Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management

WINTER FLOUNDER

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Coast Wide
Fishery-Dependent Priorities
High
- Increase the intensity of commercial fishery discard length sampling.
- Expand sea sampling to validate commercial discard estimates from VTR.

Fishery-Independent Priorities
Moderate
- Evaluate the maturity-at-age of fish sampled in inshore surveys (i.e., MEDMR, MADMF, NEAMAP, etc.).[1]
- Encourage support for Industry Based Surveys, which can provide valuable information on stock abundance, distribution, and catchability in research surveys that are independent of and supplemental to NMFS effort.

Modeling / Quantitative Priorities
Moderate
- Investigate the skipped spawning percentage for each stock and estimate inter-annual variation when sufficient data have been collected.

Low
- Develop mortality estimates from the American Littoral Society tagging data, if feasible.
- Explore use of a more complex Stock Synthesis model with small rates of migration between stocks.
- Revise the NEFSC assessment software to include the ability to model stock-recruit functions including environmental factors with errors/probabilities.
- Develop time series of winter flounder consumption by the major fish predators of winter flounder.
- Explore development of an index of winter flounder larval abundance based on MARMAP, GLOBEC, and other time series.

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[1] See McBride et al. 2013. Latitudinal and stock-specific variation in size- and age-at-maturity of female winter flounder, Pseudopleuronectes americanus, as determined with gonad histology. *Journal of Sea Research*. 75: 41-51.

Life History, Biological, and Habitat Priorities
High
- Focus research on quantifying mortality associated with habitat loss and alteration, contamination by toxins, and power plant entrainment and impingement. Examine the implications of these anthropogenic mortalities on estimation of YPR, if feasible.
- Conduct studies to delineate all major sub-stocks in terms of geographic spawning area and seasonal offshore movements (e.g., exposure to fishing pressure).[2,99]

Moderate
- Update and investigate migration rates between stocks and movement patterns. Investigate localized structure/genetics within the stocks.[98,3]

Low
- Conduct studies of flounder populations in impacted areas to quantify physiological adaptation to habitat alteration, and interactive effects, on an individual and population level.

Management, Law Enforcement, and Socioeconomic Priorities
High
- Investigate ways to improve compliance to help VTR. Currently about 300 of the 1,500 permitted vessels consistently under report the number of statistical areas fished.

Southern New England – Mid-Atlantic Stock Complex
Modeling / Quantitative Priorities
Low
- Quantify adult sex ratio to determine the possibility of population decline due to a skewed sex ratio.

Life History, Biological, and Habitat Priorities
Moderate
- Examine egg and larvae distribution and abundance to determine YPR to predict future biomass development for the fishery.
- Assess distribution of winter flounder during each life stage by conducting tagging methods, focusing on juvenile to adult life stages. This information would be useful for estimating YPR and helpful to find answers as to why recruitment is at a vulnerable state.[99]
- Examine winter flounder distribution, abundance, and productivity based on oceanographic and climate warming and how that impacts biomass for the fishery.

Low
- Examine predator-prey relationships due to increased populations of cormorants, seals, and striped bass (examine stomach contents of predators to get a better idea on the quantification of predation on winter flounder by these predators).

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[2] The most recent comprehensive tagging study was completed in the 1960's (Howe and Coates). Some telemetry work done in southern Gulf of Maine, see DeCelles and Cadrin 2010. Movement patterns of winter flounder (Pseudopleuronectes americanus) in the southern Gulf of Maine: observations with the use of passive acoustic telemetry. *Fisheries Bulletin*. 108: 408-419.

[3] See Fairchild et al. 2009. Using telemetry to monitor movements and habitat use of cultured and wild juvenile winter flounder in a shallow estuary. *Tagging and Tracking of Marine Animals with Electronic Devices*. 9: 5-22.

Georges Bank Stock
Fishery-Independent Priorities
High
- Examine maturity data from NEFSC strata on Nantucket Shoals and near Georges Bank separately from more inshore areas.[97]

Life History, Biological, and Habitat Priorities
High
- Investigate use of periodic gonad histology studies to validate maturity estimates, with particular attention to obtaining sufficient samples from the Georges Bank stock.[97]
- Conduct studies to better understand recruitment processes of winter flounder, particularly in the Gulf of Maine and on Georges Bank.

Moderate
- Further explore the relationship between large scale environmental forcing (e.g., temperature, circulation, and climate) for effects on life history, reproduction, and recruitment in the Georges Bank stock.

Gulf of Maine Stock
Fishery-Dependent Priorities
High
- Improve sampling for biological data (particularly hard parts for ageing) of commercial landings for winter flounder.
- Process archived age samples from surveys and commercial landings and develop analytical based assessments.[4]

Low
- Estimate and evaluate the effects of catch and release components of recreational fishery on discard-at-age.

Fishery-Independent Priorities
Moderate
- Evaluate size selectivity performance of survey gear compared to typical commercial gear and implications for estimation of commercial discards from research survey length frequency information.

Modeling / Quantitative Priorities
Low
- Evaluate the effects of smoothed length frequency distributions on the relationship between survey and commercial catches-at-length.

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[4] Maine DMR has archived winter flounder otoliths since 2002.

Life History, Biological, and Habitat Priorities
High
- Examine growth variations within the Gulf of Maine, using results from the Gulf of Maine Biological Sampling Survey (1993-94).[5]
- Conduct studies to better understand recruitment processes of winter flounder, particularly in the Gulf of Maine and on Georges Bank.

Moderate
- Further examine the stock boundaries to determine if Bay of Fundy winter flounder should be included in the Gulf of Maine stock complex.[98]

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[5] Biological data on winter flounder has been collected on the Maine DMR trawl survey from 2000-2008 and should be included.