An Essential Fish Habitat (EFH) 5-yr review presentation was given by John Olson (NMFS-AFSC), Chris Rooper (NMFS-AFSC), and Brad Harris (Alaska Pacific University). Public testimony was provided by John Warrenchuk (Oceana).

The SSC reviewed the document, "Defining EFH for Alaska Groundfish Species using Species Distribution Modeling", that demonstrated the use of distribution models and proposes to use the distribution modeling framework to refine descriptions of essential fish habitat on a regional level for three Alaska regions (eastern Bering Sea, Aleutian Islands and Gulf of Alaska). Where possible, authors propose utilizing available life history information to provide descriptions of essential fish habitat for the different life stages of each species or species group.

The authors described four levels of species descriptions included in the EFH mandate. In the previous EFH assessment, species were described at Level 1 where the 95% of each species distribution range was determined using cumulative survey data and observed catch per unit effort. The species distribution modeling framework, as proposed by the authors, will provide data driven predictions of the 95% species distribution range, moving the species descriptions to Level 2, and will promote the possibility of habitat-based modeling in stock assessments. The authors propose using habitat measurements widely available from remote sensing, long-term monitoring programs at the AFSC such as survey catches (bottom trawl, but also pelagic surveys and ichthyoplankton surveys) since 1991 to provide a summer snapshot of each species', and/or species' life stage, distribution. Authors will use the best available data (presence/absence, or abundance data) for each species or species life stage. Expected products from the study include:

- a NOAA Technical Memorandum that describes the individual species modeling results, with maps of the distribution of each species in each region for all life history stages where modeling can be accomplished,
- ArcGIS coverages for each species, region and life history stage that can be incorporated into SAFE documents and used for further analyses, and
- a manuscript describing the general methodology and results for publication in a peer-reviewed journal.

The SSC supports the use of species distribution modeling for predicting species distribution and we have the following suggestions and comments:

- Any limitations to the data used in the modeling should be explicitly described and confidence bounds on predictions included when possible. In cases where estimates of variability are not possible, including an author's recommendation as to what uses the model results can support (in terms of scale and data limitations) may be helpful since very few data are available to estimate most parameters.
- Due to changes in species' distributions over time, the SSC believes it is necessary to include survey data collected prior to 1991 when describing EFH, even if that means incorporating the data as presence/absence or describing them as of a different quality.
- The SSC believes that acoustic data should also be included when describing species distributions.

- The SSC believes it is important to include seasonal distributions when there are data available (including fishery data) to do so. Even though survey data are often not available in winter and fishery data may provide incomplete distributions, using fishery data may be useful to describe distributions in seasons other than summer would be extremely valuable, but may need to be acknowledged as minimum distributions.
- Because 95% of the species distribution is being used for defining EFH, the SSC encourages authors to check annual distributions to make sure that anomalous environmental conditions in a particular year do not result in a large amount of that year's data being excluded in the 5%.
- The survey data could be compared to the fishery data as an evaluation of the two data sets within the same season.
- For model predictions based on abundance data, contours or percentiles on the resulting maps would be useful for identifying species "hot spots".
- Model predictions that are based on presence/absence data from opportunistic surveys, or results from the literature may provide an incomplete description of a species distribution. In these cases, in may be necessary to use habitat association data (more than one variable may be necessary) to extrapolate the data to predict a more complete distribution. If this is done, delineating species distributions with and without extrapolation on the same map would be helpful.
- The SSC encourages authors to include information from the literature, in addition to data from AFSC surveys, to help describe EFH. The SSC acknowledges that literature information may be on a different scale that is not comparable in time and space to current data included in model, so encourages the authors to include literature information in whatever way they feel is possible.
- The SSC encourages authors to include organics in the sediment as a habitat characteristic in modeling. Because sediment organics relate to the presence of benthic animals that serve as prey for fish species, they may be a useful data source for EFH. Data on the distribution of sediment organics might be found in the literature and may require extrapolation to be used as a large scale predictor. Authors should consider how to incorporate sediment organics data, given that their distribution may change over time
- Defining EFH for pelagic species will continue to be challenging, but exploration of this issue may lead to better understanding.Producing a distribution map of all species combined would be a helpful addition to that of individual species. This could reveal which habitats and places are important for numerous species.
- Peer reviewed publications by Matt Baker and Dan Kotwicki have both examined overlapping distributions of species and ocean variables and might be helpful for reference.

Another document provided to the SSC, "Examination of the Fujioka fishing effects model: model formulation, implementation, and interpretation", provides an explanation of the Fujioka (2006) model and its implementation during the previous 2005 assessment of fishing impacts on essential fish habitat in Alaska. The model is a generic ocean-impacts analysis framework, compares the model and its implementation to the Swept Area Seabed Impact model (SASI) implemented by the New England Fishery Management Council. The document discusses how it could be used to evaluate alternative management options (e.g. area closures, gear modifications) to minimize adverse impacts of fishing on essential fish habitat. Finally, the document provides recommendations for updating the implementation of the Fujioka model to assess potential adverse impacts on essential fish habitat from commercial fishing gear.

The SSC supports the authors' recommendation to examine fishing effects on habitat under a schedule of time-varying fishing effort and urges the authors to carefully consider the appropriate time step (e.g. monthly, seasonally, annually, multi-year) with consideration of the data and habitat recovery rates. The SSC believes that moving to a time-discrete model would be a valuable advancement because, not only could fishing effort vary among time steps, but the productivity of the living substrate could also vary over time. In addition, using a time-discrete model would provide analysts with a covariate related to a fish life history that could allow them to evaluate the impact of habitat on fish species before populations decrease to a critical level, such as the minimum stock size threshold.

The SSC commends the authors on the work that has been done and attainment of funding grants to carry out the proposed work. Due to the extensive work required to complete these projects, SSC acknowledges that recommended analyses may not be completed within the timeframe originally predicted in the documents.