Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management

NORTHERN SHRIMP

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Fishery-Dependent Priorities

High

- Evaluate selectivity of shrimp by traps and trawls
- Continue sampling of the northern shrimp commercial fishery, including port, sea, and RSA sampling to confirm, and if necessary update, the length-frequency of the species and identify any bycatch in the fishery

Moderate

- Conduct a study comparing the effectiveness of the compound grate versus the double-Nordmore grate

Fishery-Independent Priorities

High

- Continuing sampling through summer shrimp survey despite the current low abundance of shrimp and the closure of the shrimp fishery in 2013

Moderate

- Explore ways to quantify age 1 and younger shrimp
- Adapt the current model-based approach for estimating trawl biomass indices to estimates of length structure
- Evaluate potential benefits of re-stratification of the ASMFC Shrimp Survey. Two strata have already been dropped, and the remaining strata may be less optimal. Given the possibility that shrimp may move to deeper waters as surface waters warm, higher depth resolution of strata may be useful
- As the GOM northern Shrimp stock is the southernmost stock, it is highly likely to be sensitive to changing temperature regimes. If temperatures continue to increase, a substantial change in the spatial distribution of the stock may result. The current spatial distribution and potential changes in distribution should be explored, with a particular view to how the future data may inform subsequent model runs.

Modeling / Quantitative Priorities

High

- Continue research to refine annual estimates of consumption by predators, and include in models as appropriate
- Explore alternate forms of time-varying natural mortality, relaxing the current assumption of direct linear dependence of M_t on PPI
- Extend the current modelling approach to allow for directly estimating the functional relationship between M_t and PPI or other environmental factors
- Conduct more thorough evaluation and estimation of uncertainty and covariances (e.g., by either predicting data out of sample, resampling approaches to quantify the uncertainty in model predictions, evaluation of the impacts of effective sample size on model outputs, etc.)

Moderate

- Investigate growth parameters for the UME length-based model and the feasibility of adding a spatial-temporal structure to the model framework
- Improve representation of temperature and other environmental predictors on recruitment. Currently the variance scaler used for sensitivity tests assumes temperature and recruitment deviations have equivalent uncertainties, whereas the relationship between temperature and recruitment deviations could be directly estimated in the model

Low

- Develop a spatially-implicit model with length-specific mortality rates varying seasonally to determine what effects this might have on the fishery

Life History, Biological, and Habitat Priorities

High

- Investigate application of newly developed direct ageing methods to ground truth assumed ages based on size and stage compositions.
- Evaluate larval and adult survival and growth, including frequency of molting and variation in growth rates, as a function of environmental factors and population density.
- Study the effects of oceanographic and climatic variation (i.e., North Atlantic Oscillation) on the cold water refuges for shrimp in the Gulf of Maine.
- Explore the mechanisms behind the stock-recruitment and temperature relationship for Gulf of Maine northern shrimp.

Low

- Re-evaluate size-based relationships for maturity and fecundity which are used to expand fishery-independent data and to inform the model.

Management, Law Enforcement, and Socioeconomic Priorities

High

- Characterize demographics of the fishing fleet by area and season. Perform comparative analysis of fishing practices between areas.[1]
- Develop an understanding of product flow and utilization through the marketplace. Identify performance indicators for various sectors of the shrimp industry. Identify significant variables driving market prices and how their dynamic interactions result in the observed intra-annual and inter-annual fluctuations in market price for northern shrimp.
- Explore new markets for Gulf of Maine shrimp, including community supported fisheries.[2]
- Develop a framework to aid evaluation of the impact of limited entry proposals on the Maine fishing industry.[6,7,3]
- Develop a socioeconomic analysis assessing the importance of the northern shrimp fishery in annual activities of commercial fishing.
- Determine the relative power relationships between the harvesting and processing sector and the larger markets for shrimp and shrimp products.
- Develop an economic-management model to determine the most profitable times to fish, how harvest timing affects markets, and how the market affects the timing of harvesting.

Moderate

- Perform cost-benefit analyses to evaluate management measures.

[1] Dunham and Muller at the University of Maine conducted an economic study characterizing demographics of the fishing fleet by area and season in 1976. This study should be updated.

[2] Maine Fishermen's Forum panel discussions, 2006 and 2007

[3] Maine Coastal Fishery Research Priorities, 2001, online at http://www.maine.gov/dmr/research/table_of_contents.htm