

## HydroNet Component 1.1: Productive Capacity of Fish Habitats in Rivers

### Rationale:

The productive capacity of fish habitats is the maximum fish production rate that may be observed in a given aquatic ecosystem. This variable is central to the estimation of the effects of humans on ecosystems and to the implementation of the principle of 'no net loss'. The estimation and the modeling of the productive capacity of fish habitats are affected by practical and conceptual challenges.

### Description:

The objectives of the component ***Productive capacity of fish habitats in rivers*** (Lead: Daniel Boisclair, Université de Montréal) are to improve our ability to estimate and model metrics of the productive capacity of fish habitats in rivers. The productive capacity of fish habitats may depend on community (community structure), population (density, biomass), and individual (physiological responses) attributes. Hence, the main focuses of this component are on the estimation and the modeling of the effects of environmental conditions on: i) within- and among-river variations of metrics of the productive capacity of fish habitats (fish density, biomass, and community structure); and ii) indicators of the individual responses of fish (stress, growth).

### List of Student Projects related to this component:

- *Stress state of fish in hydro-peaking River: effects of heavy daily flow discharge in a top predator, Esox lucius (Northern pike)*– Simonne Harvey-Lavoie (Ph.D., Université de Montréal)
- *Ecological effects of flow and temperature regimes on fish populations* – Camille Macnaughton (Ph.D. Université de Montréal)
- *Exploring the uncertainty in the British Columbia Instream Flow Methodology in a steep mountain stream* – Dorian Turner (M.Sc. Simon Fraser University)

### Outcomes /Deliverables:

- Statistical models to explain, and eventually predict, variations of metrics of productive capacity of fish habitats within and among rivers using environmental conditions that may be affected by hydroelectric facilities as independent variables;
- Quantification of the individual responses of fish (stress, growth) to flow and water temperature regimes;
- Conceptual approaches to assess the effects of hydropower on the productive capacity of fish habitats.

### Benefits from this research:

This component aims at developing knowledge and tools that may facilitate the estimation and the prediction of the effects of hydroelectric facilities on the productive capacity of fish habitats, and hence, the decision-making process that relates to the implementation of the principle of 'no net loss'.