How does flow regulation affect riverine fishes?

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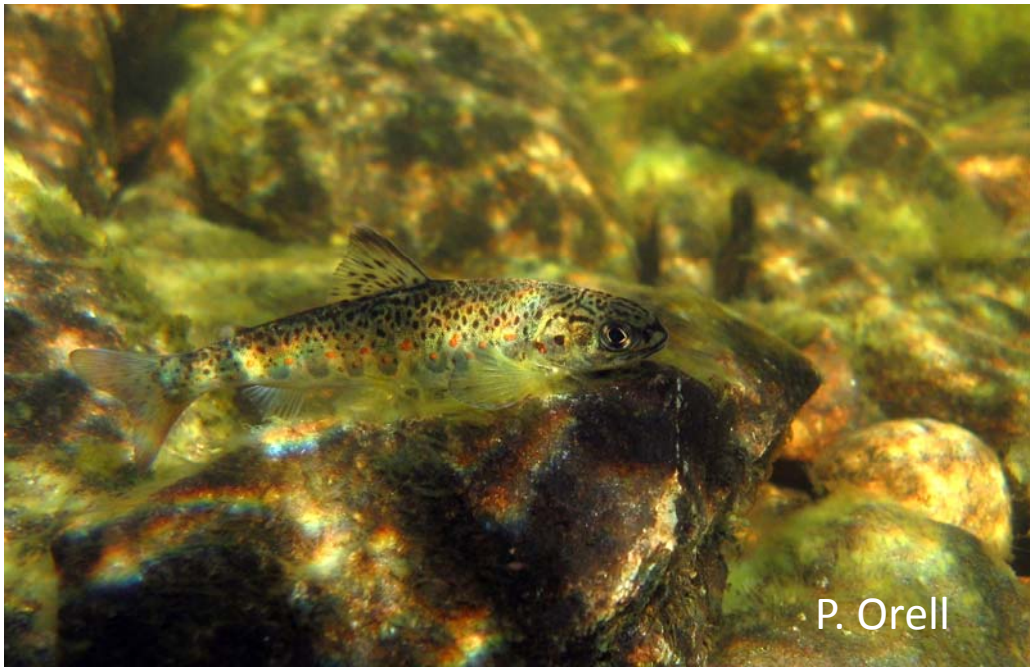
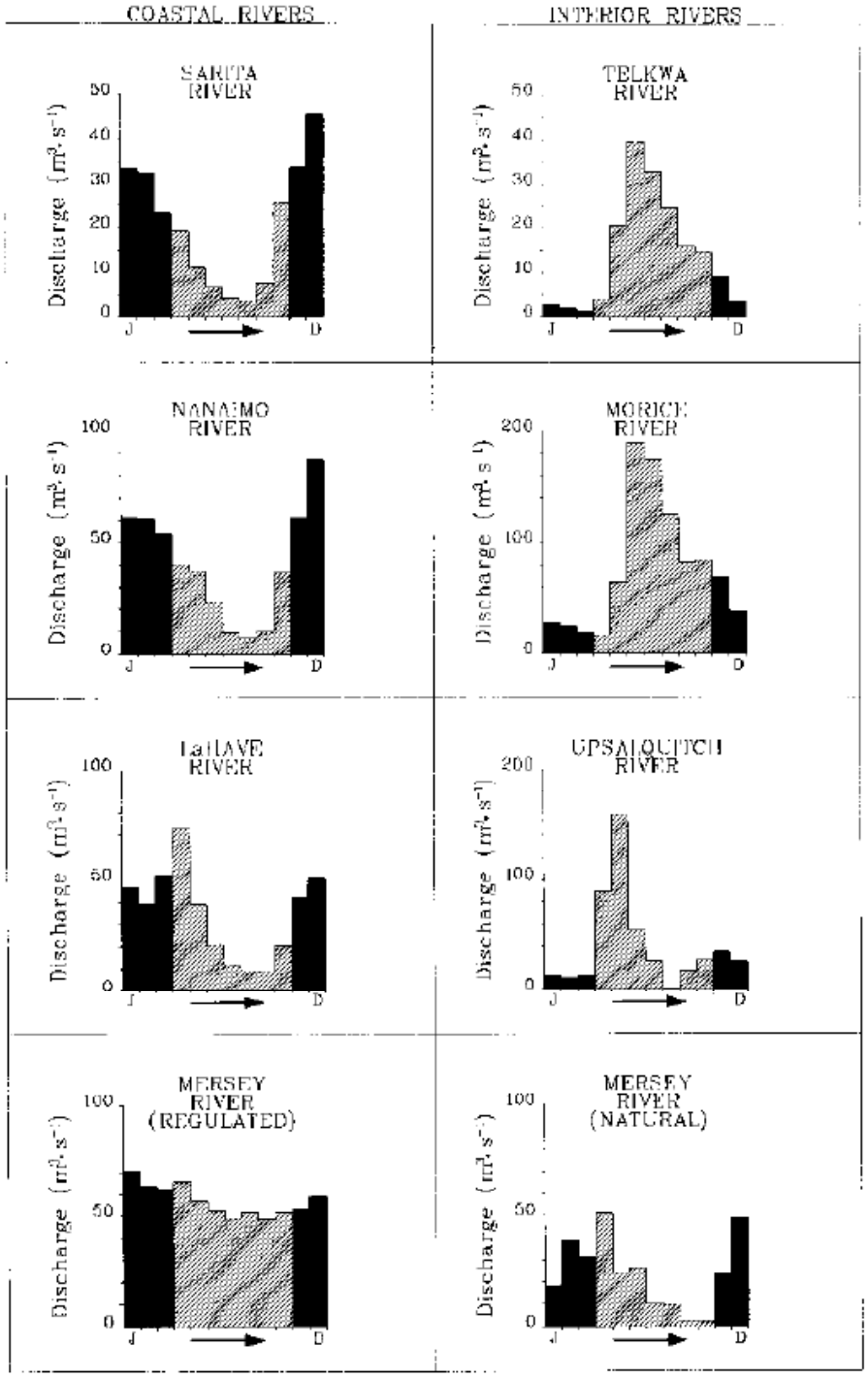
Hell
P. Orell

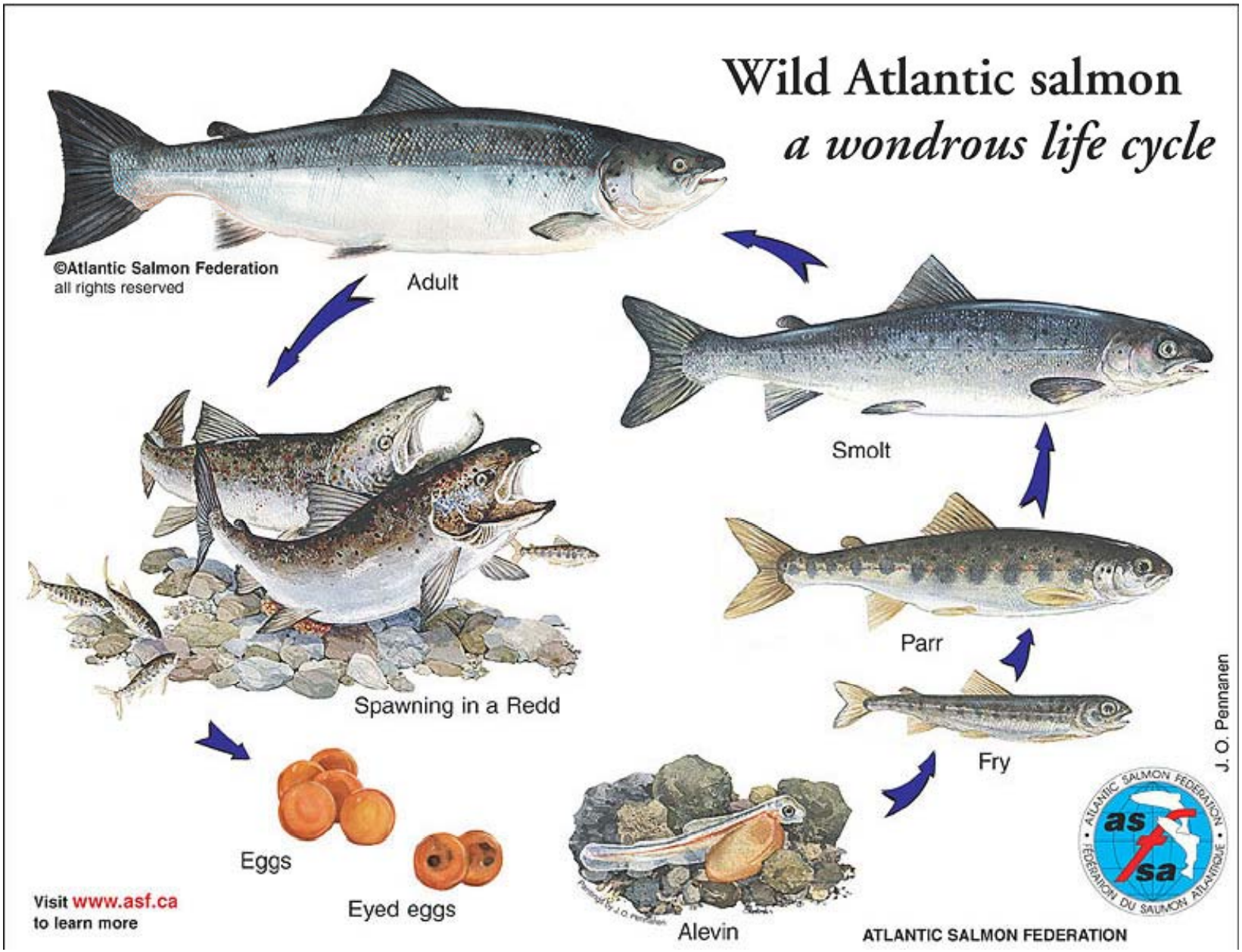
The general objective of NSERC's HydroNet is to promote sustainable hydropower in Canada *via* a better understanding of the effects of hydroelectric operations on aquatic ecosystems.



Spatial and temporal Flow variability in Canadian rivers



From Cunjak (1996)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Parr
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Alevin
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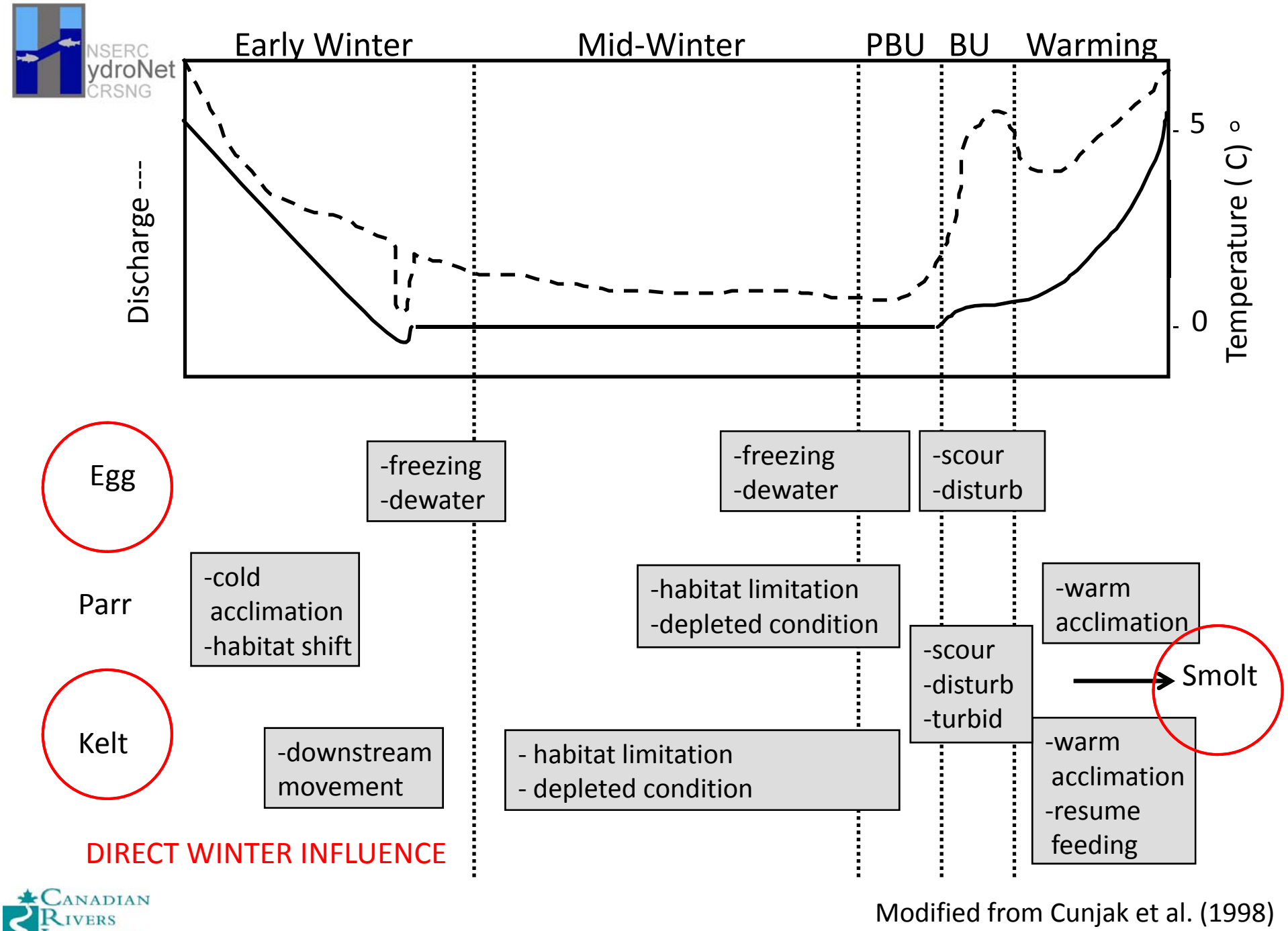


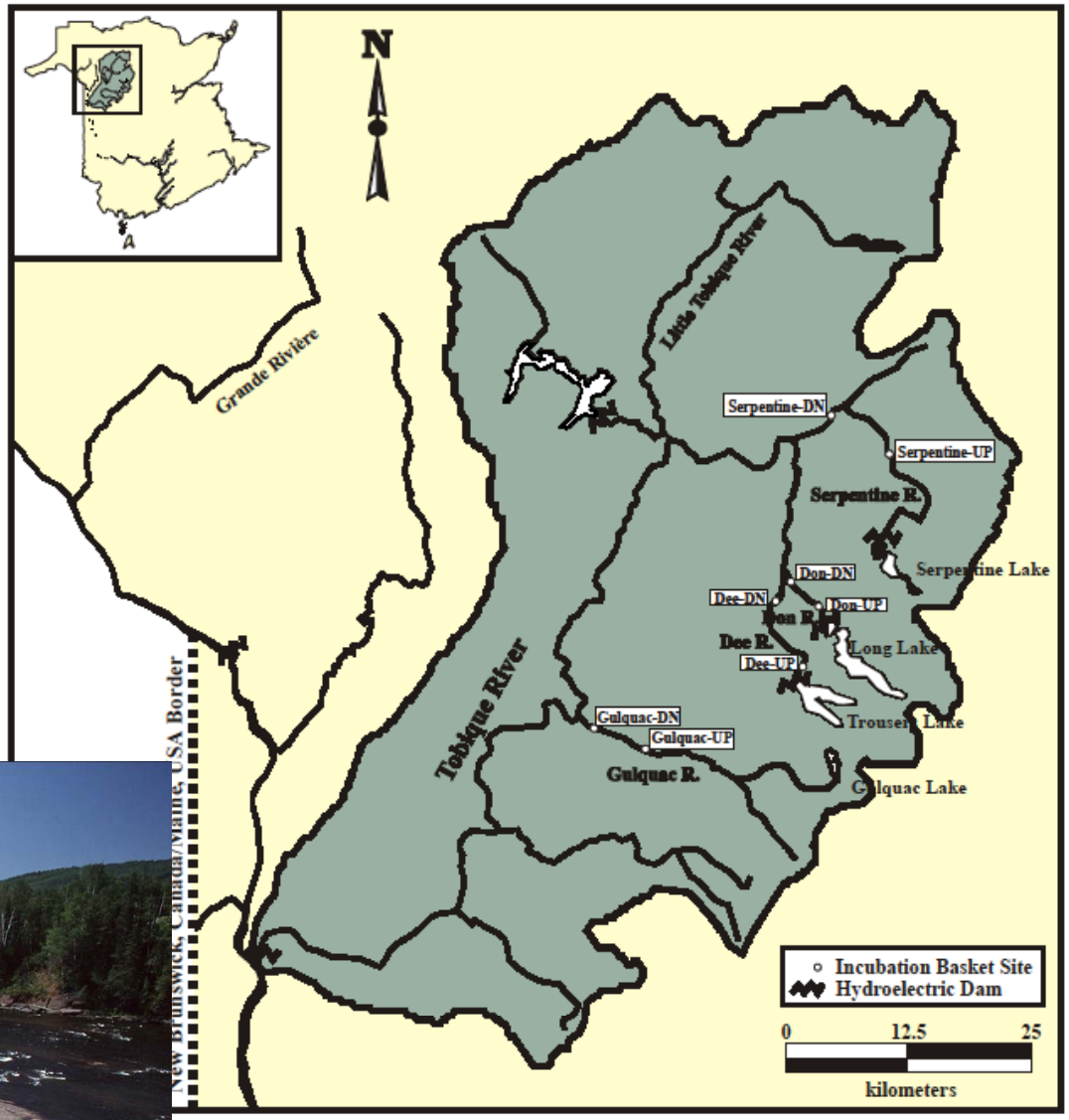
Modified from Cunjak et al. (1998)

NSERC
ydroNet
CRSNG

Three Graduate Research Projects

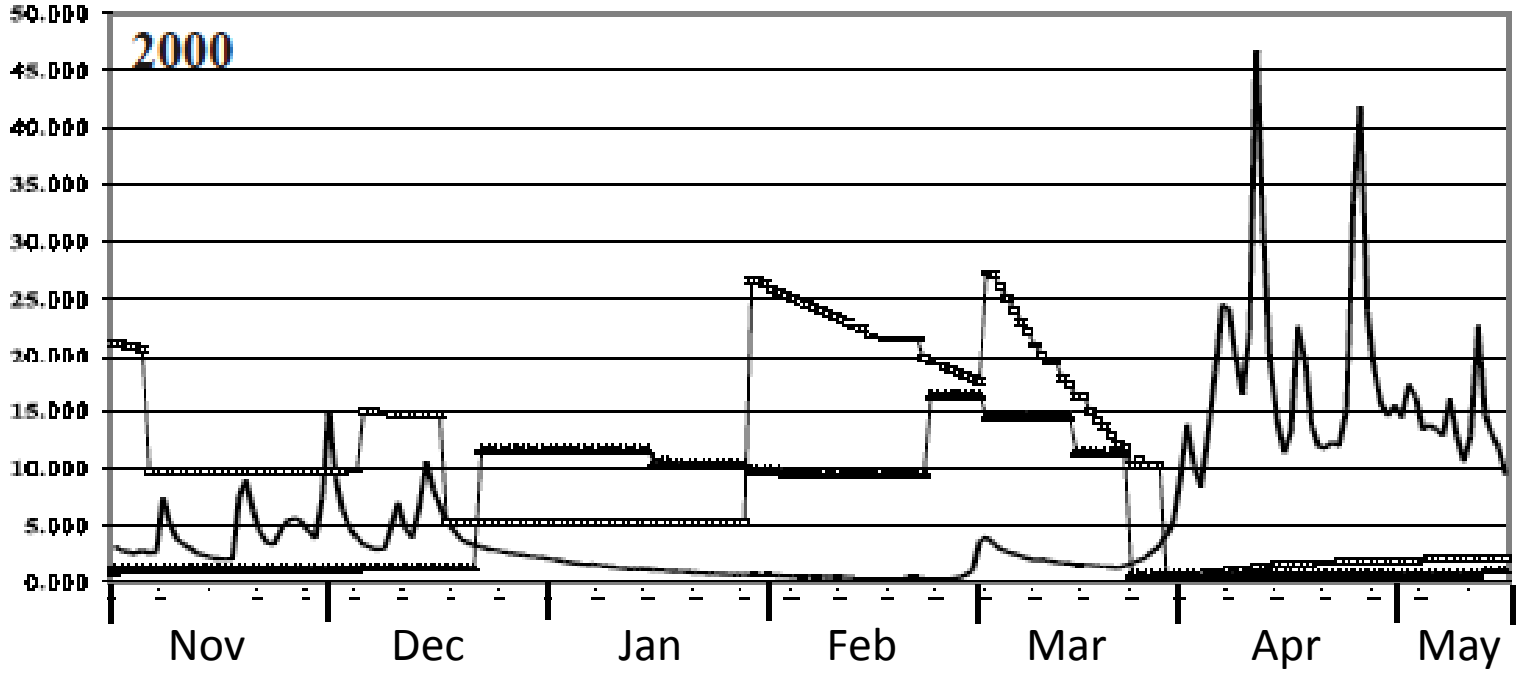
Study Area: Tobique River basin

(4300 km^2 drainage area)



NSERC HydroNet CRSNG

Winter – Spring Hydrograph – 2000
Dee and Serpentine Rivers (regulated)
Grande Rivière (unregulated)



Regulated rivers: higher winter flow; lower, stable spring flow

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MSc Project (Paula Thoms)

How does hyporheic water quality (DO, temp) affect salmon egg/alevin survival?

- As winter Q increases, egg S increases but… (Cunjak et al. 1998)

- during low winter Q, low DO groundwater DO penetrated redds and affected egg S (Malcolm et al. 2004)

How might this relationship be affected by flow regulation?

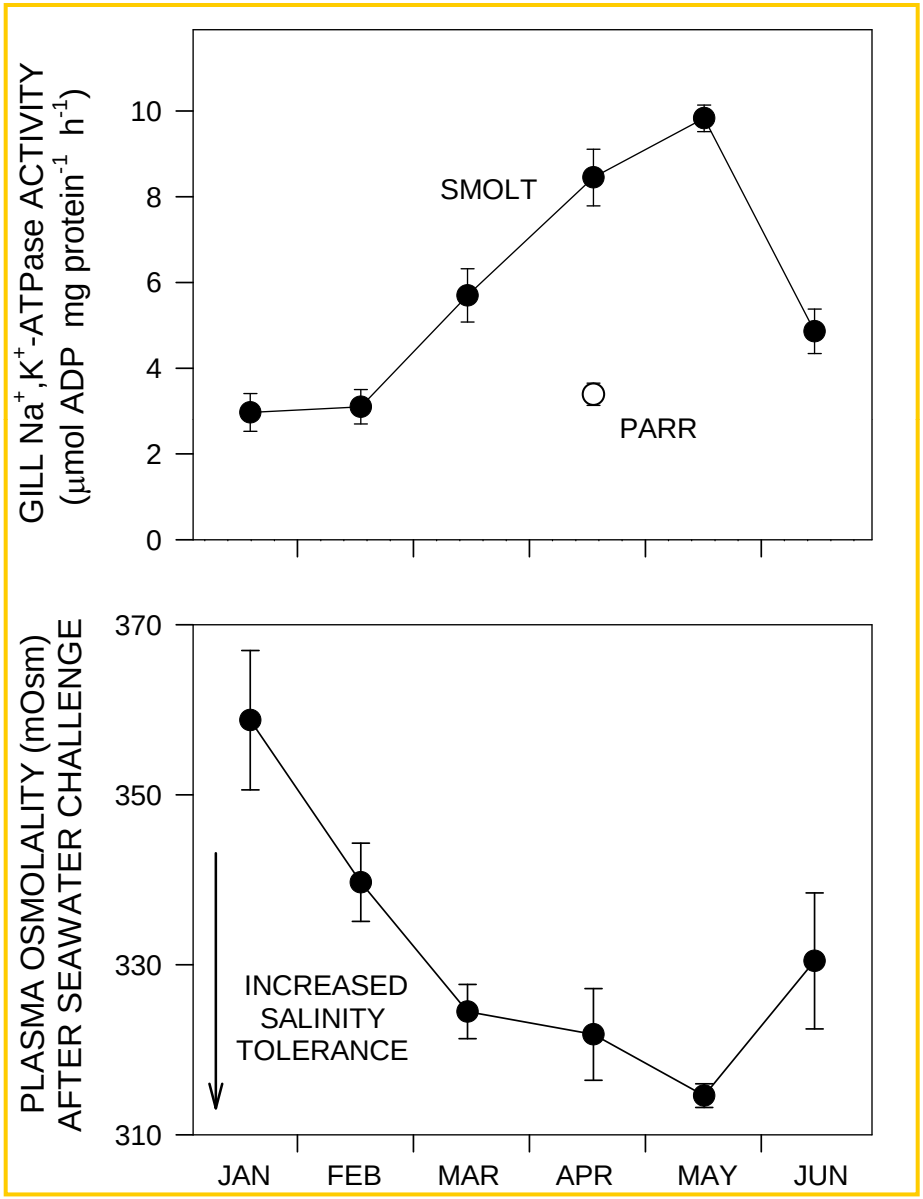
MSc Project (Sherr Vue)

Do hydropeaking flows affect condition of overwintering Atlantic salmon parr?

- Smoltification success ?

Experimental study
at DFO Mactaquac facility
(hydro-peaking simulation)

Osmoregulatory changes during smolt development



(from S. McCormick)

3. PhD Project (Adrian Hards)

- Does winter flow regulation affect survival, movement and habitat use of post-spawned Atlantic salmon (kelts)?
- Does flow regulation over summer enhance growth (relative to streams with natural flow regime) for Atlantic salmon parr?

Scientific relevance (HydroNet):

- Understanding mechanisms driving survival, growth, movement
- metrics influencing productive capacity (Boisclair)
- Growth relationships (Macnaughton, Power)
- Inter-relationship of biological responses to physical stressors (Hicks, Loewen, Lapointe, Eaton)

Potential scaling-up of research and networking?

- Extend Adrian's work on growth to other rivers (QC, ON)
- Extend the post spawning movement work – NL, BT in ON?
- Extend Paula's egg S work to QC?

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