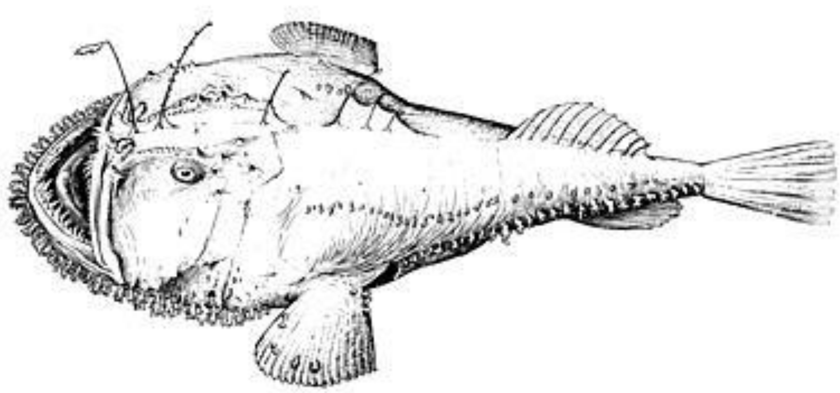
Monkfish Fishery Management Plan

Framework Adjustment 13



DRAFT Discussion Document

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Prepared by the
New England Fishery Management Council
In consultation with the
National Marine Fisheries Service and the
Mid-Atlantic Fishery Management Council

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MONKFISH FISHERY MANAGEMENT PLAN

FRAMEWORK ADJUSTMENT 13

Proposed Action:	Propose monkfish specifications for fishing years 2023 - 2025 and other measures.
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Abstract:	[to be completed]

1.0 EXECUTIVE SUMMARY

[to be completed]

In April 2022, the Council initiated this action to include FY 2023-2025 specifications and consider: 1) revising Days-at-Sea allocations and possession limits, including the incidental limit; 2) requiring 12" mesh for monkfish gillnets; 3) requiring use of the Vessel Monitoring System (VMS) across the monkfish fishery; and 4) management measures to reduce southern area discards.

In June, the Council decided to not include VMS alternatives in this action and that the existing range of alternatives were sufficient to address the southern area discard issue.

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3.0 BACKGROUND AND PURPOSE

3.1 BACKGROUND

The monkfish fishery in the EEZ 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 managed as two stocks, northern and southern and in two management areas; 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 fishery is primarily managed with a yearly allocation of days-at-sea (DAS) and landing limits.

Overfishing Limit and stock status. An overfishing limit (OFL) for the northern and southern monkfish stocks has been defined as the product of the fishing mortality threshold (F_{max}) and the current estimate of exploitable biomass ($B_{current}$). The stock assessments in 2010 and 2013 concluded that the northern and southern monkfish stocks were not overfished and overfishing was not occurring but recognized significant uncertainty in this determination. After the 2013 assessment, the OFLs for FY 2014-2016 were lowered to 17,805 mt and 23,204 mt for the northern and southern stocks, respectively (NEFMC 2014).

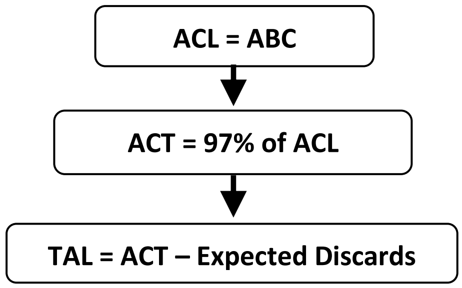
Stock status has been unknown since the 2016 assessment. The 2016 assessment did not update the SCALE model that had been used since 2007 to assess the monkfish stocks after its use was invalidated by age validation research. Instead, the stock was assessed using the "Plan B smooth" method which is based solely on the trawl survey index (Richards 2016). This method is considered interim until a more analytical assessment is possible. The 2016 assessment concluded that many of the biological reference points were no longer relevant due to invalidation of the growth model (e.g., F_{max} could not be recalculated), and thus were not updated. The 2019 assessment continued use of the Plan B smooth method due to ongoing uncertainties but determined that a strong recruitment event in 2015 led to an increase in biomass in 2016-2018, though abundance declined in 2019 as recruitment returned to average levels. The status of the stocks will be revisited with updated data in the 2022 Monkfish Management Track Assessment, which will be peer reviewed in September 2022. OFLs have remained at the levels set for FY 2014.

Under the Plan B smooth method, fishery catch data are not used in the assessment of stock status. However, the assessment document updates the timeseries of fishery catch for each calendar year (CY). Discards are estimated by gear, half year and management area using observer data. For otter trawls and gillnets, the observed monkfish discard-per-kept-monkfish ratio is expanded to total monkfish discards. For scallop dredges and shrimp trawls, the observed monkfish discard-per-all-kept-catch ratio is expanded to total monkfish discards. Lack of observer data in recent years due to the pandemic is a challenge across all fisheries for calculating discards. The 2019 assessment updated fishery catch data through CY 2018 (NEFSC 2020); data through CY 2021 is expected to be updated in the 2022 assessment document.

When calculating monkfish discards, the discard mortality is assumed to be 100% across all gear types. Weissman et al. (2021) evaluated monkfish discard mortality in scallop dredge gear; the results suggested that discard mortality is lower than the assumed 100%. The dredge discard mortality assumption is being revisited during the 2022 assessment. The monkfish assessment in 2025 will likely be a research track assessment, in which this issue could also potentially be addressed.

Acceptable Biological Catch and fishery specifications. Specifications follow a hierarchy of an acceptable biological catch (ABC), and an annual catch limit (ACL) set equal to the ABC, an annual catch target (ACT) set equal to 97% of the ACL, and total allowable landings (TAL) set equal to the difference between the ACT and expected discards. These specifications are set for each management area to reduce the likelihood of the ACL being exceeded.

Figure 1. Formula for monkfish specification setting.



Acceptable Biological Catch (ABC). For setting the northern and southern stock ABCs for FY 2020-2022, a multiplier from the 2019 assessment was applied to the existing ABC (rather than to recent average catch as described in the assessment, NEFSC 2020). The multiplier is the proportional rate of change in smoothed survey indices (average of fall and spring NEFSC surveys) over the most recent three fishing years. Depending on the outcome of the 2022 assessment, the PDT may prepare ABCs with the survey multiplier applied to recent catch (the Plan B smooth method) and to existing ABC (method for FY 2020-2022 specifications) for the Scientific and Statistical Committee (SSC) to make a recommendation.

Annual Catch Limit (ACL). The ACL for each stock is set equal to the ABC. The ACL is a limit that will trigger accountability measures if catch exceeds this amount (a pound-for-pound reduction in ACL in the second year following the overage).

Annual Catch Target (ACT). The ACT for each stock is 97% of the ACL, because the management uncertainty buffer between the ACL and ACT is currently set at 3%. This buffer was last changed through FW10 for FY 2017-2019, lowered from 13.5% for the northern stock and 6.5% for the southern. For the rationale, the Final Rule stated that: "The approach used to calculate discards has performed well in the past; an adequate amount of discards has been forecasted, reducing the likelihood of the ACL being exceeded. Further, as previously explained, the TALs have been consistently underharvested in both areas. As a result, there is little risk of exceeding the TALs and a more substantive management uncertainty buffer is no longer necessary."

Total Allowable Landings (TAL). The TAL for each stock is set by subtracting expected discards from the ACT. The discard deduction has been set by applying a discard rate to the ACT. This rate is the latest 3-year moving average of calendar year discards divided by total catch, as calculated through the assessment. However, the PDT is considering revising the method for calculating the discard deduction based on the work of O'Keefe (2020; see below).

Note: The monkfish regulations indicate that "The ACTs established for each management area shall be the basis for setting management measures (DAS and trip limits), after accounting for incidental catch in non-directed fisheries and discards in all fisheries." Landings by vessels with an open-access Category E federal monkfish permit or with other permits but not on a Monkfish DAS are typically considered incidental. All monkfish landings where the permit number >000000 are monitored in-season against the TALs.

3.2 Purpose and Need

To be completed later as the Council develops this action.

Per the 2022 management priorities approved by the Council in December 2021, the following are being considered in this action:

- 12-inch minimum mesh size for monkfish gillnets,
- Vessel Monitoring System requirement, and
- Measures to reduce discards in the Southern Monkfish Management Area.

4.0 ALTERNATIVES UNDER CONSIDERATION

This action includes FY 2023-2025 specifications and considers: 1) revising Days-at-Sea allocations and possession limits, including the incidental limit; 2) requiring 12" mesh for monkfish gillnets; 3) requiring use of the Vessel Monitoring System across the monkfish fishery; and 4) management measures to reduce southern area discards.

4.1 Action 1 - FY 2023-2025 Specifications

Action 1 sets monkfish fishery specifications for fishing years 2023 - 2025.

4.1.1 Alternative 1 - No Action

Under Alternative 1 (No Action), the specifications for FY 2023-2025 would be unchanged from the specifications for FY 2020-2022.

For FY 2020-2022, the ABC had a 10% increase in the Northern Fishery Management Area (NFMA) and was status quo in the Southern Fishery Management Area (SFMA) relative to FY 2017-2019 (Table 1). For the NFMA, this was more conservative than the adjustment factor coming from the 2019 assessment (a 20% increase) because of uncertainty about how long the 2015-year class would influence biomass in the next three fishing years, the recent trends in the survey indices (increasing in the north, steady in the south), and the recent performance of the fishery, which has only been achieving the TAL since FY 2016. For the SFMA, status quo ABC was consistent with the adjustment factor coming from the assessment, which supported no change in the ABC.

Relative to the FY 2017-2019 specifications, the discard rate used to set the discard deduction increased for FY 2020-2022. The discard rate for the NFMA increased from 13.9% to 18.2%; the SFMA discard rate increased from 24.6% to 50.8% over the same timeframe. The large increase in SFMA discard rate was likely due to the large 2015-year class, predominantly caught in dredge gear (NEFSC 2020, Figure D8, p. 119).

Table 1. Specifications for FY 2020-2022 (Framework 12).

	Northern FMA (mt)	Southern FMA (mt)
ABC = ACL	8,351	12,316
ACT (97% of ACL)	8,101	11,947
Expected Discards	(18.2%) 1,477	(50.8%) 6,065
Federal TAL (ACT – discards)	6,624	5,882
Note: Discard rate shown in parentheses.		

4.1.2 Alternative 2 - ???

Under Alternative 2, …

Rationale: …..

[*Note:* Specification alternatives will be developed by the PDT after the 2022 monkfish assessment is peer reviewed on September 20, 2022. The SSC will review the PDT work and recommend ABCs in October.]

4.1.3 Setting the discard deduction from TALs

In 2020 and 2021, Dr. Cate O'Keefe worked with the Monkfish PDT to analyze alternate methods for setting the discard deduction from TALs (O'Keefe 2020; 2021). This work was prompted by concerns that as the 2015-year class entered the fishery, discards increased, causing the discard deduction for FY2020-2022 (based on average discards in 2017-2019) to be higher than expected.

In September 2021, the Committee reviewed the ideas for alternate methods and decided to not adjust the deduction for FY 2022 specifications, mid-specifications cycle. This was consistent with the PDT recommendation. It was noted that the range of estimates of discards as a percent of catch among all approaches was similar, and it was preferable to consider changing methods when specifications are being set rather than mid-cycle.

The PDT is analyzing alternate discard deduction approaches for the FY 2023-2025 specifications and going forward. Per request of the PDT, the Monkfish Committee provided in March 2022 its vision for the management goal, or intended outcome, of the discard deduction:

> *GOAL: "The Committee feels that a monkfish discard deduction approach should provide as much stability to the directed fishery as possible (minimizing change between specification cycles), while considering recent recruitment (potentially diverging based on a trigger)."*

In April 2022, the NEFMC reviewed this goal and agreed that recent recruitment would <u>not</u> be considered for setting the deduction in these specifications due to the uncertainty about monkfish aging, growth, and recruitment, and that using recruitment as a predictor of discards is a more complex research project than time allows for this year.

<u>What is the current method used within the Monkfish FMP?</u>

For both management areas, the discard deduction from TAL has been calculated from fishery catch data using the most recent three-year discard percentage of total catch. This approach has been used since FY 2014. O'Keefe (2020) found that this approach performed relatively well (projected and realized discards were similar) when landings and discards were stable but did not perform well after the strong 2015 recruitment event. If the method for calculating the discard deduction is unchanged, the FY 2023-2025 specifications would likely use the average discard percentage from CY 2019-2021.

<u>What alternate methods are being considered?</u>

The PDT is preparing a few alternate methods for consideration:

- Latest 10 year mean and median discard/catch (may balance stability with recent trends), and
- Latest 10 year mean and median of discards (discards are largely not in directed fishery).

The Committee was briefed on the PDT's progress at the May Committee meeting. The PDT expects that the SSC will review the PDT work and make a recommendation in October.

4.2 Action 2 - Effort Controls

PDT notes and questions for the AP and Committee:

- There has been some conversation at AP and Committee meetings about the results of the monkfish assessment driving opinions about how effort controls should change. The preliminary indication from the assessment is that trawl survey indices have declined for both stocks, thus a subsequent decline in the ABC for FY 2023-2025 is a distinct possibility. Does the current range of effort control alternatives hold under scenarios of both positive and negative change in the assessment?
- Alternatives 2-4 are written as packages of effort control adjustments, progressively following the order of the Committee's bullets (above). In case the Committee wants to only adjust possession limits, the PDT added Alternative 5.
- Although the Committee is focused on adjusting SFMA effort controls, the PDT wrote the DAS overage adjustment (Bullet #1) to apply to the NFMA as well. The current regulations on this apply to both areas and the PDT assumed that the Committee would prefer to keep this consistent between areas.
- The Committee should confirm consent with this range of alternatives, including the specific percentages of possession limits.
- Section 6.1.1 includes preliminary PDT work to analyze these alternatives. There is no model for how the fishery may adjust to changes in effort controls. The PDT has identified which vessels may be more likely to change their effort in response to the alternatives, but there are several assumptions and uncertainties noted.

Action 2 includes alternatives that would adjust effort controls for the monkfish fishery, specifically the possession limits and use of Days-At-Sea. The following is a problem statement that effort control alternatives would address:

> *Monkfish quota use has been low in the SFMA. Adjusting DAS allocations and/or possession limits may help optimize landings. In addition, there are discards that could be turned into landings in the incidental fishery. Effort control alternatives will focus on the SFMA in this action.*

The Monkfish Committee recommended the following for effort control alternatives with the intent of optimizing landings at 90% of TAL (Table 2). This would help the fishery be more flexible and reduce discards and better prevent exceeding TAL rather than optimizing at 100%.

1. Allow for the declaration and use of additional DAS, up to three, for a trip which would otherwise be charged a single DAS. Such a trip would be subject to a trip limit equal to the trip limit for a single day multiplied by the number of DAS which were declared and used.
2. To remove the restriction on DAS use in the SFMA (currently, 46 are allocated, permits receive 45.2 due to RSA deduction, but only 37 can be used).
3. Increase incidental limits for vessels not under a DAS program, options to include an increase of up to 50%.

   To optimize at 90% of TAL, after above adjustments, increasing possession limits in the SFMA by percentages and applicable to all limited access permits.

Table 2. Summary of effort control alternatives under consideration.

	Increase DAS overage adjustment	Remove DAS use restriction in SFMA	Increase SFMA possession limits	
			Incidental	Limited access
No Action				
Alternative 2	√	√		
Alternative 3	√	√	+ 25%	+ 15%
Alternative 4	√	√	+ 50%	+ 25%
Alternative 5			+ 50%	+ 15%

4.2.1 Alternative 1 – No Action

Under Alternative 1 (No Action), SFMA DAS use restriction, DAS overage adjustment, and possession limits would be unchanged. Each vessel issued a limited access monkfish permit is allocated 46 monkfish DAS per fishing year (reduced to 45.2 for RSA DAS deduction), 37 of which can be used in the Southern Fishery Management Area. Limited access possession limits vary by permit category and area and have remained relatively stable since FY 2016 (Table 21).

To land more than incidental amounts of monkfish, vessels must have a monkfish limited access permit and be fishing under a monkfish DAS. Monkfish DAS are charged according to gear type. For gillnet trips, 1 DAS = 24 hours = 1 full trip possession limit. Limited access trips using a monkfish DAS and gillnet gear that are under 15 hours long are rounded up and charged 15 hours or 0.625 DAS (15/24 hours). Trips over 15 hours long are charged actual time (e.g., an 18-hour trip = 0.75 DAS). Trips using trawl gear are charged actual time; a 6-hour trawl trip = 0.25 DAS. The action alternatives would not change the DAS charge for trips under 24 hours.

DAS overage. In both management areas, there is a DAS overage adjustment for any vessel with a limited access monkfish permit fishing any gear on a monkfish DAS (50 CFR 648.92(b)(10)). For trips less than or equal to 24 hours long, vessels can land up to two possession limits' worth of monkfish (2 DAS' worth of monkfish) and be charged up to 1.007 DAS (24 hours and 1 minute). This overage adjustment applies no matter the trip length. For example, for trips over 24 hours but up to 48 hours long, vessels can land up to three possession limits worth of monkfish (3 DAS' worth of monkfish) and be charged up to 2.007 DAS (48 hours and 1 minute).

Incidental limits. To land incidental amounts of monkfish from federal waters, vessels must have a federal monkfish permit (permit category E, open access incidental permit) and not fish on a monkfish-only 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 area (Table).

4.2.2 Alternative 2 – Increase DAS overage adjustment; remove DAS use restriction in the SFMA.

Under Alternative 2, vessels would be granted more flexibility to land additional DAS' worth of monkfish on a trip in either management area and could use the full DAS allocation in the SFMA.

DAS overage. The DAS overage adjustment for both management areas would be revised to allow an extra DAS to be used on each trip. For trips less than or equal to 24 hours long, vessels can land up to three possession limits' worth of monkfish (3 DAS) and be charged up to 2.007 DAS. For trips over 24 hours but up to 48 hours long, vessels can land up to four possession limits worth of monkfish (4 DAS) and be charged up to 3.007 DAS (72 hours and 1 minute).

Rationale: Alternative 2 would help the fishery be more flexible and reduce monkfish discards by turning more monkfish discards into landings while keeping the overage provision consistent in the NFMA and SFMA and between vessels regardless of whether they use VMS or IVR. Revising the DAS overage provision would effectively allow for a similar flexibility that vessels using IVR lost when the FY 2020 specifications were implemented. NOAA Fisheries clarified the trip declaration requirements such that vessels using IVR had to call in a trip no more than one hour ahead of leaving port (no timeframe was specified prior). This change made the call-in timeframe for vessels using IVR match that of vessels using the Vessel Monitoring System, so that declaration requirements were consistent across the monkfish fishery. Previously, a vessel using IVR could declare a trip and let the clock run for several days before sailing (i.e., "preloading DAS") and land the corresponding trip limit, even though they were at sea for a shorter period. Starting in FY 2020, vessels using IVR could, for example, no longer land three DAS' worth of monkfish on a trip that was over 24 hours.

DAS use. The restriction on DAS use in the SFMA would be removed; vessels could use the full number of DAS allocated to their limited access permits in this area (45.2).

Rationale: Regarding removing the DAS use restriction in the SFMA, the number of DAS that can be used in the SFMA was last increased in FY 2017, from 32 to 37 (NEFMC 2017), to help optimize landings. Another increase, from 37 to 45.2, would further help optimize landings. At least as far back as FY 2007, fewer DAS have been able to be used in the southern area, perhaps due to stock status concerns. However, given the low TAL usage in this area, increasing DAS is justifiable.

4.2.3 Alternative 3 – Increase DAS overage adjustment; remove DAS use restriction in the SFMA; increase incidental possession limits by 25% in the SFMA; increase limited access possession limits by 15% in the SFMA.

Under Alternative 3, vessels would be granted additional flexibility to land additional DAS' worth of monkfish on a trip in either management area, would be allowed to use the full DAS allocation in the SFMA, and possession limits would increase for both limited access and incidental permits.

DAS overage. Like Alternative 2, the DAS overage adjustment for both management areas would be revised to allow an extra DAS to be used on each trip. For trips less than or equal to 24 hours long, vessels can land up to three possession limits' worth of monkfish (3 DAS' worth of monkfish) and be charged up to 2.007 DAS. For trips over 24 hours but up to 48 hours long, vessels can land up to four possession limits worth of monkfish (4 DAS' worth of monkfish) and be charged up to 3.007 DAS (72 hours and 1 minute).

DAS use. The restriction on DAS use in the SFMA would be removed; vessels could use the full number of DAS allocated to their limited access permits in this area (45.2).

Possession limits would increase in the SFMA. Incidental possession limits would increase by about 25% (rounded to the nearest 5 lb) when not under a DAS program and not in the MA Exemption area or Gulf of Maine or Georges Bank Regulated Mesh areas. Limited access possession limits would increase by about 15% (rounded to the nearest 100 lb; Table 3).

Rationale: The rationale for Alternative 3 is the same as for Alternative 2. Increasing possession limits would be an additional measure to help the fishery be more flexible and reduce monkfish discards by turning more monkfish discards into landings.

Table 3. Incidental possession limits (lb, tail weight) for vessels not under a DAS program in the SFMA under each alternative.

Limit Type	No Action: no change	Alt. 2: no change	Alt. 3: +25%*	Alt. 4: +50%*	Alt. 5: +50%*
Per day	50 lb (146 lb)	50 lb (146 lb)	65 lb (189 lb)	75 lb (218 lb)	75 lb (218 lb)
Per trip	150 lb (437 lb)	150 lb (437 lb)	190 lb (553 lb)	225 lb (655 lb)	225 lb (655 lb)
Note: Whole weights given in parentheses. Adjustments to the incidental possession limits included in this action focus on vessels not under a DAS program and do not include adjustments for the MA Exemption area west of the MA Exemption Area boundary or GOM or GB Regulated Mesh Areas. * Increases are rounded to the nearest 5 lb for tail weight and then converted to whole weight using the 2.91 conversion factor.					

Table 4. Limited access possession limits (lb, tail weight) by DAS and permit category in the SFMA under each alternative.

Permit Category	DAS	No Action: no change	Alt. 2: no change	Alt. 3: +15%*	Alt 4: +25%*	Alt. 5: +15%*
A	Monkfish DAS	700 lb (2,037 lb)	700 lb (2,037 lb)	800 lb (2,328 lb	900 lb (2,619 lb)	800 lb (2,328 lb)
	Monkfish and Northeast Multispecies DAS	-	-	-	-	-
B	Monkfish DAS	575 lb (1,673 lb)	575 lb (1,673 lb)	700 lb (2,037 lb)	700 lb (2,037 lb)	700 lb (2,037 lb)
	Monkfish and Northeast Multispecies DAS	-	-	-	-	-
C	Monkfish DAS	700 lb (2,037 lb)	700 lb (2,037 lb)	800 lb (2,328 lb)	900 lb (2,619 lb)	800 lb (2,328 lb)
	Monkfish and Northeast Multispecies DAS	700 lb (2,037 lb)	700 lb (2,037 lb)	800 lb (2,328 lb)	900 lb (2,619 lb)	800 lb (2,328 lb)
D	Monkfish DAS	575 lb (1,673 lb)	575 lb (1,673 lb)	700 lb (2,037 lb)	700 lb (2,037 lb)	700 lb (2,037 lb)
	Monkfish and Northeast Multispecies DAS	575 lb (1,673 lb)	575 lb (1,673 lb)	700 lb (2,037 lb)	700 lb (2,307 lb)	700 lb (2,037 lb)
Note: Whole weights given in parentheses. * Increases are rounded to the nearest 100 lb for tail weight and then converted to whole weight using the 2.91 conversion factor.						

4.2.4 Alternative 4 – Increase DAS overage adjustment; remove DAS use restriction in the SFMA; increase incidental possession limits by 50% in the SFMA; increase limited access possession limits by 25% in the SFMA.

Under Alternative 4, vessels would be granted additional flexibility to land additional DAS' worth of monkfish on a trip in either management area, would be allowed to use the full DAS allocation in the SFMA, and possession limits would increase for both limited access and incidental permits.

DAS overage. Like Alternatives 2 and 3, the DAS overage adjustment for both management areas would be revised to allow an extra DAS' worth of monkfish to be landed on each trip. For trips less than or equal to 24 hours long, vessels can land up to three possession limits' worth of monkfish (3 DAS' worth of monkfish) and be charged up to 2.007 DAS. For trips over 24 hours but up to 48 hours long, vessels can land up to four possession limits worth of monkfish (4 DAS' worth of monkfish) and be charged up to 3.007 DAS (72 hours and 1 minute).

DAS use. The restriction on DAS use in the SFMA would be removed; vessels could use the full number of DAS allocated to their limited access permits in this area (45.2).

Possession limits would increase in the SFMA but would be higher than under Alternative 3. Incidental possession limits would increase by about 50% (rounded to the nearest 5 lb) when not under a DAS program and not in the MA Exemption area or Gulf of Maine or Georges Bank Regulated Mesh areas (Table 3). Limited access possession limits would increase by about 25% (rounded to the nearest 100 lb; Table 4).

Rationale: The rationale for Alternative 4 is the same as for Alternative 3. However, increasing possession limits above the levels under Alternative 3 would be an additional measure to help the fishery be more flexible and reduce monkfish discards by turning more monkfish discards into landings.

4.2.5 Alternative 5 – Increase incidental possession limits by 50% in the SFMA; increase limited access possession limits by 15% in the SFMA (Possession limit changes only).

Under Alternative 5, possession limits would increase for both limited access and incidental permits. Each limited access monkfish permit would still be subject to the current DAS measures (same as Alternative 1 regarding DAS measures).

Possession limits would increase in the SFMA. Incidental possession limits would increase by about 50% (rounded to the nearest 5 lb) when not under a DAS program and not in the MA Exemption area or Gulf of Maine or Georges Bank Regulated Mesh areas (Table 3) (the same percent increase as Alternative 4). Limited access possession limits would increase by about 15% (rounded to the nearest 100 lb) (the same percent increase as Alternative 3) (Table 4).

Rationale: Increasing possession limits could help the fishery be more flexible and reduce monkfish discards by turning more monkfish discards into landings. Including an alternative that only increases possession limits may lessen impacts to protected resources relative to alternatives that could increase fishing effort by increasing DAS.

4.3 Action 3 - Monkfish Gillnet Mesh Size

PDT notes and questions for the AP and Committee:

- May 2022 Committee consensus statement: *The Committee recommends including two alternatives that would require an 11" or 12" minimum mesh for gillnets in the exemption areas where 10" is required currently.*
- The regulations at 50 CFR 648.91(c)(1)(iii) state that gillnet vessels on a monkfish DAS must use a minimum of 10" inch mesh. Where the exemption areas are described, the regulations state that a monkfish-only DAS may only be used in the exemption areas. Although the Committee's consensus statement is specific to the exemption areas, the PDT recommends having the alternatives in this section indicate that the mesh size increase is applicable to the use of monkfish DAS. This would help clarify the intent and keep regulations consistent. The way the regulations are written, the PDT recommends specifying a mesh size increase only in the GOM/GB dogfish and monkfish area (see below), though it effectively would apply to the SNE monkfish and skate area too. Please confirm if this is acceptable.
- For the GOM/GB Dogfish and Monkfish Gillnet Exemption Area, there is a separate regulation that vessels targeting dogfish may use a 6.5" gillnet (catch of other species must be under 10%). It would be straightforward to revise the 10" gillnet mesh requirement in this area given the minimum mesh size of 10" is defined separately from dogfish (i.e., any changes to the minimum mesh size for vessels targeting monkfish would not affect the dogfish fishery).
- For the SNE Monkfish and Skate Gillnet Exemption Area, the regulations state that all gillnets must have a minimum size of 10". If the minimum mesh size is changed for this exemption area, it would apply to all the trips that are authorized under this exemption area. That includes monkfish-only DAS trips and trips with a Letter of Authorization to fish for skate bait. If it is the Committee's intent to only constrain the monkfish-only DAS trips, then the PDT recommends not changing the minimum mesh size in this area. Monkfish DAS gillnet vessels fishing in this area would need to conform to the minimum mesh size for monkfish DAS, so effectively, the alternatives in this action would apply to this area. The alternatives were written assuming this is the intent. Please confirm if this is acceptable.
- Pending confirmation from the Committee, the explanations above will be added to the alternatives.
- Section 6.1.2 includes preliminary PDT work to analyze these alternatives.

To land monkfish from the NFMA or SFMA, a gillnet vessel must declare that its fishing trip will use both a Northeast multispecies DAS and monkfish DAS. However, there are two areas where vessels can be exempt from using a Northeast multispecies DAS and only need to use monkfish DAS. In these two exemption areas, 10" gillnet mesh is required when fishing for monkfish:

1. Gulf of Maine/Georges Bank Dogfish and Monkfish Gillnet Fishery Exemption Area (50 CFR 648.80(a)(13)).
2. Southern New England (SNE) Monkfish and Skate Gillnet Exemption Area (50 CFR 648.80(b)(6)).

Action 3 includes alternatives that would increase the minimum gillnet mesh size for the monkfish fishery.

4.3.1 Alternative 1 - No Action

Under Alternative 1 (No Action), the monkfish gillnet minimum mesh size would be unchanged from the current regulations of 10" if fishing under a monkfish DAS (50 CFR 648.91(c)(1)(iii)). Also, the minimum mesh size for the Gulf of Maine/Georges Bank Dogfish and Monkfish Gillnet Fishery Exemption Area would also remain at 10" (50 CFR 648.80(a)(13)).

4.3.2 Alternative 2 – 11" mesh size

Under Alternative 2, an 11" minimum mesh size would be required for monkfish gillnets if fishing under a monkfish DAS. Also, the minimum mesh size for the GOM/GB Dogfish and Monkfish Gillnet Fishery Exemption Area would increase to 11". Alternative 2 would be implemented in FY 2025 (i.e., delayed two years from implementation of this action).

Rationale: An increase in mesh size for monkfish gillnets under these two conditions would help reduce discards of small monkfish and skates, promote sustainability in the monkfish fishery. While 12" mesh is used in most of the monkfish gillnet trips, some fishermen do use 11" mesh gear at certain times of the year. An implementation delay would help defray the costs of purchasing new gear, as gillnets are commonly replaced every few years. Alternative 2 would avoid affecting other fisheries participating in subsets of the exemption areas, especially the dogfish and skate fisheries.

4.3.3 Alternative 3 – 12" mesh size

Under Alternative 3, a 12" minimum mesh size would be required for monkfish gillnets if fishing under a monkfish DAS. Also, the minimum mesh size for the GOM/GB Dogfish and Monkfish Gillnet Fishery Exemption Area would increase to 12". Alternative 3 would be implemented in FY 2025 (i.e., delayed two years from implementation of this action).

Rationale: The rationale for Alternative 3 is the same as for Alternative 2. However, a 12" mesh size would further help reduce discards and promote sustainability. Use of 12" mesh is widespread in the monkfish gillnet fishery, so Alternative 3 would better align fishing regulations with fishing operations.

4.4 Alternatives Considered but Rejected

4.4.1 Vessel Monitoring System Requirement

The Council considered developing alternatives in this action for requiring use of the Vessel Monitoring System (VMS) in the federal monkfish fishery. The Council considered some of the costs and benefits of requiring VMS and decided to not develop a problem statement for identifying the issues that VMS would help address and to not develop alternatives. Use of VMS is required for most segments of the monkfish fishery because of the requirements related to other permits (e.g., limited access scallop and groundfish permits) that are associated with monkfish permits. It is likely that vessels with monkfish-only permits (limited access permit category A or B), and a subset of permit category C and D vessels would be most impacted by this measure. Most of the monkfish vessels without a VMS requirement are under 50 ft in length, fish in the SFMA, and use gillnets. The Council was concerned about the acquisition and transmission costs of VMS units and considered the electronic vessel tracking device that was recently approved by the Atlantic States Marine Fisheries Commission for federally permitted lobster and Jonah crab vessels. The Council was interested in having additional positional data for vessels but noted that the timeframe for developing alternatives would extend beyond what is appropriate for a specifications action. The Council may take up this topic in a future action.

4.4.2 Measures to Reduce Discards in SFMA

The Council considered developing alternatives in this action for reducing discards in the SFMA. The Council considered the magnitude of monkfish discards in the SFMA, potential reasons for discards, current monkfish fishery discard requirements, and potential approaches to reduce discards in this area. The Committee had identified that the goals for such measures would be to reduce unnecessary waste and mortality of monkfish, and to turn discards into landings where possible for economic reasons, including for fisheries that do not target monkfish. The Council decided to not develop other alternatives for this action beyond those described in Sections 4.2 and 4.3, which are designed to help reduce discards.

5.0 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.

[NOTE: To be developed. See Frameworks 10 and 12 for earlier information. See DRAFT fishery performance report for latest information.]

5.1 TARGET SPECIES (MONKFISH)

5.2 NON-TARGET SPECIES

5.3 PHYSICAL ENVIRONMENT AND ESSENTIAL FISH HABITAT

5.4 PROTECTED RESOURCES

5.4.1 Protected Species Present in the Area

Numerous protected species occur in the affected environment of the Monkfish FMP (Table 5) 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 Affected Environment of the monkfish fishery. Marine mammal species italicized and in bold are considered MMPA strategic stocks.1

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

[1] A strategic stock is defined under the MMPA as 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

Species	Status	Potentially impacted by this action?
future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the 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.		

5.4.2 Species and Critical Habitat Not Likely to be Impacted by the Proposed Action

Based on available information, it has been determined that this action is not likely to impact multiple ESA listed and/or MMPA protected species or any designated critical habitat (Table 5). 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 or Technical Memoranda; MMPA List of Fisheries (LOF); NMFS 2021a).[1] 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 5 and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2021a).

5.4.3 Species Potentially Impacted by the Proposed Action

Table 5 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 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, as well as reviewed the May 27, 2021, Biological Opinion (Opinion)[2] issued by NMFS. The 2021 Opinion considered the effects of the NMFS'

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[1] 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.

[2] NMFS' May 27, 2021, Biological Opinion on the 10 FMPs is found at: https://www.fisheries.noaa.gov/resource/document/biological-opinion-10-fishery-management-plans

authorization of ten fishery management plans (FMP),[3] 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 not likely 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 not likely 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.

5.4.3.1 Sea Turtles

Below is a summary of the status and trends, as well as 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 a number of 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 5). 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 Atlantic Ocean DPS) have shown increases; however, over the long-term the DPS is considered stable (NMFS 2021a).

[3] The ten FMPs considered in the May 27, 2021, Biological Opinion include the: (1) American Lobster; (2) Atlantic Bluefish; (3) Atlantic Deep-Sea Red Crab; (4) Mackerel/Squid/Butterfish; (5) Monkfish; (6) Northeast Multispecies; (7) Northeast Skate Complex; (8) Spiny Dogfish; (9) Summer Flounder/Scup/Black Sea Bass; and (10) Jonah Crab FMPs.

For Kemp's ridley sea turtles, from 1980-, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15% annually (Heppell et al. 2005); 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

Hard-shelled sea turtles. 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).

Leatherback sea turtles. 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).

5.4.3.2 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 6). 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 6, 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 11 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 affected environment of the monkfish fishery.

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. • 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.

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
	• 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 Mid-Atlantic (SNE included), GOM, and GB; • 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, over the 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, as well as 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 etne al. (2002) 2017; 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; 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); Stanistreet et al. 2018; Stone et al. (2017)2017;

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
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).	

5.4.3.3 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 7). 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 7 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 affected environment of the monkfish fishery

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.

Species	Occurrence ad Distribution in the Affected Environment
	• **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.
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 meters); 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 meters). • **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 meters). • 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 meters **<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°N (Mid-Atlantic and SNE waters); although low numbers have been found along the southern flank of GB, but no further than 41°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°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	Occurrence ad Distribution in the Affected Environment
	• Species tends to occupy areas of high relief or submerged banks. **Area of Species Overlap:** along the mid-Atlantic shelf break between Delaware and the southern flank of GB.
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).	

5.4.3.4 Pinnipeds

Status and Trends

Harbor, gray, harp and hooded seals are identified as having the potential to be impacted by the proposed action (Table 8). 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 8 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 affected environment of the monkfish fishery.

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).	

5.4.3.5 Atlantic sturgeon

Status and Trends

As in Table 5, 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 2017; 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; 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)(ASMFC 2017b).

Based on fishery-independent and dependent surveys, as well as 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; 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) (Breece et al. 2018). Data from fishery-independent and dependent surveys, as well as 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; Wipplehauser 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, 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 2017), and NMFS (2021a).

5.4.3.6 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 (NOAA 2016; USFWS and NMFS 2018; NMFS 2021a).

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 (NMFS and USFWS 2005, 2016; Fay et al. 2006). 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; USASAC 2013; Hyvarinen et al. 2006; Lacroix and McCurdy 1996; Lacroix et al. 2004, 2005; Reddin 1985; Reddin and Short 1991; Reddin and Friedland 1993; Sheehan et al. 2012; NMFS and

USFWS 2005, 2016; Fay et al. 2006). 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).

5.4.3.7 Giant Manta Ray

Status and Trends

As provided in Table 10, giant manta rays have the potential to be impacted by the proposed action. 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 and 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 and Klimovich 2017).

5.4.4 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 2010-20194. For ESA listed species, the most recent 10 years of data on observed or documented interactions is available from 2010-2019[5]. Available information on gear interactions with a given species (or species group) is provided in the sections below. This is not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute the monkfish fishery (i.e., sink gillnet and bottom trawl gear).

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[4] GAR Marine Animal Incident Database, unpublished data; Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020; Hayes et al. 2021; Hayes et al. 2022; Cole and Henry 2013; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Henry et al. 2021; Henry et al. 2022.

[5] ASMFC 2017; Kocik et al. 2014; NMFS 2021a; GAR Marine Animal Incident Database, unpublished data; NMFS Marine Mammal SARs for the Atlantic Region; NMFS NEFSC protected species serious injury and mortality Reference Documents or Technical Memoranda; NMFS NEFSC observer/sea sampling database, unpublished data; GAR Sea Turtle and Disentanglement Network, unpublished data; NMFS Sea Turtle Stranding and Salvage Network, unpublished data.

5.4.4.1 Sea Turtles

Bottom Trawl Gear

Bottom trawl gear poses an injury and mortality risk to sea turtles (Sasso and 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; Murray 2015; Murray 2020; NMFS NEFSC observer/sea sampling database, unpublished data; NMFS 2021a; Warden 2011a,b). 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 (Murray 2015). 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 greater than 50 meters deep. The greatest number of estimated interactions occurred in the Mid-Atlantic region north of 39º N, during July to October in waters less than 50 meters deep. Within each stratum, interaction rates for non-loggerhead species were lower than rates for loggerheads (Murray 2020).

Based on Murray (2020)[6], 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; Murray 2013; Murray 2018; NMFS NEFSC observer/sea sampling database, unpublished data; NMFS 2021a). 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 (the most recent five-year period that has been statistically analyzed for gillnets), Murray (2018) estimated that sink gillnet fisheries in the Mid-Atlantic and Georges Bank bycaught 705 loggerheads (CV=0.29, 95% CI over all years: 335-1116), 145 Kemp's ridleys (CV =0.43, 95% CI over

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[6] Murray (2020) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2008; Murray 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 and Orphanides 2013, Orphanides 2010).

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).[7] 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 in large mesh 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 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.

5.4.4.2 Atlantic Sturgeon

Sink gillnet and Bottom Trawl Gear

The ASMFC (2017), Miller and Shepard 2011; NMFS (2021a), as well as the most recent 10 years of NMFS observer data (i.e., 2010-2019; NMFS NEFSC observer/sea sampling database, unpublished data) show that there have been 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 of less than 40 meters, mesh sizes of greater than 10 inches, and the months of April and May (ASMFC 2007). For otter trawl fisheries, the highest incidence of Atlantic sturgeon bycatch have been associated with depths less than 30 meters (ASMFC 2007). 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 less than 20 meters (ASMFC 2017).

The ASMFC (2017) Atlantic sturgeon benchmark stock assessment represents the most accurate predictor of annual Atlantic sturgeon interactions in fishing gear (e.g., otter trawl, gillnet). The stock assessment analyzes fishery observer and VTR data to estimate Atlantic sturgeon interactions in fishing gear in the Mid-Atlantic and New England regions from 2000-2015, the timeframe which included the most recent, complete data at the time of the report. The total bycatch of Atlantic sturgeon from bottom otter trawls ranged between 624-1,518 fish over the 2000-2015 time series, while the total bycatch of Atlantic sturgeon from gillnets ranged from 253-2,715 fish. Focusing on the most recent five-year period of data provided in the stock assessment report,[8] the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals and in gillnet gear is 627.6 individuals.

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[7] Murray (2018) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2009, 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 and Orphanides 2013, Orphanides 2010).
[8] The period of 2011-2015 was chosen as it is the period within the stock assessment that most accurately resembles the current trawl fisheries in the region.

5.4.4.3 Atlantic Salmon

Sink Gillnet and Bottom Trawl Gear

Atlantic salmon are at risk of interacting with bottom trawl or gillnet gear (NEFSC observer/sea sampling database, unpublished data; Kocik *et al*. 2014; NMFS 2021a). Northeast Fisheries Observer Program (NEFOP) data from 1989-2019 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 (seven) occurred in 1992 (NMFS NEFSC observer/sea sampling database, unpublished data).[9] 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.

5.4.4.4 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 NEFSC observer/sea sampling database, unpublished data; NMFS 2021a). The most recent 10 years of NEFOP data show that between 2010-2019, two (unidentified) giant manta rays 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 between 2001 and 2019) 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 currently 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 (see NMFS reports available at: http://www.sefsc.noaa.gov/labs/panama/ob/gillnet.htm).

5.4.4.5 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 2022 LOF (87 FR 23122, April 19, 2022) 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.

[9] 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.

5.4.4.6 Large Whales

Bottom Trawl Gear

The most recent 10 years of observer, stranding, and/or baleen whale serious injury and mortality determinations from 2010-2019, and the GAR Marine Animal Incident database (which contains data for 2019) shows that there have been no observed or confirmed documented interactions with large whales and bottom trawl gear.[10] Thus, large whale interactions with bottom trawl gear are not expected.

Sink Gillnet Gear

Large whale interactions (entanglements) with fishing gear have been observed and documented in the waters of the Northwest Atlantic.[11] 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.[12]

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 (Angliss and Demaster 1998; Cassoff et al. 2011; Cole and Henry 2013; Kenney and Hartley 2001; Knowlton and Kraus 2001; 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; see 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, as well as 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*).[13] 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;

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[10] GAR Marine Animal Incident Database (unpublished data); NMFS Marine Mammal Stock Assessment Reports for the Atlantic Region; NMFS NEFSC observer/sea sampling database, unpublished data ; MMPA List of Fisheries (LOF); Cole and Henry 2013; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Henry et al. 2021; Henry et al. 2022.

[11] 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 or Technical Memoranda; MMPA List of Fisheries; NMFS 2021a,b.

[12] NMFS NEFSC Baleen Whale Serious Injury and Morality Determinations Reference Documents or Technical Memoranda

[13] 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, as well as the net panels of gillnet gear. ALWTRP regulations currently in effect are summarized online.

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 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.[14] 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.[15]. For further details on the Plan, refer to the ALWTRP.

5.4.4.7 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.[16] Reviewing marine mammal stock assessment and serious injury reports that cover the most recent 10 years data (i.e., 2010-2019), as well as the MMPA LOF's covering this time frame (i.e., issued between

[14] 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.

[15] 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 .

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

2017 and 2021), Table 9 provides 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 9, 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 and Orphanides 2014, 2015, 2016; Orphanides and Hatch 2017; Orphanides 2019, 2020). In terms of bottom trawl gear, short-beaked common dolphins, Risso's dolphins, and Atlantic white-sided dolphins are the most frequently observed bycaught marine mammal species in the GAR, followed by gray seals, long-finned pilot whales, bottlenose dolphin (offshore), harbor porpoise, harbor seals, and harp seals (Chavez-Rosales *et al.* 2017; Lyssikatos 2015; Lyssikatos et al. 2020; Lyssikatos et al. 2021).

Table 9. Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II sink gillnet or bottom trawl fisheries in the affected environment of the monkfish fishery.

Fishery	Category	Species Observed or Reported Injured/Killed
Northeast Sink Gillnet	I	Bottlenose dolphin (offshore)
		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 (Northern Migratory coastal)
		Bottlenose dolphin (Southern Migratory coastal)
		Bottlenose dolphin (offshore)
		Harbor porpoise
		Short-beaked common dolphin
		Harbor 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 2017-2021 LOFs at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries		

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.[17] 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.

5.5 Human Communities

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 10). The number of fishing vessels with limited access monkfish permits has decreased over the past decade, from 670 to 562 (Table 11). 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 11, Table 12).

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.

[17] 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).

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, Landings, and Revenues

Methods for Calculating Catch

Total Discards

Historically, monkfish discards have been calculated two ways: i) by GARFO following the close of the fishing year for end of year ACL accounting and ii) by NEFSC by calendar year during the assessment process. Methods for calculating discards are evolving towards a unified estimate from GARFO and the NEFSC using the Catch Accounting and Monitoring System (CAMS), but the discard data presented in this report were calculated as follows:

- For ACL accounting (Table 13), GARFO estimates discards using a Cochran discard ratio estimator with observed trips stratified by gear, mesh group, management area and half year. Discard ratios estimated from observed trips were then applied to stratified unobserved trips to estimate discards on unobserved trips. Total discards were calculated by using the estimates of observed discards on observed trips and using the calculated rate and trip K_{all} on unobserved trips.

Monkfish discard mortality was assumed to be 100% across all gear types, although recent research suggests that monkfish discard mortality may be lower, at least in the scallop dredge fishery (Weissman *et al.* 2021).

- For the assessment (Figure 2), the NEFSC estimates discards by gear, half year and management area using observer data. For otter trawls and gillnets, the observed monkfish discard-per-kept-monkfish ratio is expanded to total monkfish discards. For scallop dredges and shrimp trawls, the observed monkfish discard-per-all-kept-catch ratio is expanded to total monkfish discards. Monkfish discard mortality is also assumed to be 100% across all gear types in NEFSC estimates of monkfish discards.

Total Landings

Total landings of monkfish were calculated by GARFO using the CFDERS dealer dataset after the close of the fishing year for both commercial and state permits.

Recreational catch

Recreational catch was calculated from the MRIP database. Monkfish recreational discard mortality was assumed to be 100%.

Total Catch – Year-End ACL Accounting

From FY 2017-2020, the ACL was exceeded in the NFMA twice and never in the SFMA (Table 13). 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. In the SFMA, discards were higher in FY 2017-2019 (41-43%) but lowered to 13% in FY 2020.

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**	**83.5.0%**
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 greater than zero 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; also Marine Recreational Information Program database.

FY 2021 landings

Through FY 2021, 79% of the FY 2021 TAL had been landed in the northern area and 34% in the southern area (Table 14). In the northern area, monthly landings were lower in May-November 2021 relative to December-March (312-417 lb/month vs. 501-654 lb/month). Otter trawls accounted for 63% of the FY 2021 landings to date. In the southern area, monthly landings were highest in May and June 2021 (439-535 lb/month), then dropped to a low in July-November (9-59 lb/month), then have been moderate since December (117-227 lb/month).

Table 14. FY 2021 Preliminary commercial monkfish landings by stock area and gear type: May 2021 – April 2022 (landings in live weight).

	MAY - 2021	JUN - 2021	JUL - 2021	AUG - 2021	SEP - 2021	OCT - 2021	NOV - 2021	DEC - 2021	JAN - 2022	FEB - 2022	MAR - 2022	APR - 2022	May–April, FY2021		FY 2021*		FY 2020*		Fishing Year* Landings
													Metric Tons	Percent of Area	April, 21 as a % of Target TAL	Target TAL Metric Tons	April, 20 as a % of Target TAL	Target TAL Metric Tons	Metric Tons
NORTHERN	312	417	364	348	372	338	342	539	549	501	637	509	5,228	73%	79%	6,624	80%	6,624	
OTTER TRAWL	280	294	206	167	206	234	280	493	530	482	614	464	4,250	59%	64%		70%		
GILLNET	25	103	150	178	164	96	58	45	18	14	8	45	904	13%	14%		9%		
DREDGE	0	1	3	2	1	8	3	1	1	0	0	0	20	0%	0%		0%		
OTHER GEARS	7	19	5	1	1	0	1	0	0	5	15	0	54	1%	1%		1%		
SOUTHERN	535	439	59	19	9	9	24	227	117	120	236	188	1,982	27%	34%	5,882	39%	5,882	
OTTER TRAWL	26	14	7	1	5	6	11	43	36	41	42	30	262	4%	4%		7%		
GILLNET	443	342	29	8	0	1	11	153	63	62	187	150	1,449	20%	25%		29%		
DREDGE	39	30	23	10	4	2	1	11	9	4	2	7	142	2%	2%		3%		
OTHER GEARS	27	53	0	0	0	0	1	20	9	13	5	1	129	2%	2%		1%		
ALL AREAS	847	856	423	367	381	347	366	766	666	621	873	697	7,210	100%					
OTTER TRAWL	306	308	213	168	211	240	291	536	566	523	656	494	4,512	63%					
GILLNET	468	445	179	186	164	97	69	198	81	76	195	195	2,353	33%					
DREDGE	39	31	26	12	5	10	4	12	10	4	2	7	162	2%					
OTHER GEARS	34	72	5	1	1	0	2	20	9	18	20	1	183	3%					
LANDINGS - ALL AREAS																			
Fishing Year 2021	847	856	423	367	381	347	366	766	666	621	873	697	6,513						
Fishing Year 2020	815	1,096	464	413	373	459	574	596	881	570	683	681	6,924						7,605
Fishing Year 2019	1,506	1,221	786	541	505	590	558	888	1,086	1,004	720	555	9,405						9,960
Fishing Year 2018	1,423	1,215	620	531	534	767	666	1,068	998	851	1,021	1,074	9,694						10,768
Fishing Year 2017	1,067	1,153	607	654	634	953	780	1,122	1,057	1,004	607	697	9,638						10,319
Fishing Year 2016	1,417	1,069	511	420	358	447	713	887	880	912	939	1,239	8,553						9,792
Fishing Year 2015	1,256	963	590	431	389	482	578	848	594	755	992	935	7,878						8,813
Fishing Year 2014	1,313	1,149	453	415	357	463	654	900	824	395	785	1,110	7,708						8,818
Fishing Year 2013	1,232	919	522	350	412	556	745	952	630	765	756	845	7,839						8,684
Fishing Year 2012	1,574	1,266	502	394	439	672	547	806	733	530	654	988	8,116						9,104
Fishing Year 2011	1,044	1,066	542	338	385	530	809	982	867	1,000	929	1,008	8,491						9,499
Fishing Year 2010	928	839	422	306	282	350	561	643	716	712	730	830	6,488						7,318
Fishing Year 2009	1,253	1,182	647	396	331	479	554	418	753	696	644	795	7,353						8,148
Fishing Year 2008	1,641	1,359	674	537	539	665	808	812	1,084	703	634	824	9,455						10,279
Fishing Year 2007	1,413	1,206	917	776	695	934	1,163	1,314	1,088	897	737	1,090	11,140						12,230
Fishing Year 2006	1,314	1,490	1,181	909	880	1,104	1,140	1,130	967	671	951	848	11,738						12,586
Fishing Year 2005	2,040	3,040	1,862	1,487	1,343	1,100	1,616	1,413	1,523	1,143	1,309	1,313	17,876						19,189
Fishing Year 2004	1,806	1,979	1,581	1,380	1,304	1,243	1,803	1,681	1,264	1,173	1,235	1,478	16,449						17,927
Fishing Year 2003	2,681	3,199	1,913	1,746	1,420	2,253	2,823	1,907	1,976	2,386	2,172	1,797	24,475						26,273
Fishing Year 2002	1,574	2,093	1,489	1,382	1,524	1,643	1,937	2,203	2,015	1,762	2,631	1,553	20,255						21,807

Source: GARFO quota monitoring website, accessed July 2022.

Landings relative to TAL

The NFMA has a higher TAL and higher possession limits relative to the SFMA. Landings relative to TAL in the NFMA have been between 80-107% since FY 2016 (Table 15), 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 15. 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	968	15%	5,882	1,075	18%
*Data as of July 2022.						
Source: GARFO quota monitoring data, accessed 8/22/2022.						

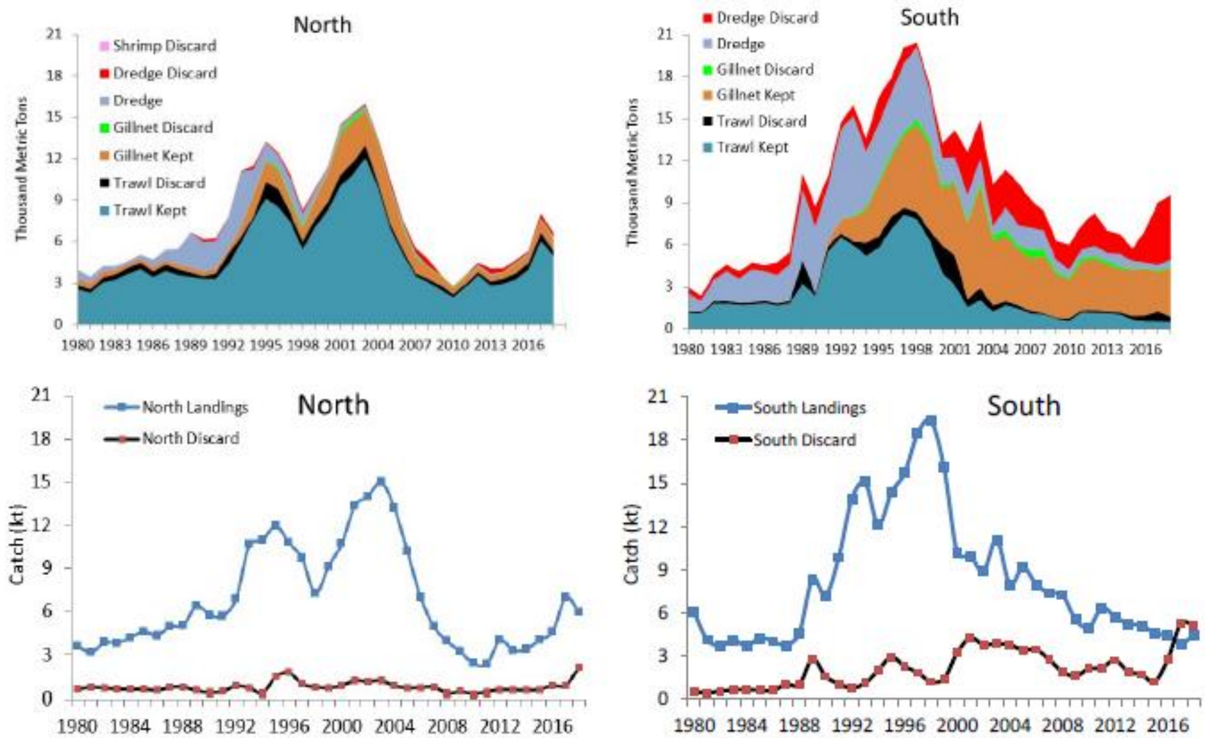
Landings and discards by gear type

The northern and southern areas have distinctions in terms of gear type. Since at least 1980, monkfish landings in the northern area have largely been by vessels using trawls (Figure 2). In the southern area, landings were primarily by vessels using dredges and trawls from 1980 to the early 1990s.[1] Through the 1990s and to today, gillnets have been the predominant gear for vessels landing monkfish. Discards have traditionally been higher in the south relative to the north, and recently, southern discards have approximated or exceeded landings. Since FY 2018, discards in the north and south have largely been from scallop dredges, with lesser amounts by otter trawl, gillnets, and other gears (Table 9).

Table 16. Average monkfish discards by gear type, FY 2018-2021.

	Scallop Dredge	Otter Trawl	Gillnet	Other
Northern Area	52%	23%	13%	13%
Southern Area	83%	8%	3%	6%
Source: CAMS, accessed July 2022.				

Figure 2. Monkfish landings and discards by gear type (top panel) and total (bottom panel) for North (left) and South (right), FY 1980 – 2019.



Source: NEFSC (2020, Figure D5).

Revenue

Monkfish fishery revenue has generally declined in recent years, from $42.2M in CY 2005 to $10.3M in CY 2021 (Table 17, 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 18). 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. Monkfish price per live pound has been on a declining trend since 2010, though prices have been increasing within the last year (Figure 3). 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		

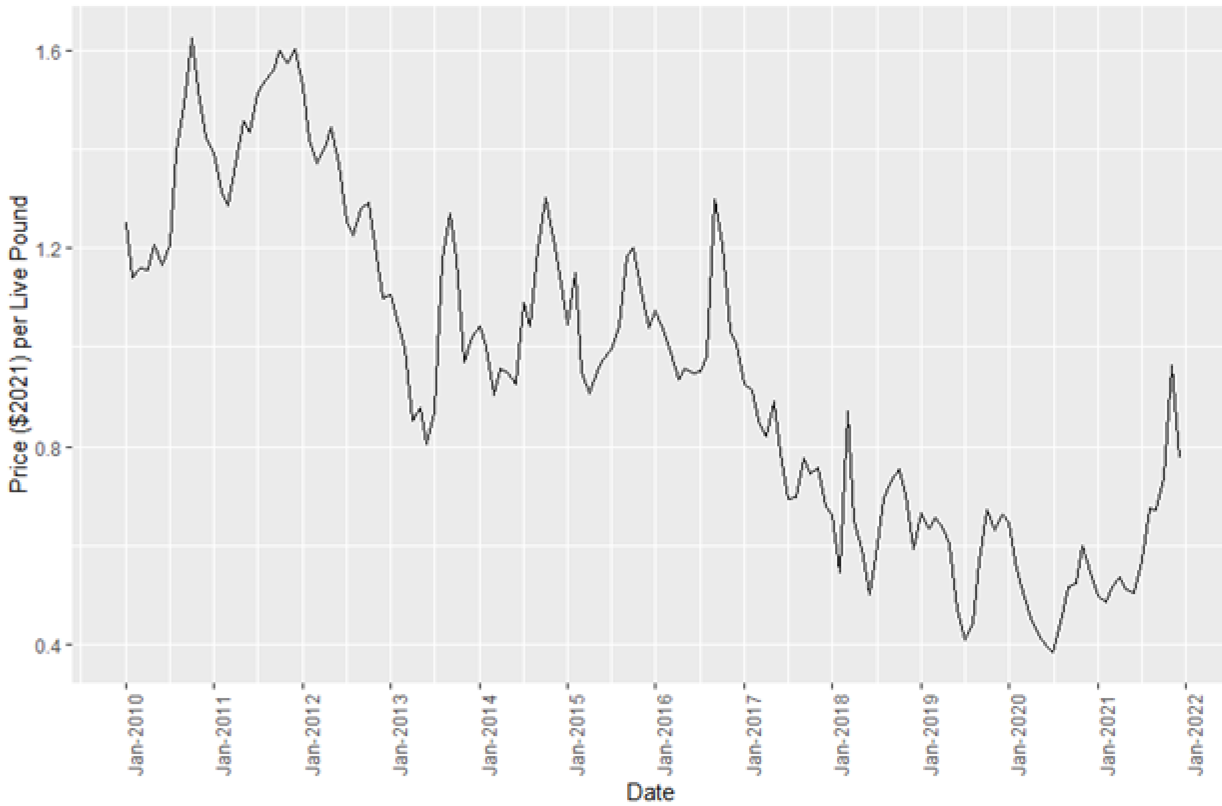
Source: ACCSP data, accessed April 2022.
Note: Revenues not adjusted for inflation.

Table 18. Monkfish revenue and revenue dependence on trips where over 50% of revenue is from monkfish, CY 2011 – 2020.

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.

Figure 3. Monthly monkfish price per live pounds ($2021), 2010 – 2021.



Source: NEFSC SSB, July 2022.

5.5.3 Effort Controls

Effort controls such as Days-at-Sea (DAS) and possession limits are used to 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.

5.5.3.1 Day-at-Sea (DAS)

DAS allocations have remained the same since FY 2017 (FW10). Limited access vessels are allocated 45.2 monkfish DAS per vessel per fishing year, 37 of which can be used in the Southern Fishery Management Area. There is a substantial amount of latent effort in the monkfish fishery; the number of DAS used is far below the DAS allocated. An average of 575 permits were allocated DAS between FY 2019 – FY 2021, where permit categories C and D accounted for the greatest number of allocated DAS with about 10-11,000 DAS allocated for each (Table 19). The percent of vessels that used at least one monkfish DAS varies by permit category. Of the Category A and B permit vexes, 52-64% used at least one DAS in FY 2019-2020, but that decreased to 28-38% on FY 2021. The Category C and D vessels had more stable participation, but was generally lower, 4-18% these past three years.

Table 19. 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.

Monkfish DAS may be used in combination with a Northeast (NE) multispecies DAS or an Atlantic sea scallop DAS. Monkfish permit categories C and D with 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. Permit Category C and D vessels fishing in the NFMA on both a NE multispecies and monkfish DAS do not have a monkfish trip limit.

For trips using a monkfish declaration, Monkfish DAS-only trips in the southern management area ('MNK-SAM') accounted for the greatest number of trips and monkfish landings in FY2018 (Table 20). A few hundred sector vessel trips were taken in both the northern and southern management areas by about ~25 vessels. Monkfish vessels participating in the Northeast multispecies common pool fishery accounted for the least amount of monkfish landings, caught by <10 vessels.

Table 20. Monkfish landings and total number of vessels and trips in the directed monkfish fishery, FY 2018.

	Program Code	Program Code Description	Whole weight (live lb)	Tail weight (lb)	Number of Vessels	Number of Trips
NFMA	MNK-NAC	*Monkfish Northern Management Area Common Pool Vessel Trip*	C	C	C	C
	MNK-NAM	*Monkfish Northern Management Area Monkfish-Only Vessel Trip*	41,177	14,150	8	25
	MNK-NAS	*Monkfish Northern Management Area Sector Vessel Trip*	2,302,932	791,386	25	232
SFMA	MNK-SAC	*Monkfish Southern Management Area Common Pool Vessel Trip*	62,496	21,476	8	81
	MNK-SAM	*Monkfish Southern Management Area Monkfish-Only Vessel Trip*	3,132,510	1,076,464	68	1,761
	MNK-SAS	*Monkfish Southern Management Area Sector Vessel Trip*	1,540,991	529,550	24	396
TOTAL [a]			**>7,080,106**	**>2,433,026**	**>133**	**>2,495**

Notes:
C = confidential, < 3 vessels.
- RSA trips were removed from the data and a 2.91 conversion factor was used to calculate the tail weight from whole weight (lb).
- There are several trips with NFMA program codes that are in the southern statistical areas and vice versa; the values in this table were filtered by activity code, not management area.
- Combination monkfish-scallop trips are not included in this table because these trips did not occur in FY 2018 (only two of these combination trips occurred in 2011 and two trips in 2012).
- 'MNK' plan codes are directed monkfish fishery trips. When monkfish is landed under other plan codes such as 'NMS' (Northeast Multispecies) and 'SES' (scallop), these landings are considered more incidental (i.e., not directed) monkfish landings.

Source: CAMS and AMS Trip and Charge databases. Accessed April and May 2022.

Additional data on DAS use are in Section 6.1.1.1.

5.5.3.2 Possession Limits

There are multiple monkfish possession limits depending on whether the vessel has a limited access or incidental monkfish permit, the specific permit category and whether a Monkfish DAS is being used alone or in combination with other permits (Table 21)

Limited Access Possession Limits and Usage

Table 21. NFMA current monkfish limited access possession limits by permit category.

Monkfish Permit Category	Description	FY20-22 Monkfish Possession Limits (lb)	Previous Possession Limits
A	Only monkfish DAS (no NE multispecies or Atlantic scallop limited access permit)	**Monk DAS:** 1,250 lb tail weight or 3,638 lb whole weight	No change since at least FY 2011.
B	Only monkfish DAS (no NE multispecies or Atlantic scallop limited access permit)	**Monk DAS:** 600 lb tail weight or 1,746 lb whole weight	No change since at least FY 2011.
C	Monkfish DAS and either a NE multispecies or Atlantic scallop limited access permit	**Monk DAS:** 1,250 lb tail weight or 3,638 lb whole weight **Monk DAS & NE Mult A DAS:** Unlimited	**Monk DAS:** No change since at least FY 2011. **Monk DAS & NE Mult A DAS:** FW9 (FY16): eliminated limit; No change since then.
D	Monkfish DAS and either a NE multispecies or Atlantic scallop limited access permit	**Monk DAS:** 600 lb tail weight or 1,746 lb whole weight **Monk DAS & NE Mult A DAS:** Unlimited	**Monk DAS:** No change in since at least FY 2011. **Monk DAS & NE Mult A DAS:** FW9 (FY16): eliminated limit; No change since then.

Table 22. SFMA current monkfish limited access possession limits by permit category.

Monkfish Permit Category	Description	FY20-22 Monkfish Possession Limits (lb)	Previous Possession Limits
A	Only monkfish DAS (no NE multispecies or Atlantic scallop limited access permit)	**Monk DAS:** 700 lb tail weight or 2,037 lb whole weight	**Monk DAS:** Increased from 610 lb in FW8 (FY 14-16) to 700 lb (tail weight) in FW10 (FY17-19). No change since then.
B	Only monkfish DAS (no NE multispecies or Atlantic scallop limited access permit)	**Monk DAS:** 575 lb tail weight or 1,673 lb whole weight	Increased from 500 lb in FW8 (FY 14-16) to 575 lb (tail weight) in FW10 (FY17-19). No change since then.
C	Monkfish DAS and either a NE multispecies or Atlantic scallop limited access permit	**Monk DAS** OR **Monk DAS & NE Mult A DAS:** 700 lb tail weight or 2,037 lb whole weight	Increased from 610 lb in FW8 (FY14-16) to 700 lb (tail weight) in FW10 (FY17-19). No change since then.
D	Monkfish DAS and either a NE multispecies or Atlantic scallop limited access permit	**Monk DAS** OR **Monk DAS & NE Mult A DAS:** 575 lb tail weight (1,673 lb whole weight)	Increased from 500 lb in FW8 (FY14-16) to 575 lb (tail weight) in FW10 (FY17-19). No change since then.
F	Seasonal offshore monkfish fishery in SFMA (Oct. 1-April 30)	**Monk DAS:** 1,600 lb tail weight or 4,656 lb whole weight	No change since at least FY 2011
H	SFMA only	**Monk DAS:** 575 lb tail weight or 1,673 lb whole weight	Increased from 500 lb in FW8 (FY14-16) to 575 lb (tail weight) in FW10 (FY17-19). No change since then.

Provided here are data on monkfish landings by type of trip and permit category to help determine if possession limit adjustments are warranted. Data from FY 2018 are provided because it is the last complete fishing year without any impacts from the pandemic, however, these data may not be indicative of current fishing effort. The PDT could also provide FY 2019 - FY 2020 to gain a better understanding of more recent fishing effort, though these additional years could be anomalous given the market disruptions from the pandemic. FY 2021 data are not yet available.

In the NFMA, most trips targeting monkfish are landing less than 90% of trip possession limits except for a subset of trips using B or D permits on a monkfish only DAS (Table 23). There are many trips landing minimal amounts of monkfish; this could be due to the low value of monkfish relative to other groundfish species when on a monkfish and Northeast Multispecies DAS. There are no trip possession limits in the northern management area when vessels are using both a monkfish and a Northeast multispecies DAS. Overall, trip limits do not appear to be constraining landings for the northern monkfish fishery, thus, an increase in possession limits would be expected to have a minimal, if any, effect on total monkfish landings.

In the SFMA, there are many trips landing at least 90% of the trip limits, especially for permit categories A and C when on a monkfish only DAS and permit category D when on both a monkfish and Northeast multispecies DAS (Table 23). For this subset of trips, trip limits appear to be constraining. Like northern area, there are many trips landing minimal amounts of monkfish. An increase in possession limits in the southern monkfish fishery would be expected to have some effect on total monkfish landings, especially for the subset of the monkfish fishery with trips landing at least 90% trip limits.

Table 23. Number of directed monkfish trips by permit category landing < and ≥ 90% trip possession limits, FY 2018.

Type of Monkfish Trip	Permit Category	# of Trips < 90% Trip Limits	# of Trips ≥ 90% Trip Limits	Total # of Trips
Northern area while on a Monkfish only DAS	A & C	13	0	13
	B & D	7	5	12
Northern area while on a Monkfish and Northeast Multispecies DAS	C & D	NA (unlimited trip limits)	NA (unlimited trip limits)	233
Southern area while on a Monkfish only DAS	A & C	323	309	632
	B, D, & H	798	331	1,129
Southern area while on a Monkfish and Northeast Multispecies DAS	C	109	24	133
	D	184	158	342

Source: CAMS and Allocation Management System (AMS) databases, accessed May 2022.

Note: Only trips with an activity code 'MNK' are included; RSA trips are excluded. The DAS overage provision is accounted for in the data.

Permit category F not included in the data given this represents a minor number of vessels, trips.

'MNK' plan codes are directed monkfish fishery trips. When monkfish is landed under other plan codes such as 'NMS' (Northeast Multispecies) and 'SES' (scallop), these landings are considered more incidental (i.e., not directed) monkfish landings.

Incidental Possession Limits and Usage

To land incidental amounts of monkfish from federal waters, vessels must have a federal monkfish permit (permit category E, open access incidental permit) and not fish on a monkfish-only 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 area (Table 24).

Vessels have the flexibility to land over the incidental limit when fishing on a Northeast Multispecies A DAS or 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 landing 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="2">Incidental Possession Limit Category</th><th>Management Area</th><th>Incidental Possession Limits by gear, permits</th></tr>
<tr><td colspan="2" rowspan="2">While on a NE Multispecies DAS</td><td>NFMA</td><td>All gear - 900 lb tail weight (permit C), 750 lb (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="2">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 colspan="2">While not under a DAS Program</td><td></td><td>GOM, GB Reg. Mesh Areas – 5% of total fish weight on board
SNE Reg. Mesh Area – 50 lb tail weight/day, up to 150 lb per trip
MA Exemption Area – 5% of total fish weight on board up to 450 lb tail weight
NFMA or SFMA – 50 lb tail weight/day, up to 150 lb per trip</td></tr>
<tr><td colspan="2">While not under a DAS Program 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">While not under a DAS Program 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>

PDT evaluated whether the incidental landings are being constrained by the current possession limits for the following DAS programs: 1) using non-trawl gear on a Northeast DAS in SFMA and 2) while not under a DAS program using scallop dredge gear and all other gear. The PDT did not further delineate incidental landings when not under a DAS program that also hold permits in other fisheries/special cases

(NE Multispecies Small Vessel permit, Surfclam or Ocean Quahog permit, or Sea Scallop permit; Table 25). The PDT can do this as a next step if that is the will of the Committee.

For vessels only fishing in the SFMA on a Northeast Multispecies DAS (i.e., no Monkfish DAS), 13 out of 21 trips were landing close to or at the 50 lb/day tail weight or 150 lb/trip tail weight incidental possession limits in FY 2018 (Table 25).

For vessels not fishing under a DAS program, most trips using non-scallop dredge gear are landing < 90% of incidental limits (84% of trips) while there are few incidental trips using scallop dredge gear.

Table 25. Number of incidental monkfish trips and landings for vessels fishing on NE Multispecies DAS in SFMA and not under a DAS program by gear type, FY 2018.

DAS Program	Gear Type	Monkfish Landings (lb, live/whole weight)		Number of trips	
		< 90% of incidental limits	≥ 90% of incidental limits	< 90% of incidental limits	≥ 90% of incidental limits
While on a Northeast Multispecies DAS in SFMA[A]	Non-Trawl [B]	850	29,107	8	13
While not under a DAS program [C]	Non-scallop dredge gear [D]	185,925	155,002	1,911	378
	Scallop dredge gear	150	C	3	C

Note: C = confidential, < 3 vessels.

[A] Data do not include 'MNK' plan codes given a monkfish DAS cannot be used for incidental landings. The total monkfish landings ≥ 90% of incidental limits include trips with high monkfish landings (range of 183 lb – 5,700 lb whole weight); this includes trips with 'M' monkfish trip option in which vessels can flex on a monkfish DAS to land over the incidental trip limit. These high overages with 'M' monkfish option could be a result of a data entry error in which trips were not also charged a monkfish DAS.

[B] Includes mostly gillnet gear and minimal hook gear.

[C] Monkfish landings by limited access vessels not on a monkfish DAS are considered to be incidental landings. These landings include data from Declared out of Fishery (DOF) and no plan code.

[D] Non-scallop dredge gear include longline, other, otter trawl, twin otter trawl, pots & traps fish, shrimp trawl, and sink anchor drift gillnet.

Source: CAMS and AMS Trip and Charge databases. Accessed May 2022.

Fishing Communities

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 26). Of these, the highest revenue ports are New Bedford, Gloucester, and Boston, MA (Table 27). 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 26).

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:

1. At least $100,000 average annual revenue of monkfish, 2010-2019, or
2. 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 27).

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 28). 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 29). 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.

6.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

6.1 DRAFT APPROACH TO IMPACTS ANALYSIS

6.1.1 Effort Controls

This section provides a preliminary analysis of the effort control alternatives under consideration in Action 2 (Section 4.2). There is no model of the monkfish fishery available to predict how the fishery may respond to changes in effort controls. Prior relaxations in effort controls may have benefited certain vessels but did not necessarily lead to fishery-wide increases in landings. Here, the PDT has identified which vessels may be more likely to change their effort in response to the alternatives, but several assumptions and uncertainties are noted.

6.1.1.1 Relax DAS use restrictions

Alternatives 2-4 would relax the DAS use restrictions in two ways: 1) increase the DAS overage adjustment in the NFMA and SFMA and 2) remove the DAS use restriction in the SFMA, so vessels could use 45.2 rather than 37 DAS in that area. Here are starting assumptions for this analysis.

Assumptions regarding DAS overage adjustment

1. There are very few vessels in the NFMA that have used the current DAS overage adjustment in FY 2018-2021. This analysis thus assumes that there would be very few vessels in the NFMA that would take advantage of an increase in the DAS overage adjustment, so the focus here is in the SFMA.
2. The vessels that would more likely take advantage of an increase in the DAS overage adjustment (i.e., land an additional DAS' worth of monkfish) in the SFMA are assumed to be those that:
    a. Have not recently used their full allocation of DAS, defined here as using up to 90% of allocated DAS; and
    b. Are currently using the DAS overage provision.

Assumptions regarding SFMA DAS use restriction

3. The vessels that would take advantage of removing the SFMA DAS use restriction are assumed to be those vessels that are at or near the use of their full allocation, again with use of 90% of DAS as the threshold defining use of full allocation of DAS.
4. While the annual DAS limit is 37 in the SFMA, use of 41 may be possible if the vessel had carryover[18] from the previous fishing year (4 DAS carryover permitted). For the vessels using ≥ 90% of DAS in the SFMA, the range of DAS use was 33.9 up to 60.7. That maximum is 19.7 DAS over the limit if carryover was used. For this analysis, it is assumed that vessels would continue to have overages.
5. To simplify the analysis, each additional DAS used would translate to one DAS worth of possession limit used (i.e., vessels would not use the DAS overage adjustment).

Fishery data analyzed

6. Fishery data used for this analysis are from FY 2018-2021. The years FY 2018-2019 may be more representative of pre-pandemic years. However, since the fishery has not fully returned to pre-pandemic conditions, FY 2020-2021 data are included. While data on the total unique vessels

[18] Overages were found in the 100-200 DAS use range in the NFMA for an individual vessel.

across these years are provided, an average of these years is used in identifying the number of vessels more likely to take advantage of relaxing the DAS use restrictions.

Step 1: Identify actual, recent DAS use in the SFMA

Using these assumptions, the first step is to identify those vessels using <90% and ≥ 90% of their allocated monkfish DAS in the SFMA during FY 2018-2021 (Table 30). For simplicity, included in this analysis are only vessels fishing entirely in the SFMA in a given fishing year (though data are provided on vessels fishing in only the NFMA and in both areas).

Vessels using <90% of DAS. Over FY 2018-2021, 127 unique vessels (annual average of 66 vessels) fishing exclusively in the SFMA using less than 90% of the 37 DAS allowed to be used in the SFMA.

Vessels using ≥90% of DAS. Over FY 2018-2021, over 34 unique vessels (annual average of over 12 vessels) fishing exclusively in the SFMA used at least 90% of the 37 DAS they were allowed to use in the SFMA. The data in Table 30 are broken down by permit category and there are some confidential data for the category E vessels.

While it is reasonable to assume that the upper bound of DAS use in the SFMA is the limit (37), the fishery data indicate that actual DAS use for the 34+ vessels using at least 90% of their DAS ranges up to 60.7 and averages about 40 DAS. There are 24 unique vessels that exceeded the 37 DAS limit in at least one of the four years examined (most of which occurred in FY 2018) and 9 that exceeded 45.2. While the limit is 37 DAS/FY, use of 41 DAS may be possible if the vessel had carryover from the previous year (4 unused DAS are allowed to be carried over). The PDT is unsure to what extent carryover is accounting for these overages and/or if these data indicate regulatory violations or data errors, especially for those vessels that used over 41 DAS.

Table 30. Total and average number of vessels by DAS usage (< and ≥ 90% DAS allocated) by permit category and management area, FY 2018 – 2021.

Management Area	Permit Category	Total # of Vessels (FY18-21)		Average # of Vessels (FY18-21)	
		< 90% DAS used	*≥ 90% DAS used*	*< 90% DAS used*	*≥ 90% DAS used*
Vessels fishing only in NFMA					
NFMA (45.2 DAS allocated per vessel per FY)	C	24	30	9	18
	D	58	29	29	15
	E	53	4	29	C
	TOTAL	**135**	**63**	**67**	**33+**
Vessels fishing only in SFMA					
SFMA (37 DAS allocated per vessel per FY)	A	12	9	6	3
	B	31	8	17	3
	C	18	8	10	3
	D	40	9	17	3
	E	26	C	16	C
	TOTAL	**127**	**34+**	**66**	**12+**
Vessels fishing in both the NFMA and the SFMA in a given FY					
NFMA + SFMA (45.2 DAS allocated per vessel per FY)	**C**	5	13	C	5
	D	13	19	5	7
	E	C		0	
	F	C		0	
	TOTAL	**18+**	**32**	**5+**	**12**

Notes: Data include all trips where monkfish was landed (i.e., not just 'MNK' plan code). Table 23 includes data for only the 'MNK' plan code (considered more of the directed monkfish fishery), which is why the values in the two tables do not match.
Permit categories A and B in the NFMA and F and H in both management areas account for a minor number of permits, DAS allocated, and DAS used, thus, are not included in table. RSA trips were removed from this data table.
C = confidential, < 3 vessels. '+' indicates confidential data.
A couple of vessels have two permit categories in a given year; the data were not combined for these vessels (i.e., these vessels are included in both permit category rows).
Source: CAMS and Allocation Management System (AMS) databases, accessed August 2022.

Step 2: Identify vessels likely to take advantage of removing the SFMA DAS use restriction

To determine how the total number of DAS used would increase with the SFMA DAS use restriction removed (i.e., ability to use 45.2 DAS in the SFMA versus 37 DAS currently), the average percent of DAS used for vessels using ≥ 90% of DAS (Table 30) was multiplied by 45.2. This helps base the expected outcome on past behavior, instead of assuming all vessels would take advantage of using the full 45.2 DAS.

For vessels using ≥ 90% of DAS in the SFMA, the average number of DAS used was 40 DAS. By permit category, the average number of DAS used over FY 2018-2021 are:

- Permits A & C: 40.2 DAS/FY
- Permits B & D: 40.0 DAS/FY

There were 12 vessels that used on average ≥ 90% of their annual DAS allocation (Table 30), using an average of 108% of their annual DAS allocation (40 DAS used / 37 DAS allocated). If each of these 12 vessels use 108% of the proposed 45.2 DAS, they would use 48.8 DAS each. Thus, the increase in DAS for each vessel would be 8.8 DAS used in a fishing year (48.8 – 40, the average DAS used). This translates to about 106 more DAS used in the fishery overall (8.8 DAS * 12 vessels). Because vessels in each permit category used ~ 40 DAS/FY and had an average of 3 vessels using ≥ 90% of their annual DAS allocation (Table 30), it is expected that each permit category would see an increase of 26.4 DAS/FY (8.8 DAS * 3 vessels). By permit category, landings would increase by the following, if each additional DAS would translate to one DAS worth of possession limit used (i.e., would not use the DAS overage adjustment):

- *Permit A*: 26.4 DAS * 700 lb (tail weight) = 18,480 lb (tail weight)
- *Permit B*: 26.4 DAS * 575 lb (tail weight) = 15,180 lb (tail weight)
- *Permit C*: 26.4 DAS * 700 lb (tail weight) = 18,480 lb (tail weight)
- *Permit D*: 26.4 DAS * 575 lb (tail weight) = 15,180 lb (tail weight)

Preliminary conclusion: By removing the DAS use restriction in the SFMA, it is estimated that an additional 106 DAS would be used, translating to about 67,320 lb (tail weight) in annual landings.

Step 3: Increase DAS overage adjustment

The vessels currently taking advantage of the DAS overage provision and that also do not have high annual DAS usage would be more apt to land an additional DAS' worth of monkfish with the additional flexibility. The total number of vessels currently using the overage provision were first identified for both management areas (Table 31). Based on FY 2018 – 2021 data, few vessels in the NFMA used the ability to land one additional DAS' worth of monkfish on a given trip. Most vessels that used the overage provision operated in the SFMA (including vessels that fished in both management areas), suggesting that these vessels would also take advantage of the ability to land another DAS' worth of monkfish on a trip. Thus, effort is unlikely to meaningfully change in the NFMA by allowing an increase in DAS overage flexibility, and the focus of this analysis is in the SFMA.

Table 31. Number of unique vessels using overage provision by fishing year in the northern and southern management areas.

Fishing Year		# of Vessels using Overage Provision	Total # of Vessels	% of Vessels using Overage Provision during at least 1 trip
NORTH				
FY 2018		3	142	2%
FY 2019		0	129	0%
FY 2020		0	85	0%
FY 2021		0	126	0%
AVERAGE		***<1***	***121***	***<1%***
SOUTH				
Fishing Year	**Permit Category**	**# of Vessels using Overage Provision**	**Total # of Vessels**	**% of Trips using Overage Provision**
FY 2018	*A*	14 (182)	14 (398)	46%
	B	23 (278)	25 (684)	41%
	C	7 (118)	30 (497)	24%
	D	15 (217)	52 (1,104)	20%
	TOTAL	**61 (819)**	**148 (3,166)**	**26%**
FY 2019	*A*	11 (146)	11 (294)	50%
	B	20 (196)	23 (478)	41%
	C	6 (118)	22 (345)	34%
	D	9 (126)	38 (631)	20%
	TOTAL	**48 (606)**	**111 (1,970)**	**31%**
FY 2020	*A*	3 (5)	5 (55)	9%
	B	11 (41)	16 (141)	29%
	C	C	10 (39)	C
	D	C	18 (173)	C
	TOTAL	**14+ (46+)**	**59 (479)**	**~10%**
FY 2021	*A*	5 (61)	5 (147)	41%
	B	12 (136)	14 (307)	44%
	C	4 (46)	17 (269)	17%
	D	8 (72)	20 (393)	18%
	TOTAL	**29 (315)**	**67 (1,229)**	**26%**
AVERAGE (FY 2018-2021)	***A***	***8 (99)***	***9 (224)***	***44%***
	B	***17 (163)***	***20 (403)***	***40%***
	C	***~6 (~94)***	***20 (288)***	***~33%***
	D	***~11 (~138)***	***32 (575)***	***~24%***

Notes: Data include all trips where monkfish was landed (i.e., not just 'MNK' plan code). F and H permit categories are included in the 'Total' rows of the table but not separated out because few vessels have these permits; permit category E was not included because this is not a limited access permit.

Data are not broken down by permit category for the northern management area given confidentiality issues in the low number of vessels using the overage provision.

The “Average (FY 2018-2021)” rows represent the average of the preceding rows’ data; not the average of unique vessels.

Data in parentheses are the total number of trips.

C = confidential, < 3 vessels. ‘+’ indicates confidential data.

Source: CAMS and Allocation Management System (AMS) databases, accessed August 2022.

To estimate how landings would change when vessels are allowed to land up to 3 DAS’ worth of monkfish on a trip, only the vessels that use < 90% of their DAS allocated were analyzed. The vessels currently taking advantage of the DAS overage provision but already have high annual DAS usage may use the additional flexibility, however, the vessels’ overall annual DAS usage would not change by any meaningful amount given these vessels are already high performers (i.e., using ≥ 90% of their DAS allocation). The additional flexibility would, however, help improve efficiency by minimizing costs and expenses such as fuel by being able to take fewer trips but land a similar amount of monkfish. The data from Table 30 (SFMA vessels using < 90% of DAS) were filtered by the data from Table 31 (SFMA vessels using overage provision) to estimate the number of vessels that would land up to 3 DAS’ worth of monkfish on a trip and also increase their annual DAS use. It was assumed that this subset of vessels would land one additional DAS’ worth of monkfish, equivalent to one additional trip limit (A, C permits = 700 lb (2,037 lb whole weight); B, D permits = 575 lb (1,673 lb whole weight) (Table 32).

By permit category, the number of trips and total annual landings would increase by the following, if each additional trip would translate to one trip’s worth of possession limit used:

- *Permit A*: 45 trips * 700 lb (tail weight) = 31,500 lb (tail weight)
- *Permit B*: 115 trips * 575 lb (tail weight) = 66,125 lb (tail weight)
- *Permit C*: 56 trips * 700 lb (tail weight) = 39,200 lb (tail weight)
- *Permit D*: 56 trips * 575 lb (tail weight) = 32,200 lb (tail weight)

Preliminary conclusion: By increasing the DAS overage adjustment in the SFMA, it is estimated that an additional 169,025 lb would be landed, translating to about 3% of the SFMA TAL.

Table 32. Number of unique vessels and trips that used the DAS overage provision that also used < 90% of their DAS allocation in the southern area, FY 2018 - 2021.

Fishing Year	Permit Category	# of Vessels (Trips) using Overage Provision with < 90% DAS use
FY 2018	*A*	6 (40)
	B	16 (186)
	C	C
	D	6 (49)
	TOTAL	**28+ (275)**
FY 2019	*A*	9 (98)
	B	17 (134)
	C	4 (65)
	D	7 (81)
	TOTAL	**39 (398)**
FY 2020	*A*	3 (5)
	B	11 (41)
	C	C
	D	C
	TOTAL	**14+ (46+)**
FY 2021	*A*	3 (37)
	B	11 (99)
	C	4 (46)
	D	4 (38)
	TOTAL	**22 (220)**
AVERAGE (FY 2018-2021)	***A***	***5 (45)***
	B	***14 (115)***
	C	***~4 (~56)***
	D	***~6 (~56)***

Notes: Data include all trips where monkfish was landed (i.e., not just 'MNK' plan code). F and H permit categories are included in the 'Total' rows of the table but not separated out because few vessels have these permits; permit category E was not included because this is not a limited access permit.

Data are not broken down by permit category for the northern management area given confidentiality issues in the low number of vessels using the overage provision.

The "Average (FY 2018-2021)" rows represent the average of the preceding rows' data; not the average of unique vessels.

Data in parentheses are the total number of trips.

C = confidential, < 3 vessels. '+' indicates confidential data.

Source: CAMS and Allocation Management System (AMS) databases, accessed August 2022.

Step 4: Estimate the total increase in landings from relaxing DAS use restriction in the SFMA and increasing DAS overage adjustment

- Average SFMA TAL over FY 2018 – 2021 = 7,446.5 mt (Table 15)
  - Equivalent to 16,416,722 lb whole weight
  - Equivalent to 5,641,485 lb tail weight (tail weight = whole weight / 2.91)

- Estimated increase in DAS and landings expected from relaxing DAS use in the SFMA, averaged over FY 2018 – 2021 (from Step 1):
  - Permits A & C: 52.8 DAS →36,960 lb tail weight
  - Permits B & D: 52.8 DAS → 30,360 lb tail weight
  - **TOTAL across permit categories: ~106 DAS → ~67,320 lb tail weight (1.2% of SFMA TAL)**

- Estimated increase in landings from increasing DAS overage adjustment, averaged over FY 2018-2021 (from Step 2):
  - Permits A & C: 70,700 lb tail weight
  - Permits B & D: 98,325 lb tail weight
  - **TOTAL across permit categories: 169,025 lb tail weight (3% of SFMA TAL)**

Main Takeaways:

- In the NFMA, effort is not likely to meaningfully change by allowing an increase in DAS overage flexibility given few vessels use this provision currently.
- In the SFMA, increasing the DAS overage adjustment and removing the DAS use restriction (so vessels could use 45.2 rather than 37 DAS) would help a subset of vessels that are currently using a high percent of their annual DAS allocation or the overage provision.
  - Total estimated increase in landings from both DAS adjustments: 236,345 lb (tail weight)
    - 4.2% of SFMA TAL
  - Relaxing the DAS use restriction in the SFMA is not likely to have a substantial impact on monkfish fishing effort, specifically overall DAS use and landings, based on the past four years of fishing data.

6.1.1.2 Possession Limits

6.1.1.2.1 Evaluation with recent data

The PDT can conduct an evaluation of possession limit alternatives, identifying the vessels more likely to use an increase in possession limits. The tables in Section 5.5.3.2 may be a good starting point, which identify the trips that are landing at least 90% of possession limits in recent years.

6.1.1.2.2 Historical evaluation

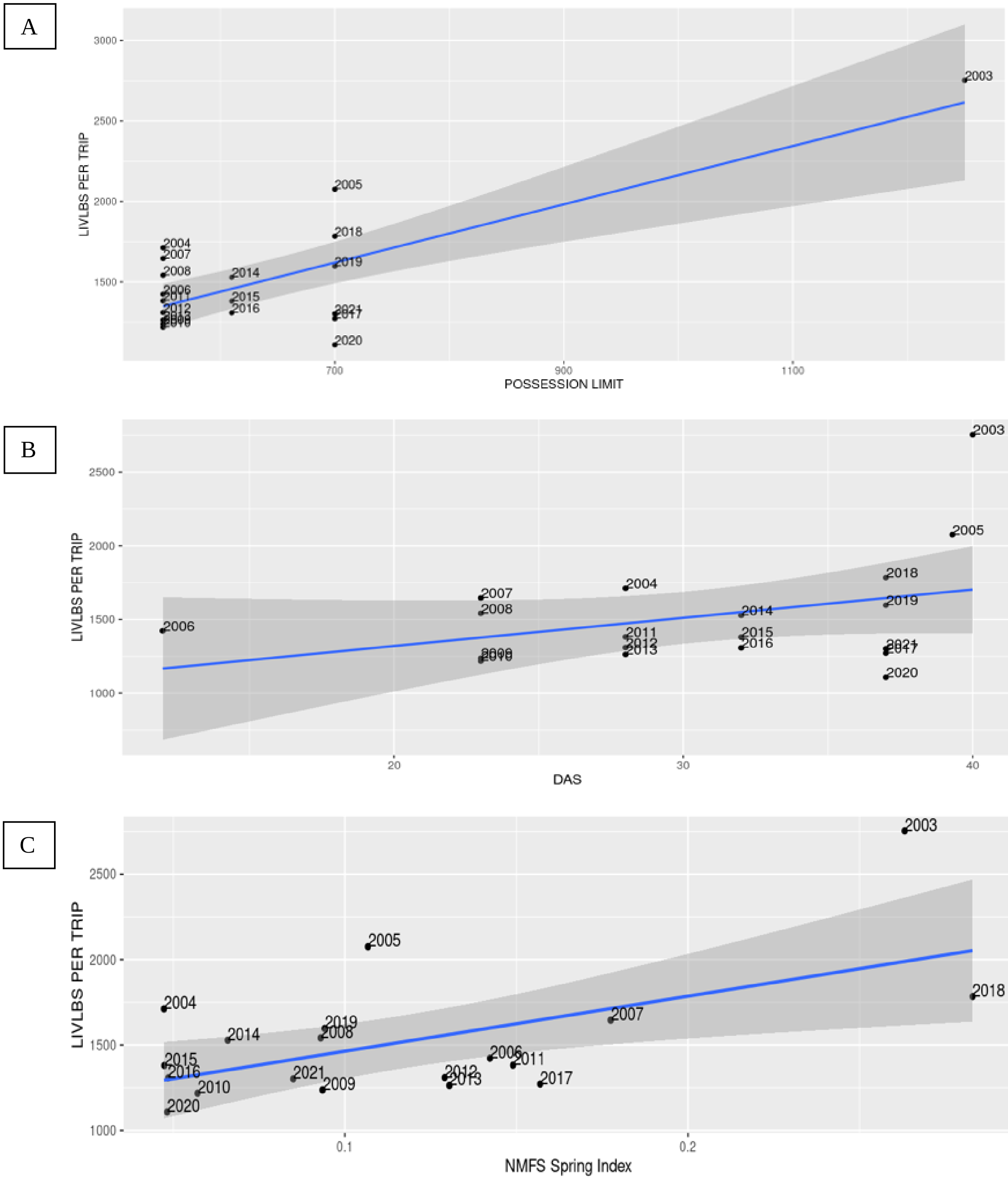
Limited Access Permits

Historically, monkfish effort controls (possession limit and DAS allocation) have been liberalized or tightened due to landings being above or below desired TALs, respectively. Unfortunately at the time, without the availability of longer-term data or accurate predictive models to understand how effort controls drive landings, previous changes in possession limits and DAS allocation have often led to landings lower or higher than the set TALs.

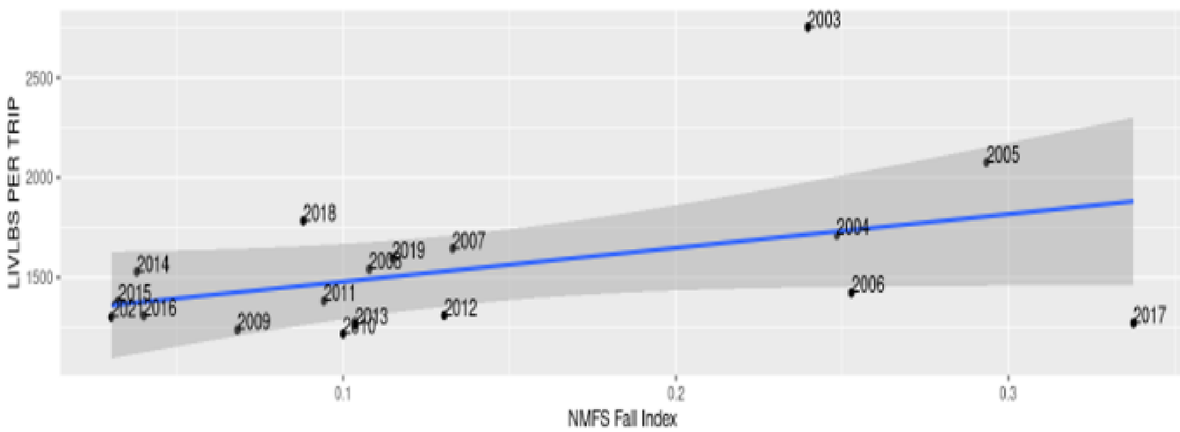
Now, given the availability of almost two decades of monkfish landings data (FY 2003 – FY 2021) over a period in which effort controls have been modified, it is possible to conduct an exploratory analysis to understand any potential impact of changing possession limits. Preliminary exploration of monkfish landings data from monkfish permit categories A, C and B, D suggest that higher possession limits and DAS allocations lead to higher landings of monkfish per monkfish trip (Figure 4A and B, Figure 5A and B) and that landings per trip are also a function of the size of the monkfish population available to harvest in a given year (Figure 4C, D and Figure 5C, D).

Using available data, it may be possible to develop an exploratory regression model that more accurately predicts monkfish landings by permit category as a function of effort controls. Fitted models would also infer whether possession limits or DAS allocation are more important drivers of annual landings versus other factors, such as monkfish population size indices and the number of monkfish trips and permits in a given fishing year. If accurate predictive models can in fact be developed, they may provide a much more accurate approach to achieving the desired TALs than historic approaches used with the monkfish fishery. It is worth noting that this type of predictive model only works if there is little variability in the relationship between monkfish landings and effort controls (both trip limits and DAS).

Figure 4. Total live lb per monkfish trip in the southern management area and permit categories A & C by possession limit, DAS allocation, and NMFS spring and fall monkfish index from FY 2003 - 2021. Gray bar indicates 95% confidence intervals.

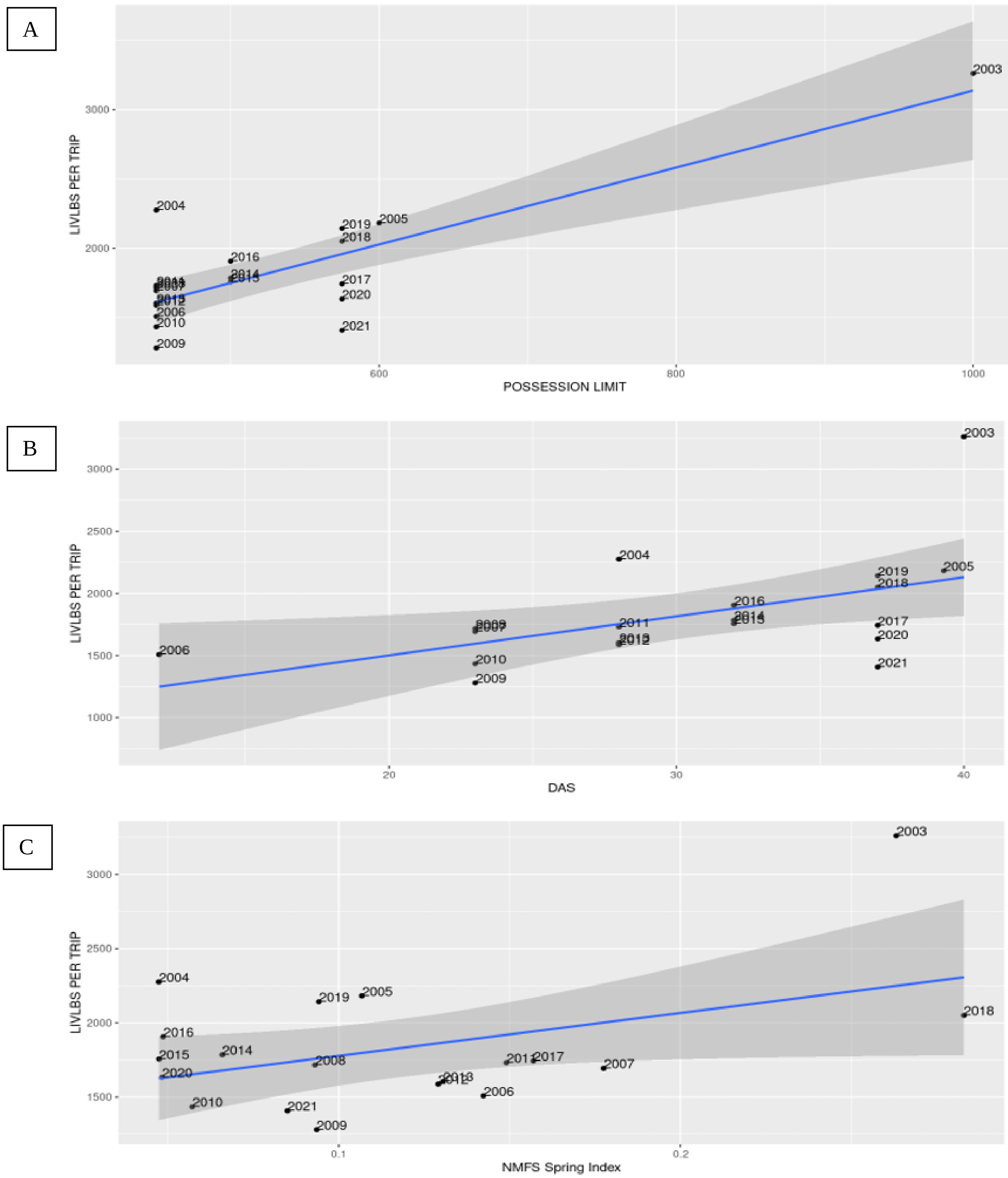


D

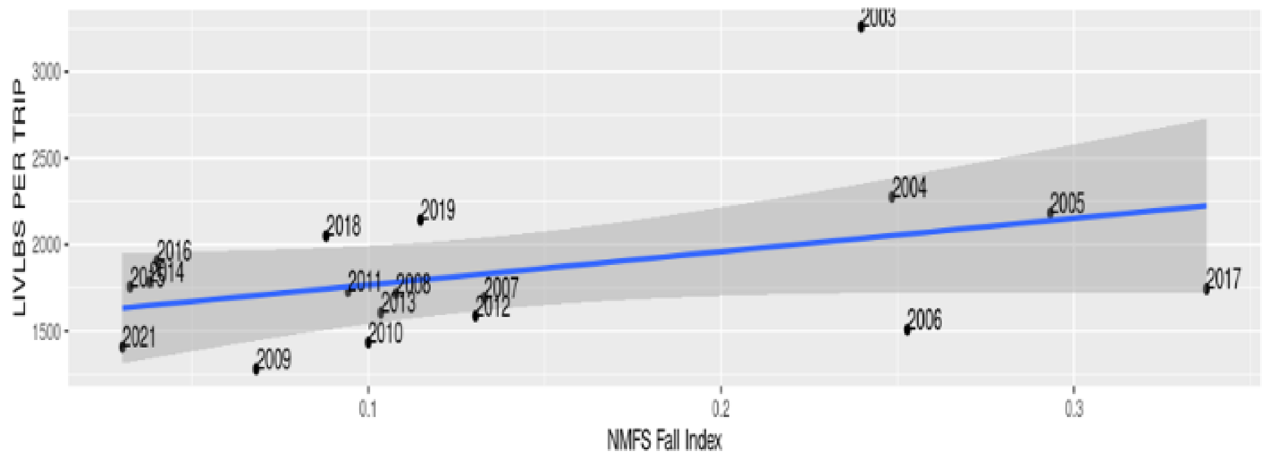


LIVLBS PER TRIP
2500
2000
1500
0.1
0.2
0.3
NMFS Fall Index
2003
2005
2004
2006
2017
2018
2014
2015
2016
2009
2011
2013
2010
2008
2019
2007
2012

Figure 5. Total live lb per monkfish trip in the southern management area and permit categories B & D by possession limit, DAS allocation, and NMFS spring and fall monkfish index from FY 2003 - 2021. Gray bar indicates 95% confidence intervals.



D



Trips with incidental landings

The exploratory analysis described above for limited access permits can be done for trips with incidental monkfish landings if that is of interest to the Committee. Based on previous work shown in Section 5.5.3.2 (Table 24, Table 25) for vessels not under a DAS program, incidental limits do not appear to be constraining for most trips; only a subset (16% of trips) comprised both of day and multi-day trips are landing ≥ 90% of incidental limits. Adjustments could be warranted for the subset of trips that appear to be constrained by the incidental limits.

6.1.2 Monkfish Gillnet Measures

To fish on a monkfish-only DAS (i.e., not using a groundfish or scallop DAS), vessels must fish exclusively in an exemption area or fishery. With some exemptions, the minimum gillnet mesh size while fishing on a monkfish DAS is 10” diamond mesh (50 CFR 648.91(c)(1)(iii)). There are five exemption areas that apply to the monkfish fishery, each with specific gear requirements; only exemptions pertaining to gillnet are included here. Note that these exempted fisheries allow vessels to be exempt from certain Northeast Multispecies regulations (not required to use a NE multispecies DAS or to be on a NE multispecies non-DAS sector trip) provided a larger mesh size is used to help ensure bycatch of regulated groundfish species is minimal. If a vessel fishes outside these exemption areas in either the Gulf of Maine or Georges Bank Regulated Mesh Areas (thus, using both a monkfish DAS and a NE Multispecies DAS), then the gillnets must be a minimum of 6.5 inches throughout the entire net.

- *The Gulf of Maine/Georges Bank Monkfish Gillnet Exemption*. Seasonal exemption (July 1 – September 14) for vessels using gillnets with a minimum mesh size of 10 inches (diamond) throughout the net; vessels can only land monkfish and/or American lobster.
- *The SNE Monkfish Gillnet Exemption Area*. Year-round exemption for vessels using gillnets in Southern New England with a minimum mesh size of 10-inch diamond; vessels can also land skates, spiny dogfish, and incidentally caught species allowed in the SNE Regulated Mesh Area.
- *The Mid-Atlantic Exemption Area – trawl or gillnet gear*. Year-round exemption for vessels using or gillnet gear (minimum mesh size of 5 inches, maximum of 50 stand-up gillnets); vessels can land spiny dogfish, monkfish, whiting and red hake but are not permitted to land other regulated multispecies.

In the SFMA, at least 96% of monkfish gillnet trips used at least 11” mesh size in FY 2018-2021, trips taken by at least 93% of the monkfish gillnet vessels (Table 33). Examined by primary landing port, most of the active landing ports by gillnet mesh size are confidential. Vessels using under 11” mesh are located in Rhode Island and New York (Table 34).

Table 33. Number of monkfish gillnet trips and vessels by mesh size, FY 2018 – FY 2021.

Mesh Size	Number of trips in SFMA	Percent of trips	Number of vessels in SFMA	Percent of vessels
FY 2018				
10”	13	<1%	3	4%
11”	14	<1%	3	4%
12”	1,928	95%	66	87%
12.5”	67	3%	4	5%
FY 2019				
10”	6	<1%	3	4%
11”	35	2%	6	8%
12”	1,692	94%	65	84%
12.5”	C	C	C	-
13”	23	1%	C	-
FY 2020				
10”	6	1%	4	7%
11”	36	3%	6	10%
12”	1,077	93%	50	82%
12.5”	43	4%	C	-
FY 2021				
11”	16	4%	C	-
12”	334	93%	28	88%
12.5”	8	2%	C	-
14	C	<1%	C	-

Source: Vessel Trip Reports 2018-2022, accessed July 2022.

Notes: Data only include activity code ‘MNK-SAM’ (southern fishery management area) given most gillnets operate in the southern region and only a minor number of trips use gillnet in the northern region.

The number of vessels by mesh size are not additive given there is a small number of vessels that fish multiple mesh sizes (i.e., the number of vessels are not unique vessels).

‘C’ represents confidential data with < 3 fishing vessels.

Table 34. Number of vessels by primary landing port and mesh size, averaged across FY 2018 – FY 2021.

Principle Port / Landing Port	**Mesh Size**					
	10"	***11"***	***12"***	***12.5"***	***13"***	***14"***
Portland, ME			C			
Rye, NH			C			
Gloucester, MA			C			
Chatham, MA		3	4			
Harwich, MA		C				
Fairhaven, MA			C			
New Bedford, MA			C			
Westport, MA			C			
Newport, RI			C	C		
Point Judith, RI	C		4			
Sakonnet, RI	C		4			
Tiverton, RI	C		4			
Little Compton, RI			C	C		
New London, CT			C			
Center Moriches, NY			C			
Montauk, NY	C	4				C
Hampton Bays, NY	C	C	C			
Shinnecock, NY			C			
Barnegat Light, NJ			9	C	C	
Point Pleasant, NJ			3			
Waretown, NJ			C			
Manasquan, NJ		C	C			
Ocean City, MD			C			
Chincoteague, VA			C			
Greenbackville, VA			C			
Wanchese, NC			C			

Source: Vessel Trip Reports 2018-2022, accessed July 2022.
Notes: Data only include activity code 'MNK-SAM' (southern fishery management area) given most gillnets operate in the southern region and only a minor number of trips use gillnet in the northern region.
The number of vessels by mesh size are not additive given there is a small number of vessels that fish multiple mesh sizes (i.e., the number of vessels are not unique vessels).
'C' represents confidential data with < 3 fishing vessels.

Has the idea of increasing the minimum mesh size been considered previously?

Yes. Developing a 12" minimum mesh size for gillnets was first discussed by the Skate Committee in 2020 as a gear modification to reduce bycatch and then scoped for in Skate Amendment 5 in early 2021, but it was determined that the measure was more appropriate as a monkfish action. Later in 2020, the Monkfish Committee supported this idea as a 2021 management priority. However, the Council disapproved it for 2021, noting that many fishermen targeting monkfish were already using this mesh size (e.g., 83% of observed gillnet hauls in the Northern Fishery Management Area from 2004-2007; Salerno, et al. 2010). The 12" mesh gillnet size was not discussed during the monkfish and skate AP, Committee, and Council meetings from 2016 (and perhaps earlier) up to 2020.

What research may inform requirement of 12-inch minimum mesh size?

The PDT is aware of the following research that may inform the consideration of management alternatives but will continue looking for other prior studies. The PDT would like to investigate if and how the Council has used this research to inform decision-making in the past.

In 2007, the Monkfish Research-Set-Aside (RSA) program funded a study called "Determining the Best Size for Gillnetting Monkfish *Lophius americanus*" (Mike Pol and Brad Bowen, PIs) and the final report was completed in 2009. The project was a collaboration of the Massachusetts Division of Marine Fisheries and commercial fishermen. Mesh sizes of 10, 12 and 14" were tested for monkfish retention and bycatch reduction. Increasing mesh size from 10 to 12" resulted in: increased monkfish length and weight per trip, decreased bycatch including smaller monkfish. While fewer monkfish were caught in the larger mesh, revenues were similar as larger monkfish have higher prices.

In 2010, the Gulf of Maine Research Institute and Massachusetts Division of Marine Fisheries completed a study called "Analysis of Size Selectivity and Bycatch in the Gillnet Fishery for Monkfish." The study evaluated the monkfish catch and bycatch rates for gillnet mesh sizes 10", 12", and 14" and otter trawl gear in the Gulf of Maine. For gillnet gear, 12" mesh sizes had the highest monkfish catch (by weight) and lowest bycatch levels, while the 14" mesh had the lowest monkfish catch (by weight and number) and the 10" mesh had the highest bycatch (Salerno *et al.* 2010).

In 2018, the Monkfish RSA program funded a study called "Increasing Twine Thickness and Mesh Size to Reduce Skate Bycatch in Monkfish Sink Gillnets" led by Cornell Cooperative Extension. In that study, 12" mesh is the control and 13" mesh is the test, with and without tie-downs. The project had several delays and extensions; the fieldwork is expected to be completed this winter, and the final report is due in October 2022. Data analysis is ongoing, so it is unclear if/how this research would inform the development of Framework 13.

What are some pros and cons for requiring 12-inch mesh size?

Pros: Would likely help reduce discards of groundfish and other species, particularly juveniles. However, if this gear is commonly used already, actual reductions may be limited.

Cons: Could prevent the use of a smaller mesh size if needed in the future. The body shape of monkfish could prevent changes in minimum mesh size from substantially improving monkfish selectivity.

7.0 REFERENCES

Altenritter M.N., G.B. Zydlewski, M.T. Kinnison & G.S. Wippelhauser (2017). Atlantic sturgeon use of the Penobscot River and marine movements within and beyond the Gulf of Maine. *Marine and Coastal Fisheries. 9*: 216-230.

ASMFC (2017). *2017 Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report*. Arlington, VA: Atlantic States Marine Fisheries Commission. 456 p.

ASSRT (2007). *Status Review of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) - Report of the Atlantic Sturgeon Status Review Team to NMFS*. Gloucester, MA: U.S. Department of Commerce. 174 p.

Baumgartner M.F., N.S.J. Lysiak, C. Schuman, J. Urban-Rich & F.W. Wenzel (2011). Diel vertical migration behavior of *Calanus finmarchicus* and its influence on right and sei whale occurrence. *Marine Ecology Progress Series. 423*: 167-184.

Baumgartner M.F. & B.R. Mate (2005). Summer and fall habitat of North Atlantic right whales (*Eubalaena glacialis*) inferred from satellite telemetry. *Canadian Journal of Fisheries and Aquatic Sciences. 62*(3): 527-543.

Baumgartner M.F., C.A. Mayo & R.D. Kenney (2007). Enormous carnivores, microscopic food and a restaurant that's hard to find. In: *The Urban Whale: North Atlantic Right Whales at the Crossroads*. Cambridge, MA: Harvard University Press,. p. 138-171.

Bort J., S.M. Van Parijs, P.T. Stevick, E. Summers & S. Todd (2015). North Atlantic right whale Eubalaena glacialis vocalization patterns in the central Gulf of Maine from October 2009 through October 2010. *Endangered Species Research. 26*(3): 271-280.

Braun-McNeill J. & S.P. Epperly (2002). Spatial and temporal distribution of sea turtles in the Western North Atlantic and the U.S. Gulf of Mexico from Marine Recreational Fishery Statistics Survey (MRFSS). *Marine Fisheries Review. 64*(4): 50-56.

Braun-McNeill J., S.P. Epperly, L. Avens, M.L. Snover & J.C. Taylor (2008). Life stage duration and variation in growth rates of loggerhead *(Caretta caretta)* sea turtles from the western North Atlantic. *Herpetological Conservation and Biology. 3*(2): 273-281.

Braun J. & S.P. Epperly (1996). Aerial surveys for sea turtles in southern Georgia waters, June 1991. *Gulf of Mexico Science. 1996*(1): 39-44.

Breece M.W., D.A. Fox, K.J. Dunton, M.G. Frisk, A. Jordaan & M.J. Oliver (2016). Dynamic seascapes predict the marine occurrence of an endangered species: Atlantic Sturgeon Acipenser oxyrinchus oxyrinchus. *Methods in Ecology and Evolution. 7*(6): 725-733.

Breece M.W., D.A. Fox, D.E. Haulsee, I.I. Wirgin & M.J. Oliver (2017). Satellite driven distribution models of endangered Atlantic sturgeon occurrence in the mid-Atlantic Bight. *ICES Journal of Marine Science. 75*(2): 562-571.

Brown M.W., O.C. Nichols, M.K. Marx & J.N. Ciano (2002). *Surveillance of North Atlantic Right Whales in Cape Cod Bay and Adjacent Waters - Final Report to the Division of Marine Fisheries, Commonwealth of Massachusetts*. Provincetown, MA: Provincetown Center for Coastal Studies. 29 p.

Caillouet C.W., Jr., S.W. Raborn, D.J. Shaver, N.F. Putman, B.J. Gallaway & K.L. Mansfield (2018). Did declining carrying capacity for the Kemp's ridley sea turtle population within the Gulf of Mexico contribute to the nesting setback in 2010–2017? *Chelonian Conservation and Biology. 17*(1): 123-133.

CeTAP (1982). *Final Report of the Cetacean and Turtle Assesment Program: A Characterization of Marine Mammals and Turtles in the Mid- and North Atlantic Areas of the U.S. Outer Continental Shelf*. Washington, DC: University of Rhode Island. AA511-CT8-48. 568 p.

Charif R.A., Y. Shiu, C.A. Muirhead, C.W. Clark, S.E. Parks & A.N. Rice (2020). Phenological changes in North Atlantic right whale habitat use in Massachusetts Bay. *Global Change Biology. 26*(2): 734-745.

Clapham P.J., L.S. Baraff, M.A. Carlson, D.K. Christian, D.K. Mattila, C.A. Mayo, M.A. Murphy & S. Pittman (1993). Seasonal occurrence and annual return of humpback whales, *Megaptera novaeangliae*, in the southern Gulf of Maine. *Canadial Journal of Zoology. 71*: 440-443.

Cole T.V.N., P.C. Hamilton, A.G. Henry, P. Duley, R.M. Pace III, B.N. White & T. Frasier (2013). Evidence of a North Atlantic right whale *Eubalaena glacialis* mating ground. *Endangered Species Research. 21*(55-64).

Collins M.R. & T.I.J. Smith (1997). Distribution of shortnose and Atlantic sturgeons in South Carolina. *North American Journal of Fisheries Management. 17*: 995-1000.

Conant T.A., P.H. Dutton, T. Eguchi, S.P. Epperly, C.C. Fahy, M.H. Godfrey, S.L. MacPherson, E.E. Possardt, B.A. Schroeder, J.A. Seminoff, et al. (2009). *Loggerhead Sea Turtle (Caretta caretta) 2009 Status Review under the U.S. Endangered Species Act.* Silver Spring, MD: U.S. Department of Commerce. Report of the Loggerhead Biological Review Team to the National Marine Fisheries Service. 222 p.

Dadswell M.J. (2006). A review of the status of Atlantic sturgeon in Canada, with comparisons to populations in the United States and Europe. *Fisheries. 31*: 218-229.
Dadswell M.J., B.D. Taubert, T.S. Squires, D. Marchette & J. Buckley (1984). Synopsis of biological data on shortnose sturgeon, *Acipenser brevirostrum*. *LeSuer.* 1818.
Davis G.E., M.F. Baumgartner, J.M. Bonnell, J. Bell, C. Berchok, J. Bort Thornton, S. Brault, G. Buchanan, R.A. Charif, D. Cholewiak, et al. (2017). Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (*Eubalaena glacialis*) from 2004 to 2014. *Scientific Reports. 7*(1): 13460.
Davis G.E., M.F. Baumgartner, P.J. Corkeron, J. Bell, C. Berchok, J.M. Bonnell, J. Bort Thornton, S. Brault, G.A. Buchanan, D.M. Cholewiak, et al. (2020). Exploring movement patterns and changing distributions of baleen whales in the western North Atlantic using a decade of passive acoustic data. *Global Change Biology. 26*(9): 4812-4840.
Dodge K.L., B. Galuardi, T.J. Miller & M.E. Lutcavage (2014). Leatherback turtle movements, dive behavior, and habitat characteristics in ecoregions of the northwest Atlantic Ocean. *PLoS ONE. 9*(3 e91726): 1-17.
Dovel W.L. & T.J. Berggren (1983). Atlantic sturgeon of the Hudson River Estuary, New York. *New York Fish and Game Journal. 30*: 140-172.
Dunton K.J., A. Jordaan, D.O. Conover, K.A. McKown, L.A. Bonacci & M.G. Frisk (2015). Marine distribution and habitat use of Atlantic sturgeon in New York lead to fisheries interactions and bycatch. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science. 7*: 18-32.
Dunton K.J., A. Jordaan, K.A. McKown, D.O. Conover & M.G. Frisk (2010). Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. *Fishery Bulletin. 108*: 450-465.
Eckert S.A., D. Bagley, S. Kubis, L. Ehrhart, C. Johnson, K. Stewart & D. DeFreese (2006). Internesting and postnesting movements of foraging habitats of leatherback sea turtles (*Dermochelys coriacea*) nesting in Florida. *Chelonian Conservation Biology. 5*(2): 239-248.
Epperly S.P., J. Braun & A.J. Chester (1995a). Areal surveys for sea turtles in North Carolina inshore waters. *Fishery Bulletin. 93*: 254-261.
Epperly S.P., J. Braun, A.J. Chester, F.A. Cross, J.V. Merriner & P.A. Tester (1995b). Winter distribution of sea turtles in the vicinity of Cape Hatteras and their interactions with the summer flounder trawl fishery. *Bulletin of Marine Science. 56*(2): 547-568.
Epperly S.P., J. Braun & Veishlow (1995c). Sea turtles in North Carolina waters. *Conservation Biology. 9*(2): 384-394.
Erickson D.L., A. Kahnle, M.J. Millard, E.A. Mora, M. Bryja, A. Higgs, J. Mohler, M. DuFour, G. Kenney, J. Sweka, et al. (2011). Use of pop-up satellite archival tags to identify oceanic-migratory patterns for adult Atlantic Sturgeon, Acipenser oxyrinchus oxyrinchus Mitchell, 1815. *Journal of Applied Ichthyology. 27*(2): 356-365.
Ganley L.C., S. Brault & C.A. Mayo (2019). What we see is not what there is: estimating North Atlantic right whale Eubalaena glacialis local abundance. *Endangered Species Research. 38*: 101-113.
Good C. (2008). *Spatial Ecology of the North Atlantic Right Whale (Eubalaena glacialis)* Duke University.
Griffin D.B., S.R. Murphy, M.G. Frick, A.C. Broderick, J.W. Coker, M.S. Coyne, M.G. Dodd, M.H. Godfrey, B.J. Godley, L.A. Mawkes, et al. (2013). Foraging habitats and migration corridors utilized by a recovering subpopulation of adult female loggerhead sea turtles: Implications for conservation. *Marine Biology. 160*: 3071-3086.
Hain J.H.W., M.J. Ratnaswamy, R.D. Kenney & H.E. Winn (1992). The fin whale, *Balaenoptera physalus,* in waters of the northeastern United States continental shelf. *Reports of the International Whaling Commission. 42*: 653-669.

Hamilton P.K. & C.A. Mayo (1990). Population characteristics of right whales (*Eubalaena glacialis*) observed in Cape Cod and Massachusetts Bays, 1978-1986. *Reports of the International Whaling Commission. 12*: 203-208.
Hawkes L.A., M.J. Witt, A.C. Broderick, J.W. Coker, M.S. Coyne, M.G. Dodd, M.G. Frick, M.H. Godfrey, D.B. Griffin, S.R. Murphy, et al. (2011). Home on the range: spatial ecology of loggerhead turtles in Atlantic waters of the USA. *Diversity and Distributions. 17*: 624-640.
Hayes S.A., E. Josephson, K. Maze-Foley & P.E. Rosel (2017). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2016*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NE-241. p.
Hayes S.A., E. Josephson, K. Maze-Foley & P.E. Rosel (2018). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2017*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NE-245. 371 p.
Hayes S.A., E. Josephson, K. Maze-Foley & P.E. Rosel (2019). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2018*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NE-258. 291 p.
Hayes S.A., E. Josephson, K. Maze-Foley & P.E. Rosel (2020). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2019*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NE-264. 479 p.
Hayes S.A., E. Josephson, K. Maze-Foley, P.E. Rosel & J. Turek (2021). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2020*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NE-271. 403 p.
Hayes S.A., E. Josephson, K. Maze-Foley, P.E. Rosel & J. Wallace (2022). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2021*. U.S. Department of Commerce. 386 p.
Hilton E.J., B. Kynard, M.T. Balazik, A.Z. Horodysky & C.B. Dillman (2016). Review of the biology, fisheries, and conservation status of the Atlantic Sturgeon, (Acipenser oxyrinchus oxyrinchus Mitchill, 1815). *Journal of Applied Ichthyology. 32*(S1): 30-66.
Hirth H.F. (1997). *Synopsis of the Biological Data of the Green Turtle, Chelonia mydas (Linnaeus 1758)*. In: US Fish and Wildlife Service Biological Report 97.Vol. 1. 120 p.
Ingram E.C., R.M. Cerrato, K.J. Dunton & M.G. Frisk (2019). Endangered Atlantic Sturgeon in the New York Wind Energy Area: implications of future development in an offshore wind energy site. *Scientific Reports. 9*(1): 12432.
James M.C., R. Myers & C. Ottenmeyer (2005). Behaviour of leatherback sea turtles, *Dermochelys coriacea*, during the migratory cycle. *Proceedings of the Royal Society of Biological Sciences. 272*(1572): 1547-1555.
James M.C., S.A. Sherrill-Mix, K. Martin & R.A. Myers (2006). Canadian waters provide critical foraging habitat for leatherback sea turtles. *Biological Conservation. 133*: 347-357.
Jefferson T.A., D. Fertl, J. Bolanos-Jimenez & A.N. Zerbini (2009). Distribution of common dolphins (*Delphinus sp.*) in the western North Atlantic: A critical re-examination. *Marine Biology. 156*: 1109-1124.
Kenney R.D., M.A.M. Hyman, R.E. Owen, G.P. Scott & H.E. Winn (1986). Estimation of prey densities required by western North Atlantic right whales. *Marine Mammal Science. 2*: 1-13.
Kenney R.D., H.E. Winn & M.C. Macaulay (1995). Cetaceans in the Great South Channel, 1979-1989: Right whale (*Eubalaena glacialis*). *Continental Shelf Research. 15*: 385-414.
Khan C.B., T.V.N. Cole, P. Duley, A. Glass & Gatzke (2010). *North Atlantic Right Whale Sightings Survey (NARWSS) and Right Whale Sighting Advisory System (NARWSS) 2009 Results Summary*. Woods Hole, MA: U.S. Department of Commerce. 10-07. 7 p.
Khan C.B., T.V.N. Cole, P. Duley, A. Glass & Gatzke (2011). *North Atlantic Right Whale Sightings Survey (NARWSS) and Right Whale Sighting Advisory System (NARWSS) 2010 Results Summary*. Woods Hole, MA: U.S. Department of Commerce. 11-05. 6 p.

Khan C.B., T.V.N. Cole, P. Duley, A. Glass & Gatzke (2012). *North Atlantic Right Whale Sightings Survey (NARWSS) and Right Whale Sighting Advisory System (NARWSS) 2011 Results Summary*. Woods Hole, MA: U.S. Department of Commerce. 12-09. 6 p.

Khan C.B., T.V.N. Cole, P. Duley, A. Glass, M. Niemeyer & C. Christman (2009). *North Atlantic Right Whale Sightings Survey (NARWSS) and Right Whale Sighting Advisory System (NARWSS) 2008 Results Summary*. Woods Hole, MA: U.S. Department of Commerce. NEFSC Reference Document 09-05. 7 p.

Kynard B., M. Horgan, M. Kieffer & D. Seibel (2000). Habitat use by shortnose sturgeon in two Massachusetts rivers, with notes on estuarine Atlantic sturgeon: A hierarchical approach. *Transactions of the American Fisheries Society. 129*: 487-503.

Laney R.W., J.E. Hightowerm, B.R. Versak, M.F. Mangold, W.W. Cole Jr. & S.E. Winslow (2007). Distribution, habitat use, and size of Atlantic sturgeon captured during cooperative winter tagging cruises, 1988–2006. In: *Anadromous Sturgeons: Habitats, Threats, and Management*. Bethesda, MD: American Fisheries Society. p. 167-182.

Leiter S.M., K.M. Stone, J.L. Thompson, C.M. Accardo, B.C. Wikgren, M.A. Zani, T.V.N. Cole, R.D. Kenney, C.A. Mayo & S.D. Kraus (2017). North Atlantic right whale *Eubalaena glacialis* occurrence in offshore wind energy areas near Massachusetts and Rhode Island, USA. *Endangered Species Research. 34*: 45-59.

Mate B.R., S.L. Nieukirk & S.D. Kraus (1997). Satellite-monitored movements of the Northern right whale. *The Journal of Wildlife Management. 61*(4): 1393-1405.

Mayo C.A., L. Ganley, C.A. Hudak, S. Brault, M.K. Marx, E. Burke & M.W. Brown (2018). Distribution, demography, and behavior of North Atlantic right whales (Eubalaena glacialis) in Cape Cod Bay, Massachusetts, 1998–2013. *Marine Mammal Science. 34*(4): 979-996.

McLellan W.A., E. Meagher, L. Torres, G. Lovewell, C. Harper, K. Irish, B. Pike & D.A. Pabst (2004). Winter right whale sightings from aerial surveys of the coastal waters of the U.S. Mid-Atlantic. Paper presented at: 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC.

Moore M.J., T.K. Rowles, D.A. Fauquier, J.D. Baker, I. Biedron, J.W. Durban, P.K. Hamilton, A.G. Henry, R.M. Pace III, H.M. Pettis, et al. (2021). Assessing North Atlantic right whale health: threats, and development of tools critical for conservation of the species. *Diseases of Aquatic Organisms. 143*: 205-226.

Morreale S.J. & E. Standora (2005). Western North Atlantic waters: Crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. *Chelonean Conservation and Biology. 4*(4): 872-882.

Muirhead C.A., A.M. Warde, I.S. Biedron, A. Nicole Mihnovets, C.W. Clark & A.N. Rice (2018). Seasonal acoustic occurrence of blue, fin, and North Atlantic right whales in the New York Bight. *Aquatic Conservation: Marine and Freshwater Ecosystems. 28*(3): 744-753.

Murphy T.M., S.R. Murphy, D.B. Griffin & C.P. Hope (2006). Recent occurrence, spatial distribution and temporal variability of leatherback turtles (*Dermochelys coriacea*) in nearshore waters of South Carolina, USA. *Chelonian Conservation Biology. 5*(2): 216-224.

Murray K.T. (2015). The importance of location and operational fishing factors in estimating and reducing loggerhead turtle (Caretta caretta) interactions in US bottom trawl gear. *Fisheries Research. 172*: 440-451.

NEFMC (2014). *Monkfish Fishery Management Plan Framework Adjustment 8*. Newburyport, MA: New England Fishery Management Council and Mid-Atlantic Fishery Management Council in consultation with National Marine Fisheries Service. 179 p.

NEFMC (2017). *Monkfish Fishery Management Plan Framework Adjustment 10 Including Specifications for Fishing Years 2017-2019*. Newburyport, MA: New England Fishery Management Council and Mid-Atlantic Fishery Management Council in consultation with National Marine Fisheries Service. 218 p.

NEFSC (2020). *Operational Assessment of the Black Sea Bass, Scup, Bluefish, and Monkfish Stocks, Updated through 2018*. Woods Hole, MA: U.S. Department of Commerce. NEFSC Reference Document 20-01. 160 p.

NMFS (1991). *Final Recovery Plan for the Humpback Whale (Megaptera novaeangliae)*. Silver Spring, MD: U.S. Department of Commerce. 105 p.

NMFS (2005). *Recovery Plan for the North Atlantic Right Whale (Eubalaena glacialis)*. Silver Spring, MD: U.S. Department of Commerce. 137 p.

NMFS (2010). *Final recovery plan for the fin whale (Balaenoptera physalus).* Silver Spring, MD: U.S. Department of Commerce. 121 p.

NMFS (2011). *Final recovery plan for the sei whale (Balaenoptera borealis).* Silver Spring, MD: U.S. Department of Commerce. 108 p.

NMFS (2021a). *Endangered Species Act Section 7 Consultation on the: (a) Authorization of the American Lobster, Atlantic Bluefish, AtlanticDeep-Sea Red Crab, Mackerel/Squid/Butterfish, Monkfish, Northeast Multispecies, Northeast Skate Complex, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Jonah Crab Fisheries and (b) Implementation of the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2 [Consultation No. GARFO-2017-00031]*. Gloucester, MA: U.S. Department of Commerce. p.

NMFS (2021b). *Final Environmental Impact Statement, Regulatory Impact Review, and Final Regulatory Flexibility Analysis for Amending the Atlantic Large Whale Take Reduction Plan: Risk Reduction Rule*. U.S. Department of Commerce. 601 p.

NMFS & USFWS (1991). *Recovery Plan for U.S. Population of Atlantic Green Turtle (Chelonia mydas)*. Washington, DC: U.S. Department of Commerce and U.S. Department of the Interior. 58 p.

NMFS & USFWS (1992). *Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico*. Silver Spring, MD: U.S. Department of Commerce and U.S. Department of the Interior. 65 p.

NMFS & USFWS (1995). *Status Reviews for Sea Turtles Listed under the Endangered Species Act of 1973*. Washington, DC: U.S. Department of Commerce and U.S. Department of the Interior. 139 p.

NMFS & USFWS (1998a). *Recovery Plan for U.S. Pacific Populations of the Green Turtle (Chelonia mydas)*. Silver Spring, MD: U.S. Department of Commerce and U.S. Department of the Interior. 58 p.

NMFS & USFWS (1998b). *Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (Dermochelys coriacea)*. Silver Spring, MD: U.S. Department of Commerce. 65 p.

NMFS & USFWS (2007a). *Green Sea Turtle (Chelonia mydas) 5 Year Review: Summary and Evaluation*. Silver Spring, MD: U.S. Department of Commerce and U.S. Department of the Interior. 102 p.

NMFS & USFWS (2007b). *Kemp's Ridley Sea Turtle (Lepidochelys kempii) 5 Year Review: Summary and Evaluation*. Silver Spring, MD: U.S. Department of Commerce and U.S. Department of the Interior. 50 p.

NMFS & USFWS (2008). *National Recovery Plan for the Loggerhead Sea Turtle (Caretta caretta)*.2nd ed. Siver Spring, MD: U.S. Department of Commerce. 325 p.

NMFS & USFWS (2011). *Bi-national Recovery Plan for the Kemp's Ridley Sea Turtle (Lepidochelys kempii)*.2nd ed. Siver Spring, MD: National Marine Fisheries Service. 156 & appendices p.

NMFS & USFWS (2013). *Leatherback Sea Turtle (Dermochelys coriacea) 5 Year Review: Summary and Evaluation*. Silver Spring, MD: U.S. Department of Commerce and U.S. Department of the Interior. 91 p.

NMFS & USFWS (2015). *Kemp's Ridley Sea Turtle (Lepidochelys kempii) 5 Year Review: Summary and Evaluation*. Silver Spring, MD: U.S. Department of Commerce and U.S. Department of the Interior. 62 p.

NMFS & USFWS (2020). *Endangered Species Act status review of the leatherback turtle (Dermochelys coriacea).* . Silver Spring, MD: Report to the National Marine Fisheries Service Office of Protected Resources and U.S. Fish and Wildlife Service. p.

NOAA (2008). *High Numbers of Right Whales Seen in Gulf of Maine: NOAA Researchers Identify Wintering Ground and Potential Breeding Ground*. U.S. Department of Commerce. NOAA press release. December 31, 2008. p.

Northwest Atlantic Leatherback Working Group (2018). *Northwest Atlantic Leatherback Turtle (Dermochelys coriacea) Status Assessment (Bryan Wallace and Karen Eckert, Compilers and Editors)*. Godfrey, IL: Conservation Science Partners and the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). WIDECAST Technical Report No. 16. 36 p.

Novak A., J., A. Carlson, E., C. Wheeler, R., G.S. Wippelhauser & J. Sulikowski, A. (2017). Critical Foraging Habitat of Atlantic Sturgeon Based on Feeding Habits, Prey Distribution, and Movement Patterns in the Saco River Estuary, Maine. *Transactions of the American Fisheries Society*. *146*(2): 308-317-2017.

O'Keefe C. (2020). *Evaluation of Methods to Estimate Monkfish Discards for Calculating Total Allowable Landings*. Fishery Applications Consulting Team LLC with support from the New England Fishery Management Council. 32 p.

O'Keefe C. (2021). *2021 Evaluation of Monkfish Discard Estimation for Calculating Total Allowable Landings*. Fishery Applications Consulting Team LLC with support from the New England Fishery Management Council. 19 p.

O'Leary S.J., K.J. Dunton, L. King, M.G. Frisk & D.D. Chapman (2014). Genetic diversity and effective size of Atlantic sturgeon, *Acipenser oxyrhinchus oxyrhinchus* river spawning populations estimated from the microsatellite genotypes of marine-captured juveniles. *Conservation Genetics*. 1-9.

Pace III R.M. & R. Merrick (2008). *Northwest Atlantic Ocean Habitats Important to the Conservation of North Atlantic Right Whales (Eubalaena glacialis)*. Woods Hole, MA: USDo Commerce. p.

Payne P.M. & D.W. Heinemann (1993). The distribution of pilot whales (*Globicephala sp.*) in shelf/shelf edge and slope waters of the northeastern United States, 1978-1988. *Reports of the International Whaling Commission*. *14*: 51-68.

Payne P.M., L.A. Selzer & A.R. Knowlton (1984). *Distribution and density of cetaceans, marine turtles, and seabirds in the shelf waters of the northeastern United States, June 1980 - December 1983, based on shipboard observations*. Woods Hole, MA: Manomet Bird Observatory. 294 p.

Payne P.M., D.N. Wiley, S.B. Young, S. Pittman, P.J. Clapham & J.W. Jossi (1990). Recent fluctuations in the abundance of baleen whales in the southern Gulf of Maine in relation to changes in selected prey. *Fishery Bulletin*. *88*: 687-696.

Pendleton D.E., A.J. Pershing, M.W. Brown, C.A. Mayo, R.D. Kenney, N.R. Record & T.V.N. Cole (2009). Regional-scale mean copepod concentration indicates relative abundance of North Atlantic right whales. *Marine Ecology Progress Series*. *378*: 211-225.

Record N.R., J.A. Runge, D.E. Pendleton, W.M. Balch, K.T.A. Davies, A.J. Pershing, C.L. Johnson, K. Stamieszkin, R. Ji, Z. Feng, et al. (2019). Rapid climate-driven circulation changes threaten conservation of endangered North Atlantic right whales. *Oceanography*. *32*(2): 162-169.

Richards R.A. (2016). *2016 Monkfish Operational Assessment*. Woods Hole, MA: U.S. Department of Commerce. NEFSC Reference Document 16-09. 109 p.

Risch D., C.W. Clark, P.J. Dugan, M. Popescu, U. Siebert & S.M. Van Parijs (2013). Minke whale acoustic behavior and multi-year seasonal and diel vocalization patterns in Massachusetts Bay, USA. *Marine Ecological Progress Series*. *489*: 279-295.

Roberts J.J., B.D. Best, L. Mannocci, E. Fujioka, P.N. Halpin, D.L. Palka, L.P. Garrison, K.D. Mullin, T.V.N. Cole, C.B. Khan, et al. (2016). Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. *Scientific Reports*. *6*: 22615.

Rothermel E.R., M.T. Balazik, J.E. Best, M.W. Breece, D.A. Fox & B.I. Gahagan (2020). Comparative migration ecology of striped bass and Atlantic sturgeon in the US Southern mid-Atlantic bight flyway. *PLoS ONE*. *15*(6): e0234442.

Salerno D., S. Eayrs, M. Pol, S. Lee & A.J. Baukus (2010). *Analysis of Size Selectivity and Bycatch in the Gillnet Fishery for Monkfish*. Portland, ME: Gulf of Maine Research Institute. p.

Schevill W.E., W.A. Watkins & K.E. Moore (1986). Status of *Eubalaena glacialis* off Cape Cod. *Reports of the International Whaling Commission. 10*: 79-82.

Seminoff J.A., C.D. Allen, G.H. Balazs, P.H. Dutton, T. Eguchi, H.L. Hass, S.A. Hargrove, M. Jensen, D.L. Klemm, A. Lauritsen, M., et al. (2015). *Status Review of the Green Turtle (Chelonia mydas) Under the Endangered Species Act*. U.S. Department of Commerce. NOAA Technical Memorandum: NOAA-TM-NMFS-SWFSC-539. p.

Shoop C. & R.D. Kenney (1992). Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. *Herpetological Monographs. 6*: 43-67.

Stein A., K.D. Friedland & M. Sutherland (2004a). Atlantic sturgeon marine bycatch and mortality on the continental shelf of the Northeast United States. *North American Journal of Fisheries Management. 24*: 171-183.

Stein A., K.D. Friedland & M. Sutherland (2004b). Atlantic sturgeon marine distribution and habitat use along the northeastern coast of the United States. *Transactions of the American Fisheries Society. 133*: 527-537.

Stone K.M., S. Leiter, R.D. Kenney, B. Wikgren, J.L. Thompson, J.K.D. Taylor & S.D. Kraus (2017). Distribution and abundance of cetaceans in a wind energy development area offshore of Massachusetts and Rhode Island. *Journal of Coastal Conservation. 21*: 527-543.

Swingle W.M., S.G. Barco, T.D. Pitchford, W.A. McLellan & D.A. Pabst (1993). Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. *Marine Mammal Science. 9*(3): 309-315.

TEWG (1998). *An Assessment of the Kemp's Ridley (*Lepidochelys kempii*) and Loggerhead (Caretta caretta) Sea Turtle Populations in the Western North Atlantic*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-SEFSC-409. 96 p.

TEWG (2000). *Assessment of the Kemp's Ridley and Loggerhead Sea Turtle Populations in the Western North Atlantic*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-SEFSC-444. 115 p.

TEWG (2007). *An Assessment of the Leatherback Turtle Population in the Western North Atlantic Ocean*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-SEFSC-555. 116 p.

TEWG (2009). *An Assessment of the Loggerhead Turtle Population in the Western North Atlantic*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-SEFSC-575. 131 p.

Vu E., D. Risch, C.W. Clark, S. Gaylord, L. Hatch, M. Thompson, D.N. Wiley & S.M. Van Parijs (2012). Humpback whale song occurs extensively on feeding grounds in the western North Atlantic Ocean. *Aquatic Biology. 14*(2): 175-183.

Waldman J.R., T.L. King, T. Savoy, L. Maceda, C. Grunwald & I.I. Wirgin (2013). Stock origins of subadult and adult Atlantic sturgeon, *Acipenser oxyrinchus*, in a non-natal estuary, Long Island Sound. *Estuaries and Coasts. 36*: 257-267.

Watkins W.A. & W.E. Schevill (1982). Observations of right whales (*Eubalaena glacialis*) in Cape Cod waters. *Fishery Bulletin. 80*(4): 875-880.

Weissman A., R. Knotek, J. Mandelman, D. Rudders, S. Roman & J. Sulikowski (2021). Determining discard mortality of monkfish in a sea scallop dredge fishery. *North American Journal of Fisheries Management. 41*.

Winn H.E., C.A. Price & P.W. Sorensen (1986). The distributional biology of the right whale (*Eubalaena glacialis*) in the western North Atlantic. *Reports of the International Whaling Commission. 10*: 129-138.

Wippelhauser G.S., J. Sulikowski, G.B. Zydlewski, M.A. Altenritter, M. Kieffer & M.T. Kinnison (2017). Movements of Atlantic Sturgeon of the Gulf of Maine Inside and Outside of the Geographically Defined Distinct Population Segment. *Marine and Coastal Fisheries. 9*: 93-107.

Wirgin I.I., M.W. Breece, D.A. Fox, L. Maceda, K.W. Wark & T.L. King (2015a). Origin of Atlantic sturgeon collected off the Delaware Coast during spring months. *North American Journal of Fisheries Management. 35*: 20-30.

Wirgin I.I., L. Maceda, C. Grunwald & T.L. King (2015b). Population origin of Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus* by-catch in U.S. Atlantic coast fisheries. *Journal of Fish Biology*. *86*(4): 1251-1270.