

Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management

SUMMER FLOUNDER

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Fishery-Dependent Priorities

- Develop a program to annually sample the length and age frequency of summer flounder discards from the recreational fishery.¹
- A comprehensive collection of otoliths, for all components of the catch-at-age matrix, needs to be collected on a continuing basis for fish larger than 60 cm (~7 years). The collection of otoliths and the proportion at sex for all of the catch components could provide a better indicator of stock productivity.²
- Develop a reference collection of summer flounder scales and otoliths to facilitate future quality control of summer flounder production ageing. In addition, a comparison study between scales and otoliths as ageing structures for summer flounder should be completed.³
- Collect and evaluate information on the reporting accuracy of recreational discards estimates in the recreational fishery.⁴

¹ The SDWG noted that to date, ongoing programs are in place in the MRFSS/MRIP recreational sampling and the American Littoral Society (ALS). Most states have volunteer angler surveys (NC, VA, MD, NJ, NY, CT, RI, MA) which collect length of fish discarded (and landed) via several different methods (e.g., surveys, e-logbooks, etc.). Some progress has been made, but more synoptic data and potentially less biased data are needed including the length, age, and sex-frequency of discards.

² The SDWG noted that through a PMAFS study, 2 years of data collection has occurred to determine sex ratios in the commercial and recreational landings (Working Paper A13). This is not an ongoing study. One year of data collection has occurred to determine the sex of fish in the NJ state survey, and the MA state survey has had ongoing collection of sex data in their survey (2009-present). The Northeast region fishery sampling program now collects otoliths and scales for commercial landings, and is scheduled to start collecting individual weights.

³ The SDWG noted that an exchange of ageing structures between NEFSC and NCDMF was completed and a report was reviewed by the 2007 SDWG, in response to a 2005 SAW 41 high priority Research Recommendation. An additional exchange occurred between the NC-DMF and NEFSC in 2009. The SDWG notes that while the exchanges indicate that the current level of ageing consistency between NC and NEFSC is acceptable, there is a need to conduct and fund exchanges between all production ageing entities (e.g., NC, VIMS, ODU, NEFSC) using scales and otoliths more frequently, on a schedule consistent with benchmark assessments.

⁴ The SDWG noted that some research has been conducted on reporting accuracy in the recreational for-hire fishery (Bochenek et al. 2011); however, comprehensive work across all fishing modes has not been completed.

- Evaluate potential changes in fishery selectivity relative to the spawning potential of the stock; analysis should consider the potential influence of the recreational and commercial fisheries.⁵
- Use NEFSC fishery observer age-length keys for 1994 and later years (as they become available) to supplement NEFSC survey data in ageing the commercial fishery discard.
- Collect data to determine the sex ratio for all of the catch components.⁶
- Evaluate the size distribution of landed and discarded fish, by sex, in the summer flounder fisheries.
- Develop and ongoing sampling program for the recreational fishery landings and discards (i.e., collect age, length, sex) to develop appropriate age-length keys for ageing the recreational catch.

Fishery-Independent Priorities

- Collect information on overall fecundity for the stock, both egg condition and production, as a better indicator of stock productivity.⁷

Modeling / Quantitative Priorities

- Investigate trends in sex ratios and mean lengths and weights of summer flounder in state agency and federal survey catches.⁸
- Examine the sensitivity of the summer flounder assessment to the various unit stock hypothesis and evaluate spatial aspects of the stock to facilitate sex and spatially explicit modeling of summer flounder.⁹
- Determine the appropriate level for the steepness of the S-R relationship and investigate how that influences the biological reference points.
- Evaluate uncertainties in biomass to determine potential modifications to default OFL CV.
- Evaluate past and possible future changes to size regulations on retention and selectivity in stock assessments and projections.
- Incorporate sex -specific differences in size at age into the stock assessment.
- Apply standardization techniques to all of the state and academic-run surveys, to be evaluated for potential inclusion in the assessment.

⁵ The SDWG noted that some progress has been made on this topic in a report prepared for the MAFMC SSC describing a MSE for the recreational fishery.

⁶ The SDWG noted that through a PMAFS study, 2 years of data collection has occurred to determine sex ratios in the commercial and recreational landings (WPA13). This is not an ongoing study.

⁷ The SDWG noted that this recommendation has not been fully addressed and remains an ongoing data collection need. An ongoing study conducted by Dr. Chris Chambers (NOAA NMFS NEFSC Sandy Hook Laboratory) is examining summer flounder fecundity and egg condition.

⁸ The SDWG noted that these trends were examined in great detail for the federal surveys for this assessment (WPA1). MADMF surveys collect sex data. The VIMS NEAMAP surveys collect sex data.

⁹ The SDWG noted that progress has been made on aspects of this recommendation in WPA1, WPA8, WPA11, WPA12, and WPA15.

- Conduct sensitivity analyses to identify potential causes of the recent retrospective pattern. Efforts should focus on identifying factors in both survey and catch data that could contribute to the decrease in cohort abundance between initial estimates based largely on survey observations and subsequent estimates influenced by fishery dependent data as the cohort recruits to the fishery.
- Further work examining aspects that create greater realism to the summer flounder assessment (e.g., sexually dimorphic growth, sex-specific F, differences in spatial structure [or distribution by size?]) should be conducted. This could include:
 - a) Simulation studies to determine the critical data and model components that are necessary to provide reliable advice, and need to determine how simple a model can be while still providing reliable advice on stock status for management use, and should evaluate both simple and most complex model configurations.
 - b) Development of models incorporating these factors that would create greater realism.
 - c) These first steps (a or b) can be used to prioritize data collection, and determine if additional investment in data streams (e.g., collection of sex at age and sex at length and maturity data from the catch, additional information on spatial structure and movement, etc.) are worthwhile in terms of providing more reliable assessment results.
 - d) The modeling infrastructure should be simultaneously developed to support these types of modeling approaches (flexibility in model framework, MCMC/bootstrap framework, projection framework).
- Develop methods that more fully characterize uncertainty and ensure coherence between assessments, reference point calculation and projections.

Life History, Biological, and Habitat Priorities

- Examine the male to female ratio at age-0 and potential factors (e.g., environmental) that may influence determination of that ratio.¹⁰
- Conduct further research to examine the predator-prey interactions of summer flounder and other species, including food habitat studies, to better understand the influence of these other factors on the summer flounder population.¹¹
- Evaluate range expansion and change in distribution and their implications for stock assessment and management.
- Continued evaluation of natural mortality and the differences between males and females. This should include efforts to estimate natural mortality, such as through mark-recapture programs, telemetry.

¹⁰ The SDWG noted that the male female ratio has been updated for the NEFSC surveys. The SDWG reviewed information in Luckenbach et al. 2009 which describes potential environmental factors that may affect sex ratios at age-0.

¹¹ The SDWG noted that WPA1 reviewed food habits data available on summer flounder predators and prey. The SDWG concludes that the data are not sufficient to estimate predator consumption of summer flounder and has not attempted to estimate summer flounder consumption of prey.

- Develop comprehensive study to determine the contribution of summer flounder nursery area to the overall summer flounder population, based off approaches similar to those developed in WPA12.
- Continue efforts to improve understanding of sexually dimorphic mortality and growth patterns. This should include monitoring sex ratios and associated biological information in the fisheries and all ongoing surveys to allow development of sex-structured models in the future.

Management, Law Enforcement, and Socioeconomic Priorities

- Consider use of management strategy evaluation techniques to address the implications of harvest policies that incorporate consideration of retrospective patterns (see ICES Journal of Marine Science issue of May 2007).¹²

Previous Research Recommendations

Full Citation: Atlantic States Marine Fisheries Commission. 2013. Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management. Special Report # 89. ASMFC, Arlington, VA. 58pp.

Fishery-Dependent Priorities

High

- Develop a program to annually sample the length and age frequency of summer flounder discards from the recreational fishery.
- Collect and evaluate information on the reporting accuracy of recreational discard estimates in the recreational fishery.
- Conduct more comprehensive collection of otoliths, for all components of the catch-at-age matrix, on a continuing basis for fish larger than 60 cm (~7 years). The collection of otoliths and the proportion at sex for all of the catch components could provide a better indicator of stock productivity.
- Develop a reference collection of summer flounder scales and otoliths to facilitate future quality control of summer flounder production ageing. In addition, a comparison study between scales and otoliths as ageing structures for summer flounder should be completed.¹³

¹² The SDWG noted that given the retrospective pattern has changed since this recommendation was developed (i.e., smaller and less problematic), this recommendation is no longer considered relevant by the SDWG.

¹³ The SDWG reported that an exchange of aging structures between NEFSC and NCDMF was completed and a report was reviewed by the 2007 SDWG, in response to a 2005 SAW 41 high priority Research Recommendation. The SDWG noted that while the Fall 2006 ageing exchange between NC-DMF and the NEFSC indicated that the current level of ageing consistency between NC and NEFSC is acceptable, there is a need to conduct and fund these exchanges more frequently, on a schedule consistent with benchmark assessments.

- Examine mesh selectivity patterns for a range of commonly used mesh sizes greater than the currently mandated sizes (5.5 Diamond/6 inch square).¹⁴
- Continue to collect and analyze age-length samples and CPUE data from the commercial and recreational fisheries throughout the range of summer flounder.

Moderate

- Research directed at evaluating the mesh exemption program should be continued, with increased sample sizes to allow reliable statistical testing of results.
- Use NEFSC fishery observer age-length keys for 1994 and later years (as they become available) to supplement NEFSC survey data in ageing the commercial fishery discard.
- Undertake research to determine hooking mortality on summer flounder by circle, kahle, and regular “J” hooks and make the results of work already completed available to the Management Board.
- Collect data to determine the sex ratio for all of the catch components.
- Develop fish excluder devices to reduce bycatch of immature flatfish in fisheries that target species other than flounder.

Fishery-Independent Priorities

High

- Collect information on overall fecundity for the stock, both egg condition and production, as a better indicator of stock productivity.¹⁵
- Continue fishery-independent surveys and expand existing surveys to capture all sizes and age classes in order to develop independent catch-at-age and CPUE should focus on YOY and the southern region.

Modeling / Quantitative Priorities

High

- Investigate trends in sex ratios and mean lengths and weights of summer flounder in state agency and federal survey catches.

¹⁴ This research should only be a high priority if managers want to change the commercial minimum size. This research should wait until changes in minimum size are anticipated so outdated research does not have to be updated.

¹⁵ The SDWG noted that observed change in the sex ratio in NEFSC survey samples may result in the SSB estimates not translating as directly to egg production since there are more males proportionally in those older age categories. While these trends have not been examined in the state survey catches, these trends were examined in the NEFSC spring, autumn, and winter survey data. Additional work to examine and explain these trends in greater detail should be conducted.

Low

- Examine the sensitivity of the summer flounder assessment to the various unit stock hypotheses and evaluate spatial aspects of the stock to facilitate sex and spatially explicit modeling of summer flounder.¹⁶

Life History, Biological, and Habitat Priorities**Moderate**

- Develop or determine stock identification methods via meristics, morphometrics, biochemical research, and tagging (particularly off Virginia and North Carolina).

Low

- Evaluate effects of dissolved oxygen and water current requirements for adult summer flounder and summer flounder eggs.
- Evaluate the relationship between recruitment of summer flounder to nursery areas and Ekman transport or prevailing directions of water flow.
- Examine male female ratio at age 0 and potential factors (e.g., environmental) that may influence determination of that ratio.
- Conduct the basic research necessary to develop land and pen culture techniques.
- Conduct further research to examine the predator-prey interactions of summer flounder and other species, including food habitat studies, to better understand the influence of these other factors on the summer flounder population.

Management, Law Enforcement, and Socioeconomic Priorities**Moderate**

- Consider use of MSE techniques to address the implications of harvest policies that incorporate consideration of retrospective patterns (see ICES Journal of Marine Science issue of May 2007).
- Conduct a detailed socioeconomic study of the summer flounder fisheries.

¹⁶ Current ASAP model lacks the capability to do sex and spatial modeling, so Stock Synthesis version of this approach (e.g., M. Maunder 2008 SAW 47 work) would be necessary. Above all, there is a lack of sufficient time series data to sex all catch and surveys, and lack of information on spatial movement and/or recruitment patterns.