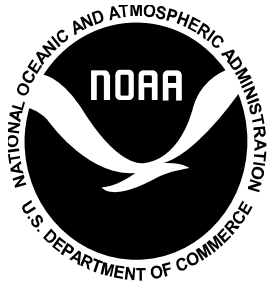




NOAA Technical Memorandum NMFS-NE-244

2018 Standardized Bycatch Reporting Methodology Annual Discard Report with Observer Sea Day Allocation

**US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts
April 2018**



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2018 Standardized Bycatch Reporting Methodology Annual Discard Report with Observer Sea Day Allocation

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Editorial Notes

Information Quality Act Compliance: In accordance with section 515 of Public Law 106-554, the Northeast Fisheries Science Center completed both technical and policy reviews for this report. These predissemination reviews are on file at the NEFSC Editorial Office.

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Table of Contents

List of Acronyms and Abbreviations	vi
Executive Summary	vii
Introduction	1
Summary of Observer Coverage	1
Summary of Discard Estimates	2
Summary of Sea Days Needed.....	2
Summary of Funding Available for the April 2018 through March 2019 period	6
Prioritization Trigger and Details of the Allocation of Sea Days to Fleets.....	8
Discussion	11
References	13

List of Tables

Table 1 A list of the 14 fish and invertebrate species groups and 1 species of sea turtles, and the species that compose these groups, corresponding to the 13 federal fishery management plans implements in the waters off the northeastern United States	15
Table 2 Total catch, Vessel Trip Report landings, estimated discards, associated coefficient of variation, and standard error of the estimated discards for 14 Standardized Bycatch Reporting Methodology (SBRM) species groups combined, by fleet, based on July 2016 through June 2017 data	17
Table 3 The most recent average annual estimates of sea turtle interactions and their associated coefficient of variation (in U.S. Mid-Atlantic commercial fisheries	19
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 for fish and invertebrate species groups based on July 2016 through June 2017 data	20
Table 5 The number of sea days needed to monitor fish/invertebrates, loggerhead turtles, combined species groups by fleet, and the number of funded sea days for April 2018 through March 2019 and the differences between needed and funded days	22
Table 6 The number of sea days needed to monitor the combined species groups, prioritized days, non-prioritized days, industry-funded scallop days, and the 2018 observer sea days allocated for April 2018 through March 2019, by fleet.....	24
Appendix Table 1. Stratification abbreviations used for 2018 fleets	26

List of Acronyms and Abbreviations

AA = Access area
ACCSP = Atlantic Coastal Cooperative Statistics Program
ASM = At-Sea Monitoring Program
CV = coefficient of variation
ESA = Endangered Species Act
FMP = fishery management plan
FSB = Fisheries Sampling Branch
FY = Fiscal Year
GEN = General category
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
NY DEC = New York Department of Environmental Conservation
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 2018 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 2018, 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 69,947 mt (154,206,116 lb) of federally regulated species were discarded during the July 2016 through June 2017 time period.

Estimates of sea turtle interactions in sink gillnet gear in the Mid-Atlantic and Georges Bank region from 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 this gear type.

After sea days adjustments, a total of 10,568 sea days is needed to monitor the 15 Standardized Bycatch Reporting Methodology species groups (14 fish/invertebrates species groups and 1 sea turtle species) during the April 2018 through March 2019 period. Of the 10,568 sea days, 7,519 sea days are needed for agency-funded fleets and 3,049 sea days are needed for industry-funded fleets.

The funds available to the NEFSC's Northeast Fisheries Sampling Branch in fiscal year (FY) 2018 are estimated to provide support for 5,122 days and 3,131 days are carried over (i.e., bought ahead) from FY2017 funds for a total of 8,253 days for the April 2018 through March 2019 time period. Based upon an observer set-aside compensation rate analysis for the Industry Funded Scallop program, there is industry funding for 4,101 days. Hence, 12,354 days are available for observer coverage during April 2018 through March 2019.

Within the agency-funded fleets and prioritization-applicable funding, funded days exceed the needed days resulting in an estimated surplus of funds equivalent to approximately 162 days. The 2018 funding does not trigger the SBRM prioritization approach. In addition, practical limitations prevent the observer program from covering the 28 sea days associated with 5 fleets. Hence, a funding equivalent to the 190 sea days will be utilized at the agency's discretion. Any remaining discretionary observer funds disseminated to the NEFSC, if any, will be used at the agency's discretion.

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 2018 through March 2019 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 VTRs.

INTRODUCTION

The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment was implemented on 27 February 2008 (NMFS 2008, NEFMC 2007) and later vacated by the US District Court for the District of Columbia and remanded back to National Marine Fisheries Service (NMFS) on 15 September 2011 due to 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 (FSB) 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 2018 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 2018, 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 2018 through March 2019 period.

SUMMARY OF OBSERVER COVERAGE

A total of 3,238 trips (9,149 days) was observed during the July 2016 through June 2017 time period. When these trips were stratified by fleet and quarter, some trips were partitioned between fleets resulting in 3,445 trips (9,654 days). See Tables 2 and 3 in Wigley and Tholke 2018 for a summary of the number of observed trips and industry Vessel Trip Reports (VTR) trips by fleet and

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".

calendar quarter and a summary of the number of observed sea days and industry sea days by fleet and calendar quarter, respectively. There were 68 fleets uniquely identified in the July 2016 through June 2017 data. Based upon the industry activity during this time period, 10 new fleets were added to the collection of fleets analyzed (Wigley and Tholke 2018). Additionally, scallop trawl, twin trawl, shrimp trawl, beam trawl, and mid-water trawl fleets were partitioned into specific mesh size groups to create consistency in mesh size groups among all trawl fleets (Wigley and Tholke 2018).

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, 72% 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 2016 through June 2017 time period, see Table 4 in Wigley and Tholke 2018.

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 2016 through June 2017 time period (Wigley and Tholke 2018). Based upon that discard estimation analysis, an estimated 69,947 mt (154,206,116 lb) of federally regulated species were discarded (Table 2). Fleet abbreviations used in this report are described in Appendix Table 1. See Table 5A and 5B in Wigley and Tholke 2018 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 U.S. 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 68 fleets³ by using data collected during July 2016 through June 2017 (Wigley and Tholke 2018). Based on that sample size analysis, a total of 15,599 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 Table 5 Step 1 presents 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 2018 analysis, there were 17 “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

³ Trips fishing in Pamlico Sound have been removed from the sea day analysis (see Wigley and Tholke 2018) because the Southeast Region has mandatory observer coverage of the southeastern shrimp fishery and allocates observer coverage to trips fishing in Pamlico Sound (Scott-Denton 2012). The sea days needed for Mid-Atlantic shrimp trawl and shrimp twin trawl (Rows 22 and 24) represent those needed to monitor trips in ocean waters.

data collection systems (e.g., otter trawl, other; pots and trap, other; dredge, other; and shrimp trawl). The 344 sea days associated with the 17 “erroneous” fleets (composed of 618 VTR trips during the July 2016 through June 2017 time period) have been set to zero (Table 5, Step 2, gray shaded cells). When this adjustment is made, a total of 15,255 days are needed to monitor 14 fish/invertebrate species groups in 51 fleets.

As described in Wigley et al. 2007, the importance filter is applied to each of the 14 species groups to remove sea days associated with fleets that contribute the smallest fraction of discards and the smallest fraction of total mortality. This is done to ensure that the observer coverage in the upcoming year is not driven by imprecise estimates of small quantities of discards. The importance filter utilizes discards derived from observer data. In the 2016 and 2017 SBRM analyses, there were some fleets without observer coverage and hence no estimated discards for these fleets to feed into the importance filter. The Mid-Atlantic (MA) and New England (NE) crab pot fleets were among the fleets with no observer coverage in the July 2015 through June 2016 time period. In the July 2016 through June 2017 time period, pilot coverage was allocated and observers were deployed in the MA and NE crab pot fleets in order to better inform the 2018 SBRM analysis. Observer-derived discard estimates for the MA and NE crab pot fleets were available for SBRM analysis for the first time. However, the observer coverage in the MA crab pot fleet was not completely achieved. There are concerns that the observer coverage in this fleet may not have been optimal given the temporal coverage of observed trips paired with the unique behaviors and distribution exhibited by red deepsea crabs. Observer coverage was obtained on 2 trips in Quarter 1, 3 trips in Quarter 2, and no trips in Quarters 3 and 4, falling short of the goal of 3 trips per quarter in all but Quarter 2. Consistent with SBRM methodologies, the observer data were used to calculate estimated discards by using the 5 available trips in the MA crab pot fleet and imputing values for the quarters with less than 3 observed trips (i.e., number of trips that represent minimum pilot coverage). Pilot coverage was achieved in the NE crab pot fleet in all four quarters.

The overall 2018 analysis produced very large sea day requirements to meet the 30% CV precision standard for red deepsea crab in two trawl fleets. An estimated 6,059 sea days were needed to achieve the precision standard for red deepsea crab discards in the NE large mesh otter trawl fleet (Row 8, Table 4,) and 2,212 day in the MA small mesh otter trawl fleet (Row 5, Table 4). The sea day requirement for this fleet increases to 2,411 days needed when all 15 SBRM species are considered. Adopting the 2018 sea days needed as prescribed by SBRM methods would require approximately \$7.7 million in additional funding over last year’s funding when all 15 species groups are considered.

The pattern of very high sea day requirements to monitor red deepsea crab discards in the NE large mesh otter trawl fleet has been noted for many years and is the result of high variability in the amount of red deepsea crab discards between fishing trips; trips that fish in deep water along the shelf edge sometimes encounter red deepsea crabs, while the bulk of the fleet that fishes shallower water does not.

Given the prescribed observer coverage was not completely achieved in 2017 for the MA crab pot fleet and the cost implications of pursuing the resulting coverage in the two trawl fleets are significant; a decision was made to exclude sea day requirements for red deepsea crab from the MA small mesh otter trawl and NE large mesh otter trawl fleets (Rows 5 and 8, respectively; Table 5). Holistic explorations are being considered to determine if there are other solutions beyond large year-to-year changes in observer coverage.

Given the decision, the sea days needed for fish/invertebrate species groups in the MA small mesh otter trawl (Row 5) and the NE large mesh otter trawl (Row 8) will be set based on the next

largest sea day requirements for the fish/invertebrate species groups: 847 sea days (to meet requirements for Squid-Butterfish-Mackerel [SBM]) and 565 sea days (to meet requirements for Fluke-Scup-Black Sea Bass [FSB]), respectively (Table 4 and Table 5, Step 2, orange shaded cells).

With all sea day adjustments (adjustments for the erroneous fleets and adjustments to the two trawl fleets), a total of 8,396 sea days is needed for the 14 fish/invertebrate species groups in 51 fleets (Table 5, 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 2017, coverage needs for turtles on vessels using scallop dredge gear in the Mid-Atlantic 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, due to the likelihood that most dredge-based takes of sea turtles may be unobservable (NMFS 2012)⁴. Therefore, observer coverage levels in the Mid-Atlantic scallop dredge fleets in 2018 will be driven by other species groups. This 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 using 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 in prep). 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-Atlantic⁵ turtle gear types and fish/invertebrate fleets are given here and in Table 5, Steps 2 and 3.

⁴ The Incidental Take Statement of the 2012 Sea Scallop [Biological Opinion](#) was amended 1 May 2015.

⁵ 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.

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, 9-14, 18, and 25-26	3,309	1,510
MA Gillnet Rows 30-32	887	514

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 computing for each region separately. As such, days cannot be extracted from the 887 and allocated to Georges Bank and Mid-Atlantic separately. This is an expanded region over previous analyses, and overlaps a portion of NE fish/invertebrate fleets. Had fish and turtle days been merged over all 6 fleets (NE and MA gillnet fleets), then over 200 of the 887 days would have been allocated to Gulf of Maine where turtles are not present, and likewise fewer days 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 days⁶.

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

- 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 difference⁷ between the sea days needed for turtles and fish were distributed according

⁶ Using June 2016 through July 2017 VTR data, it has been estimated that the 518 days needed for fish in NE gillnet fleets would provide approximately 230 days of expected coverage in the Georges Bank region.

⁷ 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.

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 2018 and reflects industry activity during the July 2016 through June 2017 time period.

A total of 10,568 sea days is needed for fish/invertebrates and loggerhead turtles (COMBINED; Table 5, Step 5) during the April 2018 through March 2019 period. Of the 10,568 sea days, 7,519 sea days are needed for agency-funded fleets and 3,049 sea days are needed for industry-funded fleets (Table 5, Step 6).

SUMMARY OF FUNDING AVAILABLE FOR APRIL 2018 THROUGH MARCH 2019

The funds available to the NEFSC's Northeast Fisheries Sampling Branch in fiscal year (FY) 2018 are estimated to provide support for 5,122 days and 3,131 days are carried over (i.e., bought ahead) from FY2017 funds⁸ for a total of 8,253 (5,122 + 3,131) days for the April 2018 through March 2019 time period. Based upon an observer set-aside compensation rate analysis for the Industry Funded Scallop program, there is industry funding for 4,101 days. Hence, 12,354 (8,253 + 4,101) days are available for observer coverage during April 2018 through March 2019.

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

- **Agency-funded:** The funding sources for the 8,253 agency-funded sea days include: Atlantic Coast Observers (644 days), Northeast Fisheries Observers (2,894 days), National Observer Program (1,122 days), Reducing Bycatch (54 days), and 2,967 FY2017 carryover/bought ahead days collectively fund the sea days for prioritization (7,681 days; Table 5, Step 7); and Marine Mammal Protection Act (MMPA; 408 days) and FY2017 carryover/bought ahead (164 days) collectively fund the sea days to monitor protected species (572 days; Table 5, Step 7).
 - 572 agency-funded days are applicable to protected species⁹ only.
 - 572 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.

⁸ The best estimate of the FY2017 carryover days is 3,131 days (2,967 prioritized carryover days and 164 MMPA carryover days).

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

- 7,681 (8,253 - 572) agency-funded days are applicable for all species.
 - 7,681 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 FY17): \$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 percent 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 11 industry-funded scallop fleets (Rows 10, 12, 14, and 38-45; Table 5).

Because of the greater sampling requirements in New England, 20% of the New England open area limited access trips will be observed, compared to 5% of the Mid-Atlantic limited access open area trips. The observer compensation rate in the access areas will be increased from 200 lb/day to 225 lb/day, due to anticipated reduction in the prices of scallops. Observer coverage rates for limited access vessels in the Georges Bank access areas would be required to be at least 10%. Observer coverage would be 10% for the trips to the Nantucket Lightship West, where two trips per full-time limited access vessels maybe allocated. Because only one trip is proposed to Closed Area I and the southeastern portion of Nantucket Lightship South, the coverage rate there would be higher (15%). Coverage rate in the Mid-Atlantic access areas, where there are less bycatch concerns as well as an allocation of 2 trips per limited access vessel, would be 9.5%.

- Based upon the compensation rate analysis and proposed Framework 29 allocations, a total of 4,101 sea days can be funded: 2,192 days for Open Areas, 948 days for Mid-Atlantic Access Areas, and 961 days in the New England Access Areas.
 - The industry-funded schedule runs April through March
 - Bulletins describing the 2018 set-aside compensation rate calculations and scallop management measures are available online at the [Greater Atlantic Regional Fisheries Office webpage](#).
- Of the 2,192 days for the Open Areas, there are 232 days for Limited Access General Category fleets (Rows 12, 42, and 43; Table 6) and 1,960 days for Limited Access fleets (Rows 14, 44, and 45; Table 6).
- Coverage of the 11 fleets depends on industry activity among these fleets during April 2018 through March 2019; 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 2018 through March 2019.

Funding Source	Sea Days
Agency-funded Total	8,253
Agency-funded applicable to all species (prioritized days)	7,681
Agency-funded applicable to protected species only (non-prioritized days)	572
Industry-funded Scallop Total applicable to all species	4,101
Total	12,354

PRIORITIZATION TRIGGER AND DETAILS OF SEA DAY ALLOCATION TO FLEETS

Within the agency-funded fleets and prioritization-applicable funding, funded days exceed the needed days resulting in an estimated surplus of funds equivalent to approximately 162 (7,681 – 7,519) days (Table 5). The 2018 funding does not trigger the SBRM prioritization approach.

In 2018, there are practical limitations that prevent the observer program from covering 5 fleets (MA and NE floating trap [Rows 28 and 29, respectively], MA purse seine [Row 36], NE weir [Row 60], and NE urchin dredge [Row 66]; Table 6). The observer program currently has no sampling protocols in place for these fleets and will need time to research whether or not new trainings, logs, or databases need to be created to support sampling in these fleets. It is unlikely the observer program will be able to prepare and train new observers before quarters 2 and 3 when most of the industry active occurs. There are 28 sea days associated with the 5 fleets.

The funding equivalent to the 190 (162 + 28) sea days will be utilized at the agency’s discretion. Any remaining discretionary observer funds disseminated to the NEFSC, if any, will be used at the agency’s discretion.

The following describes the steps taken to allocate the 12,354 funded sea days (Tables 5 and 6).

- Step 1. Derive the number of sea days needed for the 14 fish/invertebrate species groups (see Wigley and Tholke 2018; Table 5).
- Step 2. Apply the sea day adjustments to 17 “erroneous” fleets (Rows 9, 11, 13, 18, 19, 22, 23, 25-27, 46, 47, 51, 52, 63-65), the MA small mesh otter trawl fleet (Row 5), and NE large mesh otter trawl fleet (Row 8). A total of 8,396 days is needed for fish/invertebrate species group across 51 fleets (40 agency-funded fleets and 11 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 2018). The VTR sea days associated with the 17 “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 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 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 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 multiple 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 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 10,568 days is needed to achieve a 30% CV on the discards of the 15 species groups in 2018; Table 5).

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

There were 7,519 days and 3,049 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 non-prioritized days).

There are 7,681 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 surplus of 162 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.

Steps 9.1 through 9.3. In 2018, no prioritization is needed; are not applicable this year.

Step 9.4. The 7,681 prioritized sea days provide observer coverage to meet the 7,519 days needed in all 40 agency-funded fleets with remaining funding equivalent to approximately 162 days. These funds will be utilized at the agency's discretion.

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

In 2018, there are practical limitations that prevent the observer program from covering 5 fleets (as described above). The 28 sea days associated with the 5 fleets are set to zero (Table 6, Step 9.5, rose shaded cells). Hence, the funding equivalent to the 190 (162 + 28) prioritized sea days will be utilized at the agency's discretion.

The observer program plans to contract with 1 third-party provider for the 5-year contract, to be awarded this year.

Step 10. Allocate agency-funded non-prioritized sea days.

There are 572 agency-funded days that are not applicable to the prioritization process (non-prioritized MMPA days; Table 6).

The 572 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 30-35; Table 6).

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 2018 through March 2019 period and will be capped as described above. Due to differences in stratification between the SBRM and scallop compensation rate analyses, the 4,101 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, 38, and 40; Table 6); Open Areas fleets (Rows 12, 42, and 43 for Limited Access General Category fleets and Rows 14, 44, and 45 for Limited Access; Table 6); and New England Access Area fleets (Rows 39 and 41; Table 6). 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 6).

Step 12. The sea days allocated for the April 2018 – March 2019 (TOTAL) is the sum of the prioritized days (Step 9.5), non-prioritized days (Step 10), and industry-funded scallop days (Step 11). A total of 12,354 days is allocated across 51 fleets (Table 6). At this time,

there are remaining funds equivalent to approximately 190 days that will be utilized at the agency's discretion (Prioritized sea days not allocated; Table 6).

The agency-funded fleets with an * or ** (Table 6) 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 means all or some of the observer coverage within each of these fleets will depend upon industry activity during the April 2018 through March 2019 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 2016 through June 2017 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 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, the sea days will be carried over.

The sample size analysis conducted by Wigley and Tholke (2018) 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 Fig. 3 in Wigley and Tholke 2018). Deriving the expected CV assumes the variance of the discard estimate is constant over a range of sample sizes (number of trips).

The estimated 2,967 prioritized carryover days are the result of unaccomplished sea days during the April 2017-March 2018 time period. The 2,967 prioritized carryover days have increased the number of prioritized sea days to a level that meets the number of sea days needed to monitor the 15 SBRM species groups during the April 2018-March 2019 time period. Due to the unaccomplished sea days during the April 2017-March 2018 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.

The New York Department of Environmental Conservation (NY DEC) has secured funding through the Atlantic Coast Cooperative Statistical Program (ACCSP) to support observer coverage up to approximately 1,163 sea days (282 carryover days + 881 days for upcoming year), of which 528 sea days will be allocated during the April 2018 through March 2019 time period. NY DEC allocates these sea days among NY state vessels and federally permitted vessels. NY DEC has allocated sea days to otter trawl, gillnet, and pot/trap fleets in the Mid-Atlantic region. The ACCSP observer coverage is implemented by NEFSC's observer program (via a Memorandum of Understanding) and uses sampling protocols that collect data on all species encountered on the

trips. The ACCSP observer coverage is separate from that allocated in this report (i.e., ACCSP days are not included in Table 6).

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 2018 fish/invertebrate analyses (Wigley and Tholke 2018) because these trips may have different goals/objectives and/or different stratification/sea day allocations than the other NEFOP trips and IFS trips. This 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, in prep).

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).

Vessel Selection Systems

The observer program uses three systems to select fishing trips for observer coverage: the Pre-Trip Notification System (PTNS), IFS call-in program, and a non-PTNS selection process (based on a sea day schedule) that includes either an observer approaching the vessel at the dock, a phone call to request a trip, or a selection letter in the mail. For some fleets, both PTNS and the non-PTNS systems are used for the groundfish and non-groundfish components of these fleets. The sea day schedule is used for trips in the non-groundfish component. Amendment 16 of the Northeast Multispecies FMP specifies that vessel captains are required to notify the PTNS for any groundfish trip they plan to make. PTNS handles the deployment of NEFOP, NEFOP limited, and ASM coverage for all groundfish trips. For NEFOP and ASM deployments, coverage is deployed proportional to the fishing activity in a given strata. Discussions are underway to modify the PTNS to meet SBRM and other regulatory requirements.

Expanded Sampling Frame for MA and NE Lobster Pot Fleets

The 2018 SBRM analyses for discard estimation and sample size (Wigley and Tholke 2018) 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 2016 through June 2017 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 2018 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, etc.) 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 2018 through March 2019 period.

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 turtles (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 DEEPSEA CRAB (RCRAB)	<i>Chaceon quinquedens</i>
SEA SCALLOP (SCAL)	<i>Placopecten magellanicus</i>
SKATE COMPLEX (SKATE)¹⁰	<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>

¹⁰ Skate complex comprises 7 species as well as skate, unknown.

Table 1, continued. A list of the 14 fish and invertebrate species groups and 1 species of sea turtles (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
SQUID¹¹ - BUTTERFISH - MACKEREL (SBM)	
Atlantic mackerel	<i>Scomber scombrus</i>
Butterfish	<i>Peprilus triacanthus</i>
Northern shortfin squid	<i>Illex illecebrosus</i>
Longfin inshore squid	<i>Doryteuthis (Amerigo) pealeii</i>
SURFLAM - OCEAN QUAHOG (SCOQ)	
Surfclam	<i>Spisula solidissima</i>
Ocean quahog	<i>Arctica islandica</i>
TILEFISH¹² (TILE)	
Blueline tilefish	<i>Caulolatilus microps</i>
Golden tilefish	<i>Lopholatilus chamaeleonticeps</i>
LOGGERHEAD TURTLE (TURS)	<i>Caretta caretta</i>

¹¹ 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.

¹² Tilefish, unclassified is included in this species group.

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 2016 through June 2017 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 2018.

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	1,858,295	1,643,691	214,605	0.666	142,979	
2	Longline, Bottom	OPEN	all	NE	all	7,093,565	6,336,502	757,063	0.907	687,002	
3	Hand Line	OPEN	all	MA	all	333,468	327,239	6,229	0.694	4,324	P
4	Hand Line	OPEN	all	NE	all	2,228,616	2,222,016	6,599	0.588	3,879	
5	Otter Trawl	OPEN	all	MA	sm	34,589,991	21,721,179	12,868,811	0.090	1,154,165	
6	Otter Trawl	OPEN	all	MA	lg	24,599,124	12,888,606	11,710,518	0.096	1,129,501	
7	Otter Trawl	OPEN	all	NE	sm	73,949,077	61,275,706	12,673,371	0.096	1,213,450	
8	Otter Trawl	OPEN	all	NE	lg	76,348,669	48,380,632	27,968,037	0.105	2,926,736	
9	Otter Trawl, Scallop	AA	GEN	MA	sm	77,385	38,901	38,484	0.275	10,590	
10	Otter Trawl, Scallop	AA	GEN	MA	lg	337,735	273,753	63,982	0.445	28,460	P
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	147,070	61,744	85,326	0.108	9,176	P
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	1,820,876	1,308,864	512,012	0.299	152,874	
14	Otter Trawl, Scallop	OPEN	LIM	MA	lg	214,261	62,243	152,017	0.000	0	P
15	Otter Trawl, Twin	OPEN	all	MA	sm	1,446,304	1,038,141	408,163	0.139	56,830	P
18	Otter Trawl, Ruhle	OPEN	all	MA	sm	273,414	273,414				P
19	Otter Trawl, Ruhle	OPEN	all	NE	sm	1,517,081	1,517,081				P
20	Otter Trawl, Ruhle	OPEN	all	NE	lg	316,083	180,166	135,917	0.000	0	P
21	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	4,853,539	2,805,177	2,048,363	0.141	287,885	P
22	Otter Trawl, Shrimp	OPEN	all	MA	sm	45,246	4,270	40,976	0.000	0	P
23	Otter Trawl, Shrimp	OPEN	all	NE	sm	194,950	194,950				P
24	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	705,700	2,074	703,626	0.211	148,763	
25	Otter Trawl, Other	OPEN	all	MA	sm	114,143	114,143				P
27	Otter Trawl, Other	OPEN	all	NE	sm	324,228	324,228				P
29	Floating Trap	OPEN	all	NE	all	10,504	10,504				P
30	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	2,532,728	2,312,035	220,692	0.350	77,317	
31	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	6,670,169	6,378,608	291,561	0.124	36,236	
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	6,152,429	5,163,692	988,738	0.107	105,415	
33	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	22,845	20,740	2,104	0.000	0	P
34	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	9,523,193	8,736,042	787,151	0.287	225,687	

See Appendix Table 1 for fleet abbreviations.

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 2016 through June 2017 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 2018.

Species: 14 SBRM SPECIES GROUPS COMBINED

Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	SE	Pilot
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	20,475,638	17,442,003	3,033,635	0.081	245,229	
36	Purse Seine	OPEN	all	MA	all	0	0				P
37	Purse Seine	OPEN	all	NE	all	49,977,720	49,967,871	9,849	0.658	6,485	
38	Dredge, Scallop	AA	GEN	MA	all	6,110,147	4,739,975	1,370,172	0.243	333,136	
39	Dredge, Scallop	AA	GEN	NE	all	5,055,291	4,451,449	603,842	0.128	77,258	
40	Dredge, Scallop	AA	LIM	MA	all	84,161,452	69,222,452	14,939,000	0.125	1,864,896	
41	Dredge, Scallop	AA	LIM	NE	all	140,497,949	110,358,100	30,139,849	0.111	3,337,482	
42	Dredge, Scallop	OPEN	GEN	MA	all	15,015,503	12,051,591	2,963,912	0.097	286,370	
43	Dredge, Scallop	OPEN	GEN	NE	all	8,779,208	7,541,948	1,237,260	0.148	182,812	
44	Dredge, Scallop	OPEN	LIM	MA	all	62,681,838	56,629,542	6,052,295	0.096	579,227	
45	Dredge, Scallop	OPEN	LIM	NE	all	141,744,817	126,866,058	14,878,759	0.088	1,312,160	
48	Trawl, Mid-water Paired&Single	AA	all	NE	sm	6,659,240	6,651,575	7,665	0.260	1,992	
49	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	3,996,203	3,987,192	9,011	0.733	6,607	
50	Trawl, Mid-water Paired&Single	OPEN	all	NE	sm	66,329,205	66,193,957	135,248	0.683	92,333	
53	Pots and Traps, Fish	OPEN	all	MA	all	481,812	335,852	145,960	0.256	37,336	
54	Pots and Traps, Fish	OPEN	all	NE	all	347,401	181,143	166,258	0.179	29,720	
55	Pots and Traps, Conch	OPEN	all	MA	all	7,384	7,292	92	0.899	83	
56	Pots and Traps, Conch	OPEN	all	NE	all	1,519	1,077	442	0.599	265	
58	Pots and Traps, Lobster	OPEN	all	MA	all	254,875	177,963	76,912	1.148	88,300	
59	Pots and Traps, Lobster	OPEN	all	NE	all	154,458	50,383	104,075	0.659	68,587	
61	Pots and Traps, Crab	OPEN	all	MA	all	488,739	305,231	183,508	0.398	73,105	
62	Pots and Traps, Crab	OPEN	all	NE	all	4,023,966	2,893,361	1,130,605	0.233	263,871	
63	Beam Trawl	OPEN	all	MA	sm	30,000	30,000				P
65	Dredge, Other	OPEN	all	MA	all	0	0				P
67	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	243,744,732	241,345,504	2,399,228	0.429	1,028,881	
68	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	218,019,531	216,577,371	1,442,160	0.247	355,587	
Confidential fleets						2,640,668	2,148,638	492,031	0.178	87,703	
Other minor fleets						589,348	589,348				
TOTAL						1,340,569,332	1,186,363,217	154,206,116	0.036	5,621,211	

See Appendix Table 1 for fleet abbreviations

Table 3 The most recent average annual estimates of sea turtle interactions and their associated coefficient of variation (CV) in U.S. 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 (2018 Sea Days Needed) for fish and invertebrate species groups based on July 2016 through June 2017 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 2018.

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	2018 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	84	84	84	
2	Longline, Bottom	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	53	0	0	0	34	14	53	
3	Hand Line	OPEN	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	13	75	P
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	2,212	0	847	662	0	657	418	387	314	0	0	141	26	2,212	
6	Otter Trawl	OPEN	all	MA	lg	0	0	0	0	0	0	590	104	0	99	229	149	0	0	152	28	590	
7	Otter Trawl	OPEN	all	NE	sm	0	0	0	0	0	486	0	747	671	621	1,105	596	0	0	224	33	1,105	
8	Otter Trawl	OPEN	all	NE	lg	0	0	0	6,059	0	0	367	180	443	213	323	565	0	0	288	35	6,059	
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	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	P
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	P
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	27	27	
13	Otter Trawl, Scallop	OPEN	LIM	MA	sm	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	P
14	Otter Trawl, Scallop	OPEN	LIM	MA	lg	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	P
15	Otter Trawl, Twin	OPEN	all	MA	sm	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	P
16	Otter Trawl, Twin	OPEN	all	MA	lg	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	P
17	Otter Trawl, Twin	OPEN	all	NE	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	67	67	
18	Otter Trawl, Ruhle	OPEN	all	MA	sm	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	P
19	Otter Trawl, Ruhle	OPEN	all	NE	sm	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	P
20	Otter Trawl, Ruhle	OPEN	all	NE	lg	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	P
21	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	P
22	Otter Trawl, Shrimp	OPEN	all	MA	sm	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	P
23	Otter Trawl, Shrimp	OPEN	all	NE	sm	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	P
24	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	208	0	0	0	57	57	208	
25	Otter Trawl, Other	OPEN	all	MA	sm	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	P
26	Otter Trawl, Other	OPEN	all	MA	lg	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	P
27	Otter Trawl, Other	OPEN	all	NE	sm	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	P
28	Floating Trap	OPEN	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	P
29	Floating Trap	OPEN	all	NE	all	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	MA	sm	0	0	0	0	0	0	0	0	0	0	402	0	0	0	41	12	402	
31	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	75	0	0	0	46	13	75	
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	0	0	0	0	0	0	0	0	0	37	0	0	0	0	36	14	37	
33	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	P
34	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	405	0	0	0	74	21	405	
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	0	0	0	0	0	0	105	0	0	0	28	0	0	0	93	19	105	

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 (2018 Sea Days Needed) for fish and invertebrate species groups based on July 2016 through June 2017 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 2018.

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	2018 Sea Days Needed	Pilot	
36	Purse Seine	OPEN	all	MA	all	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	P
37	Purse Seine	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	18	18	
38	Dredge, Scallop	AA	GEN	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	25	25	
39	Dredge, Scallop	AA	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	29	29	
40	Dredge, Scallop	AA	LIM	MA	all	0	0	0	0	196	0	371	0	0	157	0	0	0	0	0	126	95	371	
41	Dredge, Scallop	AA	LIM	NE	all	0	0	0	0	370	0	384	388	0	132	0	448	0	0	0	172	109	448	
42	Dredge, Scallop	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	98	23	23	
43	Dredge, Scallop	OPEN	GEN	NE	all	0	0	0	0	0	0	109	0	0	66	0	0	0	0	0	86	19	109	
44	Dredge, Scallop	OPEN	LIM	MA	all	0	0	0	0	0	0	46	0	0	60	0	0	0	0	0	119	110	110	
45	Dredge, Scallop	OPEN	LIM	NE	all	0	0	0	0	0	0	229	629	0	188	0	1,772	0	0	0	188	115	1,772	
46	Danish Seine	OPEN	all	MA	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
47	Danish Seine	OPEN	all	NE	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
48	Trawl, Mid-water Paired&Single	AA	all	NE	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	43	43	
49	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	16	16	
50	Trawl, Mid-water Paired&Single	OPEN	all	NE	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	
51	Pots and Traps, Other	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
52	Pots and Traps, Other	OPEN	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	P
53	Pots and Traps, Fish	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	12	12	
54	Pots and Traps, Fish	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	16	9	9	
55	Pots and Traps, Conch	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	12	12	
56	Pots and Traps, Conch	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	9	9	
57	Pots and Traps, Hagfish	OPEN	all	NE	all	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	P
58	Pots and Traps, Lobster	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	16	16	
59	Pots and Traps, Lobster	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	447	17	17	
60	Weir	OPEN	all	NE	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
61	Pots and Traps, Crab	OPEN	all	MA	all	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	30	30	30	
62	Pots and Traps, Crab	OPEN	all	NE	all	0	0	0	68	0	0	0	0	0	0	0	0	0	0	0	80	80	80	
63	Beam Trawl	OPEN	all	MA	sm	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	P
64	Beam Trawl	OPEN	all	NE	lg	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	P
65	Dredge, Other	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
66	Dredge, Urchin	OPEN	all	NE	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
67	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83	24	24	
68	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	0	0	0	0	0	0	151	0	0	7	0	0	0	0	0	63	18	151	
					Totals	782	782	782	9,131	1,348	2,115	3,796	2,830	2,553	2,829	3,969	4,632	782	782	4,036	2,062	15,599		

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 2018 through March 2019 (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	2018 Sea Days Needed for FISH	2018 Sea Days Needed for FISH ADJUSTED	2018 Sea Days Needed for TURS	Vessel Trip Report Sea Days	% Vessel Trip Report Sea Days	% Sea Days Needed for FISH	Additional days needed for TURS	TURS Sea Days by FISH fleet	2018 Sea Days Needed COMBINED
1	Longline, Bottom	OPEN	all	MA	all	84	84		1,380					84
2	Longline, Bottom	OPEN	all	NE	all	53	53		1,563					53
3	Hand Line	OPEN	all	MA	all	75	75		3,720					75
4	Hand Line	OPEN	all	NE	all	13	13		3,013					13
5	Otter Trawl	OPEN	all	MA	sm	2,212	847		7,052	0.458	0.561	824	1,670	1,670
6	Otter Trawl	OPEN	all	MA	lg	590	590	3,309	7,591	0.493	0.391	887	1,477	1,477
7	Otter Trawl	OPEN	all	NE	sm	1,105	1,105		11,180					1,105
8	Otter Trawl	OPEN	all	NE	lg	6,059	565		14,424					565
9	Otter Trawl, Scallop	AA	GEN	MA	sm	7	0		19	0.000	0.000	0	0	0
10	Otter Trawl, Scallop	AA	GEN	MA	lg	12	12		108	0.007	0.008	13	25	25
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	15	0		18	0.000	0.000	0	0	0
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	27	27		591	0.038	0.018	69	96	96
13	Otter Trawl, Scallop	OPEN	LIM	MA	sm	35	0		39	0.000	0.000	0	0	0
14	Otter Trawl, Scallop	OPEN	LIM	MA	lg	34	34		58	0.004	0.023	7	41	41
15	Otter Trawl, Twin	OPEN	all	MA	sm	58	58		201					58
16	Otter Trawl, Twin	OPEN	all	MA	lg	14	14		161					14
17	Otter Trawl, Twin	OPEN	all	NE	sm	67	67		160					67
18	Otter Trawl, Ruhle	OPEN	all	MA	sm	38	0		101	0.000	0.000	0	0	0
19	Otter Trawl, Ruhle	OPEN	all	NE	sm	37	0		147					0
20	Otter Trawl, Ruhle	OPEN	all	NE	lg	15	15		52					15
21	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	107	107		970					107
22	Otter Trawl, Shrimp	OPEN	all	MA	sm	37	0		93					0
23	Otter Trawl, Shrimp	OPEN	all	NE	sm	14	0		142					0
24	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	208	208		1,191					208
25	Otter Trawl, Other	OPEN	all	MA	sm	48	0		67	0.000	0.000	0	0	0
26	Otter Trawl, Other	OPEN	all	MA	lg	28	0		46	0.000	0.000	0	0	0
27	Otter Trawl, Other	OPEN	all	NE	sm	29	0		143					0
28	Floating Trap	OPEN	all	MA	all	9	9		82					9
29	Floating Trap	OPEN	all	NE	all	6	6		41					6
30	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	402	402		2,033	0.338	0.782	126	528	528
31	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	75	75	887	2,297	0.382	0.146	142	217	217
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	37	37		1,687	0.280	0.072	105	142	142
33	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	8	8		8					8
34	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	405	405		3,545					405
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	105	105		4,637					105
36	Purse Seine	OPEN	all	MA	all	7	7		200					7
37	Purse Seine	OPEN	all	NE	all	18	18		454					18

See Appendix Table 1 for fleet abbreviations

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 2018 through March 2019 (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	2018 Sea Days Needed for FISH	2018 Sea Days Needed for FISH ADJUSTED	2018 Sea Days Needed for TURS	Vessel Trip Report Sea Days	% Vessel Trip Report Sea Days	% Sea Days Needed for FISH	Additional days needed for TURS	TURS Sea Days by FISH fleet	2018 Sea Days Needed COMBINED
38	Dredge, Scallop	AA	GEN	MA	all	25	25		1,552					25
39	Dredge, Scallop	AA	GEN	NE	all	29	29		1,620					29
40	Dredge, Scallop	AA	LIM	MA	all	371	371		5,967					371
41	Dredge, Scallop	AA	LIM	NE	all	448	448		8,014					448
42	Dredge, Scallop	OPEN	GEN	MA	all	23	23		4,896					23
43	Dredge, Scallop	OPEN	GEN	NE	all	109	109		4,313					109
44	Dredge, Scallop	OPEN	LIM	MA	all	110	110		4,236					110
45	Dredge, Scallop	OPEN	LIM	NE	all	1,772	1,772		9,234					1,772
46	Danish Seine	OPEN	all	MA	all	3	0		10					0
47	Danish Seine	OPEN	all	NE	all	3	0		3					0
48	Trawl, Mid-water Paired&Single	AA	all	NE	sm	43	43		79					43
49	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	16	16		56					16
50	Trawl, Mid-water Paired&Single	OPEN	all	NE	sm	44	44		836					44
51	Pots and Traps, Other	OPEN	all	MA	all	6	0		18					0
52	Pots and Traps, Other	OPEN	all	NE	all	19	0		53					0
53	Pots and Traps, Fish	OPEN	all	MA	all	12	12		821					12
54	Pots and Traps, Fish	OPEN	all	NE	all	9	9		717					9
55	Pots and Traps, Conch	OPEN	all	MA	all	12	12		797					12
56	Pots and Traps, Conch	OPEN	all	NE	all	9	9		1,147					9
57	Pots and Traps, Hagfish	OPEN	all	NE	all	94	94		219					94
58	Pots and Traps, Lobster	OPEN	all	MA	all	16	16		1,864					16
59	Pots and Traps, Lobster	OPEN	all	NE	all	17	17		35,751					17
60	Weir	OPEN	all	NE	all	3	3		12					3
61	Pots and Traps, Crab	OPEN	all	MA	all	30	30		190					30
62	Pots and Traps, Crab	OPEN	all	NE	all	80	80		422					80
63	Beam Trawl	OPEN	all	MA	sm	7	0		23					0
64	Beam Trawl	OPEN	all	NE	lg	12	0		43					0
65	Dredge, Other	OPEN	all	MA	all	6	0		213					0
66	Dredge, Urchin	OPEN	all	NE	all	3	3		11					3
67	Dredge, Ocean Quahog/Surflclam	OPEN	all	MA	all	24	24		4,148					24
68	Dredge, Ocean Quahog/Surflclam	OPEN	all	NE	all	151	151		3,129					151
Total						15,599	8,396	4,196	159,608					10,568
Step 6		Agency Fleets (Sea Days Needed)				12,582	5,436							7,519
		Industry Fleets (Sea Days Needed)				3,017	2,960							3,049
Step 7		Agency Fleets (Sea Days Funded)				Prioritized						7,681		
		Industry Fleets (Sea Days Funded)				Non-prioritized (MMPA)						572		
Step 8		Agency Fleet Difference				SURPLUS						162		
		Industry Fleet Difference				SURPLUS						1,052		
Turtle Gear Types		MA Trawl	3,046	1,510	3,309	15,400	1,799	1,799	3,309	3,309				3,309
		MA Gillnet	514	514	887	6,017	373	373	887	887				887
KEY: Agency funded fleets		Industry funded fleets												
Fleets with reduction in sea days														
Fleets identified as "erroneous"														
						Difference between taxa								

Table 6 The number of sea days needed to monitor the combined species groups (COMBINED; Step 5), prioritized days (Steps 9.4 and 9.5), non-prioritized days (protected species [MMPA]; Step 10), industry-funded scallop days (Step 11), and the 2018 observer sea days allocated for April 2018 through March 2019 (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 9.4	Step 9.5	Step 10	Step 11	Step 12	Comments
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2018 Sea Days Needed COMBINED	2018 Sea Days PRIORITIZED (Penultimate approach not needed)	2018 Sea Days PRIORITIZED (Penultimate approach not needed)	2018 Sea Days non-prioritized (MMPA)	2018 Sea Days Industry-funded Scallop	Sea Days Allocated for April 2018 - March 2019 (TOTAL)	
1	Longline, Bottom	OPEN	all	MA	all	84	84	84	0		84	Fish stock assessment support
2	Longline, Bottom	OPEN	all	NE	all	53	53	53	0		53	Fish stock assessment support **
3	Hand Line	OPEN	all	MA	all	75	75	75	0		75	Fish stock assessment support
4	Hand Line	OPEN	all	NE	all	13	13	13	0		13	Fish stock assessment support **
5	Otter Trawl	OPEN	all	MA	sm	1,670	1,670	1,670	0		1,670	Fish stock assessment and turtle bycatch support
6	Otter Trawl	OPEN	all	MA	lg	1,477	1,477	1,477	0		1,477	Fish stock assessment and turtle bycatch support **
7	Otter Trawl	OPEN	all	NE	sm	1,105	1,105	1,105	0		1,105	Fish stock assessment support
8	Otter Trawl	OPEN	all	NE	lg	565	565	565	0		565	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	25						Industry funded scallop * (see Row 40)
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	0						Fleet removed (erroneous fleet)
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	96						Industry funded scallop * (see Row 43)
13	Otter Trawl, Scallop	OPEN	LIM	MA	sm	0						Fleet removed (erroneous fleet)
14	Otter Trawl, Scallop	OPEN	LIM	MA	lg	41						Industry funded scallop * (see Row 45)
15	Otter Trawl, Twin	OPEN	all	MA	sm	58	58	58	0		58	Fish stock assessment support
16	Otter Trawl, Twin	OPEN	all	MA	lg	14	14	14	0		14	Fish stock assessment support **
17	Otter Trawl, Twin	OPEN	all	NE	sm	67	67	67	0		67	Fish stock assessment support
18	Otter Trawl, Ruhle	OPEN	all	MA	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
19	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
20	Otter Trawl, Ruhle	OPEN	all	NE	lg	15	15	15	0		15	Fish stock assessment support **
21	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	107	107	107	0		107	Fish stock assessment support *
22	Otter Trawl, Shrimp	OPEN	all	MA	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
23	Otter Trawl, Shrimp	OPEN	all	NE	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
24	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	208	208	208	0		208	Fish stock assessment support
25	Otter Trawl, Other	OPEN	all	MA	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
26	Otter Trawl, Other	OPEN	all	MA	lg	0	0	0	0		0	Fleet removed (erroneous fleet)
27	Otter Trawl, Other	OPEN	all	NE	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
28	Floating Trap	OPEN	all	MA	all	9	9	0	0		0	Fleet removed (NEFOP limitation)
29	Floating Trap	OPEN	all	NE	all	6	6	0	0		0	Fleet removed (NEFOP limitation)
30	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	528	528	528	0		528	Fish stock assessment and turtle bycatch support
31	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	217	217	217	0		217	Fish stock assessment and turtle bycatch support
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	142	142	142	0		142	Fish stock assessment and turtle bycatch support **
33	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	8	8	8	0		8	Fish stock assessment support **
34	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	405	405	405	0		405	Fish stock assessment support **
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	105	105	105	0		105	Fish stock assessment support **
36	Purse Seine	OPEN	all	MA	all	7	7	0	0		0	Fleet removed (NEFOP limitation)
37	Purse Seine	OPEN	all	NE	all	18	18	18	0		18	Fish stock assessment support

Table 6, continued. The number of sea days needed to monitor the combined species groups (COMBINED; Step 5), prioritized days (Steps 9.4 and 9.5), non-prioritized days (protected species [MMPA]; Step 10), industry-funded scallop days (Step 11), and the 2018 observer sea days allocated for April 2018 through March 2019 (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 9.4	Step 9.5	Step 10	Step 11	Step 12	
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2018 Sea Days Needed COMBINED	2018 Sea Days PRIORITIZED (Penultimate approach not needed)	2018 Sea Days PRIORITIZED (Penultimate approach not needed)	2018 Sea Days non-prioritized (MMPA)	2018 Sea Days Industry-funded Scallop	Sea Days Allocated for April 2018 - March 2019 (TOTAL)	Comments
38	Dredge, Scallop	AA	GEN	MA	all	25						Industry funded scallop * (see Row 40)
39	Dredge, Scallop	AA	GEN	NE	all	29						Industry funded scallop * (see Row 41)
40	Dredge, Scallop	AA	LIM	MA	all	371				948	948	Industry funded scallop * (Rows 10, 38, & 40)
41	Dredge, Scallop	AA	LIM	NE	all	448				961	961	Industry funded scallop * (Rows 39 & 41)
42	Dredge, Scallop	OPEN	GEN	MA	all	23						Industry funded scallop * (see Row 43)
43	Dredge, Scallop	OPEN	GEN	NE	all	109				232	232	Industry funded scallop * (Rows 12, 42, & 43)
44	Dredge, Scallop	OPEN	LIM	MA	all	110						Industry funded scallop * (see Row 45)
45	Dredge, Scallop	OPEN	LIM	NE	all	1,772				1,960	1,960	Industry funded scallop * (Rows 14, 44, & 45)
46	Danish Seine	OPEN	all	MA	all	0	0	0	0	0	0	Fleet removed (erroneous fleet)
47	Danish Seine	OPEN	all	NE	all	0	0	0	0	0	0	Fleet removed (erroneous fleet)
48	Trawl, Mid-water Paired&Single	AA	all	NE	sm	43	43	43	0		43	Fish stock assessment support *
49	Trawl, Mid-water Paired&Single	OPEN	all	MA	sm	16	16	16	0		16	Fish stock assessment support *
50	Trawl, Mid-water Paired&Single	OPEN	all	NE	sm	44	44	44	0		44	Fish stock assessment support *
51	Pots and Traps, Other	OPEN	all	MA	all	0	0	0	0		0	Fleet removed (erroneous fleet)
52	Pots and Traps, Other	OPEN	all	NE	all	0	0	0	0		0	Fleet removed (erroneous fleet)
53	Pots and Traps, Fish	OPEN	all	MA	all	12	12	12	0		12	Fish stock assessment support
54	Pots and Traps, Fish	OPEN	all	NE	all	9	9	9	0		9	Fish stock assessment support
55	Pots and Traps, Conch	OPEN	all	MA	all	12	12	12	0		12	Fish stock assessment support
56	Pots and Traps, Conch	OPEN	all	NE	all	9	9	9	0		9	Fish stock assessment support
57	Pots and Traps, Hagfish	OPEN	all	NE	all	94	94	94	0		94	Fish stock assessment support
58	Pots and Traps, Lobster	OPEN	all	MA	all	16	16	16	0		16	Fish stock assessment support
59	Pots and Traps, Lobster	OPEN	all	NE	all	17	17	17	0		17	Fish stock assessment support
60	Weir	OPEN	all	NE	all	3	3	0	0		0	Fleet removed (NEFOP limitation)
61	Pots and Traps, Crab	OPEN	all	MA	all	30	30	30	0		30	Fish stock assessment support
62	Pots and Traps, Crab	OPEN	all	NE	all	80	80	80	0		80	Fish stock assessment support
63	Beam Trawl	OPEN	all	MA	sm	0	0	0	0		0	Fleet removed (erroneous fleet)
64	Beam Trawl	OPEN	all	NE	lg	0	0	0	0		0	Fleet removed (erroneous fleet)
65	Dredge, Other	OPEN	all	MA	all	0	0	0	0		0	Fleet removed (erroneous fleet)
66	Dredge, Urchin	OPEN	all	NE	all	3	3	0	0		0	Fleet removed (NEFOP limitation)
67	Dredge, Ocean Quahog/Surflclam	OPEN	all	MA	all	24	24	24	0		24	Fish stock assessment support
68	Dredge, Ocean Quahog/Surflclam	OPEN	all	NE	all	151	151	151	0		151	Fish stock assessment support
Prioritized sea days not allocated							162	190			190	To be announced
MMPA coverage									572		572	Coverage associated with Rows 30-35***
Total						10,568	7,681	7,681	572	4,101	12,354	

Step 6	Agency Fleets (Sea Days Needed)	7,519		
	Industry Fleets (Sea Days Needed)	3,049		
Step 7	Agency Fleets (Sea Days Funded)	7,681	Prioritized days	7,681
	Agency Fleets (Sea Days Funded)	572	Non-prioritized days (MMPA)	572
	Industry Fleets (Sea Days Funded)	4,101	Industry-funded scallop days	4,101
Step 8	Agency Fleet Difference	162		
	Industry Fleet Difference	1,052		
	Turtle Gear Types			
	MA Trawl	3,309		
	MA Gillnet	887		

KEY: Agency funded fleets | Industry funded fleets
 Fleets with reduction in sea days | Fleets with NEFOP Limitations
 Fleets identified as "erroneous" | Steps used in sea day allocation

Appendix Table 1 Stratification abbreviations used for 2018 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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