Mesoscale modelling of the productive capacity of fish habitats in lakes and reservoirs.

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Accurate estimation of metrics of the productive capacity of fish habitats is crucial to the assessment of the effects of hydropower of fish communities. The general objective of this project is to contribute to the development of methods aimed at estimating metrics of productive capacity in lakes and reservoirs. This project is based on the view that ecosystems consist of mosaics of habitat patches that play different roles for different species and life-stages. Changing water levels in lakes or reservoirs may not only modify total wetted area but the size, the spatial structure, and the proportion of habitat patches. It therefore appears potentially useful to develop modelling approaches in which habitat patches are explicitly considered. The specific objectives of this project are: 1) to identify what sampling method/combination of sampling methods may be best to estimate metrics of the productive capacity of fish in the littoral zone; 2) to assess the relative roles of local, lateral, and contextual variables on metrics of the productive capacity of littoral habitats; 3) to evaluate the potential difference between estimates of productive capacity obtained on the littoral zone during the day and the night; 4) Document the utility of using the concept of guilds of fish to improve the explanatory power of models of the productive capacity of fish habitats in the littoral zone. Results of the 2011 sampling season suggest that the 3 preferred sampling methods to study the littoral zone should be gill nets (no more than 3-4 h of continuous sampling to minimize mortality and maximise the capacity to associate catch to habitat use by fish), seining, and boat electrofishing. Given the size of the study ecosystems it may be strategically preferable to intensively study (76 sampling sites per lake) only one ecosystem (Lac du Bonnet, a reservoir managed by the industry partner of this project, Manitoba Hydro). The preliminary study of habitat structure indicates that the littoral zone of Lac du Bonnet comprises no more than 5-6 littoral habitat types. The sampling design for summer 2012 will be developed using this information.