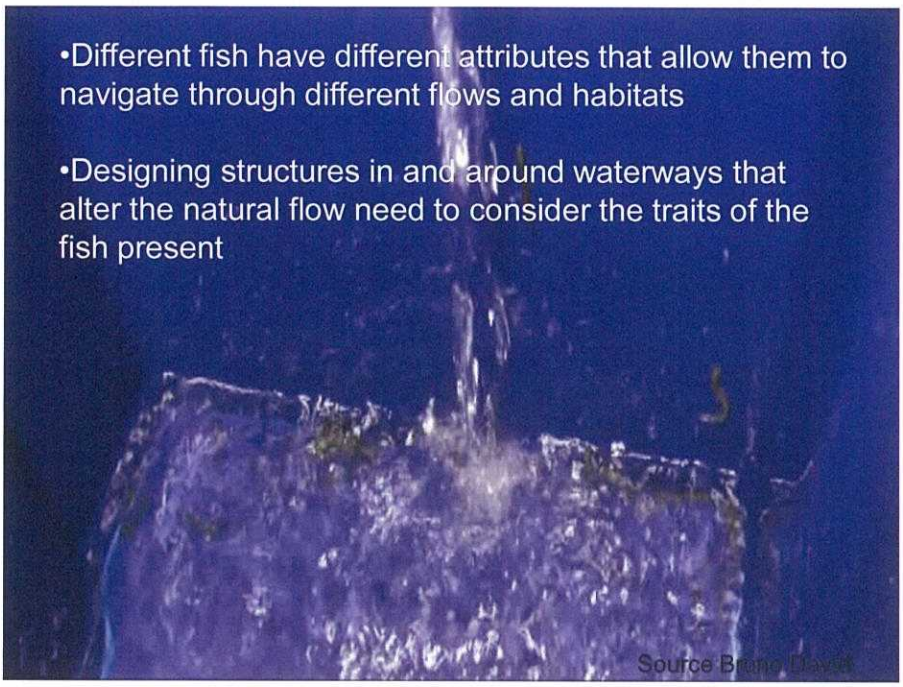
Jumpers

Swimmers

+ combination

- Varying styles & abilities,
- Vary with life stage





Barriers to fish passage

- **Unintentional barriers**
  - Man-made structures e.g. culverts, dams, weirs, fords…..
  - Natural waterfalls or cascades
- **Intentional barriers**
  - Built barriers
  - Water intake structure and design

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Unintentional barriers

- Road crossings, Culverts, Weirs, Fords




- Dams


- Floodgates

- Natural barriers

Sometimes barriers are protecting native fish that can not compete with others e.g. Trout..... best not to fix

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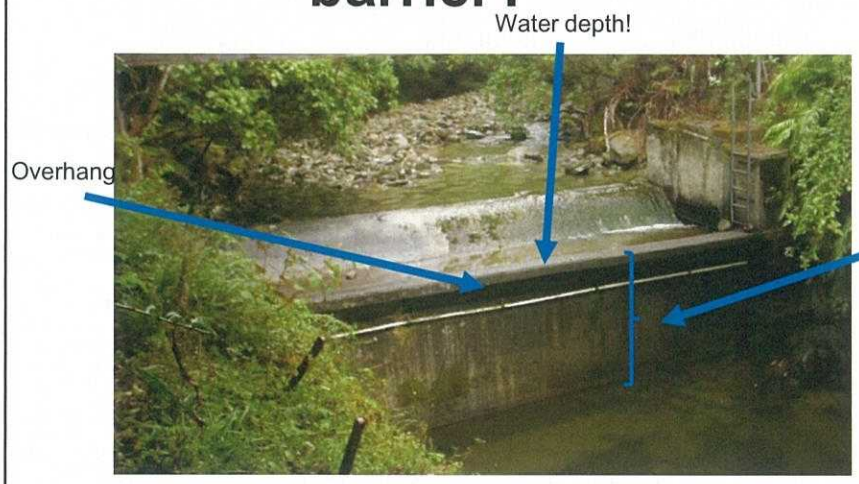
Natural barriers

Swimburn waterfall protecting Central Otago Roundhead galaxias from brown trout

Hakataramea waterfall protecting native fish upstream from brook char downstream

What makes a migration barrier?



Weir/intake structure

NIWA
Taihoro Nukurangi

What makes a migration barrier?

Tide/flood gate

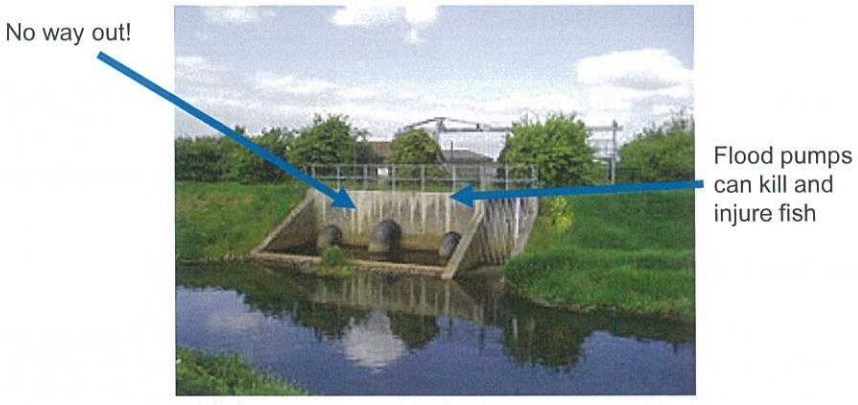
NIWA
Taihoro Nukurangi

What makes a migration barrier?

NIWA Taihoro Nukurangi

What makes a migration barrier?

Flood pumping station



NIWA Taihoro Nukurangi

What makes a migration barrier?

Water intake

Need to ensure their is a way out & it's connected

Fish can get impinged & entrained

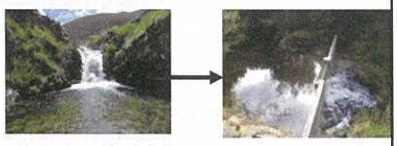
Fish can get entrained into take area and then no where to go

NIWA
Taihoro Nukurangi

Intentional Barriers

Built barriers

- Barriers that are installed to protect native fisheries or other values
- Natural Barriers altered to ensure protection



Water intakes

Built to try & prevent entrainment & impingement as fish that get into water intakes often have no way out

What makes a migration barrier?

Built Barrier

Fall and Head maximised

Overhanging structure prevent climbers for some

Water levels can be managed

Pool creation downstream prevented

What makes a migration barrier?

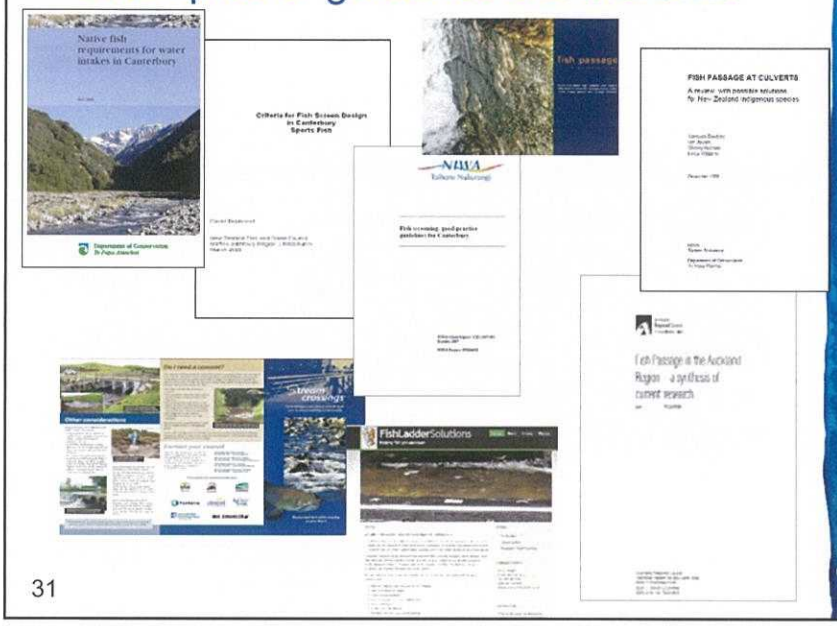
Water intake

Need to ensure their is a way out & it's connected

Fish can get impinged & entrained

Fish can get entrained into take area and then no where to go

Examples of guidance out there…..



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Key considerations

- Best to design structures to allow for fish passage, than try and retrofit later
- Understand the fish
- One fish pass or barrier does not fit all
- Monitoring and maintenance is critical
- At a few key locations and water intakes; barriers are a good thing

Acknowledgements

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•Irrigation NZ, ECan and Fish & Game Water Intake/Screening group

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