



## Term of Reference 1: Scientific and Technical Approach to Fishery Stock Assessment Model

### Summary

The Northeast Fisheries Science Center (NEFSC) uses standard and customized versions of models that are found in the NOAA Fisheries Toolbox, an online suite of software programs used in peer-reviewed stock assessments in the U.S. and globally. The majority of the data-rich target species are based on the Age Structured Assessment Program (ASAP) Virtual Population Analysis (VPA) framework. ASAP is a statistical catch-at-age model which incorporates fishery dependent and fishery independent data such as abundance indices and length and age composition in one statistical framework while VPA is commonly used when catch at age is known well. Both models are able to produce estimates of spawning stock biomass and annual catch limits and to estimate the uncertainty around those quantities.

For more data-limited situations, a variety of methods exists to set annual catch limits. Statistical Catch at Length (SCALE) is an age based model tuned to length information. An Index Method (AIM) relies on only a time series of relative abundance and catch to determine a relative fishing mortality rate that will allow the stock to replace itself. Customized assessments include Atlantic sea scallop which takes advantage of the historical size information available on each shell to create a truly length-based assessment. In all cases, annual catch limits can be generated.

Assessment modeling at NEFSC is constantly evolving. An update of ASAP was recently created which allows inclusion of environmental covariates for many estimable parameters. NEFSC scientists played a leading role in the recent ICES World Conference on Stock Assessment Methods by generating simulated data for researchers around the world. The stock assessment scientists at the Center work collaboratively to develop and improve each assessment through the SAW/SARC process. This collaboration allows transfer of knowledge from one assessment to another and improves development of new approaches. Multiple NEFSC scientists are on national and international assessment working groups, and their participation helps foster collaboration and the infusion of alternative methods at the NEFSC. The use and development of NOAA Fisheries Toolbox programs keeps the Center up to date to what many scientists are using nationally and internationally. However, custom models are used when the data or situation requires such an approach. Many assessment scientists are also adjunct faculty at universities and serve on graduate committees for projects related to new developments in stock assessment.