

Smith Sound Acoustic Surveys

The province is committed to enhancing our knowledge of cod stocks off Newfoundland and Labrador (NL). The Department of Fisheries and Aquaculture (DFA) therefore supports the Smith Sound acoustic surveys that track migration and spawning patterns of Northern cod. This research, conducted by Dr. George Rose and his research team at the Marine Institute of Memorial University of Newfoundland, provides valuable information that will help ensure the sustainable and responsible management of Northern cod.

Northern cod was once one of the world's largest cod stocks and supported a major fishery in NL for over 500 years. However, Northern cod declined to low levels in the 1980's and in 1992 was placed under a directed fishing moratorium. While limited growth has allowed for some fishing in inshore areas, the stock remains well below historical levels.

Historically, the bulk of the Northern cod stock overwintered in the offshore areas of Northeast Newfoundland and Southern Labrador, with small aggregations overwintering in the inshore coastal areas. However, in April 1995, a large aggregation of spawning cod was unexpectedly detected in Smith Sound, a narrow inlet in western Trinity Bay. Acoustic surveys using scientific echo-sounders were subsequently conducted in the Sound. These surveys determined that during the 1990's, cod in Smith Sound was the largest known overwintering aggregation of coastal Northern cod.

Due to a lack of funding, the long-term acoustic survey in Smith Sound was suspended in 2005. Recognizing the importance of these surveys in understanding the dynamics of the Northern cod stock, in 2006 DFA funded its continuation through the Cod Recovery Strategy. Since then, DFA has provided annual funding towards this research.



Figure 1: Samples of cod are collected during acoustic surveys in Smith Sound to provide information on size and other factors such as age and reproductive potential.

Dr. Rose conducts these surveys at various times throughout the year, with particular emphasis on the over-wintering and spawning periods. The surveys provide information on the distribution, growth, health, and movement of Smith Sound cod. Acoustic data provides an annual biomass estimate of cod in this inshore area. Cod samples are also collected during the surveys which provide biological data on sizes, age, reproductive potential, and feeding habits.

The results of the acoustic surveys in Smith Sound have contributed to Fisheries and Oceans Canada's annual scientific assessments of the Northern cod stock. These surveys thus contribute to our understanding of the Northern cod resource, which is critical to ensuring its sustainable management.



Figure 2: Dr. George Rose conducting an acoustic survey using the *RV Gecho II*, a new inshore research vessel that was custom built to conduct acoustic surveying and other fisheries research activities in coastal NL.

Results

The Smith Sound acoustic surveys have provided insight into the migration and spawning patterns of the inshore components of the Northern cod stock. Acoustic data suggests that each year, cod typically overwinter in the deep waters of the sound. Some fish appear to remain in Smith Sound all year, but the majority moves north to Bonavista Bay in late spring and returns to Smith Sound in the fall. Cod spawning in Smith Sound occurs during the spring and summer of each year.

The surveys have also provided insight on biomass trends of cod in Smith Sound over the past decade. In 2001, biomass increased to a peak of about 26,000 tonnes(t) but then declined to 18,000t in 2004. Biomass indices were stable in 2006 at 16,500-18,500t, but declined to 14,000t in 2007 and to 7,200t in 2008. The estimated biomass from surveys conducted in 2009, 2010 and 2011 were much lower (600t, 300t, and 449t, respectively). Low exploitation rates from tagging and high survival rates of acoustically tagged cod were also observed during this period. This suggests that the recent biomass decline of cod in Smith Sound likely reflects a redistribution of some overwintering cod, and is not solely due to the combined effects of fishing and natural mortality.