

Theme 3, Project 3.5

Geospatial Risk Mapping - Relating Downstream Aquatic Species and Communities to Upstream Water Quality and Land Use in the New Brunswick Northumberland Straight Region

Julia Linke, Post Doctoral fellow

University of Toronto
julia.linke@utoronto.ca

Project team

Marie-Josée Fortin, University of Toronto – Supervisor
Andrew Chin, PhD Student, University of Toronto – co-investigator
Roland Cormier, Eco-Risk, Collaborator
Nigel Lester, Ontario Ministry of Natural Resources, Collaborator
Keith Somers, Ontario Ministry of the Environment, Collaborator



Abstract

Habitat quality of aquatic ecosystems is influenced by direct and indirect pressures across multiple spatial and temporal scales. Northeast New Brunswick has been host to a variety of extensive direct pressures (e.g. forestry, agriculture, roads) across space and time, while also supporting a vast network of streams and rivers draining into the Northumberland Straight. To support the active management of aquatic ecosystems, their vulnerabilities and risks need to be assessed not solely at the regional watershed level, but across the multitude of finer scales that they may operate under, requiring in turn the acquisition and development of spatio-temporally explicit data and techniques. The primary goal of this research is to determine the relative ecosystems. We focus on (1) estuarine nekton communities and water quality and (2) juvenile salmon abundance in headwaters and how both of these system components are a) linked to upstream water quality and b) impacted by “upstream” pressures across New Brunswick Northumberland Straight watersheds. The methods and models developed within the scope of this project will be applicable most environmental sciences dealing with spatial data and will help developing new expertise for managing spatially dynamic aquatic ecosystems. importance, and the key spatial scales, at which various pressures influence the vulnerability of these riverine

Keywords: estuary, forestry, juvenile salmon, landscape mapping and monitoring, nekton communities, Northumberland Straight, spatial statistics

Geographic Location: Northumberland Straight Study Region, New Brunswick, Canada: the study region covers 3.5 mha across all New Brunswick watersheds that drain into the Northumberland Straight.

How does your project link to Canadian aquatic ecosystem services?

This project works on developing techniques to assess and better understand the cumulative effects of pressures on indicator species and attributes of aquatic ecosystems (e.g. water quality, nekton communities, salmon populations), whereby the state of these populations and attributes in turn impacts various ecosystem services (e.g. provision service: drinking water; supporting service: water purification; cultural service: recreational fishing). As land-use management can mainly control direct pressures through policy, approaches to better understand their relative impacts on ecosystem components will subsequently enter into the improved understanding of the services they provide.