Examining the importance of mid-range flows on salmon migrations

Phil Jellyman

Salmon symposium, November 2017

Ashburton

NIWA
Taihoro Nukurangi

NIWA Christchurch, New Zealand
*phillip.jellyman@niwa.co.nz Ph. 03 343 8052

NIWA Science

Atmosphere

World class research, contributing to our understanding of greenhouse gases, ozone depletion, and urban air pollution.

- Our services
- Programme overview
- Research projects
- Our data
- Facilities

Climate

Information about our varying climate is critical for managing resources and reducing risks.

- Our services
- Research projects
- Information and resources
- Publications
- News

Natural Hazards

Nature can be a destructive force. Our science will prevent property damage and save lives.

- Our services
- Hazards
- Research projects
- News
- Key contacts

Environmental Information

Consistent, accurate and easily accessible data are fundamental to effective environmental science.

- Our services
- Research projects
- New Zealand from space
- Environmental Information Update
- Key contacts

Coasts and Oceans

NIWA aims to provide the knowledge needed for the sound environmental management of our marine resources.

- Our services
- Programme Overview
- Research projects
- Tools and resources
- Bathymetry

Aquaculture

NIWA has the largest team of aquaculture specialists and dedicated facilities in New Zealand.

- Our services
- Research projects
- Aquaculture species
- News
- Key contacts

Fisheries

Balancing the sustainability of our fisheries stocks and the impacts of fishing on the environment with the economic opportunities they offer is an ongoing challenge.

- Our services
- Tools & resources
- Research projects
- Programme overview
- News

Freshwater and Estuaries

We provide public information on river, lake, and groundwater conditions across New Zealand including water quantity and quality.

- Our services
- Management tools
- Research projects
- Programme overview
- News

Pacific Rim

NIWA's environmental science helps contribute to sustainable development in the Asia-Pacific region.

- Our services
- Research projects
- Publications
- News
- Key contacts

Te Kūwaha - Māori Environmental Research

Sharing knowledge with Māori communities and empowering Māori business with the latest science.

- Our services
- Research projects
- Tools and resources
- News
- Key contacts

Vessels

NIWA's vessels are world class environmental monitoring and research platforms.

- NIWA Vessels
- Key contacts
- Voyages

Antarctica

NIWA scientists have worked for many years on Antarctic atmospheric processes and aquatic ecosystems.

- About Antarctica
- Research projects
- Key contacts
- News
- Photo gallery

✉ phillip.jellyman@niwa.co.nz

NIWA Science

Atmosphere

World class research, contributing to our understanding of greenhouse gases, ozone depletion, and urban air pollution.

- Our services
- Programme overview
- Research projects
- Our data
- Facilities

Climate

Information about our varying climate is critical for managing resources and reducing risks.

- Our services
- Research projects
- Information and resources
- Publications
- News

Natural Hazards

Nature can be a destructive force. Our science will prevent property damage and save lives.

- Our services
- Hazards
- Research projects
- News
- Key contacts

Environmental Information

Consistent, accurate and easily accessible data are fundamental to effective environmental science.

- Our services
- Research projects
- New Zealand from space
- Environmental Information Update
- Key contacts

Coasts and Oceans

NIWA aims to provide the knowledge needed for the sound environmental management of our marine resources.

- Our services
- Programme Overview
- Research projects
- Tools and resources
- Bathymetry

Aquaculture

NIWA has the largest team of aquaculture specialists and dedicated facilities in New Zealand.

- Our services
- Research projects
- [illegible] species
- [illegible] contacts

Fisheries

Balancing the sustainability of our fisheries stocks and the impacts of fishing on the environment with the economic opportunities they offer is an ongoing challenge.

- Our services
- Tools & resources
- Research projects
- Programme overview
- News

Freshwater and Estuaries

We provide public information on river, lake, and groundwater conditions across New Zealand including water quantity and quality.

- Our services
- Management
- Rese
- [illegible]

Pacific Rim

NIWA's environmental science helps contribute to sustainable development in the Asia-Pacific region.

- Our services
- Research projects
- Publications
- News
- Key contacts

Te Kûwaha - Māori Environmental Research

Sharing knowledge with Māori communities and empowering Māori business with the latest science.

- Our services
- Research projects
- Tools and resources
- News
- Key contacts

Vessels

NIWA's vessels are world class environmental monitoring and research platforms.

- NIWA Vessels
- Key contacts
- Voyages

Antarctica

NIWA scientists have worked for many years on Antarctic atmospheric processes and aquatic ecosystems.

- About Antarctica
- Research projects
- Key contacts
- News
- Photo gallery

✉ phillip.jellyman@niwa.co.nz

NIWA Freshwater & Estuaries Research

Science

- Aquaculture
- Atmosphere
- Climate
- Coasts and Oceans
- Environmental Information
- Fisheries
- **Freshwater and Estuaries**
  - Our services
  - Management tools
  - Research projects
  - **Programme overview**
    - Water resources
    - Sustainable water allocation
    - Causes and effects of water quality degradation
    - Catchments to estuaries
    - Freshwater biosecurity
    - Rehabilitation and protection
  - News
  - Freshwater and Estuaries Update
  - Key contacts
- Natural Hazards
- Pacific Rim
- Te Kūwaha
- Vessels
- Antarctica
- Voyages

Freshwater and Estuaries programme overview

NIWA's Freshwater and Estuaries Centre organises its work around six research programmes. See the following pages to find out more about our research.

Water resources

New Zealanders are increasingly demanding better information on how much water is in our rivers and groundwater aquifers, how that has changed over time and how it might change in the future. This programme will increase our understanding of the hydrological cycle: the quantity of freshwater in our rivers and groundwater systems, where that water came from and how long it took to get there.

Sustainable water allocation

This programme is focussed on understanding the effects of human activity on rivers and groundwater systems to allow better predictions and inform more sustainable water allocation decisions that benefit ecosystems and communities.

Causes and effects of water quality degradation

Understanding and predicting the sources of contaminants, developing technologies to clean up the sources, and understanding the consequences of water quality degradation for aquatic ecosystems and human use of waterways.

Catchments to estuaries

Understanding and predicting the connections between catchments and estuaries to improve the management of diffuse-source contamination.

Freshwater biosecurity

This programme will improve our ability to reduce the risk of freshwater invasive species entering and establishing in New Zealand.

Rehabilitation and protection

This programme is developing techniques for protecting, enhancing and rehabilitating the biodiversity of freshwater ecosystems and the cultural value they provide.

✉ phillip.jellyman@niwa.co.nz

enhancing the benefits of New Zealand's natural resources

NIWA Taihoro Nukurangi

NIWA Freshwater & Estuaries Research

Science

- Aquaculture
- Atmosphere
- Climate
- Coasts and Oceans
- Environmental Information
- Fisheries
- **Freshwater and Estuaries**
  - Our services
  - Management tools
  - Research projects
  - **Programme overview**
    - Water resources
    - Sustainable water allocation
    - Causes and effects of water quality degradation
    - Catchments to estuaries
    - Freshwater biosecurity
    - Rehabilitation and protection
  - News
  - Freshwater and Estuaries Update
  - Key contacts
- Natural Hazards
- Pacific Rim
- Te Kūwaha
- Vessels
- Antarctica
- Voyages

Freshwater and Estuaries programme overview

NIWA's Freshwater and Estuaries Centre organises its work around six research programmes. See the following pages to find out more about our research.

Water resources

New Zealanders are increasingly demanding better information on how much water is in our rivers and groundwater aquifers, how that has changed over time and how it might change in the future. This programme will increase our understanding of the hydrological cycle: the quantity of freshwater in our rivers and groundwater systems, where that water came from and how long it took to get there.

Sustainable water allocation

This programme is focussed on understanding the effects of human activity on rivers and groundwater systems to allow better predictions and inform more sustainable water allocation decisions that benefit ecosystems and communities.

Causes and effects of water quality degradation

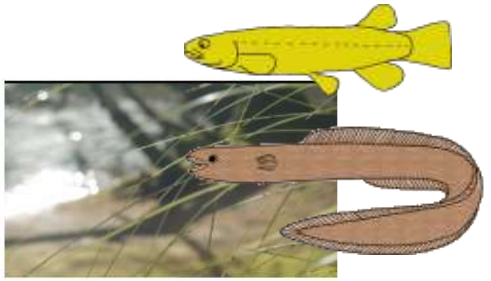
Understanding and predicting the sources of contaminants, developing technologies to clean up the sources, and understanding the consequences of water quality degradation for aquatic ecosystems and human use of waterways.

Catchments to estuaries

Understanding and predicting the connections between catchments and estuaries to improve the management of diffuse-source contamination.

Freshwater biosecurity

This programme will improve our ability to reduce the risk of freshwater invasive species entering and establishing in New Zealand.



Rehabilitation and protection

This programme is developing techniques for protecting, enhancing and rehabilitating the biodiversity of freshwater ecosystems and the cultural value they provide.

✉ phillip.jellyman@niwa.co.nz

enhancing the benefits of New Zealand's natural resources

NIWA
Taihoro Nukurangi

Balancing instream & out-of-stream fw needs

- Increasing demands on freshwater resources in many regions of NZ → on-going land-use change & intensification (NZ = high endemism)

- Many medium & large-sized rivers, particularly in lowland areas, are heavily abstracted for out-of-stream use (increasing with climate change)

✉ phillip.jellyman@niwa.co.nz

Impacts of irrigation on salmon runs?

stuff National World Business Opinion Sport Entertainment Life & Style Travel

national

Earthquakes Crime Politics Stuff Circuit Science Education Health Environment

'Poor' season for Rangitata River salmon fishery, Fish and Game New Zealand says

LIAM CAVANAGH
Last updated 21:45, January 16 2017

JOHN BISSET/FAIRFAX NZ

Peter Ritchie, of Rangitata Huts, has been fishing at the river mouth since 1937, and thinks the fishing at Rangitata has declined due to the new irrigation ponds.

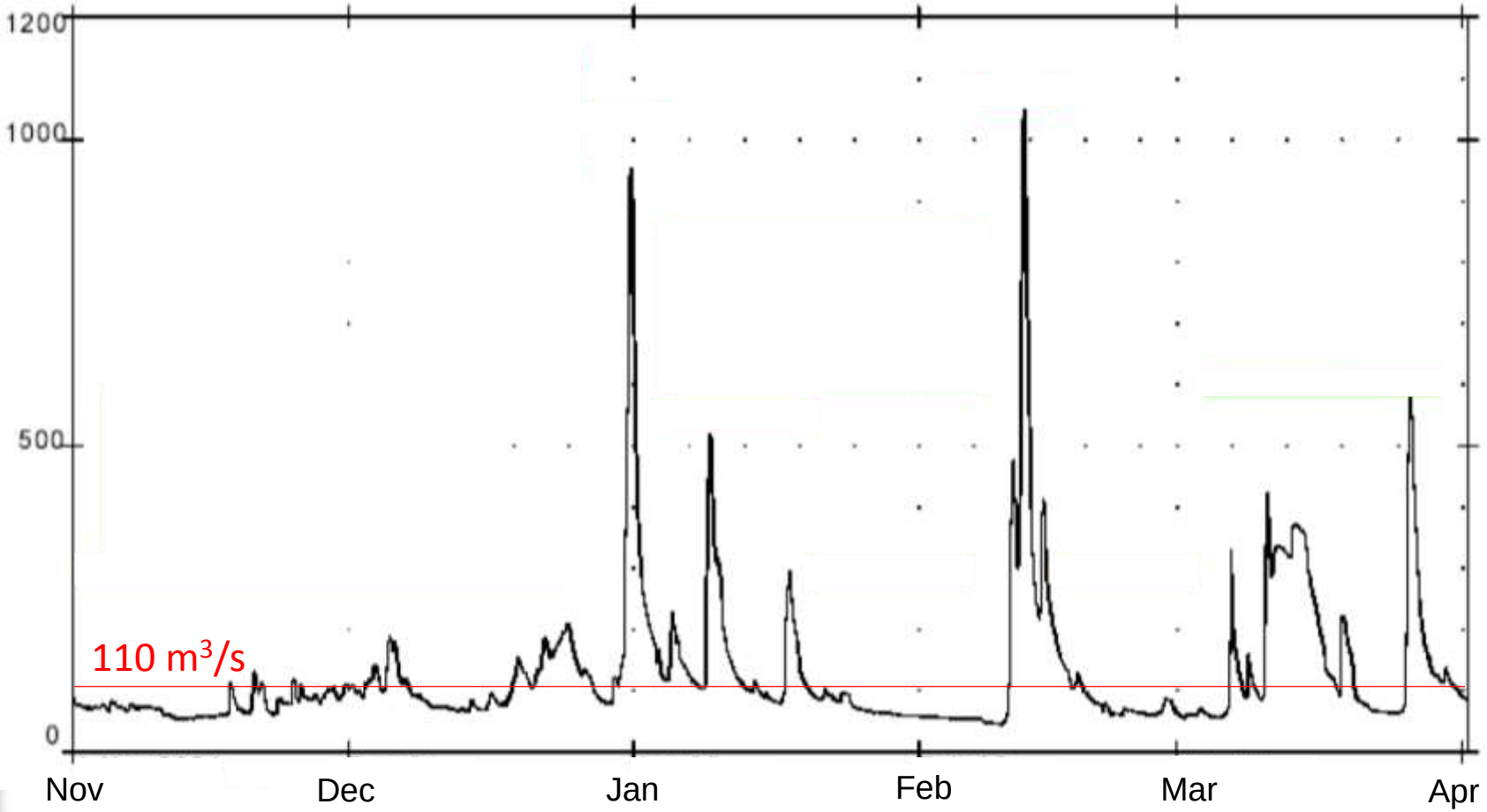
"Peter Richie, of Rangitata Huts, has been fishing at the river mouth since 1937, and thinks the fishing at Rangitata has declined due to the new irrigation ponds"

Impacts of irrigation on salmon runs?

"No other spawning race is like it in New Zealand. A lot of international research went into the design and Rooney Earthmoving Ltd has produced this incredible salmon spawning facility at no cost to the angler" - Mark Webb CSI F&G

What does flood harvesting & irrigation do to flow?

Typical east coast braided river with a run of Chinook salmon



✉ phillip.jellyman@niwa.co.nz

Research questions

1. How long does it take adult salmon to reach their spawning grounds under different flow conditions?

2. How salmon behaviour (e.g., rate of upstream movement) may vary at different times of the fishing season?

3. What flow conditions may prevent salmon from moving upstream?

✉ phillip.jellyman@niwa.co.nz

How will we be addressing these questions?

- Implanting acoustic tags into adult Chinook salmon

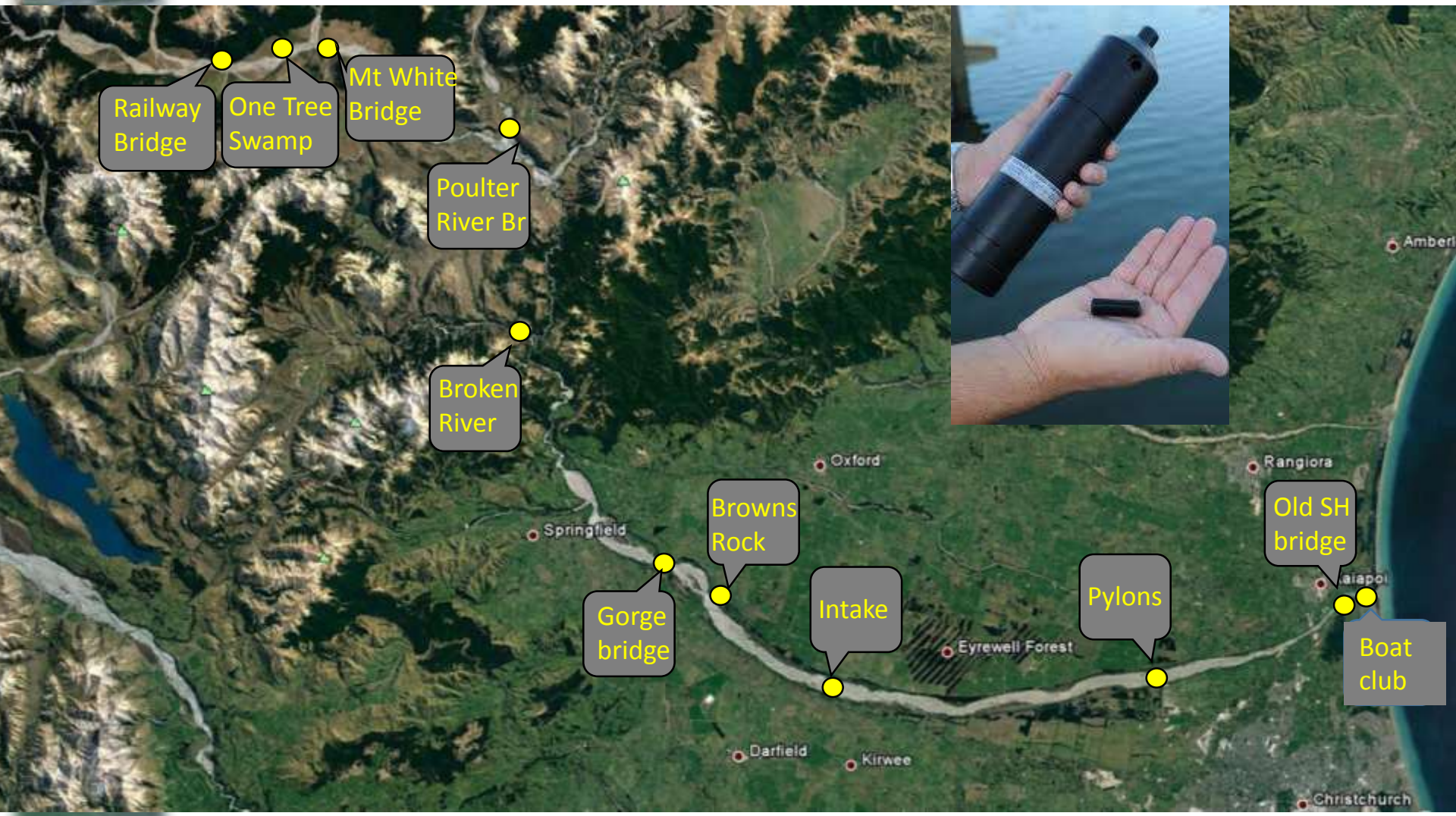
✉ phillip.jellyman@niwa.co.nz

…already trialled tagging technique

June 2017,
Montrose hatchery

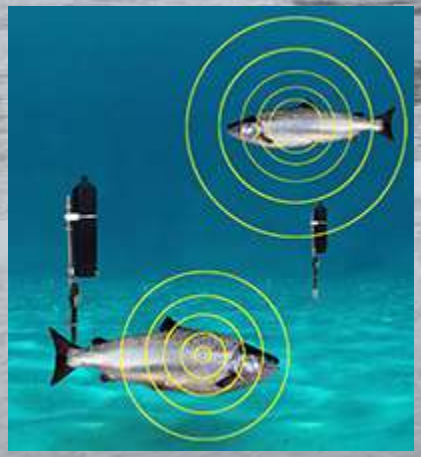
✉ phillip.jellyman@niwa.co.nz

Locations of acoustic receivers in Waimak



✉ phillip.jellyman@niwa.co.nz

Deploying acoustic receivers in Waimak



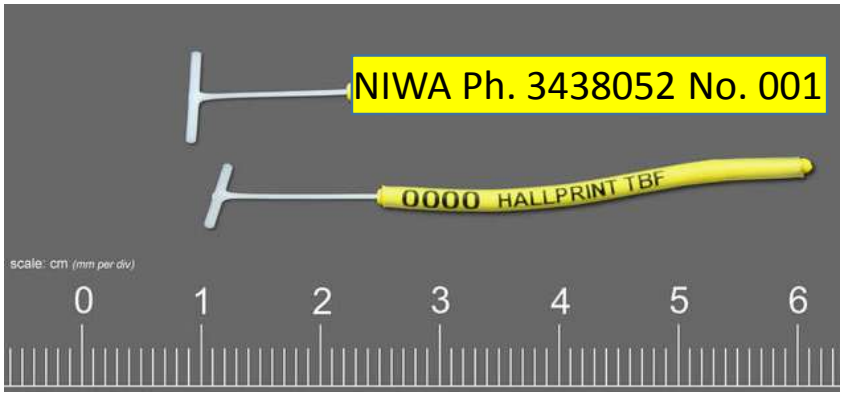
✉ phillip.jellyman@niwa.co.nz

Supplementary manual tracking in Waimak

✉ phillip.jellyman@niwa.co.nz

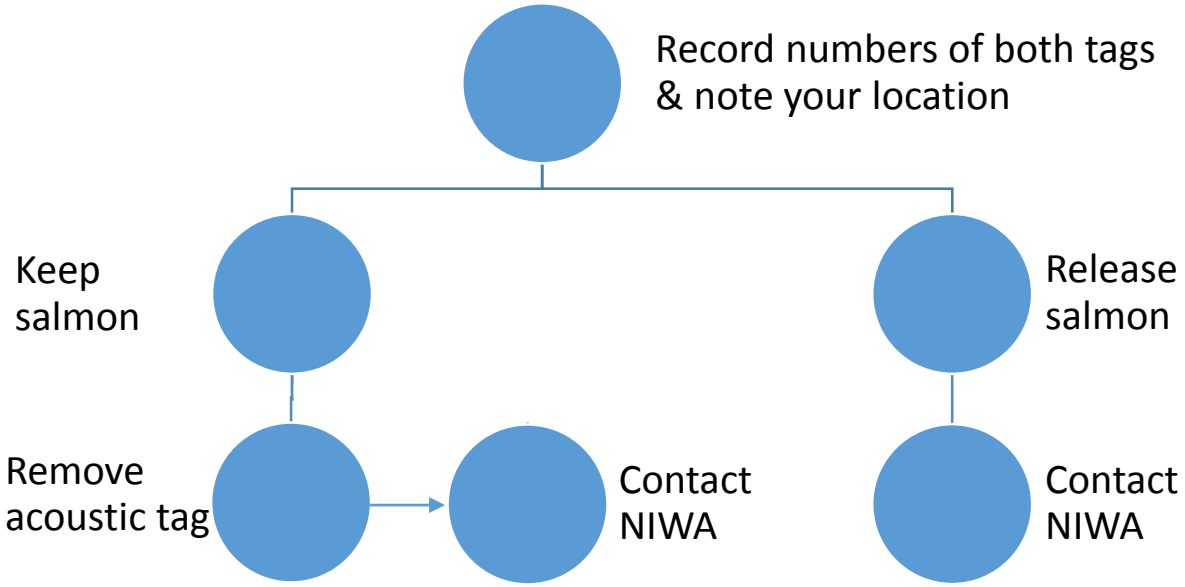
What to do if you catch a tagged salmon?

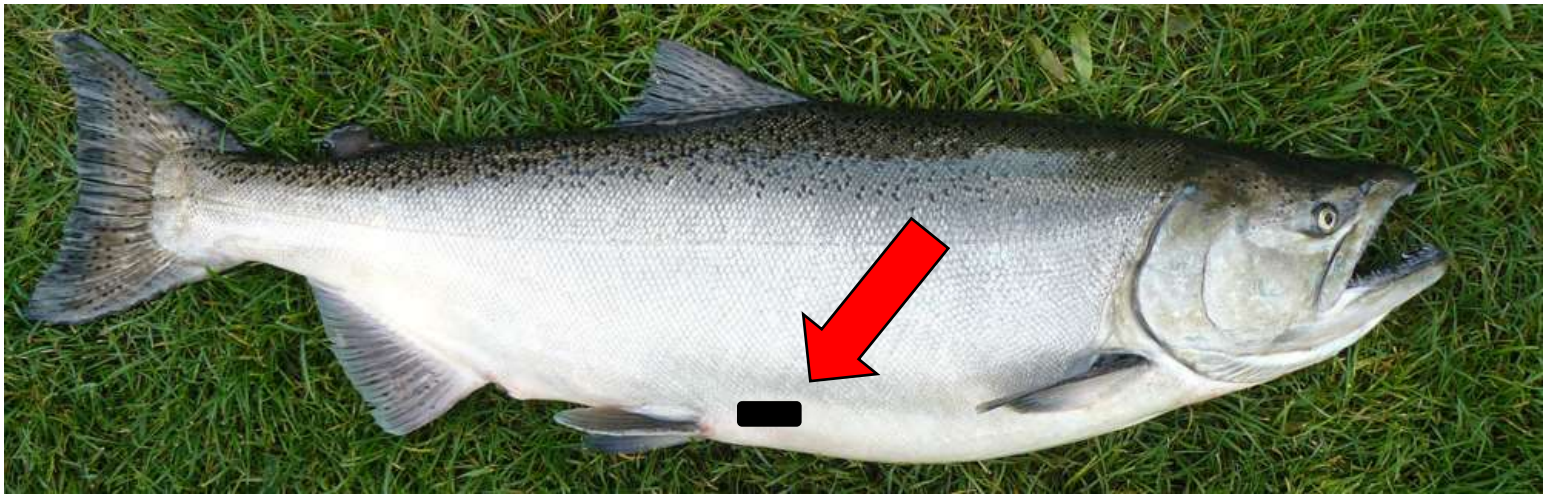
Record numbers of both tags
& note your location



✉ phillip.jellyman@niwa.co.nz

What to do if you catch a tagged salmon?





✉ phillip.jellyman@niwa.co.nz

When do we start?

…when you tell us the fish are running! (~ mid January)

Happy to hear any updates on river/fishing conditions (343 8052)

✉ phillip.jellyman@niwa.co.nz

Funding sources

NIWA
Taihoro Nukurangi

(Sustainable Water Allocation Programme)

Fish & Game™
NEW ZEALAND

(in kind contribution – field assistance)