ICES International Council for the Exploration of the Sea
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Theme Session K

Further Habitat science to support stock assessment

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This theme session aimed to highlight real and theoretical examples of habitat-research activities, which are or could be used to improve stock assessment. Contributors were encouraged to present data, theories, methodologies and ideas, which would help to improve the accuracy of currently used stock assessment models; improve stock assessment through development of new models; and improve the design of data collection surveys.

Amongst the many interesting reports, some of the highlights included:

- SST data collected by satellite can show correlations with year class strength. This is related to availability of food in cold vs. warm years. This may be useful for anticipating effects of global warming on northeast arctic cod.
- Ecosystem modeling, e.g. Ecopath with Ecosim module, can be improved by incorporating habitat data. Also more traditional stock assessment models can be improved, if habitat data can refine the variables such as M, natural mortality.
- Knowledge about nursery areas is particularly important for many species. Nursery quality is therefore an important indicator of species success. Generalized Linear Models can offer possibilities to predict effects of habitat change on species recruitment.
- For many species, the early benthic stage is a critical period, as determined by juvenile mortality, which also increases with fishing effort. IBM modeling the effects of fishing on juvenile mortality can provide managers with guidance for setting catch quotas.
- Modeling the effects of water temperatue and depth on food web dynamics has been used to forecast distribution of cod. This relationship also may help to anticipate effects of climate change on fish and fisheries.
- Isotope analyses on otoliths provide information on feeding areas, i.e. elucidates the dependence of species on specific geographic areas.
- Pelagic habitat volume can be modeled using a modifed ROMs approach and environmental parameters including circulation patterns. This approach can be extremely helpful in the stock assessment process and depends upon determining the limiting environmental variable such as oxygen concentration determining habitat suitability.

- Temporally and spatially small-scale mechanistic studies can provide important insights into the role of habitat on species recruitment. The approach can be scaled up geographically with the help of broad-scale hydrographic, e.g. IOOS, data. In time periods of relatively strong hydrographic deviation from the mean (= anomaly), it appears that local determinants of recruitment can be overridden by broader scale hydrographic changes. This may lead to a boom or bust scenario.

Overall it is clear that improved approaches to stock assessment would benefit from inclusion of a consideration of life history stages and their habitat needs. Clearly, promoting communication between fisheries scientists and ecologists can be an important factor in translating habitat science into products supporting stock assessment. Habitat features need to be mapped. Surrogates (like depth and latitude) are increasingly being replaced with real data, and new technologies make the job easier. One major goal is to predict abundance from habitat features. Habitat data can indicate what the capacity of the system is under ideal conditions, and stock assessments therefore can also support assessments of impacts from human activities including fisheries.