New Zealand **Fish Passage** Advisory Group

advisorygroup@fishpassagenz.org • doc.govt.nz/fishpassage

Improving fish passage guidance & management in NZ

Herb Familton

Sjaan Bowie

NZPI Friday 5th April

Department of Conservation / NZ Fish Passage Advisory Group

New Zealand Fish Passage Advisory Group

Group of ecologists, engineers and environmental advisors representing various groups involved in fish passage management in New Zealand.

Outline

- **What is fish passage**
- **Why do we want fish passage**
- **New resources and programmes**
  - database, protocol and application
  - national guidelines
  - water Intakes
- **What can planners do?**

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What is fish passage & why should we manage it?

Our freshwater species need help

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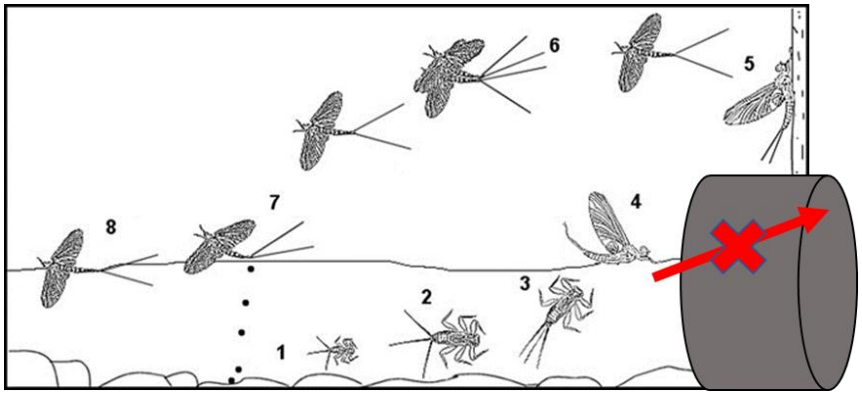
54 native fish (72% threatened/at risk)

21 exotic species

644 freshwater invertebrates (25% threatened)



Different species & places

Source: NIWA

Swimmers

Inanga, smelt, grey mullet and common bullies.

Climbers

Lamprey, elvers (juvenile eels), juvenile kōkopu and kōaro. Juvenile and adult redfin bullies and, to a limited extent, torrentfish.

Anguilliforms

Shortfin and longfin eels

Jumpers

Trout and salmon.

Migration Patterns

Sports fish

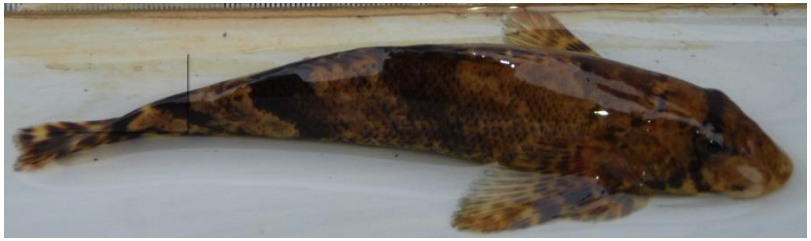
Chinook salmon, brown & rainbow trout

Juveniles & post spawning fish

Migration of spawning adults

Native fish

Migrating juveniles

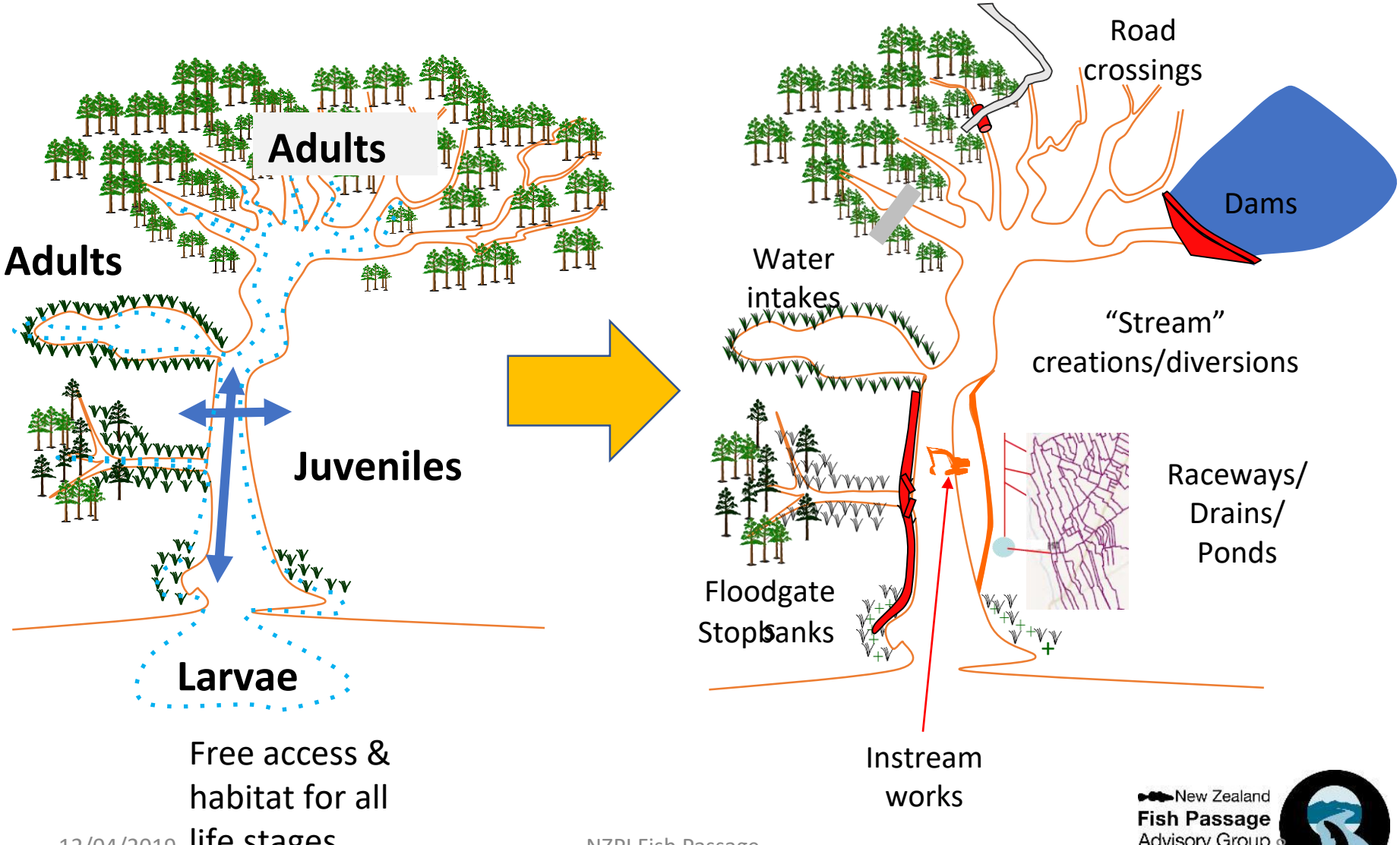


Migrating larvae

Migrating juveniles

Threatened resident larvae & juveniles

Why is connectivity important?



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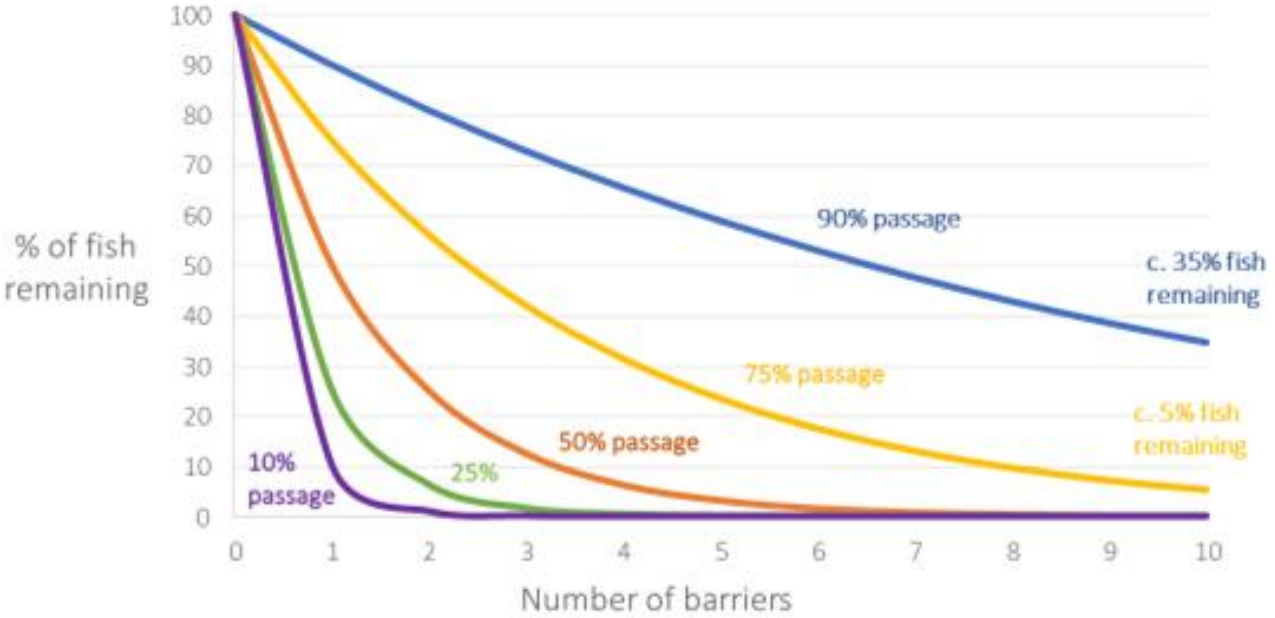
Why is connectivity important?

- Can delay or prevent movements
- Reduces abundance & diversity of species

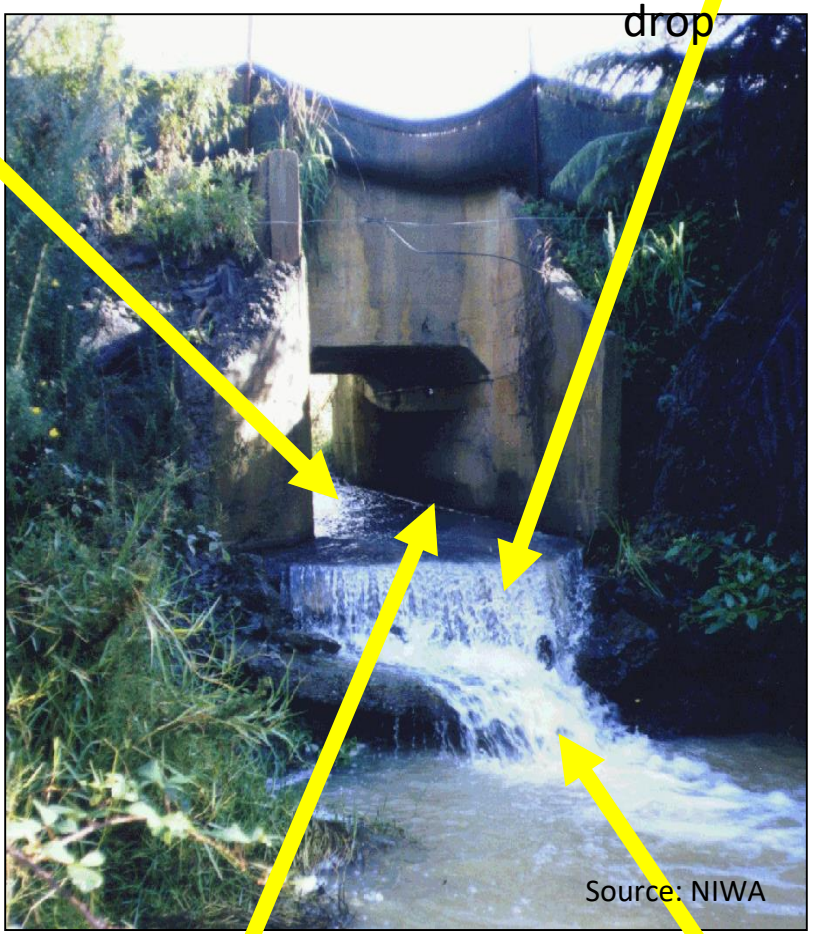
Source: Bruno David



Source: NIWA

What makes a fish migration barrier?

What makes a fish migration barrier?



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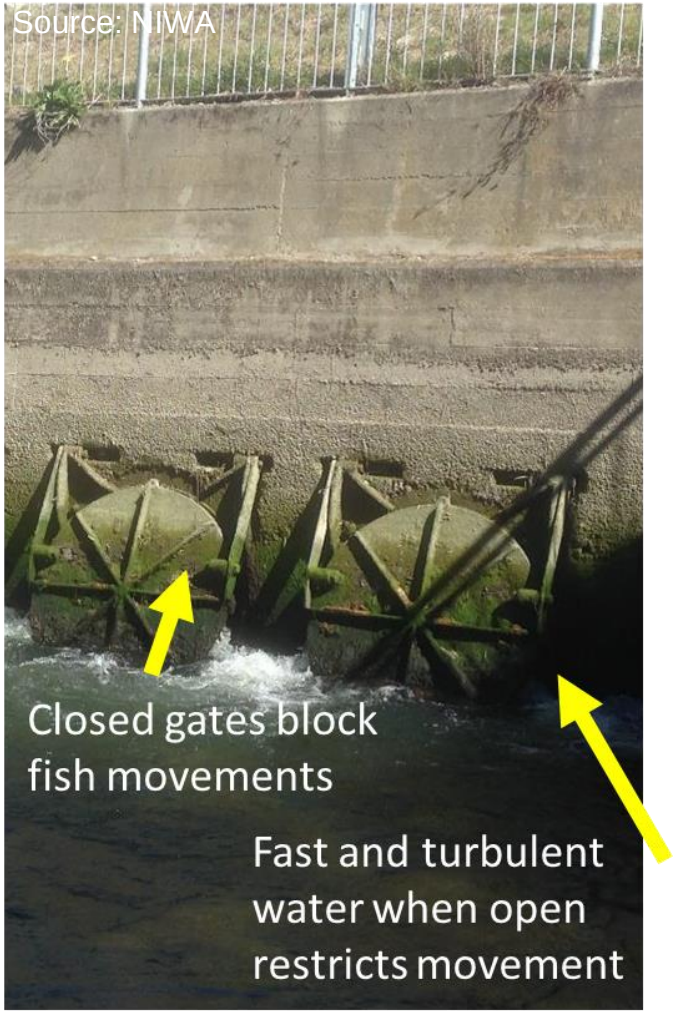
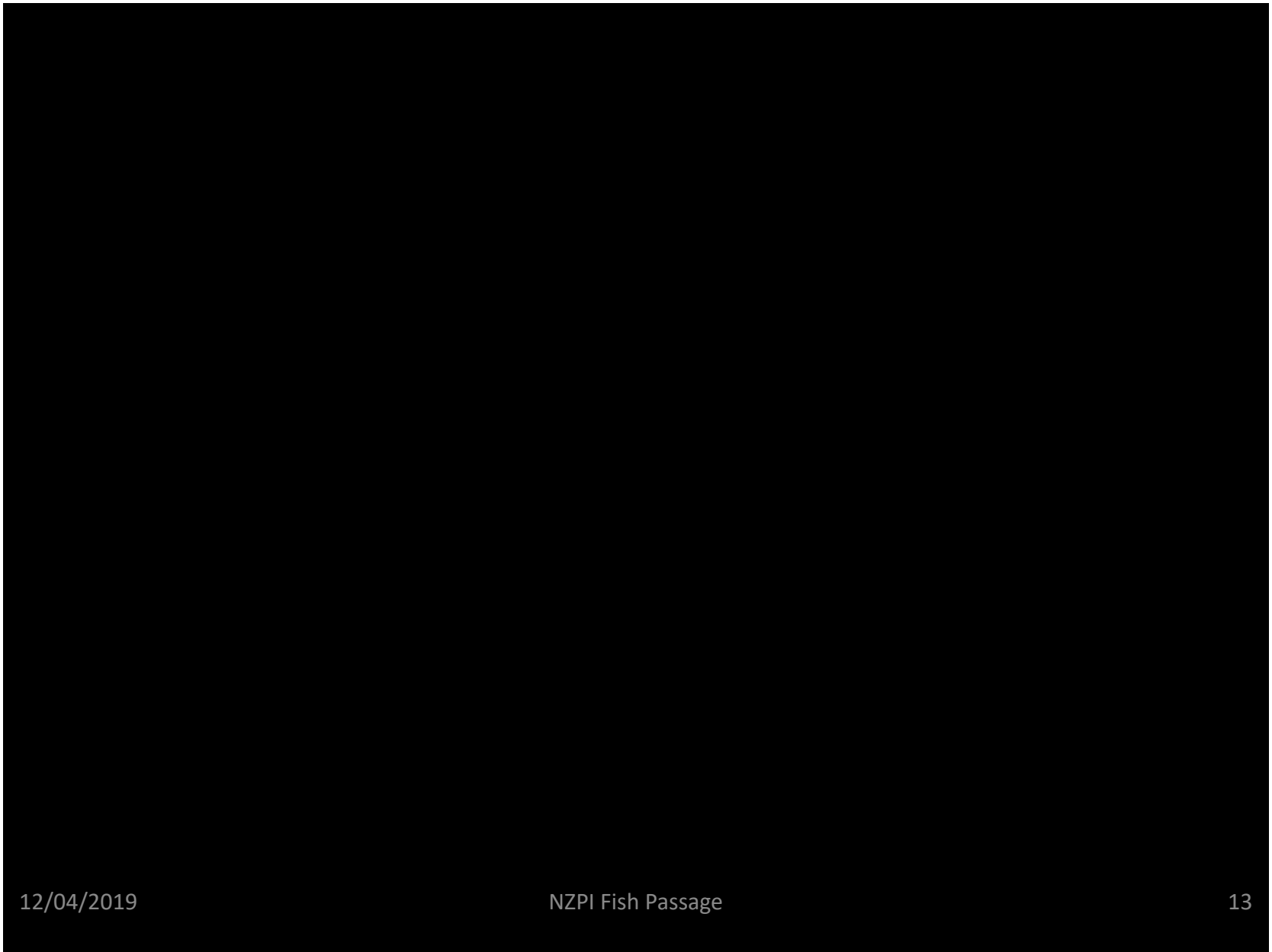
What makes a fish migration barrier? – Cont'd



- Loss of tidal variability in upstream habitats
- Alterations in water depth, velocity, substrate type & water quality

Why is connectivity important?



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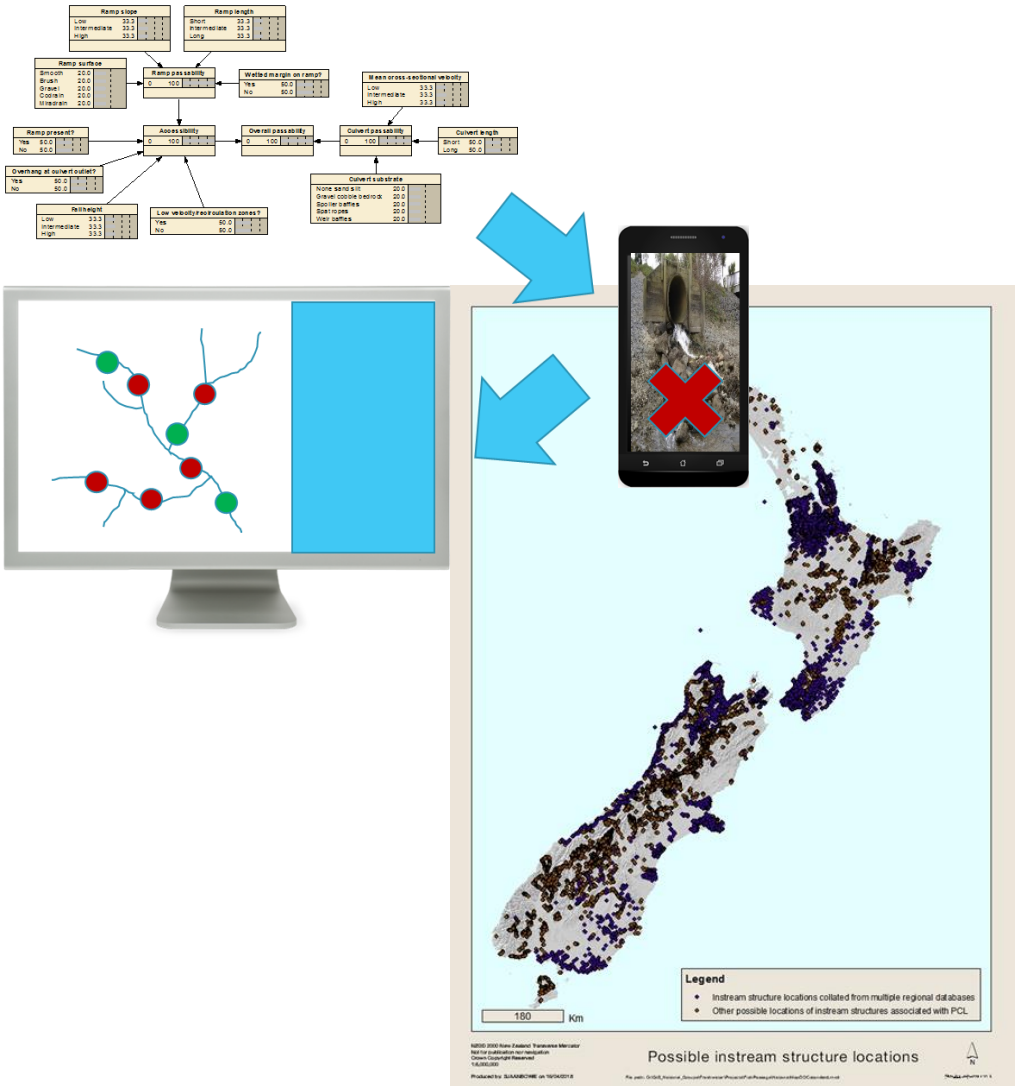
NIWA
Taihoro Nukurangi

New instream structure database, assessment protocol, and application

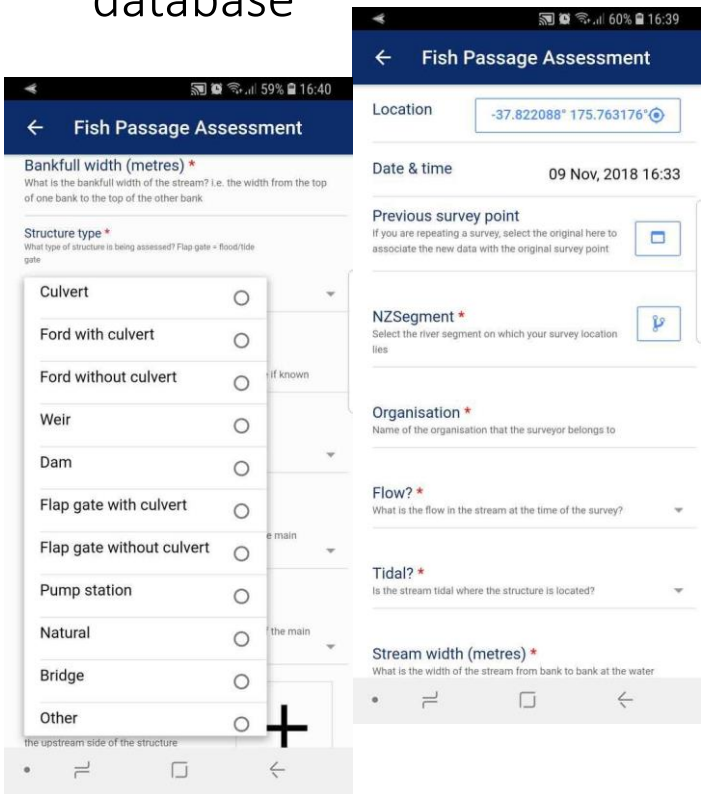
Envirolink Project

- Nationally consistent protocol
- Mobile app
- National database
- Fish passage barrier web interface
- Collates all regional databases



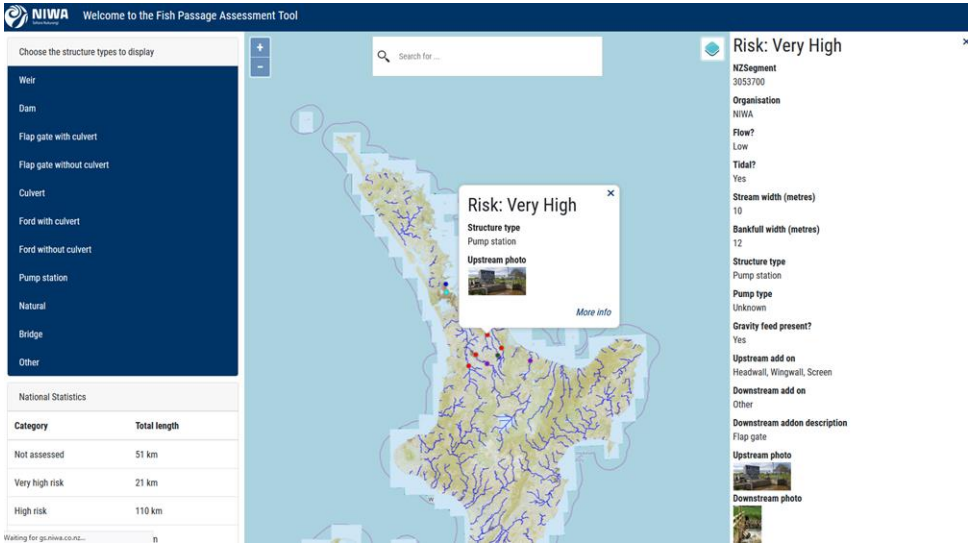
App/Assessment tool

- Standardized method for recording & assessing
- Android / Apple versions
- Works for multiple structure types
- Links automatically to national database



Webpage

- View & download data
- Determines risk to fish passage
- Calculates national statistics & prioritization scores for each structure



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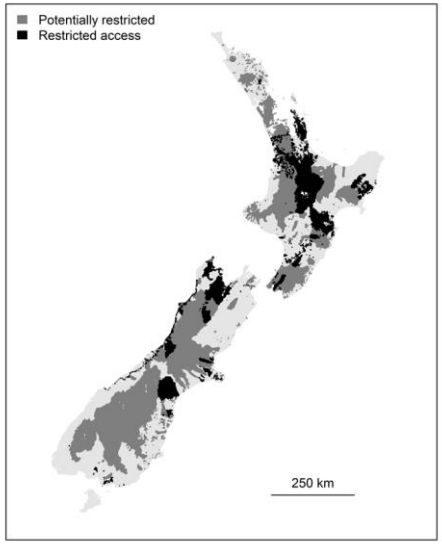
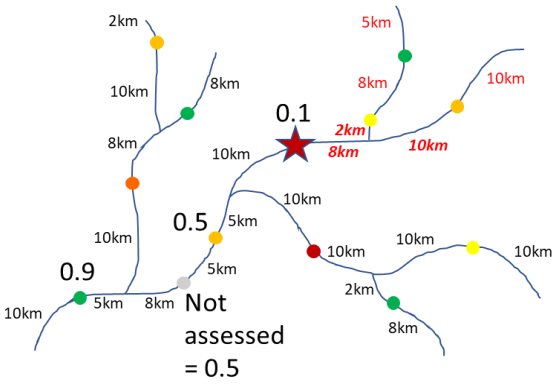
Outputs



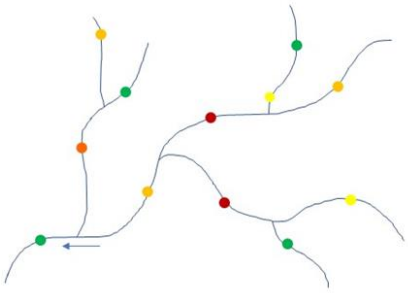
Total stream length = 174 km



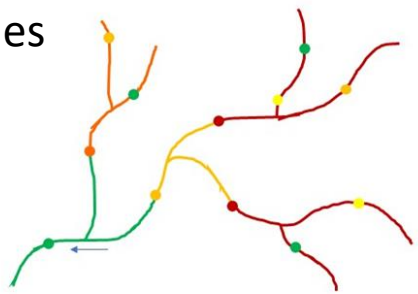
Risk scores

- Barrier score
- Downstream connectivity score
- Catchment position score
- Upstream habitat quantity score

Prioritization

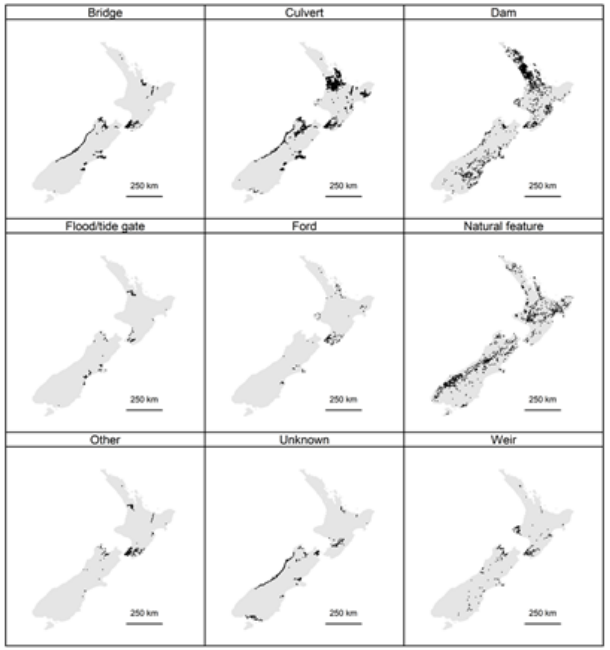


- Structures
- River reaches



Mapping

Environmental reporting



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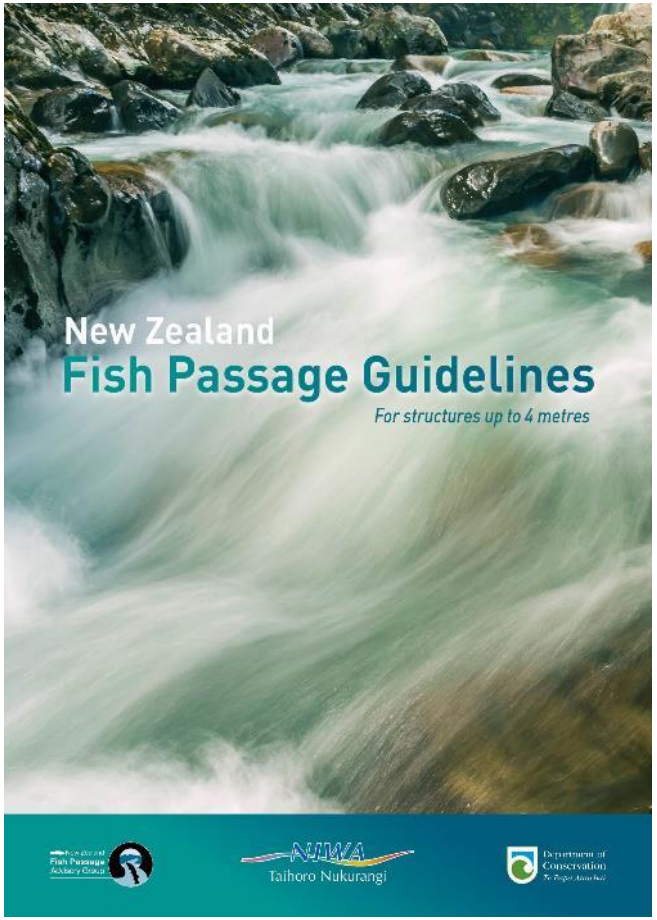
National Guidelines

Opportunity for consistency in fish passage management:

- Promote best practice
- Ensure minimum standards
- Inform legislative compliance
- Promote formal adoption

Scope

- Structures ≤4 m high
- Rationale & legal basis
- Summary of current knowledge
- Minimum design standards & best practice
- Monitoring
- Limitations of current knowledge & research gaps



Specific fish passage responsibilities

DOC Freshwater Fisheries Regulations (1983)	No conflict	Councils Resource Management Act (1991)
Caselaw: (Auckland Regional Council: re an Application EC A33/2002)		
"No culvert or ford should impede fish passage without approval"		S 13 – Restrictions on **works in a bed of lakes and rivers**, unless allowed for in NES or regional plan
"... that any proposed or dam or diversion structure built post 1983 may require a fish facility"		S 14 – Restrictions relating to **water (take, use, dam, or divert water)**, unless allowed for in NES or regional plan
"...Fish facility maintenance... approval required for structural change"		S 17 – Duty to avoid, remedy, or mitigate adverse effects

+ Other statutory requirements:

- **Design integrity**
- **Land Status**
- **Protection of species & habitat**
- **Fish salvage/translocations**

Regional Plan requirements (rules, polices)
NPS, NES

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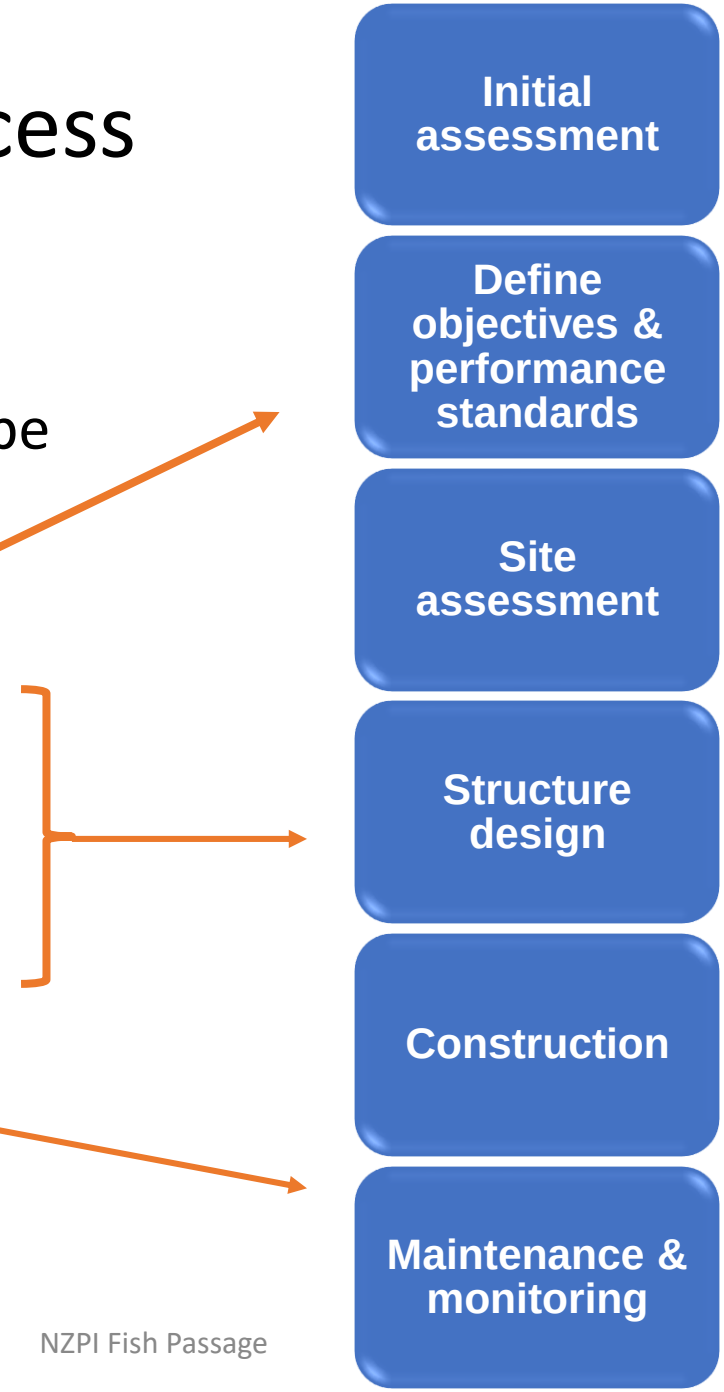
Key chapters \ Process

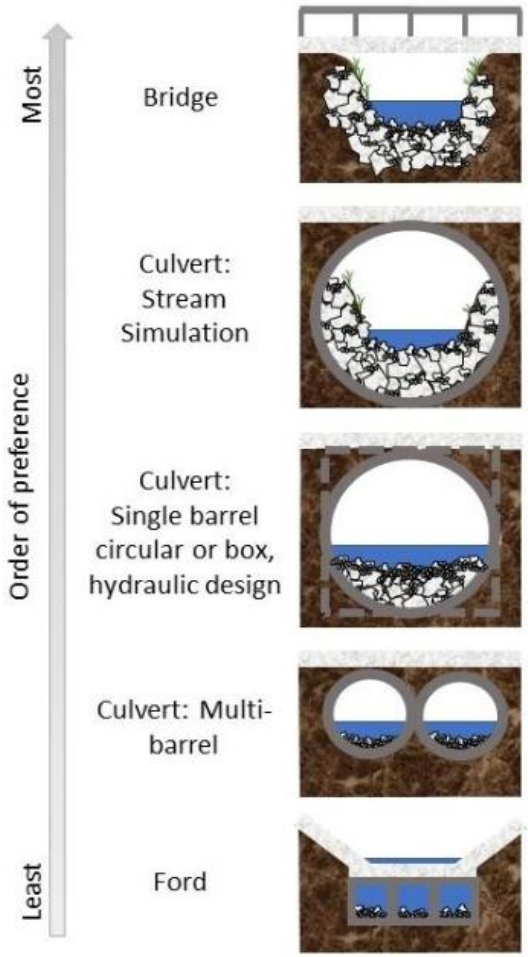
1. Introduction
2. Why should fish passage be considered?
3. Planning & design considerations
4. New instream structures
5. Remediation of existing instream structures
6. Built barriers
7. Monitoring
8. Knowledge gaps & Research needs



New Structures – General principles

Source: NIWA

New structures



Appendix G Minimum design standards for fish passage at instream structures

1. Minimum design standards for fish passage will achieve:
   a. Efficient and safe passage of all aquatic organisms and life stages with minimal delay, except where specific provisions are required to limit the movement of undesirable exotic species.
   b. A diversity of physical and hydraulic conditions leading to a high diversity of passage opportunities for aquatic organisms.
   c. A structure that will provide no greater impediment to fish movements than adjacent stream reaches.
   d. Structures that have minimal maintenance requirements and are durable.
2. Culverts installed in freshwater bodies will meet the following minimum design standards for fish passage[14]:
   a. Alteration of natural stream channel alignment will be avoided or minimized.
   b. Alteration of natural stream gradient will be avoided or minimized.

Planners could use this Appendix to consider as a Schedule in Regional Plans

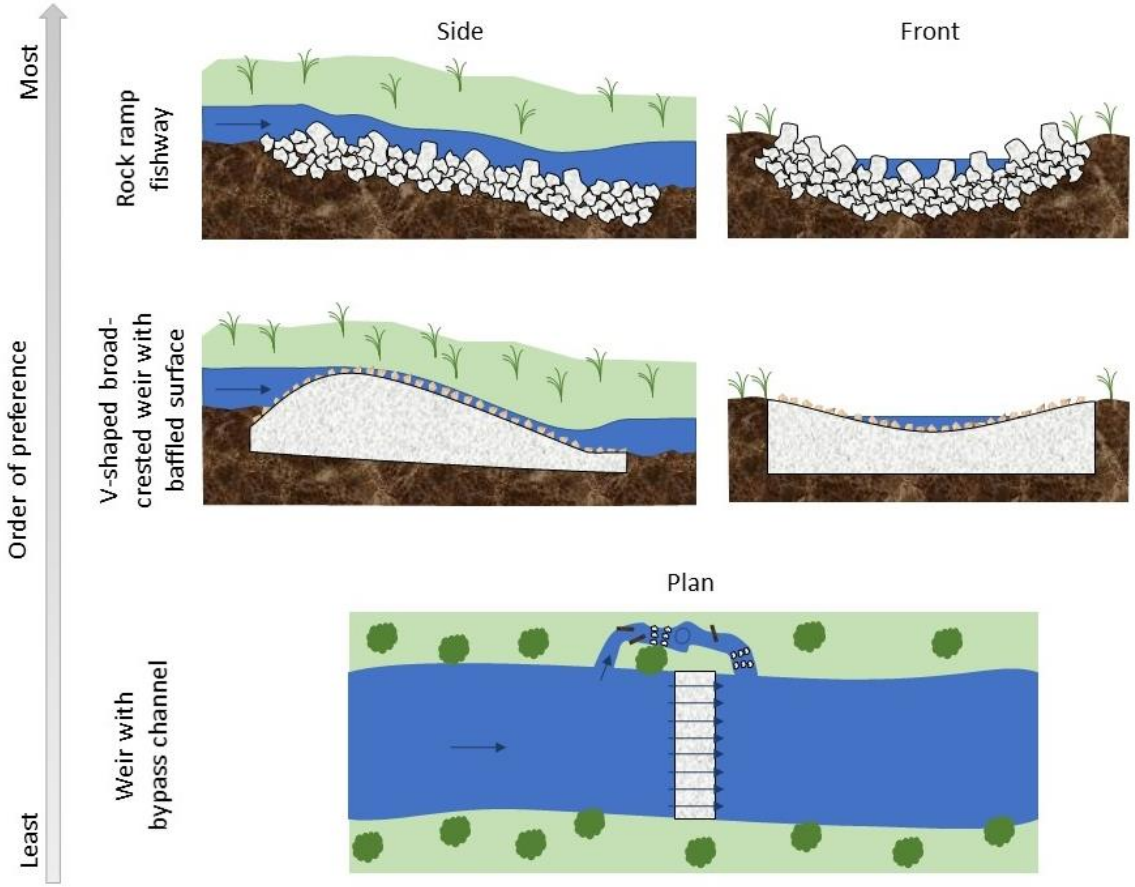
Minimum standards vs best practice

Culverts – hydraulic approach

- Low & high fish passage design flows should be defined
- Alteration of natural channel alignment & gradient should be avoided/minimised

Min. water depth - 150 mm for native fish passage,
or 250 mm where adult salmonid
or mean cross-sectional depth

Weirs - Head control structures



Existing barriers – Remediation (Chapter 5) - Built barriers (Chapter 6)

Source: NIWA

OPTIONS:

- **Removal** should be first option & will ALWAYS have best result
- **Replacement** with fish friendlier design
- **Retrofit** existing structure to improve connectivity
- **Retain or build barriers** to protect fish biodiversity

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Retaining / building barriers (Chapter 6)

Providing unimpeded passage is advantageous for most situations

BUT…….

SOME native fish, other instream species and freshwater habitats cant compete with some invasive species in SOME locations (predominately South Island)

Source; Richard Allibone

In key spots, barriers help

- to impede prevent the movement of unwanted fish species
- Successful in NZ and internationally

Barriers needed to be built in some of our key threatened non-migratory galaxiid fish habitats

Source: DOC

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(P. 76)

Common problems	Possible fixes							
	Removal	Replacement	Backwatering	Ramp fishway	Baffles	Mussel spat ropes	Bypass structure	Fish friendly flap gate
Excessive fall height	✓	✓	✓	✓		?	✓	
High water velocities	✓	✓	✓		✓	✓	?	
Insufficient water depth	✓	✓	✓		✓		?	
Physical blockage	✓	✓		✓			✓	✓

- **Novel solutions = robust monitoring if being proposed.**
- **Use approved methods in guidelines**




Water Intakes

- Consent by consent basis
- Limited best practice/ guidance




What is the problem?

- Deterioration or loss of habitat

- Diversion into unscreened or poorly screened intakes (entrainment)

- Physical damage on poorly operating screens (impingement)

Limited NZ research

59% of juvenile Trout lost in takes to irrigation races off Lindis River, Otago due to no screening (NIWA)

ECan Best Practise working party

2005 - 2007

Environment Canterbury convened a group

Fish & Game NEW ZEALAND · Environment Canterbury Regional Council Kaunihera Taiao ki Waitaha · IRRIGATION NEW ZEALAND · Department of Conservation Te Papa Atawhai

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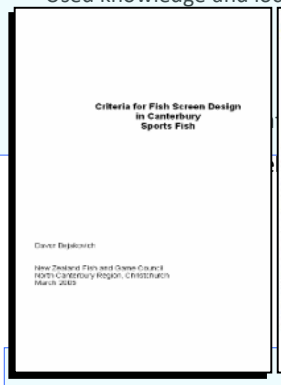
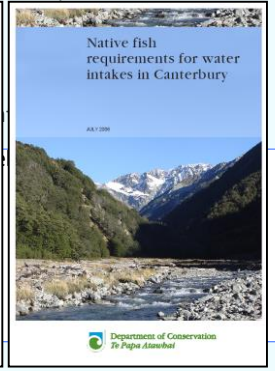
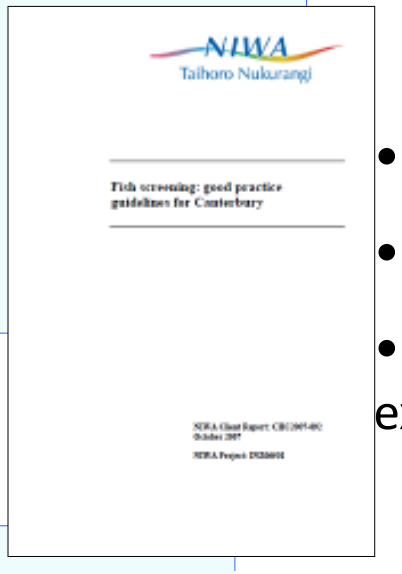
Used knowledge and local experience







- Review
- 7 criteria
- Good practice examples

2008

- **Public meetings**

NIWA Taihoro Nukurangi

Findings from field investigations of six fish screens at irrigation intakes

Prepared for Irrigation NZ

May 2014

2010-now

Trials – 6 sites

- No water intake meets all 7 criteria
- Pre-fish intake and bypass
- Release fish (salmon and trout)

The Criteria

Schedule 2 – Water & Land Plan (ECAN)

- As close as practical to, the point of take / diversion (Location)
- Approach velocity (<= 0.12 ms^{-1})
- Sweep velocity (>0.5 ms^{-1}).
- Escape route (bypass) to return undamaged into flowing water (connectivity).
- Maximum screen opening of 2-3 mm
- Maintenance / operation (monitoring)

Jamieson, D., Bonnett, M, Jellyman, D & Unwin, M. 2007: Fish screening: good practice guidelines for Canterbury. NIWA Client Report CHC2007-092

2017 – ECan Fish Screens Working Group reconvened

Focus – improving knowledge, practices and guidance that is applicable nationally & could be formally adopted

Membership – representation:

Chair – Ross Millichamp (CWMS Regional Committee)

ECAN, Fish & Game, DOC, Irrigation NZ, RDR (Fish screen operator), Riley Consulting (Engineers), Ngai Tahu, ORC, NIWA, MfE, Paul Hodgson

Action Plan

- Standardized Consent conditions
- Compliance monitoring checklist
- Assessment/review of existing fish screen/water intake consents
- Good practice fish screen installation information
- Addressing research gaps (focus native fish)
- Collate best practice developed
- Australian international collaboration

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The New Zealand National Fish Passage Guidelines

What can planners do?

Current Situation

- Scope of the issue
- Nationally variable provision and compliance
- Retrofit and removal tension
- Economic vs Environment cost
- Societal expectations

Planner key role…

- Promote / adopt awareness and consistency in regional plans policies and consenting
- Technical basis for Policy rules and consents.
- Jameson standard conditions : fish screening
- Application guidelines for remediation: appropriate tools
- Technical basis for considering new applications
- Enabling removal of barriers and construction of barriers for management of threatened native fish
- Inventory barriers via application
- Use application and database to monitor gains in connectivity- address key barriers

Next steps

DOC: www.doc.govt.nz/fishpassage or
NIWA : www.niwa.co.nz to download

Planning Issues:

- Freshwater fish are highly effected, largely negatively by the loss of connectivity
- RMA fish passage provision needs improvement for structures and screening
- Inventory national tool provides benefits at a range of scales
- Guidelines provide technical basis for improvement in consents and plans