



## Theme 3, Project 3.2: Can watershed-based classification help explain patterns in fish mercury concentrations across Ontario and Quebec?



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### Project Team

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### Abstract

Aquatic ecosystems are complex systems that include numerous small tendrils of streams flowing into ribbons of rivers and chains of lakes; water flows are filtered by wetlands, interrupted by dams and reservoirs, and fed by precipitation and groundwater inputs. Aquatic classifications simplify these complex systems in the absence of data on every lake, river, or wetland by grouping functionally similar aquatic units together on the basis of current knowledge of these systems. Watershed boundaries subdivide continuous aquatic networks and their contributing land areas into manageable units for classification, measurement, comparison, and interpretation. These boundaries are based on topography (changes in elevation) and the direction of water flow to a specific point on a river, lake, wetland, inlet or outlet. Watersheds are also referred to as catchments, basins, or drainage areas.

The goal of this research is to determine whether watershed-based ecosystem classification can be used to predict key aquatic services like the safe and sustained provision of food fisheries. The concentration and movement of mercury within a watershed and its uptake by fish are affected by a variety of complex factors including: climate and thereby fish growth rate; landcover (e.g., peatland cover); hydrology, lake size and position; and landuse change (e.g., forestry and mining). The ability to create baseline maps of expected mercury concentrations for food fish across all of Ontario and Quebec would serve the interests of industry, government, First Nations, subsistence and recreational fisheries. Geostatistical mapping or spatial interpolation is an established method used to make continuous predictions of environmental variables (e.g., of expected mercury concentration) at unsampled locations, but the assumptions of this method are violated in aquatic systems with directional flows that are restricted by lake, river, and watershed boundaries. Another goal of this research is to compare results using geostatistical mapping to results using watershed-based classification(s).

### Outcomes

This research will create effective scientific communication tools (i.e., maps, models, and research papers) that will help describe the current state of knowledge about aquatic ecosystems and baseline mercury loadings across watersheds in the Provinces of Ontario and Quebec. The work will draw attention to various issues: the distribution of safe fish for consumption; knowledge gaps; potential high risks areas in northern regions; and the generation of working hypotheses about how these aquatic ecosystems behave.