

Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management

Spiny Dogfish

The following research priorities pertaining to spiny dogfish were identified in Special Report No. 89 of the Atlantic States Marine Fisheries Commission (2013) and are listed in the 2022 Spiny Dogfish Fishery Management Plan Review.

Fishery-Dependent Priorities

High

- Determine area, season, and gear-specific discard mortality estimates coastwide in the recreational, commercial, and non-directed (bycatch) fisheries.
- Characterize and quantify bycatch of spiny dogfish in other fisheries.
- Increase the biological sampling of spiny dogfish in the commercial fishery and on research trawl surveys.
- Further analyses of the commercial fishery is also warranted, especially with respect to the effects of gear types, mesh sizes, and market acceptability on the mean size of landed spiny dogfish.

Fishery-Independent Priorities

- Conduct experimental work on NEFSC trawl survey gear performance, with focus on video work to study the fish herding properties of the gear for species like dogfish and other demersal groundfish.
- Investigate the distribution of spiny dogfish beyond the depth range of current NEFSC trawl surveys, possibly using experimental research or supplemental surveys.
- Continue to analyze the effects of environmental conditions on survey catch rates.

Modeling / Quantitative Priorities

- Continue work on the change-in-ratio estimators for mortality rates and suggest several options for analyses.
- Examine observer data to calculate a weighted average discard mortality rate based on an assumption that the rate increased with catch size.

Life History, Biological, and Habitat Priorities

- Conduct a coastwide tagging study to explore stock structure, migration, and mixing rates.
- Standardize age determination along the entire East Coast. Conduct an ageing workshop for spiny dogfish, encouraging participation by NEFSC, North Carolina Division of Marine Fisheries (NCDMF), Canada DFO, other interested agencies, academia, and other international investigators with an interest in spiny dogfish ageing.
- Identify how spiny dogfish abundance and movement affect other organisms.

Management, Law Enforcement, and Socioeconomic Priorities

- Monitor the changes to the foreign export markets for spiny dogfish, and evaluate the potential to recover lost markets or expand existing ones.
- Update on a regular basis the characterization of fishing communities involved in the spiny dogfish fishery, including the processing and harvesting sectors, based upon Hall-Arber et al. (2001) and McCay and Cieri (2000).
- Characterize the value and demand for spiny dogfish in the biomedical industry on a state by state basis.
- Characterize the spiny dogfish processing sector.

From Northeast Fishery Science Center (NEFSC). 2022. Research Track Assessment of Northwest Atlantic Spiny Dogfish. Pp. 247.

1. Develop a consistent sampling program for ageing Atlantic spiny dogfish. Sampling should occur at minimum annually, and ideally include samples from both spring and fall seasons. Fish over the species' entire size range should be sampled. This includes near-term embryos, in order to assess timing, identification criteria, and spine base diameter at first annulus deposition to better inform ageing of young fish. It is also imperative to ensure that large spiny dogfish are obtained to get a better sense of maximum ages and inform parameterization (e.g., L_{∞} estimates). Lacking appropriate growth information will result in increased uncertainty in the assessment model's estimates of stock size and mortality rates. Such growth investigations should include size at birth and maturity, as those are intricately related to growth. Investigation into alternate ageing methods should continue, owing to the large uncertainty inherent in ages estimated from worn spines using current methods. Finally, improve routine cleaning protocols for spine sampling in order to reduce potential damage to spine enamel and enable more accurate ageing.
2. Continue exploration into the spatial distribution of spiny dogfish. Such work should expand upon the analyses discussed and presented herein regarding the environmental drivers on spiny dogfish movement by sex and size, and whether such relationships have resulted in changes in distribution over time. Directed research should also be conducted on the seasonal or intra-annual movement of spiny dogfish. Questions remain regarding what component of the spiny dogfish population exists outside of the federal trawl survey bounds off the shelf, and whether such biomass varies seasonally or interannually. Such knowledge will allow for informing survey catchability. If possible, exploring environmental correlations to the degree of on- and off-shelf distribution may allow for predicting this dynamic over time, and provide a catchability time series for stock assessment model use.
3. Further explore the sensitivity of the SS3 model parameterization and configuration.
4. Conduct directed studies that estimate discard mortality rates for spiny dogfish by commercial and recreational harvesting gear type.
5. Develop state-space models that can tune to lengths. Such a model is worth considering if/when the tools are developed within SS3. When available, a review of results from the State-Space Research Track Working Group should be conducted to evaluate the efficacy of developed tools for spiny dogfish.
6. Investigate prospective contributors to the decline in maturity over time for female spiny dogfish. Analyses could include but are not limited to assessing environmental drivers and harvest effects.
7. Coordinate a biological sampling program targeting spiny dogfish from additional locations and habitats outside those sampled by the NEFSC trawl surveys to understand the various factors that influence their life history (e.g., growth, maturity, fecundity)
8. Continue developing the VAST models presented to assess additional environmental variables that may influence abundance and distribution, and better predict the size composition for models that include multiple datasets.

9. Investigate datasets enumerating the abundance or diet of known spiny dogfish predators for comparison to natural mortality assumptions, and as potential proxies for dogfish natural mortality rates.