Using Hydroacoustics to Spatially Quantify Productive Capacity in Freshwater Ecosystems

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Abstract

Hydroacoustics is a technology that has long been used in fisheries stock assessments in the marine environment, and is increasingly being used to assess fish stocks and productive capacity in freshwater environments. Many authors have claimed that the lack of reliability of assessments using traditional passive netting techniques demands an alternate approach, and that such passive tools should be used in a supplementary fashion with active observation techniques such as hydroacoustics. An appropriate combination of these assessment tools provides a relatively complete and accurate picture of the aquatic ecosystem allowing for a better understanding of productive capacity over multiple spatial scales. Acoustic surveys performed in Lac du Bonnet, Manitoba were undertaken in the summer of 2011 to obtain information about productive capacity in a reservoir system affected by hydropower. Fish abundances and densities were mapped throughout the pelagic portion of the large reservoir using Echoview 5.1 software. Plankton samples were collected haphazardly throughout the survey area in regions where unique acoustic signals were obtained, and spatial relationships between fish and plankton were assessed with GIS. The challenge of species identification with hydroacoustics was overcome by assessing productive capacity and energy flux through the ecosystem based on the body size-abundance relationship of fish of different sizes. Hydroacoustics, along with a limited amount of gill-netting, proved to be an informative method of assessing the productive capacity of the reservoir.