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

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Canadians expect to have access to healthy aquatic ecosystems and to benefit from the advantages provided by the production of renewable energy, such as hydroelectricity. Numerous regulations are aimed at protecting aquatic ecosystems. One of these regulations is Fisheries and Oceans Canada’s *Policy for the Management of Fish Habitat*. The «No Net Loss» of the productive capacity of fish habitats is the guiding principle of this policy. Compliance with this guiding principle implies the estimation of metrics of the productive capacity of fish habitat before a perturbation and the prediction of these metrics after the perturbation. Rivers, lakes, and reservoirs may be perceived as a mosaic of tiles possessing different environmental conditions. These tiles, hereafter referred to as mesohabitats, may play different purposes (*e.g.* areas for growth, survival, or reproduction) for different combinations of species and life-stages. When natural rivers or lakes are transformed into regulated rivers or reservoirs, specific mesohabitats are modified, some may disappear, and others may be created. The net effect of the development of hydroelectric facilities is therefore a result of the cumulative biological consequences for fish and the balance between mesohabitat modification, destruction, and creation. The specific objectives of this project are: 1) to augment our understanding of the role played by different types of mesohabitats in the littoral zone of lakes and reservoirs for a complete suite of fish species and life stages; 2) to gain knowledge of the daily variation of littoral habitat use in different types of mesohabitats; and, 3) to compare the relative performance of different sampling gears that may be used to develop predictive mesohabitat models in the littoral zone of lakes and reservoirs. The study, supported by Manitoba Hydro, will be conducted in one lake (Lake Manigotagan) and one reservoir (Lac du Bonnet) in Manitoba. The fish community of the littoral zone will be sampled day and night using gill nets, Fyke nets, seines, and electrofishing boats (in collaboration with Manitoba Water Stewardship and Fisheries and Oceans Winnipeg). The sampling conducted in the littoral zone will be complemented by surveys performed in the pelagic zone using hydroacoustics (in collaboration with George Rose, MUN). This study is expected to improve our ability to estimate and predict the productive capacity of lakes and reservoirs.