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Quantifying the Potential Effects of Land-based Activities on Atlantic Salmon (*Salmo salar*) Embryo Development in the Serpentine River, NB

Question: How do land based activities influence water quality conditions, and contribute to deformities and/or mortalities of incubating Atlantic Salmon embryos?

- Predictions: Atlantic Salmon embryos incubated at sites with reduced water quality conditions (e.g., contaminants, lower dissolved oxygen levels and higher water temperatures) will have a greater proportion of deformities and/or mortality because of increased hypoxic stress.
- Methods: Quantified substrate composition and water quality parameters with field data collected at 6 locations throughout the Serpentine watershed (Fig 1) and used ArcMap 10.5.1 to summarize landscape characteristics at the reach and catchment scale. Incubate ~19,200 Atlantic Salmon embryos in Jordan/Scotty egg incubators (Fig 2 - 600 eggs per incubator/4 incubators per site/6 sites) within river substrates from Nov 2020 – Jan 2021 to quantify rate of mortality and assign deformity class (Fig. 3). All landscape data will be analyzed using a principal component analysis (PCA) and all embryo data will be analyzed using a generalized linear modelling (GLM) approach.
- Main Findings (so far): Landscape characteristics at the catchment, reach, and site spatial scales explain 69.7% of the variation among sites, with landcover/landuse patterns at the catchment scale being the most influential.

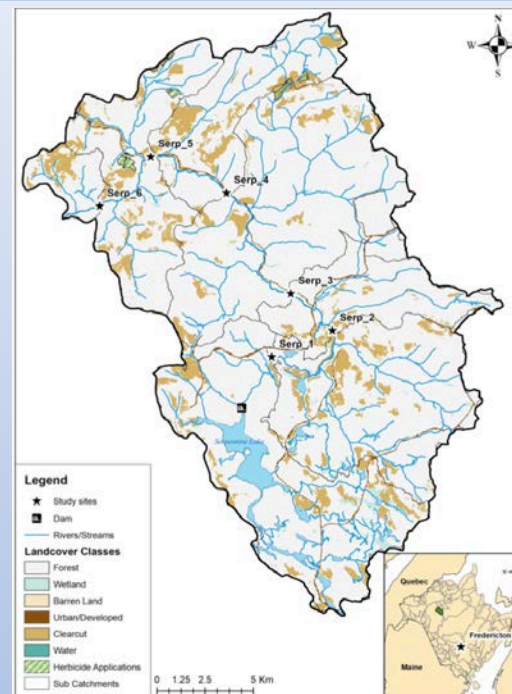


Figure 1: Map of study sites within Serpentine River watershed

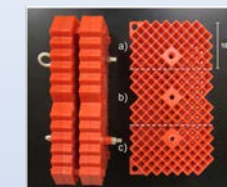


Fig 2: Jordan/Scotty Egg Incubators

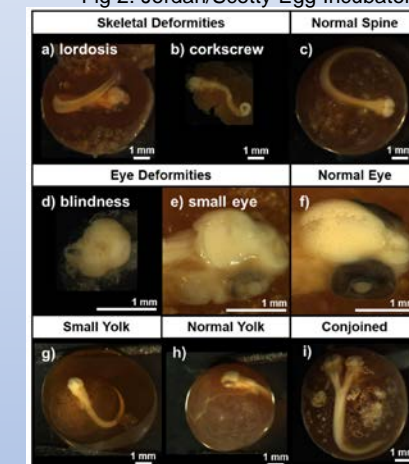


Fig 3: Deformity matrix (Annis et al, unpub)

Progress to date: PCA is complete and approx. 18,000 Atlantic Salmon embryos have been dissected. Expected completion date: September 2021

Acknowledgments:

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References: A. D. Annis, J. M. Lavery, J. Nafziger, P. Thoms & R. A. Cunjak. (2020, in preparation). Prevalence of deformed field-reared Atlantic salmon (*Salmo salar*) embryos from two cold regions river systems, New Brunswick, Canada.