

Self-sampling of the Norwegian Springs Spawning Herring fishery – optimizing data collections to achieve sufficient precision in stock assessments

Sondre Aanes and Jon Helge Vølstad

Norwegian Computing Center, P.O. Box 114 Blindern, 0314 Oslo, Norway

Institute of Marine Research, P.O. Box 1870 Nordnes, 5817 Bergen, Norway

ABSTRACT

The quotas for Norwegian spring spawning herring (NSSH) (*Clupea harengus*) are shared among Norway, Iceland, Russia, Faroe Islands and EU. The Norwegian fishing fleet landed 254 658 tons out of a total quota of 419 000 tons in 2014, and the total quota for 2015 was reduced to 283 013 tons, with 172 638 tons allocated to Norway. The International Council for the Exploration of the Sea (ICES) has assessed the NSSH stock annually using Virtual Population Analysis (VPA), and has reported estimates of fishing mortality (F) and SSB without any measures of precision. The most important input data to the stock assessments comes from the ICES coordinated international ecosystem survey in the Nordic Seas (IESNS) and biological sampling of catches from the commercial fishery. Time series derived from biological sampling of commercial catches and scientific abundance surveys are critical to stock assessments and quota advice. Such long-term monitoring is costly, and it is therefore crucial to employ cost-effective survey designs and efficient estimators to minimize errors. In this paper we use sampling theory and the statistical assessment model chosen by ICES WKPELA 2016 to quantify how precision in estimates of SSB and F estimates depends on the precision of input data on catch and relative abundance indices by age (cohorts) from monitoring programs. Using empirical self-sampling data from Norway we estimate how many catch samples and otoliths per catch that are required across vessels and fishing operations to achieve sufficient estimates of SSB and F for the stock.