2016
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[1] (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 2016 SBRM annual discard report requirements. For fish and invertebrate species groups, several of the required annual discard report elements can be found in Wigley et al. 2016, 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 fleet[2] (where a fleet represents gear type, access area, trip category, region, and mesh group combinations) for the April 2016 through March 2017 period.

Summary of Observer Coverage

A total of 4,023 trips (11,726 days) was observed during the July 2014 through June 2015 time period. When these trips were stratified by fleet and quarter, some trips were partitioned between fleets resulting in 4,410 trips (12,723 days). See Tables 2 and 3 in Wigley et al. 2016 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 57 fleets uniquely identified in the July 2014 through June 2015 data. Based upon the industry activity during this time period, the New England (NE) mid-water trawl groundfish access

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[1] Further information on the Northeast Fisheries Science Center's Northeast Fisheries Observer Program is available at http://www.nefsc.noaa.gov/fsb/

[2] Fleets are synonymous with "fishing modes".

area fleet (Row 57; a fleet containing exempted trips for which 100% monitoring coverage was required) was added to the collection of fleets analyzed.

A spatial and temporal analysis of the kept weight of all species from statistical areas and calendar quarter was conducted. Over all fleets, 56% 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 2014 through June 2015 time period, see Table 4 in Wigley et al. 2016.

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 2014 through June 2015 time period (Wigley et al. 2016). Based upon that discard estimation analysis, an estimated 57,063 mt (125,803,405 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 et al. 2016 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 2016, 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 57 fleets[3] by using data collected during July 2014 through June 2015 (Wigley et al. 2016). Based on that sample size analysis, a total of 10,746 sea days would be needed for the 14 fish and invertebrate species groups. Based on this analysis, 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 and Table 5 Step 1 presents the sea days needed by fleet.

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, a refinement was made to the sea day analysis (Wigley et al. 2016): if there were less than 3 VTR trips in a fleet and quarter in the July 2014 through June 2015 time period, then pilot coverage and minimum pilot

[3] Trips fishing in Pamlico Sound have been removed from the sea day analysis (see Wigley et al. 2016) 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 20) represent those needed to monitor trips in ocean waters.

coverage was set to zero. This refinement acts on quarterly cells within fleets 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 (Rows 10 and 15) where industry activity was so low that pilot coverage and minimum pilot coverage was zero (Table 4). This refinement should not be confused with the trip filter.

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 SBRM analyses, there are some fleets without observer coverage and hence no estimated discards for these fleets to feed into the importance filter. The NE and MA crab pot fleets (Rows 50 and 51, respectively) are among the fleets with no observer coverage. There are several indications that substantial amounts of red crab discards occur in these fleets. These indications are: fishery regulations that prohibit possession of female red 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.

An investigation revealed that VTR red crab discards[4] in NE and MA crab pot fleets were large when compared with the total red crab discards from the 40 observed fleets. In particular, the magnitude of VTR red crab discards in those crab pot fleets indicated that the discards associated with the NE large mesh otter trawl fleet (Row 8) were relatively minor, in contrast to the results of the importance filter that was based only on observer-derived discards. Further 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. Given these findings, we used the VTR red crab discards to inform the magnitude of the total red crab discards, which indicated that red crab discards in the NE large mesh otter trawl fleet were minor when compared to discards in the crab pot fleets such that, if observer-derived estimates from the NE and MA crab pot fleet had been available, the importance filter would have removed that red crab sea day requirement for the NE large mesh otter trawl fleet. Therefore, SBRM coverage requirements in the NE large mesh otter fleet were not based on the initially calculated 3,531 days needed to monitor red crab in the NE large mesh otter trawl fleet, but rather on the 760 days needed to monitor fluke-scup-black sea bass.

Due to practical limitations in identifying trips that occur in fleets with few annual trips, a trip filter was developed in 2014 to remove fleets from the sea day allocation that contain the lowest cumulative 1% of total trips. The trip filter (not mandated by the SBRM amendment) was applied in 2014 and 2015 to prevent assigning sea days that could not be accomplished. However, applying this filter resulted in unintended consequences to the importance filter, such as the significant challenges associated with unobserved fleets described above. To allow observer coverage to be obtained in all SBRM fleets, the trip filter will not be applied this year.

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[4] For these two fleets, red crab discards were summed over VTR trips that reported discards for this species.

In addition to these more substantive adjustments, the sea days for NE haddock separator trawl (Row 18) have been removed since this exempted fishery will not be active during the April 2016 through March 2017 time period.

Given the sea day adjustments described above, a total of 7,960 sea days is needed for the 14 fish/invertebrate species groups (Table 5; Step 2).

For loggerhead turtles, 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 loggerheads 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)[5]. Therefore, observer coverage levels in the Mid-Atlantic scallop dredge fleets in 2016 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., greens, Kemp's ridleys, and leatherbacks) 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 loggerheads.

[5] The Incidental Take Statement of the 2012 Sea Scallop Biological Opinion was amended 1 May 2015: https://www.greateratlantic.fisheries.noaa.gov/protected/section7/bo/actbo.html

The numbers of sea days needed to achieve a 30% CV associated with the Mid-Atlantic[6] 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	2,006
MA Gillnet Rows 24-26	2,593	622

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 et al. 2016 and reflects industry activity during the July 2014 through June 2015 time period.

A total of 11,610 sea days is needed for fish/invertebrates and loggerhead turtles (COMBINED; Table 5; Step 5) during the April 2016 through March 2017 period. Of the 11,610 sea days, 10,291 sea days are needed for agency-funded fleets and 1,319 sea days are needed for industry-funded fleets (Table 5, Step 6).

Summary of Funding available for the April 2016 through March 2017 period

The funds available to the NEFSC's Northeast Fisheries Sampling Branch in fiscal year (FY) 2016 are estimated to provide support for 8,185 days and 4,405 days are carried over (i.e., bought ahead) from FY2015 funds[7] for a total of 12,590 (8,185 + 4,405) days for the April 2016 through March

[6] 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. 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.

[7] The best estimate of the FY15 carryover days is 4,405 days (3,993 prioritized carryover days and 412 MMPA carryover days).

2017 time period. Based upon an observer set-aside compensation rate analysis for the Industry Funded Scallop program, there is industry funding for 2,850 days. Hence, 15,440 (12,590 + 2,850) days are available for observer coverage during April 2016 through March 2017.

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 12,590 agency-funded sea days include: Atlantic Coast Observers (1,116 days), Northeast Fisheries Observers (4,129 days), National Observer Program (2,230 days), Reducing Bycatch (71 days), and 3,993 FY15 carryover/bought ahead days collectively fund the sea days for prioritization (11,539 days; Table 5, Step 7); and Marine Mammal Protection Act (MMPA; 639 days) and FY15 carryover/bought ahead (412 days) collectively fund the sea days to monitor protected species (1,051 days; Table 5, Step 7).

    - 1,051 agency-funded days are applicable to protected species[8] only.

      The 1,051 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.

    - 11,539 (12,590 - 1,051) agency-funded days are applicable for all species.
        - 11,539 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 FY15): $1227 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 (IFS) program allows the vessels an increase in landings to help defray the costs of carrying an observer (i.e., the compensation rate). The

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

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 32-39; Table 5).

- Based upon the compensation rate analysis, a total of 2,850 sea days can be funded: 1,579 days for Open areas, 1,151 days for Mid-Atlantic Access Areas, and 120 days in the Nantucket Lightship Access Area (NLAA).
    - 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 2016 set-aside compensation rate calculations and scallop management measures are available online at the Greater Atlantic Regional Fisheries Office webpage http://www.greateratlantic.fisheries.noaa.gov/nr/index.html
- Of the 1,579 days for the Open areas, there are 225 days for Limited Access General Category fleets (Rows 11, 36, and 37; Table 6) and 1,354 days for Limited Access fleets (Rows 12, 38, and 39; Table 6).
- Coverage of the 12 fleets depends on industry activity among these fleets during April 2016 through March 2017; the sea days represent the maximum coverage (i.e., caps).
- Projected costs: the cost to industry for at-sea portion is $675/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 2016 through March 2017.

Funding Source	**Sea Days**
Agency-funded Total	**12,590**
Agency-funded applicable to all species (prioritized days)	11,539
Agency-funded applicable to protected species only (non-prioritized days)	1,051
Industry-funded Scallop Total applicable to all species	**2,850**
Total	**15,440**

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