The Salmon Disturbance Regime

Sediment and nutrient interactions in the Horsefly River spawning channel

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Quesnel River Research Centre QRRC

Sam J. Albers & Ellen L. Petticrew

QRRC 2010 Open House

October 2, 2010

Ecology

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"The study of the environmental house includes all the organisms in it and all the functional processes that make the house habitable" [1]

[1] Odum, E.P. and Barrett, G.W.
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Oncorhynchus

- Pacific salmon migrate from the ocean back to their natal streams to spawn and die
- Net benefit of salmon on their natal streams is dependent on:
  - Nutrient Enrichment
  - Nutrient Delivery
  - Nutrient Retention
- Productivity transfer to streams[2]

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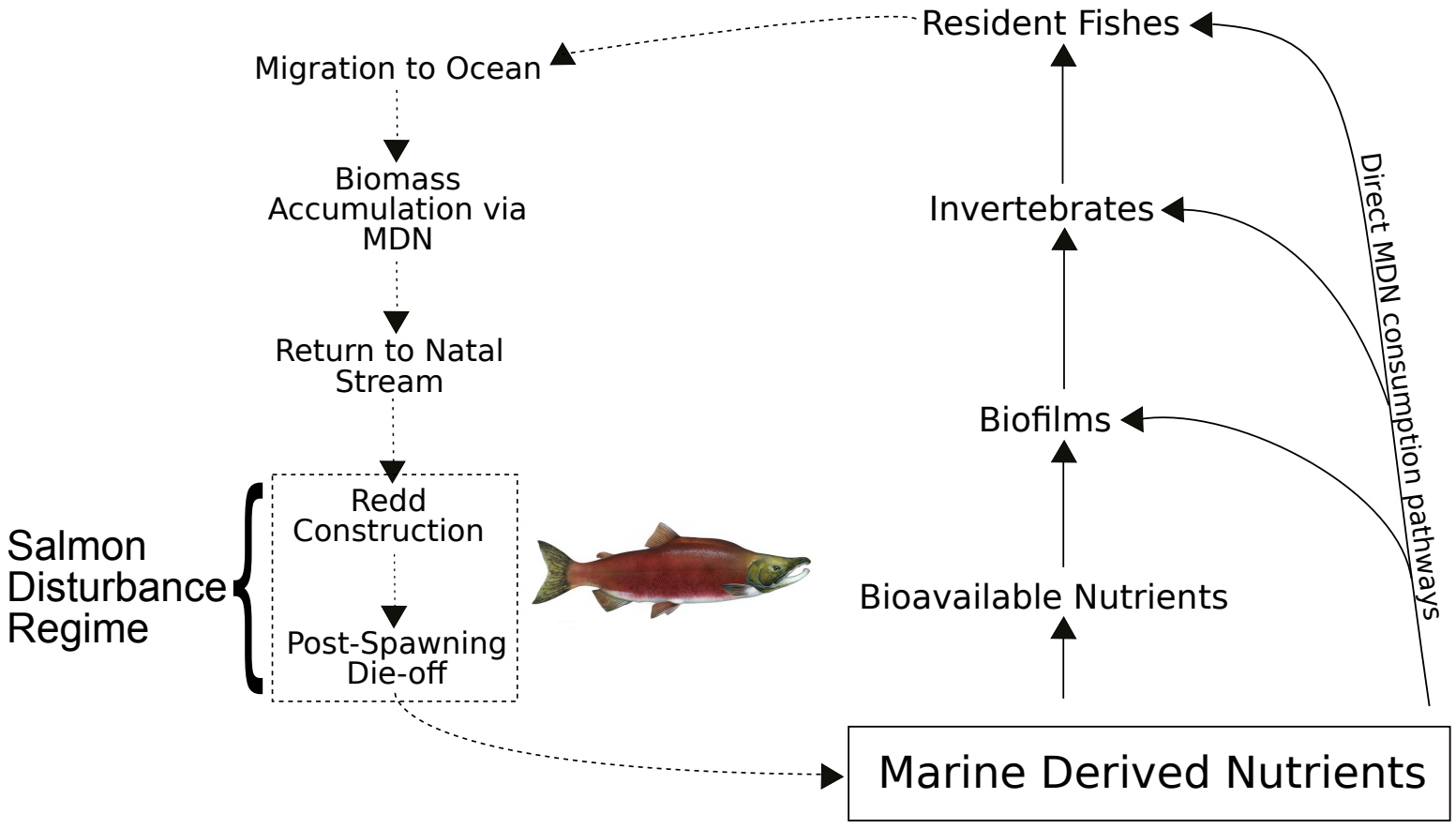
The Salmon Disturbance Regime

- Temporal overlap between disturbance and fertilization
- Assessment of complete spawning cycle



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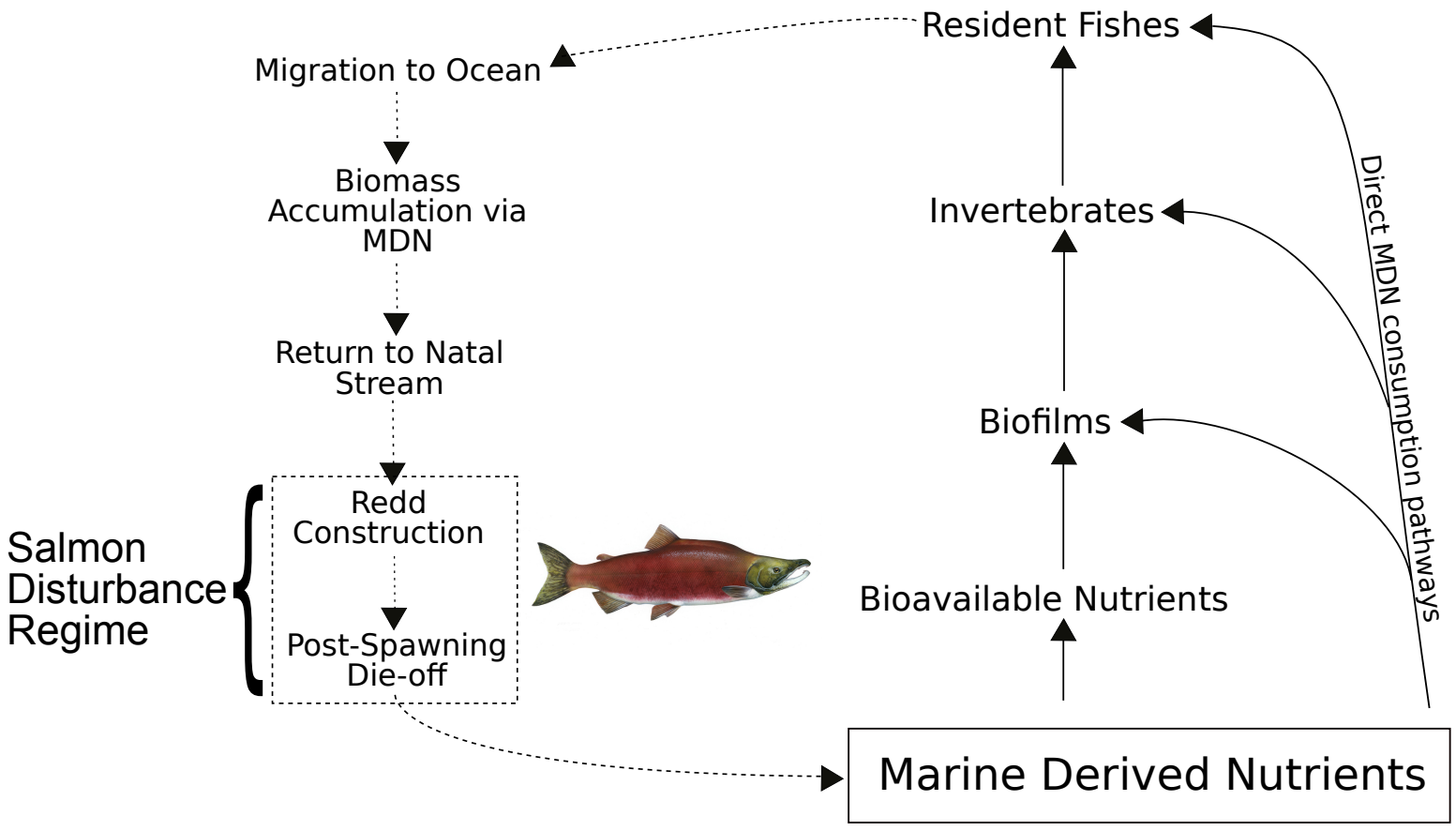

Biofilms & Sediment

- Biofilms are a layer of microorganisms growing on the streambed
- Main processor of organic material in river systems[3]
- Sediment is resuspended into the water column during salmon nest creation
- Biofilm trapping ability

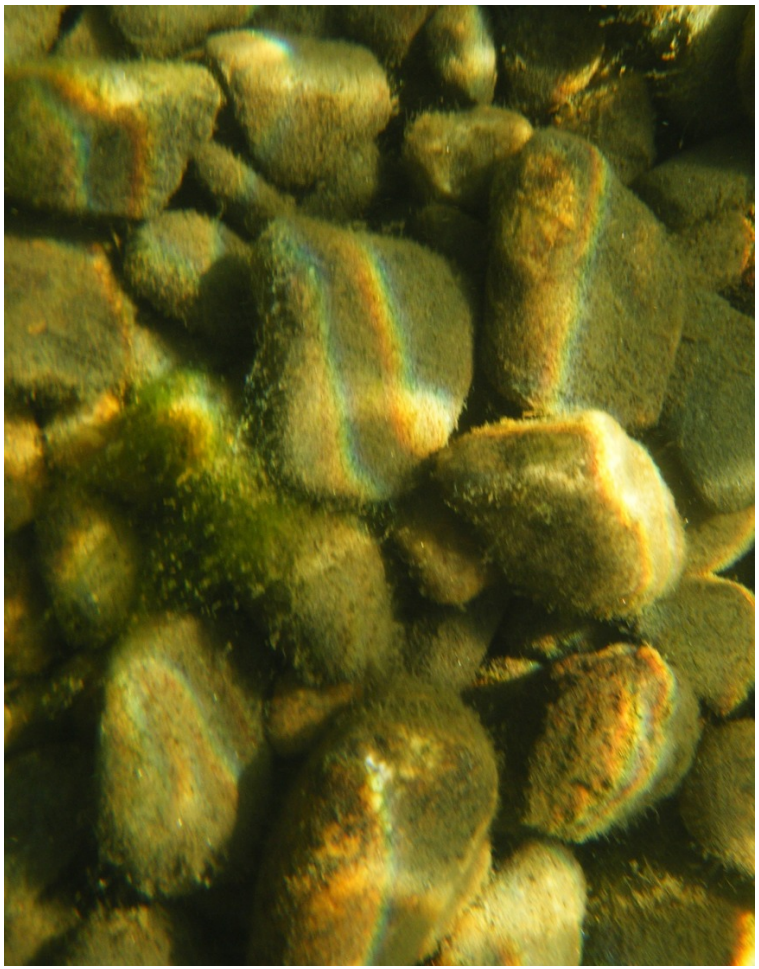

Figure: Biofilm

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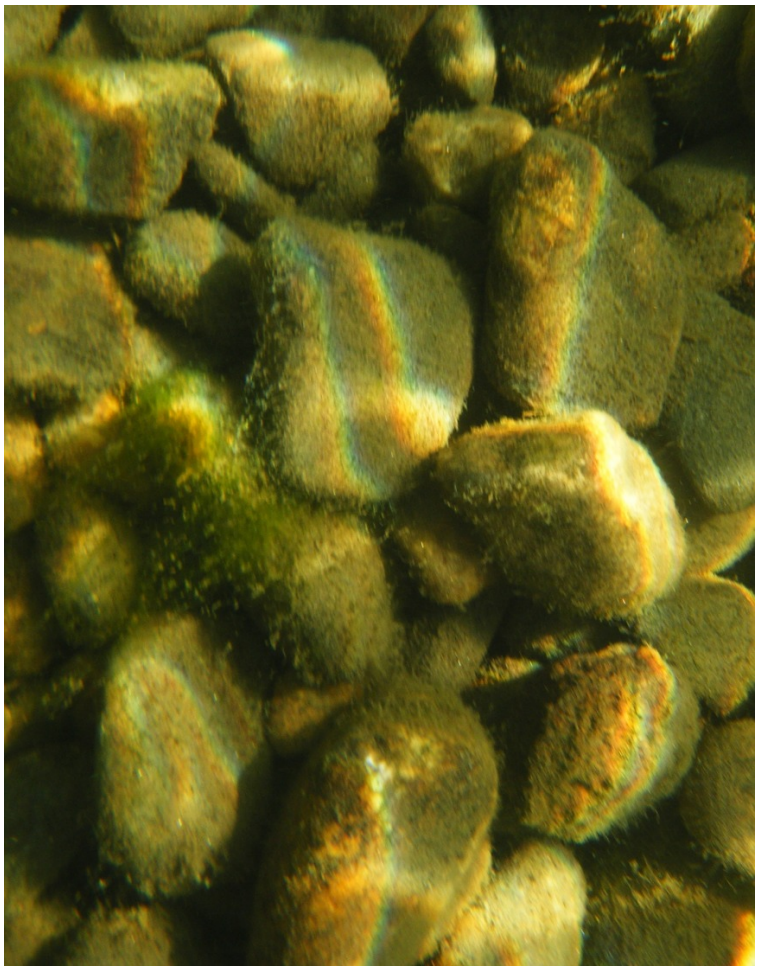

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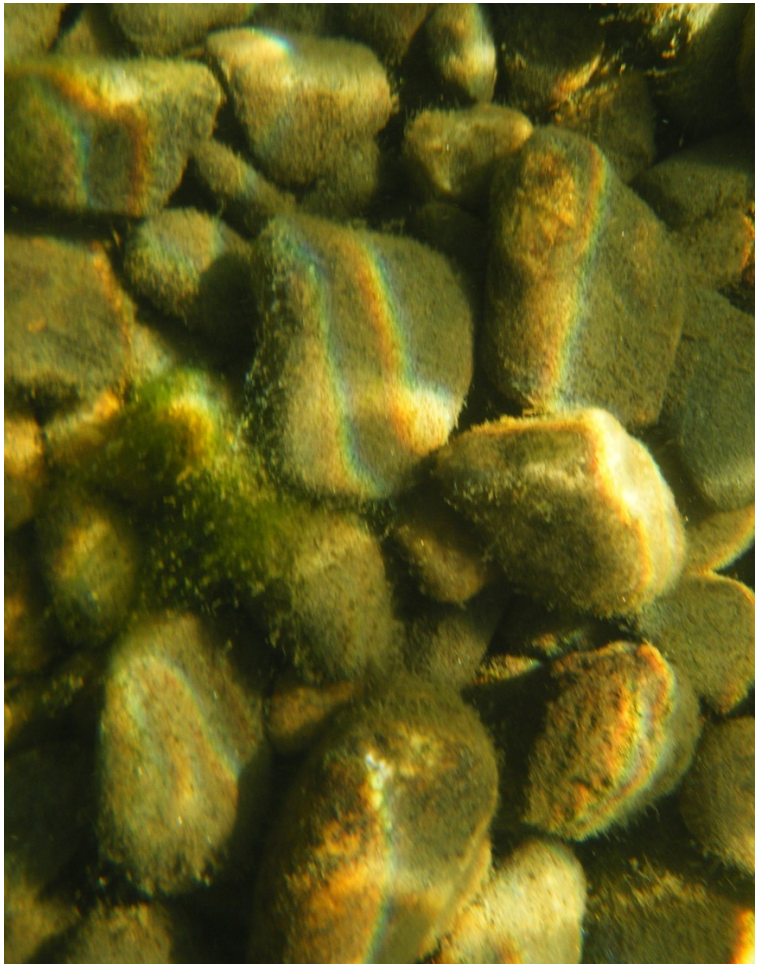

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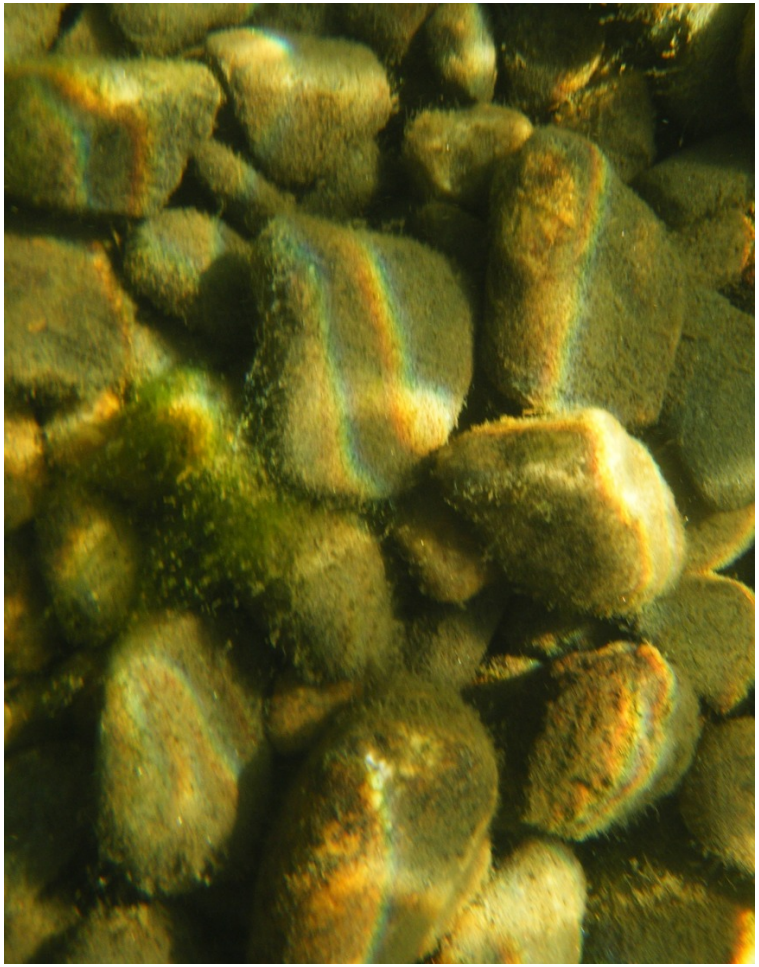

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Objectives

1. Examine the magnitude of MDN uptake and retention by benthic biofilms via biofilm abundance
2. Determine the mass of sediment trapped by biofilms.

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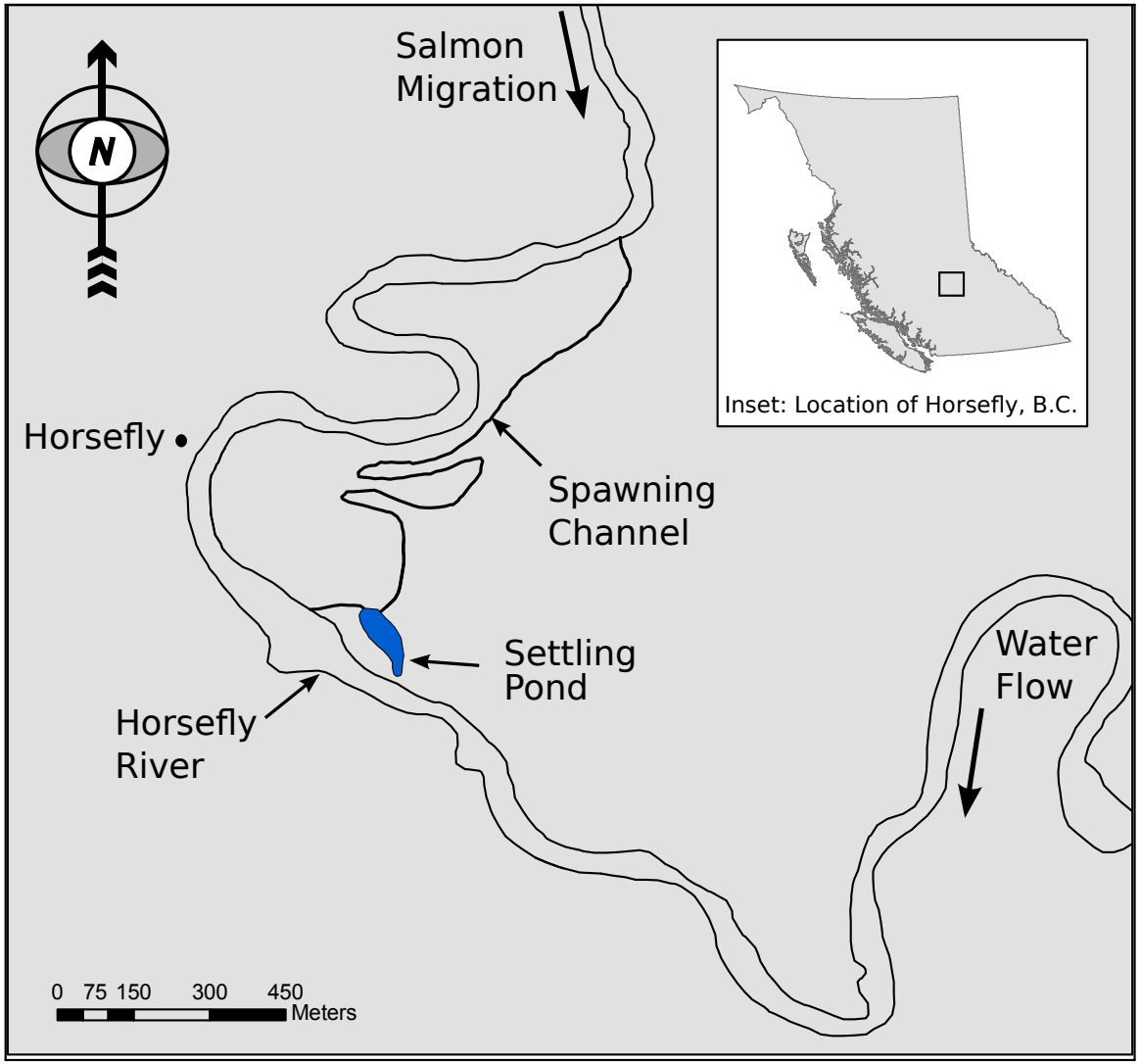
Horsefly Spawning Channel



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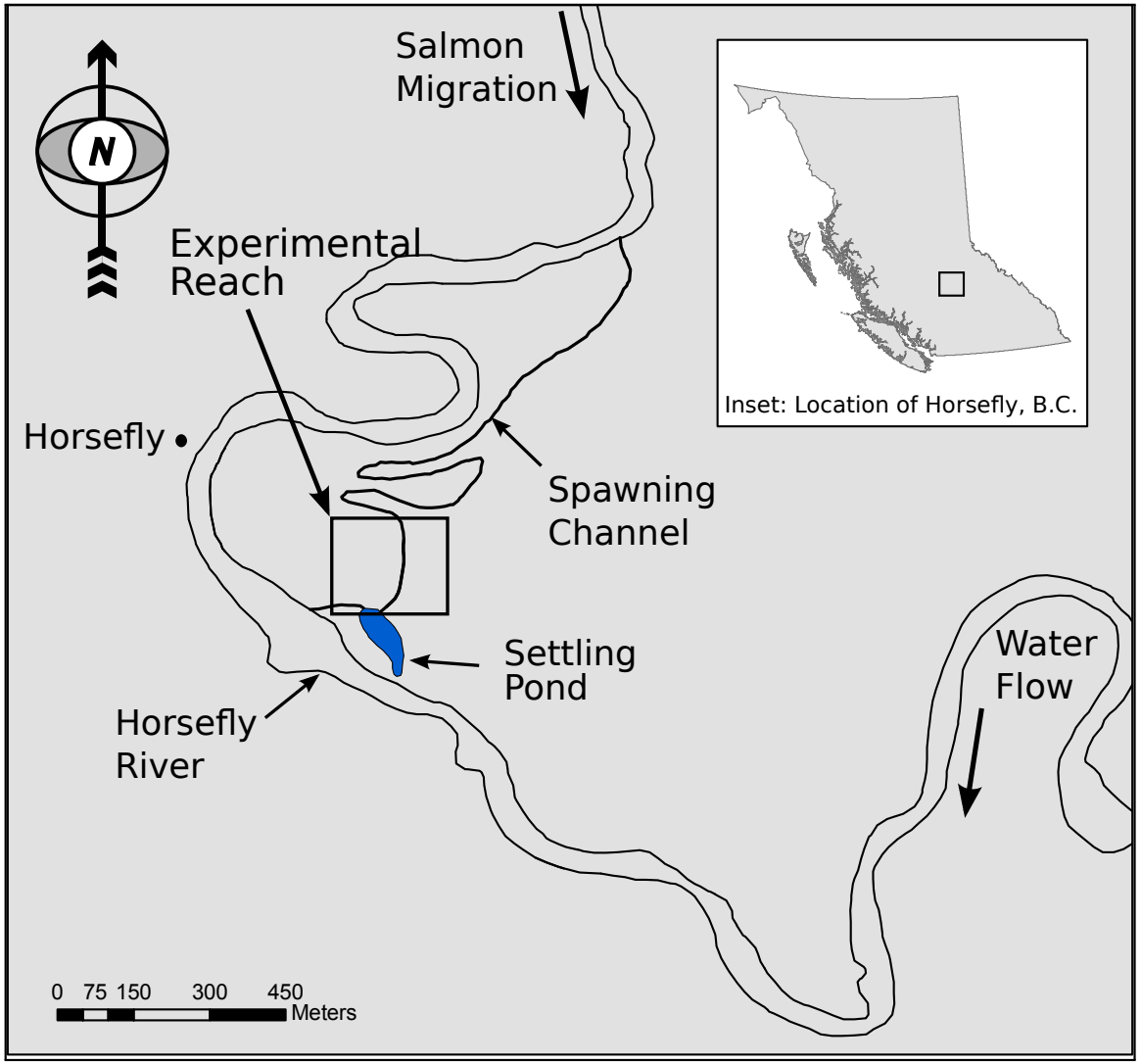
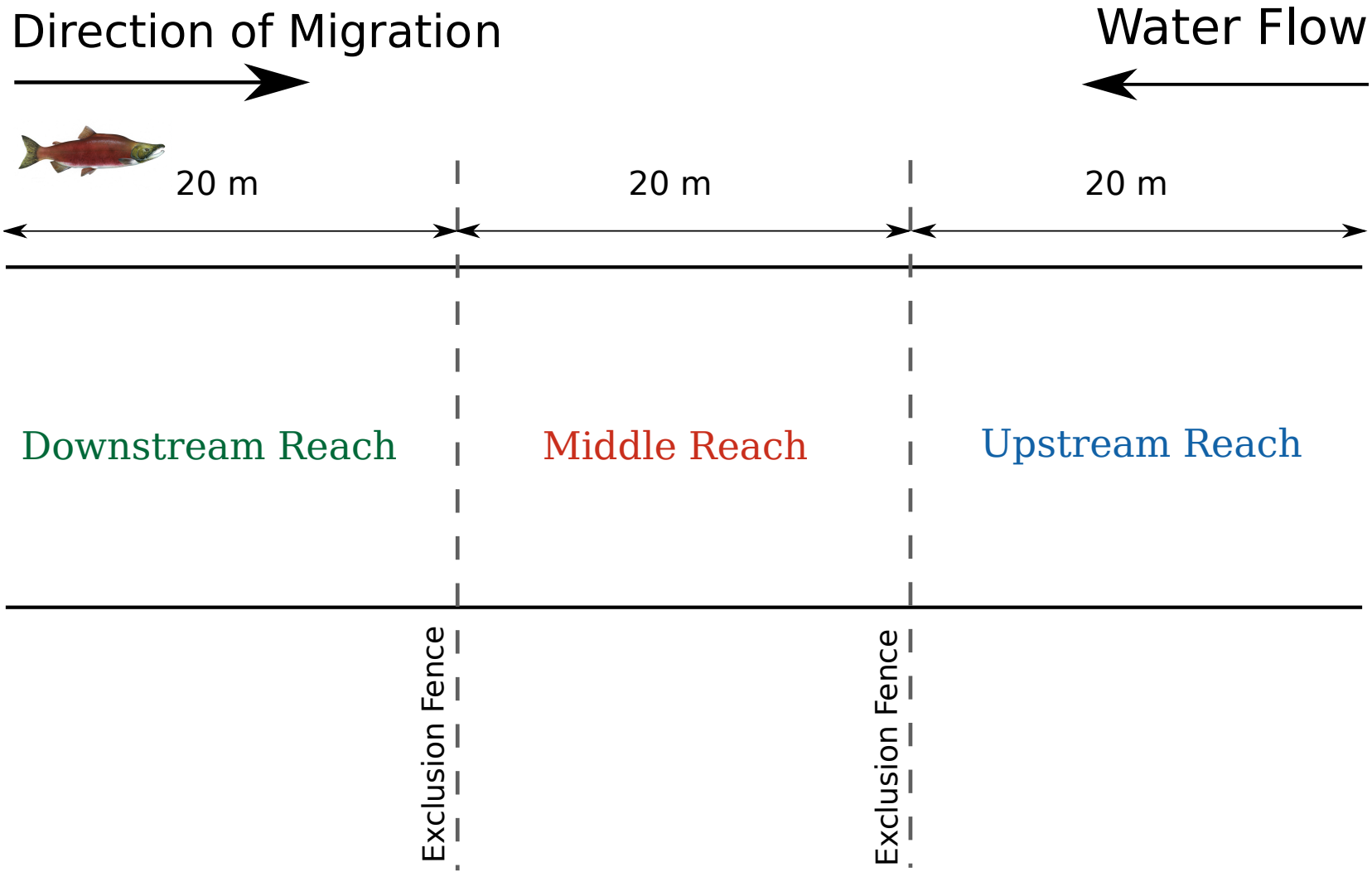


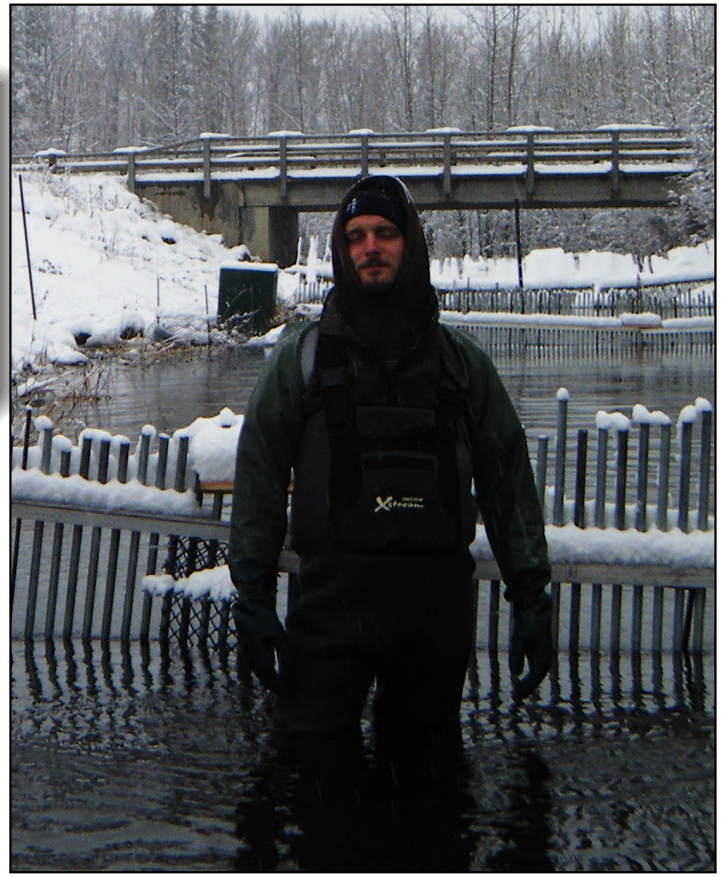
Experimental Setup



Experimental Setup

Sampling

- Scraped surface gravels sampled
- Chlorophyll *a*, Sediment, δ^{15}N
- Particle size analysis (LISST)



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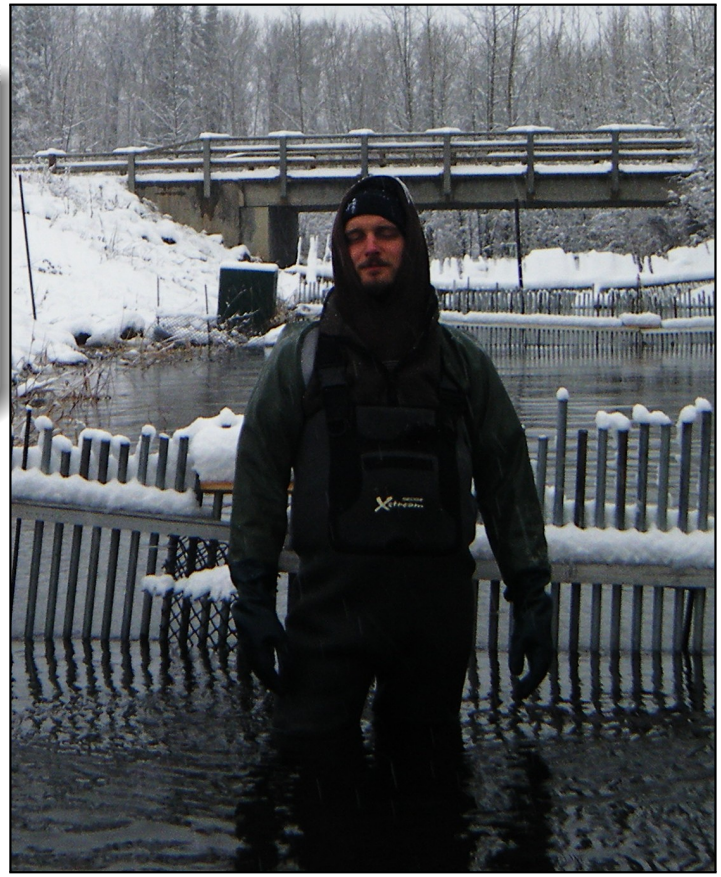

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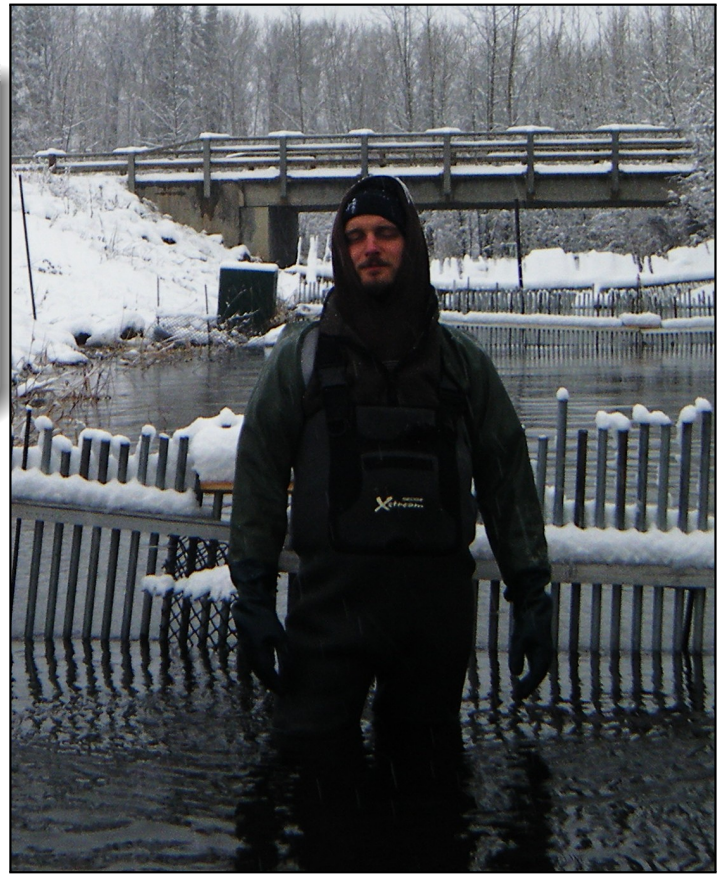
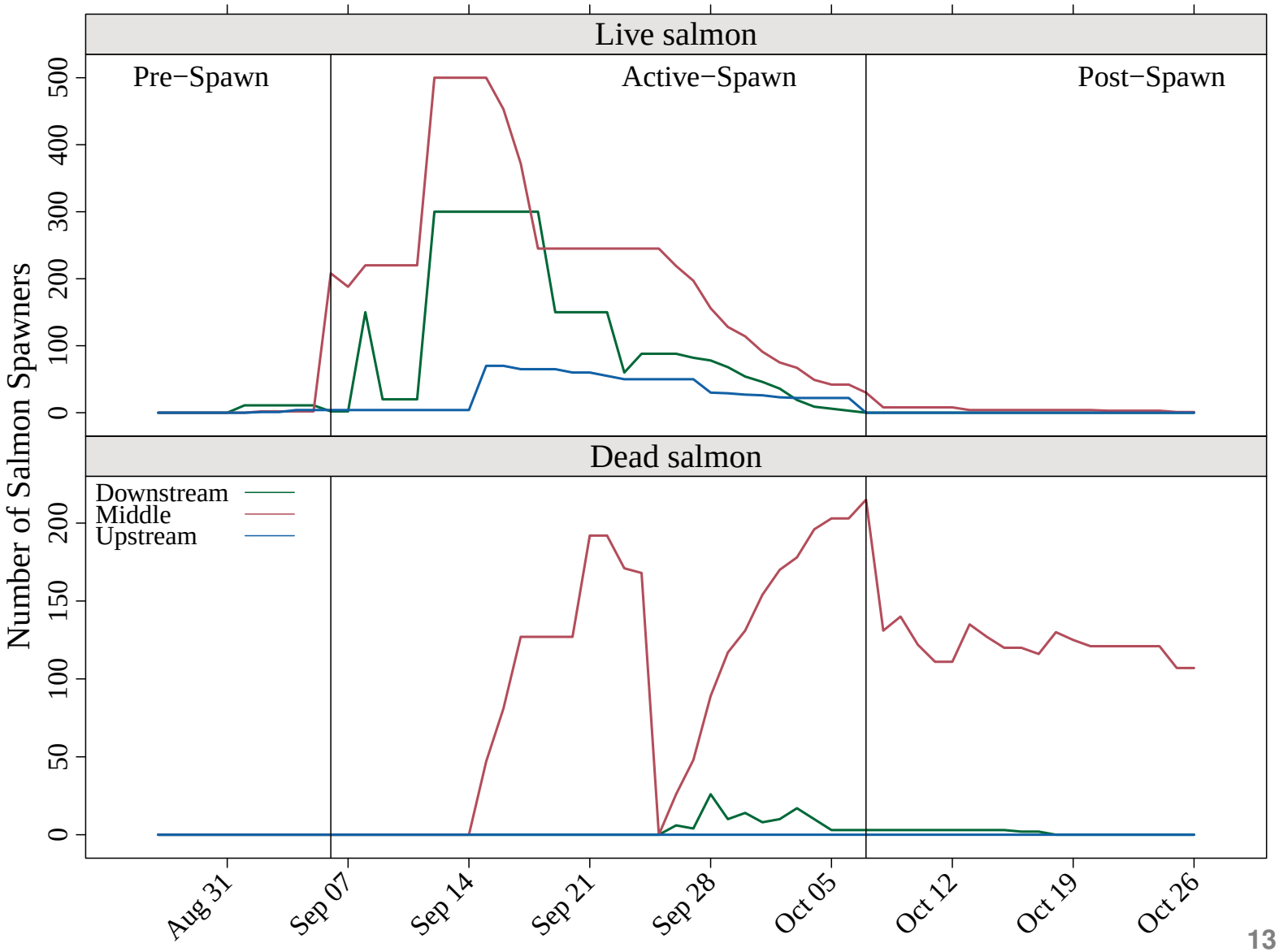
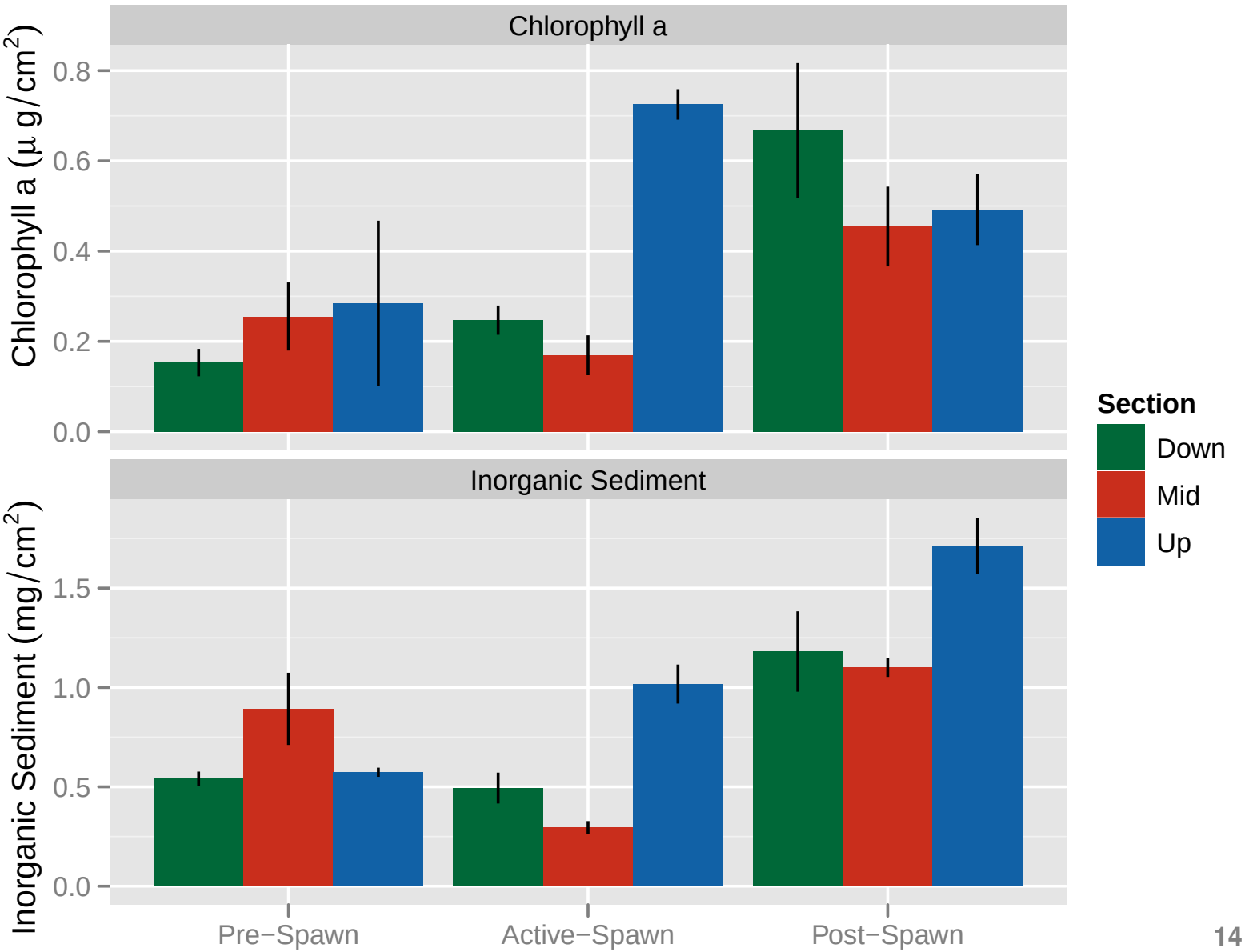


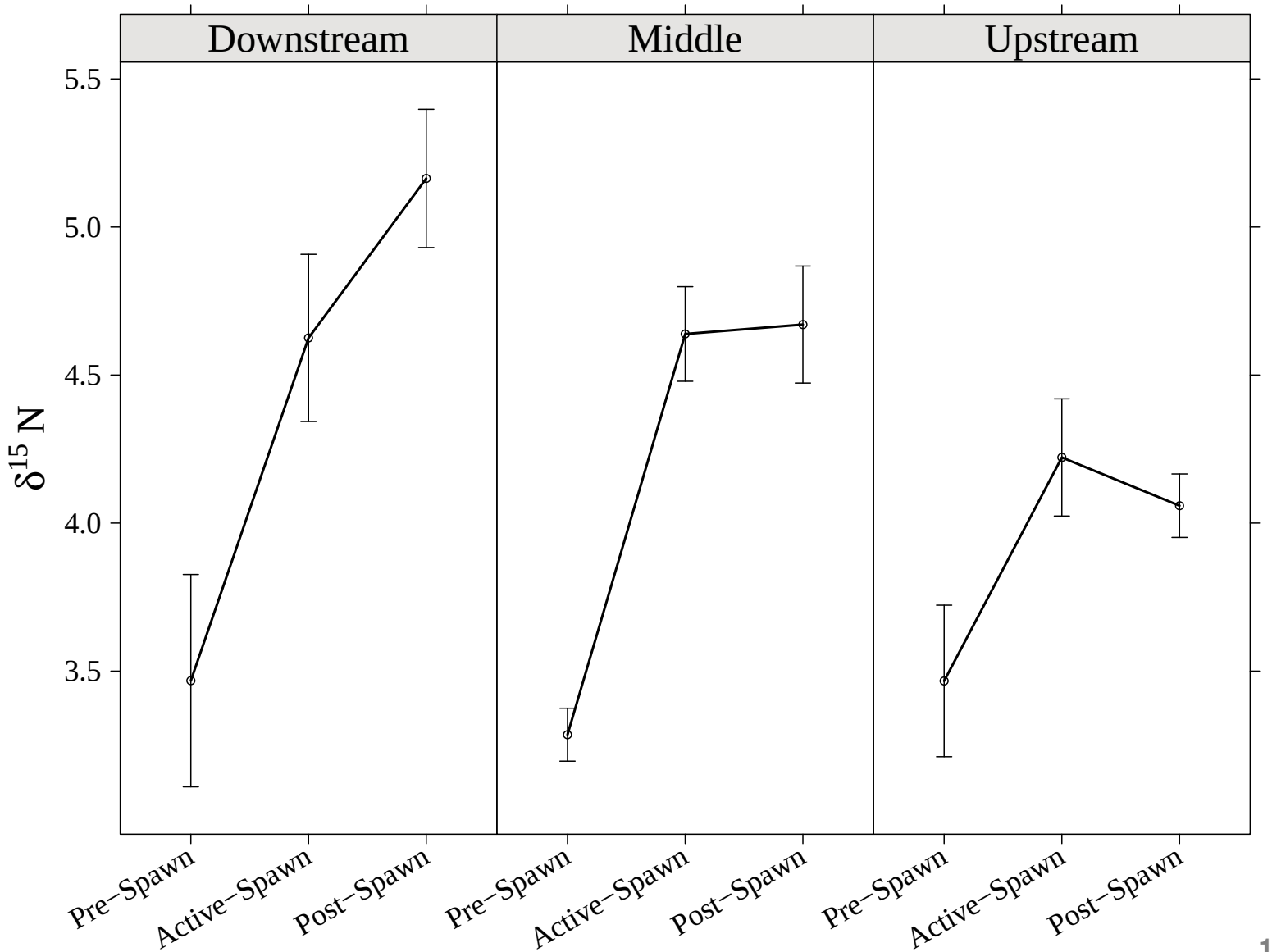
Salmon Numbers



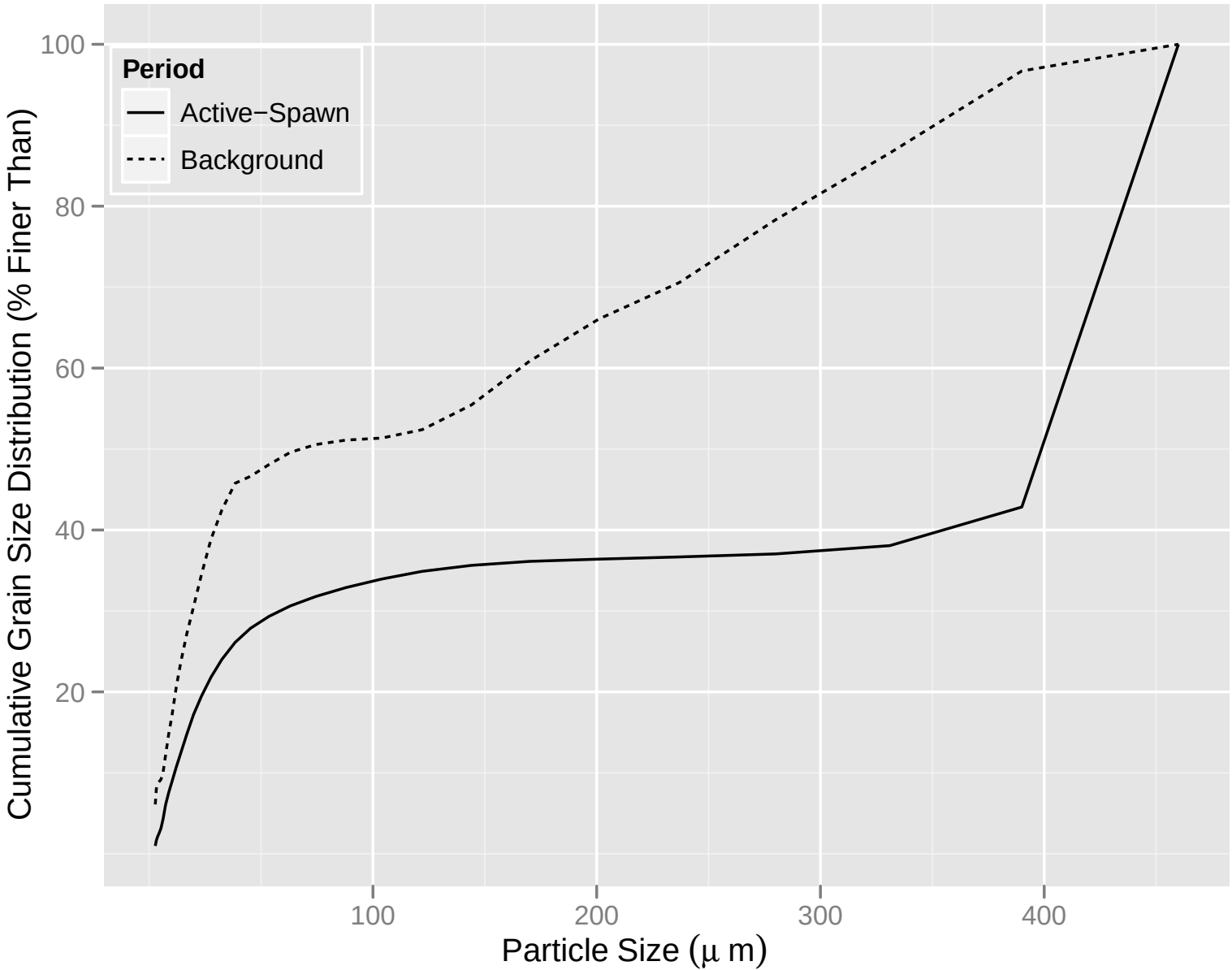
Biofilms and Sediment



Stable Isotopes - Surface Biofilms



A Coarsening...



Ecosystem Pulse

- Post-spawn biofilm abundance patterns suggest that enrichment is due to salmon
- Higher levels of δ^{15}N suggest incorporation of MDN
- Proximity of response suggests a mechanism for direct nutrient enrichment to the stream bed.

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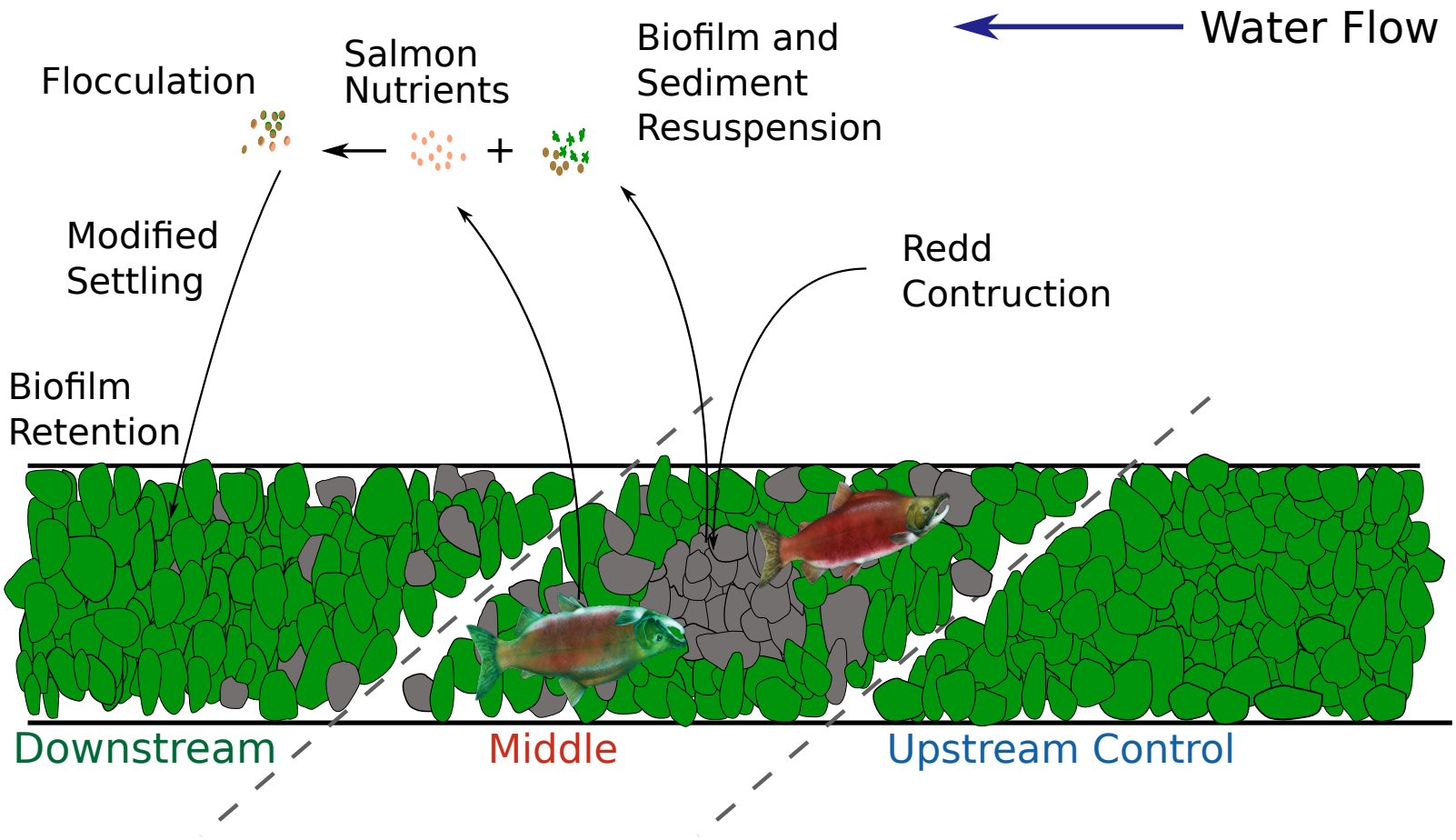
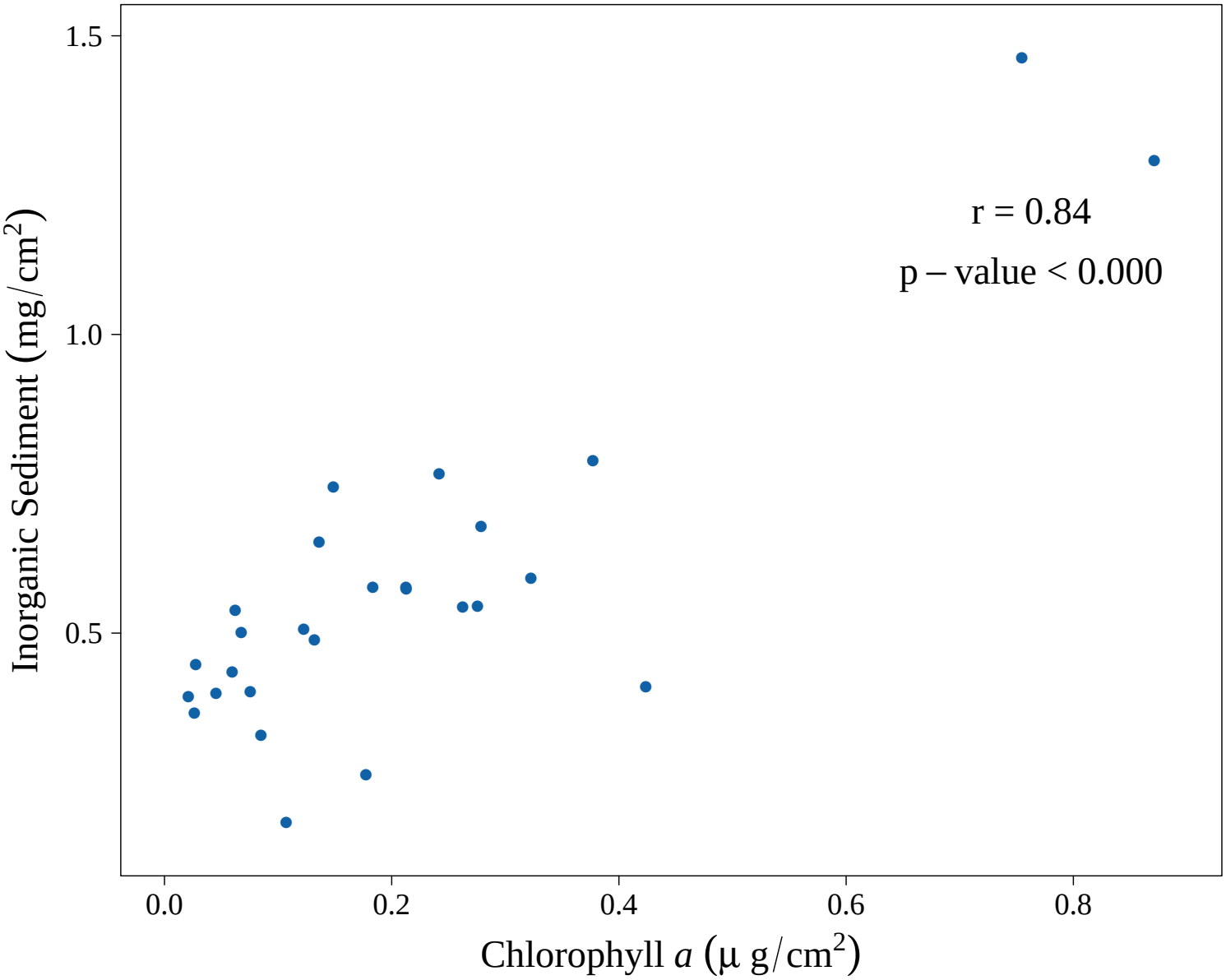
Aggregate Deposition



Biofilms Trapping Sediment



A Waste?

IN SATURDAY'S NEWSPAPER
RED WINES FOR FALL

THE VANCOUVER SUN

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Salmon run botched by DFO: critics

Tory MP, UBC expert say Ottawa too late in opening sockeye fishery

BY LENA SIN AND SUSAN LAZARUK, POSTMEDIA NEWS AUGUST 29, 2010

The initial jubilation over the massive bounty of returning salmon sockeye is now being washed up in criticism, with Conservative MP John Cummins saying fishermen are furious with the way federal regulators have delayed the fishery.

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A Waste?

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Estimate for this year's run up to 30 million, boosting local fish processors

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- Dr. Ellen Petticrew (Supervisor)
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- Quesnel River Research Centre - Richard Holmes, Bill Best and Lazlo Enyedy
- Landscape Ecology Crew
- Advisory committee: John Rex, Lito Arocena, Ian Droppo
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- Peace/Williston Aquatic Research Award (SJA)