## FUTURE NEEDS FOR SURVEY METHODS OF FISHERIES RESOURCES

## S.J. Smith

Department of Fisheries & Oceans, Bedford Institute of Oceanography, Dartmouth, NS, Canada

## <sup>†</sup>E-mail: smithsj@mar.dfo-mpo.gc.ca

Marine surveys for fishery resources by government and other fishery agencies have been used since the late 19th century to explore fishing grounds and test catching technology. Starting in the 1960s, large scale annual surveys for estimating size composition and abundance were introduced in many jurisdictions to provide information for fisheries management based on catch limits.

While the type of survey design and estimation approach is usually a function of the population(s) and habitats being sampled and the gear used to do so, debates about which general approach to take often centre on the properties of relative bias and precision. Survey estimates are often used as input data to fisheries population models and bias and precision evaluations are used as quality control measures when evaluating goodness-of-fit properties of these models. Bayesian forms of population dynamic models are becoming more common and proposals have been made to incorporate estimates of survey precision directly into the models. As a result there has been much focus on identifying, quantifying and summarizing all components of uncertainty associated with these estimates.

The real challenge for survey design research in the future will be dealing with the new technologies that are being proposed or being used right now. Towed body or autonomous selfpropelled submersible video camera platforms offer means of covering large areas of bottom without the issues of gear selectivity associated with trawl sampling or species identification problems associated with acoustic sampling. Acquisition of information on bathymetry, surficial geology and habitat data from multi-beam sounders used for cartography offers high density ancillary data that could drive developments in the application of models (e.g., empirical likelihood, predictive estimation) to traditional design-based survey estimation.