MEMORANDUM

DATE:	January 19, 2024
TO:	NEFMC and MAFMC
FROM:	Jenny Couture and Robin Frede, NEFMC Staff; Jason Didden, MAFMC Staff
SUBJECT:	**Sturgeon Framework Adjustment Alternative Packages**

The Sturgeon Bycatch Fishery Management Action Team/Plan Development Team (FMAT/PDT) developed four packages of alternatives that are designed to reduce Atlantic sturgeon bycatch. The packages use time/area closures and/or gear modifications based on the range of alternatives approved by both Councils in the fall of 2023. The FMAT/PDT also considered recent input from NMFS on bycatch reduction targets. The previous alternatives from the Councils could have resulted in tens of thousands of unique combinations, so four packages were constructed to create a reasonable range of alternatives that could be analyzed in time for April 2024 final action. The packages range from high to low impacts in terms of potential reduction in sturgeon bycatch and impacts to both fisheries. One package includes gear modifications only. The Councils may select any one of these alternatives, modify them, or create a hybrid option (e.g., a combination of multiple alternatives) leading up to final action. However, there will be minimal time for additional analyses before April 2024.

The subset of the draft Environmental Assessment includes the following information:

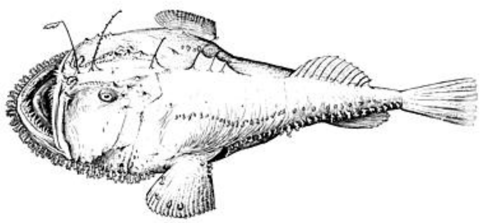
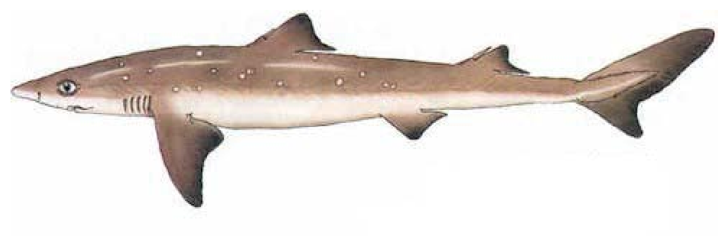
- Methods for determining the sturgeon bycatch polygons where time/area closures and gear restrictions would apply;
- Alternatives under Consideration including No Action; and
- Draft Affected Environment (subject to further revision)

Draft impact analyses will be presented to the Joint Monkfish and Spiny Dogfish Advisory Panel meeting (March 5th) and the Joint Monkfish and Spiny Dogfish Committee meeting (March 13th) where preferred alternatives will be identified.

Staff requests that the Councils review and endorse the current packages of alternatives for additional analysis and presentation to the Advisors and Joint Committee.

Joint Framework Action to Reduce Sturgeon Bycatch in Monkfish and Spiny Dogfish Fisheries

Monkfish Framework Adjustment 15
Spiny Dogfish Framework Adjustment 6

Environmental Assessment

Draft

January 26, 2024

Prepared by the

New England Fishery Management Council and the

Mid-Atlantic Fishery Management Council

in consultation with the

National Marine Fisheries Service

Document history

Initial Meetings:	April 18, 2023 (NEFMC)
	June 7, 2023 (MAFMC)
Final Meetings Planned:	April 9-11, 2024 (MAFMC)
	April 16-18, 2024 (NEFMC)
Preliminary Submission:	May X, 2024
Final Submission:	X, 2024

Cover image

NOAA image

MONKFISH AND SPINY DOGFISH FISHERY MANAGEMENT PLANS

MONKFISH FRAMEWORK ADJUSTMENT 15

SPINY DOGFISH FRAMEWORK ADJUSTMENT 6

Proposed Action:	Propose management measures to reduce sturgeon bycatch in the commercial monkfish and spiny dogfish fisheries to ensure compliance with the Endangered Species Act.
Responsible Agencies:	New England Fishery Management Council 50 Water Street, Mill #2 Newburyport, MA 01950 Mid-Atlantic Fishery Management Council 800 North State Street, Suite 201 Dover, DE 19901 National Marine Fisheries Service National Oceanic and Atmospheric Administration U.S. Department of Commerce Washington, D.C. 20235
For Further Information:	Cate O'Keefe, Executive Director New England Fishery Management Council 50 Water Street, Mill #2 Newburyport, Massachusetts 01950 Phone: (978) 465-0492 Fax: (978) 465-3116 Chris Moore, Executive Director Mid-Atlantic Fishery Management Council 800 North State Street, Suite 201 Dover, DE 19901 Phone: (302) 526-5255 Fax: (302) 674-5399

Abstract: The New England Fishery Management Council and the Mid-Atlantic Fishery Management Council, in consultation with NOAA Fisheries, have prepared Framework Adjustment 15 to the Monkfish Fishery Management Plan and Framework Adjustment 6 to the Spiny Dogfish Fishery Management Plan. This Environmental Assessment presents the range of alternatives to achieve the purpose and need of the action. The proposed action includes measures to reduce sturgeon bycatch in the commercial monkfish and spiny dogfish gillnet fisheries. This document describes the affected environment and valued ecosystem components and analyzes the impacts of the alternatives. This document also addresses other requirements of the National Environmental Policy Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Regulatory Flexibility Act, and other applicable laws.

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2.4 Acronyms and Wording Conventions

“	**inches**
ABC	**Acceptable Biological Catch**
ACL	**Annual Catch Limit**
ACT	**Annual catch target**
ASMFC	**Atlantic States Marine Fisheries Commission or Commission**

B	**Biomass**
BOEM	**Bureau of Offshore Energy Management**
CFR	**Code of Federal Regulations**
CV	**coefficient of variation**
DAH	**Domestic Annual Harvest**
DAP	**Domestic Annual Processing**
DAS	**Days at Sea**
EA	**Environmental Assessment**
EEZ	**Exclusive Economic Zone**
EFH	**Essential Fish Habitat**
EIS	**Environmental Impact Statement**
ESA	**Endangered Species Act of 1973**
F	**Fishing Mortality Rate**
FMP	**Fishery Management Plan**
FR	**Federal Register**
GB	**Georges Bank**
GOM	**Gulf of Maine**
M	**Natural Mortality Rate**
MAFMC	**Mid-Atlantic Fishery Management Council**
MMPA	**Marine Mammal Protection Act**
MSA	**Magnuson-Stevens Fishery Conservation and Management Act**
MSY	**Maximum Sustainable Yield**
MT (or mt)	**Metric Tons (1 mt equals about 2,204.62 pounds)**
MTA	**Management Track Assessment**
NE	**Northeast**
NEFMC	**New England Fishery Management Council**
NEFSC	**Northeast Fisheries Science Center**
NEPA	**National Environmental Policy Act**
NFMA	**Northern Fishery Management Area**
NMFS	**National Marine Fisheries Service (NOAA Fisheries)**
NOAA	**National Oceanic and Atmospheric Administration**
OFL	**Overfishing Level**
OY	**Optimum Yield**
PBR	**Potential Biological Removal**
RTA	**Research Track Assessment**
SFMA	**Southern Fishery Management Area**
SSC	**Scientific and Statistical Committee**
TAL	**Total allowable landings**
U.S.	**United States**
VTR	**Vessel Trip Report**

4.0 DRAFT ALTERNATIVES UNDER CONSIDERATION

The Councils considered the alternatives in this section. Alternatives considered but rejected are briefly described in Section 4.6. The four action alternatives are packages of time/area closures and/or gear restrictions for the federal monkfish and spiny dogfish fisheries. These alternatives are designed to represent a robust range of measures:

Alternative 1: No action.

Alternative 2: Higher impacts; time/area closures and gear restriction measures.

Alternative 3: Intermediate impacts; time/area closures and gear restriction measures.

Alternative 4: Lower impacts; time/area closures and gear restriction measures.

Alternative 5: Only gear restriction measures.

The Councils may select any one of these alternatives, modify them, or create a hybrid option leading up to final action (e.g., a combination of multiple alternatives). The alternatives were constructed as packages to allow for meaningful analyses of the impacts of the measures that might be implemented. Considering every possible combination would have resulted in tens of thousands of permutations that would have been impossible to analyze in a meaningful and timely manner. All packages cover multiple sturgeon take hotspots so that benefits to sturgeon and impacts to the fisheries are spread geographically across the various areas of higher sturgeon takes.

The time/area closures and gear restrictions would be implemented in both federal and state waters, however, the measures would only apply to vessels with a federal spiny dogfish or monkfish fishing permit. The Atlantic States Marine Fisheries Commission (ASMFC) is expected to consider complementary action to reduce sturgeon interactions by state vessels in state waters.

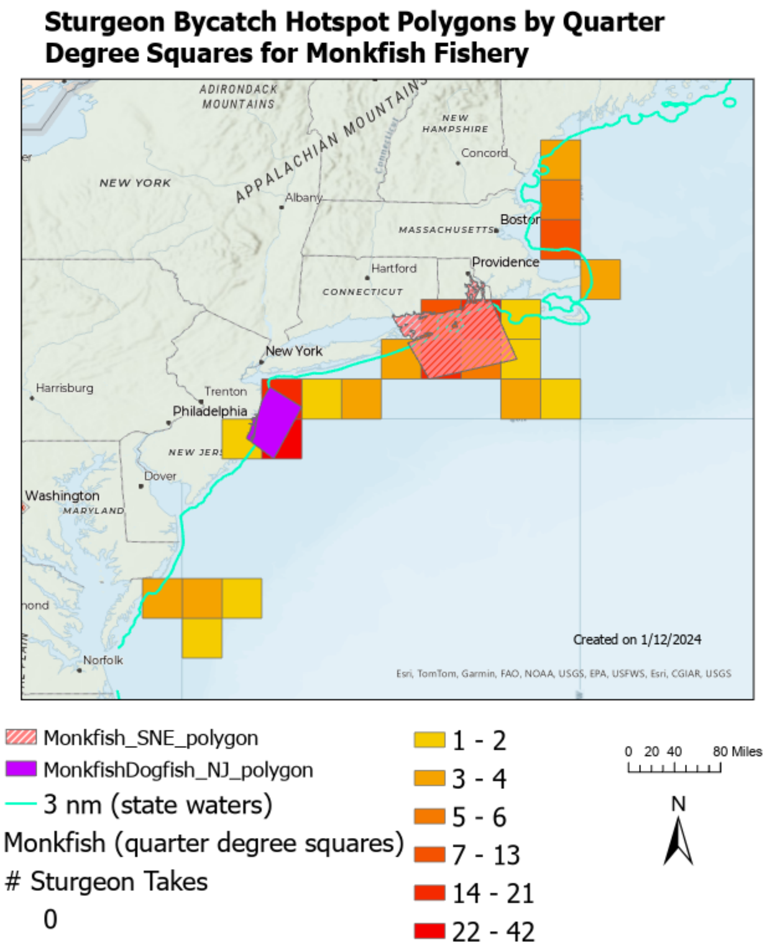
Methods for determining the sturgeon bycatch polygons where time/area closures and gear restrictions would apply

To map sturgeon take hotspots, sturgeon takes summed across 2017-2019 and 2021-2022 were quantified by 10-minute squares and shaded accordingly. Given these 10-minute squares represent confidential data, only quarter degree squares with shading are included in Figure 1 and Figure 2. The Councils were primarily interested in encompassing the bycatch hotspots with a 1-mile buffer approximately based on straight lines parallel to shore (estimating 6-9 miles offshore).

- Orange and red squares represent areas with higher takes, and groupings of these darker squares were considered hotspots. The edges of hotspots often appeared as yellow ten-minute squares.
- Boundaries of the polygons were drawn using the following criteria: If the outer-most edge of a hotspot cluster is an orange or red ten-minute square, the boundary line extends approximately one mile beyond the edge of the square. This allows for some buffer to address the potential for shifting effort. If the outer edge is a yellow ten-minute square, the boundary line is drawn at least approximately one mile out from the point where a take occurred in that yellow square. This was because yellow squares represented fewer takes and were often already on the edge of a hotspot rather than within a hotspot. Note that there are some instances where the boundary line is larger than 1 mile given the initial criteria to draw boundaries from the edges of the red and orange ten-minute squares.

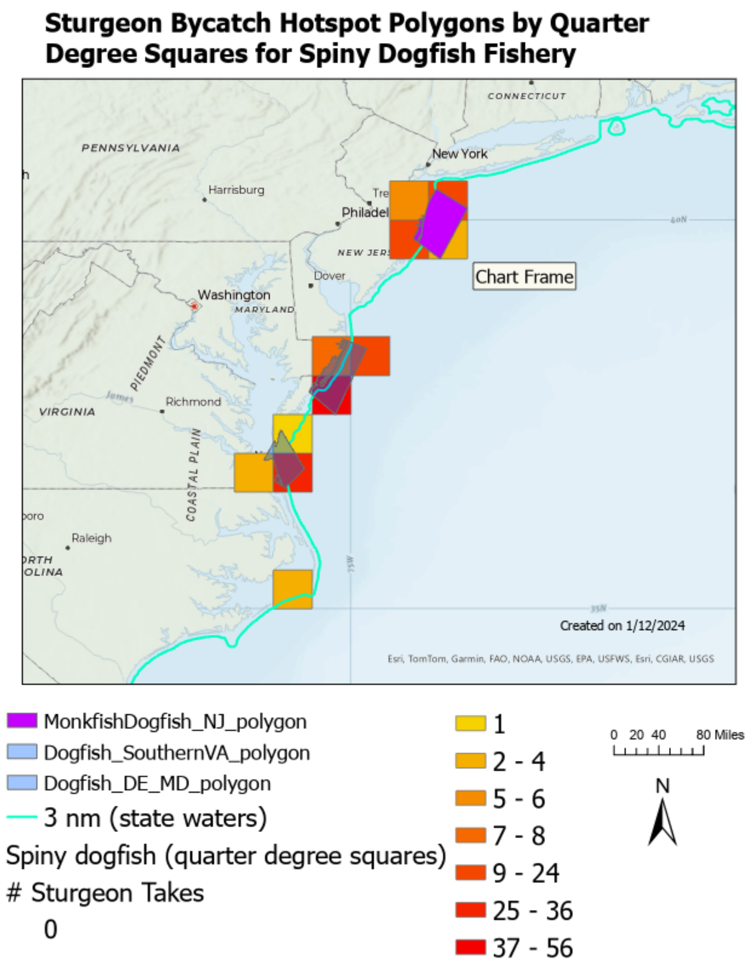
- The western area boundaries were clipped to the shore for all hotspot locations to prevent shifting effort into shallower state waters where there will likely be sturgeon present. Note, this Council action only applies to vessels with a federal fishing permit targeting monkfish and spiny dogfish in federal and state waters; ASMFC is expected to take complementary action for state only vessels fishing in state waters.
- The offshore portion of the polygon latitude and longitude values were then rounded to either the nearest 0.05 or 0.1 to help improve implementation of measures and enforcement.

Figure 1. Sturgeon bycatch hotspots in the monkfish fishery; shown as quarter degree squares due to data confidentiality.



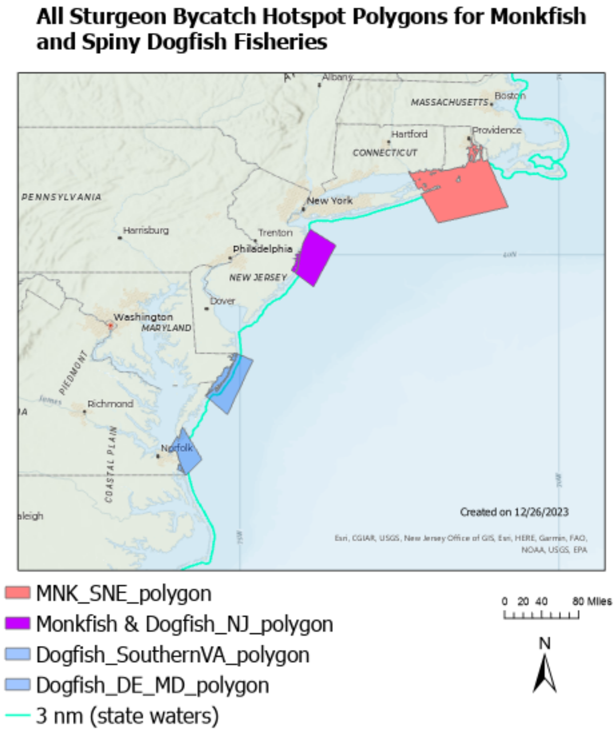
Source: 2017-2019 and 2021-2022 observer data

Figure 2. Sturgeon bycatch hotspots in the spiny dogfish fishery; shown as quarter degree squares due to data confidentiality.



Source: 2017-2019 and 2021-2022 observer data

Figure 3. All sturgeon bycatch hotspot polygons for the monkfish and spiny dogfish fisheries.



For monkfish gear measures, a January 1, 2026 implementation date is used, based on input from industry about the time needed to procure new gear with the required specifications. This delay would also allow for the Habor Porpoise Take Reduction Team to consider changes to minimum twine size requirements in the harbor porpoise regulations to potentially allow for an exemption for the low-profile gillnet gear which would use 0.81 mm versus 0.90 mm that is currently required for large-mesh gillnets (≥7”) in the Harbor Porpoise regulations during applicable months (January-April).

Note: observed sturgeon interactions were based on:

- Hauls where monkfish and spiny dogfish are caught and recorded by the observer as either TARG1 or TARG2 species for gillnet trips with mesh size ≥ 5 inches (” = inches for measurements hereafter). Monkfish and skate are caught on the same trip so it is important to include records where monkfish is not listed as the TARG1 species, for example. This is consistent with what was done in the Sturgeon Action Plan.
- Only records that denote ‘spiny dogfish’ as target species and exclude records for ‘smooth dogfish’ and ‘unknown’ records. Spiny dogfish is the only dogfish species managed by the MAFMC.
- Data subset by two mesh size groups: 1) ≥ 5” - < 7” and 2) ≥ 7” based on how the spiny dogfish and monkfish fisheries operate.
- Data from 2017-2019 and 2021-2022 were included to evaluate the most recent five years of observer data to adequately account for interannual variability, exclude 2020 when observer coverage was very low due to the global pandemic, and to help be consistent with the new Biological Opinion which is likely to use the same set of years.
- Data source: unpublished observer data and CAMS trip data from 2017, 2018, 2019, 2021, 2022.

There were **175** observed sturgeon takes in the **monkfish fishery** and *180* observed sturgeon takes in the *spiny dogfish fishery*, based on the previously described methodology and fishery definitions. In the alternative rationales below, the percent of observed sturgeon takes in a given month and polygon are based on the number of observed sturgeon takes in just the relevant fishery. For example, there were 6 observed sturgeon takes in the **monkfish** fishery in the SNE polygon in April, which represents 3% of total observed takes in the **monkfish fishery** (6 out of **175** total observed takes in the monkfish fishery).

Note: Low-profile gillnet gear mentioned below is defined based on research by Fox et al. (2012 and 2019) and He and Jones (2013) in New Jersey:

- Mesh size ranging from 12 to 13 inches,
- Net height ranging from 6 to 8 meshes tall,
- Net length of 300 feet,
- Tie-down length of at least 24 inches to 48 inches max[1],
- Tie-down spacing of 12 feet,
- Primary hanging ratio of 0.50,
- Twine size 0.81mm, and
- Net is tied at every float to keep float line down.

General Observer Coverage in Relevant Areas

The statistical areas that are most relevant for the polygons include 539, 537, 613, 612, 615, 614, 621, 625, and 631. For each statistical area, the number of commercial trips and the number of observed trips from [2017, 2018, 2019, 2021, 2022 (not 2020)] were tallied and compared. For spiny dogfish, commercial trips were tallied based on if spiny dogfish made up at least 40% of the landed weight. Monkfish commercial trip counts were based on landing monkfish and using ≥10" mesh. Tallies of observed trips were based on species targeted (target species 1 or 2 indicated as the relevant species). Trip counts and coverage levels for statistical areas near relevant polygons are provided for each fishery in Table 3 and Table 4.

Table 1. Spiny Dogfish Observer Coverage Summary.

Statistical Area	Polygon Proximity	Spiny Dogfish Commercial Trips	Spiny Dogfish Observed Trips	Percent Observer Coverage
612	NJ	591	61	10%
615	NJ	369	72	20%
614	NJ	626	105	17%
621	MD/VA	827	102	12%
625	MD/VA	1232	79	6%
631	MD/VA	2633	308	12%

Data source: unpublished observer data and CAMS trip data from 2017, 2018, 2019, 2021, 2022; accessed January 2024.

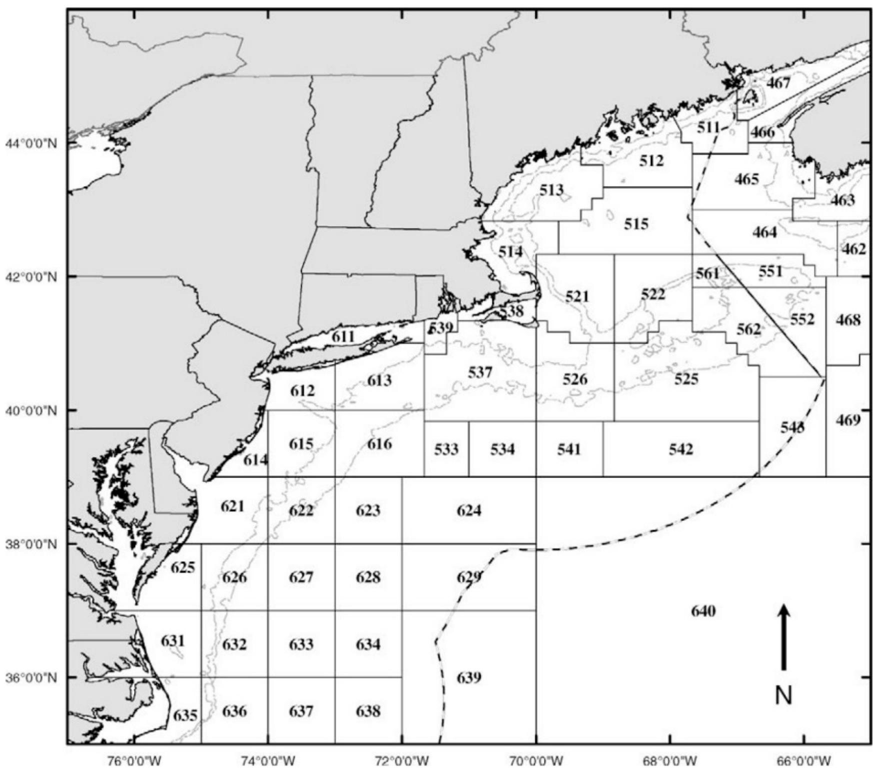
[1] The Harbor Porpoise regulations specify a 48" maximum tie-down length during the specified months; the FMAT wanted to accommodate these regulations and also enable ongoing/future research on testing low-profile gear with different tie-down lengths.

Table 2. Monkfish Observer Coverage Summary.

Statistical Area	Polygon Proximity	Monkfish Commercial Trips	Monkfish Observed Trips	Percent Observer Coverage
539	SNE	882	92	10%
537	SNE	3439	441	13%
613	SNE	2316	260	11%
612	NJ	772	86	11%
615	NJ	1229	136	11%

Data source: unpublished observer data and CAMS trip data from 2017, 2018, 2019, 2021, 2022; accessed January 2024.

Figure 4. NMFS Statistical Areas.



4.1 Alternative 1 - No Action

Under Alternative 1 (No Action), the current federal measures for the monkfish and spiny dogfish gillnet fisheries would remain – new measures to reduce sturgeon bycatch would not be implemented in 2024 through Council action. This alternative would not follow the sturgeon action plan's recommendation for developing measures to reduce sturgeon bycatch. The action plan laid out two possible paths to achieve a reduction in sturgeon bycatch by 2024. The recommended path was through action by the MAFMC and the NEFMC. Selection of Alternative 1 (No Action) by the Councils may mean that NMFS takes action via a second path, under ESA rule-making processes.

4.2 Alternative 2 – High Impact Sturgeon Package (Most Time/Area Closures and Gear Restrictions)

Under Alternative 2, there would be a broad array of time/area closures and gear restrictions for both the federal monkfish and spiny dogfish gillnet fisheries in the Atlantic sturgeon bycatch hotspot areas (Figure 5, Figure 6, Figure 7).

The time/area closures and the gear restrictions would apply to federal gillnet fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) using ≥10" mesh size and vessels with federal spiny dogfish permits using gillnet gear with mesh size of 5 - <10". Gear restrictions include a requirement for federal vessels targeting monkfish to use low-profile gillnet gear in the New Jersey bycatch hotspot polygon to be implemented on January 1, 2026.

The polygons where the closures and gear restrictions would apply are the same for both the monkfish and spiny dogfish fisheries off New Jersey to help simplify the measures and to acknowledge that sturgeon are caught in this area by both fisheries. There are two Delaware/Maryland/Virginia bycatch polygons because of the two concentrations of observed sturgeon takes. The observed sturgeon takes occurred during similar times of the year, thus, the same closure and gear restriction measures would be the same across both polygons.

More specifically, Alternative 2 includes the following time/area closures and gear restrictions:

<u>Vessels with a federal fishing permit targeting monkfish in federal and/or state waters</u>

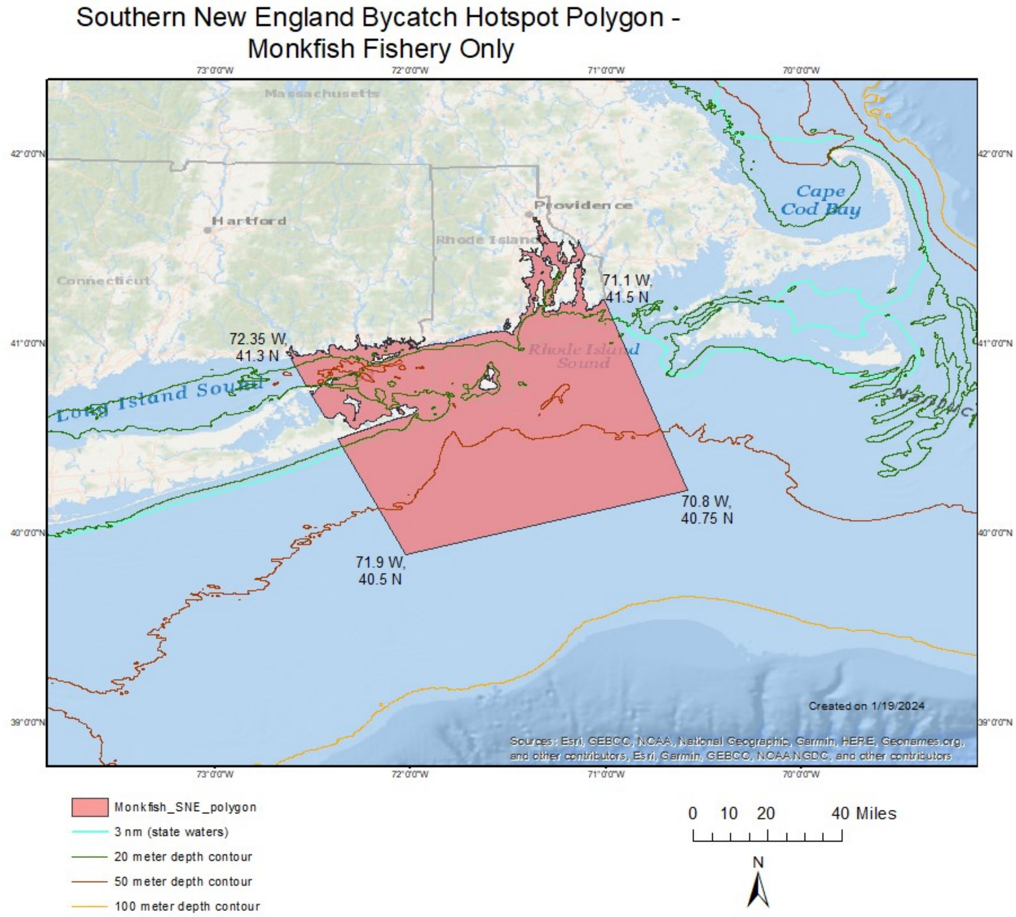
- Closure in Southern New England (SNE) bycatch hotspot polygon (Figure 5) during **April 1 – May 31**, and **December 1 – December 31.**
- Closure in New Jersey bycatch hotspot polygon (Figure 6) during **May 1 – May 31,** and **October 15 – December 31.**
- Low-profile gillnet gear requirement in New Jersey bycatch hotspot polygon (Figure 6) in the rest of year when above polygon closure is not in effect (June 1 – October 14 and January 1 – April 30).

<u>Vessels with a federal fishing permit targeting spiny dogfish in federal and/or state waters</u>

- Closure in New Jersey bycatch hotspot polygon (Figure 6) during **May 1 – May 31** and **October 15 – December 31**.
- Closure in the Delaware/Maryland/Virginia bycatch hotspot polygons (Figure 7) during **November 1 – March 31.**

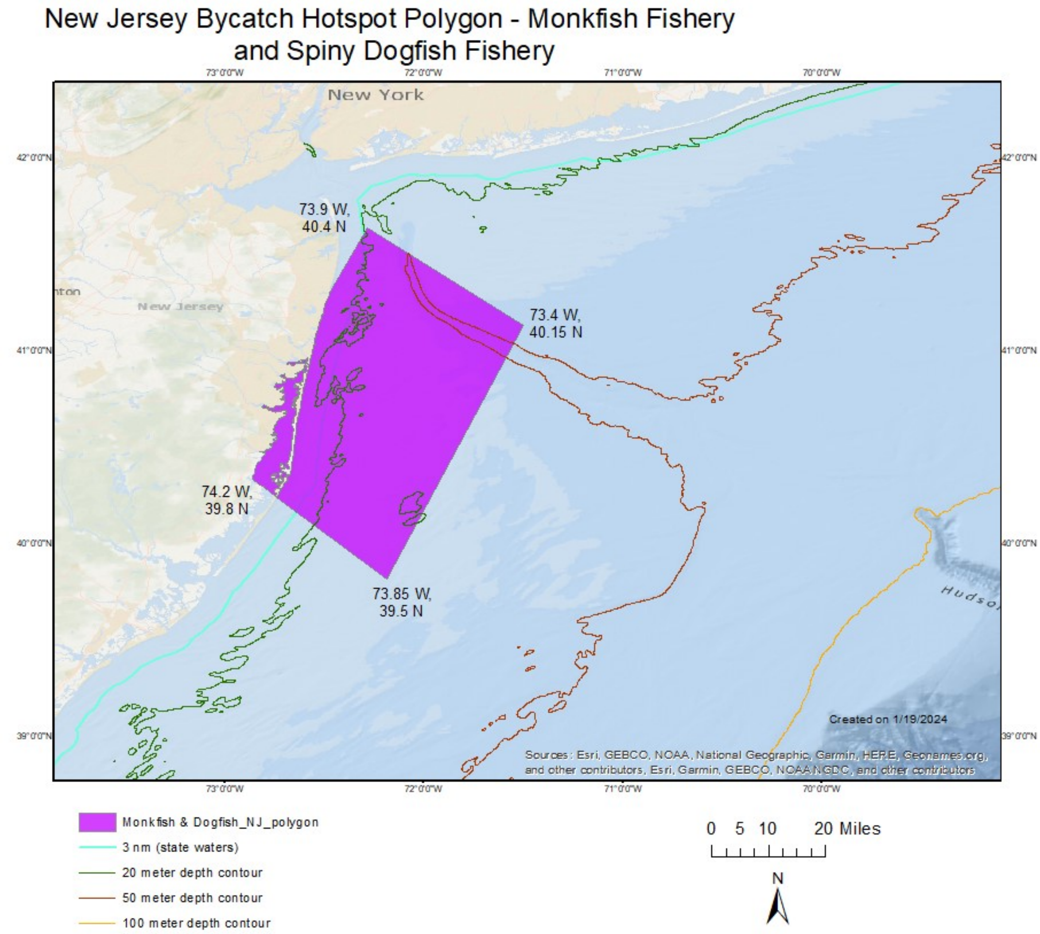
These time/area closures and gear restrictions would be implemented in both federal and state waters, however, the measures would only apply to vessels with a federal fishing permit. The Atlantic States Marine Fisheries Commission (ASMFC) is expected to take complementary action to reduce sturgeon interactions by state vessels in state waters.

Figure 5. Southern New England sturgeon polygon applicable only to the federal monkfish fishery.



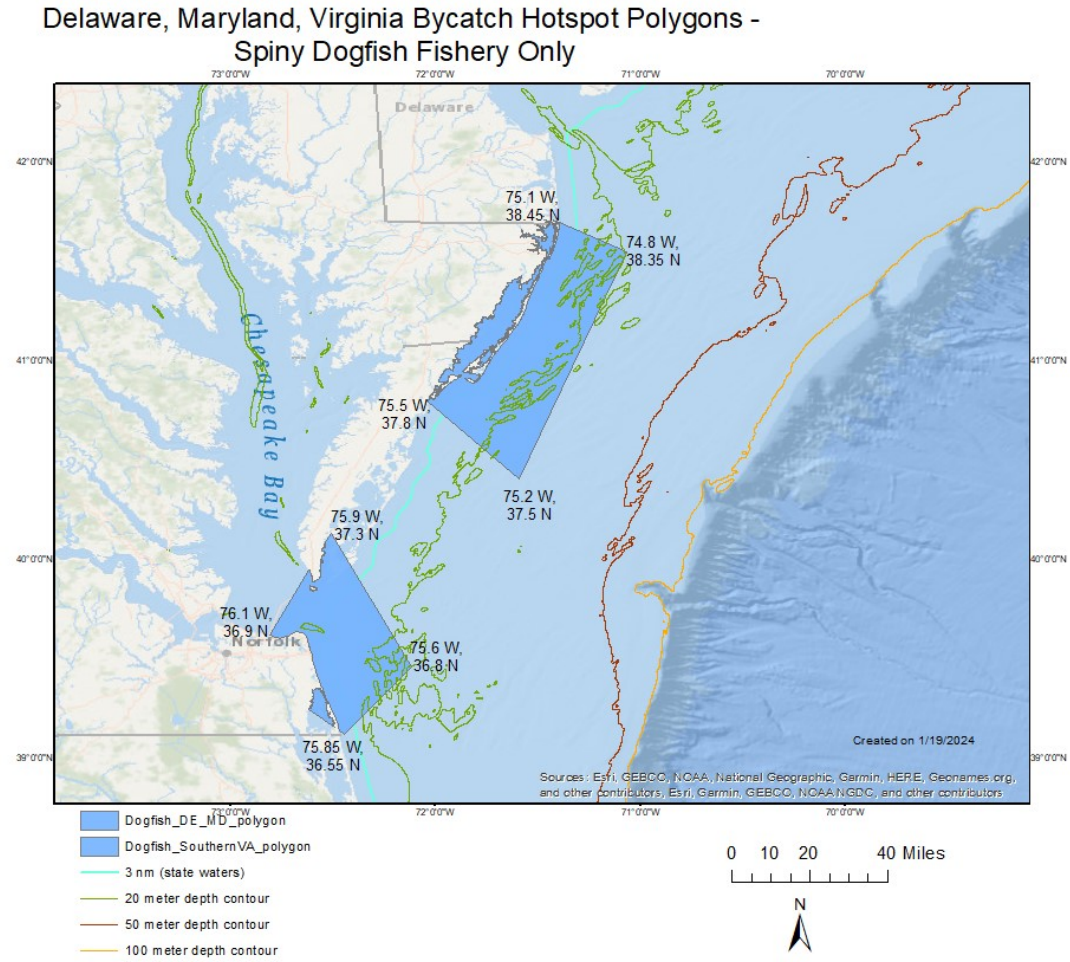
Note: The same figures are repeated in each action alternative, so the reader does not have to search for figures in other parts of the document. Accordingly, Figure 5, Figure 8, and Figure 11 are identical.

Figure 6. New Jersey sturgeon polygon applicable to both the federal monkfish and spiny dogfish fisheries.



Note: The same figures are repeated in each action alternative, so the reader does not have to search for figures in other parts of the document. Accordingly, Figure 6, Figure 9, Figure 12, and Figure 14 are identical.

Figure 7. Delaware/Maryland/Virginia sturgeon polygon applicable to only the federal spiny dogfish fishery.



> **Note: The same figures are repeated in each action alternative, so the reader does not have to search for figures in other parts of the document. Accordingly, Figure 7, Figure 10, Figure 13, and Figure 15 are identical.**

Rationale for specific time/area closures: The time-area closures would likely reduce overall gillnet fishing, thus eliminating some interactions with Atlantic sturgeon (and mortality) by federal fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) and spiny dogfish using gillnet gear in federal and state waters. These hotspot area polygons and times in which measures would apply are based on observer data indicating when and where observed sturgeon takes occurred most frequently from 2017-2019 and 2021-2022. If effort shifts to areas with less sturgeon, that would reduce both number of sturgeon takes and sturgeon mortality. This high impact Alternative would have the most beneficial impacts for sturgeon and facilitates comparing a range of alternatives.

Rationale for specific timing of measures are included as follows for observed gillnet takes on trips targeting monkfish and spiny dogfish from 2017-2019 and 2021-2022. There were 355 observed sturgeon takes for gillnet trips targeting monkfish and spiny dogfish, 175 from the monkfish fishery and 180 from the spiny dogfish fishery. See Section 4.0 for how sturgeon interactions were determined.

- Southern New England monkfish fishery
  - April had 6 observed sturgeon takes in the SNE polygon, representing ~3% of total observed gillnet takes on trips targeting monkfish from 2017-2019 and 2021-2022. The greatest number of sturgeon caught on a single observed haul in the SNE polygon was 2.
  - May had 31 observed sturgeon takes in the SNE polygon, representing ~18% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the SNE polygon was 3.
  - December had 33 observed sturgeon takes in the SNE polygon, representing ~19% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the SNE polygon was 3.
- New Jersey monkfish fishery
  - May had 23 observed takes in the NJ polygon, representing ~13% of total observed takes on trips targeting monkfish from 2017-2019 and 2021-2022. Note that there is a closure from the Harbor Porpoise Take Reduction Plan[2]; April 1 – 20 is closed to large mesh 7" + gillnet closure in the Waters off New Jersey management area which overlaps the NJ polygon. Initial feedback from OLE is this 10-day opening between closures does not pose an enforcement issues.
  - October 15 – December 31 had 29 observed sturgeon takes in the New Jersey polygon, representing ~17% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 3.
    - This time period is conservative for the monkfish fishery given all of the observed takes occurred in December, however, there was a desire to have the time period for the New Jersey polygon to be the same for the monkfish and spiny dogfish fisheries.
- New Jersey spiny dogfish fishery
  - May had 12 observed sturgeon takes in the NJ polygon, representing ~7% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 5.
  - October 15 – December 31 had 33 observed takes in the New Jersey polygon, representing ~18% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 2.
- Delaware/Maryland/Virginia spiny dogfish fishery
  - Across both Mid-Atlantic polygons, November through March had 107 observed takes, representing ~59% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in these two Mid-Atlantic polygons was 9.

Rationale for gear restriction measures:

- Low-profile gillnet gear in the monkfish fishery: Low-profile gillnet gear in the monkfish fishery has been shown to reduce sturgeon bycatch in the New Jersey region based on various studies. More specifically, in the Fox, et al. 2019 study, sturgeon bycatch was reduced by ~76% (by a ratio of 4.2 to 1) when using the experimental low-profile gillnet gear in the New Jersey region. The authors emphasize that the results are highly uncertain, however. It is also worth noting that

[2] Harbor Porpoise Take Reduction Plan information and a map of the New Jersey April 1-20 large mesh closure can be found here: https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/harbor-porpoise-take-reduction-plan.

this study also evaluated monkfish catch rates with the experimental low-profile gillnet gear and found that vessels fishing out of New Jersey had no significant difference in monkfish catch rates, however, vessels fishing out of New York caught significantly fewer monkfish. This is the reason why use of low-profile gillnet gear is only being proposed for use by the monkfish fishery in the New Jersey bycatch hotspot polygons and not other regions and not in the spiny dogfish fishery until further research is done.

- In the Fox et al., 2011 study, the researchers tested the influence of tie-downs on sturgeon bycatch using gillnets of standard height (12 meshes high) and found no significant differences in sturgeon bycatch but did find significantly lower target species catches in the gear configuration without tie downs. In the follow-up 2012 study, the researchers tested a low-profile gear configuration with the same tie-down configuration and net height 6 meshes high and found significantly lower sturgeon bycatch in the low-profile nets and lower (though not significant) target species landings (monkfish and winter skate). In their subsequent 2013 study where net height increased from 6 to 8 meshes, the researchers found lower (but not significant) sturgeon bycatch in the low-profile net and similar (not significant) rates of target species landings. Lastly, in the 2019 Fox et al study where mesh size was increased from 12 to 13 inches and twine size decreased from 0.90 to 0.81mm, the researchers found the low-profile net reduced sturgeon bycatch by a ratio of 4.2 to 1. The lighter twine is intended to reduce retention of larger sturgeon while the larger mesh size allows smaller sturgeon to escape. Results for target species catches were mixed, with the vessel based out of New York catching significantly fewer monkfish with the low-profile net, while there was no significant difference between monkfish catch by the vessel fishing out of New Jersey. Catches of winter skate were not significantly different for either vessel. In the He and Jones (2013) study, researchers tested the low-profile net design from the Fox et al 2013 study off Virginia and Maryland and found sturgeon bycatch was significantly reduced with the low-profile net, though only seven sturgeon were caught in total. Results for target species catches were mixed, with one vessel having no significant difference in monkfish catch while the other vessel had significantly lower monkfish catch with the low-profile net particularly when catch rates are high. There were no significant differences in winter skate catch. All studies had relatively low sample sizes and results are considered uncertain. Table 5 summarizes the gear studies described above.

- Requirement of low-profile gear would be delayed until January 1, 2026 to allow sufficient time for gear manufacturers to produce this gear for the commercial monkfish vessels. The delay will also allow additional time for the Harbor Porpoise Take Reduction Team to consider changes to minimum twine size requirements in the harbor porpoise regulations to potentially allow for an exemption for the low-profile gillnet gear which would use 0.81 mm versus 0.90 mm that is currently required for large-mesh gillnets (≥7”) in the Harbor Porpoise regulations during applicable months (January-April).

Table 3. Gillnet configurations used and sturgeon bycatch and target species catch results in Fox et al 2011, 2012, 2013, and 2019.

Fox et al 2011

	Mesh Size (in.)	Net Height (# Mesh)	Tie Down Length (ft)	Tie Down Spacing (ft)	Hanging Ratio	Net Length (ft)	Twine Diameter (mm)	Sturgeon Catch (# individuals)		Target Species Landings (kg)		
Control	12	12	4	24	0.5	300	0.90	18	Not significantly different	Monkfish 7,306.3	Winter skate 10,048.5	Experimental nets (no tie-downs) significantly reduced catch rates
Experimental	12	12	N/A	N/A	0.5	300	0.90	5		Monkfish 3,737.9	Winter skate 1,782.3	
Fox et al 2012												
Control	12	12	4	24	0.5	300	0.90	28	Significantly lower in low-profile nets	Monkfish 4,345	Winter skate 11,921	No significant differences, though overall catch rates lower with low-profile nets
Experimental	12	6	2	12	0.5	300	0.90	9		Monkfish 3,341	Winter skate 9,734	
Fox et al 2013												
Control	12	12	4	24	0.5	300	0.90	21	Not significantly different	Monkfish 2,615.5	Winter skate 2,417.6	Similar catch rates, not significantly different
Experimental	12	8	2	12	0.5	300	0.90	14		Monkfish 2,388.7	Winter skate 2,103.2	
Fox et al 2019												
Control	12	12	4	24	0.5	300	0.90	25	Significantly lower in low-profile nets	Monkfish 32,333	Winter skate 35,010	Monkfish catch significantly lower with low-profile nets for NY, no sig. differences for NJ; no sig. differences in winter skate catch for either
Experimental	13	8	2	12	0.5	300	0.81	6				

4.3 Alternative 3 – Intermediate Impact Sturgeon Package

Under Alternative 3, a subset of the time/area closures and gear restrictions under consideration in Alternative 2 for both the federal monkfish and spiny dogfish gillnet fisheries would be implemented in the Atlantic sturgeon bycatch hotspot areas (Figure 8, Figure 9, Figure 10). This alternative is the intermediate alternative under consideration in terms of impacts. The time/area closures and the gear restrictions would apply to federal gillnet fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) using ≥10" mesh size and vessels with federal spiny dogfish permits using gillnet gear with mesh size of 5 - <10". Gear restrictions include a requirement for federal vessels targeting monkfish to use low-profile gillnet gear in the New Jersey bycatch hotspot polygon to be implemented on January 1, 2026. Additionally, an overnight soak time prohibition from 8pm until 5am (sunrise in Point Pleasant NJ on May 15 is 5:40am) is included for federal vessels targeting spiny dogfish in the New Jersey hotspot polygon in May. The polygons where the closures and gear restrictions would apply are the same for both the monkfish and spiny dogfish fisheries off New Jersey to help simplify the measures and to acknowledge that sturgeon are caught in this area by both fisheries. There are two Delaware/Maryland/Virginia bycatch polygons because of the two concentrations of observed sturgeon takes. The observed sturgeon takes occurred during similar times of the year, thus, the same closure and gear restriction measures would be the same across both polygons.

More specifically, Alternative 3 (Intermediate Package) includes the following time/area closures and gear restrictions:

<u>Vessels with a federal fishing permit targeting monkfish in federal and/or state waters</u>

- Closure in Southern New England (SNE) bycatch hotspot polygon (Figure 8) during **May 1 – May 31** and **December 1 – December 31**, two months with the highest observed sturgeon takes.
- Closure in New Jersey bycatch hotspot polygon (Figure 9) during **December 1 – December 31**, the month with the highest observed sturgeon takes.
- Low-profile gillnet gear requirement in New Jersey bycatch hotspot polygon (Figure 9) in the rest of year when above polygon closure not in effect (January 1 – November 30).

<u>Vessels with a federal fishing permit targeting spiny dogfish in federal and/or state waters</u>

- Closure in the New Jersey bycatch hotspot polygon (Figure 9) during **November 1 – December 31**, two months with the highest observed sturgeon takes.
- Overnight soak time prohibition from 8pm until 5am in New Jersey bycatch hotspot polygon Figure 9) during **May 1 – May 31.**
    - Closure in the Delaware/Maryland/Virginia bycatch hotspot polygons (Figure 10) during **December 1 – February 28**, three consecutive months with the highest observed sturgeon takes.

Note, time/area closures and gear restrictions would be implemented in both federal and state waters, however, the measures would only apply to vessels with a federal fishing permit. Atlantic States Marine Fisheries Commission (ASMFC) is expected to take complementary action to reduce sturgeon interactions by state vessels in state waters.

Figure 8. Southern New England sturgeon polygon applicable only to the federal monkfish fishery.

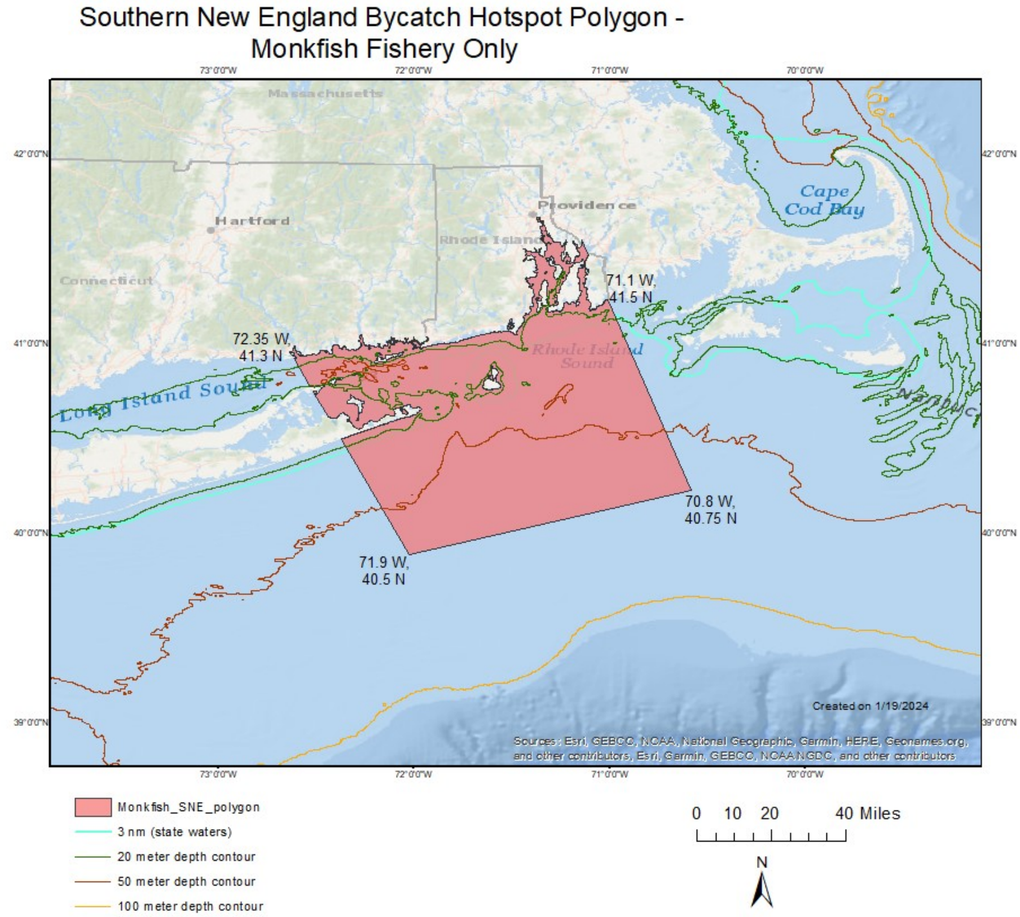


Figure 9. New Jersey sturgeon polygon applicable to both the federal monkfish and spiny dogfish fisheries.

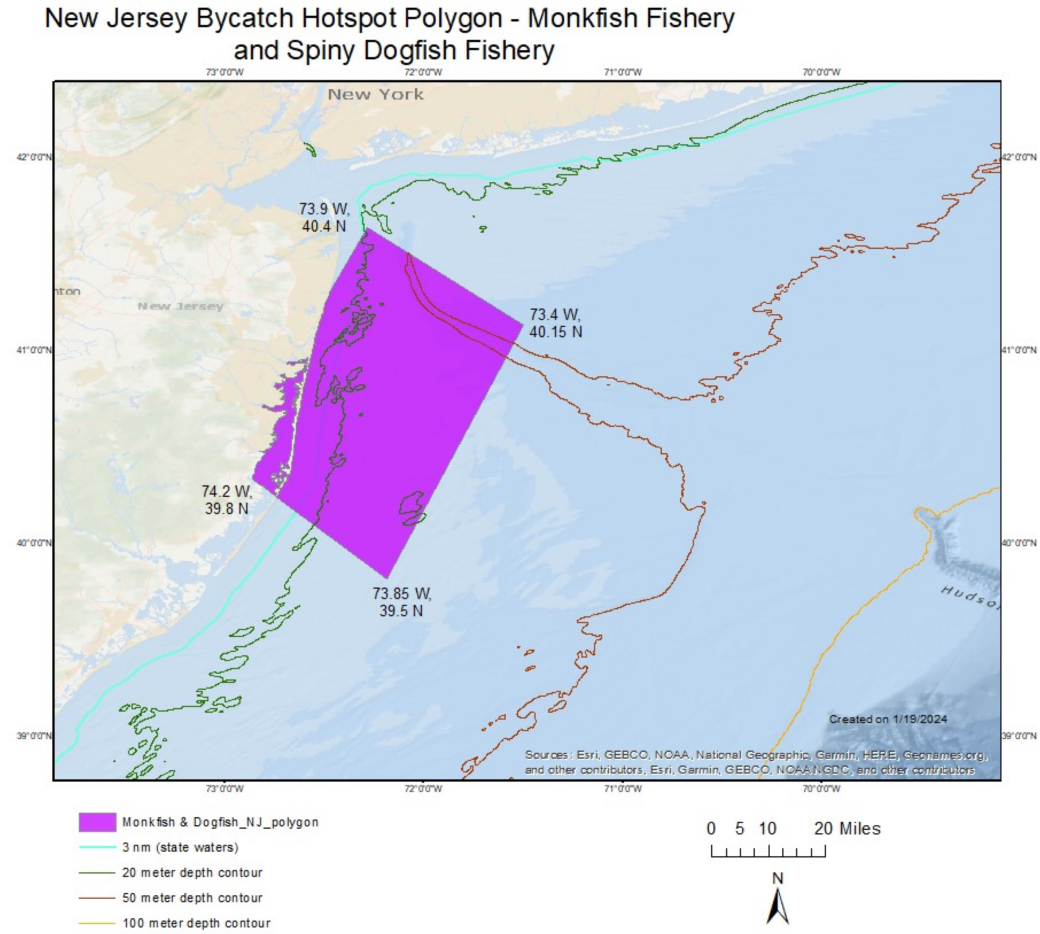
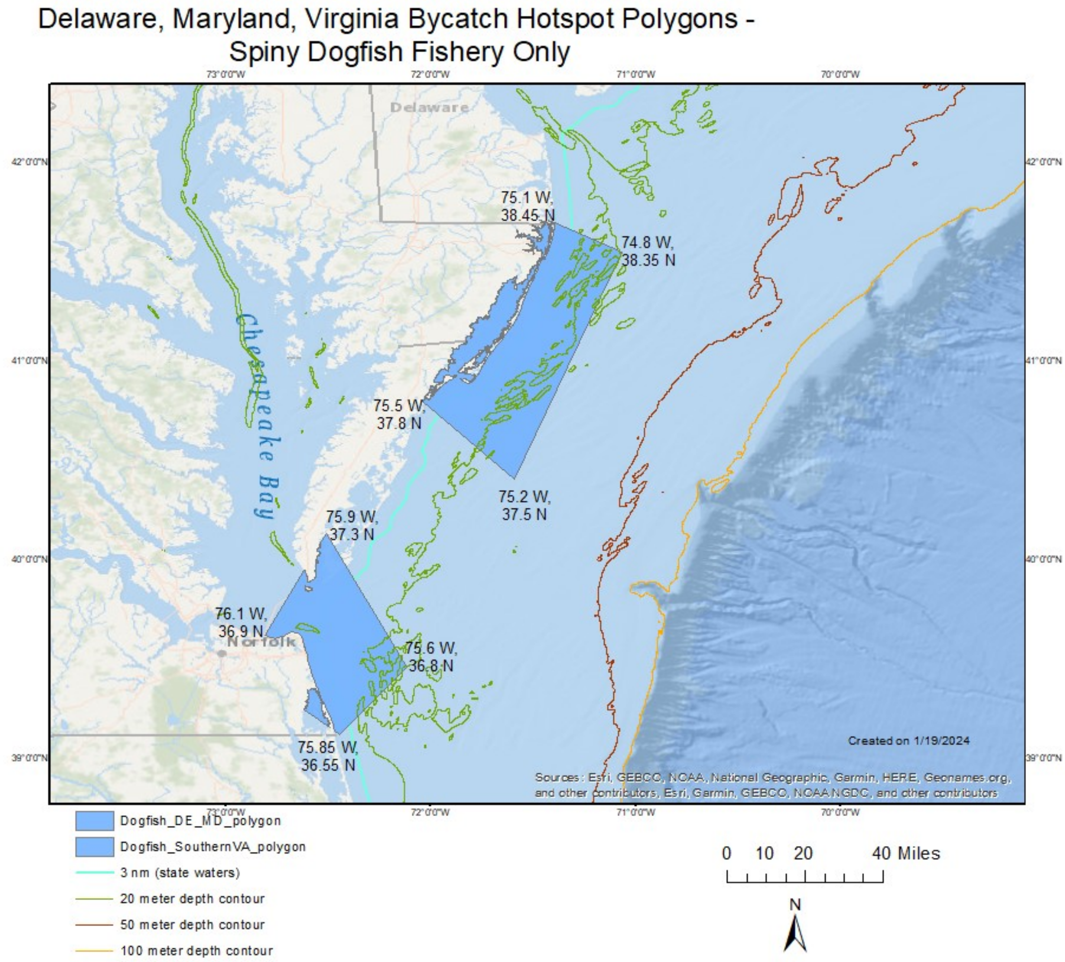


Figure 10. Delaware/Maryland/Virginia sturgeon polygon applicable to only the federal spiny dogfish fishery.



Rationale for specific time/area closures: The time-area closures would likely reduce overall gillnet fishing, thus eliminating some interactions with Atlantic sturgeon (and mortality) by federal fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) and spiny dogfish using gillnet gear in federal and state waters. These hotspot area polygons and times in which measures would apply are based on observer data indicating when and where observed sturgeon takes occurred most frequently from 2017-2019 and 2021-2022. If effort shifts to areas with less sturgeon, that would also reduce takes/mortality. This intermediate impact Alternative would have intermediate beneficial impacts for sturgeon and facilitates comparing a range of alternatives.

Rationale for specific timing of measures are included as follows for observed gillnet takes on trips targeting monkfish and spiny dogfish from 2017-2019 and 2021-2022. There were 355 observed sturgeon takes for gillnet trips targeting monkfish and spiny dogfish, 175 from the monkfish fishery and 180 from the spiny dogfish fishery. See Section 4.0 for how sturgeon interactions were determined.

- Southern New England monkfish fishery
    - May had 31 sturgeon takes from 24 vessels in the SNE polygon (unclear if these are unique vessels or not; max take for a given vessel is 3).

- December had 33 sturgeon takes in the SNE polygon, representing ~19% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the SNE polygon was 3.

- New Jersey monkfish fishery
  - December had 29 observed sturgeon takes in the NJ polygon, representing ~17% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 3.
- New Jersey spiny dogfish fishery
  - May had 12 observed sturgeon takes in the NJ polygon, representing ~7% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 5.
  - November through December has 29 observed sturgeon takes in the NJ polygon, representing 16% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 2.
- Delaware/Maryland/Virginia spiny dogfish fishery
  - Across both polygons, December through February has 79 observed takes, representing 44% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in these two Mid-Atlantic polygons was 9.

Rationale for gear restriction measures:

- Low-profile gillnet gear in the monkfish fishery: Low-profile gillnet gear in the monkfish fishery has been shown to reduce sturgeon bycatch in the New Jersey region based on various studies. More specifically, in the Fox, et al. 2019 study, sturgeon bycatch was reduced by ~76% (by a ratio of 4.2 to 1) when using the experimental low-profile gillnet gear in the New Jersey region. The authors emphasize that the results are highly uncertain, however. It is also worth noting that this study also evaluated monkfish catch rates with the experimental low-profile gillnet gear and found that vessels fishing out of New Jersey had no significant difference in monkfish catch rates, however, vessels fishing out of New York caught significantly fewer monkfish. This is the reason why use of low-profile gillnet gear is only being proposed for use by the monkfish fishery in the New Jersey bycatch hotspot polygons and not other regions and not in the spiny dogfish fishery until further research is done.

  Table 5 summarizes the gear studies. See Alternative 2 for additional detail.

- Requirement of low-profile gear would be delayed until January 1, 2026 to allow sufficient time for gear manufacturers to produce this gear for the commercial monkfish vessels. The delay will also allow additional time for the Harbor Porpoise Take Reduction Team to consider changes to minimum twine size requirements in the harbor porpoise regulations to potentially allow for an exemption for the low-profile gillnet gear which would use 0.81 mm versus 0.90 mm that is currently required for large-mesh gillnets (≥7”) in the Harbor Porpoise regulations during applicable months (January-April).

- Overnight soak time prohibition from 8pm until 5am in the spiny dogfish fishery, defined as vessels with a spiny dogfish permit using gillnet gear with mesh between 5” - <10” (e.g., would not apply to the monkfish fishery which has a minimum mesh size of 10” until May 1, 2025 at which time the minimum mesh size is increased to 12”): Soak time limits may be feasible for the spiny dogfish fishery, which may vary by fisherman and region. Restricting soak times overnight is more enforceable compared to limiting spiny dogfish fishing to 24 hours or greater. The soak time restrictions are during times of documented high sturgeon bycatch as described above for closures. The soak time restrictions reduce takes by reducing the time gear is in the water and should also reduce mortality, which increases when gear is unchecked for more than 14 hours at 15 degrees Celsius (59 Farenheight) (Kahn and Mohead 2010). Effectively requiring vessels to remove gear each day could have vessel safety issues in times of severe weather.

4.4 Alternative 4 – Low Impact Sturgeon Package (Least Time/Area Closures and Gear Restrictions)

Under Alternative 4, only the most targeted time/area closures and gear restrictions under consideration for both the federal monkfish and spiny dogfish gillnet fisheries would be implemented in the Atlantic sturgeon bycatch hotspot areas Figure 11, Figure 12, Figure 13). This alternative has the fewest measures, based on times where observed sturgeon bycatch is the highest. The time/area closures and the gear restrictions would apply to federal gillnet fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) using ≥10" mesh size and vessels with federal spiny dogfish permits using gillnet gear with mesh size of 5 - <10". Gear restrictions include a requirement for federal vessels targeting monkfish to use low-profile gillnet gear in the New Jersey bycatch hotspot polygon to be implemented on January 1, 2026. Additionally, an overnight soak time prohibition from 8pm until 5am (sunrise in Point Pleasant NJ on May 15 is 5:40am) is included for federal vessels targeting spiny dogfish in the New Jersey hotspot polygon in May. The polygons where the closures and gear restrictions would apply are the same for both the monkfish and spiny dogfish fisheries off New Jersey to help simplify the measures and to acknowledge that sturgeon are caught in this area by both fisheries. There are two Delaware/Maryland/Virginia bycatch polygons because of the two concentrations of observed sturgeon takes. The observed sturgeon takes occurred during similar times of the year, thus, the same closure and gear restriction measures would be the same across both polygons.

More specifically, Alternative 4 includes the following time/area closures and gear restrictions:

<u>Vessels with a federal fishing permit targeting monkfish in federal and/or state waters</u>

- Closure in Southern New England (SNE) bycatch hotspot polygon (Figure 11) during **December 1 – December 31**, the month with the highest observed sturgeon takes.
- Closure in New Jersey bycatch hotspot polygon (Figure 12) during **November 1 – November 30.**
    - Note, if the Councils do not select the option to require low-profile gillnet gear in the New Jersey hotspot in the month of December (month with the highest observed takes), then this closure should be in December instead of November.
- Low-profile gillnet gear requirement in New Jersey bycatch hotspot polygon (Figure 12) during **December 1 – December 31.**

<u>Vessels with a federal fishing permit targeting spiny dogfish in federal and/or state waters</u>

- Closure in New Jersey bycatch hotspot polygon (Figure 12) during **November 1 – November 30.**
- Overnight soak time prohibition from 8pm until 5am in New Jersey bycatch hotspot polygon (Figure 12) during **December 1 – December 31** and **May 1 – May 31.**
- Closure in the Delaware/Maryland/Virginia bycatch hotspot polygons (Figure 13) during **December 1 – January 31**, two consecutive months with the highest observed sturgeon takes.

Note, time/area closures and gear restrictions would be implemented in both federal and state waters, however, the measures would only apply to vessels with a federal fishing permit. Atlantic States Marine

Fisheries Commission (ASMFC) is expected to take complementary action to reduce sturgeon interactions by state vessels in state waters.

Figure 11. Southern New England sturgeon polygon applicable only to the federal monkfish fishery.

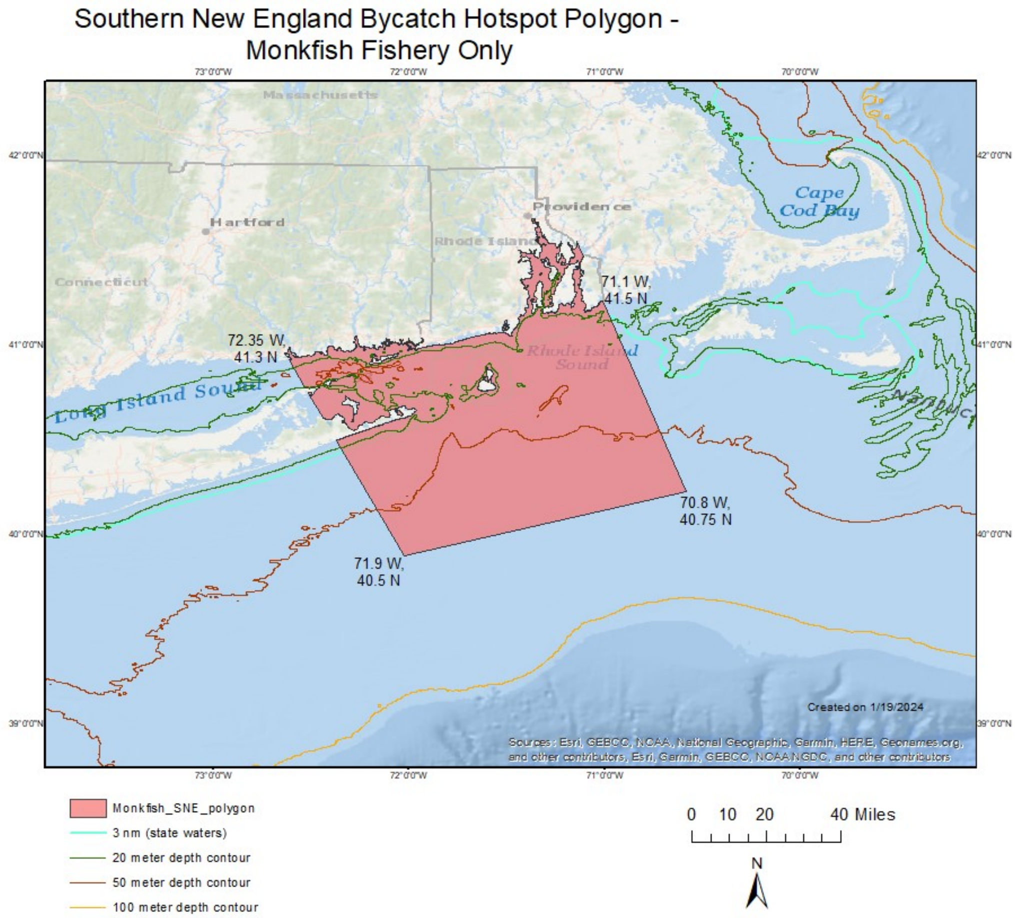


Figure 12. New Jersey sturgeon polygon applicable to both the federal monkfish and spiny dogfish fisheries.

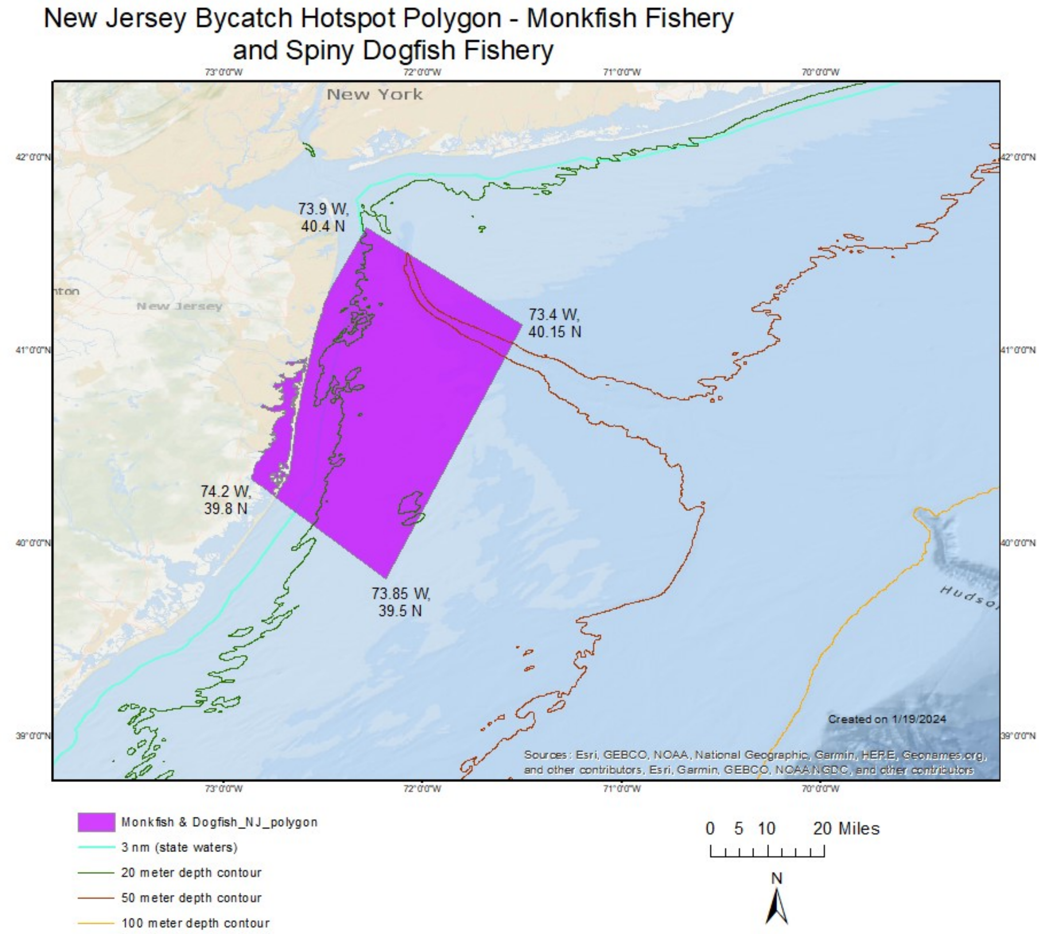
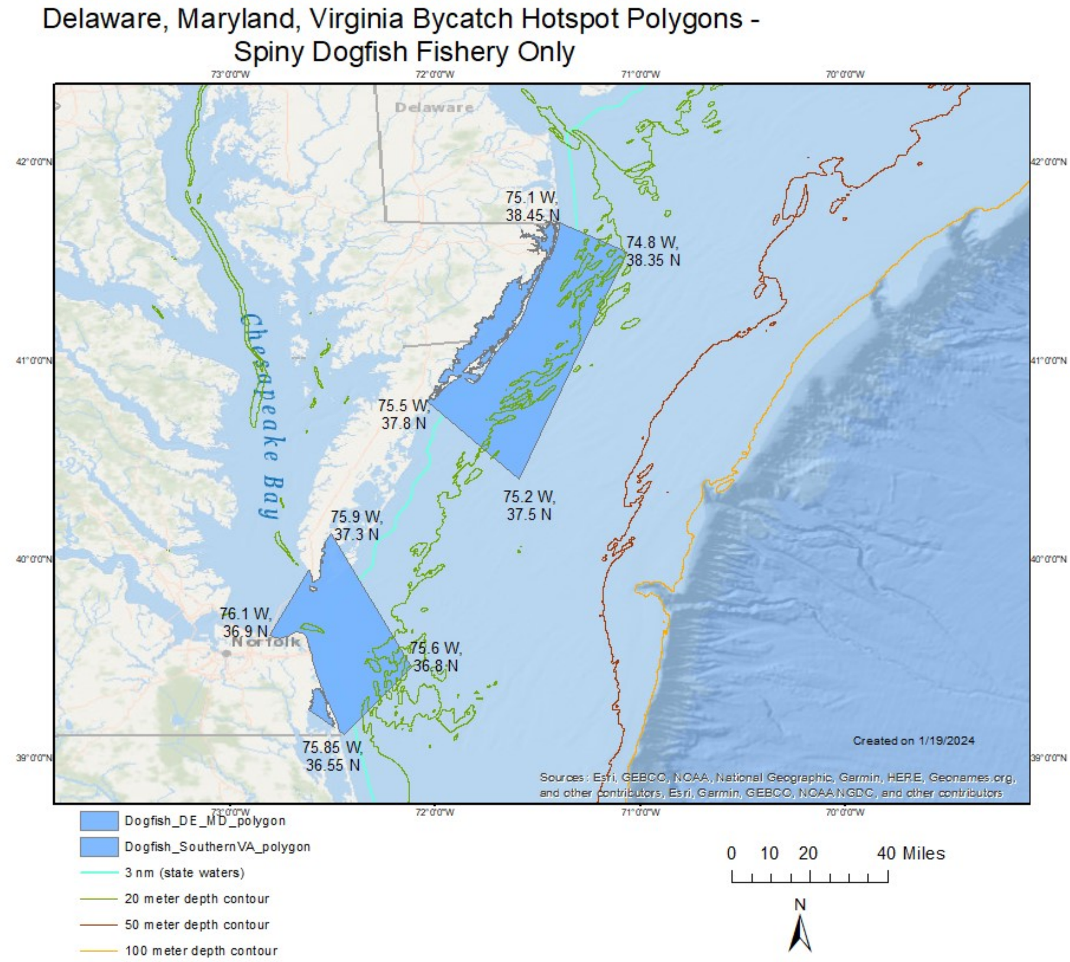


Figure 13. Delaware/Maryland/Virginia sturgeon polygon applicable to only the federal spiny dogfish fishery.



Rationale for specific time/area closures: The time-area closures would likely reduce overall gillnet fishing, thus eliminating some interactions with Atlantic sturgeon (and mortality) by federal fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) and spiny dogfish using gillnet gear in federal and state waters. These hotspot area polygons and times in which measures would apply are based on observer data indicating when and where observed sturgeon takes occurred most frequently from 2017-2019 and 2021-2022. If effort shifts to areas with less sturgeon, that would also reduce both sturgeon takes and mortality. This low impact Alternative would have the least beneficial impacts for sturgeon and facilitates comparing a range of alternatives.

Rationale for specific timing of measures are included as follows for observed gillnet takes on trips targeting monkfish and spiny dogfish from 2017-2019 and 2021-2022. There were 355 observed sturgeon takes for gillnet trips targeting monkfish and spiny dogfish, 175 from the monkfish fishery and 180 from the spiny dogfish fishery. See Section 4.0 for how sturgeon interactions were determined.

- <u>Southern New England monkfish fishery</u>
    - December had 33 observed sturgeon takes in the SNE polygon, representing ~19% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the SNE polygon was 3.

- New Jersey monkfish fishery
    - November did not have any sturgeon takes in the NJ polygon in the monkfish fishery, however, there were substantial observed sturgeon takes in the spiny dogfish fishery in this area during the same time period so there was interest in aligning these time/area measures for both fisheries.
    - December had 29 observed sturgeon takes in the NJ polygon, representing ~17% of total observed gillnet takes on trips targeting monkfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 3.
- New Jersey spiny dogfish fishery
    - May had 12 observed sturgeon takes in the NJ polygon, representing ~7% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single haul in the NJ polygon was 5.
    - November through December has 29 observed sturgeon takes in the NJ polygon, representing 16% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 2. The number of sturgeon takes for each of these months cannot be shared due to data confidentiality reasons, though it is worth noting that December represents <1% of total observed gillnet takes on trips targeting spiny dogfish.
- Delaware/Maryland/Virginia spiny dogfish fishery
    - Across both polygons, December through January had 69 sturgeon, representing ~38% of observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in these two Mid-Atlantic polygons was 9.

Rationale for gear restriction measures:

- Low-profile gillnet gear in the monkfish fishery: Low-profile gillnet gear in the monkfish fishery has been shown to reduce sturgeon bycatch in the New Jersey region based on various studies. More specifically, in the Fox, et al. 2019 study, sturgeon bycatch was reduced by ~76% (by a ratio of 4.2 to 1) when using the experimental low-profile gillnet gear in the New Jersey region. The authors emphasize that the results are highly uncertain, however. It is also worth noting that this study also evaluated monkfish catch rates with the experimental low-profile gillnet gear and found that vessels fishing out of New Jersey had no significant difference in monkfish catch rates, however, vessels fishing out of New York caught significantly fewer monkfish. This is the reason why use of low-profile gillnet gear is only being proposed for use by the monkfish fishery in the New Jersey bycatch hotspot polygons and not other regions and not in the spiny dogfish fishery until further research is done.

  Table 5 summarizes the gear studies. See Alternative 2 for additional detail.

- Requirement of low-profile gear would be delayed until January 1, 2026 to allow sufficient time for gear manufacturers to produce this gear for the commercial monkfish vessels. The delay will also allow additional time for the Harbor Porpoise Take Reduction Team to consider changes to minimum twine size requirements in the harbor porpoise regulations to potentially allow for an exemption for the low-profile gillnet gear which would use 0.81 mm versus 0.90 mm that is currently required for large-mesh gillnets (≥7”) in the Harbor Porpoise regulations during applicable months (January-April).

- Overnight soak time prohibition from 8pm until 5am in the spiny dogfish fishery, defined as vessels with a spiny dogfish permit using gillnet gear with mesh between 5” - <10” (e.g., would not apply to the monkfish fishery which has a minimum mesh size of 10” until May 1, 2025 at which time the minimum mesh size is increased to 12”): Soak time limits may be feasible for the spiny dogfish fishery, which may vary by fisherman and region. Restricting soak times overnight is more enforceable compared to limiting spiny dogfish fishing to 24 hours or greater. The soak time restrictions are during times of documented high sturgeon bycatch as described above for closures. The soak time restrictions reduce takes by reducing the time gear is in the water and should also reduce mortality, which increases when gear is unchecked for more than 14 hours at 15 degrees Celsius (59 Farenheight) (Kahn and Mohead 2010). Effectively requiring vessels to remove gear each day could have vessel safety issues in times of severe weather.

4.5 Alternative 5 – Gear-Only Sturgeon Package

Under Alternative 5, there would be gear restrictions for both the federal monkfish and spiny dogfish gillnet fisheries in several Atlantic sturgeon bycatch hotspot areas (Figure 14 and Figure 15). This alternative has the fewest measures and is the most targeted bycatch reduction alternative under consideration based on times where observed sturgeon bycatch is the highest. The time/area closures and the gear restrictions would apply to federal gillnet fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) using ≥10” mesh size and vessels with federal spiny dogfish permits using gillnet gear with mesh size of 5 - <10”. Gear restrictions include a requirement for federal vessels targeting monkfish to use low-profile gillnet gear in the New Jersey bycatch hotspot polygon to be implemented on January 1, 2026. Additionally, an overnight soak time prohibition from 8pm until 5am (sunrise in Point Pleasant NJ on May 15 is 5:40 am) is included for federal vessels targeting spiny dogfish in the New Jersey and the two Mid-Atlantic polygons. The polygons where the closures and gear restrictions would apply are the same for both the monkfish and spiny dogfish fisheries off New Jersey to help simplify the measures and to acknowledge that sturgeon are caught in this area by both fisheries. There are two Delaware/Maryland/Virginia bycatch polygons because of the two concentrations of observed sturgeon takes. The observed sturgeon takes occurred during similar times of the year, thus, the same closure and gear restriction measures would be the same across both polygons.

More specifically, Alternative 5 includes the following time/area closures and gear restrictions:

<u>Vessels with a federal fishing permit targeting monkfish in federal and/or state waters</u>

- Low-profile gillnet gear requirement in New Jersey bycatch hotspot polygon (Figure 14), **Year-round.**

<u>Vessels with a federal fishing permit targeting spiny dogfish in federal and/or state waters</u>

- Overnight soak time prohibition from 8pm until 5am in the New Jersey bycatch hotspot polygon (Figure 14) during **May 1 – May 31** and **November 1 – November 30.**
- Overnight soak time prohibition from 8pm until 5am in the Delaware/Maryland/Virginia bycatch hotspot polygons (Figure 15) during **November 1 – March 31.**

Note, time/area closures and gear restrictions would be implemented in both federal and state waters, however, the measures would only apply to vessels with a federal fishing permit. Atlantic States Marine Fisheries Commission (ASMFC) is expected to take complementary action to reduce sturgeon interactions by state vessels in state waters.

Figure 14. New Jersey sturgeon polygon applicable to both the federal monkfish and spiny dogfish fisheries.

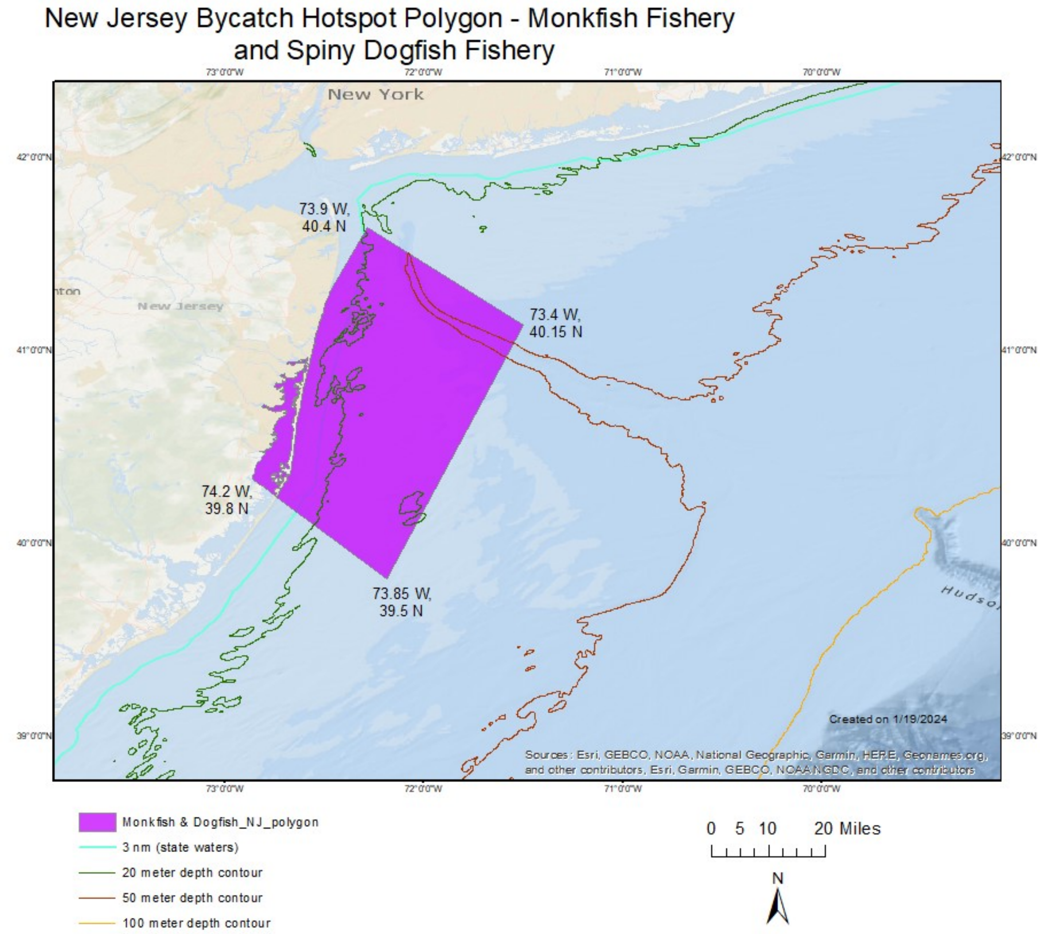
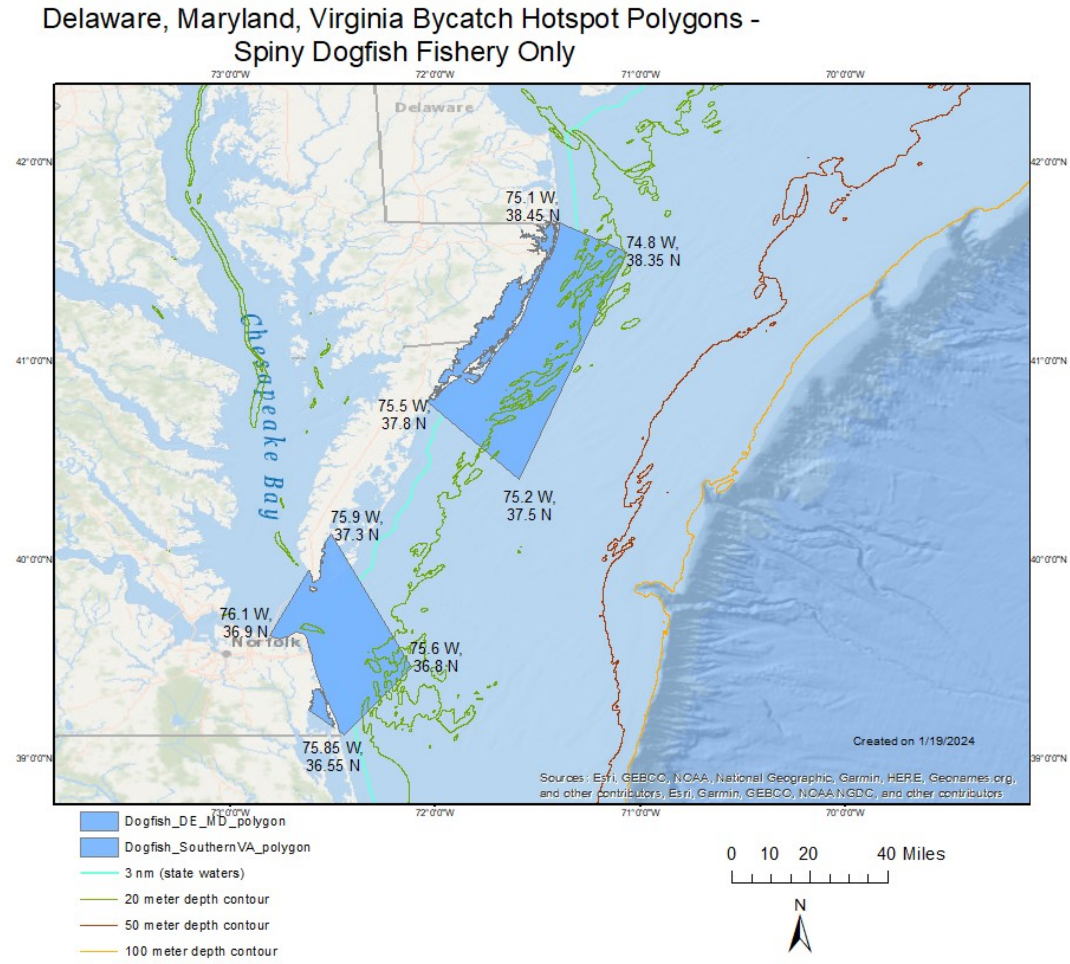


Figure 15. Delaware/Maryland/Virginia sturgeon polygon applicable to only the federal spiny dogfish fishery.



Rationale for specific time periods: The time periods in which gear restrictions would apply are based on reducing interactions with Atlantic sturgeon by federal fishing vessels targeting monkfish (e.g., vessels using a Monkfish DAS) and spiny dogfish using gillnet gear in federal and state waters in the bycatch hotspot areas. These hotspot area polygons and times in which measures would apply were based on observer data including when and where observed sturgeon takes for federal gillnet vessels targeting monkfish and spiny dogfish occurred from 2017-2019 and 2021-2022. There were 355 observed sturgeon takes for gillnet trips targeting monkfish and spiny dogfish, 175 from the monkfish fishery and 180 from the spiny dogfish fishery. See Section 4.0 for how sturgeon interactions were determined.

- <u>New Jersey spiny dogfish fishery</u>
    - May had 12 observed sturgeon takes in the NJ polygon, representing ~7% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 5.
    - November had 28 observed sturgeon takes in the NJ polygon, representing ~16% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in the NJ polygon was 2.
- <u>Delaware/Maryland/Virginia spiny dogfish fishery</u>

- Across both polygons, November through March had 107, representing ~59% of total observed gillnet takes on trips targeting spiny dogfish. The greatest number of sturgeon caught on a single observed haul in these two Mid-Atlantic polygons was 9.

Rationale for gear restriction measures:

- <u>Low-profile gillnet gear in the monkfish fishery</u>: Low-profile gillnet gear in the monkfish fishery has been shown to reduce sturgeon bycatch in the New Jersey region based on various studies. More specifically, in the Fox, et al. 2019 study, sturgeon bycatch was reduced by ~76% (by a ratio of 4.2 to 1) when using the experimental low-profile gillnet gear in the New Jersey region. The authors emphasize that the results are highly uncertain, however. It is also worth noting that this study also evaluated monkfish catch rates with the experimental low-profile gillnet gear and found that vessels fishing out of New Jersey had no significant difference in monkfish catch rates, however, vessels fishing out of New York caught significantly fewer monkfish. This is the reason why use of low-profile gillnet gear is only being proposed for use by the monkfish fishery in the New Jersey bycatch hotspot polygons and not other regions and not in the spiny dogfish fishery until further research is done.

  Table 5 summarizes the gear studies. See Alternative 2 for additional detail.

- Requirement of low-profile gear would be delayed until January 1, 2026 to allow sufficient time for gear manufacturers to produce this gear for the commercial monkfish vessels. The delay will also allow additional time for the Harbor Porpoise Take Reduction Team to consider changes to minimum twine size requirements in the harbor porpoise regulations to potentially allow for an exemption for the low-profile gillnet gear which would use 0.81 mm versus 0.90 mm that is currently required for large-mesh gillnets (≥7”) in the Harbor Porpoise regulations during applicable months (January-April).

- Overnight soak time prohibition from 8pm until 5am in the spiny dogfish fishery, defined as vessels with a spiny dogfish permit using gillnet gear with mesh between 5” - <10” (e.g., would not apply to the monkfish fishery which has a minimum mesh size of 10” until May 1, 2025 at which time the minimum mesh size is increased to 12”): Soak time limits may be feasible for the spiny dogfish fishery, which may vary by fisherman and region. Restricting soak times overnight is more enforceable compared to limiting spiny dogfish fishing to 24 hours or greater. The soak time restrictions reduce takes by reducing the time gear is in the water and should also reduce mortality, which increases when gear is unchecked for more than 14 hours at 15 degrees Celsius (59 Farenheight) (Kahn and Mohead 2010). Forcing vessels to remove gear each day could have vessel safety issues in times of severe weather.

4.6 ALTERNATIVES CONSIDERED BUT REJECTED

4.6.1 Adding an option to use Vessel Monitoring System (VMS)

The Councils considered using VMS as an enforcement / management tool as part of the range of the monkfish and spiny dogfish alternatives to make soak time restrictions and area closures more enforceable. Currently, VMS is not a requirement in the monkfish and spiny dogfish fisheries, however, this was discussed during Framework 13 development for the monkfish fishery in 2022. During the Joint Monkfish and Dogfish Committee meeting, invited enforcement representatives clarified that VMS is not required to enforce time/area closures, though is still helpful to identify the fishery declaration and vessel location. The Coast Guard uses routine patrols in aircraft and cutters and can do targeted boardings if there are known restrictions in the area regardless of whether a vessel has VMS or not. There was general concern for the impacts of any VMS requirement for these fisheries given the added cost, quota reductions, processor limitations, etc. As part of its priority list for work to be potentially done in 2024, the NEFMC decided instead to add "review of the utility of VMS and how it is used for enforcement in coordination with the MAFMC" given the broader implications for requiring VMS in other fisheries beyond monkfish and spiny dogfish.

4.6.2 Soak time restrictions of 24 hours or greater in the monkfish and spiny dogfish fisheries

The Councils considered restricting soak time limits of 24 hours or greater for the monkfish and spiny dogfish fisheries, however, the options were removed from further consideration given these restrictions do not necessarily reduce sturgeon interactions/bycatch and there are enforcement concerns.

4.6.3 Soak time and low-profile gear restrictions and closures by entire statistical area approach

The Councils considered applying gear restrictions (soak time limits and low-profile gillnet gear) and closures by entire statistical area, however, these are broad areas that are well outside of sturgeon bycatch hotpots and are likely to cause substantial impacts to fishermen.

4.6.4 Shorter increments of time/area closures and additional partial-year gear restriction time periods

Shorter, weekly increments of time/area closures and additional partial-year gear restriction time periods were considered to allow for various combinations of shorter time periods across areas and fisheries, but after initial analysis, these measures were ultimately removed from further consideration. This is because these shorter temporal measures were not likely to achieve the sturgeon bycatch reduction targets identified by GARFO's Protected Resource Division in a December 4, 2023 memo addressed to the Sturgeon Bycatch FMAT/PDT. Furthermore, the available data did not support an analysis to that level of temporal and spatial resolution without confidentiality issues. The refined range of alternatives in Section 4.0 is a more simplified version that captures the full range of possible time/area closures and gear restriction measures.

5.0 DRAFT AFFECTED ENVIRONMENT

The Affected Environment is described in this action based on valued ecosystem components (VECs), including target species, non-target species, physical environment and Essential Fish Habitat (EFH), protected resources, and human communities. VECs represent the resources, areas and human communities that may be affected by the alternatives under consideration in this amendment. VECs are the focus since they are the "place" where the impacts of management actions occur.

5.1 TARGET SPECIES

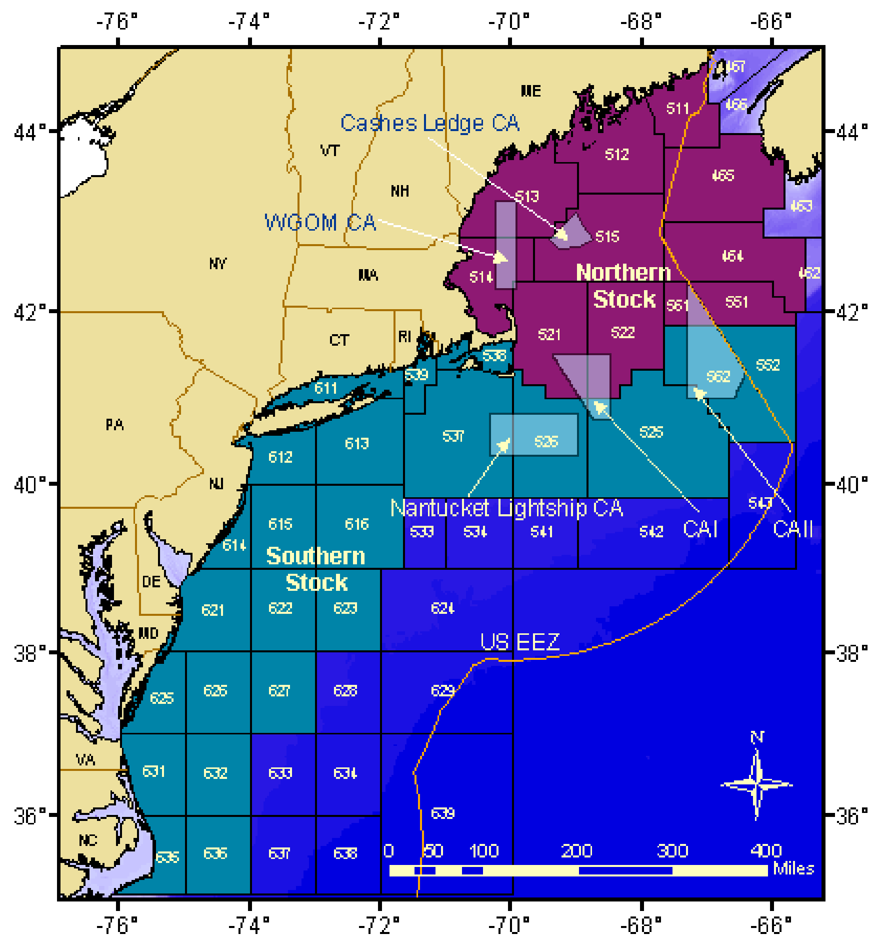
MONKFISH

Monkfish Management: The monkfish fishery in U.S. waters is jointly managed under the Monkfish Fishery Management Plan (FMP) by the New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC), with the NEFMC having the administrative lead. The fishery extends from Maine to North Carolina out to the continental shelf margin. The fishery is assessed and managed in two areas, northern and southern (Map 1). The Northern Fishery Management Area (NFMA) covers the Gulf of Maine (GOM) and northern part of Georges Bank (GB), and the Southern Fishery Management Area (SFMA) extends from the southern flank of GB through the Mid-Atlantic Bight to North Carolina. The directed monkfish fishery is primarily managed with a yearly allocation of monkfish Days-at-Sea (DAS) and possession limits, though incidental landings are allowed in other fisheries.

Monkfish Distribution and Life History. Monkfish (*Lophius americanus*), also called goosefish, occur in the Northwest Atlantic Ocean from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, North Carolina (Collette & Klein-MacPhee 2002). Data from resource surveys spanning the period 1948-2007 suggest that seasonal onshore-offshore migrations occur (from inshore areas in autumn to depths of at least 900 m in mid-spring) and appear to be related to spawning and possibly food availability (Richards *et al.* 2008). Stock structure is not well understood, but two assessment and management areas for monkfish, northern and southern, were defined in 1999 through the original Fishery Management Plan based on patterns of recruitment and growth and differences in how the fisheries are prosecuted (NEFSC 2020b).

Map 1. Fishery statistical areas used to define the Monkfish NFMA and SFMA.

Source: NEFSC (2020b).



Monkfish Stock Status. The status of the monkfish stocks changed in 2023 to unknown from not subject to overfishing and not overfished, based on the 2022 monkfish stock assessment. These changes were made because the 2013 assessment that supported the prior stock status determinations were rejected during the 2016 assessment due to an invalid ageing method. Analytical assessments have not been used for monkfish since 2013, and index-based approaches have been used since to determine catch advice. A brief history of recent assessments is provided.

The monkfish stock assessment in 2010 (SARC 50) was an analytical assessment that used the SCALE model (had been in use since 2007), concluding that monkfish was not overfished and overfishing was not occurring but recognized significant uncertainty in this determination. The 2013 operational assessment also used the SCALE model and reached the same conclusion.

The 2016 operational assessment, that informed FY 2017-2019 specifications, did not update the SCALE model because its use was invalidated by age validation research (Richards 2016). This assessment concluded that many of the biological reference points were no longer relevant due to invalidation of the growth model (e.g., no estimation of absolute biomass, F_{max} could not be recalculated), and thus were not updated. Stock status was concluded to be unknown. A strong 2015-year class was identified in both the survey and the discard data. The assessment review panel concluded that using a survey index-based method for developing catch advice was appropriate. A method now called the "Ismooth" approach was used that set catch advice based on the recent trend in NEFSC trawl survey indices. This method calculates the proportional rate of change in a smoothed average of the fall and spring NEFSC surveys over the most recent three years. This rate is the slope of the regression trend from the last three years, which is then multiplied by the most recent three years average of fishery catch to determine catch advice. The multipliers were 1.02 in the NFMA and 0.87 in the SFMA (Table 6):

*Equation 1: catch advice = Trawl survey multiplier * latest 3-year average catch = ABC*

The 2019 assessment continued use of the Ismooth method due to ongoing uncertainties. The assessment continued to see a strong recruitment event from 2015 that led to an increase in biomass in 2016-2018, though abundance declined in 2019 as recruitment returned to average levels (NEFSC 2020b). The Ismooth multipliers were 1.2 in the NFMA and 1.0 in the SFMA.

Table 4. NEFSC trawl survey multipliers for monkfish from the last three assessments.

Assessment year	NEFSC trawl survey multiplier	
	NFMA	SFMA
2016	1.02	0.87
2019	1.2	1.0
2022	0.829	0.646
Source: Richards (2016); NEFSC (2020b); Deroba (2022).		

The 2022 management track assessment again used the Ismooth method to develop catch advice. Like the 2016 and 2019 assessments, this assessment concluded that the status of monkfish remains unknown. The multipliers were 0.829 for NFMA and 0.646 for SFMA, tracking the decline in monkfish biomass in the NEFSC trawl surveys. The fishery catch time series was updated, including a new discard mortality rate for scallop dredges (reduced to 64% from 100%) and various data corrections (Deroba 2022).

The October 19, 2022 Monkfish PDT memo to the SSC on OFLs and ABCs details how these prior assessments were used in setting specifications.

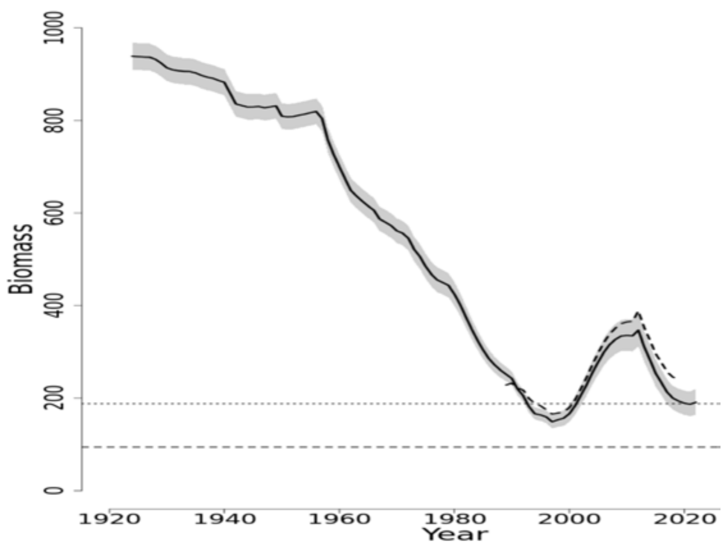
Spiny Dogfish

Spiny dogfish Management: The spiny dogfish fishery in U.S. waters is jointly managed under the Spiny dogfish Fishery Management Plan (FMP) by the Mid-Atlantic Fishery Management Council (MAFMC) and the New England Fishery Management Council (NEFMC), with the MAFMC having the administrative lead. The management unit area incudes all U.S. east coast water. Canadian landings are also accounted for as part of setting annual specifications (the assessment integrates Canadian catch data).

Life History: Spiny dogfish (*Squalus acanthias*) is a long-lived (up to 50 years) schooling shark that is widely distributed across both sides of the North Atlantic. The Northwest Atlantic population is treated as one stock – substantial migration is not believed to occur across the two sides of the Atlantic (though tagging studies do find occasional long-distance migrators (e.g. Hjertenes 1980, Templeman 1954). Spiny dogfish are considered one of the most migratory shark species in the northwest Atlantic (Compagno 1984). In the northwest Atlantic, spiny dogfish occur from Florida to Canada, with highest concentrations from Cape Hatteras to Nova Scotia. In the winter and spring, they are found primarily in Mid-Atlantic waters, and tend to migrate north in the summer and fall, with concentrations in southern New England, Georges Bank, and the Gulf of Maine (though a recent study has created some uncertainty regarding the established migration paradigm, Carlson 2014). Spiny dogfish have a wide-ranging diet consisting of fish, such as herring, mackerel and sand lance, as well as invertebrates including ctenophores, squid, crustaceans and bivalves. Spiny dogfish are live bearers with a very long gestation period (18-24 months), and are slow growing with late maturation. These reproductive characteristics generally make a stock more vulnerable to overfishing (https://www.fisheries.noaa.gov/internationalaffairs/shark-conservation, NOAA 2001). Females grow larger than males and as a result, the fishery primarily targets females.

Spiny Dogfish Stock Status: Based on the 2023 Spiny Dogfish MTA, which used the Stock Synthesis 3 (SS3) assessment model and passed peer review in 2023, the spiny dogfish stock was neither overfished nor experiencing overfishing in 2022[3]. Biomass (spawning output) in 2022 was estimated to be at 101% of the reference point/target, despite being relatively near its all-time low. Fishing mortality in 2022 was 81% of the overfishing threshold (the first time in the last decade without overfishing). Biomass and fishing mortality figures are immediately below. Due to the stock's reduced productivity, the SS3 model projections predict that relatively low future catches are needed to stay at the target (NEFSC 2023).

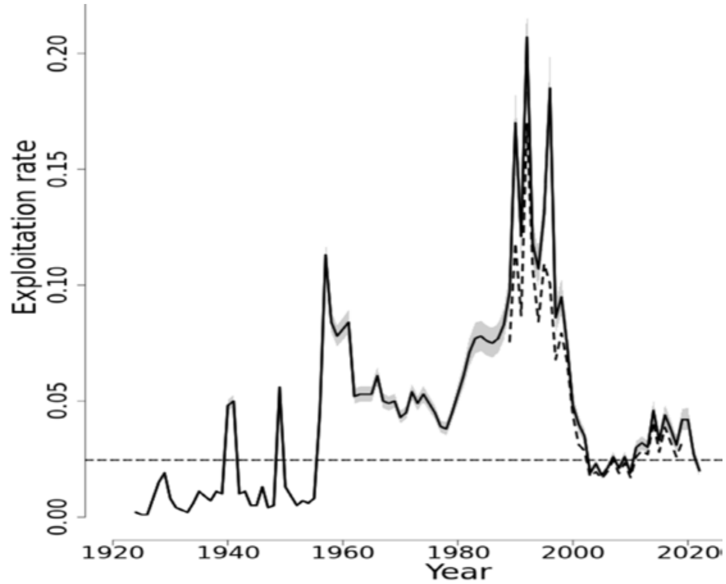
Figure 16. Time series of spawning output 1924-2022 from the accepted SS3 model with reference points (top horizontal dotted line is the target, lower dashed horizontal line is the overfished threshold.



Source: 2023 Spiny Dogfish Management Track Assessment, available at https://www.mafmc.org/ssc-meetings/october-30-2023

[3] The assessment and its peer review summary are available at https://www.mafmc.org/ssc-meetings/october-30-2023.

Figure 17. Time series of fishing mortality 1924-2022 from the accepted SS3 model with reference points (top horizontal dotted line is the target, lower dashed horizontal line is the overfished threshold.



Source: 2023 Spiny Dogfish Management Track Assessment, available at https://www.mafmc.org/ssc-meetings/october-30-2023

5.2 Non-target Species

Note: Based on fishery differences and public input over the years from affected communities, the two Councils take slightly different approaches in describing the interaction of a fishery with Non-Target species, so Section 5.2 (monkfish focus) and 5.3 (spiny dogfish focus) differ somewhat in formatting.

Monkfish Focus

The monkfish fishery is closely associated with several fisheries managed by other FMPs, specifically the groundfish, skate, spiny dogfish, and scallop fisheries. Particularly in the NFMA, monkfish can be targeted or caught as incidental bycatch during trips in which groundfish are also caught, depending on the focus of a trip. Monkfish are caught as bycatch in the scallop fishery, particularly in the SFMA. Further, skates and spiny dogfish are often caught when targeting monkfish in both areas, but particularly in the SFMA.

5.2.1 Northeast Multispecies

Life History and Population. The Northeast Multispecies FMP manages 20 groundfish stocks and stock status varies by stock (NEFMC 2022a).

In U.S. waters, cod are currently managed as two stocks: Gulf of Maine (GOM) and Georges Bank (GB). Based on the updated assessment, the GOM cod stock is overfished and overfishing is occurring for the M=0.2 model and overfished and overfishing is not occurring for the M-ramp model. Georges Bank cod, *Gadus morhua*, is the most southerly cod stock in the world. Based on the 2021 assessment, overfishing status is considered unknown and stock status remains overfished based on a qualitative evaluation of poor stock condition (NEFSC 2022). Recent work by the Atlantic Cod Stock Structure Working Group proposes a new stock structure with five biological stocks in U.S. waters: Georges Bank, Southern New England, Western Gulf of Maine and Cape Cod winter spawners, Western Gulf of Maine spring spawners, and Eastern Gulf of Maine (McBride & Smedbol 2022). The Western Gulf of Maine spring spawners overlaps spatially with the Western Gulf of Maine and Cape Cod winter spawner stock. The Council is working on a transition plan for management of the current two stocks to up to five stocks and the research track working group is currently working to determine how these stocks will be assessed, tentatively scheduled for 2023.

Six distinct haddock stocks have been identified, and the two which occur in U.S. waters are associated with Georges Bank and the Gulf of Maine. As of its 2022 assessment, GOM haddock is not overfished but overfishing is occurring; the 2021 SSB was estimated to be at 16,528 mt, which is 270% of the biomass target (NEFSC 2022 in prep). GB haddock is not overfished and overfishing is not occurring; the 2021 SSB was estimated to be 79,513 mt, which is 66% of the biomass target (NEFSC 2020b).

Off the U.S. coast, American plaice are managed as a single stock in the Gulf of Maine and Georges Bank regions. In the Gulf of Maine and Georges Bank, the American plaice is not overfished and overfishing is not occurring. The stock was in a rebuilding plan, but based on the 2019 assessment, the stock is now considered rebuilt (NEFSC 2020b).

Witch flounder is managed as a unit stock. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. NMFS determined that the stock status for witch flounder will remain overfished, with overfishing unknown, consistent with the 2016 benchmark assessment for this stock.

Winter flounder is managed and assessed in U.S. waters as three stocks: Gulf of Maine, southern New England/Mid-Atlantic, and Georges Bank. Based on the recommendation of the 2020 Peer Review Panel, overfishing is not occurring for GOM winter flounder, but the overfished status is unknown; GB winter flounder is overfished and overfishing is not occurring; SNE/MA winter flounder is overfished, but overfishing is not occurring (NEFSC 2020).

NMFS manages three yellowtail stocks off the U.S. coast including the CC/GOM, GB, and SNE/MA stocks. Based on the 2019 operational assessment, the CC/GOM yellowtail flounder stock is not overfished and overfishing is not occurring. GB yellowtail flounder status determination relative to reference points is not possible because reference points cannot be defined; 2020 stock assessment results continue to indicate low stock biomass and poor productivity. Based on the 2019 operational assessment, the SNE/MA yellowtail flounder stock is overfished and overfishing is not occurring (NEFSC 2020b).

NMFS manages Acadian redfish inhabiting the U.S. waters of the Gulf of Maine and deeper portions of Georges Bank and the Great South Channel as a unit stock. Based on the recommendation of the 2020 Peer Review Panel, redfish is not overfished and overfishing is not occurring. Redfish is rebuilt.

Pollock are assessed as a single unit, though there is considerable movement of pollock between the Scotian Shelf, Georges Bank, and the Gulf of Maine. Based on the 2019 operational assessment, the pollock stock is not overfished and overfishing is not occurring.

White hake is common on muddy bottom throughout the Gulf of Maine. Based on the 2019 operational assessment, the white hake stock is overfished and overfishing is not occurring.

Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB or northern) and Southern New England-Mid-Atlantic Bight (SNE/MA or southern) due to differences in growth rates, size at maturity, and relative abundance trends. Based on the recommendations of the 2020 Peer Review Panel, northern windowpane flounder stock status is unknown; Southern windowpane flounder is not overfished and overfishing is not occurring (status has not changed from the 2018 assessment) (NEFSC 2020b).

In US waters, ocean pout are assessed and managed as a unit stock from the Gulf of Maine to Delaware. Based on the 2020 assessment, ocean pout is overfished but overfishing is not occurring. The stock is not rebuilding as expected, despite low catch. Discards comprise most of the catch since the no possession regulation was implemented in May 2010.

Atlantic halibut is the largest species of flatfish and is distributed from Labrador to southern New England. Halibut is assessed using a data-poor method (First Second Derivative model), and projections are not possible using this method. Biological reference points are unknown for halibut, but the stock is considered overfished. Halibut is currently in a rebuilding plan with an end date of 2056.

Atlantic wolffish is a benthic fish distributed off Greenland to Cape Cod and sometimes in southern New England and New Jersey waters. Based on the recommendations of the 2020 Peer Review Panel, wolffish is overfished but overfishing is not occurring. Wolffish is in a rebuilding plan, but the end date is not defined.

Management and Fishery. Northeast multispecies are managed under a dual management system which breaks the fishery into two components: sectors and the common pool. For stocks that permit fishing, each sector is allotted a share of each stock's ACL that consists of the sum of individual sector member's potential sector contribution based on their annual catch entitlements. Sector allocations are strictly controlled as hard total allowable catch limits and retention is required for all stocks managed under an ACL. Overages are subject to accountability measures including payback from the sector's allocation for the following year. Common pool vessels are allocated days at sea (DAS) and their effort further is controlled by a variety of measures including trip limits, closed areas, minimum fish size and gear restrictions varying between stocks. Only a very small portion of the ACL is allotted to the common pool. Framework Adjustment 63 to the NE Multispecies FMP has more detail on the stock status and control of fishing effort (NEFMC 2022a).

5.2.2 Skates

Life History and Population. The Northeast Skate Complex Fishery Management Plan (Skate FMP) specifies the management measures for seven skate species (barndoor, clearnose, little, rosette, smooth, thorny, and winter skate) off the New England and Mid-Atlantic coasts. Specifications are set for skates as a complex (e.g., one ACL) every two years, which include possession limits for the skate wing and bait fisheries. These fisheries have different seasonal management structures and are subject to effort controls and accountability measures. Overfishing is not occurring on any of these species, and only one species, thorny skate, is overfished.

Management and Fishery. A detailed description of the commercial skate fishery and fishing communities may be found in Framework Adjustment 8 (NEFMC 2020b). The bait fishery is primarily whole little and small-winter skates, and the wing fishery is primarily large-winter and barndoor skates. There are three primary skate ports: Chatham and New Bedford, Massachusetts and Point Judith, Rhode Island; and 11 secondary ports from Massachusetts to New Jersey. The number of vessels landing skate has declined since FY 2011 (567) to 322 in FY 2020. Skate revenue has fluctuated between $5.2-$9.4M annually from FY 2010 to 2020, largely due to changes in wing revenue. Within the directed monkfish gillnet fishery, there is also a seasonal gillnet incidental skate fishery, in which mostly winter skates are sold for lobster bait and as cut wings for processing.

5.2.3 Atlantic Sea Scallops

Life History and Population. Sea scallops, *Placopecten magellanicus*, are distributed in the northwest Atlantic Ocean from Newfoundland to North Carolina, mainly on sand and gravel sediments where bottom temperatures remain below 20º C (68º F). North of Cape Cod, concentrations generally occur in shallow water <40 m (22 fathoms) deep. South of Cape Cod and on Georges Bank, sea scallops typically occur at depths of 25 - 200 m (14 - 110 fathoms), with commercial concentrations generally 35 - 100 m (19 - 55 fathoms). Sea scallops are filter feeders, feeding primarily on phytoplankton, but also on microzooplankton and detritus (Hart & Chute 2004). Sea scallops grow rapidly during the first several years of life. Between ages 3 and 5, they commonly increase 50 - 80% in shell height and quadruple their meat weight. Sea scallops can live more than 20 years. They usually become sexually mature at age 2, but individuals younger than age 4 probably contribute little to total egg production. Sexes are separate and fertilization is external. Spawning usually occurs in late summer and early autumn; spring spawning may also occur, especially in the Mid-Atlantic Bight. Sea scallops are highly fecund; a single large female can release hundreds of millions of eggs annually. Larvae remain in the water column for four to seven weeks before settling to the bottom. Sea scallops attain commercial size at about four to five years old, though historically, three-year-olds were often exploited. Sea scallops have a somewhat uncommon combination of life-history attributes: low mobility, rapid growth, and low natural mortality (NEFSC 2011).

Management and Fishery. The commercial fishery for sea scallops is conducted year-round, primarily using New Bedford style and turtle deflector scallop dredges. A small percentage of the fishery uses otter trawls, mostly in the Mid-Atlantic. The principal U.S. commercial fisheries are in the Mid-Atlantic (from Virginia to Long Island, New York) and on Georges Bank and neighboring areas, such as the Great South Channel and Nantucket Shoals. There is also a small, primarily inshore fishery for sea scallops in the Gulf of Maine. The NEFMC established the Scallop FMP in 1982. The scallop resource was last assessed in 2020, and it was not overfished, and overfishing was not occurring (NEFSC 2020a). Vessels targeting scallops catch monkfish and land them if the price is high enough.

SPINY DOGFISH FOCUS

Note: Based on fishery differences and public input over the years from affected communities, the two Councils take slightly different approaches in describing the interaction of a fishery with non-Target species, so Section 5.2 (monkfish focus) and 5.3 (spiny dogfish focus) differ somewhat in formatting.

<u>**Non-Target Species**</u>

A) <u>Other Species Caught in Directed Spiny Dogfish Fishing</u>

Due to reduced observer coverage in 2020 and 2021 due to Covid-19, observer data from 2017-2019 still best describe incidental catch in the spiny dogfish fishery. The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable.

From 2017-2019, gill net gear accounted for 66%-74% of annual landings. Bottom long line gear accounted for 18-27% of annual landings. All other gears, including bottom trawl, accounted for only 7-8% of annual landings and are not expected to have involved substantial targeting of spiny dogfish given current trip limits (substantial trawling for spiny dogfish would only be expected at higher trip limits given the price of spiny dogfish) and very similar intensity of bottom trawling in the region would be expected to occur even with a complete prohibition on spiny dogfish retention.

From 2017-2019 there were on average 235 observed sink gill net trips (gear # = 100) annually where spiny dogfish accounted for at least 40% of retained catch, and those trips form the basis of the following analysis to determine which other species the directed spiny dogfish fishery interacts with. These trips made 2,540 hauls of which 86% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc. These observed hauls had a 5% discard rate, most of which was spiny dogfish.

The other species to exceed 1,000 pounds of observed catch per year (used as an ad-hoc minimum indication threshold of potentially more than negligible catch) included (annual observed catch rounded to nearest 1,000 pounds): winter/big skate (83,000 pounds), little skate (8,000 pounds), unknown skates (7,000 pounds), monkfish (6,000 pounds), smooth dogfish (4,000 pounds), cod (3,000 pounds), lobster (3,000 pounds), pollock (3,000 pounds), menhaden (2,000 pounds), haddock (1,000 pounds), and striped bass (1,000 pounds). Of these, only cod is overfished while the Southern New England lobster stock is "depleted with poor prospects of recovery" (https://media.fisheries.noaa.gov/2022-05/2021_SOS_FSSI_and_nonFSSI_Stock_Status_Tables.pdf, http://www.asmfc.org/species/american-lobster).

From 2017-2019 there were on average 36 observed bottom longline trips (gear # = 010) annually where spiny dogfish accounted for at least 40% of retained catch, and those trips form the basis of the following analysis to determine which other species the directed spiny dogfish fishery interacts with. These trips made 438 hauls of which 99% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc. These observed hauls had a 10% discard rate, most of which was spiny dogfish.

The other species to exceed 1,000 pounds of observed catch per year (used as an ad-hoc minimum indication threshold of potentially more than negligible catch) included (annual observed catch rounded to nearest 1,000 pounds): golden tilefish (7,000 pounds), barndoor skate (4,000 pounds), smooth dogfish (3,000 pounds), and winter/big skate (2,000 pounds). Of these, none is overfished (https://media.fisheries.noaa.gov/2022-05/2021_SOS_FSSI_and_nonFSSI_Stock_Status_Tables.pdf).

While not extrapolations, the above amounts appear very small relative to annual catch limits for these species, and management of these species already accounts for both landings and discards. Given the apparent low level of interactions with non-target species and ongoing management of those species, their conditions are affected predominantly by other fisheries/issues and should not be affected by this action or the operation of the spiny dogfish fishery more generally.

B. Other Managed Fisheries with Non-directed Spiny Dogfish Catch

Per NMFS' 2020 report on Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States (NMFS 2020), a wide variety of gear types discard spiny dogfish beyond the gear types mentioned above that are responsible for most landings. These other gear types catch most of the species that exist in the region, some of which are in good condition and some of which are in an overfished condition. While this indicates that incidental spiny dogfish catch occurs across a wide variety of other managed fisheries, outside of the directed spiny dogfish fishery, spiny dogfish is often seen as a pest species (e.g. see MAFMC 2017 MSB Fishery Performance Report at http://www.mafmc.org/s/2017-MSB-Fishery-Performance-Report.pdf), and is often entirely discarded (e.g. longfin squid fishery – see MAFMC 2020). As such, changes in spiny dogfish regulations are not expected to change fishing patterns for other fisheries that catch (and mostly discard) spiny dogfish, or affect any of those managed species in a meaningful way. Further details about the many other managed species in the region and their current stock statuses can be found in their relevant FMPs.

5.3 Protected Resources

5.3.1 Atlantic Sturgeon

The life history traits of Atlantic sturgeon have been documented in historical and contemporary literature (e.g., Dees 1961; Vladykov and Greeley 1963; ASSRT 2007; Hilton et al. 2016; ASMFC 2017). Key characteristics include that spawning occurs in freshwater of a river that is part of an estuary. The early life stages are dependent on and remain in the natal estuary for months to years until they are suitably developed to enter the Atlantic Ocean, thus beginning their seasonal use of both estuarine and marine waters for the remainder of their life. They return to a freshwater tidal reach of a river estuary when they are ready to spawn. Tagging records and the relatively low rate of gene flow reported in population genetic studies provide evidence that Atlantic sturgeon typically return to their natal river to spawn (ASSRT 2007). Adults are long-lived and spawn multiple times within their lifespan but maturity occurs relatively late, anywhere from several years to more than 20 years (ASSRT 2007; Hilton et al. 2016). The age at which they mature and the time of year when they spawn varies among the river populations.

The marine and estuarine range of all five Atlantic sturgeon DPSs as well as the two Canadian populations overlap and extends from Canada through Cape Canaveral, Florida (ASSRT 2007, Wirgin et al. 2015; Kazyak et al. 2021). In the marine environment, Atlantic sturgeon primarily occur inshore of the 50 m depth contour, but can occur in deeper waters (Stein et al. 2004a; Dunton et al. 2010). Seasonal differences in distribution with a presence in more nearshore waters in the spring, particularly near coastal estuaries, and movement to more offshore waters in the fall have been associated with several environmental variables (e.g., water temperature) and proximity to the sturgeon’s natal river where the fish generally occur throughout the winter (Erickson et al. 2011; Ingram et al. 2019; Breece et al. 2018a; Breece et al. 2018b; Rothermel et al. 2020; Kazyak et al. 2021).

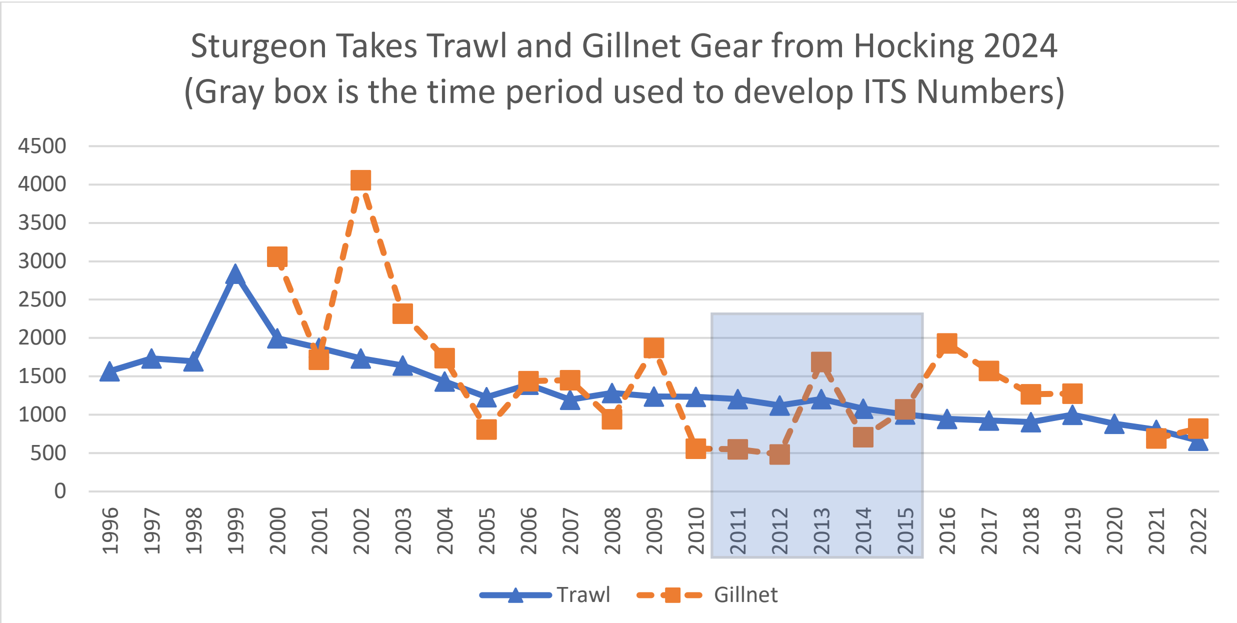
All of the Atlantic sturgeon DPSs are either at risk of extinction (i.e., those DPSs listed as endangered) or at risk of becoming endangered (i.e., the Gulf of Maine DPS) due to multiple threats that include the loss and alteration of habitat, and anthropogenic mortality. In particular, based on estimates of Atlantic sturgeon bycatch (Stein et al. 2004b; ASMFC 2007), NOAA Fisheries concluded that bycatch of Atlantic sturgeon in commercial gillnet and bottom trawl fisheries was a threat (77 FR 5880 and 77 FR 5914; February 6, 2012). NOAA Fisheries also noted in the listing determinations that there were no estimates of total abundance for any of the five DPSs but that abundance was likely orders of magnitude lower than historical abundance given the available information for adult spawning abundance and natal juvenile abundance for some DPSs and given the reduced number of known spawning populations compared to historical records.

The ASMFC’s most recent stock assessment for Atlantic sturgeon concluded that some of the DPSs have likely increased in abundance since closure of the Atlantic sturgeon fisheries in state and federal waters (ASMFC 2017). However, a lack of data hampered their efforts to assess the status of Atlantic sturgeon. New information available since the ESA-listing of the five DPSs was provided in the Stock Assessment as well as in the NOAA Fisheries 5-year reviews for each DPS. Based on the new and existing information, NOAA Fisheries concluded that the New York Bight, Chesapeake Bay, Carolina, and South

Atlantic DPSs should remain listed as endangered, and the Gulf of Maine DPS should remain listed as threatened.

The ASMFC is updating its Atlantic sturgeon assessment in 2024 and that information will be considered in the reinitiated Biological Opinion.

Figure 18. Total Estimated Gillnet Takes.



Source: Hocking 2024, available via Tables 3/4 at https://www.mafmc.org/actions/sturgeon-bycatch-framework

5.3.2 Protected Species Present in the Area

Numerous protected species occur in the affected environment of the Monkfish FMP (Table 7) and have the potential to be impacted by the proposed action (i.e., there have been observed/documented interactions in the fisheries or with gear types like those used in the fisheries (bottom trawl, gillnet gear)). These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972.

Cusk are a NMFS "candidate species" under the ESA. Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. As a result, cusk will not be discussed further in this and the following sections; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. More information on cusk is at: https://www.fisheries.noaa.gov/species/cusk.

Table 5. Species protected under the ESA and/or MMPA that may occur in the monkfish fishery affected environment.

Species	Status	Potentially impacted by this action?
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***Yes***
Humpback whale, West Indies DPS (*Megaptera novaeangliae)*	Protected (MMPA)	Yes
Fin whale (Balaenoptera physalus)	***Endangered***	***Yes***
Sei whale (Balaenoptera borealis)	***Endangered***	***Yes***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter macrocephalus	***Endangered***	***Yes***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (Globicephala spp.)[2]	Protected (MMPA)	Yes
Pygmy sperm whale (*Kogia breviceps*)	Protected (MMPA)	No
Dwarf sperm whale (*Kogia sima*)	Protected (MMPA)	No
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	Yes
Short Beaked Common dolphin (*Delphinus delphis*)	Protected (MMPA)	Yes
Atlantic Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Striped dolphin (*Stenella coeruleoalba*)	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[3]	***Protected (MMPA)***	***Yes***
Harbor porpoise (*Phocoena phocoena*)	Protected (MMPA)	Yes
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Giant manta ray (*Manta birostris)*	Threatened	Yes
Oceanic whitetip shark (*Carcharhinus longimanus*)	Threatened	No
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	Yes
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	Yes
Gray seal (*Halichoerus grypus*)	Protected (MMPA)	Yes
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	Yes
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	Yes
Critical Habitat		
North Atlantic Right Whale	ESA Designated	No
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA Designated	No
Johnson’s Sea Grass	ESA Designated	No
Elkhorn and Staghorn corals	ESA Designated	No
Smalltooth Sawfish (U.S. DPS)	ESA Designated	No

Species	Status	Potentially impacted by this action?
Note: Marine mammal species italicized and in bold are considered MMPA strategic stocks, a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Sect. 3, MMPA of 1972). [2] There are 2 species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often just referred to as *Globicephala spp*. [3] This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins. See NMFS Marine Mammal Stock Assessment Reports (SARs) for the Atlantic Region for further details.		

5.3.3 Species and Critical Habitat Unlikely to be Impacted by the Proposed Action

Based on available information, it has been determined that this action is unlikely to impact multiple ESA listed and/or MMPA protected species or any designated critical habitat (Table 7). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or based on the most recent ten years of observer, stranding, and/or marine mammal serious injury and mortality reports, there have been no observed or documented interactions between the species and the primary gear type (i.e., bottom trawl and gillnet) used to prosecute the monkfish fishery (Greater Atlantic Region (GAR) Marine Animal Incident Database, unpublished data; NMFS Marine Mammal Stock Assessment Reports (SARs) for the Atlantic Region; NMFS NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC marine mammal (small cetacean, pinniped, baleen whale) serious injury and mortality Reference Documents, Publications, or Technical Memoranda; MMPA List of Fisheries (LOF); NMFS 2021a).[4] In the case of critical habitat, this determination has been made because the action will not affect the essential physical and biological features of critical habitat identified in Table 7 and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2021a).

5.3.4 Species Potentially Impacted by the Proposed Action

Table 7 lists protected species of sea turtle, marine mammal, and fish species present in the affected environment of the monkfish fishery, and that may also be impacted by the operation of this fishery; that is, have the potential to become entangled or bycaught in the fishing gear used to prosecute the fishery. To aid in the identification of MMPA protected species potentially impacted by the action, NMFS Marine Mammal SARs for the Atlantic Region, MMPA List of Fisheries (LOF), NMFS (2021b) , NMFS NEFSC observer/sea sampling database (unpublished data), and NMFS NEFSC marine mammal (small cetacean, pinniped, baleen whale) serious injury and mortality Reference Documents, Publications, or Technical Memoranda were referenced.

To help identify ESA listed species potentially impacted by the action, we queried the NMFS NEFSC observer/sea sampling (2010-2019), Sea Turtle Disentanglement Network (2010-2019), and the GAR Marine Animal Incident (2010-2019) databases for interactions, and reviewed the May 27, 2021,

[4] For marine mammals protected under the MMPA, the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2010-2019. For ESA listed species, information on observer or documented interactions with fishing gear is from 2010-2019.

Biological Opinion (Opinion)[5] issued by NMFS. The 2021 Opinion considered the effects of the NMFS' authorization of ten fishery management plans (FMP),[6] including the Monkfish FMP on ESA-listed species and designated critical habitat. The Opinion determined that the authorization of ten FMPs may adversely affect, but is unlikely to jeopardize, the continued existence of North Atlantic right, fin, sei, or sperm whales; the Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, leatherback, Kemp's ridley, or North Atlantic DPS of green sea turtles; any of the five DPSs of Atlantic sturgeon; GOM DPS Atlantic salmon; or giant manta rays. The Opinion also concluded that the proposed action is unlikely to adversely affect designated critical habitat for North Atlantic right whales, the Northwest Atlantic Ocean DPS of loggerhead sea turtles, U.S. DPS of smalltooth sawfish, Johnson's seagrass, or elkhorn and staghorn corals. An Incidental Take Statement (ITS) was issued in the Opinion. The ITS includes reasonable and prudent measures and their implementing terms and conditions, which NMFS determined are necessary or appropriate to minimize impacts of the incidental take in the fisheries assessed in this Opinion.

As the primary concern for both MMPA protected and ESA listed species is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interaction with particular fishing gear types, to understand the potential risk of an interaction. Information on species occurrence in the affected environment of the monkfish fishery and on protected species interactions with specific fishery gear is provided below.

5.3.4.1 Sea Turtles

Below is a summary of the status and trends, and the occurrence and distribution of sea turtles in the affected environment of the monkfish fishery. More information on the range-wide status of affected sea turtles species, and their life history is in several published documents, including NMFS (2021a); sea turtle status reviews and biological reports (Conant *et al.* 2009; Hirth 1997; NMFS & USFWS 1995; 2007a; b; 2013; TEWG 1998; 2000; 2007; 2009), and recovery plans for the loggerhead (Northwest Atlantic DPS) sea turtle (NMFS & USFWS 2008), leatherback sea turtle (NMFS & USFWS 1992; 1998b; 2020), Kemp's ridley sea turtle (NMFS & USFWS 2011), and green sea turtle (NMFS & USFWS 1991; 1998a).

Status and Trends.

Four sea turtle species have the potential to be impacted by the proposed action: Northwest Atlantic Ocean DPS of loggerhead, Kemp's ridley, North Atlantic DPS of green, and leatherback sea turtles (Table 7). Although stock assessments and similar reviews have been completed for sea turtles none have been able to develop a reliable estimate of absolute population size. As a result, nest counts are used to inform population trends for sea turtle species.

For the Northwest Atlantic Ocean DPS of loggerhead sea turtles, there are five unique recovery units that comprise the DPS. Nesting trends for each of these recovery units are variable; however, Florida index nesting beaches comprise most of the nesting in the DPS (https://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/). Overall, short-term trends for loggerhead sea turtles (Northwest

[5] NMFS' May 27, 2021, Biological Opinion on the 10 FMPs is at: https://www.fisheries.noaa.gov/resource/document/biological-opinion-10-fishery-management-plans
[6] The ten FMPs considered in the May 27, 2021, Biological Opinion include: American Lobster, Atlantic Bluefish, Atlantic Deep-Sea Red Crab, Mackerel/Squid/Butterfish, Monkfish, Northeast Multispecies, Northeast Skate Complex, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Jonah Crab.

Atlantic Ocean DPS) have shown increases; however, over the long-term the DPS is considered stable (NMFS 2021a).

For Kemp's ridley sea turtles, from 1980-2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15% annually (Heppell *et al.* 2005a); however, due to recent declines in nest counts, decreased survival of immature and adult sea turtles, and updated population modeling, this rate is not expected to continue and therefore, the overall trend is unclear (Caillouet *et al.* 2018; NMFS & USFWS 2015). In 2019, there were 11,090 nests, a 37.61% decrease from 2018 and a 54.89% decrease from 2017, which had the highest number (24,587) of nests; the reason for this recent decline is uncertain (NMFS 2021a). Given this and continued anthropogenic threats to the species, according to NMFS (2021a), the species resilience to future perturbation is low.

The North Atlantic DPS of green sea turtle, overall, is showing a positive trend in nesting; however, increases in nester abundance for the North Atlantic DPS in recent years must be viewed cautiously as the datasets represent a fraction of a green sea turtle generation which is between 30 and 40 years (Seminoff *et al.* 2015). While anthropogenic threats to this species continue, taking into consideration the best available information on the species, NMFS (2021a), concluded that the North Atlantic DPS appears to be somewhat resilient to future perturbations.

Leatherback turtle nesting in the Northwest Atlantic is showing an overall negative trend, with the most notable decrease occurring during the most recent time frame of 2008 to 2017 (Northwest Atlantic Leatherback Working Group 2018). The leatherback status review in 2020 concluded that leatherbacks are exhibiting an overall decreasing trend in annual nesting activity (NMFS & USFWS 2020). Given continued anthropogenic threats to the species, according to NMFS (2021a), the species' resilience to additional perturbation both within the Northwest Atlantic and worldwide is low.

Occurrence and Distribution.

<u>*Hard-shelled sea turtles.*</u> In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature (Braun-McNeill *et al.* 2008; Braun & Epperly 1996; Epperly *et al.* 1995a; Epperly *et al.* 1995b). As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Braun-McNeill & Epperly 2002; Epperly *et al.* 1995a; Epperly *et al.* 1995b; Epperly *et al.* 1995c; Griffin *et al.* 2013; Morreale & Standora 2005; NMFS & USFWS 2020), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the GOM in June (Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the GOM by September, but some remain in Mid-Atlantic and Northeast areas until late fall (i.e., November). By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further south, although it should be noted that hard-shelled sea turtles can occur year-round in waters off Cape Hatteras and south (Epperly *et al.* 1995a; Griffin *et al.* 2013; Hawkes *et al.* 2011; Shoop & Kenney 1992).

<u>*Leatherback sea turtles.*</u> Leatherbacks, a pelagic species, are known to use coastal waters of the U.S. continental shelf and to have a greater tolerance for colder water than hard-shelled sea turtles (Dodge *et al.* 2014; Eckert *et al.* 2006; James *et al.* 2005; Murphy *et al.* 2006; NMFS & USFWS 2013). Leatherback sea turtles engage in routine migrations between northern temperate and tropical waters (Dodge *et al.* 2014; James *et al.* 2005; James *et al.* 2006; NMFS & USFWS 1992). They are found in more northern waters (i.e., GOM) later in the year (i.e., similar time frame as hard-shelled sea turtles), with most leaving the Northwest Atlantic shelves by mid-November (Dodge *et al.* 2014; James *et al.* 2005; James *et al.* 2006).

5.3.4.2 Large Whales

Status and Trends.

Six large whale species have the potential to be impacted by the proposed action: humpback, North Atlantic right, fin, sei, sperm, and minke whales (Table 8). Large whale stock assessment reports covering the period of 2010-2019, indicate a decreasing trend for the North Atlantic right whale population; however, for fin, humpback, minke, sperm, and sei whales, it is unknown what the population trajectory is as a trend analysis has not been conducted. The NMFS Marine Mammal SARs for the Atlantic Region has more information on the status of humpback, North Atlantic right, fin, sei, sperm, and minke whales.

Occurrence and Distribution.

As in Table 7, North Atlantic right, humpback, fin, sei, sperm, and minke whales occur in the Northwest Atlantic Ocean. As large whales may be present in these waters throughout the year, the monkfish fishery and large whales are likely to co-occur in the affected area. To further assist in understanding how the monkfish fishery overlaps in time and space with the occurrence of large whales, Table 8 has an overview of species occurrence and distribution in the affected environment of the fishery. More information on North Atlantic right, humpback, fin, sei, sperm, and minke whales is in: NMFS Marine Mammal SARs for the Atlantic Region.

Table 6. Large whale occurrence, distribution, and habitat use in the monkfish fishery affected environment.

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
North Atlantic Right Whale	• Predominantly occupy waters of the continental shelf, but based on passive acoustic and telemetry data, are also known to make lengthy excursions into deep waters off the shelf. • Visual and acoustic data demonstrate broad scale, year-round presence along the U.S. eastern seaboard (e.g., GOM, New Jersey, and Virginia). • Surveys have demonstrated the existence of several areas where North Atlantic right whales congregate seasonally, including Cape Cod Bay; Massachusetts Bay; and the continental shelf south of New England. Although whales can be found consistently in particular locations throughout their range, there is a high inter-annual variability in right whale use of some habitats. Since 2010, acoustic and visual surveys indicate a shift in habitat use patterns, including: > Fewer individuals are detected in the Great South Channel; > increase in the number of individuals using Cape Cod Bay (i.e., during the expected late winter and early spring foraging period and during the 'off season' period of summer and fall); > apparent abandonment of central GOM in the winter; and, > Large increase in the numbers of whales detected in a region south of Martha's Vineyard and Nantucket Islands (i.e., during the expected late winter and early spring foraging period and during the 'off season' period of summer and fall). > Passive acoustic monitoring suggests a shift to a year-round presence in the Mid-Atlantic, including year-round detections in the New York Bight with the highest presence between late February and mid-May in the shelf zone and nearshore habitat).
Humpback	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. • New England waters (GOM and GB) = Foraging Grounds (~March- November); however, acoustic detections of humpbacks indicate year-round presence in New England waters, including the waters of Stellwagen Bank. • Mid-Atlantic waters: Increasing evidence that mid-Atlantic areas are becoming an important habitat for juvenile humpback whales.

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
	• Since 2011, increased sightings of humpback whales in the New York-New Jersey Harbor Estuary, in waters off Long Island, and along the shelf break east of New York and New Jersey. • Increasing visual and acoustic evidence of whales remaining in mid- and high-latitudes throughout the winter (e.g., Mid- Atlantic: waters near Chesapeake and Delaware Bays, peak presence about January through March; Massachusetts Bay: peak presence about March-May and September-December).
Fin	• Distributed throughout all continental shelf waters of the GOM to Mid-Atlantic; • Recent sighting data show evidence that, while densities vary seasonally, fin whales are present in every season throughout most of the EEZ north of 30°N. • New England waters (GOM and GB) = Major Foraging Ground
Sei	• Primarily found in deep waters along the shelf edge, shelf break, and ocean basins between banks.; however incursions into shallower, shelf waters do occur (e.g., Stellwagen Bank, Great South Channel, waters south of Nantucket, Georges Bank). • Spring through summer, sightings concentrated along the northern, eastern (into Northeast Channel) and southwestern (in the area of Hydrographer Canyon) edge of Georges Bank, and south of Nantucket, MA. • Recent acoustic detections peaked in northern latitudes in the summer, indicating feeding grounds ranging from Southern New England through the Scotian Shelf. • Persistent year-round detections in Southern New England and the New York Bight indicate this area to be an important region for sei whales. • The wintering habitat remains largely unknown. Passive acoustic monitoring conducted in 2015-2016 off Georges Bank detected sei whales calls from late fall through the winter along the southern Georges Bank region (off Heezen and Oceanographer Canyons).
Sperm	• Distributed on the continental shelf edge, continental slope, and into mid-ocean regions. • Seasonal Occurrence in the U.S. EEZ: >**Winter**: concentrated east and northeast of Cape Hatteras; >**Spring**: center of distribution shifts northward to east of Delaware and Virginia, and is widespread throughout the central portion of the mid-Atlantic bight and the southern portion of Georges Bank; >**Summer**: similar distribution to spring, but also includes the area east and north of Georges Bank and into the Northeast Channel region, and the continental shelf (inshore of the 100-m isobath) south of New England; and, >**Fall**: occur in high levels south of New England, on the continental shelf. Also occur along continental shelf edge in the mid-Atlantic bight.
Minke	• Widely distributed within the U.S. EEZ. • Spring to Fall: widespread (acoustic) occurrence on the continental shelf; most abundant in New England waters during this period of time. • September to April: high (acoustic) occurrence in deep-ocean waters.
Note: SNE=Southern New England; GOM=Gulf of Maine; GB=Georges Bank *Sources:* Baumgartner et al. (2011; 2007); Baumgartner and Mate (2005); Bort et al. (2015); Brown et al. (Brown *et al.* 2018; 2002); CETAP (1982); Charif et al. (2020); Cholewiak et al. (2018); Clapham et al. (1993); Clark and Clapham (2004); Cole et al. (2013); Davis et al. (2017; 2020); Ganley et al. (2019); Good (2008); Hain et al. (1992); Hamilton and Mayo (1990); Hayes et al. (2017; 2018; 2019; 2020; 2021; 2022); Kenney et al. (1986; 1995); Khan et al. (2010; 2011; 2012; 2009); Kraus et al. (2016); Leiter et al. (2017); Mate et al. (1997); Mayo et al. (2018); McLellan et al. (2004); Moore et al. (2021); Morano et al. (2012); Muirhead et al. (2018); Murray et al. (2013); NMFS (1991; 2005; 2010; 2011; 2021a; b) 2012; 2015; NOAA (2008); Pace and Merrick (2008); Palka et al. (2017); Palka (2020)2020; Payne et al. (1984; 1990); Pendleton et al. (2009); Record et al. (2019); Risch et al. (2013); Robbins (2007); Roberts et al. (2016); Salisbury et al. (2016); Schevill et al. (1986);	

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
Stanistreet et al. (2018); Stone et al. (2017); Swingle et al. (1993); Vu et al. (2012); Watkins and Schevill (1982); Whitt et al. (2013); Winn et al. (1986); 81 FR 4837 (January 27, 2016); 86 FR 51970 (September 17, 2021).	

5.3.4.3 Small Cetaceans

Status and Trends. Risso's, white-sided, short beaked common, and bottlenose dolphins (Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal stocks); long and short –finned pilot whales; and harbor porpoise are identified as having the potential to be impacted by the proposed action (Table 9). The latest stock assessment (Hayes *et al.* 2021) indicates that as a trend analysis has not been conducted for Risso's, white-sided, short-beaked common dolphins; long-finned pilot whales; or harbor porpoise, the population trajectory for these species is unknown. For short-finned pilot whales a generalized linear model indicated no significant trend in the abundance estimates (Hayes *et al.* 2022). For the Western North Atlantic Offshore stock, review of the most recent information on the stock shows no statistically significant trend in population size for this species; however, the high level of uncertainty in the estimates limits the ability to detect a statistically significant trend. Regarding the Northern and Southern Migratory Coastal stocks (both considered a strategic stock under the MMPA), the most recent analysis of trends in abundance suggests a probable decline in stock size between 2010–2011 and 2016, concurrent with a large UME in the area; however, there is limited power to evaluate trends given uncertainty in stock distribution, lack of precision in abundance estimates, and a limited number of surveys (Hayes *et al.* 2021).

Occurrence and Distribution. Atlantic white sided dolphins, short and long finned pilot whales, Risso's dolphins, short beaked common dolphins, harbor porpoise, and several stocks of bottlenose dolphins are found throughout the year in the Northwest Atlantic Ocean (see NMFS Marine Mammal SARs for the Atlantic Region). Within this range, however, there are seasonal shifts in species distribution and abundance. To further assist in understanding how the monkfish fishery overlaps in time and space with the occurrence of small cetaceans, Table 9 gives an overview of species occurrence and distribution in the affected environment of the fishery. More information on small cetacean occurrence and distribution in the Northwest Atlantic is in the NMFS Marine Mammal SARs for the Atlantic Region.

Table 7. Small cetacean occurrence and distribution in the monkfish fishery affected environment.

Species	Occurrence ad Distribution in the Affected Environment
Atlantic White Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 m) of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM; however, most common in continental shelf waters from Hudson Canyon (~39°N) to GB, and into the GOM. • **January-May**: low densities found from GB to Jeffreys Ledge. • **June-September**: Large densities found from GB, through the GOM. • **October-December**: intermediate densities found from southern GB to southern GOM. • South of GB (SNE and Mid-Atlantic), particularly around Hudson Canyon, low densities found year-round, • Virginia (VA) and North Carolina (NC) waters represent southern extent of species range during winter months.
Short Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily between the 100-2,000 m isobaths) of the Mid-Atlantic, SNE, and GB (esp. in Oceanographer, Hydrographer, Block, and Hudson Canyons). • Less common south of Cape Hatteras, NC, although schools have been reported as far south as the Georgia/South Carolina border. • **January-May**: occur from waters off Cape Hatteras, NC, to GB (35° to 42°N). • **Mid-summer-autumn**: Occur in the GOM and on GB; *Peak abundance* found on GB in the autumn.

Species	Occurrence ad Distribution in the Affected Environment
Risso's Dolphin	• **Spring through fall**: Distributed along the continental shelf edge from Cape Hatteras, NC, to GB. • **Winter**: distributed in the Mid-Atlantic Bight, extending into oceanic waters. • Rarely seen in the GOM; primarily a Mid-Atlantic continental shelf edge species (can be found year-round).
Harbor Porpoise	• Distributed throughout the continental shelf of the Mid-Atlantic, SNE, GB, and GOM. • **July-September**: Concentrated in the northern GOM (waters <150 m); low numbers can be found on GB. • **October-December**: widely dispersed in waters from New Jersey (NJ) to Maine (ME); seen from the coastline to deep waters (>1,800 m). • **January-March**: intermediate densities in waters off NJ to NC; low densities found in waters off New York (NY) to GOM. • **April-June**: widely dispersed from NJ to ME; seen from the coastline to deep waters (>1,800 m). • Passive acoustic monitoring indicates regular presence from January through May offshore of Maryland.
Bottlenose Dolphin	**<u>Western North Atlantic Offshore Stock</u>** • Distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic from GB to Florida (FL). • Depths of occurrence: ≥40 m **<u>Western North Atlantic Northern Migratory Coastal Stock</u>** • Most common in coastal waters <20 m deep. • Warm water months (e.g., July-August): distributed from the coastal waters from the shoreline to about 25-m isobaths between the mouth of the Chesapeake Bay and Long Island, NY. • Cold water months (e.g., January-March): stock occupies coastal waters from Cape Lookout, NC, to the NC/VA border. **<u>Western North Atlantic Southern Migratory Coastal Stock</u>** • Most common in coastal waters <20 m deep. • **October-December**: appears stock occupies waters of southern NC (south of Cape Lookout) • **January-March**: appears stock moves as far south as northern FL. • **April-June**: stock moves north to waters of NC. • **July-August**: stock is presumed to occupy coastal waters north of Cape Lookout, NC, to the eastern shore of VA (as far north as Assateague).
Pilot Whales: ***Short- and Long-Finned***	**<u>Short- Finned Pilot Whales</u>** • Except for area of overlap (see below), primarily occur south of 40^{o}N (Mid-Atlantic and SNE waters); although low numbers have been found along the southern flank of GB, but no further than 41^{o}N. • Distributed primarily near the continental shelf break of the Mid-Atlantic and SNE (i.e., off Nantucket Shoals). **<u>Long-Finned Pilot Whales</u>** • Except for area of overlap (see below), primarily occur north of 42^{O}N. • Winter to early spring: distributed principally along the continental shelf edge off the northeastern U.S. coast. • Late spring through fall: movements and distribution shift onto GB and into the GOM and more northern waters. • Species tends to occupy areas of high relief or submerged banks. **<u>Area of Species Overlap:</u>** along the mid-Atlantic shelf break between Delaware and the southern flank of GB.

Species	Occurrence ad Distribution in the Affected Environment
Notes: Information is representative of small cetacean occurrence in the Northwest Atlantic continental shelf waters out to 2,000 m depth. *Sources*: Hayes et al. (2017; 2018; 2019; 2020; 2022); Payne and Heinemann (1993); Payne et al. (1984); Jefferson et al. (2009).	

5.3.4.4 Pinnipeds

Status and Trends. Harbor, gray, harp and hooded seals are identified as having the potential to be impacted by the proposed action (Table 10). Based on Hayes et al. (2019; 2022), the status of the:

- Western North Atlantic harbor seal and hooded seal, relative to Optimum Sustainable Population (OSP), in the U.S. Atlantic EEZ is unknown;
- Gray seal population relative to OSP in U.S. Atlantic EEZ waters is unknown, but the stock's abundance appears to be increasing in Canadian and U.S. waters; and,
- Harp seal stock, relative to OSP, in the U.S. Atlantic EEZ is unknown, but the stock's abundance appears to have stabilized.

Occurrence and Distribution. Harbor, gray, harp, and hooded seals are found in the nearshore, coastal waters of the Northwest Atlantic Ocean. Depending on species, they may be present year-round or seasonally in some portion of the affected environment of the monkfish fishery. Table 10 gives an overview of pinniped occurrence and distribution in the affected environment of the monkfish fishery. More information on pinniped occurrence and distribution in the Northwest Atlantic is in the NMFS Marine Mammal SARs for the Atlantic Region.

Table 8. Pinniped occurrence and distribution in the monkfish fishery affected environment.

Species	Occurrence and Distribution in the Affected Environment
Harbor Seal	• Year-round inhabitants of Maine; • September through late May: occur seasonally along the coasts from southern New England to Virginia.
Gray Seal	• Ranges from New Jersey to Labrador, Canada.
Harp Seal	• Winter-Spring (approx. January-May): Can occur in the U.S. Atlantic Exclusive Economic Zone. • Sightings and strandings have been increasing off the east coast of the United States from Maine to New Jersey.
Hooded Seal	• Highly migratory and can occur in waters from Maine to Florida. These appearances usually occur between January and May in New England waters, and in summer and autumn off the southeast U.S. coast and in the Caribbean.
Sources: Hayes et al. (2019, for hooded seals; 2022).	

5.3.4.5 Atlantic sturgeon

Status and Trends. As in Table 7, Atlantic sturgeon (all five DPSs) have the potential to be impacted by the proposed action. Population trends for Atlantic sturgeon are difficult to discern; however, the most recent stock assessment report concludes that Atlantic sturgeon, at both coastwide and DPS level, are depleted relative to historical levels (ASMFC 2017a; ASSRT 2007; NMFS 2021a).

Occurrence and Distribution. The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range (Altenritter *et al.* 2017; ASMFC 2017b; ASSRT 2007; Breece *et al.* 2016;

Breece *et al.* 2017; Dadswell 2006; Dadswell *et al.* 1984; Dovel & Berggren 1983; Dunton *et al.* 2015; Dunton *et al.* 2010; Erickson *et al.* 2011; Hilton *et al.* 2016; Ingram *et al.* 2019; Kynard *et al.* 2000; Laney *et al.* 2007; Novak *et al.* 2017; O'Leary *et al.* 2014; Rothermel *et al.* 2020; Stein *et al.* 2004a; Waldman *et al.* 2013; Wippelhauser *et al.* 2017; Wirgin *et al.* 2015a; Wirgin *et al.* 2015b).

Based on fishery-independent and dependent surveys, and data collected from genetic, tracking, and/or tagging studies in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour; however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Altenritter *et al.* 2017; Breece *et al.* 2016; Breece *et al.* 2018; Collins & Smith 1997; Dunton *et al.* 2010; Erickson *et al.* 2011; Ingram *et al.* 2019; Novak *et al.* 2017; Rothermel *et al.* 2020; Stein *et al.* 2004a; b; Wippelhauser *et al.* 2017). Data from fishery-independent and dependent surveys, and data collected from genetic, tracking, and/or tagging studies also indicate that Atlantic sturgeon make seasonal coastal movements from marine waters to river estuaries in the spring and from river estuaries to marine waters in the fall; however, there is no evidence to date that all Atlantic sturgeon make these seasonal movements and therefore, may be present throughout the marine environment throughout the year (Altenritter *et al.* 2017; Dunton *et al.* 2010; Erickson *et al.* 2011; Ingram *et al.* 2019; Novak *et al.* 2017; Rothermel *et al.* 2020; Wippelhauser 2012; Wippelhauser *et al.* 2017).

More information on the biology and range wide distribution of each DPS of Atlantic sturgeon is in 77 FR 5880 and 77 FR 5914 (February 6, 2012); the Atlantic Sturgeon Status Review Team's (ASSRT) 2007 status review of Atlantic sturgeon (ASSRT 2007); the ASMFC 2017 Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report (ASMFC 2017a); NMFS (2021a); and, the 5-year review for each Atlantic sturgeon DPS.

5.3.4.6 Atlantic salmon

Status and Trends. As in Table 10, Atlantic salmon (GOM DPS) have the potential to be impacted by the proposed action. There is no population growth rate available for GOM DPS Atlantic salmon; however, the consensus is that the DPS exhibits a continuing declining trend (NMFS 2021a; NMFS & USFWS 2018; NOAA 2016).

Occurrence and Distribution. The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the GOM DPS extends from the GOM (primarily the northern portion) to the coast of Greenland (Fay *et al.* 2006; NMFS & USFWS 2005; 2016). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the GOM and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay *et al.* 2006; Hyvärinen *et al.* 2006; Lacroix & Knox 2005; Lacroix & McCurdy 1996; Lacroix *et al.* 2004; NMFS & USFWS 2005; 2016; Reddin 1985; Reddin & Friedland 1993; Reddin & Short 1991; Sheehan *et al.* 2012; USASAC 2004). More information on the on the biology and range wide distribution of the GOM DPS of Atlantic salmon is in NMFS and USFWS (2005; 2016); Fay et al. (2006); and NMFS (2021a).

5.3.4.7 Giant Manta Ray

Status and Trends. Giant manta rays have the potential to be impacted by the proposed action (Table 7). While there is considerable uncertainty regarding the giant manta ray's current abundance throughout its range, the best available information indicates that in areas where the species is not subject to fishing, populations may be stable (NMFS 2021a). However, in regions where giant manta rays are (or were) actively targeted or caught as bycatch populations appear to be decreasing (Miller & Klimovich 2017).

Occurrence and Distribution. Based on the giant manta ray's distribution, the species may occur in coastal, nearshore, and pelagic waters off the U.S. east coast, usually found in water temperatures between 19 and 22°C and have been observed as far north as New Jersey. Given that the species is rarely identified in the fisheries data in the Atlantic, it may be assumed that populations within the Atlantic are small and sparsely distributed (Miller & Klimovich 2017).

5.3.5 Gear Interactions and Protected Species

Protected species are at risk of interacting with various types of fishing gear, with interaction risks associated with gear type, quantity, soak or tow duration, and degree of overlap between gear and protected species. Information on observed or documented interactions between gear and protected species is available from as early as 1989 (NMFS Marine Mammal SARs for the Atlantic Region; NMFS NEFSC observer/sea sampling database, unpublished data). As the distribution and occurrence of protected species and the operation of fisheries (and, thus, risk to protected species) have changed over the last 30 years, we use the most recent 10 years of available information to best capture the current risk to protected species from fishing gear. For marine mammals protected under the MMPA, the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2011-2020 (GAR Marine Animal Incident Database, unpublished data; Cole *et al.* 2013; Hayes *et al.* 2017; 2018; 2019; 2020; Hayes *et al.* 2021; Hayes *et al.* 2022; Hayes *et al*. 2023; Henry *et al*. 2017; Henry *et al.* 2016; Henry *et al*. 2019; Henry *et al.* 2020; Henry *et al.* 2021; Henry *et al*. 2022; Henry *et al.* 2023; Waring *et al*. 2016). For ESA listed species, the most recent ten years of data on observed or documented interactions is available from 2013-2022 (ASMFC 2017a; Kocik *et al.* 2014; unpublished data: GAR Marine Animal Incident Database, NMFS NEFSC observer/sea sampling database, GAR Sea Turtle and Disentanglement Network, NMFS Sea Turtle Stranding and Salvage Network; NMFS 2021a) (NMFS Marine Mammal SARs for the Atlantic Region; NMFS NEFSC protected species serious injury and mortality Reference Documents, Publications, or Technical Memoranda). Available information on gear interactions with a given species (or species group) is in the sections below. This is not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is on the main gear types used to prosecute the monkfish fishery (i.e., sink gillnet and bottom trawl gear).

5.3.5.1 Sea Turtles

Bottom Trawl Gear. Bottom trawl gear poses an injury and mortality risk to sea turtles (Sasso & Epperly 2006; NMFS Observer Program, unpublished data). Since 1989, the date of our earliest observer records for federally managed fisheries, sea turtle interactions with trawl gear have been observed in the GOM, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the GOM (Murray 2008; 2015; 2020; NMFS 2021a; Warden 2011a; NMFS NEFSC observer/sea sampling database, unpublished data; 2011b). As few sea turtle interactions have been observed in the GOM, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of sea turtle interactions with trawl gear in this region. As a result, the bycatch estimates and discussion below are for trawl gear in the Mid-Atlantic and Georges Bank.

Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic was 231 (CV=0.13, 95% CI=182-298); this equates to approximately 33 adult equivalents. Most recently, Murray (2020) provided information on sea turtle interaction rates from 2014-2018 (the most recent five-year period that has been statistically analyzed for trawls). Interaction rates were stratified by region, latitude zone, season, and depth. The highest loggerhead interaction rate (0.43 turtles/day fished) was in waters south of 37º N during November to June in waters over 50 m deep. The most estimated interactions occurred in the Mid-Atlantic region north of 39º N, during July to October in waters under 50 m deep. In each stratum, interaction rates for non-loggerhead species were lower than rates for loggerheads (Murray 2020).

Based on Murray (2020)[7], from 2014-2018, 571 loggerhead (CV=0.29, 95% CI=318-997), 46 Kemp's ridley (CV=0.45, 95% CI=10-88), 20 leatherback (CV=0.72, 95% CI=0-50), and 16 green (CV=0.73, 95% CI=0-44) sea turtle interactions were estimated to have occurred in bottom trawl gear in the Mid-Atlantic region over the five-year period. On Georges Bank, 12 loggerheads (CV=0.70, 95% CI=0-31) and 6 leatherback (CV=1.0, 95% CI=0-20) interactions were estimated to have occurred from 2014-2018. An estimated 272 loggerhead, 23 Kemp's ridley, 13 leatherback, and 8 green sea turtle interactions resulted in mortality over this period (Murray 2020).

Gillnet Gear. Interactions between sink gillnet gear and green, Kemp's ridley, loggerhead, and leatherback sea turtles have been observed in the GAR since 1989 (NMFS NEFSC observer/sea sampling database, unpublished data). Specifically, sea turtle interactions with gillnet gear have been observed in the GOM, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the GOM (Murray 2009a; b; 2013; 2018; NMFS 2021a; NMFS NEFSC observer/sea sampling database, unpublished data). As few sea turtle interactions have been observed in the GOM, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of sea turtle interactions with sink gillnet gear in this region. As a result, the bycatch estimates and discussion below are for sink gillnet gear in the Mid-Atlantic and Georges Bank.

From 2012-2016 , Murray (2018) estimated that sink gillnet fisheries in the Mid-Atlantic and Georges Bank[8] bycaught 705 loggerheads (CV=0.29, 95% CI over all years: 335-1116), 145 Kemp's ridleys (CV =0.43, 95% CI over all years: 44-292), 27 leatherbacks (CV =0.71, 95% CI over all years 0-68), and 112 unidentified hard-shelled turtles (CV=0.37, 95% CI over all years: 64-321).[9] Of these, mortalities were estimated at 557 loggerheads, 115 Kemp's ridley, 21 leatherbacks, and 88 unidentified hard-shelled sea turtles. Total estimated loggerhead bycatch was equivalent to 19 adults. The highest bycatch rate of loggerheads occurred in the southern Mid-Atlantic stratum (≤ 37°N to 34°N) in large mesh (≥ 7 inches) gear during November to June. Though only one sea turtle was observed in this stratum, observed effort was low, leading to a high bycatch rate. Bycatch rates of all other species were lower relative to loggerheads. Highest estimated loggerhead bycatch occurred in the northern mid-Atlantic (>37°N to the Georges Bank boundary) from July to October in large mesh gears due to the higher levels of commercial effort in the stratum. Mean loggerhead bycatch rates were ten times those of Kemp's ridley bycatch rates in large mesh gear in the northern Mid-Atlantic from July to October (Murray 2018). Although interactions between sink gillnet gear and green sea turtles have been observed (NEFSC observer/sea sampling database, unpublished data); green sea turtles were excluded from the bycatch rate calculations in Murray (2018) because the observed interaction occurred in waters of North Carolina, and therefore, outside the study region.

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[7] Murray (2020) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2008; 2015; Warden 2011a; b), where rates were estimated using generalized additive models (GAMs). Ratio estimator results may be like those using GAM or generalized linear models (GLM) if ratio estimators are stratified based on the same explanatory variables in a GAM or GLM model (Murray 2007; Murray & Orphanides 2013; Orphanides 2010).

[8] The boundaries of the Mid-Atlantic and Georges Bank were defined by Ecological Production Units (Murray 2018).

[9] Murray (2018) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches Murray (2009a); (2013), where rates were estimated using GAMs. Ratio estimator results may be like to those using GAM or GLM if ratio estimators are stratified based on the same explanatory variables in a GAM or GLM model (Murray 2007; Murray & Orphanides 2013; Orphanides 2010).

Updates to Murray (2018) were recently issued by Murray (2023). From 2017-2021[10], Murray (2023) estimated that sink gillnet fisheries operating from Maine to North Carolina[11] bycaught 142 loggerheads (CV=0.89, 95% CI over all years: 15-376), 91 Kemp's ridleys (CV =0.62, 95% CI over all years: 0-218), 49 greens (CV=1.01, 95% CI over all years: 0-177), 26 leatherbacks (CV=0.98, 95% CI over all years: 0-79), and 32 unidentified hard-shelled turtles (CV=0.59, 95% CI over all years: 0-75). Of these interactions, mortalities were estimated at 88 loggerheads, 56 Kemp's ridley, 30 greens, 16 leatherbacks, and 20 unidentified hard-shelled sea turtles. Total estimated loggerhead bycatch was equivalent to 2.5 adults. The highest interaction rate of loggerhead sea turtles occurred in the northern Mid-Atlantic (>37ºN to the Georges Bank boundary) from July to October in large mesh gears (≥ 7 inches); relative to loggerheads, interaction rates were lower for all other sea turtle species.

5.3.5.2 Atlantic Sturgeon

Sink gillnet and bottom trawl gear. The ASMFC (2017a), Miller and Shepard (2011), NMFS (2021a), Boucher and Curti (2023) and the most recent ten years of NMFS observer data (i.e., 2013-2022; NMFS NEFSC observer/sea sampling database, unpublished data) describe the observed or documented interactions between Atlantic sturgeon and bottom trawl and gillnet gear in the GAR. For sink gillnets, higher levels of Atlantic sturgeon bycatch have been associated with depths under 40 m, mesh sizes over ten in., and the months of April and May ASMFC (2007). For otter trawl fisheries, the highest incidence of Atlantic sturgeon bycatch has been associated with depths under 30 m. More recently, over all gears and observer programs that have encountered Atlantic sturgeon, the distribution of haul depths on observed hauls that caught Atlantic sturgeon was significantly different from those that did not encounter Atlantic surgeon, with Atlantic sturgeon encountered primarily at depths under 20 m (ASMFC 2017a).

Boucher and Curti (2023) updated the estimate of Atlantic sturgeon bycatch that was presented in the ASMFC (2017a) Atlantic sturgeon benchmark stock assessment for the annual Atlantic sturgeon interactions in fishing gear (e.g., otter trawl, gillnet). The assessment analyzed fishery observer and VTR data to estimate Atlantic sturgeon interactions in fishing gear in the Mid-Atlantic and New England regions from 2000-2021 (excluding 2020 due to COVID-related impacts on data collection). The total bycatch of Atlantic sturgeon from bottom otter trawls was between 638-836 fish over 2016-2021 (excluding 2020 due to COVID-related impacts on data collection), while the total bycatch of Atlantic sturgeon from gillnets ranged from 1,031-1,268 fish. The estimated average annual bycatch during 2016-2021 of Atlantic sturgeon in bottom otter trawl gear is 718.4 individuals and in gillnet gear is 1,125.4 individuals.

5.3.5.3 Atlantic Salmon

Sink gillnet and bottom trawl gear. Atlantic salmon are at risk of interacting with bottom trawl or gillnet gear (Kocik *et al.* 2014; NMFS 2021a; NEFSC observer/sea sampling database, unpublished data). Northeast Fisheries Observer Program (NEFOP) data from 1989-2022 show records of incidental bycatch of Atlantic salmon in seven of the 31 years, with a total of 15 individuals caught, nearly half of which

[10] Due to the COVID 19 pandemic, observer coverage rates were greatly reduced in 2020 and 2021. Murray (2023) determined that estimated interactions derived from a 3-year time series (2017-2019) did not differ significantly from those derived from the 5-year time series (2017-2021), suggesting that reduced and uneven observer monitoring in 2020 and 2021 did not bias the results using the longer time series. As a result, observer data from 2017-2019 was used to estimate sea turtle interaction rates, confidence intervals, and CVs for the 2017-2021 time series.

[11] Murray (2023) defined this range as the boundaries of the Gulf of Maine, Georges Bank, and Mid-Atlantic Ecological Production Units.

(seven) occurred in 1992 (NMFS NEFSC observer/sea sampling database, unpublished data).[12] Of the observed incidentally caught Atlantic salmon, ten were listed as “discarded,” which is assumed to be a live discard (Kocik, pers comm.; February 11, 2013). Five of the 15 were documented as lethal interactions. The incidental takes of Atlantic salmon occurred in bottom otter trawls (4) and gillnets (11). Observed captures occurred in March (2), April (2), May (1), June (3), August (1), and November (6). Given the very low number of observed Atlantic salmon interactions in gillnet and bottom trawl gear, interactions with these gear types are believed to be rare in the GAR.

5.3.5.4 Giant Manta Ray

Sink gillnet and bottom trawl gear. Giant manta rays are potentially susceptible to capture by bottom trawl and gillnet gear based on records of their capture in fisheries using these gear types (NMFS 2021a; NMFS NEFSC observer/sea sampling database, unpublished data). The most recent 10 years of NEFOP data show that between 2013-2022, one giant manta ray and five unidentified *Mobulidae* were observed in bottom trawl gear and two were observed in gillnet gear (NMFS NEFSC observer/sea sampling database, unpublished data). Also, all the giant manta ray interactions in gillnet or trawl gear recorded in the NEFOP database (13 in 2001-2022) indicate the animals were encountered alive and released alive. However, details about specific conditions such as injuries, damage, time out of water, how the animal was moved or released, or behavior on release is not always recorded. While there is no information on post-release survival, NMFS Southeast Gillnet Observer Program observed a range of 0-16 giant manta rays captured per year between 1998 and 2015 and estimated that approximately 89% survived the interaction and release (NMFS reports: http://www.sefsc.noaa.gov/labs/panama/ob/gillnet.htm).

5.3.5.5 Marine Mammals

Depending on species, marine mammals have been observed seriously injured or killed in bottom trawl and/or pot/trap gear. Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). In the Northwest Atlantic, the 2023 LOF (88 FR 16899, March 21, 2023) categorizes commercial sink gillnet fisheries (Northeast and Mid-Atlantic) as a Category I fishery; and bottom trawl fisheries (Northeast or Mid-Atlantic) as a Category II fishery. No changes for how these fisheries are categorised were proposed for the 2024 LOF (88 FR 62748; September 13, 2023).

5.3.5.5.1 Large Whales

Bottom Trawl Gear. The most recent 10 years of observer, stranding, and/or baleen whale serious injury and mortality determinations from 2012-2021, and the GAR Marine Animal Incident database shows that there has been one observed or confirmed documented interactions with large whales and bottom trawl gear. In 2020, a humpback whale was anchored/entangled in fishing gear, later identified by NMFS as trawl net. The animal was disentangled by responders from the Atlantic Large Whale Disentanglement Network. The gear was removed and recovered from the animal, and the whale was released alive with non-serious injuries. Additional information on this incident can be found in the 2020 Atlantic Large Whale Entanglement Report and in Henry et al. 2023).

[12] There is no information available on the genetics of these bycaught Atlantic salmon, so it is not known how many of them were part of the GOM DPS. It is likely that some of these salmon, particularly those caught south of Cape Cod, may have originated from the stocking program in the Connecticut River. Those Atlantic salmon caught north of Cape Cod and/or in the Gulf of Maine are more likely to be from the GOM DPS.

Sink Gillnet Gear. Large whale interactions (entanglements) with fishing gear have been observed and documented in the waters of the Northwest Atlantic.[13] Information available on all interactions (e.g., entanglement, vessel strike, unknown cause) with large whales comes from reports documented in the GARFO Marine Animal Incident Database (unpublished data). The level of information collected for each case varies, but may include details on the animal, gear, and any other information about the interaction (e.g., location, description, etc.). Each case is evaluated using defined criteria to assign the case to an injury/information category using all available information and scientific judgement. In this way, the injury severity and cause of injury/death for the event is evaluated, with serious injury and mortality determinations issued by the NEFSC.[14]

Based on the best available information, the greatest entanglement risk to large whales is posed by fixed gear used in trap/pot or sink gillnet fisheries (Hartley et al. 2003; Johnson et al. 2005;Whittingham et al. 2005a,b; Knowlton et al. 2012; NMFS 2021a,b; Hamilton and Kraus 2019; Henry et al. 2014; Henry et al. 2015; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Henry et al. 2021; Henry et al. 2022; Sharp et al. 2019; Pace et al. 2021; NMFS *Marine Mammal SARs for the Atlantic Region*). Specifically, while foraging or transiting, large whales are at risk of becoming entangled in vertical endlines, buoy lines, or groundlines of gillnet and pot/trap gear, and the net panels of gillnet gear that rise into the water column (Baumgartner et al. 2017; Cassoff et al. 2011; Cole and Henry 2013; Hamilton and Kraus 2019; Hartley et al. 2003; Henry et al. 2014; Henry et al. 2015; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Henry et al. 2021; Henry et al. 2022; Johnson et al. 2005; Kenney and Hartley 2001; Knowlton and Kraus 2001;Knowlton et al. 2012; NMFS 2021a,b; Whittingham et al. 2005a,b; see NMFS *Marine Mammal SARs for the Atlantic Region*).[15] Large whale interactions (entanglements) with these features of trap/pot and/or sink gillnet gear often result in the serious injury or mortality to the whale (Angliss and Demaster 1998; Cassoff et al. 2011; Cole and Henry 2013; Henry et al. 2014, Henry et al. 2015, Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Henry et al. 2021; Henry et al. 2022; Knowlton and Kraus 2001, Knowlton et al. 2012; Moore and Van der Hoop 2012; NMFS 2014; NMFS 2021a,b; Pettis et al. 2021; Sharp et al. 2019; van der Hoop et al. 2016; van der Hoop et al. 2017). In fact, review of Atlantic coast-wide causes of large whale human interaction incidents between 2010 and 2019 shows that entanglement is the highest cause of mortality and serious injury for North Atlantic right, humpback, fin, and minke whales in those instances when cause of death could be determined (NMFS 2021b). As many entanglements, and therefore, serious injury or mortality events, go unobserved, and because the gear type, fishery, and/or country of origin for reported entanglement events are often not traceable, the rate of large whale entanglement, and thus, rate of serious injury and mortality due to entanglement, are likely underestimated (Hamilton et al. 2018; Hamilton et al. 2019; Knowlton et al. 2012; NMFS 2021a,b; Pace et al. 2017; Robbins 2009).

As noted above, pursuant to the MMPA, NMFS publishes a LOF annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injurious and mortalities of marine mammals in each fishery. Large whales, in particular humpback, fin, minke, and North Atlantic right whales, are known to interact with Category I and II fisheries in the Northwest Atlantic Ocean. As fin, and North Atlantic right whales are listed as endangered under the ESA, these

[13] NMFS Atlantic Large Whale Entanglement Reports: For years prior to 2014, contact David Morin, Large Whale Disentanglement Coordinator, David.Morin@NOAA.gov; GAR Marine Animal Incident Database (unpublished data); NMFS Marine Mammal Stock Assessment Reports for the Atlantic Region; NMFS NEFSC Baleen Whale Serious Injury and Morality Determinations Reference Documents, Publications, or Technical Memoranda; MMPA List of Fisheries; NMFS 2021a,b.

[14] NMFS NEFSC Baleen Whale Serious Injury and Morality Determinations Reference Documents, Publications, or Technical Memoranda.

[15] Through the ALWTRP, regulations have been implemented to reduce the risk of entanglement in in vertical endlines, buoy lines, or groundlines of gillnet and pot/trap gear, and the net panels of gillnet gear. ALWTRP regulations currently in effect are summarized online.

species are considered strategic stocks under the MMPA. Section 118(f)(1) of the MMPA requires the preparation and implementation of a Take Reduction Plan for any strategic marine mammal stock that interacts with Category I or II fisheries. In response to its obligations under the MMPA, in 1996, NMFS established the Atlantic Large Whale Take Reduction Team (ALWTRT) to develop a plan (Atlantic Large Whale Take Reduction Plan (ALWTRP)) to reduce serious injury to, or mortality of large whales, specifically, humpback, fin, and North Atlantic right whales, due to incidental entanglement in U.S. commercial fishing gear.[16] In 1997, the ALWTRP was implemented; however, since 1997, it has been modified as NMFS and the ALWTRT learn more about why whales become entangled and how fishing practices might be modified to reduce the risk of entanglement. In 2021, adjustments to Plan were implemented and are summarized online.

The ALWTRP consists of regulatory (e.g., universal gear requirements, modifications, and requirements; area-and season- specific gear modification requirements and restrictions; time/area closures) and non-regulatory measures (e.g., gear research and development, disentanglement, education and outreach) that, in combination, seek to assist in the recovery of North Atlantic right, humpback, and fin whales by addressing and mitigating the risk of entanglement in gear employed by commercial fisheries, specifically trap/pot and gillnet fisheries. The ALWTRP recognizes trap/pot and gillnet Management Areas in Northeast, Mid-Atlantic, and Southeast regions of the U.S, and identifies gear modification requirements and restrictions for Category I and II gillnet and trap/pot fisheries in these regions; these Category I and II fisheries must comply with all regulations of the Plan.[17]. Further details on the Plan are at: the ALWTRP.

5.3.5.5.2 Small Cetaceans and Pinnipeds

Sink Gillnet and Bottom Trawl Gear. Small cetaceans and pinnipeds are vulnerable to interactions with sink gillnet and bottom trawl gear.[18] Reviewing marine mammal stock assessment and serious injury reports that cover the most recent 10 years data (i.e., 2011-2020), and the MMPA LOF’s covering this time frame (i.e., issued between 2017 and 2023), Table 11 has a list of species that have been observed (incidentally) seriously injured and/or killed by MMPA LOF Category I (frequent interactions) gillnet and/or Category II (occasional interactions) bottom trawl fisheries that operate in the affected environment of the monkfish fishery. Of the species in Table 11, gray seals, followed by harbor seals, harbor porpoises, short beaked common dolphins, and harps seals are the most frequently bycaught small cetacean and pinnipeds in sink gillnet gear in the GAR (Hatch & Orphanides 2014; 2015; 2016; Orphanides 2019; 2020; 2021; Orphanides & Hatch 2017; Precoda & Orphanides 2022). In terms of bottom trawl gear, short-beaked common dolphins, Risso’s dolphins, Atlantic white-sided dolphins, and gray seals are the most frequently observed bycaught marine mammal species in the GAR, followed by long-finned pilot whales, bottlenose dolphin (offshore), harbor porpoise, harbor seals, and harp seals (Chavez-Rosales *et al.* 2017; Lyssikatos 2015; Lyssikatos & Chavez-Rosales 2022; Lyssikatos *et al.* 2020; 2021).

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[16] The measures identified in the ALWTRP are also beneficial to the survival of the minke whale, which are also known to be incidentally taken in commercial fishing gear.

[17] The fisheries currently regulated under the ALWTRP include: Northeast/Mid-Atlantic American lobster trap/pot; Atlantic blue crab trap/pot; Atlantic mixed species trap/pot; Northeast sink gillnet; Northeast anchored float gillnet; Northeast drift gillnet; Mid-Atlantic gillnet; Southeastern U.S. Atlantic shark gillnet; and Southeast Atlantic gillnet .

[18] For additional information on small cetacean and pinniped interactions, see: NMFS NEFSC marine mammal serious injury and mortality Reference Documents, Publications, or Technical Memoranda; NMFS Marine Mammal SARs for the Atlantic Region; MMPA LOF.

Table 9. Small cetacean and pinniped species incidentally injured and/or killed by Category I sink gillnet fisheries or Category II bottom trawl fisheries operating in the affected environment of the monkfish fishery between 2010-2019.

Fishery	Category	Species Incidentally Injured/Killed
Northeast Sink Gillnet	I	Bottlenose dolphin (offshore; Northern Migratory Coastal)
		Harbor porpoise
		Atlantic white sided dolphin
		Short-beaked common dolphin
		Risso's dolphin
		Long-finned pilot whales
		Harbor seal
		Hooded seal
		Gray seal
		Harp seal
Mid-Atlantic Gillnet	I	Bottlenose dolphin (offshore, Northern and Southern Migratory coastal)
		Harbor porpoise
		Short-beaked common dolphin
		Harbor seal
		Hooded seal
		Harp seal
		Gray seal
Northeast Bottom Trawl	II	Harp seal
		Harbor seal
		Gray seal
		Long-finned pilot whales
		Short-beaked common dolphin
		Atlantic white-sided dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
		Risso's dolphin
Mid-Atlantic Bottom Trawl	II	White-sided dolphin
		Short-beaked common dolphin
		Risso's dolphin
		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal
Source: MMPA 2017-2023 LOFs		

To address the high levels of incidental take of harbor porpoise and bottlenose dolphins in sink gillnet fisheries, pursuant to section MMPA Section 118(f)(1), the Harbor Porpoise Take Reduction Plan (HPTRP) and the Bottlenose Dolphin Take Reduction Plan (BDTRP) were developed and implemented for these species.[19] Also, due to the incidental mortality and serious injury of small cetaceans, incidental to bottom and midwater trawl fisheries operating in both the Northeast and Mid- Atlantic regions, the Atlantic Trawl Gear Take Reduction Strategy was implemented. More information on each take reduction plan or strategy is at: NMFS HPTRP, NMFS BDTRP, or NMFS Atlantic Trawl Gear Take Reduction Strategy.

5.4 Physical Environment and Essential Fish Habitat

The Northeast U.S. Shelf Ecosystem has been described as including the area from the GOM south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream (Sherman *et al.* 1996). The continental slope includes the area east of the shelf, out to a depth of 2,000 m. Four distinct sub-regions comprise the NOAA Fisheries Greater Atlantic Region: the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. Occasionally another sub-region, Southern New England, is described; however, we incorporated discussions of any distinctive features of this area into the sections describing Georges Bank and the Mid-Atlantic Bight.

The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and strong currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC. The continental slope begins at the continental shelf break and continues eastward with increasing depth until it becomes the continental rise. It is homogenous, with exceptions at the shelf break, some of the canyons, the Hudson Shelf Valley, and in areas of glacially rafted hard bottom.

Pertinent physical and biological characteristics of each of these sub-regions are described in the Physical and Biological Environment section of Amendment 5 (Section 4.2), along with a short description of the physical features of coastal environments. Monkfish habitats are described in Section 4.4.1 of Amendment 5 and summarized below. Information on the affected physical and biological environments included in Amendment 5 was extracted from Stevenson et al. (2004).

5.4.1 Fishing Effects on EFH

A detailed discussion of fishing impacts on EFH is contained in the Affected Environment Section of Amendment 5 to the Monkfish FMP and in the Affected Environment Section 6 of the 2023 Spiny Dogfish Specifications EA (MAFMC 2023). Since monkfish and spiny dogfish EFH has been determined to not be vulnerable to any fishing gear (Stevenson *et al.* 2004), the discussion focuses on gillnet gear that potentially could impact EFH of other fisheries given that is the focus of this action. Discussion in Monkfish Amendment 5 and the 2023 Spiny Dogfish Specifications EA cites several important peer-reviewed studies in describing the potential biological and physical effects of fishing on various substrates (mud, sand, gravel and rocky substrates). Since gillnets are stationary or static, the gear has been determined to not have an adverse effect on EFH of other species.

[19] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal SARs (Hayes *et al.* 2022) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates provided in Section 118(f)(1).

5.4.2 Essential Fish Habitat

Section 4.4 of Monkfish Amendment 5 and Section 6 of the 2023 Specifications Environmental Assessment (MAFMC 2023) contain detailed descriptions of monkfish and spiny dogfish EFH, respectively. EFH of other species vulnerable to gillnet, the effect of the monkfish and spiny dogfish fisheries on EFH (monkfish, spiny dogfish, and other species, all life stages), and previous measures to minimize adverse effects of the monkfish and spiny dogfish fisheries on EFH can also be found in those documents.

In summary, monkfish and spiny dogfish EFH have been determined to only be minimally vulnerable to bottom gillnets. Therefore, the effects of the monkfish fishery and other fisheries on monkfish EFH do not require any management action. There are no species or life stages for which EFH is more than minimally vulnerable to bottom gillnets (Stevenson et al., 2004).

5.5 HUMAN COMMUNITIES

MONKFISH FOCUS

Note: Based on fishery differences and public input over the years from affected communities, the two Councils take slightly different approaches in describing the interaction of a fishery and the relevant human communities, so Section 5.6 (monkfish focus) and 5.7 (spiny dogfish focus) differ in formatting.

5.5.1 Permits and Vessels

The Monkfish FMP has seven types of federal permits: six categories of limited access permits (A-D, F, H) and one open access permit (E, Table 12). The number of fishing vessels with limited access monkfish permits has decreased over the past decade, from 670 to 562 (Table 13). Of those vessels, about 35-48% landed over 1 lb of monkfish each year and about 9-20% landed ≥ 10,000 lb of monkfish. Permit category C and D vessels consistently accounted for the greatest portion of vessels with monkfish permits and landing monkfish (Table 13, Table 14).

Table 10. Monkfish permit categories.

Permit Category		Description
Limited Access	A	DAS permit that *does not* also have a groundfish or scallop limited access permit (possession limits vary with permit type).
	B	
	C	DAS permit that *also* has a groundfish or scallop limited access permit (possession limits vary with permit type).
	D	
	F	Seasonal permit for the offshore monkfish fishery.
	H	DAS permit for use in the Southern Fishery Management Area *only*.
Open Access	E	Open access incidental permit.

Table 11. Fishing vessels with federal monkfish permits, with number of vessels landing over 1 lb and 10,000 lb, FY 2012-2021.

Permit Category	2012			2015			2018			2021		
	All	>1lb	>10K lb	All	>1lb	>10K lb	All	>1lb	>10K lb	All	>1lb	>10K lb
A	22	6	4	22	4	*	20	*	*	18	8	6
B	44	9	5	42	4	*	38	6	4	38	19	15
C	295	148	60	267	128	30	268	110	30	255	114	42
D	292	94	28	242	59	10	226	77	18	229	115	50
F	9	6	4	17	9	*	17	14	4	14	13	0
H	8	5	4	8	6	5	7	6	3	8	*	0
Total LA	**670**	**268**	**105**	**598**	**210**	**51**	**576**	**214**	**60**	**562**	**270**	**113**
E	1,743	338	19	1,578	247	8	1,525	247	20	1,485	176	7

Source: GARFO Permit database and DMIS as of April 2022.

Table 12. Proportion of monkfish landings by permit category to total monkfish landings in the year, FY 2012-2021.

Permit Category	2012	2015	2018	2021
A and B	15%	13%	16%	12%
C and D	75%	80%	77%	83%
F	2%	2%	1%	>1%
H	1%	1%	1%	0%
E	7%	5%	5%	4%
All	**100%**	**100%**	**100%**	**100%**

Source: GARFO Permit database and DMIS as of April 2022.

5.5.2 Catch and Landings

From FY 2017-2021, the ACL was exceeded in the NFMA twice and never in the SFMA (Table 15). Commercial landings made up 77-90% of total catch in the NFMA and 30-59% in the SFMA. State landings, defined as vessels that have never had a federal fishing permit, consistently make up under 0.5% of catch. Recreational catch is consistently under 3% of catch. In the NFMA, discards were 9% of catch in FY 2017 and increased to 28% and lowered to 20% and 19% of catch in FY 2018-2020; discards were similar in FY 2021 (21%). In the SFMA, discards were higher in FY 2017-2019 (41-43%) but lowered to 13% in FY 2020 and increased to 27% in FY 2021.

Table 13. Year-end monkfish annual catch limit (ACL) accounting, FY 2017-2021.

Catch accounting element	Pounds	Metric tons	% of ACL
FY 2017			
Northern Fishery Management Area (ACL = 7,592 mt)			
Commercial landings	15,003,103	6,805	89.6%
State-permitted only vessel landings	60,031	27	0.4%
Estimated discards	1,567,883	711	9.4%
Recreational catch (MRIP landings and discards)	11,725	5.3	0.1%
Total Northern monkfish catch	**16,642,742**	**7,549**	**99.4%**
Southern Fishery Management Area (ACL = 12,316 mt)			
Commercial landings	8,392,979	3,807	30.9%
State-permitted only vessel landings	66,936	30	0.2%
Estimated discards	11,531,614	5,231	42.5%
Recreational catch (MRIP landings and discards)	1,627	1	0.0%
Total Southern monkfish catch	**19,993,156**	**9,068**	**73.6%**
FY 2018			
Northern Fishery Management Area (ACL = 7,592 mt)			
Commercial landings	13,237,011	6,004	79.1%
State-permitted only vessel landings	37,468	17	0.2%
Estimated discards	4,666,815	2,117	27.9%
Recreational catch (MRIP landings and discards)	6,977	3	0.0%
Total Northern monkfish catch	**17,948,271**	**8,141**	**107.2%**
Southern Fishery Management Area (ACL = 12,316 mt)			
Commercial landings	10,133,407	4,596	37.3%
State-permitted only vessel landings	64,841	29	0.2%
Estimated discards	11,505,833	5,219	42.4%
Recreational catch (MRIP landings and discards)	742,988	337	2.7%
Total Southern monkfish catch	**22,447,069**	**10,181**	**82.7%**
FY 2019			
Northern Fishery Management Area (ACL = 7,592 mt)			
Commercial landings	13,673,898	6,202	81.7%
State-permitted only vessel landings	16,474	7	0.1%
Estimated discards	3,418,346	1,551	20.4%
Recreational catch (MRIP landings and discards)	164,771	75	1.0%
Total Northern monkfish catch	**17,273,489**	**7,835**	**103.2%**
Southern Fishery Management Area (ACL = 12,316 mt)			
Commercial landings	8,236,922	3,736	30.3%
State-permitted only vessel landings	66,673	30	0.2%
Estimated discards	11,174,259	5,069	41.2%

Recreational catch (MRIP landings and discards)	11,410	5	0.0%
Total Southern monkfish catch	**19,489,264**	**8,840**	**71.7%**
FY 2020			
Northern Fishery Management Area (ACL = 8,351 mt)			
Commercial landings	11,684,519	5,300	63.5%
State-permitted only vessel landings	13,416	6	0.1%
Estimated discards	3,503,282	1,589	19.0%
Recreational catch (MRIP landings and discards)	23,077	10	0.1%
Total Northern monkfish catch	**15,224,294**	**6,905**	**82.7%**
Southern Fishery Management Area (ACL = 12,316 mt)			
Commercial landings	4,944,794	2,243	18.2%
State-permitted only vessel landings	20,749	9	0.1%
Estimated discards	3,078,040	1,396	11.3%
Recreational catch (MRIP landings and discards)	359,987	163	1.3%
Total Southern monkfish catch	**8,453,570**	**3,834**	**31.1%**
FY 2021			
Northern Fishery Management Area (ACL = 8,351 mt)			
Commercial landings	11,496,640	5,215	62.4%
State-permitted only vessel landings	18,511	8	0.1%
Estimated discards	3,857,341	1,750	21.0%
Recreational catch (MRIP landings and discards)	7	0	0.0%
Total Northern monkfish catch	**15,372,499**	**6,973**	**83.5%**
Southern Fishery Management Area (ACL = 12,316 mt)			
Commercial landings	4,338,159	1,968	16.0%
State-permitted only vessel landings	32,185	15	0.1%
Estimated discards	7,278,106	3,301	26.8%
Recreational catch (MRIP landings and discards)	30,056	14	0.1%
Total Southern monkfish catch	**11,678,506**	**5,298**	**43.0%**

Notes:
"Commercial landings" includes all monkfish landings by vessels with a permit number over zero, RSA landings, and party/charter landings sold to a federal dealer.
"State-permitted only vessel landings" are landings from vessels that never had a federal fishing permit (so the permit #=0).
"Recreational catch" includes landings and discards from party charter vessels and private anglers, not sold to a federal dealer.

Source: Commercial fisheries dealer and Northeast Fishery Observer Program databases; FY 2017 data accessed 10/2018; FY 2018 accessed 3/2020; FY 2019 accessed 3/2021; FY 2020 accessed 4/22; Marine Recreational Information Program database.

Landings

Landings since FY 2016 have been higher in the NFMA than in the SFMA. The NFMA has had a higher TAL and higher possession limits relative to the SFMA (Table 16). Landings relative to TAL in the NFMA have been between 80-107% since FY 2016, which could be a combination of revised management measures (possession limits) and the large 2015-year class. The NFMA TAL was increased by 10% for FY 2020-2022 (relative to FY 2017-2019) and the individuals from the 2015-year class have grown large enough to be retained by the fishery and are less likely to be discarded because of minimum size regulations. The landings relative to TAL in the SFMA have been lower than the NFMA, between 39-51% since FY 2016.

Table 14. Recent landings (whole/live weight, mt) in the NFMA and SFMA compared to target TAL.

Fishing Year	Northern Area			Southern Area		
	TAL (mt)	Landings (mt)	Percent of TAL achieved	TAL (mt)	Landings (mt)	Percent of TAL achieved
2014	5,854	3,403	58%	8,925	5,415	61%
2015	5,854	4,080	70%	8,825	4,733	53%
2016	5,854	5,447	93%	8,925	4,345	49%
2017	6,338	6,807	107%	9,011	3,802	42%
2018	6,338	6,168	97%	9,011	4,600	51%
2019	6,338	6,211	98%	9,011	3,785	42%
2020	6,624	5,299	80%	5,882	2,294	39%
2021	6,624	5,228	79%	5,882	1,982	34%
*2022	6,624	3,569	54%	5,882	1,366	23%

*Data as of February 16, 2023.
Landings values are different than the annual catch limit accounting in Table 15 because these are the landings as of April 30 each year. Includes RSA landings.
Source: GARFO quota monitoring data, accessed 3/6/2023.

FY 2021 landings. In FY 2021, 79% of the FY 2021 TAL was landed in the northern area and 34% in the southern area. In the NFMA, monthly landings were lower in May-November 2021 relative to December-March (312-417 mt/month vs. 501-654 mt/month). Otter trawls accounted for 63% of the FY 2021 landings. In the SFMA, monthly landings were highest in May and June 2021 (439-535 mt/month), then dropped to a low in July-November (9-59 mt/month), then were moderate since December (117-227 mt/month). These data and additional information can be found at GARFO's Quota Monitoring website: https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports//monkfish/mul.htm.

Landings and discards by gear type. The northern and southern areas have distinctions in terms of gear type. Since at least 1980, monkfish landings in the NFMA have largely been by vessels using trawls (NEFMC 2022b), 84% on average since 2012 (Table 17). In the SFMA, landings were primarily by vessels using dredges and trawls from 1980 to the early 1990s. Through the 1990s and to today, gillnets have been the predominant gear for vessels landing monkfish, 72% on average since 2012.

Discards have traditionally been higher in the SFMA relative to the NFMA, and since 2017, southernessential discards have approximated landings, exceeding landings in 2020 (Table 18). In the NFMA, discards have been primarily with otter trawl gear (64%), followed by scallop dredges (29%), and gillnets (7%) over the last 10 years. In the SFMA, discards have been primarily with scallop dredges (78%), followed by otter trawl (16%), and gillnets (6%).

Table 15. Landings by gear type (mt), CY 2012-2021.

Calendar Year	Gillnet		Otter trawl		Scallop Dredge		Total[a]
Northern Fishery Management Area							
2012	359	9%	3,561	87%	135	3%	**4,081**
2013	424	13%	2,813	84%	114	3%	**3,355**
2014	424	12%	2,958	86%	36	1%	**3,434**
2015	678	17%	3,277	80%	100	2%	**4,086**
2016	629	13%	3,949	84%	111	2%	**4,723**
2017	984	14%	6,044	85%	44	1%	**7,105**
2018	870	14%	4,958	83%	153	3%	**6,009**
2019	1,029	17%	4,950	81%	53	1%	**6,084**
2020	554	10%	5,020	90%	11	0%	**5,587**
2021	961	19%	4,122	80%	20	0%	**5,121**
Annual average	**691**	**14%**	**4,165**	**84%**	**78**	**2%**	**4,959**
Southern Fishery Management Area							
2012	3,614	64%	1,144	20%	766	14%	**5,674**
2013	3,394	65%	1,115	21%	627	12%	**5,207**
2014	3,139	62%	1,029	20%	899	18%	**5,099**
2015	3,293	72%	674	15%	542	12%	**4,550**
2016	3,247	75%	577	13%	372	9%	**4,331**
2017	2,773	73%	547	14%	418	11%	**3,796**
2018	3,346	76%	497	11%	486	11%	**4,388**
2019	3,526	81%	357	8%	260	6%	**4,373**
2020	1,956	75%	387	15%	190	7%	**2,593**
2021	1,530	76%	300	15%	150	7%	**2,005**
Annual Average	2,982	**72%**	663	**15%**	471	**11%**	**4,202**

Source: Deroba (2022).
[a] The total column includes landings from other minor gear types.

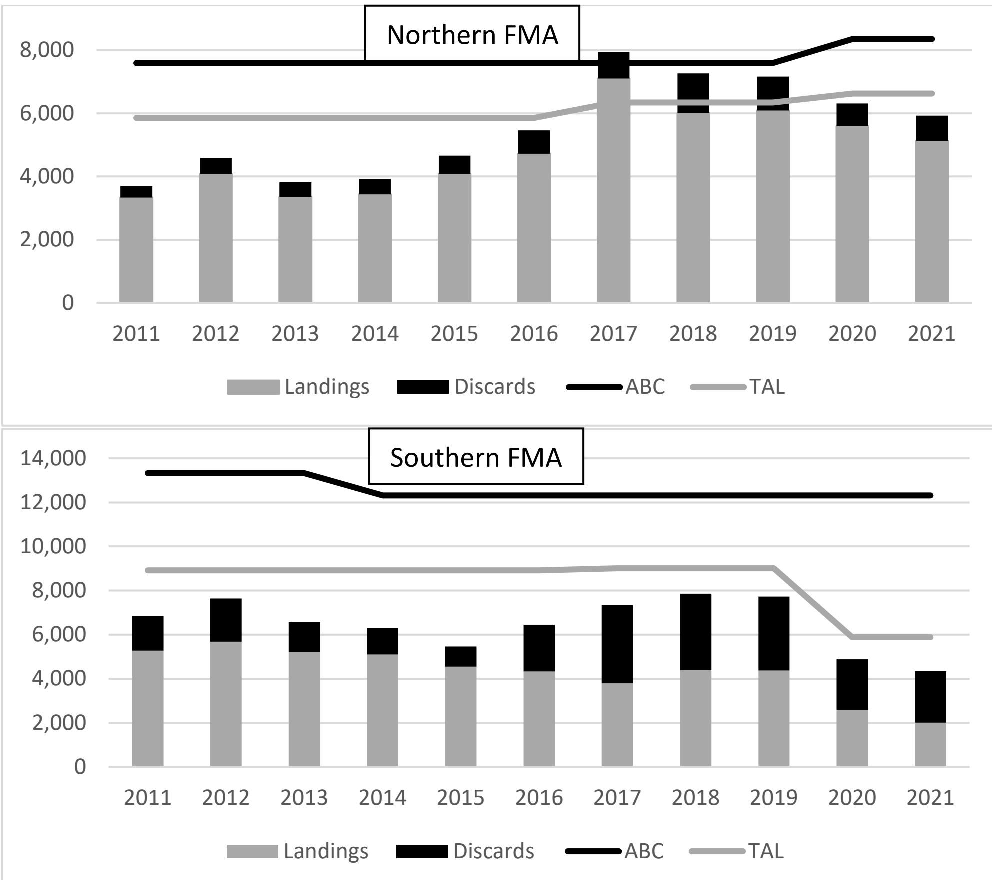
Table 16. Discards by gear type (mt), CY 2012-2021.

Calendar Year	Gillnet		Otter trawl		Scallop Dredge		Total
Northern Fishery Management Area							
2012	20	4%	233	47%	240	49%	**493**
2013	32	7%	300	65%	127	28%	**459**
2014	27	6%	384	79%	73	15%	**484**
2015	42	7%	462	81%	68	12%	**572**
2016	56	8%	483	66%	195	27%	**734**
2017	31	4%	712	85%	96	11%	**840**
2018	66	5%	404	32%	783	62%	**1,253**
2019	54	5%	512	47%	514	48%	**1,080**
2020	109	15%	528	73%	85	12%	**723**
2021	62	8%	500	62%	240	30%	**802**
Annual average	**50**	**7%**	**452**	**64%**	**242**	**29%**	**744**
Southern Fishery Management Area							
2012	192	10%	187	10%	1,583	81%	**1,962**
2013	236	17%	106	8%	1,030	75%	**1,372**
2014	151	13%	143	12%	893	75%	**1,188**
2015	73	8%	262	29%	583	64%	**919**
2016	87	4%	552	26%	1,475	70%	**2,114**
2017	116	3%	581	16%	2,847	80%	**3,544**
2018	142	4%	398	11%	2,936	84%	**3,476**
2019	172	5%	456	14%	2,730	81%	**3,358**
2020	82	4%	722	31%	1,491	65%	**2,295**
2021	67	3%	127	5%	2,147	92%	**2,340**
Annual Average	**132**	**6%**	**353**	**16%**	**1,772**	**78%**	**2,257**
Source: Deroba (2022).							

Fishery performance relative to specifications

Fishery catch has largely been below the ACL and landings below TAL since 2011, except for in 2017-2019 (Figure 19, Table 15).

Figure 19. ABC, TAL, landings, and discards (mt), 2011-2021



Note: Landings and discards are calendar year data from the assessment. ABC and TAL are the FY specifications.

5.5.3 Revenue

Monkfish fishery revenue has generally declined in recent years, from $42.2M in CY 2005 to $10.3M in CY 2021 (Table 19, not adjusted for inflation). Since at least CY 2011, about half of this revenue is from trips where monkfish was over 50% of total revenue (Table 20). There is a declining number of vessels that had trips where the monkfish revenue was over 50% of total revenue, from 206 in CY 2011 to 76 in CY 2021. CY 2020 and 2021 were particularly low revenue years. On trips where a monkfish DAS was used in FY 2021 (Table 21), 61% of the revenue was from monkfish, 17% from skate, 13% from groundfish, and minor components of the revenue from other species. Monkfish price per live pound has been on a declining trend since 2010, though prices have been increasing within the last year (Figure 20). Seasonally, prices tend to be lower in spring to summer months and higher in fall to winter.

Table 17. Total monkfish revenue, CY 2005 – 2021.

Calendar Year	Revenue	Calendar Year	Revenue
2005	$42.2M	2014	$18.7M
2006	$38.0M	2015	$19.1M
2007	$28.9M	2016	$20.0M
2008	$27.2M	2017	$18.4M
2009	$19.6M	2018	$14.8M
2010	$19.2M	2019	$14.5M
2011	$26.6M	2020	$9.3M
2012	$27.1M	2021	$10.3M
2013	$18.7M		
Source: ACCSP data, accessed April 2022. *Note:* Revenues not adjusted for inflation.			

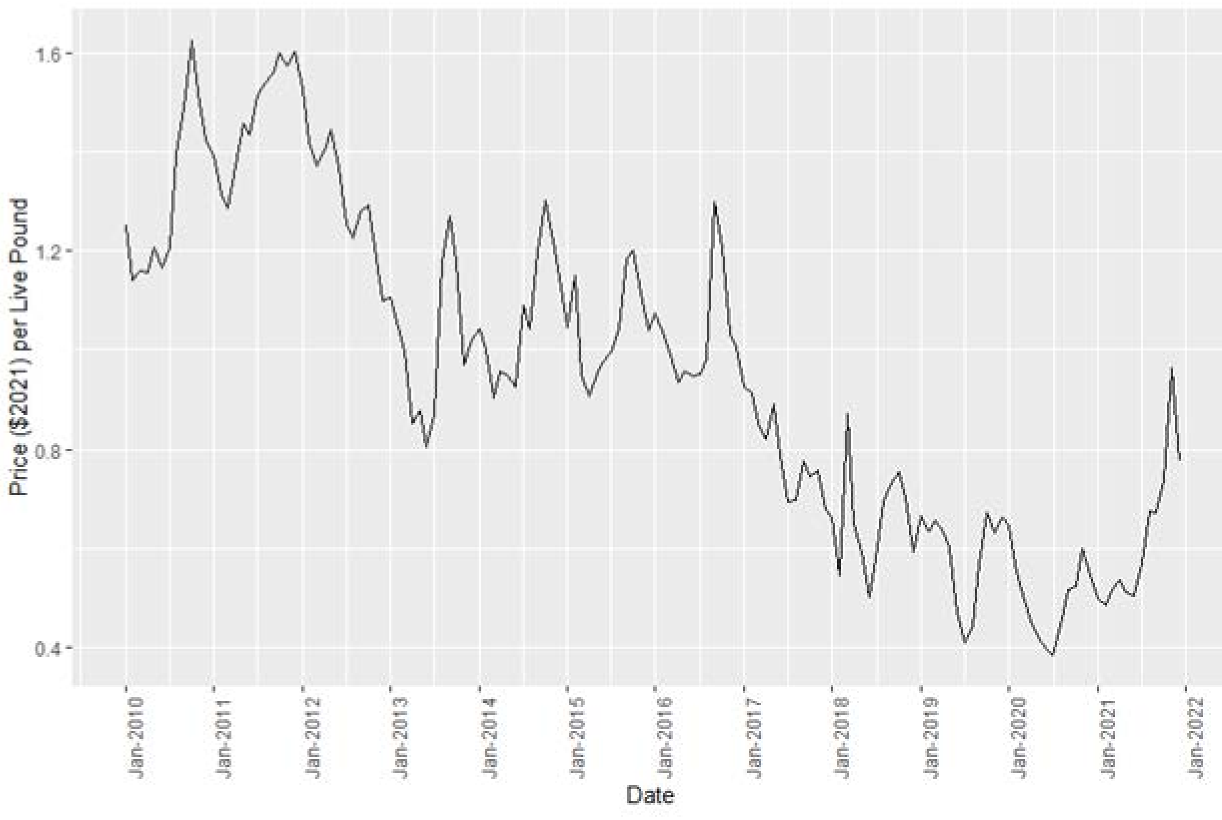
Table 18. Monkfish revenue and revenue dependence on trips where over 50% of revenue is from monkfish, CY 2011 – 2021.

Calendar Year	Vessels	Monkfish Revenue		Non-Monkfish Revenue		Total Revenue	% Monkfish
		Total	Per vessel	Total	Per vessel		
2011	206	$16,517,143	$80,180	$3,354,458	$16,284	$19,871,601	83%
2012	196	$15,138,030	$77,235	$3,339,764	$17,040	$18,477,794	82%
2013	164	$8,994,464	$54,844	$2,414,798	$14,724	$11,409,262	79%
2014	173	$9,307,800	$53,802	$3,042,854	$17,589	$12,350,654	75%
2015	140	$9,319,537	$66,568	$2,286,111	$16,329	$11,605,648	80%
2016	127	$9,654,776	$76,022	$1,957,503	$15,413	$11,612,280	83%
2017	135	$9,471,858	$70,162	$2,545,266	$18,854	$12,017,124	79%
2018	108	$7,001,537	$64,829	$1,660,777	$15,378	$8,662,314	81%
2019	96	$7,021,724	$73,143	$1,912,752	$19,924	$8,934,476	79%
2020	70	$2,700,687	$38,581	$995,332	$14,219	$3,696,019	73%
2021	76	$3,611,791	$47,524	$1,057,492	$13,914	$4,669,283	77%
Source: NEFSC SSB. *Note:* Revenues adjusted to 2021 USD.							

Table 19. Landings and revenue dependence from monkfish and other fisheries on trips where a Monkfish DAS was used, FY 2021.

	Live pounds	Revenue	
Monkfish	3,507,169	$2,464,974	61%
Skate	3,382,423	$699,805	17%
Groundfish	270,948	$542,289	13%
Dogfish	75,295	$21,890	1%
Other	70,806	$308,774	8%
Total	**7,306,641**	**$4,037,732**	**100%**
Source: GARFO/APSD, accessed January 2023. Note: Includes trips where only a monkfish DAS is used and trips where a monkfish DAS and other DAS are used.			

Figure 20. Monthly monkfish price ($2021) per live pounds, 2010 – 2021.



Source: NEFSC SSB, July 2022. *Note:* Revenues adjusted to 2021 USD.

5.5.4 Fishing Effort

Effort controls such as Days-at-Sea (DAS) and possession limits help ensure that the fishery landings remain within the TAL. Framework 10 established the possession limits and DAS allocations for FY 2017-2019, and these remain unchanged through FY 2022.

5.5.4.1 Day-at-Sea (DAS)

DAS use. DAS allocations have remained the same since FY 2017 (Framework 10). Limited access vessels are allocated 35 monkfish DAS per fishing year to use in the NFMA and 37 DAS to be used in the SFMA. Additionally, vessels are prohibited from using more than 46 total allocated DAS annually. The number of monkfish DAS used each year is far below what is allocated, suggesting a substantial amount of latent effort in the monkfish fishery. An average of 575 permits were allocated DAS between FY 2019 – 2021, with permit categories C and D accounting for the greatest number of vessels and DAS (Table 22). DAS use varies with permit category. Of the Category A and B permit vessels, 52-64% used at least one DAS in FY 2019-2020, but that decreased to 28-38% in FY 2021. The Category C and D vessels had more stable participation, but was generally lower, 4-18% these past three years.

Table 20. Monkfish DAS usage, combined management areas and all vessels with a limited access monkfish permit, FY 2019 – FY 2021.

Permit Category	All Vessels			Vessels that used ≥ 1 DAS
	Total Vessels	DAS Allocated	DAS Used	
FY 2019				
A	21	909	385	11 (52%)
B	39	1,689	750	25 (64%)
C	273	11,821	583	24 (9%)
D	238	10,305	850	42 (18%)
FY 2020				
A	15	650	193	9 (60%)
B	37	1,602	444	23 (62%)
C	268	11,604	334	17 (6%)
D	229	9,916	490	32 (14%)
FY 2021				
A	18	779	130	5 (28%)
B	37	1,602	280	14 (38%)
C	255	11,042	177	11 (4%)
D	223	9,656	397	24 (11%)

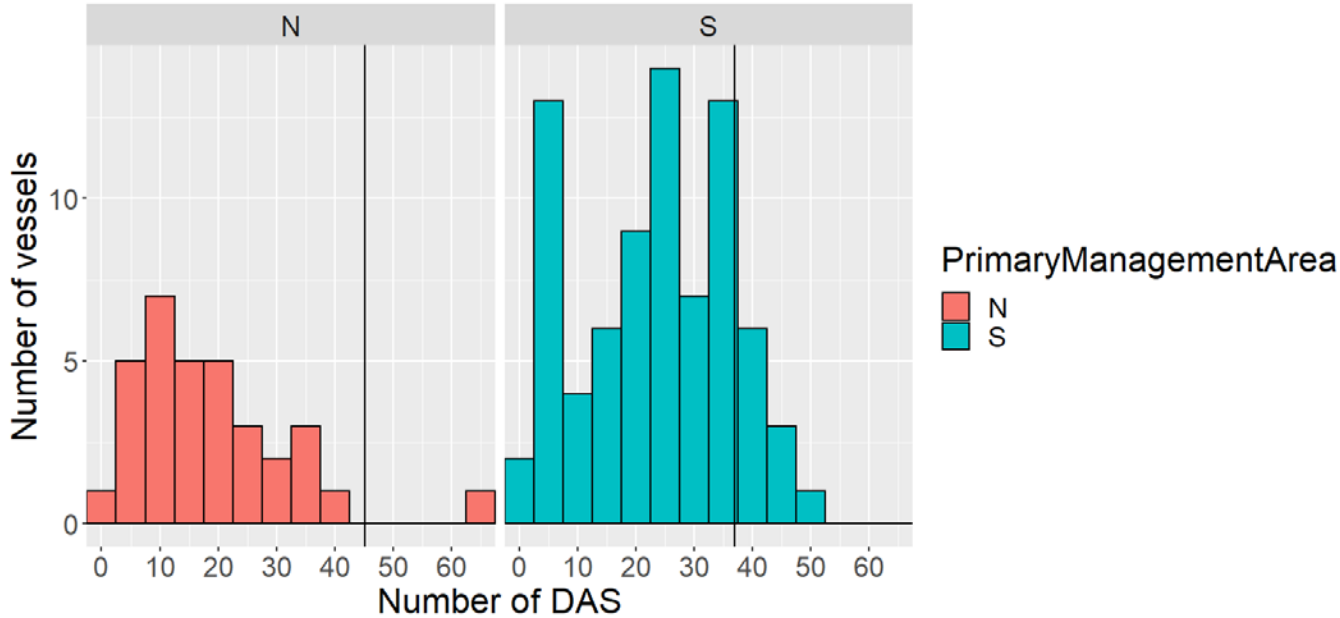
Notes: Permit categories F and H account for a minor number of permits, DAS allocated, and DAS used, thus, are not included in table.

Data include all vessels with a monkfish limited access permit (i.e., all activity codes).

Source: NMFS Vessel Permits and Allocation Management System (AMS) databases, accessed March 2022.

The use of the monkfish DAS allocation varies by vessel and fishing area. In FY 2019 and 2021, vessels that fished primarily in the NFMA used fewer monkfish DAS relative to vessels fishing primarily in the SFMA, despite the 37 DAS use restriction in the SFMA (Figure 21). Some of the vessels fishing primarily in the SFMA vessels exceeded the 37 DAS use restriction, but some of these vessels also took trips in the NFMA, where there is no DAS use restriction. For vessels fishing primarily in the NFMA, one vessel used more than the 45.2 DAS allocated. For primarily SFMA vessels, 12 vessels used more than 37 DAS and 2 used more than 45.2.

Figure 21. Frequency of monkfish DAS use by vessels allocated monkfish DAS, FY 2019 and FY 2021 average.



Notes: Black vertical line represents annual DAS allocations that can be used in the NFMA (45.2) and the SFMA (37). Each vessel was binned into one management area based on where most of its trips occurred.

Source: CAMS database. Accessed October 2022.

FY 2021, 2019 monkfish landings by trip declaration.

Although use of a monkfish DAS is required for landing more than incidental amounts of monkfish, a substantial amount of monkfish landings occur on the incidental trips, particularly in the NFMA. An average of FY 2021 and FY 2019 performance is used to illustrate this. In the NFMA, the most trips and about 86% of the monkfish landings were on trips that did not use a monkfish DAS (Table 23). In the SFMA, vessels using a monkfish DAS accounted for the most trips and 73% of the monkfish landings.

In the NFMA, most of the monkfish landings are on trips using a Northeast (NE) multispecies DAS. Vessels with a Category C and D monkfish permit that also has a limited access NE multispecies DAS permit can declare a monkfish DAS while at sea in the NFMA if they are fishing on a NE multispecies DAS and declare the "monkfish option" prior to leaving port at the start of its trip. When these vessels do not declare a monkfish DAS, their monkfish landings are constrained by a possession limit (900 lb and 750 lb tail weight for Category C and D, respectively, per NE multispecies used; Table 26). If these vessels do select the "monkfish option" while at sea, then they declare and use a monkfish DAS and do not have a monkfish possession limit (unlimited). Trips using a multispecies DAS but not a monkfish DAS accounted for 85% (8.4M lb) of the NFMA monkfish landings, averaged over FY 2019 and FY 2021. Trips using both a NE multispecies and monkfish DAS accounted for >14% (>1.35 M lb) that year. The vessels participating in the Northeast multispecies sector fishery accounted for the greatest amount of monkfish landings.

Besides the NE multispecies fishery, monkfish is landed in other fisheries without a monkfish DAS declaration: declared out of fishery (DOF), scallop, herring, surfclam/ocean quahog/mussel, squid/mackerel/butterfish, and undeclared (Table 23). Out of these fisheries, trips that are DOF or use only a scallop DAS account for the greatest amount of landings.

Table 21. Monkfish landings and total number of vessels and trips by trip declarations (plan code) and DAS used, average across FY 2019 and FY 2021. Orange highlights indicate trips where monkfish was landed without a monkfish DAS.

Declaration/ Plan Code	Program Code Description	DAS used	Whole weight, live lb (mt in parentheses)	# of Vessels	# of Trips
NORTH					
Monkfish	*Monkfish Northern Management Area Common Pool Vessel Trip*	Monkfish and Northeast Multispecies	C	C	C
	Monkfish Northern Management Area Sector Vessel Trip	Monkfish and Northeast Multispecies	1,347,155 (611)	21	222
	Monkfish Northern Management Area Monkfish-Only Vessel Trip	Monkfish	26,851 (12)	6	20
Northeast Multispecies	*Multispecies Common Pool Vessel Trip*	Northeast Multispecies	55,255 (25)	5	100
	Multispecies Sector Vessel Trip	Northeast Multispecies	8,289,963 (3,760)	99	2,992
Scallop	*Special Access Area*	Scallop	43,979 (20)	20	28
	Limited Access General Category	Scallop	17,145 (8)	19	223
	Limited Access	Scallop	12,611 (6)	7	11
Other	*Herring; undeclared; surfclam, ocean quahog, mussel; squid, mackerel, butterfish*	-	61,447 (28)	22	469
Declared out of Fishery (DOF)		-	10,820 (5)	11	32
		NORTH Landings Total	**> 9,865,226 (4,475)**		

SOUTH					
Monkfish	*Monkfish Southern Management Area Common Pool Vessel Trip*	Monkfish and Northeast Multispecies	62,203 (28)	5	25
	Monkfish Southern Management Area Sector Vessel Trip	Monkfish and Northeast Multispecies	493,536 (224)	15	178
	Monkfish Southern Management Area Monkfish-Only Vessel Trip	Monkfish	3,200,563 (1,452)	50	1,183
Northeast Multispecies	*Multispecies Common Pool Vessel Trip*	Northeast Multispecies	50,555 (23)	14	145
	Multispecies Sector Vessel Trip	Northeast Multispecies	100,963 (46)	27	482
Scallop	*Special Access Area*	Scallop	168,319 (76)	91	210
	Limited Access General Category	Scallop	87,994 (40)	56	986
	Limited Access	Scallop	145,156 (66)	69	106
Other	*Herring, undeclared, surfclam/ocean quahog/mussel and squid/mackerel/butterfis h*	-	575,484 (261)	243	2,195
DOF		-	293,271 (133)	152	2,094
		SOUTH Landings Total	**5,178,044 (2,349)**		

Notes:

- C = confidential, < 3 vessels. The 'Total' number of vessels is not the sum of the columns but the sum of the unique vessels.
- In the "Other" rows, data for undeclared trips include incidental landings, which do not require any declaration.
- The total monkfish landings from this table differs slightly from Table 16 likely due to differences in data source (CAMS versus quota monitoring), requirement of having a monkfish permit category associate with monkfish landings in Table 25, and when the data were pulled.
- Data do not include RSA trips; DOF includes scientific and other research trips.

Source: CAMS database. Accessed November 2022.

5.5.4.2 Possession Limits

There are multiple monkfish possession limits depending on whether the vessel has a limited access or open access incidental monkfish permit, the specific permit category, whether a monkfish DAS is being used, and if so, whether the monkfish DAS is used alone or in combination with DAS for other fisheries (Table 24, Table 25).

Monkfish Possession Limits while on a Monkfish DAS

Table 22. NFMA FY 2020-2022 monkfish limited access possession limits while fishing on a monkfish DAS.

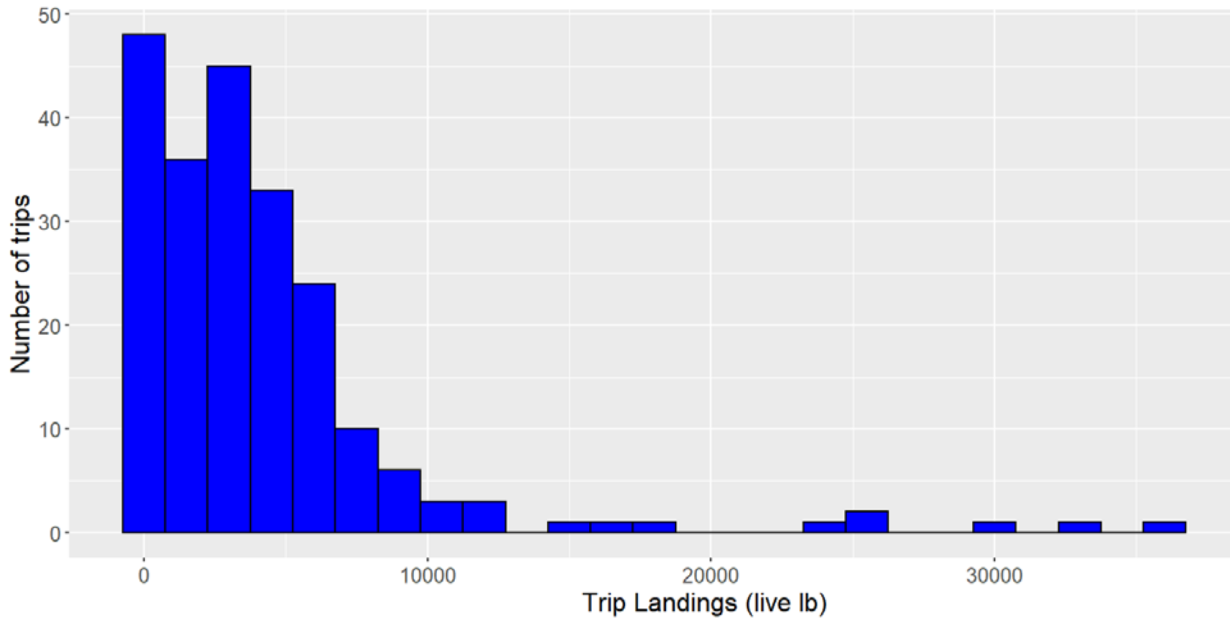
Monkfish Permit Category	Description	FY 2020-2022 Monkfish Possession Limits (lb)	Previous Possession Limits
A	Only monkfish DAS	1,250 lb tail weight 3,638 lb whole weight	No change since at least FY 2011.
B		600 lb tail weight 1,746 lb whole weight	
C	Only monkfish DAS	1,250 lb tail weight 3,638 lb whole weight	
	Monk DAS & NE Mults A or Scallop DAS	Unlimited	FW9 (FY16): eliminated limit; No change since then.
D	Only monkfish DAS	600 lb tail weight 1,746 lb whole weight	No change in since at least FY 2011.
	Monk DAS & NE Mults A or Scallop DAS	Unlimited	FW9 (FY16): eliminated limit; No change since then.

Table 23. SFMA FY 2020-2022 monkfish limited access possession limits while fishing on at least a monkfish DAS.

Monkfish Permit Category	Description	FY 2020-2022 Monkfish Possession Limits (lb)	Previous Possession Limits
A	Only monkfish DAS	700 lb tail weight 2,037 lb whole weight	No change since FY 2017.
B		575 lb tail weight 1,673 lb whole weight	
C	Only monkfish DAS	700 lb tail weight 2,037 lb whole weight	
	Monk DAS & NE Mults A or Scallop DAS	700 lb tail weight 2,037 lb whole weight	
D	Only monkfish DAS	575 lb tail weight 1,673 lb whole weight	
	Monk DAS & NE Mults A or Scallop DAS	700 lb tail weight 2,037 lb whole weight	
F	Seasonal offshore monkfish fishery in SFMA (Oct. 1-April 30)	1,600 lb tail weight 4,656 lb whole weight	No change since at least FY 2011.
H	SFMA only	575 lb tail weight 1,673 lb whole weight	No change since FY 2017.

Vessels that use both a Northeast Multispecies (NE) DAS and a monkfish DAS in the NFMA have an unlimited monkfish possession limit. FY 2021, 16 vessels took at least one trip that used both DAS, taking a total of 208 trips, landing an average of 8,554 lb (whole weight) of monkfish per trip, with a range from 603 lb to 36,212 lb, whole weight (Figure 22, Table 23). There is no monkfish landing limit for these trips.

Figure 22. Frequency of trip landings while using both a monkfish and Northeast Multispecies DAS, FY 2021.



Source: CAMS database. Accessed October 2022.

Incidental Possession Limits. To land incidental amounts of monkfish from federal waters, vessels must have a federal monkfish permit and not fish on a monkfish DAS. Incidental monkfish can be caught while on a Northeast Multispecies DAS, on a Scallop DAS or in the Sea Scallop Access Area Program, not under a DAS Program, and not under a DAS program that also hold permits in other fisheries/special cases. Incidental possession limits vary by trip type, gear, and management area (Table 26).

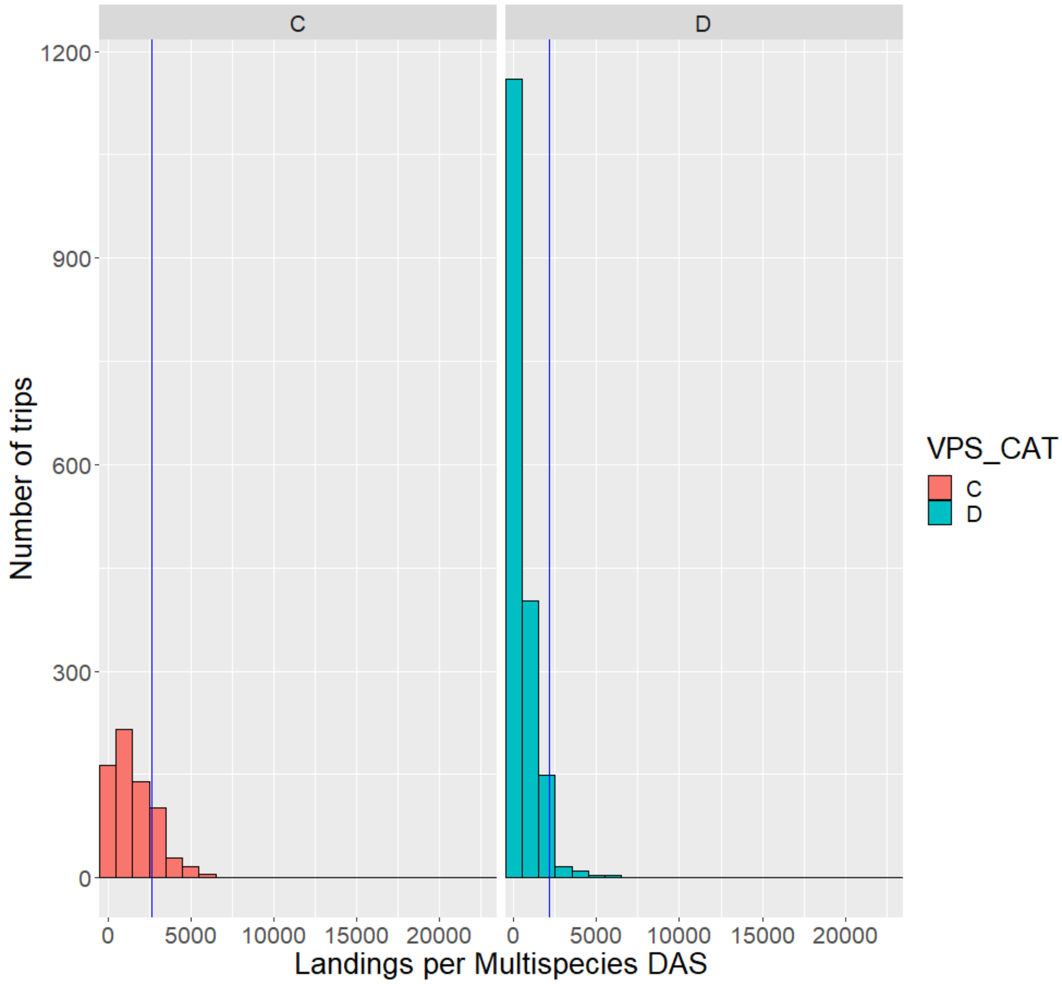
Vessels have the flexibility to land over the incidental limit when fishing on a Northeast Multispecies A DAS (e.g., a sector trip) if the vessel fishes only in the NFMA and declares the 'monkfish option' on the VMS unit before leaving port. If the vessel "flexes" the monkfish option during the trip (e.g., when landings exceed the incidental limit), then the vessel is charged both a Monkfish and NE Multispecies DAS and this is considered a directed monkfish trip. If the vessel selects the monkfish option prior to leaving port but does not flex on that option, then the vessel can only land incidental amounts of monkfish.

Table 24. Monkfish incidental possession limits by management area, gear, and permit category. Source: GARFO.

<table>
<tr><th colspan="3">Incidental Possession Limit Category</th><th>Management Area</th><th>Incidental Possession Limits by gear, permits</th></tr>
<tr><td colspan="3" rowspan="2">While on a NE Multispecies DAS</td><td>NFMA</td><td>All gear - 900 lb tail weight (2,619 lb whole weight; permit C), 750 lb (2,183 lb whole weight; permit D), up to 300 lb (permits E/F/H)</td></tr>
<tr><td>SFMA</td><td>Non-trawl – 50 lb tail weight for permits C, D, H
Trawl – 300 lb tail weight for permits C, D, H</td></tr>
<tr><td colspan="3">While on a Scallop DAS or in the Sea Scallop Access Area Program</td><td>NFMA and SFMA</td><td>All gear - 300 lb tail weight</td></tr>
<tr><td rowspan="8">While not under a DAS Program</td><td colspan="3">GOM, GB Reg. Mesh Areas</td><td>5% of total fish weight on board</td></tr>
<tr><td colspan="3">SNE Reg. Mesh Area</td><td>50 lb tail weight/day, up to 150 lb per trip</td></tr>
<tr><td colspan="3">MA Exemption Area</td><td>5% of total fish weight on board up to 450 lb tail weight</td></tr>
<tr><td colspan="3">NFMA or SFMA</td><td>50 lb tail weight/day, up to 150 lb per trip</td></tr>
<tr><td colspan="2">And fishing under skate bait Letter of Authorization</td><td>SNE Reg. Mesh Area</td><td>50 lb tail weight/day, up to 150 lb per trip</td></tr>
<tr><td rowspan="3">And holds permits in other fisheries/special cases</td><td>NE Multispecies Small Vessel Permit</td><td rowspan="3">NFMA or SFMA</td><td>All gear - 50 lb tail weight/day, up to 150 lb per trip</td></tr>
<tr><td>Surfclam or ocean quahog permit</td><td>Hydraulic clam dredge or mahogany quahog dredge - 50 lb tail weight/day, up to 150 lb per trip</td></tr>
<tr><td>Sea scallop permit</td><td>Scallop dredge only - 50 lb tail weight/day, up to 150 lb per trip.
If in scallop dredge exemption areas - 50 lb tail weight/trip</td></tr>
</table>

In FY 2021, most NFMA monkfish landings were from vessels participating in the NE Multispecies sector program using only a Northeast Multispecies DAS (10.1 M live lb, Table 23). These incidental trips were harvested by vessels using either a monkfish C or D permit category using either trawl or gillnet gear, thus, have incidental limits of 2,619 lb and 2,183 lb whole weight per Northeast Multispecies DAS used (Table 26). The average incidental landings per Multispecies DAS used were 1,638 lb and 573 lb whole weight for permit category C and D, respectively (Figure 23). Most monkfish landings while only on a NE Multispecies DAS were less than the possession limits, however, some trips did exceed these limits (Table 27).

Figure 23. Frequency of monkfish landings per Northeast Multispecies DAS in the NFMA for permit categories C and D, FY 2021.



Notes: Blue vertical lines represent trip possession limits while using a Northeast multispecies DAS in the NFMA (2,619 lb for permit C and 2,183 lb for permit D, whole weight).
RSA trips were removed.
Source: CAMS and discard modules, November 2022.

Table 25. Monkfish landings (lb, whole weight) under and over incidental trip limits while using and not using a Northeast Multispecies DAS, by permit category, FY 2021.

Permit Category	Trips using NE Mult. DAS					Trips not using NE Mult. DAS (undeclared or NE Mult. sector or common pool)*	
	Trips landing < incidental limit		Trips landing > incidental trip limits				
	Total Landings	# Trips	Total Landings	Landings in excess**	# Trips	Total Landings	# Trips
C	5,242,947	620	196,625	49,961	56	1,098,745	251
D	2,171,167	1,674	243,711	59,392	72	877,139	750
TOTAL	7,414,116	2,294	440,336	109,353	128	1,975,884	1,001

Notes: RSA trips were removed from data.

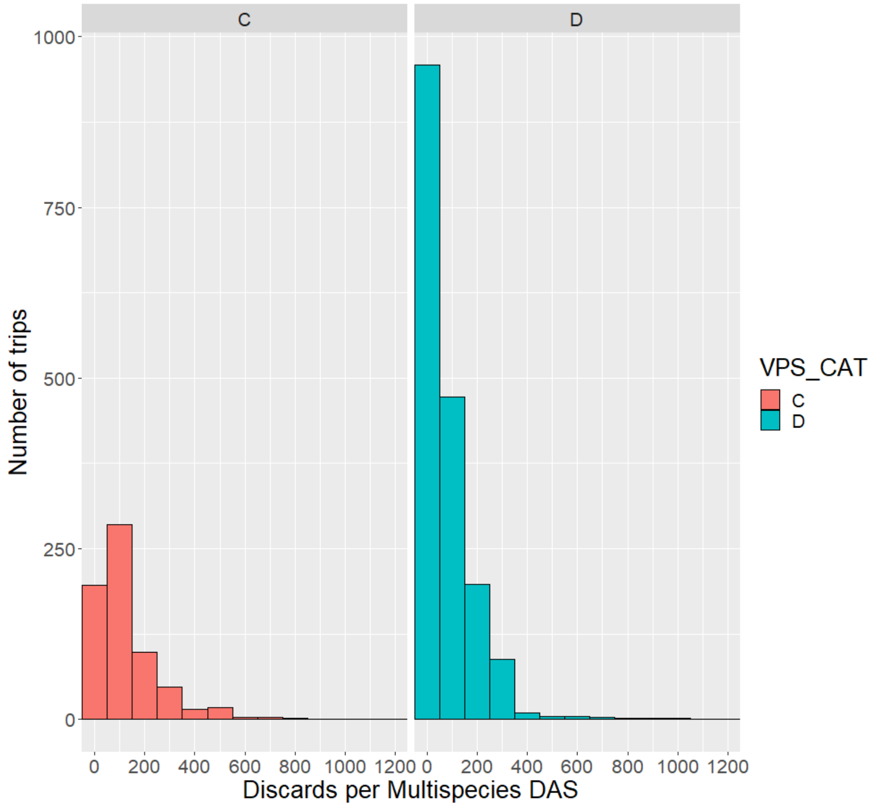
* These are either undeclared or NE Multispecies sector or common pool trips where a DAS is not required. These trips have incidental possession limits (146 lb whole weight per day, not to exceed 437 lb whole weight per trip). ~30% of these trips are landing over the incidental amount, landing 888,504 lb whole weight in excess, but some of these trips are Exempted Fishing Permit trips which have different possession limits.

** Only includes the landings more than the incidental possession limits (i.e., does not include the incidental landings legally allowed).

Source: CAMS and discard modules, November 2022.

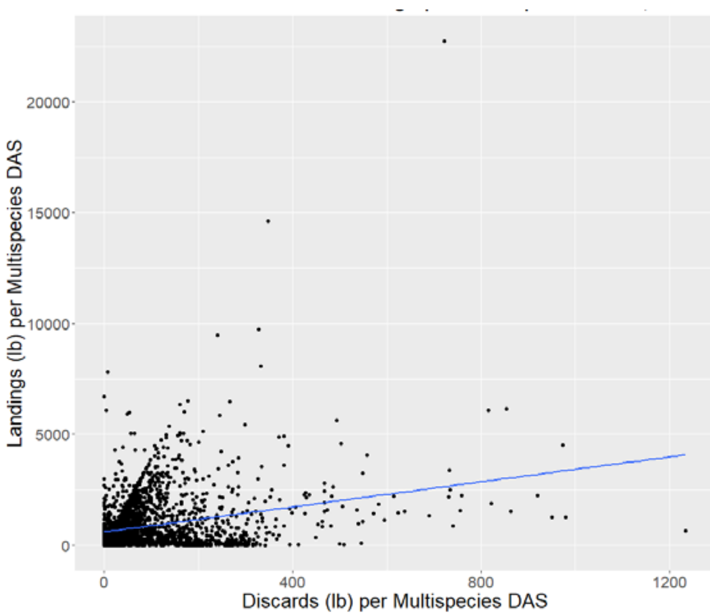
When on a NE Multispecies DAS, vessels discarded about 80 to 129 lb (whole weight) per NE Multispecies DAS used, depending on whether a D or C permit category was used, respectively (Figure 24). The amount of discarding appears to increase as landings increase (Figure 25).

Figure 24. Frequency of trip discards per NE Multispecies DAS, by permit category, FY 2021.



Notes: RSA trips were removed.
Source: CAMS and discard modules, November 2022.

Figure 25. Discards as a function of landings (lb, whole weight), per NE Multispecies DAS in FY 2021.



Notes: RSA trips were removed. Blue line indicates a trend line.
Source: CAMS and discard modules, November 2022.

5.5.5 Fishing Communities

Consideration of the social and economic impacts on fishing communities of proposed fishery regulations is required by the National Environmental Policy Act of 1969, as Amended (NEPA 1969) and the Magnuson-Stevens Fishery Conservation and Management Act, particularly National Standard 8 (MSA 2007) which defines a “fishing community” as “a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community” (16 U.S.C. § 1802(17)). Here, “fishing communities” include communities with a substantial involvement in or dependence on the monkfish fishery.

5.5.5.1 Monkfish Fishing Communities Identified

Primary and secondary monkfish fishing ports are identified for the Monkfish FMP. Based on the criteria below, there are six primary ports in the fishery (Table 28). Of these, the highest revenue ports are New Bedford, Gloucester, and Boston, MA (Table 29). There are 14 secondary ports. The primary and secondary ports comprised 66% and 28% of total fishery revenue, respectively, during 2010-2019. There are 138 other ports that have had more minor participation (6%) in the fishery recently. More community information is available from the NEFSC Social Sciences Branch website and in Clay et al. (2007).

Primary Port Criteria. The monkfish fishery primary ports are those that are substantially engaged in the fishery. The primary ports meet at least one of the following criteria:

1. At least $1M average annual revenue of monkfish during 2010-2019, or
2. Ranking of very high (factor score ≥ 5)[2] for engagement in the monkfish fishery on average in 2016-2020, using the NOAA Fisheries Community Social Vulnerability Indicators (Table 28).

Secondary Port Criteria. The monkfish fishery secondary ports are involved to a lesser extent. The secondary ports meet at least one of the following criteria:

- At least $100,000 average annual revenue of monkfish, 2010-2019, or
- A ranking of high (factor score 1-4.99) for engagement in the monkfish fishery on average in 2016-2020, using the NOAA Fisheries Community Social Vulnerability Indicators (Table 29).

Table 26. Primary and secondary ports in the monkfish fishery.

State	Port	Average revenue 2010-2019		Monkfish Engagement, 2016-2020		Primary/ Secondary
		>$100K	>$1M	High	Very High	
ME	Portland	√		√		Secondary
NH	Portsmouth	√		√		Secondary
MA	Gloucester		√		√	Primary
	Boston		√		√	Primary
	Scituate	√		√		Secondary
	Chatham	√		√		Secondary
	Harwichport	√		√		Secondary
	New Bedford		√		√	Primary
	Westport	√		√		Secondary
RI	Little Compton	√		√		Secondary
	Newport	√		√		Secondary
	Narragansett/Point Judith		√		√	Primary
CT	New London	√		√		Secondary
NY	Montauk	√			√	Primary
	Hampton Bays/ Shinnecock	√		√		Secondary
NJ	Point Pleasant	√		√		Secondary
	Barnegat Light/Long Beach		√	√		Primary
	Cape May			√		Secondary
VA	Chincoteague	√				Secondary
	Newport News			√		Secondary

Table 27. Fishing revenue (unadjusted for inflation) and vessels in top Monkfish ports by revenue, calendar years 2010 – 2019.

Port	Average revenue, 2010-2019			Total active monkfish vessels, 2010-2019
	All fisheries	Monkfish only	% Monkfish	
New Bedford, MA	$368,627,420	$4,240,639	1%	**479**
Gloucester, MA	$48,514,248	$2,924,748	6%	**190**
Boston, MA	$15,999,540	$1,809,192	11%	**44**
Pt. Judith, RI	$47,753,305	$1,604,760	3%	**214**
Long Beach, NJ	$26,124,402	$1,459,529	6%	**74**
Chatham, MA	$11,764,003	$817,736	7%	**57**
Little Compton, RI	$2,398,385	$802,384	33%	**31**
Montauk, NY	$17,192,554	$726,690	4%	**116**
Hampton Bay, NY	$5,746,477	$578,235	10%	**64**
Portland, ME	$24,798,943	$559,798	2%	**71**
Other (n=146)	$368,846,866	$3,750,338	1%	
Total	**$937,766,141**	**$19,274,049**	**2%**	

Source: NMFS Commercial Fisheries Database (AA data), accessed April 2022.
Note: “Active” defined as landing > 1 lb of monkfish.

The Engagement Index can be used to determine trends in a fishery over time. Those ports with very high monkfish engagement in 2016-2020, generally had very high engagement in 2006-2010 and 2011-2015, except for Boston, MA, which had increasing engagement over this time (Table 30). There are 14 ports that have had high or very high engagement during all three periods, indicating a stable presence in those communities. Annual data on port engagement is available at the [Commercial Fishing Performance Measures website.]()

Table 28. Changes in monkfish fishery engagement over time for all ports with high engagement during at least one year, 2006 – 2020.

State	Community	Engagement Index			
		2006-2010	2011-2015	2016-2020	2020 only
ME	Portland	High	High	High	High
NH	Portsmouth	High	Med.-High	High	High
MA	Gloucester	Very High	Very High	Very High	Very High
	Boston	High	High	Very High	Very High
	Scituate	High	High	High	High
	Chatham	High	High	High	High
	Harwichport	Medium	Medium	High	High
	New Bedford	Very High	Very High	Very High	Very High
	Westport	Med.-High	High	High	Med.-High
RI	Tiverton	Med.-High	Medium	Medium	Medium
	Little Compton	High	High	High	High
	Newport	High	High	High	High
	Narragansett/Pt. Judith	Very High	Very High	Very High	Very High
CT	Stonington	Med.-High	Med.-High	Med.-High	High
	New London	Med.-High	High	High	High
NY	Montauk	Very High	Very High	Very High	High
	Hampton Bays/Shinnecock	High	High	High	High
NJ	Point Pleasant	High	High	High	High
	Barnegat Light/Long Beach	Very High	Very High	High	High
	Cape May	High	High	High	High
MD	Ocean City	High	High	Med.-High	Med.-High
VA	Chincoteague	High	High	Medium	Medium
	Newport News	Med.-High	High	High	High
NC	Wanchese	High	Med.-High	Med.-High	Med.-High
	Beaufort	Medium	Med.-High	Med.-High	Medium

Source: http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/index.

Landings by state

During CY 2012-2021, monkfish were landed in 11 states, mostly in Massachusetts (61%), followed by Rhode Island (13%), and New Jersey (9%, Table 31). Massachusetts continues to account for the greatest proportion of all monkfish landings.

Table 29. Monkfish landings by state, CY 2012 – 2021.

STATE	Monkfish landings (mt)										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total	
ME	488	115	257	345	243	178	219	170	411	442	**4,062**	4%
NH	57	86	74	38	50	68	123	119	175	213	**1,463**	2%
MA	5,247	3,812	4,972	4,303	4,227	4,581	5,067	5,943	6,306	6,057	**55,961**	61%
RI	1,303	1,598	2,122	1,495	1,488	1,819	1,648	1,560	1,412	2,306	**11,441**	13%
CT	347	305	457	547	724	380	464	275	246	324	**2,123**	2%
NY	841	766	1,059	1,183	773	748	827	1,193	829	1,005	**5,996**	7%
NJ	1,003	1,418	1,676	1,389	1,351	1,740	1,250	1,335	1,229	1,205	**7,946**	9%
DE	0										**0**	0%
MD	51	83	98	69	86	78	36	51	32	19	**285**	0%
VA	412	402	638	567	413	352	259	218	88	142	**1,748**	2%
NC	10	27	10	3	38	47	56	33	36	20	**244**	0%
Total	**9,758**	**8,612**	**11,365**	**9,940**	**9,394**	**9,992**	**9,949**	**10,897**	**10,765**	**11,735**	**91,271**	**100%**

Source: ACCSP database, accessed April 2022.

5.5.5.2 Social and Gentrification Pressure Vulnerabilities

The NOAA Fisheries Community Social Indicators (see also Jepson & Colburn 2013) are quantitative measures that describe different facets of social and economic well-being that can shape either an individual's or community's ability to adapt to change. The indicators represent different facets of the concepts of social and gentrification pressure vulnerability to provide context for understanding the vulnerabilities of coastal communities engaged in and/or reliant on commercial fishing activities. Provided here are these indicators for the primary and secondary monkfish ports (Table 32).

Social Vulnerability Indicators. There are five social vulnerability indicators; the variables for which represent different factors that may contribute to a community's vulnerability. The **Labor force structure** index characterizes the strength/weakness and stability/instability of the labor force. The **Housing characteristics** index measures infrastructure vulnerability and includes factors that indicate housing that may be vulnerable to coastal hazards. The **Personal disruption** index represents factors that disrupt a community member's ability to respond to change because of personal circumstances affecting family life such as unemployment or educational level. The **Poverty** index is a commonly used indicator of vulnerable populations. The **Population composition** index shows the presence of populations who are traditionally considered more vulnerable due to circumstances often associated with low incomes and fewer resources. A high rank in any of these indicates a more vulnerable population.

Most monkfish port communities exhibited medium-high to high vulnerability in at least one of the five social vulnerability indicators. Across all monkfish ports, the highest indicator of vulnerability is labor force structure.

Gentrification Pressure Indicators. Gentrification pressure indicators characterize factors that, over time, may indicate a threat to the viability of a commercial or recreational working waterfront, including the displacement of fishing and fishing-related infrastructure. The **Housing Disruption** index represents factors that indicate a fluctuating housing market where some fishing infrastructure displacement may occur due to rising home values and rents. The **Retiree migration** index characterizes areas with a higher concentration of retirees and elderly people in the population. The **Urban sprawl** index describes areas with increasing population and higher costs of living. A high rank in any of these indicates a population more vulnerable to gentrification.

Almost all monkfish ports scored medium-high to high in at least one of the three gentrification pressure indicators. This suggests that shoreside fishing infrastructure and fishing family homes may face rising property values (and taxes) from an influx of second homes and businesses catering to those new residents, which may displace the working waterfront. Across all monkfish ports, the highest indicator of vulnerability is housing disruption.

Combined Social and Gentrification Pressure Vulnerabilities. Overall, 11 of the 20 communities have medium to high levels of vulnerability for four or more of the eight indicators (combined social and gentrification pressure). This indicates high social and gentrification pressure vulnerability overall for both the primary and secondary communities. New Bedford, MA has six indicators at the medium to high level.

Table 30. Social vulnerability and gentrification pressure in monkfish ports, 2019.

State	Community	Social vulnerability					Gentrification pressure		
		Labor Force Structure	Housing Characteristics	Environmental Justice indicators			Housing Disruption	Retiree Migration	Urban Sprawl
				Personal Disruption	Poverty	Population Composition			
ME	Portland (s)	Low	Medium	Low	Medium	Low	Medium	Low	Medium
NH	Portsmouth (s)	Low	Low	Low	Low	Low	Med-High	Low	Medium
MA	Gloucester (p)	Low	Low	Low	Low	Low	Medium	Low	Medium
MA	Boston (p)	Low	Low	Medium	Med-High	Med-High	High	Low	High
MA	Scituate (s)	Low	Low	Low	Low	Low	Med-High	Low	Med-High
MA	Chatham (s)	High	n/a	Low	Low	Low	High	High	Low
MA	Harwichport (s)	High	Low	Low	Low	Low	Med-High	High	Low
MA	New Bedford (p)	Low	Med-High	Med-High	High	Med-High	Medium	Low	Med-High
MA	Westport (s)	Medium	Medium	Low	Low	Low	Medium	Medium	Medium
RI	Little Compton (s)	Medium	Low	Low	Low	Low	Med-High	Med-High	Medium
RI	Newport (s)	Low	Low	Low	Medium	Low	High	Low	Medium
RI	Narragansett/Pt. Judith (p)	Medium	Low	Low	Low	Low	Med-High	Medium	Low
CT	New London (s)	Low	Med-High	High	High	Med-High	Low	Low	Low
NY	Montauk (p)	Med-High	Low	Low	Low	Low	High	High	Med-High
NY	Hampton Bays/Shinnecock (s)	Low	Low	Low	Low	Med-High	High	Low	Medium
NJ	Point Pleasant (s)	Low	Low	Low	Low	Low	Medium	Low	Medium
NJ	Barnegat Light/Long Beach (p)	High	n/a	Low	Low	Low	High	High	Medium
NJ	Cape May (s)	Med-High	Medium	Low	Low	Low	High	Med-High	Low
VA	Chincoteague (s)	High	Med-High	Medium	Low	Low	Medium	Med-High	Low
VA	Newport News (s)	Low	Medium	Medium	Medium	Med-High	Low	Low	Low

Source: NOAA Fisheries Community Social Indicators.
*n/a indicates ranking is not available due to incomplete data. (p) = herring primary port. (s) = herring secondary port

SPINY DOGFISH FOCUS

Note: Based on fishery differences and public input over the years from affected communities, the two Councils take slightly different approaches in describing the interaction of a fishery and the relevant human communities, so Section 5.6 (monkfish focus) and 5.7 (spiny dogfish focus) differ in formatting.

5.5.6 Purpose

This section describes the performance of the spiny dogfish fishery to allow the reader to understand its socio-economic importance. Also see NMFS' communities page at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/socioeconomics/socioeconomic-cultural-and-policy-research-northeast.

The most obvious way that human communities are affected by the fishery is from the revenues generated, and the jobs created. The affected communities include both individuals directly involved in harvesting and processing as well as indirect support services (e.g. vessel maintenance, insurance, ice, etc.). While the direct data points that are most available are landings and revenues, it is important to keep in mind that by contributing to the overall functioning of and employment in coastal communities, the fishery has indirect social impacts as well. Social impacts are strongly aligned with changes to fishing opportunities and while difficult to measure can include impacts to families from income changes/volatility, safety-at-sea (related to changes in fishery operations due to regulation changes), job satisfaction, and/or frustration by individuals due to management's impacts (especially if they perceive management actions to be unreasonable or ill-informed).

5.5.7 Recent Fishery Performance

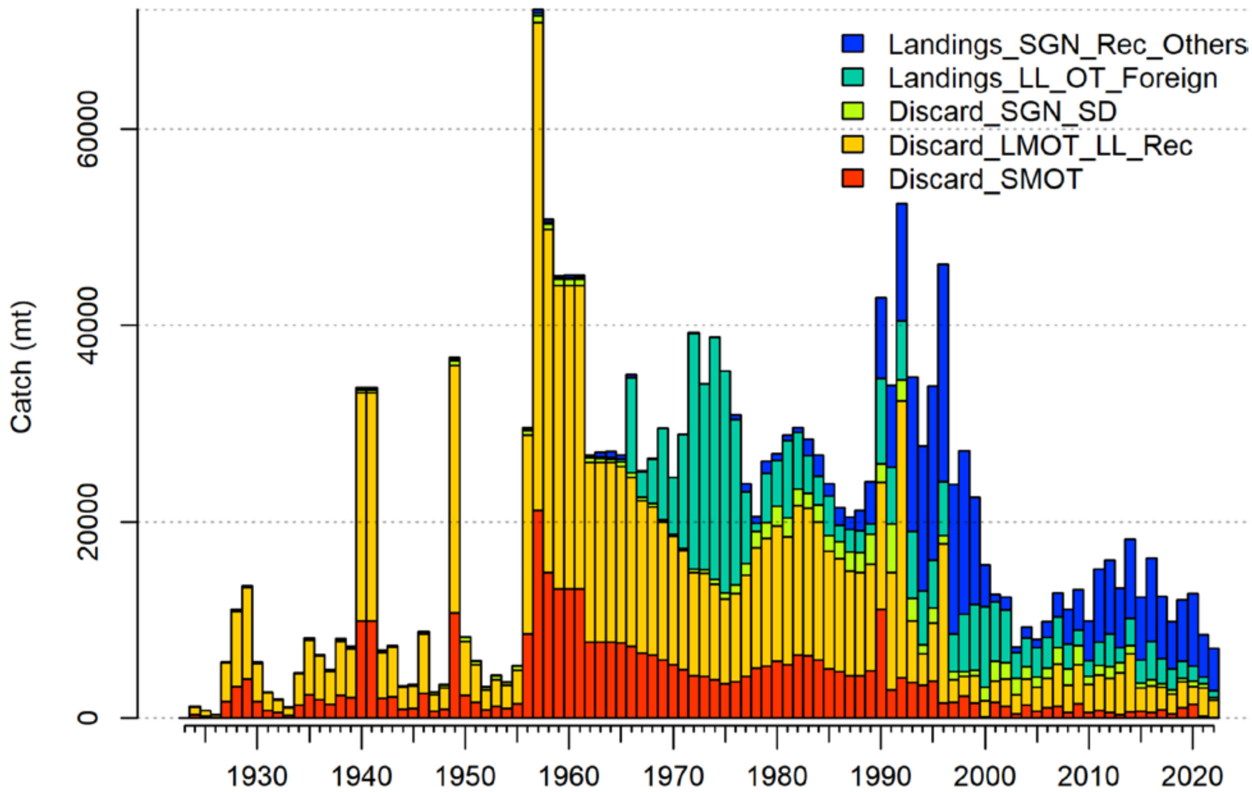
This section establishes a descriptive baseline for the fishery with which to compare actual and predicted future socio-economic changes that result from management actions. The 2023 spiny dogfish Fishery Information Document and 2023 Spiny Dogfish Fishery Performance Report have details on recent commercial fishing activity, summarized below. These are available at https://www.mafmc.org/dogfish. There is negligible directed recreational effort/catch.

The NEFMC and MAFMC jointly manage spiny dogfish in federal waters (MAFMC has lead) and the ASMFC has a complementary state waters plan. Directed fishing was curtailed in 2000 when federal management began after overfishing in the 1990s led to an overfished finding. Examining vessels possessing any federal permit and landings of at least 10,000 pounds of spiny dogfish, during the initial rebuilding from 2001-2005, 29-68 vessels participated in the spin dogfish fishery. As abundance increased and fishing measures were liberalized, participation increased to a peak of 282 vessels in 2012. Participation has been declining since 2012, and 80 such vessels participated in the 2022 fishing year.

Figure 26 below, from the 2023 Assessment, describes spiny dogfish catch 1924-2022 and highlights the 1970s foreign fishery (teal color) and then domestication of the fishery in the 1990s (royal blue). Figure 27 to Figure 29 describe recent domestic landings, nominal ex-vessel revenues, and prices (inflation adjusted). Data since 1996 is more reliable than previous data due to improvements in reporting requirements. The Gross Domestic Product Implicit Price Deflator was used to report ex-vessel prices as "2022 dollars." Figure 30 illustrates preliminary weekly 2022 (yellow-orange) and 2023 (blue) landings through the year. Figure 31 displays locations of 2010-2021 NEFSC survey catches and VTR landings.

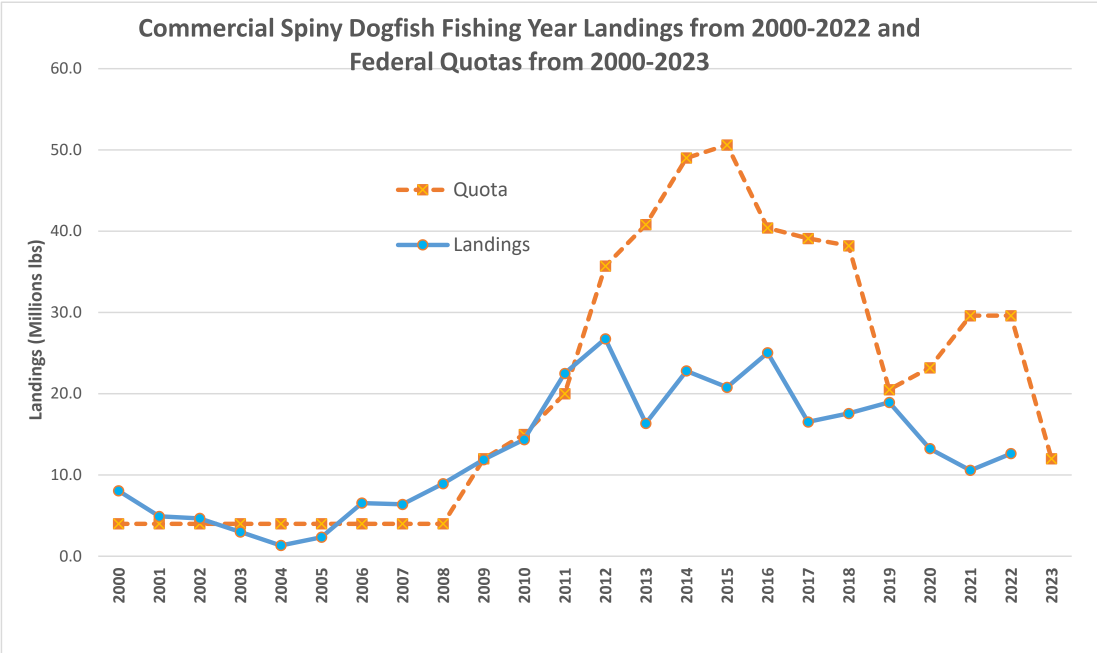
Recently most landings were in MA, VA, and NJ (Table 33). The fishery occurs throughout the year but is more focused north in the summer and south in the winter (Table 34). Most landings are made with gillnet gear (Table 35). There has been a recent decline in the number of federally-permitted vessels participating (Table 36). Individual port data are not provided as it may violate the spirit of data confidentiality provisions even if not the letter of the law (an astute observer could potentially glean confidential data even if not obvious to some readers).

Figure 26. Spiny Dogfish Catches 1924-2022.



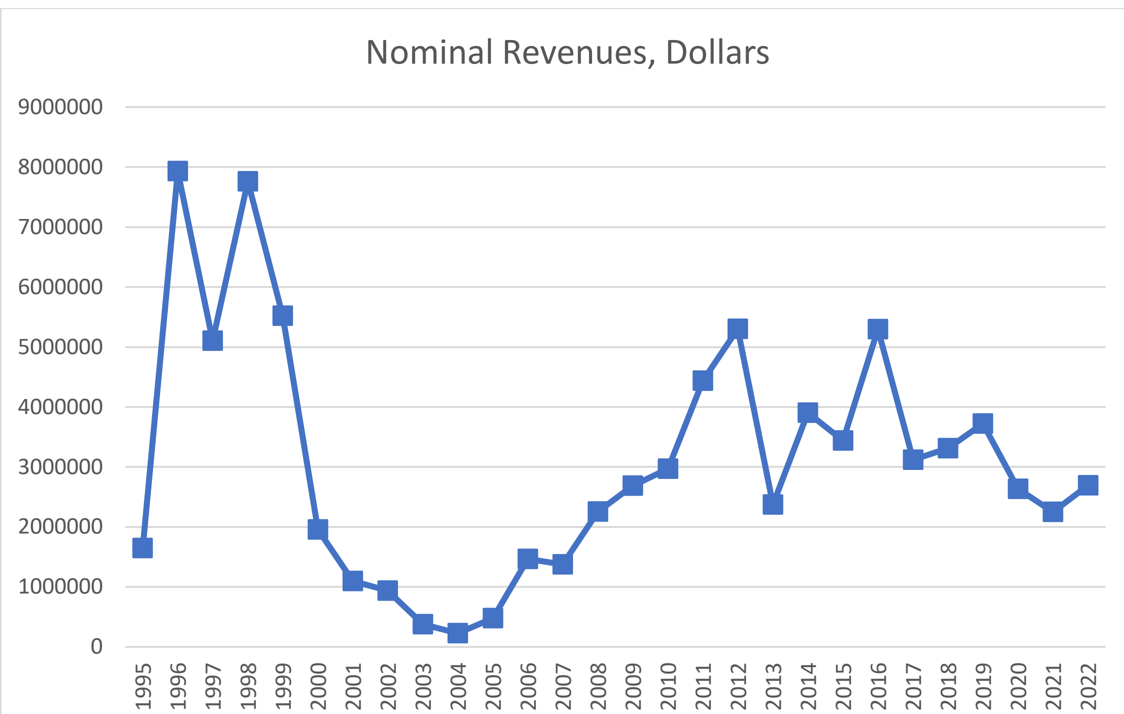
Source: 2023 Spiny Dogfish Management Track Assessment, available at *https://apps-nefsc.fisheries.noaa.gov/saw/sasi.php.*

Figure 27. U.S. Spiny Dogfish Landings and Quotas 2000-2023 fishing years.



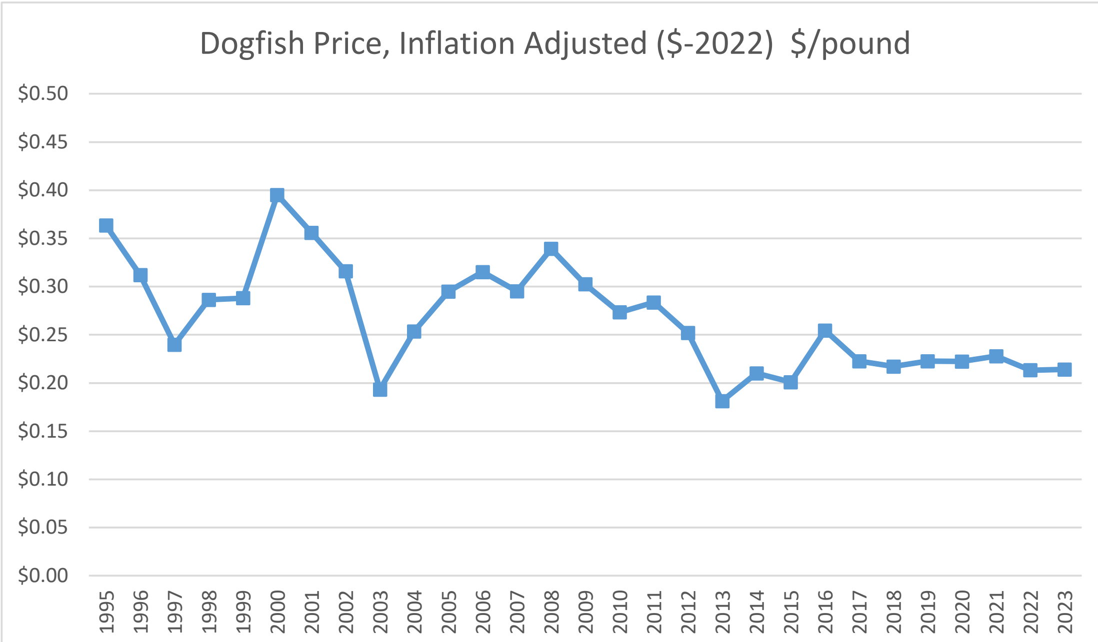
Source: NMFS unpublished dealer data.

Figure 28. Spiny Dogfish Ex-Vessel Revenues 1995-2022 fishing years, Nominal Dollars.



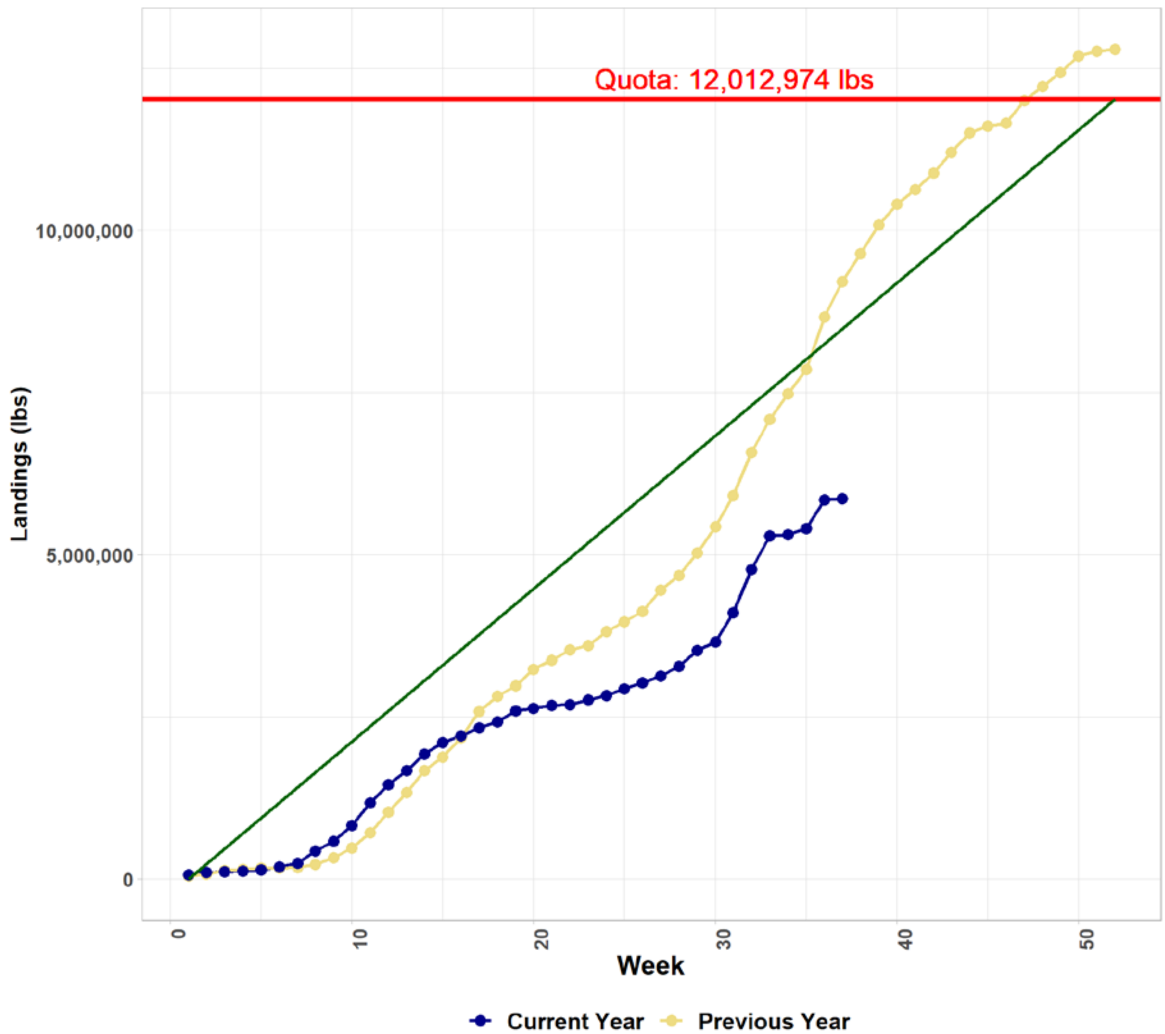
Source: Unpublished NMFS landings data.

Figure 29. Ex-Vessel Spiny Dogfish Prices 1995-2022 Adjusted to 2022 Dollars.



Source: NMFS unpublished dealer data.

Figure 30. U.S. Preliminary spiny dogfish landings; 2023 fishing year in dark blue, 2022 in yellow-orange.



Source: https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/quota-monitoring-greater-atlantic-region. For data reported through 2024-01-17 Week 0 = May 1. 2023 fishing year quota noted (12.0 million pounds)

Figure 31. Survey and VTR Spiny Dogfish Catches 2010-2021 – Assessment – Jones 2022 Working Paper available at https://apps-nefsc.fisheries.noaa.gov/saw/sasi.php.

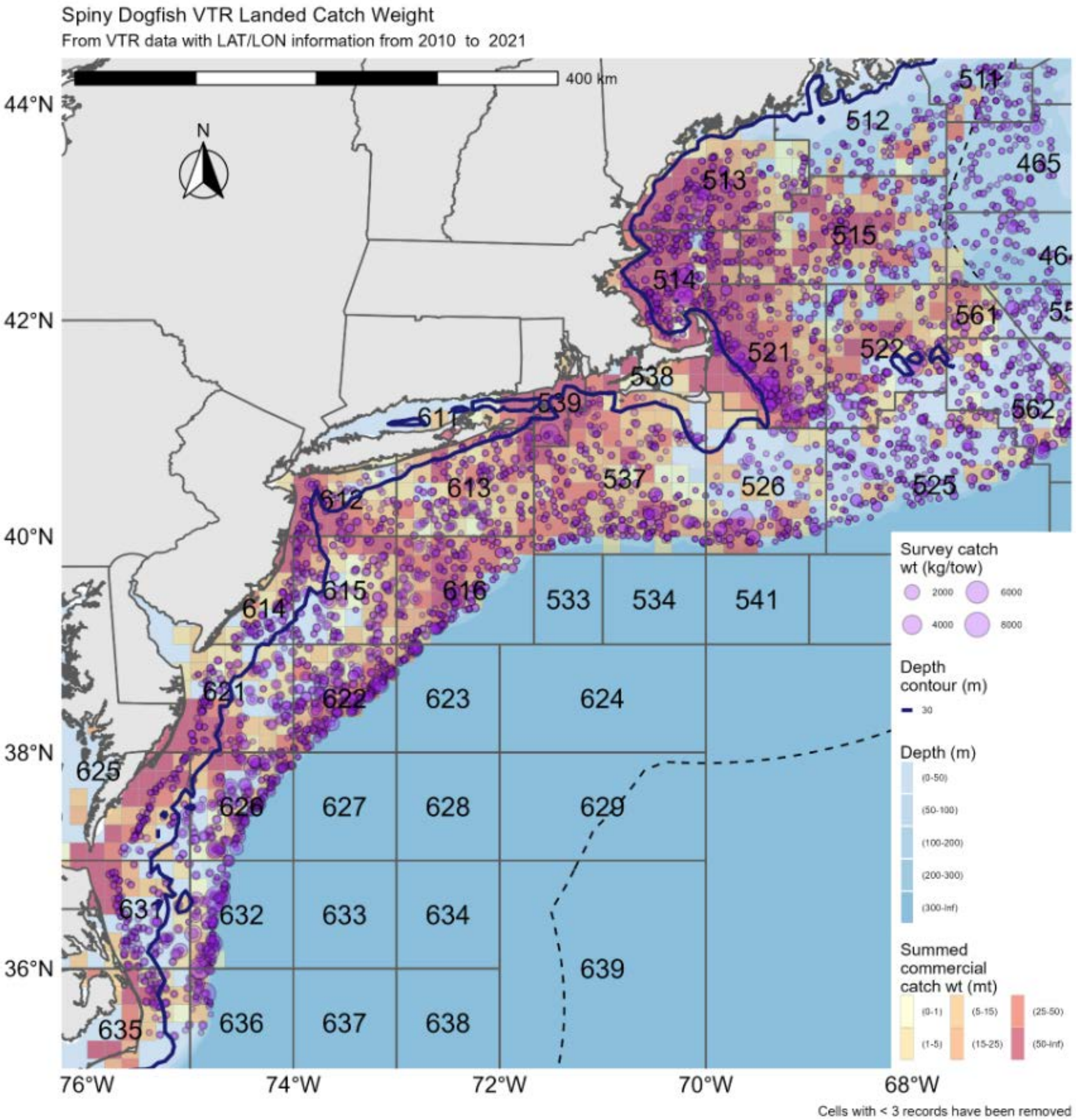


Table 31. Commercial Spiny Dogfish landings (live weight – millions of pounds) by state for 2020-2022 fishing years.

Year	MA	VA	NJ	Other (ME, NH, RI, CT, NY, MD, NC)	Total
2020	6.6	3.3	2.0	1.4	13.3
2021	3.8	4.0	1.6	1.2	10.6
2022	3.8	6.0	1.7	1.1	12.6

Source: NMFS unpublished dealer data.

Table 32. **Commercial Spiny Dogfish landings (live weight – millions of pounds) by months for 2020-2022 fishing years.**

Year	May-Aug	Sept-Dec	Jan-April	Total
2020	4.9	5.5	2.8	13.3
2021	2.9	4.6	3.1	10.6
2022	2.7	5.0	4.9	12.6

Source: NMFS unpublished dealer data. [2]

Table 33. **Commercial Spiny Dogfish landings (live weight – millions of pounds) by gear for 2020-2022 fishing years.**

Year	GILL_NET_SINK__OTHER	LONGLINE__BOTTOM	TRAWL_OTTER_BOTTOM_FISH	Unknown/Other	Total
2020	9.7	1.8	0.4	1.4	13.3
2021	9.2	0.5	0.3	0.6	10.6
2022	10.1	0.9	0.2	1.3	12.6

Source: NMFS unpublished dealer data. [2]

Table 34. Vessel participation over time in the Spiny Dogfish Fishery based on annual landings (pounds). Note: State-only vessels are not included.

YEAR	Vessels 200,000+	Vessels 100,000 - 199,999	Vessels 50,000 - 99,999	Vessels 10,000 - 49,999	Total with at least 10,000 pounds landings
2000	16	10	8	43	77
2001	4	12	10	33	59
2002	2	14	8	31	55
2003	4	5	3	17	29
2004	0	0	0	42	42
2005	0	0	1	67	68
2006	0	4	11	114	129
2007	1	2	21	72	96
2008	0	5	20	119	144
2009	0	11	42	166	219
2010	0	26	54	124	204
2011	1	48	73	135	257
2012	25	55	56	146	282
2013	10	27	45	87	169
2014	27	38	38	81	184
2015	31	33	36	59	159
2016	52	26	14	45	137
2017	28	27	24	32	111
2018	28	26	20	35	109
2019	29	25	21	29	104
2020	23	27	15	22	87
2021	15	27	11	26	79
2022	28	9	14	29	80

Source: NMFS unpublished dealer data.