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2019 Standardized Bycatch Reporting Methodology Annual Discard Report with Observer Sea Day Allocation

**US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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**Northeast Fisheries Science Center
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2019 Standardized Bycatch Reporting Methodology Annual Discard Report with Observer Sea Day Allocation

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LIST OF ACRONYMS AND ABBREVIATIONS

AA = Access area
AMS = Allocation Management System
ASM = At-Sea Monitoring Program
CV = coefficient of variation
ESA = Endangered Species Act
FMP = fishery management plan
FY = Fiscal Year
GEN = General category
IFM = Industry funded monitoring
IFS = Industry Funded Scallop Observer program
lg = large mesh
LIM = Limited access category
MA = Mid-Atlantic
MMPA = Marine Mammal Protection Act
NE = New England
NEFOP = Northeast Fisheries Observer Program
NEFSC = Northeast Fisheries Science Center
NMFS = National Marine Fisheries Service
NOAA = National Oceanic and Atmospheric Administration
OPEN = Nonaccess area
PTNS = Pre-Trip Notification System
SBRM = Standardized Bycatch Reporting Methodology
SE = standard error of the estimate
sm = small mesh
TDD = Turtle Deflector Dredge
US = United States
VTR = Vessel Trip Report
xlg = extra large mesh

EXECUTIVE SUMMARY

This document contains a compilation of the information to meet the 2019 Standardized Bycatch Reporting Methodology (SBRM) annual discard report requirements. For fish and invertebrate species groups, several of the required annual discard report elements (discards and precision by fleet) can be found in Wigley and Tholke 2019, along with a description of the data sources, methods, results, and discussion. Similarly, for sea turtles, further information can be found in Murray 2012, 2015a, 2018.

An estimated 58,298 mt (128,526,054 lb) of federally regulated species were discarded during the July 2017 through June 2018 time period.

Based on the most recent bycatch analysis of sea turtles in the sink gillnet gear (2012-2016), there were an estimated 141 loggerhead interactions per year, 29 Kemp's ridley interactions per year, 5 leatherback interactions per year, and 22 unidentified hard-shelled turtle interactions per year. In the most recent analysis of bottom trawl gear (2009-2013), there were 231 estimated loggerhead interactions per year.

After sea day adjustments, a total of 9,304 sea days is needed to monitor the 15 SBRM species groups (14 fish/invertebrates species groups and 1 sea turtle species) during the April 2019 through March 2020 period. Of the 9,304 sea days, 7,713 sea days are needed for agency-funded fleets, and 1,591 sea days are needed for industry-funded fleets.

The funds available to the Northeast Fisheries Science Center's (NEFSC) Northeast Fisheries Sampling Branch in fiscal year (FY) 2019 are estimated to provide support for 5,622 days, and 1,992 days are carried over (i.e., bought ahead) from FY2018 funds for a total of 7,614 days for the April 2019 through March 2020 time period. Based upon an observer set-aside compensation rate analysis for the Industry-Funded Scallop Program, there is industry funding for 3,711 days. Hence, 11,325 days are available for observer coverage during April 2019 through March 2020.

Within the agency-funded fleets and prioritization-applicable funding, a shortfall of 645 (7,713 – 7,068) days is expected. The 2019 funding shortfall triggers the SBRM prioritization process; the prioritization approach is utilized with a portion of the agency funds. Practical limitations prevent the observer program from covering the 33 sea days associated with 5 fleets. These 33 sea days have been reallocated to the fleet impacted by the prioritization process.

The numbers of sea days allocated by fleet (where a fleet represents gear type, access area, trip category, region, and mesh group combinations) are given for the April 2019 through March 2020 period.

There is a proposed SBRM framework action to expand the sampling frame for the Mid-Atlantic and New England lobster pot fleets. If the framework action is approved, then beginning in the calendar quarter following final approval, all active federal lobster vessels may be eligible for selection to take an observer, regardless of whether they are required to submit Vessel Trip Reports.

INTRODUCTION

The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment was implemented on 27 February 2008 (NMFS 2008; NEFMC 2007) and later vacated by the United States (US) District Court for the District of Columbia and remanded back to National Marine Fisheries Service (NMFS) on 15 September 2011 because of a deficiency associated with the prioritization process, an element of the amendment. On 29 December 2011, NMFS removed the regulations implementing the SBRM (NMFS 2011). A revised SBRM Omnibus Amendment (NEFMC 2015), hereafter referred to as the SBRM amendment, was approved on 13 March 2015, and a final rule was implemented on 30 July 2015.

The SBRM amendment requires an annual discard report utilizing information obtained from the Northeast Fisheries Science Center’s (NEFSC) Fisheries Sampling Branch’s observer programs (Northeast Fisheries Observer Program [NEFOP] and Industry-funded Scallop [IFS] observer program) for 14 federally managed species groups¹ and sea turtles (Table 1). Specifically, the SBRM annual discard report requirements include: “...summaries of the trips observed, fishing modes in the relevant time period, funding issues and other related issues and developments, and projections of coverage across fisheries for upcoming time period. More detailed information would be provided in tables and figures that addressed: The number of observer trips and sea days scheduled that were accomplished for each fishing mode and quarter, as well as the number of trips and sea days of industry activity; the kept weight from unobserved quarters and statistical areas summarized by fishing mode; the amount kept and estimated discards of each species by fishing mode; and the relationship between sample size and precision for relevant fishing modes.” (NEFMC 2015, pages 237-238).

This document contains a compilation of the information to meet the 2019 SBRM annual discard report requirements. For fish and invertebrate species groups, several of the required annual discard report elements can be found in Wigley and Tholke 2019, along with a description of the data sources, methods, results, and discussion. Similarly, for sea turtles, further information can be found in Murray 2012, 2015a, 2018. This document also presents the number of sea days needed to monitor the 15 species groups, the funding available for observer coverage, and the numbers of sea days allocated by fleet² (where a fleet represents gear type, access area, trip category, region, and mesh group combinations) for the April 2019 through March 2020 period.

SUMMARY OF OBSERVER COVERAGE

A total of 3,560 trips (9,594 days) was observed during the July 2017 through June 2018 time period. When these trips were stratified by fleet and quarter, some trips were partitioned between fleets resulting in 3,793 trips (10,158 days). See Tables 2 and 3 in Wigley and Tholke 2019 for a summary of the number of observed trips and industry Vessel Trip Reports (VTR) trips by fleet and calendar quarter and a summary of the number of observed sea days and industry sea days by fleet and calendar quarter, respectively. There were 63 fleets uniquely identified in the July 2017 through June 2018 data. Based upon the industry activity during this time period, the

¹ As of December 15, 2017, blueline tilefish became a federally managed species in the [Mid-Atlantic Fishery Management Council’s Golden and Blueline Tilefish Fishery Management Plan](#).

² Fleets are synonymous with “fishing modes”.

New England (NE) large mesh other otter trawl fleet (Row 23) was added to the collection of fleets analyzed. Additionally, the NE small mesh mid-water trawl fleet (Row 43) was added as new fleet based on a decision to merge the NE OPEN small mesh mid-water trawl fleet with the NE Access Area small mesh mid-water trawl fleet (See Discussion in Wigley and Tholke 2019). Trips using shrimp twinned trawl (negear = 450) were removed from the analyses because these trips are subject to the South Atlantic Fishery Management Council's shrimp FMP that has an SBRM provision and are therefore covered by the Southeast Fisheries Science Center's observer program.

A spatial and temporal analysis of the kept weight of all species (i.e., any species retained during the trip) from statistical areas and calendar quarter was conducted. Over all fleets, 66% of kept weight of all species occurred in statistical areas and calendar quarters that had observer coverage. For a summary of the percentage of kept weight with observer coverage by fleet for the July 2017 through June 2018 time period, see Table 4 in Wigley and Tholke 2019.

SUMMARY OF DISCARD ESTIMATES

For fish/invertebrate species, the total catch, kept, and estimated discards (in live weight) and their associated coefficient of variation (CV) were derived for fleets using data collected during the July 2017 through June 2018 time period (Wigley and Tholke 2019). Based upon that discard estimation analysis, an estimated 58,298 mt (128,526,054 lb) of federally regulated species were discarded (Table 2). Fleet abbreviations used in this report are described in Appendix Table 1. See Tables 5A and 5B in Wigley and Tholke 2019 for summaries by fleet and SBRM species group and by fleet and individual species that compose these 14 species groups, respectively.

The most recent average annual estimates of sea turtle interactions and CVs in US Mid-Atlantic commercial fisheries are listed in Table 3. Methods to estimate sea day needs for the different gear types can be found in either Murray (2012) or Murray (2018).

SUMMARY OF SEA DAYS NEEDED

For fish/invertebrate species groups, the number of sea days needed to achieve a 30% CV of total discards for each species group was derived for 63 fleets by using data collected during July 2017 through June 2018 (Wigley and Tholke 2019). Based on that sample size analysis, a total of 7,667 sea days would be needed for the 14 fish and invertebrate species groups. Table 4 presents the number of sea days needed for each of the 14 species groups, number of pilot coverage days, and number of minimum pilot days. Table 4 and Step 1 in Table 5 present the sea days needed by fleet. The number of needed sea days for fish/invertebrate species groups is further adjusted as described below.

In the Wigley and Tholke 2019 analysis, there were 15 "erroneous" fleets identified which resulted from either VTR misreporting the gear type used (e.g., scallop trawl, beam trawl), fishing outside the regulations (using smaller mesh size than allowed), or inconsistent gear codes between data collection systems (e.g., otter trawl, other; pots and trap, other; dredge, other; and shrimp trawl). The 386 sea days associated with the 15 "erroneous" fleets (composed of 1,051 VTR trips during the July 2017 through June 2018 time period) have been set to zero (Table 5, Step 2, gray shaded cells). When this adjustment is made, a total of 7,281 days are needed to monitor 14 fish/invertebrate species groups in 48 fleets (Table 5A, Step 2).

For loggerhead turtles (*Caretta caretta*), roughly 3,300 days are needed across bottom trawl fisheries (Murray 2015a, and sea day estimation methods in Murray 2012), and roughly 887 days are needed across sink gillnet fisheries (Murray 2018). Estimates of sea day needs for turtles are revised when new bycatch estimates are published for a particular gear type (approximately every 5 years).

Similar to 2018, coverage needs for turtles on vessels using scallop dredge gear in the Mid-Atlantic (MA) were not estimated. Since May 2013, the use of turtle deflector dredges (TDDs) with chain mats have been required on scallop dredges in times and areas where loggerhead turtles are known to be most common. These modifications are intended to reduce those interactions in which animals are landed or observed from the deck, although other “unobservable” interactions may still be occurring (i.e., those in which animals escape from the gear or come in contact with the gear but are not captured and brought to the surface where they can be observed; Warden and Murray 2011). Managers currently monitor dredge fishing hours in the Mid-Atlantic scallop fishery as an indicator of whether elevated turtle interactions may be occurring compared to baseline conditions, because of the likelihood that most dredge-based takes of sea turtles may be unobservable (NMFS 2012)³. Therefore, observer coverage levels in the Mid-Atlantic scallop dredge fleets in 2019 will be driven by other species groups. This approach ensures that some level of coverage still exists to monitor the effectiveness of TDDs and chain mats in reducing observable interactions and helps monitor turtle interactions outside of gear regulated times and areas.

Sea day requirements for non-loggerhead turtle species (i.e., green [*Chelonia mydas*], Kemp’s ridley [*Lepidochelys kempii*], and leatherback [*Dermochelys coriacea*]) are not currently estimated because either: (1) too few have been observed to estimate total bycatch and CVs for these species with model-based approaches (Murray 2012) or (2) encounter rates of these species are so low that monitoring needs for these species are still being evaluated (Murray 2018) via a possible rarity filter, described in more detail in the SBRM 3-year Review Report (SBRM FMAT 2019). Because observers document all protected species interactions on trips, monitoring of other turtles species will still occur via days intended to monitor fish or loggerhead turtles.

The numbers of sea days needed to achieve a 30% CV associated with the Mid-Atlantic⁴ turtle gear types and fish/invertebrate fleets are given below and in Table 5, Steps 2 and 3.

Turtle Gear Types and Fish/Invertebrate Fleets	Sea Days Needed	
	Loggerhead Turtles	Fish/Invertebrate Species Groups
MA Otter Trawl, MA Scallop Trawl, MA Ruhle Trawl, MA Other Otter Trawl Rows 5, 6, 9-11, 15-16, and 21	3,309	1,890
MA Gillnet Rows 26-28	887	283

³ The Incidental Take Statement of the 2012 Sea Scallop [Biological Opinion](#) was amended 1 May 2015.

⁴ In the sea turtle sample size analysis, Mid-Atlantic refers to areas fished west of 70°W. In the fish/invertebrate sample size analysis, Mid-Atlantic refers to region based on port of departure from Connecticut and southward to North Carolina. Although it is recognized that port of departure may differ from the area fished, an odds ratio analysis conducted to evaluate broad-scale spatial coherence indicated a strong relationship between area fished (statistical area) and port of departure (region). Based upon this analysis, the “Mid-Atlantic” stratifications used in the 2 analyses were considered similar for otter trawl.

Days required for loggerhead turtles in gillnet gear encompass both the Mid-Atlantic and Georges Bank regions (Murray 2018). Projected sea day coverage was estimated from a pooled CV over all turtle strata, so monitoring needs for both regions are combined, rather than computed separately for each region. As such, days cannot be extracted from the 887 and allocated to Georges Bank and Mid-Atlantic separately. This region is expanded over previous analyses and overlaps a portion of New England fish/invertebrate fleets. Had fish and turtle days been merged over all 6 fleets (NE and MA gillnet fleets), then over 245 of the 887 days would have been allocated to the Gulf of Maine where turtles are not present, and likewise fewer days would have been allocated to the Mid-Atlantic. Therefore, all 887 days were allocated to the Mid-Atlantic, because 97% of estimated loggerhead bycatch is in the Mid-Atlantic, and mean bycatch rates in the Mid-Atlantic are >200 times larger than those on Georges Bank. Monitoring for turtles will still occur on Georges Bank because some northern Mid-Atlantic vessels using “Mid-Atlantic” days will likely fish on Georges Bank, and effort is also expected there from fish days⁵.

The numbers of sea days needed for the combined fish/invertebrate and turtle species groups were derived as followed:

- If the sum of the sea days needed for fish/invertebrate species groups of the corresponding fish/invertebrate fleets exceeded the sea days needed for the turtle gear type, then the sea days needed for fish/invertebrate was used. To support the penultimate prioritization approach, the sea days needed for turtles are apportioned to the corresponding fish/invertebrate fleets using the proportion of fish/invertebrate sea days within the turtle gear type (Table 5, Step 4).
- If the number of sea days needed for turtles for the gear type exceeded the sum of the sea days needed for fish/invertebrate groups of the corresponding fish/invertebrate fleets, then the difference⁶ between the sea days needed for turtles and fish were distributed according to the proportion of VTR sea days corresponding to fish/invertebrate fleets and added to the days needed for fish/invertebrate groups, by fleet (Table 5, Step 4). The number of VTR sea days by fleet is taken from Table 3 in Wigley and Tholke 2019 and reflects industry activity during the July 2017 through June 2018 time period.

A total of 9,304 sea days is needed for fish/invertebrates and loggerhead turtles (COMBINED; Table 5, Step 5) during the April 2019 through March 2002 period. Of the 9,304 sea days, 7,713 sea days are needed for agency-funded fleets and 1,591 sea days are needed for industry-funded fleets (Table 5, Step 6).

⁵ Using June 2017 through July 2018 VTR data, it has been estimated that the 367 days needed for fish in NE gillnet fleets would provide approximately 187 days of expected coverage in the Georges Bank region.

⁶ The use of the difference between sea days needed for fish and sea days needed for turtles (rather than the sum of the sea days needed for turtles) represents a refinement to the sea day allocation methods described in the 2015 SBRM Omnibus Amendment. This refinement prevents the sea days needed to monitor fish and turtles (combined) from exceeding the sea days needed for either taxa within a gear type.

SUMMARY OF FUNDING AVAILABLE FOR THE APRIL 2019 THROUGH MARCH 2020 PERIOD

The funds available to the NEFSC's Fisheries Sampling Branch in fiscal year (FY) 2019 are estimated to provide support for 5,622 days, and 1,992 days are carried over (i.e., bought ahead) from FY2018 funds⁷ for a total of 7,614 (5,622 + 1,992) days for the April 2019 through March 2020 time period. Based upon an observer set-aside compensation rate analysis for the Industry Funded Scallop program, there is industry funding for 3,711 days. Hence, 11,325 (7,614 + 3,711) days are available for observer coverage during April 2019 through March 2020.

Below is a summary of the 2 funding source categories: agency-funded and industry-funded. Within the agency-funded category, there are 5 subcategories: Atlantic Coast Observers, National Observer Program, Northeast Fisheries Observers, Marine Mammal Protection Act, and Reducing Bycatch.

Agency-funded

The funding sources for the 7,614 agency-funded sea days include: Atlantic Coast Observers (748 days), Northeast Fisheries Observers (3,832 days [2,806 days provided by permanent funds + 1,026 days provided by additional funds⁸ in the Consolidated Appropriations Act of 2019]), National Observer Program (567 days), Reducing Bycatch (59 days), and 1,862 FY2018 carryover/bought ahead days collectively fund the sea days for prioritization (7,068 days; Table 5, Step 7), and Marine Mammal Protection Act (MMPA; 416 days) and FY2018 carryover/bought ahead (130 days) collectively fund the sea days to monitor protected species (546 days; Table 5, Step 7).

- 546 agency-funded days are applicable to protected species⁹ only.
 - 546 MMPA days are associated with trips having sampling protocols that are specific to protected species (marine mammals, sea turtles, Endangered Species Act [ESA] listed fish species) and are not applicable for non-ESA listed fish and invertebrates. Owing to the extra demands of monitoring protected species, information on finfish and shellfish discards is not collected on these trips. However, these days will provide observer coverage for sea turtles and ESA-listed fish species above that which is allocated for all species.
- 7,068 (7,614 - 546) agency-funded days are applicable for all species.

⁷ The best estimate of the FY2018 carryover days is 1,992 days (1,862 prioritized carryover days and 130 MMPA carryover days).

⁸ Per the US DC Circuit Court (*Oceana v. Locke*, 2011), NMFS must fund Standardized Bycatch Reporting Methodology requirements in the Northeast before directing discretionary funds to at-sea monitoring and will therefore allocate the necessary resources from Observers and Training to meet SBRM requirements before funding at-sea monitoring with discretionary funding. However, in the FY19 Consolidated Appropriations Act, Congress allocated specific funds to use for at-sea monitoring and directed NMFS to fully fund the at-sea monitoring program. As such, these funds are not discretionary and NMFS has been directed to fully fund the at-sea monitoring program regardless of whether the SBRM requirements have been met.

⁹ In this document, protected species refers to marine mammals, sea turtles, and ESA-listed fish.

- 7,068 days are subject to the prioritization process across all fleets. The prioritization approach is described in the next section and given in Table 6.
- No sea days have been set aside to support discovery days to address emerging questions of scientific and management interest as the year progresses.
- Projected costs (i.e., an estimated rate that includes fixed and variable costs for operations, training, and data processing infrastructure and at-sea costs based on realized cost in FY18): \$1,227 for NEFOP days (\$712 for the costs associated with the sea days and \$515 from the infrastructure).

Industry-funded

The number of industry-funded sea days available for scallop fleets is determined by taking 1% of the total acceptable biological catch/annual catch limit set for the year. The Industry Funded Scallop program allows the vessels an increase in landings to help defray the costs of carrying an observer (i.e., the compensation rate). The sale of the additional scallops allocated to each boat supplies the funding for the at-sea costs of observer coverage. Based upon projected landings and expected prices, the IFS program generates funds in support of discard monitoring of the scallop fleets. A compensation rate analysis was undertaken to support observer coverage of the 10 industry-funded scallop fleets (Rows 10, 11, and 34-41; Table 5).

Because some NE vessels will be fishing in both NE and MA statistical areas, the New England and Mid-Atlantic open area limited access trips will be observed at 10%. The observer compensation rate in the access areas will be increased from 225 lb/day to 250 lb/day, because of the anticipated reduction in the prices of scallops. Observer coverage rates for limited access vessels in the proposed Framework 30 Georges Bank access areas would require at least 10%. Observer coverage would be 10% for the trips to Nantucket Lightship West, where 3 trips per full-time limited access vessel are proposed. Because only 1 trip is proposed to Closed Area I, the coverage rate there would be higher (15%). The coverage rate in the Mid-Atlantic access areas, where there are fewer bycatch concerns as well as the proposed allocation of 3 trips per limited access vessel, would be 10%.

- Based upon the compensation rate analysis and proposed Framework 30 allocations, a total of 3,711 sea days can be funded: 1,643 days for Open Areas, 940 days for Mid-Atlantic Access Areas, and 1,128 days in the New England Access Areas.
 - The industry-funded schedule runs April through March
 - Bulletins describing the 2019 set-aside compensation rate calculations and scallop management measures are available online at the [Greater Atlantic Regional Fisheries Office webpage](#).
- Of the 1,643 days for the Open Areas, there are 75 days for Limited Access General Category fleets (Rows 11, 38, and 39; Table 7) and 1,568 days for Limited Access fleets (Rows 40 and 41; Table 7).

- Coverage of the 10 fleets depends on industry activity among these fleets during April 2019 through March 2020; the sea days represent the maximum coverage (i.e., caps).
- Projected costs: the cost to industry for the at-sea portion is \$700/day for industry-funded scallop fleets. Additional agency funds are needed for training and certification of observers and data processing.

Below is a summary of sea days based on the agency budget and the compensation rate analysis, by funding source for April 2019 through March 2020.

Funding Source	Sea Days
Agency-funded Total	7,614
Agency-funded applicable to all species (prioritized days)	7,068
Agency-funded applicable to protected species only (nonprioritized days)	546
Industry-funded Scallop Total applicable to all species	3,711
Total	11,325

PRIORITIZATION TRIGGER AND DETAILS OF THE ALLOCATION OF SEA DAYS TO FLEETS

Within the agency-funded fleets and prioritization-applicable funding, a funding shortfall of 645 (7,713 – 7,068) days is expected (Table 5). The 2019 funding shortfall triggers the SBRM prioritization approach; the prioritization approach is utilized with a portion of the agency funds.

The following describes the steps taken to allocate the 11,325 funded sea days (Tables 5, 6, and 7).

- Step 1. Derive the number of sea days needed for the 14 fish/invertebrate species groups (see Wigley and Tholke 2019; Table 5).
- Step 2. Apply the sea day adjustments to 15 “erroneous” fleets (Rows 9, 15, 17, 19-23, 42, 45, 46, 57-60). A total of 7,281 days is needed for fish/invertebrate species group across 48 fleets (38 agency-funded fleets and 10 industry-funded fleets; Table 5).
- Step 3. Derive the number of sea days needed for sea turtles (see Murray 2012, 2015a, 2018; Table 5).
- Step 4. To integrate the monitoring needs of fish/invertebrates and sea turtles and to support the penultimate prioritization approach, derive the number of sea days needed for loggerhead turtles for each of the fish/invertebrate fleets associated with the turtle gear types (Table 5).
 - a. Summarize the number of VTR sea days corresponding to each fish/invertebrate fleet (see Table 3 in Wigley and Tholke 2019). The VTR sea days associated with the 15 “erroneous” fleets are given but not used (Table 5, Step 4a, gray shaded cells).

- b. Derive the percentage of VTR sea days for each fish/invertebrate fleet within the turtle gear type. For each fish/invertebrate fleet associated with the turtle gear type, divide the VTR sea days by the sum of the VTR sea days for the gear type.
- c. Derive the percentage of sea days needed for fish/invertebrate for each fish/invertebrate fleet within the turtle gear type. For each fish/invertebrate fleet associated with a turtle gear type, divide the adjusted sea days (Step 2) by the sum of the sea days for the gear type.
- d. Derive the number of additional sea days needed for loggerhead turtles.

If the number of sea days needed for loggerhead turtles is less than or equal to the sum of the sea days needed for the fish/invertebrate fleets associated with the turtle gear type, then no additional sea days are needed to monitor turtles. The additional sea days for turtles are set to zero for fish/invertebrate fleets.

If the number of sea days needed for loggerhead turtles is greater than the sum of the sea days needed for the fish/invertebrate fleets associated with the turtle gear type, then derive the difference between the sea days needed for loggerhead turtles and the sum of the sea days needed for fish/invertebrates. For each turtle gear type, multiply the difference between the number of sea days needed by the percentage of VTR sea days for each fish/invertebrate fleet within the turtle gear type. These days represent the number of additional days needed to monitor turtles in the fish/invertebrate fleets.

- e. Derive the number of sea days needed for loggerhead turtles by fish/invertebrate fleets.

If the number of sea days needed for loggerhead turtles is less than or equal to the sum of the sea days needed for the fish/invertebrate fleets associated with the turtle gear type, then multiply the sea days needed for turtles by the percentage of sea days needed for fish for each fish/invertebrate fleet within the turtle gear type (Step 4c).

If the number of sea days needed for loggerhead turtles is greater than the sum of the sea days needed for the fish/invertebrate fleets associated with the turtle gear type, then, add the sea days needed for fish/invertebrates (Step 2) and the additional days needed for turtles (Step 4d) for each fish/invertebrate fleet.

Step 5. Derive the number of sea days needed for fish/invertebrates and turtles COMBINED; select the largest of the 2 sea days (i.e., adjusted sea days needed for the 14 fish/invertebrate species groups [Step 2] and sea days needed for loggerhead turtles [Step 4e]) within the fleet.

A total of 9,304 days is needed to achieve a 30% CV on the discards of the 15 species groups in 2019 (Table 5).

Step 6. Partition fleets into funding source categories and sum the number of sea days needed by funding source.

There were 7,713 days and 1,591 days needed to achieve a 30% CV for the 15 species groups for agency-funded and industry-funded fleets, respectively (Table 5).

Step 7. Obtain funded sea days by funding source category. For agency-funded sea days, calculate the number of sea days applicable to the prioritization process (prioritized versus nonprioritized days).

There are 7,068 agency-funded days applicable to the prioritization process (Table 5).

Step 8. Evaluate needed sea days versus funded sea days for each funding category and calculate shortfall or surplus sea days associated with the prioritization process.

A funding shortfall of 645 days is expected for agency-funded fleets (Table 5).

Step 9. Apply the penultimate approach algorithm to allocate sea days to fleets for agency-funded days that are applicable to prioritization process.

As described in the SBRM Amendment, the number of agency-funded sea days applicable to the prioritization process is assigned to each fleet (fishing mode) after sequentially removing the sea days needed for the species group/fleet with the highest sea day difference between adjacent species groups within a fleet until the sea day shortfall is removed.

The following describes the steps taken to assign the agency-funded sea days applicable to the prioritization process using the penultimate approach (Table 6).

Step 9.1. For each agency-funded fleet where sea days are needed, list the sea days needed for the 15 species groups (fish/invertebrates and loggerhead turtles) in descending order within a fleet (Table 6). The minimum pilot days (Table 4) serves as the minimum sea days needed for fleets.

Step 9.2. Calculate the differences in sea days between adjacent species groups within each agency-funded fleet (Table 6).

Step 9.3. Within the resulting matrix of sea day differences (Step 9.2), identify the largest difference and remove the sea days associated with the species group accounting for this difference (Table 6).

Repeat this process for the next largest difference, with the constraint that the differences are taken in penultimate order (from left to right in the matrix) within a fleet, until the cumulative reduction of sea days equals the sea day shortfall (Step 8). If the reduction in sea days using the next largest (penultimate) value is greater than the shortfall, reduce the number of sea days only enough to remove the shortfall.

The 2019 sea day shortfall is 645 days. The 2,169 days (loggerhead turtles [TURS] in Row 5; Tables 5 and 6) associated with the largest sea day difference (766 days) between adjacent species groups is removed first (Table

6). The penultimate value in Row 5 is associated with monkfish (MONK, 1,403 days; Tables 4 and 6). Removing 766 days associated with TURS would remove more sea days than needed to reach the shortfall amount of 645 days (Table 6). Thus, only 645 of the 766 sea day difference between adjacent species groups (2,169 days for TURS and 1,403 days for MONK) are needed (Table 6). The penultimate value for Row 5 becomes 1,524 (2,169 - 645) days for TURS.

Step 9.4. After the removal of sea days within a fleet (Step 9.3), the remaining highest sea days (i.e., the penultimate or the left-hand-most value in Step 9.1) becomes the “PRIORITIZED” sea days required for that fleet.

The 7,068 prioritized sea days provide observer coverage to all 38 agency-funded fleets. There are 37 fleets for which no reduction in sea days occurred and there is 1 fleets (Row 5) for which the numbers of sea days allocated are less than the days needed to achieve a 30% CV. The prioritized sea days for Row 5 become 1,524 days (Table 6). For Row 5, all fish/invertebrate species groups have an expected CV of 30% or less; however, the CV for TURS in the MA otter trawl gear type group is expected to exceed 30%.

Step 9.5. Identify fleets that cannot be covered by observer program this year.

In 2019, there are practical limitations that prevent the observer program from covering 5 fleets (MA and NE floating trap [Rows 24 and 25, respectively], MA purse seine [Row 32], NE weir [Row 54], and NE urchin dredge [Row 61]; Table 7, rose shaded cells). The observer program currently has no sampling protocols in place for these fleets and will need time to create new trainings, logs, and/or databases to support sampling in these fleets. It is unlikely the observer program will be able to make significant changes to the observer databases or observer manuals this year. There are 33 sea days associated with the 5 fleets. The 33 prioritized sea days associated with the 5 fleets have been reallocated to Row 5, the fleet impacted by the prioritization process. Row 5 has 1,557 (1,524 + 33) prioritized sea days and the 5 fleets with practical limitations have zero days (Table 7).

The observer program has a current contract with 1 third-party provider for a 5-year period that began in 2018.

Step 10. Allocate agency-funded nonprioritized sea days.

There are 546 agency-funded days that are not applicable to the prioritization process (nonprioritized MMPA days; Table 7).

The 546 MMPA sea days, all assumed to have limited sampling protocols, are allocated to a row designated as “MMPA coverage” and will be associated with the MA and NE gillnet fleets (Rows 26-31; Table 7).

Step 11. Allocate industry-funded scallop days. The sea days for the industry-funded scallop fleets are assigned to trips via [the call-in system](#). The sea day coverage for industry-funded scallop fleets will depend on industry activity during the April 2019 through March 2020 period and will be capped as described above. Because of differences in stratification between the SBRM and scallop compensation rate analyses, the 3,711 industry-funded scallop sea days have not been allocated to individual fish/invertebrate fleets, but rather to groups of fish/invertebrate fleets that correspond to the stratification used in the compensation rate analysis: Mid-Atlantic Access Area fleets (Rows 10, 34, and 36; Table 7); Open Areas fleets (Rows 11, 38, and 39 for Limited Access General Category fleets and Rows 40 and 41 for Limited Access; Table 7); and New England Access Area fleets (Rows 35 and 37; Table 7). The allocated sea days represent the maximum coverage (i.e., caps).

Industry-funded sea days are expected to meet or exceed the SBRM required sea days for each fleet group corresponding to the stratification used in the compensation rate analysis (Table 7).

Step 12. The sea days allocated for the April 2019 – March 2020 (TOTAL) is the sum of the prioritized days (Step 9.5), nonprioritized days (Step 10), and industry-funded scallop days (Step 11). A total of 11,325 days is allocated across 48 fleets (Table 7).

The agency-funded fleets with an * or ** (Table 7) indicate that all or some of the observer coverage will be assigned via the Pre-Trip Notification System (PTNS; Palmer et al. 2013) or call-in programs for scallops and herring. This designation means all or some of the observer coverage within each of these fleets will depend upon industry activity during the April 2019 through March 2020 period. The PTNS sea days for agency-funded fleets will be proportionally allocated based initially on previous year's industry activity and then adjusted to correspond to current year's activity.

All other fleets will have sea days assigned to fishing trips via the NEFOP sea day schedule. The prioritized sea days on the NEFOP sea day schedule are provided by fleet. A matrix of VTR trip percentages by quarter and state within a fleet based on the VTR trips during the July 2017 through June 2018 time period is provided as information on previous industry activity patterns. This information does not replace third-party provider's local knowledge of current industry activity.

DISCUSSION

As a practical matter, fleets with low trip activity within a quarter or overall are very difficult to “find” unless they are part of PTNS or a call-in program. Attempts to assign observers can be inefficient since the probability of randomly finding such trips at a specific port or time period will be very low. While some of the challenges may be overcome with outreach, vessel selection letters, and other operational efforts, some fleets may fall below practical detection limits and therefore some of the sea days associated with low trip activity fleets may not be accomplished. If any sea days are not accomplished, those sea days will be carried over.

The sample size analysis conducted by Wigley and Tholke (2019) derived the expected precision (CV) of the discard estimates for various species groups over a range of sample sizes for each of the species groups that were not filtered out by the importance filter (see Table 7 and Figure 3 in Wigley and Tholke 2019). Deriving the expected CV assumes the variance of the discard estimate is constant over a range of sample sizes (number of trips).

The estimated 1,862 prioritized carryover days are the result of unaccomplished sea days during the April 2018-March 2019 time period. The 1,862 prioritized carryover days have increased the number of prioritized sea days to monitor the 15 SBRM species groups during the April 2019-March 2020 time period. Because of the unaccomplished sea days during the April 2018-March 2019 time period, it is possible that the lower observer coverage could lead to discard estimates with CVs that are higher than the SBRM precision standard for some fleets.

At-Sea Monitoring (ASM) coverage, associated with Northeast Multispecies (groundfish) fishery management plan (FMP), is used for compliance monitoring and is not used to meet SBRM sea day requirements. Information relating to industry-funded ASM coverage can be found on the [Greater Atlantic Regional Fisheries Office monitoring webpage](#).

To reduce potential bias within SBRM, data associated with ASM, Atlantic States Marine Fisheries Commission, and NY DEC were not used in the 2019 fish/invertebrate analyses (Wigley and Tholke 2019) because these trips may have different goals/objectives and/or different stratification/sea day allocations than the other NEFOP trips and IFS trips. This approach follows the 2017 SBRM Fishery Management Action Team recommendation to exclude individual FMP compliance monitoring trips from future annual discard estimation, precision, and sample size analyses for fish/invertebrate species groups (SBRM FMAT, 2019).

The SBRM analyses use master data and are predicated upon accurately reported and audited data. To reduce and/or prevent “erroneous” fleets, the VTR master data would benefit from enhanced data auditing (including data leverage between data collection systems) coupled with targeted outreach and education to industry members on the importance of accurate reporting. Additionally, gear code consistency is needed between the fishery dependent data collection systems (Observer, Vessel Trip Report, and Commercial Fisheries databases).

Trip Selection Systems

The observer program uses 3 systems to select fishing trips for observer coverage: the PTNS; IFS interactive voice response/call-in program (IVR); and the NEFOP Sea Day Schedule selection protocols that include selection by phone, email, letter, VMS message, or in person at the docks (dock intercept). For some fleets, both PTNS and the NEFOP Sea Day Schedule are used for the groundfish and nongroundfish components of these fleets. The Sea Day Schedule is used for trips in the nongroundfish component. Amendment 16 of the Northeast Multispecies FMP specifies that vessel representatives are required to notify NMFS in advance of planned groundfish declared trips via the PTNS. The PTNS handles the selection of trips for NEFOP, NEFOP limited (MMPA funded sea days), and ASM coverage for all groundfish trips. For NEFOP and ASM sampling, trip selection is proportional to the current fishing activity in a given stratum.

In 2018, the PTNS was modified to allow the system to support multiple sampling programs with different sampling designs (e.g., SBRM, ASM). This modification now allows NMFS to deploy SBRM coverage in the groundfish fleets consistent with the SBRM requirements. In past fishing years, NMFS has distributed the SBRM coverage evenly across the groundfish fleets, and each sector received approximately the same NEFOP SBRM coverage rate. Starting

May 1, 2019¹⁰, NEFOP SBRM sea days will be assigned consistent with the fleet-based coverage levels prescribed by the SBRM. This change is intended to better ensure that the levels of NEFOP SBRM coverage meet SBRM regulatory requirements. Since SBRM fleets can experience varying levels of NEFOP coverage depending on the fleet composition of some sectors, some sectors will receive more NEFOP coverage than others. Hence, sectors may require differing amounts of ASM coverage to achieve the combined target coverage level. The methods used to apportion observer sea days among the trip selection systems are described in the 2019 Observer Sea Days by Trip Selection System (NEFSC 2019).

Expanded Sampling Frame for MA and NE Lobster Pot Fleets

The 2019 SBRM analyses for discard estimation and sample size (Wigley and Tholke 2019) used the VTR (including clam logbook) data to define the sampling frame for the Greater Atlantic region's fleets using data collected from the July 2017 through June 2018 time period. Vessels that hold federal fishing permits have VTR reporting requirements except vessels that hold only a federal lobster permit. Consequently, vessels with only a federal lobster permit were not included in the SBRM data sets. The discard estimates in Wigley and Tholke 2019 appropriately reflect the underlying data used (e.g., the VTR data used to raise the discard ratios to total discards and the observed trips used to derive the discard ratios were from the same VTR-based sampling frame). It is inappropriate to extrapolate beyond the sampling frame used unless it can be shown that the trips with no VTR reporting requirements have the same landings and discard characteristics as the trips with VTR reporting requirements. An approach was needed to include all federal trips in the MA and NE lobster pot fleets such that the SBRM analyses would be based upon information from all federally permitted vessels.

In April 2016, the agency found that expanding the sampling frame for the MA and NE lobster pot fleets to include all vessels with a federal permit requires a regulatory change to the SBRM Amendment. The agency has pursued the required language change through a proposed framework action. The proposed SBRM framework action seeks to clarify the Councils' intent for the SBRM process to monitor bycatch of federally managed or protected species from the entire active lobster pot fleet. This proposed action would expand the lobster pot sampling frame used in this analysis by allowing the NEFSC to include fishing activity and catch data (e.g., trip length, date, pounds kept, port of landing) for all active lobster pot vessels in the annual SBRM analyses and to assign NEFOP coverage to any federal lobster pot vessel, regardless of whether the vessel is required to submit VTRs. If the proposed SBRM framework action is approved then, beginning in the calendar quarter following approval, all active federal lobster vessels may be eligible for selection. Implementing the proposed action would not change the number of sea days needed for the April 2019 through March 2020 period.

¹⁰ For the first month of the 2019 SBRM year (April 1, 2019 - April 30, 2019) only, SBRM coverage will be distributed equally across all SBRM fleets operating within the groundfish fishery and will continue at a constant coverage rate across sectors. Beginning May 1, 2019, consistent with the start of the groundfish fishing year, SBRM sea days will be tasked following fleet-based coverage levels prescribed by the SBRM. The modification to the sampling objectives is intended to ensure that the levels of SBRM NEFOP coverage meet SBRM regulatory requirements. PTNS target coverage will still be set to achieve all required SBRM sea days by March 31, 2020. This decision was driven by a need to allow for some additional time to communicate to industry what changes can be expected from fleet-varying SBRM NEFOP coverage levels (and thus variable ASM coverage needs) across sectors. In future years, SBRM fleet-based coverage in PTNS will be deployed consistent with the SBRM year April 1 through March 31.

The rest of the SBRM fleets did not need to have the sampling frame expanded because these vessels have VTR reporting requirements associated with their federal fishing permits and their fishing trips are already included in the SBRM sampling frame.

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Table 1. A list of the 14 fish and invertebrate species groups and 1 species of sea turtle (in bold), with species group abbreviations in parentheses and scientific names in italics, and the species that compose these groups, corresponding to the 13 federal fishery management plans implements in the waters off the northeastern United States.

Species/Group	Scientific Name
ATLANTIC SALMON (SAL)	<i>Salmo salar</i>
BLUEFISH (BLUE)	<i>Pomatomus saltatrix</i>
FLUKE - SCUP - BLACK SEA BASS (FSB)	
Black sea bass	<i>Centropristis striata</i>
Fluke	<i>Paralichthys dentatus</i>
Scup	<i>Stenotomus chrysops</i>
HERRING, ATLANTIC (HERR)	<i>Clupea harengus</i>
LARGE MESH GROUND FISH (GFL)	
American plaice	<i>Hippoglossoides platessoides</i>
Atlantic cod	<i>Gadus morhua</i>
Atlantic halibut	<i>Hippoglossus hippoglossus</i>
Atlantic wolffish	<i>Anarhichas lupus</i>
Haddock	<i>Melanogrammus aeglefinus</i>
Ocean pout	<i>Zoarces americanus</i>
Pollock	<i>Pollachius virens</i>
Redfish	<i>Sebastes fasciatus</i>
White hake	<i>Urophycis tenuis</i>
Windowpane flounder	<i>Scophthalmus aquosus</i>
Winter flounder	<i>Pseudopleuronectes americanus</i>
Witch flounder	<i>Glyptocephalus cynoglossus</i>
Yellowtail flounder	<i>Limanda ferruginea</i>
MONKFISH (MONK)	<i>Lophius americanus</i>
RED DEEPCRAB (RCRAB)	<i>Chaceon quinque-dens</i>
SEA SCALLOP (SCAL)	<i>Placopecten magellanicus</i>
SKATE COMPLEX (SKATE)¹¹	<i>Rajidae</i>
Barndoor skate	<i>Dipturus laevis</i>
Clearnose skate	<i>Raja eglanteria</i>
Little skate	<i>Leucoraja erinacea</i>
Rosette skate	<i>Leucoraja garmani</i>
Smooth skate	<i>Malacoraja senta</i>
Thorny skate	<i>Amblyraja radiata</i>
Winter skate	<i>Leucoraja ocellata</i>
SMALL MESH GROUND FISH (GFS)	
Offshore hake	<i>Merluccius albidus</i>
Red hake	<i>Urophycis chuss</i>
Silver hake	<i>Merluccius bilinearis</i>
SPINY DOGFISH (DOG)	<i>Squalus acanthias</i>
SQUID¹² - BUTTERFISH - MACKEREL (SBM)	
Atlantic mackerel	<i>Scomber scombrus</i>
Butterfish	<i>Peprilus triacanthus</i>
Longfin inshore squid	<i>Doryteuthis (Amerigo) pealeii</i>
Northern shortfin squid	<i>Illex illecebrosus</i>
SURFLAM - OCEAN QUAHOG (SCOQ)	
Surfclam	<i>Spisula solidissima</i>
Ocean quahog	<i>Arctica islandica</i>
TILEFISH (TILE)	
Blueline tilefish	<i>Caulolatilus microps</i>
Golden tilefish	<i>Lopholatilus chamaeleonticeps</i>
LOGGERHEAD TURTLE (TURS)	<i>Caretta caretta</i>

¹¹ Skate complex comprises 7 species as well as skate, unknown.

¹² Squid, unclassified is included in this species group. Longfin inshore squid and northern shortfin squid are also known as Loligo squid and Illex squid, respectively.

Table 2. Total catch (live lb), Vessel Trip Report landings (kept; live lb), estimated discards (live lb), associated coefficient of variation (CV), and standard error of the estimated discards (SE; live lb) for 14 Standardized Bycatch Reporting Methodology (SBRM) species groups combined, by fleet, based on July 2017 through June 2018 data. Dark shading indicates fleets not considered or with no observed trips in the annual analysis. These CV were not used in the annual sample size analysis. Blank CV indicates either no discards or discards equals 0. "P" indicates fleets with "pilot" designation. Taken from Table 5C in Wigley and Tholke 2019.

Species: 14 SBRM SPECIES GROUPS COMBINED

Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	SE	Pilot
1	Longline, Bottom	OPEN	all	MA	all	1,595,552	1,576,176	19,376	0.426	8,247	
2	Longline, Bottom	OPEN	all	NE	all	4,799,880	4,309,280	490,600	0.239	117,425	
3	Hand Line	OPEN	all	MA	all	316,236	261,958	54,278	0.349	18,956	
4	Hand Line	OPEN	all	NE	all	2,512,561	2,306,305	206,256	0.256	52,719	
5	Otter Trawl	OPEN	all	MA	sm	52,608,309	41,351,074	11,257,235	0.098	1,104,356	
6	Otter Trawl	OPEN	all	MA	lg	20,300,478	10,454,308	9,846,170	0.075	742,537	
7	Otter Trawl	OPEN	all	NE	sm	75,071,960	61,973,548	13,098,412	0.080	1,046,754	
8	Otter Trawl	OPEN	all	NE	lg	73,694,645	52,768,389	20,926,256	0.120	2,506,820	
10	Otter Trawl, Scallop	AA	GEN	MA	lg	387,000	387,000				P
11	Otter Trawl, Scallop	OPEN	GEN	MA	lg	267,814	251,606	16,209	0.000	0	P
12	Otter Trawl, Twin	OPEN	all	MA	sm	1,575,733	1,189,225	386,508	0.341	131,787	
13	Otter Trawl, Twin	OPEN	all	MA	lg	529,408	414,126	115,282	0.302	34,853	
14	Otter Trawl, Twin	OPEN	all	NE	sm	208,941	152,798	56,142	0.000	0	P
16	Otter Trawl, Ruhle	OPEN	all	MA	lg	16,834	16,834				P
17	Otter Trawl, Ruhle	OPEN	all	NE	sm	1,210,358	751,598	458,761	0.119	54,394	P
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	3,023,769	2,492,141	531,628	0.071	37,884	P
19	Otter Trawl, Shrimp	OPEN	all	MA	sm	878,790	3,007	875,783	0.660	577,793	P
20	Otter Trawl, Shrimp	OPEN	all	NE	sm	120,435	120,435				P
22	Otter Trawl, Other	OPEN	all	NE	sm	815,604	815,604				P
25	Floating Trap	OPEN	all	NE	all	13,381	13,381				P
26	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	1,583,990	1,283,012	300,978	0.173	52,058	
27	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	3,059,321	2,952,510	106,811	0.181	19,335	
28	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	6,668,738	5,695,211	973,527	0.254	246,906	
29	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	2,386	2,386				P
30	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	8,284,374	6,846,983	1,437,391	0.188	269,809	
31	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	21,132,635	18,055,328	3,077,307	0.104	320,477	
32	Purse Seine	OPEN	all	MA	all	0	0				P
33	Purse Seine	OPEN	all	NE	all	48,831,516	48,831,365	151	0.441	66	

Table 2, continued. Total catch (live lb), Vessel Trip Report landings (kept; live lb), estimated discards (live lb), associated coefficient of variation (CV), and standard error of the estimated discards (SE; live lb) for 14 Standardized Bycatch Reporting Methodology (SBRM) species groups combined, by fleet, based on July 2017 through June 2018 data. Dark shading indicates fleets not considered or with no observed trips in the annual analysis. These CV were not used in the annual sample size analysis. Blank CV indicates either no discards or discards equals 0. "P" indicates fleets with "pilot" designation. Taken from Table 5C in Wigley and Tholke 2019.

Species: 14 SBRM SPECIES GROUPS COMBINED

Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	SE	Pilot
34	Dredge, Scallop	AA	GEN	MA	all	2,017,588	1,884,391	133,198	0.252	33,524	
35	Dredge, Scallop	AA	GEN	NE	all	3,998,196	3,717,758	280,438	0.174	48,896	
36	Dredge, Scallop	AA	LIM	MA	all	62,033,358	58,137,895	3,895,464	0.092	358,209	
37	Dredge, Scallop	AA	LIM	NE	all	169,168,438	150,726,183	18,442,255	0.068	1,257,005	
38	Dredge, Scallop	OPEN	GEN	MA	all	12,564,665	10,385,800	2,178,865	0.075	164,498	
39	Dredge, Scallop	OPEN	GEN	NE	all	9,039,701	7,611,759	1,427,942	0.146	208,932	
40	Dredge, Scallop	OPEN	LIM	MA	all	49,352,598	45,136,451	4,216,148	0.142	598,544	
41	Dredge, Scallop	OPEN	LIM	NE	all	172,097,751	147,211,797	24,885,953	0.122	3,027,753	
43	Trawl, Mid-water Paired&Single	all	all	NE	sm	56,155,463	56,144,411	11,052	0.614	6,790	
44	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	16,176,872	16,098,715	78,157	0.586	45,790	P
46	Pots and Traps, Other	OPEN	all	NE	all	8,744	8,744				P
47	Pots and Traps, Fish	OPEN	all	MA	all	385,190	285,501	99,688	0.168	16,743	
48	Pots and Traps, Fish	OPEN	all	NE	all	463,494	282,389	181,105	0.408	73,906	
49	Pots and Traps, Conch	OPEN	all	MA	all	561	120	441	0.631	278	
50	Pots and Traps, Conch	OPEN	all	NE	all	2,415	1,402	1,013	0.647	655	
52	Pots and Traps, Lobster	OPEN	all	MA	all	244,498	118,041	126,457	0.651	82,378	
53	Pots and Traps, Lobster	OPEN	all	NE	all	417,979	67,833	350,146	2.139	748,934	
55	Pots and Traps, Crab	OPEN	all	MA	all	394,144	241,029	153,115	0.126	19,246	P
56	Pots and Traps, Crab	OPEN	all	NE	all	4,337,324	3,209,542	1,127,782	0.315	354,707	
57	Beam Trawl	OPEN	all	MA	sm	1,101,402	1,101,402				P
60	Dredge, Other	OPEN	all	MA	all	170	170				P
62	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	258,915,686	256,425,795	2,489,891	0.453	1,127,836	
63	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	199,453,587	195,241,703	4,211,884	0.198	835,334	
	Confidential fleets					660,365	660,365				
	Other minor fleets					417,127	417,127				
	TOTAL					1,348,917,964	1,220,391,910	128,526,054	0.038	4,872,768	

Table 3. The most recent average annual estimates of sea turtle interactions and their associated coefficient of variation (CV) in US Mid-Atlantic commercial fisheries.

Fishery	Estimate	CV	Years Included	Species*	Reference
Bottom trawl, for fish and scallops	231	0.13	01 Jan 2009-2013	Loggerhead	Murray 2015a
Sea Scallop Dredge	22	0.73	01 Jan 2009-2014	Loggerhead	Murray 2015b
Sink Gillnet	141	0.29	01 Jan 2012-2016	Loggerhead	Murray 2018
Sink Gillnet	29	0.43	01 Jan 2012-2016	Kemp's ridley	Murray 2018
Sink Gillnet	5	0.71	01 Jan 2012-2016	Leatherback	Murray 2018
Sink Gillnet	22	0.37	01 Jan 2012-2016	Unidentified hard-shelled	Murray 2018

* Sea day monitoring needs for Kemp's ridley and leatherback turtles in sink gillnet gear were not projected because of the low encounter rate of these species.

Table 4. The number of sea days needed to achieve a 30% coefficient of variation of the discard estimate for each of the 14 fish and invertebrate species groups, the number of pilot sea days, the number of minimum pilot sea days, and the maximum number of sea days needed for each fleet (2019 Sea Days Needed) for fish and invertebrate species groups based on July 2017 through June 2018 data. Bold red font indicates basis for fleet sea days. "P" indicates fleets with "pilot" designation. Species group abbreviations are given in Table 1. Taken from Table 6B in Wigley and Tholke 2019.

Row	Fleet Gear Type	Access Area	Trip	Region	Mesh Size	BLUE	HERR	SAL	RCRAB	SCAL	SBM	MONK	GFL	GFS	SKATE	DOG	FSB	SCOC	TILE	Pilot Days	Min Pilot Days	2019 Sea Days Needed	Pilot
1	Longline, Bottom	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107	107	107	
2	Longline, Bottom	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	35	0	0	0	23	14	35	
3	Hand Line	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	14	14	
4	Hand Line	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	13	13	
5	Otter Trawl	OPEN	all	MA	sm	0	0	0	0	0	0	1,403	0	930	599	608	474	0	0	162	30	1,403	
6	Otter Trawl	OPEN	all	MA	lg	0	0	0	0	0	0	451	0	0	71	209	242	0	0	132	30	451	
7	Otter Trawl	OPEN	all	NE	sm	0	0	0	0	0	611	0	740	713	568	664	550	0	0	205	34	740	
8	Otter Trawl	OPEN	all	NE	lg	0	0	0	0	0	0	284	134	1,068	435	1,590	602	0	0	267	35	1,590	
9	Otter Trawl, Scallop	AA	GEN	MA	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	7	
10	Otter Trawl, Scallop	AA	GEN	MA	lg	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	P
11	Otter Trawl, Scallop	OPEN	GEN	MA	lg	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	P
12	Otter Trawl, Twin	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	55	55	
13	Otter Trawl, Twin	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	13	13	
14	Otter Trawl, Twin	OPEN	all	NE	sm	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	P
15	Otter Trawl, Ruhle	OPEN	all	MA	sm	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	P
16	Otter Trawl, Ruhle	OPEN	all	MA	lg	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	P
17	Otter Trawl, Ruhle	OPEN	all	NE	sm	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	P
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	P
19	Otter Trawl, Shrimp	OPEN	all	MA	sm	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	P
20	Otter Trawl, Shrimp	OPEN	all	NE	sm	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	P
21	Otter Trawl, Other	OPEN	all	MA	sm	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	P
22	Otter Trawl, Other	OPEN	all	NE	sm	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	P
23	Otter Trawl, Other	OPEN	all	NE	lg	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
24	Floating Trap	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
25	Floating Trap	OPEN	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	P
26	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	125	0	0	0	38	13	125	
27	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	13	13	
28	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	0	0	0	0	0	0	0	0	0	145	0	0	0	36	14	145		
29	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
30	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	181	0	0	0	65	20	181	
31	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	0	0	0	0	0	0	180	0	0	69	96	0	0	0	90	21	180	
32	Purse Seine	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
33	Purse Seine	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	19	19	

Table 4, continued. The number of sea days needed to achieve a 30% coefficient of variation of the discard estimate for each of the 14 fish and invertebrate species groups, the number of pilot sea days, the number of minimum pilot sea days, and the maximum number of sea days needed for each fleet (2019 Sea Days Needed) for fish and invertebrate species groups based on July 2017 through June 2018 data. Bold red font indicates basis for fleet sea days. "P" indicates fleets with "pilot" designation. Species group abbreviations are given in Table 1. Taken from Table 6B in Wigley and Tholke 2019.

Row	Fleet Gear Type	Access Area	Trip	Region	Mesh Size	BLUE	HERR	SAL	RCRAB	SCAL	SBM	MONK	GFL	GFS	SKATE	DOG	FSB	SCOQ	TILE	Pilot Days	Min Pilot Days	2019 Sea Days Needed	Pilot
34	Dredge, Scallop	AA	GEN	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	17	17	
35	Dredge, Scallop	AA	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	6	6	
36	Dredge, Scallop	AA	LIM	MA	all	0	0	0	0	0	0	112	0	0	68	0	0	0	0	99	80	112	
37	Dredge, Scallop	AA	LIM	NE	all	0	0	0	0	268	0	222	352	252	149	0	0	0	0	187	89	352	
38	Dredge, Scallop	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	11	0	0	0	0	68	21	21	
39	Dredge, Scallop	OPEN	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	18	18	
40	Dredge, Scallop	OPEN	LIM	MA	all	0	0	0	0	0	0	79	0	0	97	0	0	0	0	99	99	99	
41	Dredge, Scallop	OPEN	LIM	NE	all	0	0	0	0	904	0	214	543	393	118	0	635	0	0	173	111	904	
42	Danish Seine	OPEN	all	MA	all	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	P
43	Trawl, Mid-water Paired&Single	all	all	NE	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	42	42	
44	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	P
45	Pots and Traps, Other	OPEN	all	MA	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
46	Pots and Traps, Other	OPEN	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	P
47	Pots and Traps, Fish	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	12	12	
48	Pots and Traps, Fish	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	9	9	
49	Pots and Traps, Conch	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	12	12	
50	Pots and Traps, Conch	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	12	12	
51	Pots and Traps, Hagfish	OPEN	all	NE	all	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	P
52	Pots and Traps, Lobster	OPEN	all	MA	all	0	0	0	13	0	0	0	0	0	0	0	0	0	0	38	19	19	
53	Pots and Traps, Lobster	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	444	17	17	
54	Weir	OPEN	all	NE	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
55	Pots and Traps, Crab	OPEN	all	MA	all	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	P
56	Pots and Traps, Crab	OPEN	all	NE	all	0	0	0	80	0	0	0	0	0	0	0	0	0	0	90	90	90	
57	Beam Trawl	OPEN	all	MA	sm	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	P
58	Beam Trawl	OPEN	all	MA	lg	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	P
59	Beam Trawl	OPEN	all	NE	lg	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	P
60	Dredge, Other	OPEN	all	MA	all	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	P
61	Dredge, Urchin	OPEN	all	NE	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
62	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	0	0	0	0	0	0	8	0	0	0	0	0	0	0	80	24	24	
63	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	0	0	0	0	0	0	35	0	0	25	0	0	0	0	55	18	35	
					Totals	775	775	775	868	1,947	1,386	3,763	2,544	4,131	3,130	4,283	3,278	775	775	3,767	1,923	7,667	

Table 5. The number of sea days needed to monitor fish/invertebrates (FISH), loggerhead turtles (TURS), combined species groups (COMBINED) by fleet (Steps 1 through 6), and the number of funded sea days for April 2019 through March 2020 (Step 7) and the differences between needed and funded days (Step 8).

Fleet						Step 1	Step 2	Step 3	Step 4a	Step 4b	Step 4c	Step 4d	Step 4e	Step 5
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2019 Sea Days Needed for FISH	2019 Sea Days Needed for FISH ADJUSTED	2019 Sea Days Needed for TURS	Vessel Trip Report Sea Days	% Vessel Trip Report Sea Days	% Sea Days Needed for FISH	Additional Sea Days needed for TURS	TURS Sea Days by FISH fleet	2019 Sea Days Needed COMBINED
1	Longline, Bottom	OPEN	all	MA	all	107	107		1,028					107
2	Longline, Bottom	OPEN	all	NE	all	35	35		971					35
3	Hand Line	OPEN	all	MA	all	14	14		3,453					14
4	Hand Line	OPEN	all	NE	all	13	13		3,029					13
5	Otter Trawl	OPEN	all	MA	sm	1,403	1,403	3,309	8,117	0.5399	0.742	766	2,169	2,169
6	Otter Trawl	OPEN	all	MA	lg	451	451		6,578	0.4376	0.239	621	1,072	1,072
7	Otter Trawl	OPEN	all	NE	sm	740	740		10,256					740
8	Otter Trawl	OPEN	all	NE	lg	1,590	1,590		13,349					1,590
9	Otter Trawl, Scallop	AA	GEN	MA	sm	7	0		23	0.0000	0.000	0	0	0
10	Otter Trawl, Scallop	AA	GEN	MA	lg	13	13		172	0.0114	0.007	16	29	29
11	Otter Trawl, Scallop	OPEN	GEN	MA	lg	19	19		145	0.0096	0.010	14	33	33
12	Otter Trawl, Twin	OPEN	all	MA	sm	55	55		197					55
13	Otter Trawl, Twin	OPEN	all	MA	lg	13	13		94					13
14	Otter Trawl, Twin	OPEN	all	NE	sm	16	16		33					16
15	Otter Trawl, Ruhle	OPEN	all	MA	sm	39	0		76	0.0000	0.000	0	0	0
16	Otter Trawl, Ruhle	OPEN	all	MA	lg	4	4.0		21	0.0014	0.002	2	6	6
17	Otter Trawl, Ruhle	OPEN	all	NE	sm	61	0		162					0
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	105	105		515					105
19	Otter Trawl, Shrimp	OPEN	all	MA	sm	59	0		1,250					0
20	Otter Trawl, Shrimp	OPEN	all	NE	sm	16	0		107					0
21	Otter Trawl, Other	OPEN	all	MA	sm	18	0		69	0.0000	0.000	0	0	0
22	Otter Trawl, Other	OPEN	all	NE	sm	71	0		254					0
23	Otter Trawl, Other	OPEN	all	NE	lg	6	0		15					0
24	Floating Trap	OPEN	all	MA	all	6	6		66					6
25	Floating Trap	OPEN	all	NE	all	12	12		178					12
26	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	125	125	887	1,889	0.358	0.442	216	341	341
27	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	13	13		1,695	0.321	0.046	194	207	207
28	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	145	145		1,689	0.320	0.512	194	339	339
29	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	6	6		15					6
30	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	181	181		3,074					181
31	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	180	180		4,503					180
32	Purse Seine	OPEN	all	MA	all	6	6		234					6
33	Purse Seine	OPEN	all	NE	all	19	19		712					19

Table 5, continued. The number of sea days needed to monitor fish/invertebrates (FISH), loggerhead turtles (TURS), combined species groups (COMBINED) by fleet (Steps 1 through 6), and the number of funded sea days for April 2019 through March 2020 (Step 7) and the differences between needed and funded days (Step 8).

Fleet						Step 1	Step 2	Step 3	Step 4a	Step 4b	Step 4c	Step 4d	Step 4e	Step 5
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2019 Sea Days Needed for FISH	2019 Sea Days Needed for FISH ADJUSTED	2019 Sea Days Needed for TURS	Vessel Trip Report Sea Days	% Vessel Trip Report Sea Days	% Sea Days Needed for FISH	Additional Sea Days needed for TURS	TURS Sea Days by FISH fleet	2019 Sea Days Needed COMBINED
34	Dredge, Scallop	AA	GEN	MA	all	17	17		666					17
35	Dredge, Scallop	AA	GEN	NE	all	6	6		1,375					6
36	Dredge, Scallop	AA	LIM	MA	all	112	112		4,022					112
37	Dredge, Scallop	AA	LIM	NE	all	352	352		8,787					352
38	Dredge, Scallop	OPEN	GEN	MA	all	21	21		3,419					21
39	Dredge, Scallop	OPEN	GEN	NE	all	18	18		4,490					18
40	Dredge, Scallop	OPEN	LIM	MA	all	99	99		3,060					99
41	Dredge, Scallop	OPEN	LIM	NE	all	904	904		8,622					904
42	Danish Seine	OPEN	all	MA	all	10	0		38					0
43	Trawl, Mid-water Paired&Single	all	all	NE	sm	42	42		570					42
44	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	38	38		174					38
45	Pots and Traps, Other	OPEN	all	MA	all	3	0		23					0
46	Pots and Traps, Other	OPEN	all	NE	all	12	0		147					0
47	Pots and Traps, Fish	OPEN	all	MA	all	12	12		834					12
48	Pots and Traps, Fish	OPEN	all	NE	all	9	9		1,141					9
49	Pots and Traps, Conch	OPEN	all	MA	all	12	12		800					12
50	Pots and Traps, Conch	OPEN	all	NE	all	12	12		1,051					12
51	Pots and Traps, Hagfish	OPEN	all	NE	all	133	133		241					133
52	Pots and Traps, Lobster	OPEN	all	MA	all	19	19		1,765					19
53	Pots and Traps, Lobster	OPEN	all	NE	all	17	17		36,310					17
54	Weir	OPEN	all	NE	all	3	3		6					3
55	Pots and Traps, Crab	OPEN	all	MA	all	29	29		239					29
56	Pots and Traps, Crab	OPEN	all	NE	all	90	90		509					90
57	Beam Trawl	OPEN	all	MA	sm	29	0		131					0
58	Beam Trawl	OPEN	all	MA	lg	30	0		66					0
59	Beam Trawl	OPEN	all	NE	lg	14	0		43					0
60	Dredge, Other	OPEN	all	MA	all	11	0		426					0
61	Dredge, Urchin	OPEN	all	NE	all	6	6		14					6
62	Dredge, Ocean Quahog/Surflclam	OPEN	all	MA	all	24	24		4,020					24
63	Dredge, Ocean Quahog/Surflclam	OPEN	all	NE	all	35	35		2,754					35
Total						7,667	7,281	4,196	149,712					9,304
Step 6		Agency Fleets (Sea Days Needed)		6,099		5,720								7,713
		Industry Fleets (Sea Days Needed)		1,568		1,561								1,591
Step 7		Agency Fleets (Sea Days Funded)				Prioritized								7,068
		Agency Fleets (Sea Days Funded)				Non-prioritized (MMPA)								546
		Industry Fleets (Sea Days Funded)												3,711
Step 8		Agency Fleet Difference				SHORTFALL								-645
		Industry Fleet Difference				SURPLUS								2,120
		Turtle Gear Types		MA Trawl		1,954	1,890	3,309	15,033	1,419		1,419	3,309	3,309
				MA Gillnet		283	283	887	5,273	604		604	887	887
KEY:		Agency funded fleets		Industry funded fleets										
		Fleets identified as "erroneous"												
										Difference between taxa				

See Appendix Table 1 for fleet abbreviations

Table 6. The 2019 sea days needed (COMBINED; Step 5) and the information used in the penultimate approach to prioritize sea days to fleets for agency-funded days that are applicable to the prioritization process (Steps 9.1 through 9.5).

Fleet						Step 5	Step 9.1						Step 9.2						Step 9.3		Step 9.4	Step 9.5						
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2019 Sea Days Needed COMBINED	Penultimate sea days needed for the 15 species groups, in descending order with minimum pilot coverage as minimum for fleet						Sea day differences between adjacent species groups within a row (red font indicated values used in Step 9.3)						Sea day differences, in descending order with fleet constraint	Cumulative reduction of sea days	2019 Sea Days PRIORITIZED (Penultimate)	2019 Sea Days PRIORITIZED (Penultimate)						
1	Longline, Bottom	OPEN	all	MA	all	107	107										0							645 of 766	645	107	107	
2	Longline, Bottom	OPEN	all	NE	all	35	14										21									35	35	
3	Hand Line	OPEN	all	MA	all	14	14										0									14	14	
4	Hand Line	OPEN	all	NE	all	13	13										0									13	13	
5	Otter Trawl	OPEN	all	MA	sm	2,169	1,403	930	608	599	474	30	766	473	322	9	125	444								1,524	1,557	
6	Otter Trawl	OPEN	all	MA	lg	1,072	451	242	209	71	30		621	209	33	138	41									1,072	1,072	
7	Otter Trawl	OPEN	all	NE	sm	740	713	664	611	568	550	34	27	49	53	43	18	516								740	740	
8	Otter Trawl	OPEN	all	NE	lg	1,590	1,068	602	435	284	134	35	522	466	167	151	150	99								1,590	1,590	
9	Otter Trawl, Scallop	AA	GEN	MA	sm	0																						
10	Otter Trawl, Scallop	AA	GEN	MA	lg	29																						
11	Otter Trawl, Scallop	OPEN	GEN	MA	lg	33																						
12	Otter Trawl, Twin	OPEN	all	MA	sm	55	55										0									55	55	
13	Otter Trawl, Twin	OPEN	all	MA	lg	13	13										0									13	13	
14	Otter Trawl, Twin	OPEN	all	NE	sm	16	16										0									16	16	
15	Otter Trawl, Ruhle	OPEN	all	MA	sm	0	0										0									0	0	
16	Otter Trawl, Ruhle	OPEN	all	MA	lg	6	4										2									6	6	
17	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0										0									0	0	
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	105	105										0									105	105	
19	Otter Trawl, Shrimp	OPEN	all	MA	sm	0	0										0									0	0	
20	Otter Trawl, Shrimp	OPEN	all	NE	sm	0	0										0									0	0	
21	Otter Trawl, Other	OPEN	all	MA	sm	0	0										0									0	0	
22	Otter Trawl, Other	OPEN	all	NE	sm	0	0										0									0	0	
23	Otter Trawl, Other	OPEN	all	NE	lg	0	0										0									0	0	
24	Floating Trap	OPEN	all	MA	all	6	6										0									6	0	
25	Floating Trap	OPEN	all	NE	all	12	12										0									12	0	
26	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	341	125	13					216	112												341	341	
27	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	207	13						194													207	207	
28	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	339	145	14					194	131												339	339	
29	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	6	6						0													6	6	
30	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	181	20						161													181	181	
31	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	180	96	69					84	27												180	180	
32	Purse Seine	OPEN	all	MA	all	6	6						0													6	0	
33	Purse Seine	OPEN	all	NE	all	19	19						0													19	19	

Table 6, continued. The 2019 sea days needed (COMBINED; Step 5) and the information used in the penultimate approach to prioritize sea days to fleets for agency-funded days that are applicable to the prioritization process (Steps 9.1 through 9.5).

Fleet					Step 5	Step 9.1					Step 9.2					Step 9.3		Step 9.4	Step 9.5	
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2019 Sea Days Needed COMBINED	Penultimate sea days needed for the 15 species groups, in descending order with minimum pilot coverage as minimum for fleet					Sea day differences between adjacent species groups within a row (red font indicated values used in Step 9.3)					Sea day differences, in descending order with fleet constraint	Cumulative reduction of sea days	2019 Sea Days PRIORITIZED (Penultimate)	2019 Sea Days PRIORITIZED (Penultimate)
34	Dredge, Scallop	AA	GEN	MA	all	17														
35	Dredge, Scallop	AA	GEN	NE	all	6														
36	Dredge, Scallop	AA	LIM	MA	all	112														
37	Dredge, Scallop	AA	LIM	NE	all	352														
38	Dredge, Scallop	OPEN	GEN	MA	all	21														
39	Dredge, Scallop	OPEN	GEN	NE	all	18														
40	Dredge, Scallop	OPEN	LIM	MA	all	99														
41	Dredge, Scallop	OPEN	LIM	NE	all	904														
42	Danish Seine	OPEN	all	MA	all	0	0										0	0		
43	Trawl, Mid-water Paired&Single	all	all	NE	sm	42	42										42	42		
44	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	38	38										38	38		
45	Pots and Traps, Other	OPEN	all	MA	all	0	0										0	0		
46	Pots and Traps, Other	OPEN	all	NE	all	0	0										0	0		
47	Pots and Traps, Fish	OPEN	all	MA	all	12	12										12	12		
48	Pots and Traps, Fish	OPEN	all	NE	all	9	9										9	9		
49	Pots and Traps, Conch	OPEN	all	MA	all	12	12										12	12		
50	Pots and Traps, Conch	OPEN	all	NE	all	12	12										12	12		
51	Pots and Traps, Hagfish	OPEN	all	NE	all	133	133										133	133		
52	Pots and Traps, Lobster	OPEN	all	MA	all	19	19										19	19		
53	Pots and Traps, Lobster	OPEN	all	NE	all	17	17										17	17		
54	Weir	OPEN	all	NE	all	3	3										3	0		
55	Pots and Traps, Crab	OPEN	all	MA	all	29	29										29	29		
56	Pots and Traps, Crab	OPEN	all	NE	all	90	90										90	90		
57	Beam Trawl	OPEN	all	MA	sm	0	0										0	0		
58	Beam Trawl	OPEN	all	MA	lg	0	0										0	0		
59	Beam Trawl	OPEN	all	NE	lg	0	0										0	0		
60	Dredge, Other	OPEN	all	MA	all	0	0										0	0		
61	Dredge, Urchin	OPEN	all	NE	all	6	6										6	0		
62	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	24	24										24	24		
63	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	35	35										35	35		
Total						9,304														
Step 6		Agency Fleets (Sea Days Needed)				7,713														
		Industry Fleets (Sea Days Needed)				1,591														
Step 7		Agency Fleets (Sea Days Funded)				7,068	Prioritized days													
		Agency Fleets (Sea Days Funded)				546	Non-prioritized days (MMPA)													
		Industry Fleets (Sea Days Funded)					Industry-funded scallop days													
Step 8		Agency Fleet Difference				-645														
		Industry Fleet Difference				2,120														
		Turtle Gear Types																		
		MA Trawl				3,309														
		MA Gillnet				887														

KEY: Agency funded fleets	Industry funded fleets
Fleets identified as "erroneous"	Fleets with NEFOP Limitation
Fleets with reduction in sea days	

Table 7. The number of sea days needed to monitor the combined species groups (COMBINED; Step 5), prioritized days (Step 9.5), nonprioritized days (protected species [MMPA]; Step 10), industry-funded scallop days (Step 11), and the 2019 observer sea days allocated for April 2019 through March 2020 (Step 12), by fleet. Note: * indicates all coverage is dependent on industry activity; ** indicates some coverage is dependent on industry activity; * indicates coverage for protected species bycatch.**

Fleet						Step 5	Step 9.5	Step 10	Step 11	Step 12	Comments
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2019 Sea Days Needed COMBINE D	2019 Sea Days PRIORITIZED (Penultimate)	2019 Sea Days non-prioritized (MMPA)	2019 Sea Days Industry-funded Scallop	Sea Days Allocated for April 2019 - March 2020 (TOTAL)	
1	Longline, Bottom	OPEN	all	MA	all	107	107	0		107	Fish stock assessment support
2	Longline, Bottom	OPEN	all	NE	all	35	35	0		35	Fish stock assessment support **
3	Hand Line	OPEN	all	MA	all	14	14	0		14	Fish stock assessment support
4	Hand Line	OPEN	all	NE	all	13	13	0		13	Fish stock assessment support **
5	Otter Trawl	OPEN	all	MA	sm	2,169	1,557	0		1,557	Fish stock assessment and turtle bycatch support
6	Otter Trawl	OPEN	all	MA	lg	1,072	1,072	0		1,072	Fish stock assessment and turtle bycatch support **
7	Otter Trawl	OPEN	all	NE	sm	740	740	0		740	Fish stock assessment support
8	Otter Trawl	OPEN	all	NE	lg	1,590	1,590	0		1,590	Fish stock assessment support **
9	Otter Trawl, Scallop	AA	GEN	MA	sm	0					Fleet removed (erroneous fleet)
10	Otter Trawl, Scallop	AA	GEN	MA	lg	29					Industry funded scallop * (see Row 36)
11	Otter Trawl, Scallop	OPEN	GEN	MA	lg	33					Industry funded scallop * (see Row 38)
12	Otter Trawl, Twin	OPEN	all	MA	sm	55	55	0		55	Fish stock assessment support
13	Otter Trawl, Twin	OPEN	all	MA	lg	13	13	0		13	Fish stock assessment support *
14	Otter Trawl, Twin	OPEN	all	NE	sm	16	16	0		16	Fish stock assessment support
15	Otter Trawl, Ruhle	OPEN	all	MA	sm	0	0	0		0	Fleet removed (erroneous fleet)
16	Otter Trawl, Ruhle	OPEN	all	MA	lg	6	6	0		6	Fish stock assessment and turtle bycatch support
17	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0	0		0	Fleet removed (erroneous fleet)
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	105	105	0		105	Fish stock assessment support *
19	Otter Trawl, Shrimp	OPEN	all	MA	sm	0	0	0		0	Fleet removed (erroneous fleet)
20	Otter Trawl, Shrimp	OPEN	all	NE	sm	0	0	0		0	Fleet removed (erroneous fleet)
21	Otter Trawl, Other	OPEN	all	MA	sm	0	0	0		0	Fleet removed (erroneous fleet)
22	Otter Trawl, Other	OPEN	all	NE	sm	0	0	0		0	Fleet removed (erroneous fleet)
23	Otter Trawl, Other	OPEN	all	NE	lg	0	0	0		0	Fleet removed (erroneous fleet)
24	Floating Trap	OPEN	all	MA	all	6	0	0		0	Fleet removed (NEFOP limitation)
25	Floating Trap	OPEN	all	NE	all	12	0	0		0	Fleet removed (NEFOP limitation)
26	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	341	341	0		341	Fish stock assessment and turtle bycatch support
27	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	207	207	0		207	Fish stock assessment and turtle bycatch support
28	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	339	339	0		339	Fish stock assessment and turtle bycatch support **
29	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	6	6	0		6	Fish stock assessment support
30	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	181	181	0		181	Fish stock assessment support **
31	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	180	180	0		180	Fish stock assessment support **
32	Purse Seine	OPEN	all	MA	all	6	0	0		0	Fleet removed (NEFOP limitation)
33	Purse Seine	OPEN	all	NE	all	19	19	0		19	Fish stock assessment support

Table 7, continued. The number of sea days needed to monitor the combined species groups (COMBINED; Step 5), prioritized days (Step 9.5), nonprioritized days (protected species [MMPA]; Step 10), industry-funded scallop days (Step 11), and the 2019 observer sea days allocated for April 2019 through March 2020 (Step 12), by fleet. Note: * indicates all coverage is dependent on industry activity; ** indicates some coverage is dependent on industry activity; * indicates coverage for protected species bycatch.**

Fleet						Step 5	Step 9.5	Step 10	Step 11	Step 12		
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2019 Sea Days Needed COMBINED	2019 Sea Days PRIORITIZED (Penultimate)	2019 Sea Days non-prioritized (MMPA)	2019 Sea Days Industry-funded Scallop	Sea Days Allocated for April 2019 - March 2020 (TOTAL)	Comments	
34	Dredge, Scallop	AA	GEN	MA	all	17				0	Industry funded scallop * (see Row 36)	
35	Dredge, Scallop	AA	GEN	NE	all	6				0	Industry funded scallop * (see Row 37)	
36	Dredge, Scallop	AA	LIM	MA	all	112			940	940	Industry funded scallop * (Rows 10, 34, & 36)	
37	Dredge, Scallop	AA	LIM	NE	all	352			1128	1,128	Industry funded scallop * (Rows 35 & 37)	
38	Dredge, Scallop	OPEN	GEN	MA	all	21			75	75	Industry funded scallop * (Rows 11, 38, & 39)	
39	Dredge, Scallop	OPEN	GEN	NE	all	18				0	Industry funded scallop * (see Row 38)	
40	Dredge, Scallop	OPEN	LIM	MA	all	99			1,568	1,568	Industry funded scallop * (Rows 40 & 41)	
41	Dredge, Scallop	OPEN	LIM	NE	all	904				0	Industry funded scallop * (see Row 40)	
42	Danish Seine	OPEN	all	MA	all	0	0	0		0	Fleet removed (erroneous fleet)	
43	Trawl, Mid-water Paired&Single	all	all	NE	sm	42	42	0		42	Fish stock assessment support **	
44	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	38	38	0		38	Fish stock assessment support **	
45	Pots and Traps, Other	OPEN	all	MA	all	0	0	0		0	Fleet removed (erroneous fleet)	
46	Pots and Traps, Other	OPEN	all	NE	all	0	0	0		0	Fleet removed (erroneous fleet)	
47	Pots and Traps, Fish	OPEN	all	MA	all	12	12	0		12	Fish stock assessment support	
48	Pots and Traps, Fish	OPEN	all	NE	all	9	9	0		9	Fish stock assessment support	
49	Pots and Traps, Conch	OPEN	all	MA	all	12	12	0		12	Fish stock assessment support	
50	Pots and Traps, Conch	OPEN	all	NE	all	12	12	0		12	Fish stock assessment support	
51	Pots and Traps, Hagfish	OPEN	all	NE	all	133	133	0		133	Fish stock assessment support	
52	Pots and Traps, Lobster	OPEN	all	MA	all	19	19	0		19	Fish stock assessment support	
53	Pots and Traps, Lobster	OPEN	all	NE	all	17	17	0		17	Fish stock assessment support	
54	Weir	OPEN	all	NE	all	3	0	0		0	Fleet removed (NEFOP limitation)	
55	Pots and Traps, Crab	OPEN	all	MA	all	29	29	0		29	Fish stock assessment support	
56	Pots and Traps, Crab	OPEN	all	NE	all	90	90	0		90	Fish stock assessment support	
57	Beam Trawl	OPEN	all	MA	sm	0	0	0		0	Fleet removed (erroneous fleet)	
58	Beam Trawl	OPEN	all	MA	lg	0	0	0		0	Fleet removed (erroneous fleet)	
59	Beam Trawl	OPEN	all	NE	lg	0	0	0		0	Fleet removed (erroneous fleet)	
60	Dredge, Other	OPEN	all	MA	all	0	0	0		0	Fleet removed (erroneous fleet)	
61	Dredge, Urchin	OPEN	all	NE	all	6	0	0		0	Fleet removed (NEFOP limitation)	
62	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	24	24	0		24	Fish stock assessment support	
63	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	35	35	0		35	Fish stock assessment support	
MMPA coverage								546		546	Coverage associated with Rows 26-31***	
Total						9,304	7,068	546	3,711		11,325	

Step 6	Agency Fleets (Sea Days Needed)	7,713	
	Industry Fleets (Sea Days Needed)	1,591	
Step 7	Agency Fleets (Sea Days Funded)	7,068	Prioritized days
	Agency Fleets (Sea Days Funded)	546	Non-prioritized days (MMPA)
	Industry Fleets (Sea Days Funded)		Industry-funded scallop days
Step 8	Agency Fleet Difference	-645	
	Industry Fleet Difference	2,120	
	Turtle Gear Types		
	MA Trawl	3,309	
	MA Gillnet	887	

KEY: Agency funded fleets	Industry funded fleets
Fleets identified as "erroneous"	Fleets with NEFOP Limitation
Fleets with reduction in sea days	

Appendix Table 1. Stratification abbreviations used for 2019 fleets.

Abbreviation	Definition
NE	New England ports (RI and northward)
MA	Mid-Atlantic ports (CT and southward)
Sm	Small mesh (less than 5.50 in)
Lg	Large mesh (from 5.50 to 7.99 in for gillnet; 5.50 in and greater for trawl)
Xlg	Extra large mesh (8.00 in and greater for gillnet)
AA	Access area
OPEN	Nonaccess area
GEN	General category
LIM	Limited access category

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