

2017
Standardized Bycatch Reporting Methodology
Annual Discard Report with Observer Sea Day Allocation

by

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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 Observer Program](#) (NEFOP) for 14 federally managed species groups 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 2017 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 2017, along with a description of the data sources, methods, results, and discussion. Similarly, for sea turtles, further information can be found in Murray 2012, 2013, 2015a. 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 fleet¹ (where a fleet represents gear type, access area, trip category, region, and mesh group combinations) for the April 2017 through March 2018 period.

Summary of Observer Coverage

A total of 3,802 trips (10,500 days) was observed during the July 2015 through June 2016 time period. When these trips were stratified by fleet and quarter, some trips were partitioned between fleets resulting in 4,202 trips (11,401 days). See Tables 2 and 3 in Wigley and Tholke 2017 for a summary of the number of observed trips and industry 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 56 fleets uniquely identified in the July 2015 through June 2016 data. Based upon the industry activity during this time period, no new fleets were added. The New England (NE) small mesh haddock separator trawl fleet was not active during the time period analyzed; hence there is one less fleet this year.

¹ Fleets are synonymous with “fishing modes”.

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 2015 through June 2016 time period, see Table 4 in Wigley and Tholke 2017.

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 2015 through June 2016 time period (Wigley and Tholke 2017). Based upon that discard estimation analysis, an estimated 69,691 mt (153,643,333 pounds) 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 2017 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 in U.S. Mid-Atlantic commercial fisheries are listed in Table 3. Estimates are summarized by gear type, and estimates with associated CVs allocated across managed fish species can be found in the references cited. The CVs around the estimates allocated across managed fish species were used to estimate coverage needs in 2017, per methods used in Murray (2012).

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 56 fleets² by using data collected during July 2015 through June 2016 (Wigley and Tholke 2017). Based on that sample size analysis, a total of 12,278 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 is further adjusted as described below.

The use of pilot coverage in the sample size analysis may result in too much coverage in cases where little or no observer coverage may actually be needed, when effort changed sharply between years, or when the fleet effort comprises only a few trips. To address the latter, when there were less than 3 Vessel Trip Report (VTR) trips in a fleet and quarter in the July 2015 through June 2016 time period, pilot coverage and minimum pilot coverage was set to zero. This is applied quarterly where industry activity is too low to support the 3 trip per quarter minimum observer coverage and prevents assigning more coverage than could be attained. There were 2 fleets where industry

² Trips fishing in Pamlico Sound have been removed from the sea day analysis (see Wigley and Tholke 2017) 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 (Row 19) represent those needed to monitor trips in ocean waters.

activity was so low that pilot coverage and minimum pilot coverage was zero for all quarters (Rows 10 and 26; Table 4).

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 are some fleets without observer coverage and hence no estimated discards for these fleets to feed into the importance filter. The Mid-Atlantic (MA) and NE crab pot fleets are among the fleets with no observer coverage in the July 2015 through June 2016 time period. There are several indications that substantial amounts of red deepsea crab discards occur in these 2 fleets. These indications are: fishery regulations that prohibit possession of female red deepsea crab and set minimum size requirements for male crabs; previous SBRM discard estimates for these fleets; and self-reported VTR discards. Because there was low compliance to report discards in VTR data, these data are not sufficient to derive discard estimates in a systematic manner. However, these self-reported data can be used to inform the observer-derived discard estimates by providing perspective on the amount of the discards estimated from observed fleets.

The self-reported discards of red deepsea crab (*Chaceon quinque-dens*) in the MA and NE crab pot VTR data were considered a minimum discard value and were explored to inform a decision to not allow sea day requirement for red deepsea crab to drive the sea day requirement for the NE large mesh otter trawl fleet in the [2016 SBRM Annual Discard Report with Observer Sea Day Allocation](#). In 2017, the VTR self-reported discard value would result in the sea day requirement for red deepsea crab in the NE lobster pot fleet being excluded by the importance filter. However, the discard value in the NE large mesh otter trawl fleet would be within a few percentage points of having the sea day requirement excluded by the importance filter. It is recognized that the sea day requirement for red deepsea crab in the NE large mesh otter trawl fleet would not be excluded based on the importance filter alone, but a non-traditional data source was used for this investigation. In the SBRM analyses, it is also recognized that other fleets may be in similar situations, where the sea day requirement is driven by the requirement for a species group that is close to being excluded by one of the importance filters. Altering any aspect of the SBRM analysis and process is avoided unless the situation is particularly egregious, as it is in this case (4,460 sea days difference).

Investigation of VTR data for the other unobserved fleets and for all 14 species groups found no evidence of substantial discarding that would influence importance filter considerations. Thus, it appears that the red deepsea crab situation is unique in having a large amount of discards reported in VTR data for two unobserved fleets (MA and NE crab pot fleets). This situation was not anticipated in the development or early implementation of SBRM, and it could lead to a distorted priority in how to allocate resources and observers to obtain quality bycatch estimates of all fisheries. If an adjustment is not made, it is believed that allowing the red deepsea crab anomalies to dictate such a disparately high level of observer coverage, potentially at the expense of having available observers in other fleets, is inconsistent with the intent of the SBRM.

To address this situation temporarily, near-term decisions regarding sea day requirements were made in 2016 and 2017, and observers were deployed in the crab pot fleets in order to have the data to better inform the SBRM analysis next year. It was decided not to allow sea day requirements for

red deepsea crab to drive the sea day requirements for NE lobster pot and NE large mesh otter trawl fleets in 2017. Further holistic explorations are being considered to determine if there are other solutions beyond simply increasing observer coverage.

If the sea day requirements for red deepsea crab were allowed to drive the process, the sea day requirement for NE large mesh otter trawl fleet would be 5,256 days and NE lobster pot fleet would be 602 days. Instead, 2017 SBRM coverage for the NE large mesh otter trawl and NE lobster pot fleets will be set based on the penultimate sea day requirements: 796 sea days (to meet requirements for Fluke-Scup-Black Sea Bass) and 17 sea days (minimum pilot coverage), respectively (Table 5, Step 2). With these sea day adjustments, a total of 7,233 sea days is needed for the 14 fish/invertebrate species groups (Table 5, Step 2).

For loggerhead turtles (*Caretta caretta*), the numbers of sea days needed to achieve a 30% CV of turtle discards were estimated by fishery, defined as a managed fish or invertebrate species landed on vessels using bottom otter trawl or sink gillnet gear in the Mid-Atlantic region (Murray 2012). The maximum amount of projected coverage across all the fisheries was considered the desired level of sampling to monitor turtle discards for that gear type. Roughly 3,300 days are needed across bottom trawl fisheries (Murray 2015a, and sea day estimation methods in Murray 2012), and roughly 2,600 days are needed across sink gillnet fisheries (Murray 2013, and sea day estimation methods in Murray 2012). Estimates of sea day needs for turtles are revised when new bycatch estimates are published for a particular gear type (approximately every 5 years).

Coverage needs for turtles on vessels using scallop dredge gear in the Mid-Atlantic were not estimated because the utility of observers as a monitoring tool for turtles in the fishery appears to be decreasing (Murray 2015b). 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). No loggerhead turtles have been observed in the scallop dredge fleets since 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)³. Therefore, observer coverage levels in the Mid-Atlantic scallop dredge fleets in 2017 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 too few have been observed to estimate total bycatch and CVs for these species using model-based approaches (Murray 2012). 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.

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

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 Rows 5, 6, 9-12, and 15	3,309	1,297
MA Gillnet Rows 23-25	2,593	161

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.
- 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 sea days needed for turtles were distributed according to the proportion of VTR sea days corresponding to fish/invertebrate fleets (Table 5, Steps 4a - 4c). The number of VTR sea days by fleet is taken from Table 3 in Wigley and Tholke 2017 and reflects industry activity during the July 2015 through June 2016 time period.

A total of 11,705 sea days is needed for fish/invertebrates and loggerhead turtles (COMBINED; Table 5, Step 5) during the April 2017 through March 2018 period. Of the 11,705 sea days, 10,469 sea days are needed for agency-funded fleets and 1,236 sea days are needed for industry-funded fleets (Table 5, Step 6).

Summary of Funding available for the April 2017 through March 2018 period

The funds⁵ available to the NEFSC’s Northeast Fisheries Sampling Branch in fiscal year (FY) 2017 are estimated to provide support for 6,096 days and 5,276 days are carried over (i.e., bought ahead)

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.

⁵ At this time, the Department of Commerce FY2017 budget remains under a Continuing Resolution through April 28, 2017.

from FY2016 funds⁶ for a total of 11,372 (6,096 + 5,276) days for the April 2017 through March 2018 time period. Based upon an observer set-aside compensation rate analysis for the Industry Funded Scallop program, there is industry funding for 2,741 days. Hence, 14,113 (11,372 + 2,741) days are available for observer coverage during April 2017 through March 2018.

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 11,372 agency-funded sea days include: Atlantic Coast Observers (751 days), Northeast Fisheries Observers (3,392 days), National Observer Program (1,412 days), Reducing Bycatch (60 days), and 4,895 FY2016 carryover/bought ahead days collectively fund the sea days for prioritization (10,510 days; Table 5, Step 7); and Marine Mammal Protection Act (MMPA; 481 days) and FY2016 carryover/bought ahead (381 days) collectively fund the sea days to monitor protected species (862 days; Table 5, Step 7).
 - 862 agency-funded days are applicable to protected species⁷ only.
 - 780 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 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.
 - Funding equivalent to 82 days will be in support of observer data analysis.
 - 10,510 (11,372 - 862) agency-funded days are applicable for all species.
 - 10,510 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 FY16): \$1,227 for NEFOP days (\$712 for the costs associated with the sea days and \$515 from the infrastructure).

⁶ The best estimate of the FY2016 carryover days is 5,276 days (4,895 prioritized carryover days and 381 MMPA carryover days).

⁷ In this document, protected species refers to marine mammals, sea turtles, and ESA-listed fish.

- **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 (IFS) 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 12 industry-funded scallop fleets (Rows 9-12 and 31-38; Table 5).
 - Based upon the compensation rate analysis, a total of 2,741 sea days can be funded: 1,142 days for Open Areas, 780 days for Mid-Atlantic Access Areas, and 819 days in the New England Access Areas.
 - The industry-funded schedule runs March through February, a 12-month period that is shifted 1 month from the NEFOP sea day schedule of April to March.
 - Bulletins describing the 2017 set-aside compensation rate calculations and scallop management measures are available online at the [Greater Atlantic Regional Fisheries Office webpage](#).
 - Of the 1,142 days for the Open Areas, there are 144 days for Limited Access General Category fleets (Rows 11, 35, and 36; Table 6) and 998 days for Limited Access fleets (Rows 12, 37, and 38; Table 6).
 - Coverage of the 12 fleets depends on industry activity among these fleets during April 2017 through March 2018; the sea days represent the maximum coverage (i.e., caps).
 - Projected costs: the cost to industry for 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 2017 through March 2018.

Funding Source	Sea Days
Agency-funded Total	11,372
Agency-funded applicable to all species (prioritized days)	10,510
Agency-funded applicable to protected species only (non-prioritized days)	862
Industry-funded Scallop Total applicable to all species	2,741
Total	14,113

Prioritization Trigger and Details of the Allocation of Sea Days 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 41 (10,510 – 10,469) days (Table 5). The 2017 funding does not trigger the SBRM prioritization approach. 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 14,113 funded sea days to 56 fleets (Tables 5 and 6).

Step 1. Derive the number of sea days needed for the 14 fish/invertebrate species groups (see Wigley and Tholke 2017; Table 5).

Step 2. Apply the sea day adjustments to the NE large mesh otter trawl fleet (Row 8) and the NE lobster pot fleet (Row 49). A total of 7,233 days is needed across 54 fleets (43 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, 2013, 2015a; 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 type group (Table 5).

- a. Summarize the number of VTR sea days corresponding to each fish/invertebrate fleet (see Table 3 in Wigley and Tholke 2017). The VTR sea days are zero for the fish/invertebrate fleets that do not need observer sea days.
- b. Derive the percentage of VTR sea days for each fish/invertebrate fleet within a turtle gear type group. For each fish/invertebrate fleet associated with a turtle gear type, divide the VTR sea days by the sum of the VTR sea days for the gear type group.
- c. Derive the number of sea days needed for loggerhead turtles by fish/invertebrate fleet. Multiply the number of turtle sea days needed for the gear type by the percentage of VTR sea days for each fish/invertebrate fleet within the turtle gear type group.

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 4c]) within the fleet.

A total of 11,705 days is needed to achieve a 30% CV on the discards of the 15 species groups in 2017; Table 5).

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

There were 10,469 days and 1,236 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 10,510 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 41 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.

In 2017, no prioritization is needed; Steps 9.1 through 9.3 are not applicable this year.

Step 9.4. The 10,510 prioritized sea days provide observer coverage to meet the 10,469 days needed in all 43 agency-funded fleets with remaining funding equivalent to approximately 41 days. These funds will be utilized at the agency's discretion.

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

In 2017, there are no practical limitations that prevent the NEFOP from covering these fleets. The NEFOP has contracted with 2 third-party providers to ensure the highest rate of accomplished days.

The sea days in Step 9.5 equal the sea days in Step 9.4 (Table 6).

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

There are 862 agency-funded days that are not applicable to the prioritization process (non-prioritized MMPA days; Table 6).

Of the 862 MMPA sea days, 780 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 23-28; Table 6). The funding equivalent of 82 MMPA sea days are assigned to a row designated as "MMPA analysis."

Step 11. Allocate industry-funded 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 2017 through March 2018 period and will be capped as described above. The 2,741 industry-funded 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 compensation rate analysis: Mid-Atlantic Access Area fleets (Rows 9, 10, 31, and 33; Table 6); Open Areas fleets (Rows 11, 35, and 36 for Limited Access General Category fleets and Rows 12, 37, and 38 for Limited Access; Table 6); and New England Access Area fleets (Rows 32 and 34; 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 2017 – March 2018 (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 14,113 days is allocated across 54 fleets (Table 6). At this time, there are remaining funds equivalent to approximately 41 days that will be utilized at the agency’s discretion (to be announced; 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 the scallop call-in program. This means all or some of the observer coverage within each of these fleets will depend upon industry activity during the April 2017 through March 2018 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 2015 through June 2016 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, they will be carried over.

The sample size analysis conducted by Wigley and Tholke (2017) 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 2017). Deriving the expected CV assumes the variance of the discard estimate is constant over a range of sample sizes (number of trips).

The estimated 4,895 prioritized carryover days are the result of unaccomplished sea days during the April 2016 - March 2017 time period. The 4,895 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 2017-March 2018 time period. Due to the unaccomplished sea days during the April 2016-March 2017 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 NEFOP has contracted with 2 third-party providers to ensure the highest rate of accomplished days.

The New York Department of Environmental Conservation has secured funding through the Atlantic Coast Cooperative Statistical Program (ACCSP) to support observer coverage (approximately 518 days) for otter trawl, gillnet, and pot/trap fleets in the Mid-Atlantic region. Additionally, the Atlantic States Marine Fisheries Commission (ASMFC) has funding to support observer coverage (25 days) in the small mesh otter trawl fleet in the New England and Mid-Atlantic regions. The ACCSP and ASMFC observer coverage is implemented by NEFOP (via a Memorandum of Understanding) and uses sampling protocols that collect data on all species encountered on the trips. The ACCSP and ASMFC observer coverage is separate from that allocated of this report (i.e., ACCSP and ASMFC days are not included in Table 6).

At-Sea Monitoring (ASM) coverage 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](#).

Pre-Trip Notification System

The NEFOP uses two systems to select fishing trips for observer coverage: the PTNS 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 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 2017 SBRM analyses for discard estimation and sample size (Wigley and Tholke 2017) used the VTR (including clam logbook) data to define the sampling frame for the 56 fleets using data collected from the July 2015 through June 2016 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 2017 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 fleet to include all vessels with a federal permit requires a regulatory change to the SBRM Amendment. The agency is pursuing the required language change through the appropriate regulatory procedures. In the meantime, the NEFOP will not use the expanded sampling frame for lobster pot fleets until a regulatory change is made.

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.

Industry Funded Scallop Program Sea Days

The SBRM provides a structured sampling design, data collection procedures, and analyses to determine Federally-funded observer coverage to estimate bycatch in multiple fisheries based on the relative precision and relative importance of discards of Federally-managed species groups. Industry funded programs may be needed to address other management needs, or meet a finer scale or stratification of monitoring identified by the Council. The determination of observer coverage also considers other factors such as the need for at-sea biological sampling of sea scallops (*Placopecten magellanicus*) and groundfish bycatch. Hence, the objectives of SBRM analyses and the bycatch monitoring differ and the resultant observer coverage differs. The SBRM sea days may be considered the minimum coverage required and the industry-funded coverage may exceed that minimum. There are two basic reasons why observer coverage for sea scallops may result in greater needs than the SBRM:

1. Discards need to be estimated on a spatial scale finer than that used for SBRM. For example, SBRM combines all three New England scallop access areas together. For many bycatch species of concern for the scallop fishery, the three access areas are in different stock areas, thus requiring estimation of discards for each access area. Additionally, when the NEFMC is considering reopening one or more of these access areas, estimates of bycatch specific to that area are needed to assess the impact to the bycatch stocks of opening that area to scallop fishing.
2. Scallop observer data are crucial to obtain measurements of commercially landed shell heights, which is required in the sea scallop stock assessment in order to estimate commercial selectivity. Unlike many other stocks, where this type of information can be obtained through port sampling, sea scallops are shucked at sea, so that sea sampling is the only way to obtain these data. Additionally, observers collect volumetric data on the size of meats at shell height. While shell height to meat weight data are collected on the scallop dredge surveys, weights of sea scallops shucked by scientists may be statistically different from commercial-shucked sea scallops. Commercial shell heights and meat weights from

observer data are important for the sea scallop assessment since they allow for the converting of landings in units of weight into numbers of sea scallops by shell height. These other uses are not considered in the SBRM.

Elevated observer coverage rates in the scallop fishery are based on the Council's recommendations. In Framework 16 to the Atlantic Sea Scallop Fishery Management Plan (FMP), the Council recommended between 9 and 25 percent coverage in the access areas within the groundfish closed areas; observer coverage rates have been within these limits in the access areas in recent years. There are no other specific coverage level recommendations or targets in the Atlantic Sea Scallop FMP. As a result, NMFS evaluates the coverage level that is needed for additional catch and bycatch information that will improve evaluation of the scallop fishery, using the Council's recommendations as a guide.

The Council has also specified an amount of the sea scallop resource to be used to compensate the industry for the added cost of the observer. NMFS calculates the observer compensation rates by using various sources of data including sea day allocations, average daily cost of the observer, landings per unit of effort (LPUE), and average price per pound of sea scallops. The compensation rates are expected to provide sufficient compensation for the observer fee, while also providing sufficient observer coverage based on anticipated coverage levels needed for the start of the fishing year. NMFS calculates the rates to include a buffer between the anticipated landed value of the sea scallops and the cost of the observer. The intent of these excess funds is to account for the cost in harvesting the additional set-aside sea scallop pounds as well as for uncertainties in prices and LPUE. The set-aside this year and last year did not limit the amount of coverage that was applied to the sea scallop fishery. Ultimately, a compensation rate is selected that provides sufficient funds to pay for the observer while not creating sampling bias with excessively high or low compensation. As a result, some sea scallop set-aside has been left unharvested.

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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 DEESEA CRAB (RCRAB)⁸	<i>Chaceon quinquedens</i>
SEA SCALLOP (SCAL)	<i>Placopecten magellanicus</i>
SKATE COMPLEX (SKATE)⁹	<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>
SQUID¹⁰ - 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>
TILEFISH (TILE)	<i>Lopholatilus chamaeleonticeps</i>
LOGGERHEAD TURTLE (TURS)	<i>Caretta caretta</i>

⁸ Red deepsea crab was referred to as red crab in documents prior to 2014.

⁹ Skate complex comprises 7 species as well as skate, unknown.

¹⁰ 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 species groups combined, by fleet, based on July 2015 through June 2016 data. Dark shading indicates fleets not considered or with no Northeast Fisheries Observer Program trips in the annual analysis. These CVs 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 2017.*

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	OPEN	all	MA	all	1,395,876	1,155,953	239,923	0.293	70,288	
2	Longline	OPEN	all	NE	all	3,949,633	3,236,766	712,867	0.391	278,920	
3	Hand Line	OPEN	all	MA	all	295,388	295,388	0			P
4	Hand Line	OPEN	all	NE	all	2,502,557	2,420,243	82,314	1.272	104,681	
5	Otter Trawl	OPEN	all	MA	sm	40,617,554	22,783,110	17,834,444	0.091	1,625,413	
6	Otter Trawl	OPEN	all	MA	lg	39,321,081	15,847,982	23,473,099	0.109	2,548,548	
7	Otter Trawl	OPEN	all	NE	sm	63,571,021	52,410,056	11,160,966	0.085	947,546	
8	Otter Trawl	OPEN	all	NE	lg	87,963,325	49,838,534	38,124,791	0.089	3,388,088	
9	Scallop Trawl	AA	GEN	MA	all	1,942,298	770,913	1,171,385	0.279	326,485	
11	Scallop Trawl	OPEN	GEN	MA	all	184,981	94,556	90,425	0.404	36,527	
12	Scallop Trawl	OPEN	LIM	MA	all	65,861	65,861				P
13	Otter Trawl, Twin	OPEN	all	MA	all	2,315,245	2,041,787	273,458	0.644	176,096	P
14	Otter Trawl, Twin	OPEN	all	NE	all	1,189,172	956,977	232,195	0.106	24,583	P
16	Otter Trawl, Ruhle	OPEN	all	NE	sm	1,348,709	1,278,037	70,672	0.000	0	P
17	Otter Trawl, Ruhle	OPEN	all	NE	lg	84,471	84,471				P
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	5,705,411	4,133,646	1,571,765	0.198	310,827	
19	Shrimp Trawl	OPEN	all	MA	all	227,203	24,682	202,521	0.000	0	P
20	Shrimp Trawl	OPEN	all	NE	all	216,788	216,788				P
22	Floating Trap	OPEN	all	NE	all	4,406	4,406				P
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	2,229,625	2,102,717	126,908	0.418	53,098	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	6,400,571	6,049,093	351,477	0.158	55,623	
25	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	6,877,249	5,636,861	1,240,389	0.108	134,572	
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	2,286	2,286				P
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	9,795,676	7,288,013	2,507,663	0.144	359,867	
28	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	21,662,437	18,829,387	2,833,050	0.132	373,882	
29	Purse Seine	OPEN	all	MA	all	0	0				P
30	Purse Seine	OPEN	all	NE	all	55,868,638	55,865,565	3,073	1.113	3,422	
31	Scallop Dredge	AA	GEN	MA	all	13,237,194	10,951,668	2,285,526	0.135	309,605	

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 species groups combined, by fleet, based on July 2015 through June 2016 data. Dark shading indicates fleets not considered or with no Northeast Fisheries Observer Program trips in the annual analysis. These CVs 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 2017.

Species: 14 SBRM SPECIES GROUPS COMBINED

Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	SE	Pilot
32	Scallop Dredge	AA	GEN	NE	all	2,590,875	2,404,835	186,041	0.135	25,118	
33	Scallop Dredge	AA	LIM	MA	all	63,982,171	56,539,840	7,442,331	0.132	981,073	
34	Scallop Dredge	AA	LIM	NE	all	80,621,516	72,391,699	8,229,817	0.117	965,565	
35	Scallop Dredge	OPEN	GEN	MA	all	9,402,600	6,822,826	2,579,774	0.081	210,243	
36	Scallop Dredge	OPEN	GEN	NE	all	8,207,370	6,735,750	1,471,620	0.133	196,194	
37	Scallop Dredge	OPEN	LIM	MA	all	47,210,884	39,530,325	7,680,559	0.085	654,913	
38	Scallop Dredge	OPEN	LIM	NE	all	119,147,122	103,183,698	15,963,423	0.075	1,200,741	
39	Danish Seine	OPEN	all	MA	all	5,661	5,661				P
40	Mid-water Paired & Single Trawl	AA	all	NE	all	2,817,886	2,815,151	2,735	0.204	559	
42	Mid-water Paired & Single Trawl	OPEN	all	NE	all	91,457,893	91,457,330	563	0.401	226	
43	Pots and Traps, Fish	OPEN	all	MA	all	406,663	297,394	109,269	0.786	85,869	
44	Pots and Traps, Fish	OPEN	all	NE	all	284,161	177,560	106,601	0.215	22,970	
45	Pots and Traps, Conch	OPEN	all	MA	all	4,431	3,847	584	0.401	234	
46	Pots and Traps, Conch	OPEN	all	NE	all	2,761	250	2,511	0.983	2,468	
47	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0				P
48	Pots and Traps, Lobster	OPEN	all	MA	all	228,340	176,371	51,969	0.596	30,963	
49	Pots and Traps, Lobster	OPEN	all	NE	all	492,440	151,424	341,016	0.349	118,977	
50	Pots and Traps, Crab	OPEN	all	MA	all	312,429	312,429				P
51	Pots and Traps, Crab	OPEN	all	NE	all	2,540,660	2,540,660				P
52	Beam Trawl	OPEN	all	MA	all	246,704	246,704				P
53	Beam Trawl	OPEN	all	NE	all	247,236	247,236				P
54	Dredge, Other	OPEN	all	MA	all	0	0				P
55	Ocean Quahog/Surflclam Dredge	OPEN	all	MA	all	252,166,971	248,442,275	3,724,696	0.317	1,180,835	
56	Ocean Quahog/Surflclam Dredge	OPEN	all	NE	all	199,602,039	198,441,125	1,160,914	0.236	273,900	
Confidential fleets						3,388,896	3,388,896				
Other minor fleets						1,392,414	1,392,414				
TOTAL						1,255,734,776	1,102,091,443	153,643,333	0.034	5,251,126	

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	89	0.26	01 Jan 2007-2001	Loggerhead	Murray 2013
Sink Gillnet	95	0.21	01 Jan 2007-2011	Hard-shelled	Murray 2013

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 (2017 Sea Days Needed) for fish and invertebrate species groups based on July 2015 through June 2016 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 6 in Wigley and Tholke 2017.*

Row	Fleet Gear Type	Access Area	Trip Category	Region	Mesh Group	BLUE	HERR	SAL	RCRAB	SCAL	SBM	MONK	GFL	GFS	SKATE	DOG	FSB	SCOQ	TILE	Pilot Days	Min Pilot Days	2017 Sea Days Needed	Pilot
1	Longline	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	94	94	
2	Longline	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	44	0	0	0	22	14	44	
3	Hand Line	OPEN	all	MA	all	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	13	65	P
4	Hand Line	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	14	14	
5	Otter Trawl	OPEN	all	MA	sm	0	0	0	0	0	719	450	0	1,010	189	323	130	0	0	141	28	1,010	
6	Otter Trawl	OPEN	all	MA	lg	0	0	0	0	0	0	183	125	0	80	167	172	0	0	186	30	183	
7	Otter Trawl	OPEN	all	NE	sm	0	0	0	0	0	331	1,946	490	520	448	468	392	0	0	209	35	1,946	
8	Otter Trawl	OPEN	all	NE	lg	0	0	0	5,256	0	0	314	353	598	342	301	796	0	0	318	36	5,256	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0	0	0	0	0	0	0	0	50	0	0	0	13	13	50	
10	Scallop Trawl	AA	LIM	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	17	17	
12	Scallop Trawl	OPEN	LIM	MA	all	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	P
13	Otter Trawl, Twin	OPEN	all	MA	all	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	P
14	Otter Trawl, Twin	OPEN	all	NE	all	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	P
15	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
16	Otter Trawl, Ruhle	OPEN	all	NE	sm	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	P
17	Otter Trawl, Ruhle	OPEN	all	NE	lg	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	P
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	0	0	0	0	0	0	0	219	0	0	0	0	0	0	102	102	219	
19	Shrimp Trawl	OPEN	all	MA	all	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	P
20	Shrimp Trawl	OPEN	all	NE	all	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	P
21	Floating Trap	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
22	Floating Trap	OPEN	all	NE	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	12	12	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	116	0	0	0	46	13	116	
25	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xl	0	0	0	0	0	0	0	0	0	33	0	0	0	0	41	14	33	
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	240	0	0	0	80	21	240	
28	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xl	0	0	0	0	0	0	162	0	0	197	507	0	0	0	102	19	507	
29	Purse Seine	OPEN	all	MA	all	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	P
30	Purse Seine	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	21	21	
31	Scallop Dredge	AA	GEN	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	26	26	
32	Scallop Dredge	AA	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	23	23	
33	Scallop Dredge	AA	LIM	MA	all	0	0	0	0	154	0	82	0	0	125	0	0	0	0	100	85	154	
34	Scallop Dredge	AA	LIM	NE	all	0	0	0	0	187	0	128	0	0	101	0	0	0	0	114	93	187	
35	Scallop Dredge	OPEN	GEN	MA	all	0	0	0	0	0	0	55	0	0	16	0	0	0	0	79	26	55	
36	Scallop Dredge	OPEN	GEN	NE	all	0	0	0	0	0	0	41	0	0	58	0	0	0	0	85	18	58	
37	Scallop Dredge	OPEN	LIM	MA	all	0	0	0	0	0	0	46	0	0	34	0	0	0	0	103	97	46	
38	Scallop Dredge	OPEN	LIM	NE	all	0	0	0	0	406	0	272	160	489	130	0	563	0	0	185	109	563	
39	Danish Seine	OPEN	all	MA	all	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	P
40	Mid-water Paired & Single Trawl	AA	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	25	
41	Mid-water Paired & Single Trawl	OPEN	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	P

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 (2017 Sea Days Needed) for fish and invertebrate species groups based on July 2015 through June 2016 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 6 in Wigley and Tholke 2017.

Row	Fleet Gear Type	Access Area	Trip Category	Region	Mesh Group	BLUE	HERR	SAL	RCRAB	SCAL	SBM	MONK	GFL	GFS	SKATE	DOG	FSB	SCOQ	TILE	Pilot Days	Min Pilot Days	2017 Sea Days Needed	Pilot	
42	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	40	
43	Pots and Traps, Fish	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	13	13	
44	Pots and Traps, Fish	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	10	10	
45	Pots and Traps, Conch	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	12	12	
46	Pots and Traps, Conch	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	9	9	
47	Pots and Traps, Hagfish	OPEN	all	NE	all	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	P
48	Pots and Traps, Lobster	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	15	15	
49	Pots and Traps, Lobster	OPEN	all	NE	all	0	0	0	602	0	0	0	0	0	0	0	0	0	0	0	459	17	602	
50	Pots and Traps, Crab	OPEN	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	P
51	Pots and Traps, Crab	OPEN	all	NE	all	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	P
52	Beam Trawl	OPEN	all	MA	all	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	P
53	Beam Trawl	OPEN	all	NE	all	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	P
54	Dredge, Other	OPEN	all	MA	all	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	11	P
55	Ocean Quahog/Surfclam Dredge	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	21	21	
56	Ocean Quahog/Surfclam Dredge	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	16	16	
					Total	641	641	641	6,499	1,388	1,691	4,320	1,988	3,258	2,394	2,857	2,694	641	641	3,686	1,725	12,278		

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 2017 through March 2018 (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 5	
Row	Gear Type	Access Area	Trip Cat.	Region	Mesh	2017 Sea Days Needed for FISH	2017 Sea Days Needed for FISH ADJUSTED	2017 Sea Days Needed for TURS	Vessel Trip Report Sea Days	% Vessel Trip Report Sea Days	TURS Sea Days by FISH fleet	2017 Sea Days Needed COMBINED	
1	Longline	OPEN	all	MA	all	94	94		1,246			94	
2	Longline	OPEN	all	NE	all	44	44		861			44	
3	Hand Line	OPEN	all	MA	all	65	65		3,201			65	
4	Hand Line	OPEN	all	NE	all	14	14		3,186			14	
5	Otter Trawl	OPEN	all	MA	sm	1010	1,010	3,309	7,039	0.417	1,381	1,381	
6	Otter Trawl	OPEN	all	MA	lg	183	183		9,310	0.552	1,828	1,828	
7	Otter Trawl	OPEN	all	NE	sm	1946	1,946		10,443			1,946	
8	Otter Trawl	OPEN	all	NE	lg	5256	796		15,878			796	
9	Scallop Trawl	AA	GEN	MA	all	50	50		335	0.020	66	66	
10	Scallop Trawl	AA	LIM	MA	all	0	0		4	0.000	1	1	
11	Scallop Trawl	OPEN	GEN	MA	all	17	17		124	0.007	24	24	
12	Scallop Trawl	OPEN	LIM	MA	all	33	33		43	0.003	8	33	
13	Otter Trawl , Twin	OPEN	all	MA	all	30	30		310			30	
14	Otter Trawl , Twin	OPEN	all	NE	all	89	89		171			89	
15	Otter Trawl, Ruhle	OPEN	all	MA	lg	4	4		5	0.000	1	4	
16	Otter Trawl, Ruhle	OPEN	all	NE	sm	14	14		58			14	
17	Otter Trawl, Ruhle	OPEN	all	NE	lg	24	24		74			24	
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	219	219		1,461			219	
19	Shrimp Trawl	OPEN	all	MA	all	50	50		531			50	
20	Shrimp Trawl	OPEN	all	NE	all	33	33		122			33	
21	Floating Trap	OPEN	all	MA	all	6	6		76			6	
22	Floating Trap	OPEN	all	NE	all	3	3		15			3	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	12	12	2,593	1,651	0.2779	720	720	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	116	116		2,285	0.3846	998	998	
25	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xl	33	33		2,006	0.3376	875	875	
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0		4			0	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	240	240		4,003			240	
28	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xl	507	507		5,107			507	
29	Purse Seine	OPEN	all	MA	all	7	7		223			7	
30	Purse Seine	OPEN	all	NE	all	21	21		524			21	
31	Scallop Dredge	AA	GEN	MA	all	26	26		3,794			26	
32	Scallop Dredge	AA	GEN	NE	all	23	23		849			23	
33	Scallop Dredge	AA	LIM	MA	all	154	154		3,999			154	
34	Scallop Dredge	AA	LIM	NE	all	187	187		4,780			187	
35	Scallop Dredge	OPEN	GEN	MA	all	55	55		3,929			55	
36	Scallop Dredge	OPEN	GEN	NE	all	58	58		4,244			58	
37	Scallop Dredge	OPEN	LIM	MA	all	46	46		3,996			46	
38	Scallop Dredge	OPEN	LIM	NE	all	563	563		8,880			563	
39	Danish Seine	OPEN	all	MA	all	7	7		49			7	
40	Mid-water Paired & Single Trawl	AA	all	NE	all	25	25		35			25	
41	Mid-water Paired & Single Trawl	OPEN	all	MA	all	13	13		45			13	
42	Mid-water Paired & Single Trawl	OPEN	all	NE	all	40	40		1,170			40	
43	Pots and Traps, Fish	OPEN	all	MA	all	13	13		717			13	
44	Pots and Traps, Fish	OPEN	all	NE	all	10	10		617			10	
45	Pots and Traps, Conch	OPEN	all	MA	all	12	12		1,165			12	
46	Pots and Traps, Conch	OPEN	all	NE	all	9	9		1,298			9	
47	Pots and Traps, Hagfish	OPEN	all	NE	all	97	97		325			97	
48	Pots and Traps, Lobster	OPEN	all	MA	all	15	15		1,834			15	
49	Pots and Traps, Lobster	OPEN	all	NE	all	602	17		36,393			17	
50	Pots and Traps, Crab	OPEN	all	MA	all	28	28		149			28	
51	Pots and Traps, Crab	OPEN	all	NE	all	83	83		358			83	
52	Beam Trawl	OPEN	all	MA	all	31	31		253			31	
53	Beam Trawl	OPEN	all	NE	all	13	13		115			13	
54	Dredge, Other	OPEN	all	MA	all	11	11		314			11	
55	Ocean Quahog/Surflam Dredge	OPEN	all	MA	all	21	21		3,147			21	
56	Ocean Quahog/Surflam Dredge	OPEN	all	NE	all	16	16		2,822			16	
Total						12,278	7,233	5,902	155,573			11,705	
Step 6						Agency Fleets (Sea Days Needed)	11,066	6,021					10,469
						Industry Fleets (Sea Days Needed)	1,212	1,212					1,236
Step 7						Agency Fleets (Sea Days Funded)					Prioritized		10,510
						Agency Fleets (Sea Days Funded)					Non-prioritized (MMPA)		862
						Industry Fleets (Sea Days Funded)							2,741
Step 8						Agency Fleet Difference					SURPLUS		41
						Industry Fleet Difference					SURPLUS		1,505
Turtle Gear Types						MA Trawl	1,297	1,297	3,309	16,860		3,309	3,337
						MA Gillnet	161	161	2,593	5,942		2,593	2,593

KEY: Agency funded fleets | Industry funded fleets

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 2017 observer sea days allocated for April 2017 through March 2018 (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.

Row	Fleet						2017 Sea Days Needed COMBINED	Step 9.4 2017 Sea Days PRIORITIZED (Penultimate approach not needed)	Step 9.5 2017 Sea Days PRIORITIZED (Penultimate approach not needed)	Step 10 2017 Sea Days non-prioritized (MMPA)	Step 11 2017 Sea Days Industry-funded Scallop	Step 12 Sea Days Allocated for April 2017 - March 2018 (TOTAL)	Comments
	Gear Type	Access Area	Trip Cat.	Region	Mesh								
1	Longline	OPEN	all	MA	all	94	94	94	0			94	Fish stock assessment support
2	Longline	OPEN	all	NE	all	44	44	44	0			44	Fish stock assessment support **
3	Hand Line	OPEN	all	MA	all	65	65	65	0			65	Fish stock assessment support
4	Hand Line	OPEN	all	NE	all	14	14	14	0			14	Fish stock assessment support
5	Otter Trawl	OPEN	all	MA	sm	1,381	1,381	1,381	0			1,381	Fish stock assessment and turtle bycatch support
6	Otter Trawl	OPEN	all	MA	lg	1,828	1,828	1,828	0			1,828	Fish stock assessment and turtle bycatch support **
7	Otter Trawl	OPEN	all	NE	sm	1,946	1,946	1,946	0			1,946	Fish stock assessment support **
8	Otter Trawl	OPEN	all	NE	lg	796	796	796	0			796	Fish stock assessment support **
9	Scallop Trawl	AA	GEN	MA	all	66							Industry funded* (see Row 33)
10	Scallop Trawl	AA	LIM	MA	all	1							Industry funded * (see Row 33)
11	Scallop Trawl	OPEN	GEN	MA	all	24							Industry funded * (see Row 36)
12	Scallop Trawl	OPEN	LIM	MA	all	33							Industry funded * (see Row 38)
13	Otter Trawl , Twin	OPEN	all	MA	all	30	30	30	0			30	Fish stock assessment support
14	Otter Trawl , Twin	OPEN	all	NE	all	89	89	89	0			89	Fish stock assessment support
15	Otter Trawl, Ruhle	OPEN	all	MA	lg	4	4	4	0			4	Fish stock assessment support
16	Otter Trawl, Ruhle	OPEN	all	NE	sm	14	14	14	0			14	Fish stock assessment support
17	Otter Trawl, Ruhle	OPEN	all	NE	lg	24	24	24	0			24	Fish stock assessment support *
18	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	219	219	219	0			219	Fish stock assessment support *
19	Shrimp Trawl	OPEN	all	MA	all	50	50	50	0			50	Fish stock assessment support
20	Shrimp Trawl	OPEN	all	NE	all	33	33	33	0			33	Fish stock assessment support
21	Floating Trap	OPEN	all	MA	all	6	6	6	0			6	Fish stock assessment support
22	Floating Trap	OPEN	all	NE	all	3	3	3	0			3	Fish stock assessment support
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	720	720	720	0			720	Fish stock assessment support
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	998	998	998	0			998	Fish stock assessment and turtle bycatch support **
25	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	875	875	875	0			875	Fish stock assessment and turtle bycatch support **
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0	0	0			0	Fish stock assessment and turtle bycatch support
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	240	240	240	0			240	Fish stock assessment support **
28	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	507	507	507	0			507	Fish stock assessment support **
29	Purse Seine	OPEN	all	MA	all	7	7	7	0			7	Fish stock assessment support
30	Purse Seine	OPEN	all	NE	all	21	21	21	0			21	Fish stock assessment support
31	Scallop Dredge	AA	GEN	MA	all	26							Industry funded * (see Row 33)
32	Scallop Dredge	AA	GEN	NE	all	23							Industry funded * (see Row 34)
33	Scallop Dredge	AA	LIM	MA	all	154				780	780		Industry funded * (Rows 9, 10, 31, & 33)
34	Scallop Dredge	AA	LIM	NE	all	187				819	819		Industry funded * (Rows 32 & 34)
35	Scallop Dredge	OPEN	GEN	MA	all	55							Industry funded * (see Row 36)
36	Scallop Dredge	OPEN	GEN	NE	all	58				144	144		Industry funded * (Rows 11, 35, & 36)
37	Scallop Dredge	OPEN	LIM	MA	all	46							Industry funded * (see Row 38)
38	Scallop Dredge	OPEN	LIM	NE	all	563				998	998		Industry funded * (Rows 12, 37, & 38)
39	Danish Seine	OPEN	all	MA	all	7	7	7	0			7	Fish stock assessment support
40	Mid-water Paired & Single Trawl	AA	all	NE	all	25	25	25	0			25	Fish stock assessment support
41	Mid-water Paired & Single Trawl	OPEN	all	MA	all	13	13	13	0			13	Fish stock assessment support
42	Mid-water Paired & Single Trawl	OPEN	all	NE	all	40	40	40	0			40	Fish stock assessment support
43	Pots and Traps, Fish	OPEN	all	MA	all	13	13	13	0			13	Fish stock assessment support
44	Pots and Traps, Fish	OPEN	all	NE	all	10	10	10	0			10	Fish stock assessment support
45	Pots and Traps, Conch	OPEN	all	MA	all	12	12	12	0			12	Fish stock assessment support
46	Pots and Traps, Conch	OPEN	all	NE	all	9	9	9	0			9	Fish stock assessment support
47	Pots and Traps, Hagfish	OPEN	all	NE	all	97	97	97	0			97	Fish stock assessment support
48	Pots and Traps, Lobster	OPEN	all	MA	all	15	15	15	0			15	Fish stock assessment support
49	Pots and Traps, Lobster	OPEN	all	NE	all	17	17	17	0			17	Fish stock assessment support
50	Pots and Traps, Crab	OPEN	all	MA	all	28	28	28	0			28	Fish stock assessment support
51	Pots and Traps, Crab	OPEN	all	NE	all	83	83	83	0			83	Fish stock assessment support
52	Beam Trawl	OPEN	all	MA	all	31	31	31	0			31	Fish stock assessment support
53	Beam Trawl	OPEN	all	NE	all	13	13	13	0			13	Fish stock assessment support
54	Dredge, Other	OPEN	all	MA	all	11	11	11	0			11	Fish stock assessment support
55	Ocean Quahog/Surflam Dredge	OPEN	all	MA	all	21	21	21	0			21	Fish stock assessment support
56	Ocean Quahog/Surflam Dredge	OPEN	all	NE	all	16	16	16	0			16	Fish stock assessment support
	Prioritized sea days not allocated						41	41				41	To be announced
	MMPA coverage								780			780	Coverage associated with Rows 23-28***
	MMPA analysis							82				82	Observer data analysis support
						Total	11,705	10,510	10,510	862	2,741	14,113	
	Step 6		Agency Fleets (Sea Days Needed)			10,469							
			Industry Fleets (Sea Days Needed)			1,236							
	Step 7		Agency Fleets (Sea Days Funded)			10,510						10,469	
			Agency Fleets (Sea Days Funded)			862							
			Industry Fleets (Sea Days Funded)			2,741						2,741	
	Step 8		Agency Fleet Difference			41							
			Industry Fleet Difference			1,505							
			Turtle Gear Types			3,337							
			MA Trawl			3,337							
			MA Gillnet			2,593							

KEY: Agency funded fleets | Industry funded fleets

Appendix Table 1. Stratification abbreviations used for 2017 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 otter 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