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Standardized Bycatch Reporting Methodology 3-year Review Report - 2020 Reviewing SBRM Years 2018, 2019, and 2020

**US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts
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Standardized Bycatch Reporting Methodology 3-year Review Report - 2020 Reviewing SBRM Years 2018, 2019, and 2020

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LIST OF ACRONYMS AND ABBREVIATIONS

AA = access area
ABC = acceptable biological catch
ACL = annual catch limit
ASM = at-sea monitoring
ASMFC = Atlantic States Marine Fisheries Commission
CV = coefficient of variation
d/k = discard/kept
EM = electronic monitoring
ESA = Endangered Species Act
FMAT = Fishery Management Action Team
FMO = Fisheries Monitoring Operations Branch
FMP = fishery management plan
FW = framework
GAM = general additive model
GARFO = Greater Atlantic Regional Fisheries Office
IFM = industry-funded monitoring
IFS = industry-funded scallop
ITS = incidental take statement
MA = Mid-Atlantic
MAFMC = Mid-Atlantic Fishery Management Council
MSA = Magnuson-Stevens Act
NE = New England
NEFMC = New England Fishery Management Council
NEFOP = Northeast Fisheries Observer Program
NEFSC = Northeast Fisheries Science Center
NOAA = National Oceanic and Atmospheric Administration
NMFS = National Marine Fisheries Service
OB = observer
OFL = overfishing limit
PDT = Plan Development Team
PTNS = Pre-Trip Notification System
SBRM = Standardized Bycatch Reporting Methodology
SSC = Scientific and Statistical Committee
TED = turtle excluder device
TDD = turtle deflector dredge
US = United States
VTR = Vessel Trip Report

LIST OF PREPARERS

This document was prepared by a technical team, referred to as a Plan Development Team by the New England Fishery Management Council (NEFMC) or a Fishery Management Action Team by the Mid-Atlantic Fishery Management Council (MAFMC). The team had representatives from the NEFMC, MAFMC, National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center (NEFSC), NMFS Greater Atlantic Regional Fisheries Office (GARFO), and Atlantic States Marine Fisheries Commission (ASMFC). Susan Wigley was the chair of the team.

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EXECUTIVE SUMMARY

The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment to the fishery management plans (FMPs) of the Greater Atlantic Region was implemented in February 2008 to address the requirements of the Magnuson-Stevens Fishery Conservation and Management Act to include standardized bycatch reporting methodology in all FMPs of the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC). In response to a remand by the United States Court of Appeals for the District of Columbia concerning observer coverage levels specified by the SBRM, an SBRM Omnibus Amendment was implemented in 2015.

The SBRM can be viewed as the combination of sampling design, data collection procedures, and analyses used to estimate bycatch and allocate observer coverage in multiple fisheries. The SBRM also provides a structured approach for evaluating the efficacy of the allocation of observer coverage (sea days) to multiple fisheries to monitor a large number of species under the 13 different NEFMC and MAFMC FMPs and the Endangered Species Act. The SBRM is not intended to be the definitive document on estimation methods nor is it a compendium of discard rates and total discards. Instead, the SBRM is intended to support the application of multiple bycatch estimation methods that can be used in specific stock assessments. The SBRM provides a general structure for defining fisheries into homogeneous groups and allocating/re-allocating observer coverage based on prior information and the expected improvement in overall performance of the program. The general structure helps identify gaps in existing coverage, similarities among species groups that allow for realistic imputation, and the tradeoffs associated with coverage levels for different species. The SBRM allows for continuous improvement in allocation as new information on the results of the previous year's data is obtained, and it requires an annual report on discards occurring in Greater Atlantic Region fisheries to be prepared by National Marine Fisheries Service (NMFS) and provided to the Councils. Annual reports have been completed every year since 2009, including 2012-2014 when there were no SBRM regulations in place.

The SBRM also requires that every 3 years, the Regional Administrator of the Greater Atlantic Regional Fisheries Office and the Science and Research Director of the Northeast Fisheries Science Center (NEFSC) would appoint appropriate staff to work with staff appointed by the executive directors of the councils to obtain and review available data on discards and to prepare a report assessing the effectiveness of the SBRM. This report should include:

- (1) a review of the recent levels of observer coverage in each applicable fishing mode;
- (2) a review of recent observed encounters with each species in each fishery (or by gear type for turtles) and a summary of observed discards by weight;
- (3) a review of the coefficient of variation (CV) of the discard information collected for each fishery;
- (4) a review of recent estimates of the total amount of discards associated with each fishing mode (these estimates may differ from estimates generated and used in stock assessments, as different methods and stratification may be used in each case);
- (5) an evaluation of the effectiveness of the SBRM at meeting the performance standard for each fishery;
- (6) a description of the methods used to calculate the reported CVs and to determine observer coverage levels, if the methods used are different from those described and evaluated in this amendment;

- (7) an updated assessment of potential sources of bias in the sampling program and analyses of accuracy;
- (8) an evaluation of the implications of the discard information collected under the SBRM if a fishery did not achieve the performance standard.

From July 2016 through June 2019, the Northeast Fisheries Science Center's Fisheries Monitoring Operations Branch (FMO, formerly known as the Fisheries Sampling Branch) managed 3 observer programs: the Northeast Fisheries Observer Program (NEFOP), the Industry-funded Scallop Program (IFS), and the At-sea Monitoring Program (ASM) for New England groundfish. The 2018, 2019, and 2020 SBRM annual analyses for fish/invertebrates utilized observer data from the NEFOP and IFS programs. A total of 74 unique fleets (which are region, gear type, mesh group, access area, and trip category combinations) have been reported in the 3 annual SBRM analyses (2018 SBRM, 2019 SBRM, and 2020 SBRM). It is possible for a trip to be partitioned into multiple fleets if 2 or more gear types or mesh groups are used during a trip. The result of this partitioning may inflate the number of trips and sea days in each data set. The numbers of unique observed trips (and days) before applying the stratification and conditioning the data set for analysis were 3,238 (9,149), 3,560 (9,594), and 3,371 (8,915) in SBRM 2018, SBRM 2019, and SBRM 2020, respectively. In terms of numbers of trips, the percentages of observed trips varied by fleet and ranged from 0.1 to 50%, excluding 1 fleet for which 100% observer coverage was a requirement (New England access area small mesh midwater trawl [Row 51]). Over all fleets, the percentage of observed trips ranged from 4.0% to 4.7% annually. The percentage of observed sea days were generally similar and ranged from 6.0% to 6.8%. The observer coverage is higher for sea days than for trips because of the longer mean trip length and relatively higher coverage rates in some fleets.

The majority of fleets have less than 10% observer coverage of trips, sea days, or landings. It should be noted that percent coverage is only one measure for monitoring and that precision of the discard estimates is the specified metric for monitoring adequacy within SBRM.

Observers recorded 400 unique species over the 3-year period from July 2016 to June 2019. The 14 SBRM species groups represent approximately 91% of the total weight of all species recorded by observers. Observers recorded a total of 33 loggerhead (*Caretta caretta*), 13 Kemp's ridley (*Lepidochelys kempii*), 5 leatherback (*Dermochelys coriacea*), 4 green (*Chelonia mydas*), and 4 unknown species of sea turtle from July 2016 to June 2019.

For fish and invertebrate species groups, a combined d/k ratio estimator was used to estimate total annual discards and precision where d = discard pounds of a given species and k = kept pounds of all species in the observer data. The Vessel Trip Report (VTR) landings of all species combined, corresponding to each fleet and SBRM year, were used to expand the discard rate to estimate total discard weight of each SBRM species/species group, fleet, and SBRM year. The number of trips and sea days needed to achieve a given precision level was based on the variance of the total discard estimate for a species group. Sample size (trips and sea days) associated with the SBRM precision standard for discard estimates (30% CV) were derived. The sample size analysis was performed by using trips as the sampling unit, and then converting the number of trips to sea days by multiplying by the weighted mean trip length, where the weighting factor was the quarterly number of VTR trips. Since some sources of error are not encompassed in the CV calculations (e.g., from subsampling of large catches or relying on the captain's estimate of a haul weight), the estimated CVs are somewhat better (i.e., lower) than the actual precision of estimates.

An importance filter is used to provide a standardized protocol to further refine the number of baseline sea days based on 2 criteria: (a) the importance of the discarded species relative to the total amount of discards by a fleet and (b) the total fishing mortality from discards. The baseline sea days were filtered with a 95% cut-point in the discard filter and a 98% cut-point for the total mortality from discards filter. To determine the number of sea days (referred to as “SBRM standard sea days” or “SBRM sea days needed”) and trips needed to achieve a 30% CV for all species groups within a fleet, the maximum number of sea days for the 14 species groups was used. In the event that sea days for each species group within a fleet were filtered out, then the number of sea days for the fleet were based on minimum pilot coverage (3 trips per quarter for each quarter that has industry activity) to maintain some monitoring coverage for that fleet.

Typically, the NEFSC pools data over a 5-year time series and across multiple fishing fleets within the same gear type to estimate turtle bycatch¹. Estimates generally encompass only the Mid-Atlantic and Georges Bank regions, where estimated bycatch has occurred. Different approaches have been used to estimate sea turtle bycatch. In the most recent sink gillnet analysis, a stratified ratio estimator (the ratio of observed turtle bycatch per unit fishing effort) was multiplied by total fishing effort to estimate total bycatch. For otter trawl (SBRM years 2018 and 2019), a nonlinear regression model was used to estimate bycatch rates as a function of covariates pertaining to gear or environmental characteristics, and then this model was fit to commercial data. In the most recent otter trawl analysis (SBRM year 2020), a stratified ratio estimator was used, similar to that used for sink gillnet gear. The CVs from these analyses are used to estimate the number of sea days needed in sink gillnet and bottom otter trawl (including scallop trawl) gears to achieve a 30% CV goal in future years. These estimated sea days remain in place each year until new bycatch estimates are published (currently, every 5 years). For dredge gear, sea day projections had been derived from CVs around estimated loggerhead bycatch; however, after 2015 sea day needs for turtles on vessels using scallop dredge gear have not been estimated because the utility of observers as a monitoring tool for turtles in the fishery appears to be decreasing.

For the 14 SBRM fish/invertebrate species groups in the 3 SBRM years, 37 of the 42 precision estimates (88%) were less than or equal to 30% CV. Of the 5 species groups and fleet combinations with precision estimates greater than 30% CV, there were 2 species groups (Atlantic herring [*Clupea harengus*] and surfclam [*Spisula solidissima*] – ocean quahog [*Arctica islandica*]) that had discards associated with fleets that were filtered out by the importance filter, indicating that discards were a minor component of the total catch of these species groups. The 30% precision standard for estimates of loggerhead fishery interactions was met for sink gillnet fleets (combined Mid-Atlantic/Georges Bank region) and for Mid-Atlantic bottom otter trawl and scallop trawl fleets. The 30% precision standard was not met for estimates of loggerhead interactions in trawl fleets on Georges Bank, nor for Kemp’s ridley, leatherback, or green turtles in sink gillnet or trawl fleets.

The numbers of accomplished sea days were near to the funded days for numerous fleets. Over all IFS fleets, the SBRM required sea days were met but the allocated days were not (-736 days in 2018 and -824 days in 2019). During the 2018 and 2019 SBRM years, a higher than normal percentage of trips were waived from observer coverage when access areas opened and fleet activity outnumbered the observers available. For a few agency-funded fleets, there were substantial numbers of unaccomplished sea days, primarily in the Mid-Atlantic large and small mesh otter trawl and Mid-Atlantic small mesh gillnet fleets. Over all agency-funded fleets, there

¹ Throughout this document, turtle “bycatch” refers to any kind of interaction between the fishing gear and the turtle, as opposed to only those animals that are landed on the vessel and discarded.

were approximately 78% and 87% accomplished sea days in SBRM 2018 and 2019 with 1,643 and 928 sea days that were not accomplished, respectively. The unaccomplished sea days were carried over to the following year. It is notable that the carryover days from 2017 represented approximately 40% of the required days for agency-funded fleets in 2018 and 26% in 2019. Because of the COVID-19 pandemic and the observer waivers issued from April through July 2020, unaccomplished sea days in SBRM 2020 are expected to be carried over into SBRM 2021. The SBRM is designed to accommodate funding shortfalls via the prioritization process; hence, there is no reliance on unaccomplished days as a means to fund the required days in the following year.

The SBRM discard estimation analysis uses a broad stratification (region, gear type, mesh group, access area, and trip category) to encompass all federally managed species considered in the SBRM, and it also uses a combined ratio method (discard-to-kept of all species weight ratio). The discard estimates reported here may not necessarily correspond directly to the discard estimates derived for individual stock assessments because of the differences in stratification and data. It is expected, however, that estimates would be in the same order of magnitude. The SBRM discard estimates are not definitive estimates but are indicative of where discarding is occurring among commercial fleets. No survival ratios were applied to the discard estimates; SBRM does not account for the potential survival of organisms returned to the water.

The SBRM Fishery Management Action Team/Plan Development Team endorses the refinements described within the 2018-2020 annual reports and supports the approach of applying refinements when needed and documenting the change in the annual reports. The refinements and their description ensures transparency and improvement to the regional SBRM.

There was no evidence of systematic vessel selection bias. Observed trips generally occurred over the range of number of trips made by vessels within a fleet and SBRM year, with no obvious over or under sampling of few or many trips per vessel. Similarly, there was no evidence of strong, systematic bias in the mean trip length and mean kept weight of all species of observed and unobserved trips. The differences in mean for trip duration ranged from -1.00 to 0.12 days. Of the 54 fleets examined, 38 fleets (70%) had differences of means less than zero, indicating that observed trips were longer in duration than unobserved trips. However, 50 of the 54 fleets (93%) had absolute differences less than half a day (0.5 days). For the majority of fleets (94%), the absolute difference in means was less than 25% of the unobserved trip duration. The differences in mean kept weight of all species ranged from -28,356 to 2,443 pounds. Of the 54 fleets examined, 42 fleets (78%) had differences in means less than zero, indicating the kept weight of all species was greater on observed trips than unobserved trips. For the majority of fleets (76%), the absolute difference in means was less than 25% of the unobserved kept weight.

The precision of discard estimates could impact management, but there is no indication that current levels of precision (even those above 30% CV) are currently causing management difficulties. The SBRM 3-year reviews will continue to look for management problems caused by imprecise discard estimates.

This report contains recommendations for continued incremental modifications in the relevant section. This report illustrates the utility of the approach for monitoring discards in federally managed fisheries and the real-world limitations of implementing an ideal system. Overall, the SBRM represents one of the most comprehensive programs for planning and executing observer monitoring coverage of federally managed fisheries.

BACKGROUND

The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment to the fishery management plans (FMPs) of the Greater Atlantic Region (NEFMC, MAFMC, NMFS 2007; NMFS 2008) was implemented in February 2008 to address the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to include standardized bycatch reporting methodology in all FMPs of the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC). In response to a remand by the United States (US) Court of Appeals for the District of Columbia concerning observer coverage levels specified by the SBRM (NMFS 2011), an SBRM Omnibus Amendment was implemented in 2015 (NEFMC, MAFMC, NMFS 2015).

The SBRM established in the 2015 amendment comprised 7 elements:

- (1) The methods by which data and information on discards are collected and obtained;
- (2) the methods by which the data obtained through the mechanisms identified in element 1 are analyzed and utilized to determine the appropriate allocation of at-sea observers;
- (3) a performance measure by which the effectiveness of the SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days;
- (4) a process to provide the councils with periodic reports on discards occurring in fisheries they manage and on the effectiveness of the SBRM;
- (5) a measure to enable the councils to make changes to the SBRM through framework adjustments and/or annual specification packages rather than full FMP amendments;
- (6) a description of sources of available funding for at-sea observers and a formulaic process for prioritizing at-sea observer coverage allocations to match available funding; and
- (7) measures to implement consistent, cross-cutting observer service provider approval and certification procedures and to enable the councils to implement either a requirement for industry-funded observers or an observer set-aside program through a framework adjustment rather than an FMP amendment.

The SBRM can be viewed as the combination of sampling design, data collection procedures, and analyses used to estimate bycatch and allocate observer coverage in multiple fisheries. The SBRM provides a structured approach for evaluating the efficacy of the allocation of observer coverage (sea days) to multiple fisheries in order to monitor a large number of species under both the 13 different FMPs and the Endangered Species Act (ESA). The SBRM is not intended to be the definitive document on the discard estimation methods, nor is it a compendium of discard rates and total discards (Wigley et al. 2007). Instead, the SBRM is intended to support the application of multiple bycatch estimation methods that can be used in specific stock assessments. The SBRM provides a general structure for defining fisheries into homogeneous groups and allocating observer coverage based on prior information and the expected improvement in overall performance of the program. The general structure helps identify gaps in existing coverage, similarities among species groups that allow for realistic imputation, and the tradeoffs associated with coverage levels for different species. The SBRM allows for continuous improvement in allocation as new information on the results of the previous year's data are obtained.

The amendment requires an annual report on discards occurring in Greater Atlantic Region fisheries to be prepared by National Marine Fisheries Service (NMFS) and provided to the councils. Annual reports have been completed every year since 2009, including 2012-2014 when

there were no SBRM regulations in place. The SBRM annual reports for 2013 onward are available at the National Oceanic and Atmospheric Administration (NOAA) Fisheries' Annual Discard Reports for the Northeast. Once a year, the Northeast Fisheries Science Center (NEFSC) Science and Research Director presents a report to the councils on discards occurring in Greater Atlantic Region fisheries, as reported by at-sea fisheries observers. This annual discard report includes summaries of the trips observed and fishing modes in the relevant time period, funding issues and other related issues and developments, and projections of coverage across fisheries for the upcoming time period. The annual report contains more detailed information regarding: the number of observer trips and sea days scheduled that were accomplished for each fishing mode and quarter, 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 of kept and estimated discards of each species group by fishing mode, and the relationship between sample size and precision for relevant fishing.

To utilize the most recent available data, the annual SBRM analyses for fish/invertebrate species use data collected during a 12-month period from July through June. Generally, observer data are audited and available for analysis 90 days after collection; hence, these data are ready to be analyzed beginning in October. From October to January, annual analyses are performed; these include: (1) summarizing the observer data for the Annual Discard Report, (2) updating the sea day analysis to derive SBRM standard sea days (the sea days needed to achieve a 30% coefficient of variation [CV]), and (3) prioritizing sea days based on a budget. The SBRM Annual Discard Report with Observer Sea Day Allocation documents are posted online and presented to the councils. The NEFSC Fisheries Monitoring Operations Branch (FMO, formerly known as the Fisheries Sampling Branch) observer program budget funds a 12-month period ranging from April through March. [Table 1](#) provides the time frame of the data used for fish/invertebrate species and the subsequent sea day schedule for the 2018, 2019, and 2020 SBRM.

For estimating turtle discards, data for a particular gear type are pooled over a 5-year period, and estimates are updated every 5 years. The time series for the most recent turtle bycatch estimates are outlined in [Table 2](#).

The SBRM also requires that every 3 years, the Regional Administrator of Greater Atlantic Regional Fisheries Office (GARFO) and the Science and Research Director of NEFSC would appoint appropriate staff to work with staff appointed by the executive directors of the Councils to obtain and review available data on discards and to prepare a report (i.e., this report) assessing the effectiveness of the SBRM. The following 8 elements are specified in the SBRM Amendment:

- (1) A review of the recent levels of observer coverage in each applicable fishing mode;
- (2) a review of recent observed encounters with each species in each fishery (or by gear type for turtles), and a summary of observed discards by weight;
- (3) a review of the CV of the discard information collected for each fishery;
- (4) a review of recent estimates of the total amount of discards associated with each fishing mode (these estimates may differ from estimates generated and used in stock assessments, as different methods and stratification may be used in each case);
- (5) an evaluation of the effectiveness of the SBRM at meeting the performance standard for each fishery;
- (6) a description of the methods used to calculate the reported CVs and to determine observer coverage levels, if the methods used are different from those described and evaluated in this amendment;

- (7) an updated assessment of potential sources of bias in the sampling program and analyses of accuracy; and
- (8) an evaluation of the implications of the discard information collected under the SBRM if a fishery did not achieve its performance standard.

The first 3-year review was conducted in 2011-2012 and summarized data from 2009 – 2011 (Wigley et al. 2011 [Part 1], Wigley et al. 2012 [Part 2]). A 3-year review was not conducted for years 2012 – 2014 because SBRM regulations were not in place for those years; however, a 3-year review was conducted recently which summarized data from 2015 - 2017 (Hogan et al. 2019).

Since the implementation of SBRM, several other management actions associated with monitoring have been implemented. Some of these actions have or are proposing to modify or expand existing industry funded monitoring programs, (e.g., Northeast Multispecies Framework (FW) 48, FW55, Amendment 23; Scallop Amendment 21), establish cost sharing responsibilities for industry funded monitoring (e.g., IFM Amendment), or otherwise adjust reporting and data collection that could improve the ability to meet the SBRM performance standard ([Table 3](#)). Changes to monitoring requirements implemented by state agencies or the Atlantic States Marine Fisheries Commission (ASMFC), such as ASMFC's move to require 100% harvester reporting in the lobster fishery (ASMFC American Lobster Addendum XXVI to Amendment 3), may also have an impact on the SBRM process, but the complexity of the different fisheries and reporting systems involved make the effects hard to predict.

INTRODUCTION

This document represents the entirety of the 2020 SBRM 3-year Review Report and reviews the annual information presented in SBRM 2018, 2019, and 2020 with regard to the recent levels of observer coverage and observed encounters with species. This report also summarizes estimates of total discards and their associated precision for SBRM species groups and the individual species composing these groups, by fleet and SBRM year, and it addresses the 8 elements specified in the SBRM Omnibus Amendment.

The review comprises 9 sections, which cover the following topics:

- Observer Coverage
- Observed Encounters
- Discard Estimation, Precision, and Sample Size
- Discard Reasons
- Effectiveness of SBRM
- Refinements to SBRM Methods
- Potential Sources of Bias and Accuracy Analyses
- Implications for Management
- Recommendations and Conclusions

This review utilizes the stratification and methods described in the initial SBRM analysis (Wigley et al. 2007) with respect to fish, and it summarizes the data reported in SBRM annual reports for 2018, 2019, and 2020 (Wigley and Tholke 2018, 2019, 2020; NEFSC and GARFO 2018, 2019, 2020). These data were collected from July 2016 through June 2019 for 74 fleets and 14 species groups and for the individual species that compose these groups (subsequently referred to as “species/species groups”) to encompass all federal FMP managed species in the Greater Atlantic Region. Row numbers have been assigned to each unique fleet. A list of fleet stratification

abbreviations is given in [Table 4](#), a list of fleet name abbreviations is given in [Appendix Table 1](#), and a list of fish/invertebrate species is given in [Table 5](#). Summaries of turtle discards in the SBRM annual reports may have been derived from earlier years, depending on the gear type.

For fish, we use the term “bycatch” synonymously with “discard.” In basic terms, bycatch is defined as living organisms that are captured by fishing gear and returned to the water. This usage is consistent with the definition provided in the MSA where the term “bycatch” means fish which are harvested in a fishery but which are not sold or kept for personal use and includes economic discards and regulatory discards. Bycatch as used by the MSA does not include fish released alive under a recreational catch and release fishery management program (NMFS 2008). We do not define bycatch as the capture and retention of nontarget species, nor do we account for potential survival of organisms returned to the water. Most importantly, we do not base any of our analyses on the potential mortality associated with unobserved encounters with fishing gear. Our omission of these mortality sources does not confirm or deny their potential importance. Rather it explicitly recognizes that such events cannot be observed even when an observer is present on a given trip. Therefore, when using a design-based estimator, there is no basis for extrapolation of unobserved encounters to unobserved sampling units (i.e., trips). Other sources of information (e.g., tagging studies, net pen experiments) can be used to inform consideration of discard mortality.

For turtles, we are using the term “bycatch” synonymously with the ESA definition of “takes.”² Some model-based estimates of loggerhead bycatch include a portion of those considered to be “unobservable” once a gear modification (i.e., a turtle excluder device [TED] or scallop chain mat) is used to exclude turtles (Warden and Murray 2011). “Unobservable” takes are 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. If a portion of these unobservable takes can be quantified (Warden and Murray 2011), they are included in our estimates of turtle bycatch.

From July 2016 through June 2019, the NEFSC’s FMO managed 3 observer programs: the Northeast Fisheries Observer Program (NEFOP), the Industry-funded Scallop Program (IFS), and the At-sea Monitoring Program (ASM; NEFSC 2016a, 2016b). In the 2018, 2019, and 2020 SBRM annual analyses for fish/invertebrates, the observer (OB) data utilized came from the NEFOP and IFS programs. In the Data Sources section of each of the annual reports, there is a brief description of the observer data used (also see footnote 4 in Wigley and Tholke 2018, 2019, 2020). To acknowledge the distinction between these observer programs (including sampling protocols, goals, and objectives), this document utilizes the term “OB” to refer to the collection of observed trips used in the annual analyses.

1. OBSERVER COVERAGE

1.1 Methods

Using the July-June data from the 3 annual SBRM analyses, the percentage of observed coverage in terms of trips, sea days, and landings of all species combined is derived for each fleet and SBRM year by dividing the annual sum of the values for each metric in the OB data set by the annual sum of the values for each metric in the Vessel Trip Report (VTR) data set. Total annual coverage is derived for trips and sea days by summing the values for each metric over all fleets for each SBRM year and then dividing the OB total by the VTR total for each metric.

² The ESA of 1973 defines takes as: “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”

In this document, observer coverage for turtles is expressed in terms of trips, gear type, and region over the 5 combined years used in the analysis. Normally for each turtle bycatch analysis, observer coverage is evaluated at a finer temporal and spatial scale with respect to commercial effort and reported in terms of the unit of effort used in the bycatch rate.

Annually, the spatial and temporal patterns of observer coverage within a fleet are evaluated. Rather than using the number of trips (a trip-based metric), the kept weight of all species reported in the VTR was used. The “kept weight with observer coverage” was derived as the kept weight of all species reported in the VTR summed by fleet, statistical area, and quarter, where at least 1 observed trip occurred in the fleet-quarter-statistical area cell and at least 3 observed trips³ occurred in the fleet-quarter stratum. The “kept weight” was derived as the kept weight of all species reported in the VTR summed over all statistical areas and quarters within a fleet. The percentages of “kept weight with observer coverage” were calculated by dividing the “kept weight with observer coverage” by the “kept weight.” These percentages were derived for the individual fleets, confidential fleets combined into “Confidential fleets,” “Other minor fleets,” and all fleets combined. Additionally, as a relative measure of fleet activity among all fleets, the percentage of “kept weight” was derived by dividing the “kept weight” by the sum of the “kept weight” across all fleets.

1.2 Results

The numbers of OB and VTR trips and sea days, by fleet and SBRM year, used in the annual SBRM analyses are presented in [Table 6](#) and [Table 7](#), respectively. A total of 74 unique fleets (categorized by region, gear type, mesh group, access area, and trip category combinations) have been reported in the 3 annual SBRM analyses. It is possible for a trip to be partitioned if 2 or more gear types or mesh groups are used during a trip. The result of this partitioning may inflate the number of trips and sea days in each data set. Before applying the stratification and conditioning the data set for analysis, the numbers of unique OB trips (and days) were 3,238 (9,149), 3,560 (9,594), and 3,371 (8,915) in SBRM 2018, SBRM 2019, and SBRM 2020, respectively.

Of the 74 unique fleets, there were 20 fleets that we determined to be “erroneous⁴” fleets prior to the annual sea day allocation process (NEFSC and GARFO 2018, 2019, 2020). The 20 fleets are: Rows 9, 11, 14, 19, 21, 24, 25, 26, 27, 28, 29, 48, 49, 54, 55, 66, 67, 68, 69, and 70. In this report, as in the annual reports, these fleets are included in the discard estimation and precision summaries and excluded from the sea day allocation summaries.

In terms of numbers of trips, the percentages of observed trips varied by fleet and ranged from 0.1% to 50%, excluding 1 fleet for which 100% observer coverage was a requirement (New England [NE] access area [AA] small mesh midwater trawl [Row 51]; [Table 6](#)). Over all fleets, the percentage of observed trips ranged from 4.0% to 4.7%. The percentage of observed sea days

³ The 3 trips for fleet-quarter correspond with a minimum threshold for allocating observer coverage.

⁴ The Wigley and Tholke 2018, 2019, and 2020 analyses identified “erroneous” fleets which resulted from either VTR misreporting the gear type used, fishing outside the regulations (using smaller mesh size than allowed), or inconsistent gear codes between data collection systems. The required observer sea days associated with these fleets were set to zero. This action assists with improving sea day accomplishments by removing fleets that would be impossible to deploy observers on, and therefore, those erroneous fleets would always show a deficiency in observer coverage achievements. This approach also allows the observer provider to focus on deploying observers on real fleets. “Erroneous” fleets are described in Section 6 as a refinement made in SBRM 2018, 2019, and 2020. A recommendation to expand VTR audits and improve outreach to industry to improve master data (and reduce/eliminate “erroneous” fleets) is made in Section 9.

were generally similar and ranged from 6.0% to 6.8% ([Tables 6 and 7](#)). The observer coverage is higher for sea days than for trips because of longer mean trip length and relatively higher coverage rates in some fleets.

Observer coverage rates, in terms of percentage of observed trips, sea days, and landings are given in [Figures 1-3](#), respectively, by fleet for 36 selected fleets and SBRM year (fleet abbreviations are given in [Appendix Table 1](#)). The 36 selected fleets are: Rows 1-9, 16, 18, 32-34, 36, 37, 39-47, 50, 56-59, 61, 62, 64, 65, 72, and 73; these are fleets for which discards were estimated in at least 2 of the 3 years. In terms of trips, the observer coverage was highest in the fleets associated with the NE small mesh twin otter trawl fleet (Row 18), the Mid-Atlantic (MA) small mesh access area general category scallop trawl (Row 9), and NE crab pot fleet (Row 65; [Figure 1](#)). The majority of fleets have less than 10% coverage of trips, sea days, or landings ([Figures 1-3](#)). It should be noted that percent coverage is only one measure for monitoring and that precision of the discard estimates is the specified metric for monitoring adequacy within SBRM.

Pilot fleet designation generally indicates little or no observer coverage available for the SBRM sample size analyses for the upcoming year. An exception to this tendency occurs in cases in which OB trips were not temporally distributed throughout the year. Not all fleets considered within the SBRM have OB coverage. There were 30 fleets which required pilot coverage in all years, 10 fleets for which a change between pilot and nonpilot coverage occurred during the 3 years, and 34 fleets that had sufficient OB coverage in all years ([Table 6](#)).

Within the 3 SBRM years, there were 15 industry-funded scallop fleets, and 22 fleets were classified as confidential fleets in at least 1 of 3 years. Each year, fleets are added or removed from the annual SBRM analyses based on industry activity. Several new fleets were added based on the 2018 refinements to quantitatively define unique fleets as those with at least 3 VTR trips in a fleet and calendar year, the 2018 applications of specific mesh size groups to all trawls, and the 2019 decision to merge the NE OPEN small mesh midwater trawl fleet with the NE AA small mesh midwater fleet (See Section 6 for refinements to methods and Wigley and Tholke 2018, 2019, and 2020 for detailed information on the fleets added and removed from the annual SBRM analyses).

The 15 scallop resource set-aside industry-funded scallop fleets were:

- Row 9 MA access area general category small mesh scallop trawl
- Row 10 MA access area limited category large mesh scallop trawl
- Row 11 MA open general category small mesh scallop trawl
- Row 12 MA open limited category large mesh scallop trawl
- Row 13 NE open general category large mesh scallop trawl
- Row 14 MA open limited category small mesh scallop trawl
- Row 15 MA open limited category large mesh scallop trawl
- Row 40 MA access area general category scallop dredge
- Row 41 NE access area general category scallop dredge
- Row 42 MA access area limited category scallop dredge
- Row 43 NE access area limited category scallop dredge
- Row 44 MA open general category scallop dredge
- Row 45 NE open general category scallop dredge
- Row 46 MA open limited category scallop dredge
- Row 47 NE open limited category scallop dredge

There were between 11 and 13 fleets where confidentiality rules applied in each of the SBRM years; those fleets were:

SBRM 2018, Rows 14, 17, 18, 27, 30, 48, 49, 54, 55, 60, 63, 68, and 71
SBRM 2019, Rows 19, 26, 29, 30, 48, 54, 60, 63, 67, 68, and 71
SBRM 2020, Rows 13, 16, 17, 18, 19, 20, 26, 48, 52, 68, and 70

In terms of spatial and temporal patterns of kept weight of all species, the percentage of observer coverage over all fleets was 72%, 66%, and 75% in SBRM 2018, 2019, and 2020, respectively (Wigley and Tholke 2018, 2019, 2020). For each fleet reported annually, the percentage of kept weight of all species and the percentage of kept weight of all species observed are shown in [Figure 4](#). The percentages of kept weight of all species and kept weight of all species observed generally persist over the 3 years. The annual percentages of kept weight of all species vary among fleets but do not exceed 20%, and the majority of the fleets have percentages of kept weight of all species observed that exceeded 60% ([Figure 4](#)). For nonpilot fleets, the average percentage of observer coverage was 75%, 74% (reported as 73%), and 73% in SBRM 2018, 2019, and 2020, respectively (Wigley and Tholke 2018, 2019, 2020). This finding indicates that the majority of kept weight within the fleet was associated with statistical areas and quarters with observer coverage. The kept weight of all species can be considered a surrogate for fishing effort; hence, observer coverage occurred spatially and temporally where the majority of fishing effort occurred at the statistical area and quarter year scales.

Observed trips utilized for turtle bycatch analyses composed either 5% or 10% of VTR trips depending on the gear type and time series ([Table 8](#)). Coverage rates were higher or lower when evaluated at finer temporal/spatial scales (see Murray 2018).

Previously Reported Information

Both numbers of OB and VTR trips and sea days by fleet and calendar quarter and the percentages of kept weight of all species are available in Tables 2, 3, and 4 of the annual documents on discard estimation, precision, and sample size analyses for 14 federally managed species groups in the waters off the northeastern United States for SBRM 2018, 2019, and 2020 (Wigley and Tholke 2018, 2019, 2020, respectively).

1.3 Discussion

Percentage of observed coverage (in terms of trips, sea days, or landings) derived in this report should not be confused with the SBRM performance standard (30% CV of discard estimate), the specified metric used to allocate observer coverage among fleets and used to evaluate monitoring adequacy within the SBRM. It is important to note that a constant percentage of observed coverage may result in either over or under sampling the fleet relative to the precision standard.

Observer monitoring of bycatch may have multiple objectives that include: bycatch monitoring of individual species (fish and turtles), compliance monitoring of annual catch entitlements, and quota-monitoring of hard total allowable catch. SBRM focuses on monitoring to achieve acceptable measures of precision. Quota monitoring (including monitoring for compliance with regulations) is more challenging since increased coverage may be necessary to ensure more frequent in-season reports of discards rates. Monitoring rates for compliance with regulations often must be higher to reduce the scope for potential bias in estimation. It must be emphasized that SBRM does not consider the additional monitoring requirements for compliance. Increases in monitoring for compliance issues are based on the expectation that the observed variability in discard rates will include the normal variation plus potential, but unquantified, bias.

The analysis conducted for the spatial and temporal observer coverage used live weight. As a result, fleets using scallop dredge and clam dredge that target species with shells have higher kept weight percentage than other fleets because of the use of “live” weight rather than “landed meat” weight. However, the use of live weight does not distort the observed percentage (spatial or temporal pattern) within a fleet. It is important to remember that percent observer coverage is an indicator of where observed kept weight (or trips) occurred relative to unobserved kept weight (or trips). The percentage observed should not be confused with the precision of the discard estimate, which is the metric used to describe discard variability and to determine the sample size needed for monitoring purposes.

The use of the previous year’s data to estimate appropriate sampling coverage in a future year is predicated on the assumption that the discard variance remains constant (see Section 5 for variance stability). The sufficiency of the predicted number of sea days generated by using data from 1 year can change in response to a number of factors that include: variability in the discard estimates among the 15 SBRM species groups, changes in fishing patterns, changes in distribution and abundance of species groups, etc. The SBRM process is designed to capture such changes by annually updating the sample size analysis.

The SBRM formulaic prioritization process was first applied to the SBRM 2014 sea day schedule (in advance of the 2015 SBRM Omnibus Amendment); hence, the data used for the SBRM 2018, 2019, and 2020 analyses ([Table 1](#)) were entirely influenced by the 2015 SBRM Omnibus Amendment.

2. OBSERVED ENCOUNTERS

2.1 Methods

The observer data used in this section included all hauls from observed trips using “limited” sampling or “complete” sampling protocols and included observed and unobserved hauls. Any observer data that required aggregation beyond the fleet level or data that could not be stratified to a fleet because of confidentiality rules, or missing gear or mesh information, were excluded from the fleet summaries. These data, however, are reported in the species group summaries.

A list of all unique species recorded by observers over the 3-year period from July 2016 through June 2019 was compiled; species are recorded in pounds or in number, depending on the taxon. For all observed trips, observed catch quantities (kept and/or discarded) were summed for each species/species group and SBRM year and for each species/species group, fleet, and SBRM year (note: the fleet summaries excluded data that could not be classified to a fleet). Separate summaries are presented for fish/invertebrates (in live pounds) and sea turtles (in numbers).

The percentage of observed trips that encountered a species/species group is derived by dividing the number of observed trips that observed the given species/species group, regardless of catch disposition, by the number of observed trips in each fleet and SBRM year. The annual percentage of observed trips that encountered the species/species group was derived by summing the observed trips that encountered the species/species group over all fleets in each SBRM year and dividing by the sum of the number of observed trips in each SBRM year.

2.2 Results

Fish/Invertebrates

Observers recorded 400 unique⁵ species ([Appendix Table 2](#)) over the 3-year period from July 2016 to June 2019. A summary of the 14 fish/invertebrate species groups, in weight by disposition is given in [Table 9](#) for the SBRM species groups, the SBRM species groups combined, the non-SBRM species, and all species combined by SBRM year. The 14 SBRM species groups represent approximately 91% of the total weight of all species recorded by observers ([Table 9](#)). As [Table 9](#) reveals, no Atlantic salmon (*Salmo salar*) were encountered on observed trips during the time period examined; hence this species group is not reported in [Table 10](#) and [Figures 5-7](#).

Summaries of observed catch weight (kept and discarded) and the percentage of trips that encountered a species/species group by fleet and SBRM year are presented in [Table 10](#) and [Figures 5-7](#). In general, the percentage of trips encountering a species/species group varied across fleets; however, the percentages across SBRM years were similar (no distinct color patterns within a plot) and indicate persistent fleet/species group interactions. The skate complex (Rajidae), large mesh groundfish, monkfish (*Lophius americanus*), and fluke (*Paralichthys dentatus*) - scup (*Stenotomus chrysops*) – black sea bass (*Centropristis striata*) were the 4 most frequently encountered species groups on observed trips ([Figures 5](#) and [6](#)). [Figure 7](#) reveals that for many species groups (e.g., skate, spiny dogfish [*Squalus acanthias*], Atlantic surfclam [*Spisula solidissima*] -ocean quahog [*Arctica islandica*], red deepsea crab [*Chaceon quinque-dens*]) observed discards were a major component of observed catch in many fleets (symbols clustered along and near the identity line), and this pattern occurred over a wide range of catch sizes and was similar in all 3 years.

Sea Turtles

Observers recorded a total of 33 loggerhead (*Caretta caretta*), 13 Kemp’s ridley (*Lepidochelys kempii*), 5 leatherback (*Dermochelys coriacea*), 4 green (*Chelonia mydas*), and 4 unknown species of sea turtle from July 2016 to June 2019 ([Tables 11-13](#)). The number of turtles that were observed in older time periods that informed sea day coverage needs during the period of this review are listed in [Table 14](#).

2.3 Discussion

This report is a comprehensive summary of the data collected on observed trips by trained at-sea observers and monitors. No discard estimation resulting from an expansion of discard ratios has been performed for observed encounters summarization. It is improper to calculate discard-to-kept ratios using this summary ([Tables 9](#) and [10](#)) because the data utilized to generate this summary include data from all hauls for which an observer was “on-watch,” including hauls where discard data were not collected because of incidental take sampling and trips with “limited” sampling protocols. It is also improper to compare discard amounts across fleets without accounting for the number of observed trips by fleet; the number of observed trips will vary by fleet. This summary is not intended to replace analyses that subset observer data for discard estimation (see Section 3. Discard Estimation, Precision, and Sample Size).

The percentages of trips that encounter species groups are informative. The percentage of trips encountering a species group provides a measure of the expected value of a trip toward

⁵ Unique species reflect the species codes of living and nonliving matter used by observers. Some species have not been identified to the species level, such as starfish, sponge, and sea cucumbers, and there are some cases when species cannot be positively identified and are recorded as a species group not known (e.g., “flounder, NK”).

reducing the variance of an estimate for a particular species or species group. As noted earlier, not all trips will be informative for all species. For example, an encounter rate of 25% for species A in fleet B would mean that only 1 of 4 trips in fleet B is likely to provide information on species A discards.

As endangered species are listed, they should be evaluated for inclusion to SBRM. For instance, Atlantic sturgeon (*Acipenser oxyrinchus*) was listed in 2012 and has been documented as bycatch (see [Appendix Table 2](#)), yet is not currently included in SBRM. Other additional species, the giant manta ray and oceanic whitetip shark (*Carcharhinus longimanus*), both listed in 2018, though not found in [Appendix Table 2](#) should be monitored for take and added to SBRM as appropriate.

3. DISCARD ESTIMATION, PRECISION, AND SAMPLE SIZE

3.1 Methods

Fish/Invertebrates

Since SBRM 2012, the annual SBRM analyses have derived the discard estimates and their associated precision. A detailed description of the data and methods used are given in Wigley and Tholke 2018, 2019, 2020. In brief, to estimate total annual discards and precision, a combined d/k ratio estimator (Cochran 1963) was used where d = discard pounds of a given species and k = kept pounds of all species in the observer data. The VTR landings of all species combined, corresponding to each fleet and SBRM year, were used to expand the discard rate to estimate total discard weight of each SBRM species/species group, fleet, and SBRM year.

Annual SBRM sample size analyses⁶ were also conducted to estimate the number of baseline trips and sea days needed to monitor the 14 species groups in each fleet for each SBRM year. As described in Wigley et al. (2007), the number of trips and sea days needed to achieve a given precision level was based on the variance of the total discard estimate for a species group. Sample size (trips and sea days) associated with the SBRM precision standard for discard estimates (30% CV) were derived. The sample size analysis was performed by using trips as the sampling unit and then converting the number of trips to sea days by multiplying by the weighted mean trip length, where the weighting factor was the quarterly number of VTR trips.

When total discards could not be estimated because of little or no observer coverage (no data), or when total discards were zero (no variance), sample size was determined by using a pilot coverage level set to 2% of the quarterly VTR trips for a fleet, with a minimum of 3 trips per quarter (12 trips per year) and a maximum of 100 trips per quarter (400 trips per year). To avoid assigning more coverage than could be attained, if fewer than 3 VTR trips occurred in a fleet and quarter, then pilot coverage was set to zero. The quarterly trips were then multiplied by the quarterly mean VTR trip length to derive quarterly sea days. The quarterly trips and quarterly sea days were then summed for annual number of trips and sea days. Pilot coverage may result in too much coverage in cases where little or no observer coverage may actually be needed.

The SBRM Omnibus Amendment calls for attainment of CVs of no more than 30% in each fleet/species group combination. Thus, for each fleet, a CV of 30% or less is to be attained for each species group within that fleet. Some fleet/species group combinations contribute very little to the total mortality or discard of the species but may require significant resources to characterize the precision of the estimate. For example, a high variance estimate for a rare event within a fleet

⁶ “Sample size analysis” is synonymous with “sea day analysis.”

would require high levels of sampling, even though the discard in that fleet was unimportant with respect to either the total discard or total mortality on the resource.

An importance filter was used to provide a standardized protocol to further refine the number of baseline sea days based on: (a) the importance of the discarded species relative to the total amount of discards by a fleet and (b) the total fishing mortality from the discards. Two filters (i.e., fraction of discard filter and fraction of total mortality from discards filter⁷) were applied simultaneously. A detailed description of the SBRM importance filters is given in Wigley et al. (2007), and the 2012 refinement to the importance filter is given in Wigley et al. (2012).

The baseline sea days were filtered with a 95% cut-point in the discard filter and a 98% cut-point for the total mortality from discards filter. In other words, estimates of sea day coverage for a given species or species group were derived for those fleets where discards constituted 95% of the discard mortality and 98% of the total mortality. To determine the number of sea days (referred to as “SBRM standard sea days” or “SBRM needed sea days”) and trips needed to achieve a 30% CV within a fleet, the maximum number of sea days for the 14 species groups (i.e., the maximum number of sea days in a row) was used. This approach ensures that all species groups (that have not been removed via the importance filter) within a fleet will have a 30% CV or less. In the event that sea days for each species group within a fleet are filtered out, then the number of sea days for the fleet will be based on minimum pilot coverage (3 trips per quarter for each quarter that has industry activity) to maintain monitoring coverage for that fleet. If the fleet is designated as a pilot fleet, then pilot sea days are used.

Sea Turtles

Typically, the NEFSC pools data over a 5-year time series and across multiple fishing fleets within the same gear type to estimate turtle bycatch. The time series used for the most current estimates of turtle bycatch in the 3 main gear types in which bycatch occurs are presented in the Background section. Estimates generally encompass only the Mid-Atlantic or Georges Bank regions, where observed bycatch has occurred.

Different approaches have been used to estimate sea turtle bycatch in Mid-Atlantic gear types (see Murray 2018, 2015a, 2020). In the most recent sink gillnet analysis (Murray 2018), a stratified ratio estimator (the ratio of observed turtle bycatch per unit of fishing effort) was multiplied by total fishing effort to estimate total bycatch. For otter and scallop trawl gears, a nonlinear regression model was used to estimate bycatch rates as a function of covariates pertaining to gear or environmental characteristics, and then this model was fit to commercial data (Murray 2015a). In the most recent trawl analysis (Murray 2020), a stratified ratio estimator was used, similar to that used in the sink gillnet analysis. Some estimates of loggerhead bycatch include a portion of those considered to be “unobservable” once a gear modification (i.e., a TED) is used to exclude turtles (Warden and Murray 2011).

Sea days are estimated for monitoring turtle interactions in a gear type depending on the encounter rate determined from the most recent bycatch analysis. Sea days are only estimated and allocated for monitoring a turtle species in a gear type if there is a >50% probability of observing 5 or more turtles over 800 trips in a year (Hogan et al. 2019). If this threshold is met, then the CVs from these analyses are used to estimate the number of sea days needed in sink gillnet and bottom otter trawl (including scallop trawl) gears to achieve a 30% precision goal in future years. These estimated sea days remain in place each year until new bycatch estimates are published (currently,

⁷ Fraction of total mortality from discards is defined as the ratio of discards of species group j in fleet h (D_{jh}) to the sum of commercial landings (L_{jh}), recreational landings (R_{jh}), and discards (D_{jh}) summed over h .

every 5 years). For dredge gear, sea day projections had been derived from CVs around estimated loggerhead bycatch (Murray 2012); however, sea day needs for turtles on vessels using scallop dredge gear have not been estimated since 2015 because the utility of observers as a monitoring tool for turtles in the fishery appears to be decreasing (Murray 2015b; NEFSC and GARFO 2017). 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 interactions⁸ 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]). Since 2015, observer coverage levels in the Mid-Atlantic scallop dredge fleets have been driven by other species groups. This approach ensures that some level of coverage still exists to monitor the effectiveness of TDDs and chain mats in reducing observable interactions and helps monitor turtle interactions outside of gear regulated times and areas.

The number of observed sea days needed to achieve a 30% CV around estimated loggerhead bycatch was derived from Rossman (2007):

$$n_{proj} = (CV_{obs} * \sqrt{n_{obs}}/CV_{proj})^2$$

where n_{proj} = the amount of projected effort (converted to sea days) required to achieve a given precision level; CV_{obs} = the precision levels around estimated bycatch as reported in Murray 2015a or 2020 (trawl), or Murray 2018 (gillnet); n_{obs} = the observed effort as reported in the above publications; and CV_{proj} = the projected precision level to be achieved.

3.2 Results

Fish/Invertebrates

Annual VTR landings and estimated discards (live pounds) with associated precision are compiled from the 3 annual fish/invertebrate SBRM analysis as follows: (1) for each of the 14 SBRM species/species groups over all fleets for each SBRM year ([Table 15](#); [Figures 8](#) and [9](#)); and (2) for the 14 SBRM species groups combined by fleet for each SBRM year ([Table 16](#); [Figure 10](#)). The skate complex had the highest (between 31% and 40%) percentage of discards of the 14 SBRM species groups, and sea scallops (*Placopecten magellanicus*) had the second highest (between 13% and 26%) percentage of discards ([Table 15](#); [Figures 8](#) and [9](#)). Each of the remaining SBRM species groups had discards that were 10% or less of the total annual discards. There were no discards for Atlantic salmon (species not encountered during the time period examined). For the 14 SBRM species groups combined, discards varied by fleet. The NE AA limited access scallop dredge fleet (Row 43) had the highest percentage of discards among all fleets (20%, 14%, 29% in SBRM 2018, 2019 and 2020, respectively; [Table 16](#); [Figure 10](#)). The NE large mesh otter trawl fleet (Row 8) had the next highest percentage of discards among all fleets (18%, 16%, 15% in SBRM 2018, 2019 and 2020, respectively) and reflected a marked decrease from the previous 3-years (34%, 29%, and 25% in SBRM 2015, 2016 and 2017 (Hogan et al. 2019).

The landings associated with the various minor fleets aggregated in “Other fleets” generally constituted less than 0.05% of the total landings across all fleets, and fleets aggregated

⁸ Throughout this document, turtle “bycatch” refers to any kind of interaction between the fishing gear and the turtle, as opposed to only those animals that are landed on the vessel and discarded.

in “Confidential fleets” constituted 1% or less ([Table 16](#)) indicating that nearly all landings are accounted for in 74 uniquely identified fleets.

Precision of the discard estimates are displayed in [Figure 11](#) for each of the 14 SBRM species groups. The 36 selected fleets (those fleets for which discards were estimated in at least 2 of the 3 SBRM years) are shown in [Figure 12](#). The precision associated with the estimated discards of species/species groups in fleets for which discards were considered unimportant (i.e., the discards of species group and fleet combinations that constituted the lower 5% of the discard mortality and/or lower 2% of the total mortality and were filtered out via the importance filter process) was not used in the sample size analysis to determine the SBRM sea day standard. Only the precision of the discard estimates of the SBRM species groups that were used in the sample size analysis is shown in [Figure 11](#). The precision estimates for 5 of the 14 SBRM species groups (bluefish [*Pomatomus saltatrix*], tilefish [*Lopholatilus chamaeleonticeps*], Atlantic herring [*Clupea harengus*], surfclam – ocean quahog, and Atlantic salmon were not used in the sample size analysis; thus, these species groups are not presented in [Figure 12](#). The precision (CV) of the discard estimates for 14 SBRM species groups that were considered important varied by species groups, fleet, and SBRM year. The majority of species groups/fleet combinations used in the sample size analysis had 30% CV or less ([Figure 11](#)).

For the 14 SBRM species groups in the 3 SBRM years, 37 of the 42 precision estimates (88%) were less than or equal to 30% CV ([Table 15](#)). Of the 5 species group and year combinations with precision estimates greater than 30% CV, there were 2 species groups (Atlantic herring and surfclam – ocean quahog), and these species groups had discards associated with fleets that were filtered out by the importance filter, indicating that discards were a minor component of the total catch of these species groups. For the precision estimates of the individual species that composed the 14 SBRM species groups in the 3 SBRM years, see Wigley and Tholke 2018, 2019, 2020.

With regard to precision of the discard estimates, many of the species groups in the scallop industry-funded fleets have CVs below 30% ([Figure 11](#)). The numbers of observer sea days in the scallop fleets are based on the fraction of landed value allocated to discard monitoring and the daily compensation rate. The compensation rate⁹ is designed to avoid biases that might arise if vessels avoided observers at low compensation rates or changed their fishing behavior at high compensation rates. Sea days from realized coverage rates generally exceed the SBRM standard sea days.

The SBRM sea day standard (numbers of sea days needed to achieve a 30% CV for all SBRM species groups within a fleet) and the prioritized funded sea days by fleet and SBRM year, are given in [Table 17](#). The SBRM sea day standard varied across years for a given fleet because of the variability in discard estimates among the 14 SBRM species groups, changes in fishing patterns, and changes in both the distribution and abundance of the species groups. The use of the previous year’s data to estimate appropriate sampling coverage in a future year is predicated upon the assumption that the discard variance remains constant (see Section 5 for variance stability).

In all 3 SBRM years, there were practical limitations that prevented the observer program from covering 5 fleets with sea days needed (MA and NE floating trap [Rows 30 and 31], MA purse seine [Row 38], NE weir [Row 63], and NE urchin dredge [Row 71]; [Table 17](#)). The observer program currently has no sampling protocols in place for these fleets. There were 28, 33, and 36

⁹ Considerations in the compensation rate analysis include: a compensation rate that does not induce bias in vessel selection, the cost of carrying an observer, landings per unit effort, and expected scallop prices. The Industry-funded Scallop program allows the vessels an increase in landings to help defray the costs of carrying an observer. The sale of the additional scallops allocated to each boat supplied the funding for the at-sea costs of the observer coverage.

sea days needed for these 5 fleets in SBRM 2018, 2019, and 2020 respectively. Given the practical limitations, these 5 fleets were not allocated sea days ([Table 17](#)).

In 2018, a policy decision was made to exclude the sea day requirements for red deepsea crab from 2 fleets: MA small mesh otter trawl (Row 5) and NE large mesh otter trawl (Row 8; for details see NEFSC and GARFO 2018). The sea days for these 2 fleets were based on the next largest sea day requirement for fish/invertebrates species groups ([Table 17](#), orange shade). In 2019 and 2020, there were funding shortfalls equivalent to 645 and 1,536 days, respectively, which triggered the formulaic prioritization process. By using the penultimate approach, the sea days needed were reduced until the sea day shortfall was removed. In 2019, the sea days needed in MA small mesh otter trawl fleet (Row 5) were reduced, while sea days in 4 fleets in SBRM 2020 were reduced ([Table 17](#), yellow shade cell).

[Table 17](#) also presents the accomplished sea days by SBRM year and fleet for 2018 and 2019. The observed sea days for SBRM 2020 (April 2020 - March 2021) are in-progress at the time of this report and the final accomplished sea days will not be known until May/June 2021; hence, comparisons of allocated versus accomplished sea days were conducted for SBRM 2018 and 2019 only. The numbers of accomplished sea days were near to the funded days for numerous fleets. During the 2018 and 2019 SBRM years, over all IFS fleets, the SBRM sea day targets were met but allocated days were not (-736 days in 2018 and -824 days in 2019). The goal of the IFS program is to obtain the target coverage levels while still achieving the minimum SBRM days allocated. The industry-funded scallop program assigns coverage based on a predetermined coverage rate by areas that the fleets intend to fish during the vessel notification process.

Through the scallop FMP, specifications vary from year to year in regards to the number of access area trips and open area days, so the number of IFS days projected can be underachieved if total scallop industry activity (days and trips) is less than assumed at the time of the scallop compensation rate analysis. During the 2018 and 2019 SBRM year, a higher than normal percentage of trips were waived from observer coverage when access areas opened and fleet activity outnumbered observers available. The observer program trains and certifies scallop observers based on coverage needs projected over an SBRM year. However, changes in fishing effort are difficult to predict in advance and may lead to waived trips.

For a few agency-funded fleets, there were substantial numbers of unaccomplished sea days, primarily in the Mid-Atlantic large and small mesh otter trawl and MA small mesh gillnet fleets (e.g., Rows 5, 6, and 32; [Table 17](#)). Over all agency-funded fleets, there were approximately 78% and 87% accomplished sea days in SBRM 2018 and 2019 with 1,643 and 928 sea days that were not accomplished in 2018 and 2019, respectively ([Table 17](#)). Because of the COVID-19 pandemic, observer waivers were issued between April and July 2020. The sea days associated with this time period will not be made up during the remaining 2020 Sea Day Schedule year (April 2020- March 2021); hence, unaccomplished sea days are expected in SBRM 2020.

Sea Turtles

Total estimated bycatch of turtles and associated CVs by gear type are summarized in [Table 18](#), and sea days needed to achieve a 30% CV are summarized in [Table 19](#). Sea days were only estimated for loggerhead turtles in gillnet and trawl gear because encounter rates with other species (Kemp's ridley, leatherback, green) were too low (there was <50% probability of observing 5 or more turtles over 800 trips in a year). Further details are provided in the associated references.

Previously Reported Information

Discard estimates, their associated precision, and the sample sizes needed in the upcoming year are available in Tables 5A (species group) and 5B (individual species) by fleet in the annual documents on discard estimation, precision, and sample size analyses for 14 federally managed species groups in the waters off the northeastern United States for SBRM 2018, 2019, and 2020 (Wigley and Tholke 2018, 2019, 2020 respectively). Sample sizes needed for all 15 species groups are given in the annual discard report with observer sea day allocations (NEFSC and GARFO 2018, 2019, 2020).

3.3 Discussion

Fish/Invertebrates

The SBRM discard estimation analysis used a broad stratification (region, gear type, mesh group, access area, and trip category) to encompass all federally managed species considered in the SBRM and used a combined ratio method (discard-to-kept of all species weight ratio). The discard estimates reported here may not necessarily correspond directly with the discard estimates derived for individual stock assessments because of differences in stratification and data. It was expected, however, that estimates would be in the same order of magnitude. **The SBRM discard estimates were not definitive estimates but were indicative of where discarding was occurring among commercial fleets.**

This review report presents the discard estimates derived through the SBRM process. The following caveats apply:

- A broad stratification scheme has been used to encompass all the federally managed species in the Greater Atlantic Region. Species-specific stock assessment analyses may differ from this report because of differences in stratification and data used that include calendar year versus SBRM year, region (based on port of departure) versus area fished, and VTR landings versus dealer landings.
- Region, based on port of departure, was used for deploying observers, and it was recognized that the area fished would provide a better stratification for discard estimation. For further details on region versus area fished, see footnote 6 in Wigley and Tholke (2020).
- The SBRM analysis utilized the Vessel Trip Report data. Dealer (*CFDERSyyyy*) data did not contain mesh or area fished information until the trip-based allocation was performed. The trip-based allocation of dealer (*CFDETT/yyyyAA*) data was conducted annually and was not available when each of the annual SBRM analyses was initiated.
 - The VTR point location was used to determine access area for commercial scallop fleets in 2018 while activity code was used in 2019 and 2020 (see Section 6 for description of refinements).
 - There were differences in species pounds between the VTR and Dealer data sets: VTR reports the good-faith hail weights while Dealer data provide actual landings weight.
- Some imputation was needed because of limited temporal observer coverage of some fleets. It was recognized that half-year imputed estimates may not be appropriate for all species and that in some cells quarterly discard ratios were based on small sample sizes. This approach contributed to lower precision (higher variability) of the discard estimates.
- Because of data limitations, discards were not estimated for all fleets, thus *total* discards were underestimated.

- “Erroneous” fleets stemming from misreporting or insufficient auditing also contributed to uncertainty in the discard estimates. The SBRM analyses use master data and are predicated upon accurately reported and audited data. Expanded audits (focusing on stratification data elements such as gear and mesh) coupled with targeted outreach and education on the importance of accurate reporting may reduce or eliminate “erroneous” fleets and improve the assignment of trips to fleets.

No survival ratios were applied to the discard estimates; we do not account for potential survival of organisms returned to the water. When comparing discard estimates from this study with those from stock assessments, it is useful to note that survival ratios are applied in stock assessments for Georges Bank and Gulf of Maine stocks of Atlantic cod (*Gadus morhua*), Atlantic sea scallop, skates, spiny dogfish, fluke, southern New England/Mid-Atlantic and Gulf of Maine stocks of winter flounder (*Pseudopleuronectes americanus*), and southern New England/Mid-Atlantic yellowtail flounder (*Limanda ferruginea*).

Pilot coverage has been used when the bycatch ratio, when variance of the bycatch ratio, or when the variance of the composite total discards is zero. It is recognized that pilot coverage may result in too much coverage in cases where no observer coverage is needed for a cell.

The SBRM Omnibus Amendment requires 30% CV or less to be attained for each species group within each fleet. Some fleet/species combinations contribute very little to the total mortality or discard of the species but may require significant resources to characterize the precision of the estimate. For example, a high variance estimate for a rare event within a fleet would require high levels of sampling, even though the total discard in that fleet was unimportant with respect to either the total discard or total mortality on the resource. Thus, the use of the importance filter is a key feature to the SBRM in that it focuses the sampling to fleets where it is needed most and is not wasted on small, imprecisely estimated discards.

The SBRM sample size analyses do not address the coverage needed for individual sectors or multiple stock components of a species. The analytical basis for the allocation of future sea day coverage in the SBRM is a specified level of precision (i.e., 30% CV) and an expectation that the pattern of fishing activity observed in the prior year will be similar to that in the upcoming year.

Because of the unaccomplished sea days, 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 species in some fleets; however, it does not mean that all species within a given fleet will not meet the precision standard. See Sections 5 for further discussion on this topic.

The unaccomplished sea days were carried over to the following year. It is notable that the carryover days from 2017 represented approximately 40% (2,967 days) of the required days for agency-funded fleets in 2018 and 26% (1,862 days) in 2019. The SBRM is designed to accommodate funding shortfalls via the prioritization process; hence, there is no reliance on unaccomplished days as a means to fund the required days in the following year.

The NEFOP is tasked with achieving all sea days allocated by the SBRM analysis each year; however, reaching target coverage has posed significant challenges for certain fleets in recent years. For example, in 2018, 38% of the days needed to monitor turtle bycatch beyond what was needed for fish in the Mid-Atlantic were achieved. These days were, by far, the program’s greatest challenge in 2018. These days were also a challenge to achieve in 2019. In June 2018, the 5-year NEFOP contract was awarded (to begin work July 2); this transition from one NEFOP observer service provider to another led to initial challenges in accomplishing days in SBRM quarters 2 and 3 (April-September), including: (1) loss of observers during the transition, (2) time to train and certify new observers, and (3) time to establish relationships with industry and obtain vessel

contacts. The SBRM allocated sea days on the NEFOP Sea Day Schedule (versus those allocated to the Pre-Trip Notification System [PTNS]) have decreased since the previous 3-year review report. The observer provider companies have communicated that once assigned, sea days allocated to the PTNS require less time and resources to achieve and therefore are more likely to be accomplished as opposed to sea days that are not allocated to the PTNS.

Historically, vessels have been selected for NEFOP Sea Day Schedule trips via dock intercept or phone communication. With the number of sea days tasked, the NEFOP observer provider company continues their use of formal selection letters to inform permit holders that their vessels have been selected for observer coverage. The use of selection letters increased in SBRM years 2018 and 2019, as compared with SBRM year 2017 but is in line with earlier SBRM years. During the 2019 SBRM year, provider staff were reminded to use selection letters only when necessary to achieve coverage; FMO staff individually approved the use of the letters and implemented standard protocols for sending, processing, and completing.

Although coverage may be technically achievable (i.e., below 100%), it has been logistically difficult to deploy observers on vessels at a rate greater than 20% without a pre-trip notification requirement. In many cases, this difficulty is due to low industry tolerance of observer coverage. Coverage is not optional, but the absence of a pre-trip notification system requirement creates challenges in identifying eligible effort as well as in timely communication of trip selection and deployment logistics between provider staff and permit holders. (See Section 9.0 for the SBRM FMAT/PDT recommendation for use of PTNS or a system like PTNS to reduce or eliminate the need for dock intercept and phone communication.)

Additionally, low observer retention is an obstacle to achieving target sea days. Without a pre-trip notification requirement, observers and providers must work hard to obtain trips, and they continue to have difficulty in the field with substantial resistance from industry. In some cases, this difficulty has led to dissatisfaction among observers with their positions.

Providers also report difficulty maintaining the needed level of observers because there are large seasonal variations in the amount of sea days tasked throughout the course of the year, which leads to seasonality in the size of the full-time observer cadre operationally necessary to complete the allocated sea days. Furthermore, a lack of observers who possess the necessary certifications to cover certain fleets (e.g., NE surfclam) can lead to missed coverage. For certain fleets, a lack of observer provider staff and the resulting need to build new contacts and relationships can lead to lower coverage. Additionally, certain fleets or vessels within a fleet are not required to carry a vessel monitoring system (VMS). This gap leads to increased challenges for provider staff in identifying and tracking effort, which is necessary for successful observer deployment. Data sharing agreements between NMFS and state fisheries agencies have improved FMO and provider staff identification of effort among fleets and vessels without VMS requirements. Contact information for fishing vessels in North Carolina in particular was difficult to obtain prior to establishment of a data sharing agreement. Establishing a system like PTNS for these fleets would help by requiring vessels to enter current contact information.

Lack of fishing effort for certain fleets was identified as an obstacle to observer coverage, as well. Certain fleets (e.g., hagfish) went through periods where no effort occurred, while effort in other fleets (e.g., large mesh NE otter trawl) went through periods of low effort. While effort was low, there was enough effort to support the required sampling. Sea days are apportioned by fleet as described in the SBRM sea day allocation (NEFSC and GARFO 2018, 2019, and 2020). The FMO then assigns the sea days by quarter based on effort in the prior SBRM year before the

schedule is given to the observer provider. The FMO works with the provider to shift days among months within a quarter to capture shifts in effort.

Compliance with safety requirements was an obstacle to achieving coverage in several SBRM fleets (e.g., NE surfclam, MA small mesh gillnet). Observers and providers generally try to work with vessel owners to resolve safety issues whenever possible. Fleets that receive intermittent observer coverage often require more outreach by provider and observer program staff to bring vessels into safety compliance.

Coverage of all fleets at the end of the 2019 Sea Day Schedule (April 2019-March 2020) was impacted by the COVID-19 pandemic. NMFS issued the first blanket observer coverage waiver on March 20, 2020, halting observer coverage of all fleets. Though the blanket waiver was lifted on August 14, 2020, because of the ongoing pandemic and resulting observer coverage waivers, we anticipate substantial impacts to observer coverage for much of the 2020 Sea Day Schedule (April 2020-March 2021).

The FMO continues to implement changes identified in the 2018 3-year report to assist with improving sea day accomplishments. Some of these changes have included:

- (1) Modifications to the new 5-year contract (awarded June 8, 2018) that require the achievement of at least 90% of the tasked sea days;
- (2) removal of erroneous fleets and a documented process to do so annually;
- (3) increased in-person outreach to industry across both NE and MA, outside of COVID-19 restrictions;
- (4) permit holder letters informing operators of expected annual observer coverage for their state and gear type;
- (5) internal NEFSC SBRM quarterly meetings to facilitate communication across divisions within the science center;
- (6) presentations at both Fishery Management Councils on the SBRM and related achievements;
- (7) MA area lead stationed in New Jersey for more efficient outreach and follow-up with vessel operators;
- (8) greater collaboration with the NOAA Fisheries Office of Law Enforcement, US Coast Guard, and Joint Enforcement Agreement partners, such as state enforcement agencies, to assist with timely vessel trip refusal follow up and outreach to encourage compliance.

These changes have made a positive impact on accomplishments, as is reflected in 2018 and 2019 agency-funded fleet accomplishments (see Table 17).

4. DISCARD REASONS FOR FISH AND INVERTEBRATES

4.1 Methods

As mentioned above, the MSA requires FMPs to include conservation and management measures that, to the extent practicable, minimize bycatch. Thus, it could be useful to know what portion of the discards is associated with regulatory measures. As described in the SBRM Omnibus Amendment (NEFMC, MAFMC, NMFS 2007 2015), fish may be discarded for a variety of reasons including regulatory and economic reasons. It is important to note that the reasons behind the discards and the measures that could be used to reduce discards are not the focus of the SBRM.

For each of the 3 SBRM years, species group, and fleets, the fish dispositions associated with discarding (as reported by the at-sea observer) have been grouped into the following 6 discard reason categories: “No Market,” “Regulation (size),” “Regulation (quota),” “Regulation (other),”

“Poor Quality,” and “Other.” The fish dispositions and the discard reason categories are summarized in [Appendix Table 3](#). The discard reasons “No Market” and “Poor Quality” would be considered economic discards and not regulatory discards.

The observed (nonextrapolated) discards associated with each of 6 discard reason categories were summed for each species group, fleet, and SBRM year for the fleets where discards could be estimated. For individual fleets, the percentage of observed discards by discard reason category was derived by dividing the sum of the observed discards for each discard reason category by the sum of the total observed discards for each species group, fleet, and SBRM year. The extrapolated discard reason category percentages were the same as the observed discard reason category percentages. For the “Other fleets filtered out” (an aggregated fleet that represents fleets where the variance of the discard estimate was not used in the annual SBRM sample size analysis), the observed discard reason category percentages were then multiplied by the total estimated (extrapolated) discards for each species group, fleet, and SBRM year to derive the estimated discards by discard reason category for each species group, fleet, and SBRM year for each of the fleets associated with the aggregated fleet. For each “Other fleets filtered out,” the total estimated discards by discard reason category were summed over the fleets that compose the fleet aggregation for each species group and SBRM year. The extrapolated discard reason category percentage was derived by dividing the estimated discards for each discard reason category by the sum of the total estimated discards for each species group/species, fleet, and SBRM year. For each “Other fleets filtered out,” the extrapolated discard reason category percentages were the observed discard reason category percentages weighted by the estimated discards in each fleet.

Information from the annual discard reports have been summarized in graphic form for this review report.

4.2 Results

Over the 14 species groups, the discard reasons remained relatively stable over the 3 SBRM years. The majority (between 74% and 78%) of discards were attributed to “No Market,” 16% to 21% were attributed to “Regulation” (size, quota, and other), and the remaining discard percentages were roughly divided between “Poor Quality” and “Other.” The reasons for discarding varied by species group; however, the patterns of discard reasons persisted over years ([Figure 13](#)).

Previously Reported Information

Annually, the discard reasons associated with the estimated discards are summarized by species group and fleet (see Appendix Tables 3A and 3B in Wigley and Tholke 2018, 2019, 2020).

4.3 Discussion

When considering mechanisms to reduce discards, it may be useful to know why discarding is occurring. Fish may be discarded for economic reasons (e.g., no market or poor quality) or for regulatory reasons (size, quota, or other). It is important to note that a large discard reason percentage may be associated with a small quantity of discards. Additionally, it is important to note that for many species, the discards are associated with fleets that have been filtered out by the importance filter.

It should also be noted that the observer classifies the discards by fish disposition based upon NEFOP protocols (NEFSC 2016a, 2016b) where the observer asks the captain/crew why species are being discarded. Thus, these data should be considered a form of self-reported data and as such these data are difficult to verify and should be interpreted carefully. Additionally, the NEFOP protocols for collecting discard reasons recognized that more than 1 discard reason could

apply to a particular subset of discards. Information on discard reason is available within the NEFOP database to support further analysis needed by Plan Development Teams or Take Reduction Teams.

5. EFFECTIVENESS OF SBRM

5.1 Methods

Fish/Invertebrates

Performance Standard

The SBRM Omnibus Amendment established a performance standard for the Greater Atlantic Region. The SBRM performance standard is a 30% CV of the total discards (NEFMC, MAFMC and NMFS 2015). This performance standard applies to each unique fleet, species group, and SBRM year. In this section, each unique fleet, species group, and SBRM year is referred to as a cell. Each cell in the 3 SBRM years was classified to 1 of the following 6 SBRM performance classifications:

Not Applicable – SBRM performance was not applicable. The variance of the discard estimate was not available; fleets were not considered within the annual SBRM analysis, including fleets determined to be “erroneous” (Box 1; [Figure 14](#)).

Unknown – SBRM performance was unknown. The variance of the discard estimate was not used because there was no observer coverage (Box 2; [Figure 14](#)) or insufficient observer coverage (Boxes 3 and 4; [Figure 14](#)). This SBRM performance classification is associated with pilot fleets only. Discards cannot be reliably estimated for cells with insufficient OB coverage. Designation of pilot coverage is described in Wigley et al. 2007.

Met (filtered out) – SBRM performance was met because the discard CV was less than or equal to 30% (Boxes 5 and 7b; [Figure 14](#)), and the variance of discard was not used in the annual sample size analysis because of the importance filter (cell filtered out). This SBRM performance classification is associated with nonpilot fleets only.

Not Met (filtered out) – SBRM performance was not met because the discard CV was greater than 30% (Box 7a; [Figure 14](#)), and the variance of discard was not used in the annual sample size analysis because of the importance filter (cell filtered out). This SBRM performance classification is associated with nonpilot fleets only.

Met – SBRM performance was met because the discard CV was less than or equal to 30% (Box 9; [Figure 14](#)), and the variance of discard was used in the annual sample size analysis. This SBRM performance classification is associated with nonpilot fleets only.

Not Met – SBRM performance was not met because the discard CV was greater than 30% CV (Box 8; [Figure 14](#)), and the variance of discard was used in the annual sample size analysis. This SBRM performance classification is associated with nonpilot fleets only.

This classification was also used for fish species groups in the 2011 SBRM 3 year Review Report (Wigley et al. 2012). In the 2011 SBRM 3 year Review, Box 6 (Met) was used for sea turtles; however, Box 6 was not used in the 2017 SBRM 3 year Review Report or this Review Report.

Variance Stability

The SBRM uses the variance of discards from the previous year to determine the number of sea days needed in the next year. This approach assumes the variance of the discard estimates are stable such that the variances can be used from one year to inform the sample size needed in the following year. It assumes the persistence of fishing behavior over time.

The 2011 and 2017 SBRM 3 year Review Reports (Wigley et al. 2012; Hogan et al. 2019) investigated the stability of the discard variances by conducting comparisons of the discard variance and comparisons of coefficient of variation of the discards for fleet and species groups between the 3 SBRM years. Results revealed a relatively strong relationship between SBRM years indicating that the assumption of similar variance across years holds (Figures 2 and 3 in Wigley et al. 2012; Figure 16 in Hogan et al. 2019). Confidence/prediction ellipses were stronger for the 1 year comparisons and indicated that the variances and CVs are more similar with a 1-year difference than with a 2-year difference.

This analysis was not conducted this for Review Report; however, a summary of number of trips needed to achieve a 30% CV by species group, fleet, and SBRM year (taken from the Table 7 and Figure 3 in the annual SBRM analyses; Wigley and Tholke 2018, 2019, 2020) and the relationship between CV and sample size (trips) are presented for 9 selected fleets. These 9 selected fleets represent those fleets with sample sizes for species groups that were not filtered out in all SBRM years.

5.2 Results

Fish/Invertebrates

Performance Standard

The 6 SBRM performance classifications (“Not Applicable,” “Unknown,” “Met [filtered out],” “Not Met [filtered out],” “Met,” and “Not Met”) and the characteristics of the cells associated with each performance classification are depicted in [Figure 14](#). When considering fleets across all 3 SBRM years, there is a total of 1,036 cells for each SBRM year (74 fleets x 14 species groups). The number of cells by SBRM performance classification and SBRM year is presented in [Table 20](#). The number of fleets by SBRM performance classification, species group, and SBRM year is presented in [Table 21](#). The number of species groups by fleet are given in [Table 22](#). The fleet, species groups, and associated CV for cells that did not meet the SBRM performance standard are listed in [Table 23](#).

There are 308, 350, and 364 cells in SBRM 2018, SBRM 2019, and SBRM 2020, respectively, that are “Not Applicable” ([Table 20](#)).

Cells associated with pilot coverage and the SBRM performance classification of “Unknown” were considered separately from the cells with sufficient data (nonpilot cells). There were 196, 196, and 154 cells and 14, 14, and 11 fleets in 2018, 2019, and 2020 respectively ([Tables 20 and 21](#)) with “Unknown” performance classification across all species groups and fleets. The “Unknown” cells were associated with the pilot fleets (fleets with no or insufficient observer coverage in all years; [Table 6](#)) where all species groups within these fleets were “Unknown” ([Tables 20 and 21](#)).

Cells with the SBRM performance classification of “Met” (filtered out) and “Not Met” (filtered out), Boxes 5, 7a, and 7b ([Figure 14](#)), respectively, were also excluded from the set of cells used in the evaluation of effectiveness. The filtered out cells represent fleets and species groups where discards are considered a minor component of total catch and were not used in the annual sample size analyses to determine coverage for the subsequent year. The total number of

cells removed because of the importance filter in SBRM 2018, 2019, and 2020 were 477 (303+174), 441 (271 + 170), and 469 (306 + 163), respectively ([Tables 20](#) and [22](#)).

In the evaluation of effectiveness, only the cells used in the annual sample size analysis (cells associated with Boxes 8, and 9; [Figure 14](#)) were considered. The numbers of cells considered in the evaluation are: 55 (44+11), 49 (43+6), and 49 (44+5) in SBRM 2018, 2019, and 2020, respectively ([Table 20](#)). On an annual basis, the percentages of cells that met the SBRM performance standard in SBRM 2018, 2019, and 2020 were 80% (44/55), 88% (43/49), and 90% (44/49), respectively. Across SBRM years, the percentages of cells that met the SBRM performance standard in SBRM 2018, 2019, and 2020 vary by species group and fleet. The annual SBRM performance classifications for cells in the analysis were summarized by species group by using the 6 categories ([Table 21](#)) and summarized by fleet by using the following 3 categories: (1) “Not Met,” (2) “Met,” or (3) “Met” and “Not Met” that were filtered out ([Table 22](#)). There were 5 species groups (Atlantic salmon, bluefish, Atlantic herring, surfclam - ocean quahog, and tilefish) without any cells classified as “Met” or “Not Met” ([Table 21](#)). There were 4 species groups with no cells classified as “Not Met” (squid-butterfish-mackerel, small mesh groundfish, skate complex, large mesh groundfish) indicating the performance standard was met for all cells in the evaluation. The remaining species groups (fluke-scup-black sea bass, monkfish, red deepsea crab, sea scallop) had cells classified as “Not Met.”

In SBRM 2018, 2019, and 2020, pilot fleets represented 27%, 29%, and 23% of the fleets, respectively ([Tables 6](#) and [21](#)). For the nonpilot fleets, there were 10, 12, and 13 fleets in SBRM 2018, 2019, and 2020, respectively, for which all nonfiltered species groups “MET” the performance classification. [Table 23](#) lists the cells by SBRM year, species group, and fleet where the performance standard was “Not Met.” There was a single species group in each of the 11 fleets in SBRM 2018, the 6 fleets in SBRM 2019, and the 5 fleets in SBRM 2020 that did not meet the performance standard. Consequences to management are discussed in Implications for Management (Section 8).

Variance Stability

The variance stability can be qualitatively evaluated by using the relationship between sample size (number of trips) and precision ([Figure 15](#)) and the change in species groups between years [Table 24](#).

It is important to note that the number of trips (and number of sea days) for the 14 species groups varies by SBRM year within a given fleet. The variability may be due to either the changes in fishing patterns or changes in the determining species group for that year (species filtered out or not) or a combination of any of these changes. The number of SBRM trips needed within a fleet, the expected coverage (number of trips needed for April through March divided by the number of VTR trips for July-June in the analysis), and the fish species group determining the coverage (summarizes fish species group only) are given in [Table 24](#). Examples of nonpilot fleets with relatively stable numbers of SBRM trips needed include the NE longline (Row 2) fleet and the NE large mesh gillnet (Row 36) in which spiny dogfish was the determining species group in all 3 years, and MA open limited scallop dredge (Row 42) in which monkfish was the determining species group in all 3 years. Nonpilot fleets which required minimum pilot coverage in all 3 years are: MA longline (Row 1), NE handline (Row 4), NE purse seine (Row 39), MA and NE access area general category scallop dredge (Rows 40 and 41), MA open general category scallop dredge (Row 44), MA and NE fish pots (Rows 56 and 57), MA and NE conch pots (Rows 58 and 59), MA lobster pot (Row 61), and NE crab pot (Row 65) fleets; these fleets consistently have relatively low discards for all species groups in all 3 years. Two examples of fleets in which the number of

needed SBRM trips changed among years as the result of changes in observer coverage (pilot to nonpilot) are MA handline (Row 3) and MA small mesh twin otter (Row 16) fleets. The variance stability between years is also revealed in the relationship between CV and sample size (number of trips needed) among the 3 SBRM years for fleets in which sample size was determined by discard variances for species groups that were not filtered out ([Figure 15](#)). There were 9 selected fleets for which sample size was estimated by the discard variances in all 3 SBRM years. In general, there are similarities between years and species groups (many of the curves overlay one another and/or the same species group determined coverage; [Table 24](#) and [Figure 15](#)). There are some exceptions, such as MA small mesh otter trawl (Row 5), NE large mesh otter trawl (Row 8), and NE clam dredge (Row 73) fleets in which needed trips in 1 year was greater than in the other 2 years ([Figure 15](#)).

Previously Reported Information

Previously reported information on precision of discard estimates is available at a cell level by species group, fleet, and SBRM year in Tables 5A and 5B of the annual documents (Wigley and Tholke 2018, 2019, 2020). Likewise, the relationships between precision (CV) and the sample size needed for species groups/fleets combinations that were not filtered are in Figure 3, and the sample sizes needed are in Table 7 (Wigley and Tholke 2018, 2019, 2020).

Sea Turtles

Based on 5-year pooled datasets (see [Table 2](#) in Section 1 for years included), the 30% precision standard for estimates of loggerhead fishery interactions was met for Mid-Atlantic/Georges Bank sink gillnet fleets (Murray 2018) and for Mid-Atlantic bottom otter trawl and scallop trawl fleets (Murray 2015a, 2020). The 30% precision standard was not met for estimates of loggerhead and leatherback interactions in bottom otter trawl and scallop trawl fleets on Georges Bank (Murray 2020), nor for any other non-loggerhead species in Mid-Atlantic gillnet or trawl gear ([Table 18](#)). This finding is not surprising as the level of observer coverage in gillnet and trawl gears was designed to meet precision goals only for loggerheads.

5.3 Discussion

Fish/Invertebrates

Performance Standard

The SBRM is designed to allow for a feedback process to occur, such that if there is uncertainty about a discard estimate (not filtered out) of a given species group within a fleet, then more sea days are required to monitor the fleet. The effectiveness of the SBRM at meeting the performance standard is not only dependent upon the assumption of variance stability from one year to the next, but on other factors including the overall magnitude of the funding associated with the time frame of the data used. Thus, the data used in SBRM 2018 had observer coverage allocated during calendar years 2016 and 2017. In 2018 SBRM, not all fleets had been allocated the number of sea days needed to achieve the performance standard; this funding shortfall impacts the data evaluated in subsequent SBRM analyses. Although many of the pilot fleets are fleets associated with “selective gears” and have a specific target species for which incidental catch of other SBRM species is not likely, such as floating trap, hagfish pot, weir, and urchin dredge, the performance standard cannot be evaluated for pilot fleets. There is a general indication that discarding within these fleets is minimal; however, maintaining minimum pilot coverage (3 trips per quarter) would be one way to provide information such that at-sea coverage of *all* fleets could

be evaluated relative to the performance standard and the feedback process within the SBRM could be evaluated.

When considering the SBRM performance standard, it is important to examine only those fleets and species groups that are nonpilot and not filtered (important) in the evaluation. By doing so, the relative magnitude of the discard to total catch is factored into the evaluation since this relationship is also factored into the number of sea days required.

Given the regional priorities, in conjunction with groundfish compliance monitoring, funding has been directed towards nonselective gear types (otter trawl, gillnets) with known nontargeted catch in years prior to 2014. However, SBRM 2016 is the first year in which the entire data set used is based on data where the sea days were allocated by the formulaic prioritization process (i.e., sea days were allocated to all fleets except for 2 fleets in which industry effort was too low to support 3 trips per calendar quarter). The use of the formulaic prioritization process since SBRM 2014 has resulted in more fleets with allocated sea days. However, there were instances in which some fleets did not receive the number of sea days needed. As mentioned in Section 3, a funding shortfall in SBRM 2019 and 2020 triggered the prioritization process in which 1 fleet in SBRM 2019 and 4 fleets in SBRM 2020 did not receive sufficient sea days. Because of allocation decisions made prior to the prioritization process, 2 fleets in SBRM 2018 did not receive the full number of needed sea days (see Section 6 for further details).

Variance Stability

Based on past analyses and supported by current indirect approaches, evidence suggests the assumption that discard variances are stable over time is valid, particularly for a 1-year lag. If fishing behavior changes because of regulatory changes, then the relationship between years may weaken in the year following the regulatory change. A similar weakening in the relationship may occur when fish populations change (e.g., a strong year class moving through the fishery). These types of analyses should be conducted on a periodic basis. Conducting sample size analyses annually minimizes the time to a 1 year difference.

Sea Turtles

Observer coverage is typically allocated to monitor loggerhead turtles in the Mid-Atlantic region because loggerheads are the most common sea turtle species observed and occur less frequently in the Georges Bank and Gulf of Maine regions. Fishery encounters with other turtle species (Kemp's ridley, green, leatherback) are more rare and until recently, bycatch and associated CVs were not estimated because of a lack of data, so coverage for these species was not estimated nor allocated. As a result, the 30% CV standard was not met for non-loggerhead species in gillnet and trawl gears, nor for loggerheads in bottom trawl and scallop trawl gear on Georges Bank, because levels of observer coverage were driven by other species groups.

Because of the rarity of sea turtle bycatch events, data are pooled over a 5-year period for the estimation process. In a single year very few turtles may be observed, so CVs derived around a bycatch rate may be very high and warrant enormous levels of coverage to estimate bycatch with 30% precision the subsequent year. If a turtle species is not filtered out in the sea day estimation process (see Hogan et al. 2019 for details), then the CVs from the pooled 5-year time series are used to estimate annual sea day coverage in subsequent years until a new bycatch estimate is completed. This approach means that coverage levels for the time period 2014-2018, for example, will have been informed by conditions in the fishery from 2009-2013. Therefore, changes in the anticipated magnitude and distribution of fishing effort from one time series to the next could also offset the expected performance standard for turtles.

6. REFINEMENTS TO SBRM METHODS

Fish/Invertebrates

The methods used for the 2018, 2019, and 2020 SBRM are described in Wigley et al. 2007; Wigley and Tholke 2018, 2019, 2020; NEFSC and GARFO 2018, 2019, 2020. No changes to the methods used for discard estimation and precision occurred during the 3 years in review. However, methodological refinements have been incorporated into the sample size analyses used for fish/invertebrate species groups in the 2018, 2019, and 2020 SBRM. Refinements to the identification of “Other minor fleets” and the identification of “erroneous” fleets have also been incorporated. These refinements are listed below by SBRM year.

2018:

- Added blueline tilefish (*Caulolatilus microps*) to tilefish species group in 2018 onward.
- Excluded state-funded observed trips (ASMFC and New York State Department of Environmental Conservation) and ASM trips for 2018 onward. See footnote 4 and the discussion section in Wigley and Tholke 2018. Hogan et al. 2019 described the basis for the recommendation to exclude these data. Excluding these trips from the SBRM analyses does not preclude these data from being used in other discard estimation analyses.
- Expanded the use of specific mesh size groups to all trawl gear to resolve the inconsistency among various trawl gear (footnote 7 in Wigley and Tholke 2018).
- Other minor fleets – the 3 refinements described below work together to quantitatively identify fleets that constitute “Other minor fleets” and transparency in the SBRM process for 2018 onward:
 - Clarified and developed standardized criteria (quantitative rather than qualitative) for fleets with few VTR trips. A unique fleet is defined as a fleet with 3 or more VTR trips in any quarter. For fleets with fewer than 3 VTR trips per quarter for all quarters, the trips will be aggregated into “Other minor fleets.” See methods and discussion sections in Wigley and Tholke 2018).
 - Expanded the sea day allocation process to identify and remove “erroneous” fleets prior to sea day allocation. See the discussion section of Wigley and Tholke 2018 as well as NEFSC and GARFO 2018.
 - Decoupled the minimum number of trips in a fleet for the SBRM analyses from the minimum number of trips in a fleet for the implementation of observer coverage (i.e., estimation versus deployment) providing transparency in the estimation, assignment, and accomplishment of observer sea days.
- Applied a policy decision to adjust the sea days needed for red deepsea crab prior to prioritization; see NEFSC and GARFO 2018 for details.

2019:

- Removed the MA shrimp twinned trawl fleet in SBRM 2019 onward because this fleet is monitored by Southeast region; see Wigley and Tholke 2019 for further details.
- Restratified the NE small OPEN and AA midwater trawl fleets: the NE small mesh midwater trawl trips in the groundfish AA have been grouped together with the NE small mesh midwater trawl trips fishing in open areas to form the NE small mesh midwater trawl fleet (all areas); see Wigley and Tholke 2019 for further details.

- Excluded observed hauls with fish discarded by mistake (*fishdisp* = 090) from the analyses; see methods in Wigley and Tholke 2019.
- Used the vessel's activity code to identify trip category (general or limited) and access areas (access area or nonaccess area) for trips using scallop trawl and scallop dredge. This adjustment represents a refinement from using point location for the access area and the trip length for the trip category; see methods and footnote 8 in Wigley and Tholke 2019.

2020:

- Trips with electronic monitoring (EM) were not used previously; however, EM trips occurred from July 2018 to June 2019 but were not used in SBRM 2020. For details, see the discussion in Wigley and Tholke 2020.

Pending implementation:

- The SBRM framework action to expand the sampling frame for MA and NE lobster pot fleets to include all vessels that hold a federal fishing permit has been approved. When the framework action is implemented, then beginning in the calendar quarter following the implementation, all active federal lobster vessels may be eligible for observer coverage. Implementing the framework action would not change the number of sea days needed. For further details, see Wigley and Tholke 2018, 2019, 2020 and NEFSC and GARFO 2018, 2019, 2020.

Sea Turtles

Methodological refinements for sea turtles are given below by SBRM year.

2018:

- Incorporated rarity filter for turtles in 2018 onward. See Hogan et al. 2019 for details.
- Turtle gillnet analysis:
 - Change in methods (ratio estimator used rather than a Generalized Additive Model [GAM]). See Murray 2018 for details.
 - Change in stratification (study area expanded to include Georges Bank, which was combined with Mid-Atlantic). See Murray 2018 for details.
 - Expanded estimate to include other turtle species (however, sea day needs for non-loggerhead turtle species not estimated or allocated as a result of rarity filter). See Murray 2018 for details.

2019:

- No change from SBRM 2018 for all gear types

2020:

- Turtle bottom otter trawl and scallop trawl analysis:
 - Change in methods (ratio estimator used rather than a GAM). See Murray 2020 for details.
 - Change in stratification (study area expanded to include Georges Bank, which remained a separate stratum from Mid-Atlantic). See Murray 2020 for details.
 - Expanded estimate to include other turtle species (however, sea day needs for non-loggerhead turtle species, and loggerheads on Georges Bank, not estimated or allocated as a result of rarity filter). See Murray 2020 for details.

Combining Sea Days Needed for Fish/Invertebrates and Sea Turtles

The approach used to combine the sea days needed for fish/invertebrates and sea turtles is described in the annual allocation of observer sea days (NEFSC and GARFO 2018, 2019, 2020). The approach used in these 3 years differs slightly from the approach used previously. In 2018 and onward, for each turtle gear block, if turtle days are greater than the sum of fish days, then the percentage of VTR effort (sea days) corresponding to the fish fleet is used to distribute the difference in sea days needed between taxa (not the turtle sea days) among the fish fleets associated with the turtle gear block. See Step 4a - Step 4d in Table 5 of NEFSC and GARFO 2018, 2019, 2020. This refinement prevents the COMBINED days from being greater than the days for either taxon and allows FMO staff to track fish/invertebrate and turtle days separately at the fish fleet level, if needed.

In 2020, a refinement was made to sea days needed in the turtle otter trawl gear type to account for overlap in strata between fish and turtles. This refinement is applied prior to determining the COMBINED number of sea days needed to monitor fish/invertebrates and turtle species groups. See NEFSC and GARFO 2020 for details.

The SBRM FMAT/PDT recommends continued use of these refinements described above for fish/invertebrates, sea turtles, and combining sea days needed. The SBRM FMAT/PDT agrees with the status quo approach of making and documenting annual refinements (as needed) and subsequently reviewing and summarizing these refinements in the SBRM 3 year Review Report.

The SBRM FMAT/PDT recommends the following planned changes for future SBRM analyses:

- The inclusion of chub mackerel (*Scomber colias*) in the squid-butterfish-mackerel FMP species group in 2021 SBRM analyses;
- The consideration of ESA listed species such as sturgeon (Atlantic sturgeon and shortnose sturgeon [*Acipenser brevirostrum*]) as species groups;
- The expansion of the sampling frame for New England and Mid-Atlantic lobster pot fleets to include all vessels using lobster pot gear, beginning in the calendar quarter following the implementation of the SBRM framework action; and
- The utilization of a PTNS-like system for all fleets.

7. ACCURACY AND POTENTIAL SOURCES OF BIAS ANALYSES

7.1 Methods

Vessel Selection Bias: qualitative analysis

The annual 2018, 2019, and 2020 SBRM data sets for VTR and OB were used. The numbers of annual trips for each distinct vessel were summed within each data set, fleet, and SBRM year. The cumulative sum of trips by distinct vessels within each data set, fleet, and SBRM year was derived by ordering (largest to smallest) the number of annual trips made by distinct vessels. The cumulative percentage of the annual kept weight of all species and the cumulative percentage of distinct vessels was derived by ordering the sum of the annual kept weight of all species for a given vessel, from largest to smallest, then converting to the percentage of the sum of the kept weight of all species for the fleet for each fleet and SBRM year, and summing the percentage over the number of distinct vessels.

Observer Bias

In this report, observer bias is defined as a differential outcome of a trip when an observer is present compared to when an observer is not present on a commercial fishing trip. Two trip outcomes were examined to determine if observer bias occurred on trips in the 2018 – 2020 SBRM annual analyses: mean trip duration and mean kept weight of all species on unobserved and observed VTR trips within a fleet.

The VTR trips used in the annual SBRM data sets were tagged as either unobserved or observed by using one or the other of 2 methods. For the July 2016 through June 2019 time period, the VTR serial number reported on any observed trips in the NEFSC's observer database was used to find the corresponding VTR trip identifier in the VTR database and then matched to VTR trips within the SBRM analysis data set. If a VTR trip had an observer of any kind, then the trip was tagged as observed. Additionally, a trip midpoint matching scheme was also used to identify VTR trips that had an observer on board. For a given permit, a VTR and observed trip were considered a match if the midpoint of the VTR trip fell between the dates of the observer trip. When a match occurred, the VTR trip was tagged as observed for this method. If a VTR trip was tagged as observed by either method, the VTR trip was marked as observed for the analysis. The means of each metric were derived for each VTR trip group (unobserved and observed) within each fleet for fleets in which there were at least 30 observed trips. Although the NE and MA ocean quahog/surfc clam dredge fleets were excluded from the analysis because these fleets had fewer than 30 observed trips ([Table 6](#)), these fleets would have also been excluded from this analysis because this fishery does not use VTR (no VTR serial number available to distinguish a unique trip) and the trip's sail date are not reported in the clam logbook or dealer data. Plots of unobserved and observed mean trip duration and mean kept weight of all species by fleet were made for each SBRM year. A linear regression with 68% confidence ellipse was shown for each plot to demonstrate the strength of the relationship. The actual difference of mean trip duration and the actual difference of mean kept weight of all species between VTR trip groups (unobserved minus observed) were derived by fleet and SBRM year.

7.2 Results

Vessel Selection Bias: qualitative analysis

There are a few vessels that appear to have been selected at high or low rates during some time frames that may need additional investigation (e.g., NE handline [Row 4]); however, some variation in vessel selection rate is expected because of random sampling within a fleet. Overall, there was no evidence of systematic vessel selection bias ([Figure 16](#)). Observed trips generally occurred over the range of number of trips made by vessels within a fleet and SBRM year, with no obvious over- or undersampling of few or many trips per vessel. Observed trips generally occurred over the range of the cumulative distribution of annual kept weight by a vessel, with no obvious over- or undersampling of low or high catch trips ([Figure 16](#), right plots).

Observer Bias

There were 54 fleets (unique SBRM year and fleet combinations) with 30 or more observed VTR trips ([Table 25](#)). These fleets comprised mostly otter trawl, gillnet, and scallop dredge gear. The sample sizes varied by VTR group, SBRM year, and fleet. The sample sizes of unobserved VTR trips within an SBRM year and fleet were generally greater than 1,000 trips, and the sample sizes of observed trips were generally greater than 100 trips. The mean trip duration and mean kept

weight of all species for unobserved and observed VTR trips by SBRM year and fleet are given in [Table 25](#) and [Figure 17](#).

For differences in mean trip duration, the annual 68% confidence ellipses of the linear regression are centered on the identity line, indicating no strong, large-scale systematic bias for these fleets ([Figure 17](#), left plot). The differences in mean for trip duration ranged from -1.00 to 0.12 days. Of the 54 fleets examined, 38 fleets (70%) had differences of means less than zero indicating observed trips were longer in duration than unobserved trips. However, 50 of the 54 fleets (93%) had absolute differences less than half a day (0.5 days; a day is the unit of measure of the metric examined). For the majority of fleets (94%), the absolute difference in means was less than 25% of the unobserved trip duration.

For differences in mean kept weight of all species, the annual 68% confidence ellipses are centered on the identity line, indicating no strong, large-scale systematic bias for these fleets; however, there were some SBRM years and fleet combinations outside the ellipse that were above and below the identity line ([Figure 17](#); right plot). The differences in mean kept weight of all species ranged between -28,356 and 2,443 pounds. Of the 54 fleets examined, 42 fleets (78%) had differences in means less than zero indicating the kept weight of all species was greater on observed trips than unobserved trips. For the majority of fleets (76%), the absolute difference in means was less than 25% of the unobserved kept weight.

Based on the difference of the means, the potential bias appears to be relatively small for trip duration and mean kept weight of all species.

7.3 Discussion

Vessel Selection Bias

There are some observed trips for vessels without a VTR (red bars without a blue bar). These occurrences are not widespread and primarily occur in MA and NE small mesh otter trawl fleets (Rows 5 and 7, respectively; [Figure 16](#), left plots). Data leveraging between databases remains important (cross-checking OB and VTR for subtrip reporting compliance) when these data are audited. These occurrences may indicate possible VTR trips that have not reported all gear/mesh combinations used during a trip. Another contributing factor may be the use of mesh size groups. A boundary (use of cut-point to partition mesh size groups) point must be used; however, the cut-point used may not always coincide between self-reported trip mesh size in the VTR and the observer data mesh size because the observer mesh size is an average of 10 mesh size observations and mesh can stretch and/or shrink with use.

There are multiple selection systems in use: PTNS for fleets associated with Northeast Multispecies FMP, interactive voice recognition call-in program for fleets associated with the scallop FMP, and dockside intercept for remaining fleets. Qualitative results by fleet do not reveal differences among selection systems. The ASM data are included in the analysis. The PTNS is used to deploy at-sea monitors on some trips in NE fleets that are associated with the Northeast Multispecies FMP.

Observer Bias

Database limitations require multiple approaches to identify VTR trips. There may be some VTR trips that were observed but not identified as such. All observed trips (including those trips that were not used in SBRM) were used to identify which VTR trips had an observer on board.

Some SBRM fleets are known to have skewed distributions for trip duration and/or kept weight of all species because of the vessel composition within a fleet (vessel size, port location,

etc.). The shape of the distribution was not considered; hence, the mean as a measure of central tendency may not be appropriate for all fleets. Further work could include this aspect.

The use of the Pre-trip Notification System or similar system would improve vessel selection in some fleets, including those with bimodal trip duration and/or kept weight of all species.

Recent studies examining observer data for potential bias have mostly focused on groundfish fleets (subcomponents of selected fleets within SBRM). A comprehensive examination of potential bias in all SBRM fleets is a large task that will continue to require future work and additional staff resources (beyond those that the SBRM FMAT/PDT can provide). The SBRM FMAT/PDT recommends a detailed examination of potential bias in all fleets as a Research Track special topic. Fleets participating in fisheries with management constraints (e.g., limited quotas) that may incentivize contrasts in vessel behavior on observed and unobserved trips are especially important to consider. Future analyses could consider additional trip outcome metrics such as, mean number of species reported, number of areas fished, and an evaluation of minimum observer sample size (i.e., could fleets with fewer than 30 observed trips be considered) as well as examine different scales, such as individual species versus species groups and individual vessels versus fleets. Additionally, the use of 30 observed trips (the minimum sample size selected for the bias analysis) is greater than the minimum pilot coverage (12 observed trips) prescribed for some fleets resulting in the exclusion of minimum pilot coverage fleets from the bias analysis.

8. IMPLICATIONS FOR MANAGEMENT

8.1 Consequences to Management when SBRM Performance Standard Is Not Met

Species managed under Council FMP or protected under ESA

For fish and invertebrates, the species group and fleet combinations for which the SBRM performance standard was “Not Met” for SBRM years 2018-2020 are listed in [Table 23](#). Overall, there were 11 species group/fleet combinations with “Not Met” cells in 2018 (spiny dogfish in NE longline, NE small mesh otter trawl, MA small mesh gillnet, NE large mesh gillnet, and MA small mesh shrimp trawl; red deepsea crab in MA small mesh otter trawl, NE large mesh otter trawl, and MA pots/traps; monkfish in MA large mesh otter trawl and NE ocean quahog/surfclam dredge; fluke/scup/black sea bass in NE limited access scallop dredge), 6 in 2019 (monkfish in MA small mesh otter trawl and NE ocean quahog/surfclam dredge; spiny dogfish in NE large mesh otter trawl; scallop in NE limited access scallop dredge; red deepsea crab in MA pots/traps and NE pots/traps), and 5 in 2020 (spiny dogfish in NE large mesh gillnet, NE extra large mesh gillnet, NE ocean quahog/surfclam dredge; fluke/scup/black sea bass in NE pots/traps; monkfish in ocean quahog/surfclam dredge). For turtles, the SBRM performance standard was not met for loggerheads in the Georges Bank otter trawl (including scallop trawl) for the time period of 2014 to 2018, nor for any other non-loggerhead species in any of the bottom trawl or gillnet fleets ([Table 2](#); [Table 18](#)).

The SBRM performance standard may not be achieved if there are insufficient sea days in a given fleet. Inadequately funded fleets (caused by a funding shortfall or policy decisions to not fully fund selected fleets) and/or unaccomplished sea days may result in insufficient sample sizes and CVs that are greater than 30% for 1 or more species groups within a given fleet. There were 7 fleets that were not fully funded in SBRM 2018-2020. In 2018 SBRM, 2 fleets were not fully funded as a result of a policy decision to exclude the sea day requirement for red deepsea crab:

MA small mesh otter trawl (Row 5) and NE large mesh otter trawl (Row 8; NEFSC and GARFO 2018). In the 2019 SBRM, the MA small mesh otter trawl fleet was not fully funded because of a funding shortfall, which triggered the sea day prioritization process. A funding shortfall that triggered the sea day prioritization process also occurred in SBRM 2020 for the following fleets: MA small mesh otter trawl, MA large mesh otter trawl, NE large mesh otter trawl, and NE ocean quahog/surfclam dredge. Unaccomplished days have been described previously (see Section 3).

There is a temporal difference between the SBRM analysis timeframe (July through June) versus the annual sea day allocation cycle (April through March), which may also differ from the ultimate use of discard data (e.g., many stock assessments use January through December). As a result, the impacts to estimated discard precision may be spread over multiple analysis periods.

Unknown cells are those in which the CV was unknown because of no or insufficient observer coverage (pilot fleets) and are listed in [Table 21](#). These cells are generally unlikely to produce substantial discards and would usually be filtered out in the SBRM prioritization process (an exception might be red deepsea crab discards in the crab pot fleets). Consequently, these unknown cells are not expected to change catch estimates that would impact management decisions. The number of unknown cells has decreased steadily ([Table 20](#)) with the implementation of the formulaic prioritization process in 2015.

The number of sea days assigned to the scallop fishery has exceeded the amount SBRM dictates for years 2018-2020. The observer coverage to monitor the scallop fleets is partly funded by the scallop observer set-aside, and federal funding is used to cover shoreside administrative costs. The scallop FMP established the observer set-aside program (Industry-funded Scallop Program that increases coverage beyond SBRM) to improve bycatch estimates of finfish caught in the scallop fishery, monitor interactions of the scallop fishery with endangered and threatened sea turtles, and provide for at-sea biological sampling.

The 30% precision standard was not met for estimates of loggerhead interactions in bottom otter trawl and scallop trawl gear on Georges Bank (70% CV; Murray 2020), nor for Kemp's ridley (45% CV), leatherback (72% CV), or green turtles (73% CV) in Mid-Atlantic bottom otter trawl and scallop trawl gear (Murray 2020). In addition, the 30% precision standard was not met for Kemp's ridley (43% CV) or leatherback (71% CV) turtles in Mid-Atlantic (combined with Georges Bank) sink gillnet gear. This finding is not surprising as the level of observer coverage in trawl and gillnet gear is designed to meet precision goals only for loggerheads in the Mid-Atlantic region. Encounters with Kemp's ridley, leatherback, and green turtles are not as common as loggerheads, and these low encounter rates likely contributed to higher variability around the estimates.

Fish and Invertebrates species groups

As mentioned above, each year some species group/fleet combinations may not achieve the performance standard for estimating discards. When evaluating the impacts to management, it is also useful to consider the precision of total discards of a species group combined across all fleets (this statement is not suggesting that the performance standard should be changed). [Table 15](#) lists the species groups and the total amount kept and discarded each year for 2018-2020. Of the 42 (14 species groups x 3 years) estimates of total discards, there were 5 instances in which the precision of the total discards of a species group exceeded a 30% CV. These were: Atlantic herring in 2018 (57% CV) and 2020 (30.1% CV) and surfclam - ocean quahog in 2018 (56% CV), 2019 (68% CV), and 2020 (64% CV). For most of these cases, discards represented less than 1% of total catch, so they were a minor component of total catch.

In the annual discard reports, Table 5B in Wigley and Tholke 2018, 2019, 2020, breaks out the species groups by species. When examined by individual species, there are additional cases where the total estimated discards across all fleets has a CV greater than 30%. These were: Atlantic cod in 2018 (37% CV), 2019 (31% CV), and 2020 (47% CV); Atlantic wolffish (*Anarhichas lupus*) in 2018 (35% CV) and 2020 (73% CV), ocean pout (*Zoarces americanus*) in 2018 (35% CV) and 2020 (52% CV); pollock (*Pollachius virens*) in 2018 (30.4% CV) and 2019 (33% CV); Acadian redfish (*Sebastes fasciatus*) in 2018 (67% CV), 2019 (36% CV), and 2020 (73% CV); white hake (*Urophycis tenuis*) in 2018 (39% CV); blueline tilefish in 2018 (43% CV), 2019 (38% CV), and 2020 (44% CV); black sea bass in 2019 (34% CV); offshore hake (*Merluccius albidus*) in 2019 (69% CV) and 2020 (31% CV); Atlantic mackerel (*Scomber scombrus*) in 2020 (35% CV); and longfin inshore squid (*Doryteuthis [Amerigo] pealeii*) in 2020 (61% CV). While the SBRM 30% CV performance standard applies to species group and fleet combinations, lower precision of estimated discards for these individual species may impact efforts to assess and manage these species. However, for most of these species with discard CVs above 30%, the total amount of fish discarded is low compared to the amount of fish kept and landed, so less precise estimates of discards may not have an impact on total catch of the species. The exception is offshore hake, where the amount discarded often exceeds the amount kept and landed. However, total catches of offshore hake were low overall. Therefore, the potential impacts of less precise discard estimates on management/science would likely be low.

Some species are managed at a stock level that is not coastwide. To provide additional perspective on CVs at the stock level, [Table 26](#) summarizes the available discard CVs used in recent Northeast assessments or other data products¹⁰ from 2016-2019. For the stocks with available information, nearly all estimates for total discards had a 30% CV or less. Total estimated discards used in the stock assessments represent 1 or more fleets; the largest contribution to the total catch will contribute the most to the resulting precision at the stock level.

It is important to note that discard uncertainty is not the only source of uncertainty in an assessment. Other inputs, such as survey indices, natural mortality assumptions, and catchability assumptions all have varying degrees of uncertainty, and that uncertainty may or may not be integrated into assessments. If discard estimates are or become a substantial source of mortality, lower precision discard estimates could potentially impact management. Assessment results could be less precise, leading to inconsistent estimates of stock status and sustainable catches. If discard imprecision increases overfishing limit (OFL) uncertainty, a Council's Scientific and Statistical Committee (SSC) may recommend a lower Acceptable Biological Catch (ABC) limit, which could potentially lead to fewer fishing opportunities and foregone yield. While SSCs have not specifically tied uncertainty in estimated bycatch to particular ABC reductions, the MAFMC SSC has highlighted the uncertainty in commercial discards as a consideration in its application of the council's risk policy in recommending ABC for some species, including Atlantic mackerel, longfin inshore squid, and northern shortfin squid. Highly imprecise discard estimates could lead to annual catch limits (ACL) overages and reactive paybacks that can disrupt future fishing years. In such a situation, a Council may use management uncertainty buffers or larger discard set-asides to decrease chances of an ACL overage, which could further reduce fishing opportunities and yield.

¹⁰ For example, the NEFSC Population Dynamic Branch's Stock Assessment Efficiency Initiative is a project under development to improve the efficiency of the stock assessment process with the goal to streamline and automate the creation of synthesized data products used in stock assessment models as well as to archive and document those data sets and methods used to develop them in a common format.

While these kinds of paybacks and subsequent uses of larger buffers have not happened to date, proactive management uncertainty buffers are used in the management of butterfish (*Peprilus triacanthus*) and Atlantic mackerel partly to account for the variability in discard estimates, even though the estimates are not imprecise by SBRM standards. The Northeast Skate Complex FMP also utilizes an uncertainty buffer between the ABC and total annual limit, partially because of concerns about discard imprecision (NEFMC 2018a). The OFL is not defined for the skate complex.

ESA Species

Currently, estimates of interactions between commercial fishing gear and sea turtles are available for trawl (Murray 2015a, 2020), gillnet (Murray 2018), and scallop dredge (loggerhead and hard-shelled; Murray 2011, 2015b) gear in the US Mid-Atlantic. These bycatch estimates are used by ESA Section 7 biologists to assess whether authorization of the fisheries would jeopardize the continued existence of the species. If authorization of a fishery is determined to jeopardize the species, mandatory reasonable and prudent alternatives are required to remove jeopardy. If the ESA Section 7 consultation concludes that a fishery will not jeopardize the continued existence of the species, an incidental take statement (ITS) is issued. Mandatory reasonable and prudent measures terms, and conditions accompany the ITS. These measures are designed to minimize and monitor the impact of the fishery on the species.

As these estimates are used to assess fishery impacts to sea turtle species, changes in the precision (i.e., CV) of these estimates have potential implications for management. Less precise estimates (i.e., CV >30%) will have larger confidence intervals. Regardless of higher uncertainty in the bycatch estimate, it is still the best available information and will be used in combination with other data sources to assess fishery impacts to sea turtle species. To avoid underestimating impacts to sea turtles, the upper ends of the catch estimates' confidence intervals are often used in an assessment of impacts. Therefore, with less precision, the assessed level of sea turtle incidental take may be higher than what is actually occurring, resulting in an overestimate of impacts a fishery may be having on a sea turtle species. Overestimating fishery impacts to sea turtle species could increase the chance an ESA Section 7 consultation would determine that a fishery jeopardizes the continued existence of these species. Any management decisions concluded during ESA Section 7 consultation remain in place until new information becomes available to potentially change this determination.

Atlantic salmon bycatch is very rarely observed (Table 5A in Wigley et al. 2011 for 2009-2011 SBRM; Appendix Table 3 in Hogan et al. 2019 for 2015-2017 SBRM; [Table 9](#) in this report for 2018-2020 SBRM). In evaluating the number of fleets by performance classification for 2018-2020 ([Table 21](#)), Atlantic salmon were always classified as not applicable or unknown. Sea days required to monitor Atlantic salmon bycatch with 30% CV precision have not been projected because of the low encounter rate of these species.

Although this finding could have management implications, observer coverage levels in SBRM fleets operating in the Greater Atlantic Region are driven by other fish species groups, many of which overlap in time and space with Atlantic salmon. This overlap ensures that some level of coverage still exists to help monitor Atlantic salmon bycatch and inform management (e.g., ESA section 7). The observed bycatch data from these programs is considered in recovery planning, Section 7 consultation, and other management actions.

8.2 Other Management Implications: Nonfederally Managed Species

While not directly related to SBRM performance (since nonfederally managed species are not included in the SBRM), there are regular occasions when discards of nonfederally managed species are caught in federally managed fisheries, and these discards may be important for assessment/management purposes. Precision of those nonfederally management species does not determine SBRM observer sea day coverage, but observers record all catch on observed hauls when on a trip, so data are generated for non-SBRM species. Data collected under the SBRM can be used to estimate the discards of nonfederally management species in federal fisheries (e.g., see Tholke et al. 2017).

Councils may develop separate monitoring programs, such as the industry-funded monitoring for the Atlantic herring fishery (related to river herring bycatch) to address perceived coverage gaps. The SBRM framework also allows for contributions and collaboration with nonfederal stakeholders to increase observer coverage above the level called for by the SBRM, which could improve CVs for nonfederally managed species in federal fleets. For example, the ASMFC had secured funding through the Atlantic Coastal Cooperative Statistics Program to increase observer coverage to improve discard estimates in fleets of interest in the Mid-Atlantic region. While this increased coverage can provide more precise discard estimates, it can also cause outreach problems as fishermen are approached more often for observer coverage. In addition, monitoring programs with different goals/objectives or stratification from the SBRM may be very difficult to combine. As mentioned previously, the SBRM was designed to meet the specific requirements of the MSA and, as a result, is focused on species managed under a Council FMP or protected under the ESA. Expanding the focus of the SBRM beyond these species would require careful consideration of the potential implications. If the list of species groups considered within SBRM is to be expanded, then the next steps would include: (1) developing a list of nonfederally managed species (all or a selected subset of species that occur in federal waters) that would particularly benefit from additional discard information that could be addressed through SBRM (before adding species, an evaluation of current discard information would need to occur); (2) exploring the stratification needed for nonfederally managed species and evaluating if existing stratification of fleets is adequate; and (3) if appropriate, developing prioritization protocols for when funding is inadequate for fleets where the determining species is a nonfederally managed species, including considering that coverage of fleets driven by nonfederally managed species could result in lower precision of federally managed species' discards in other fleets if overall funding remains constant (or decreases). Hence, there is a distinction between considering nonfederally managed species and considering additional species managed under a Council FMP or protected under the ESA.

SBRM data are also used for a wide variety of other purposes, for example conservation under the Marine Mammal Protection Act, quota monitoring, development of management alternatives by Councils, and public data requests. While SBRM data are often important for these purposes, the evaluation of the effectiveness of SBRM data for these other uses is beyond the scope of this report.

8.3 Management Implications: Summary

In summary, the precision of discard estimates could impact management, but there is no indication that current levels of precision (even those above 30% CV) are currently causing

management difficulties. The SBRM 3-year reviews will continue to look for management problems caused by imprecise discard estimates.

9. RECOMMENDATIONS AND CONCLUSIONS

- The SBRM FMAT/PDT endorses the refinements described within the 2018-2020 annual reports and supports the approach of applying refinements when needed and documenting the change in the annual reports. The refinements and their description ensures transparency and improvement to the regional SBRM. The SBRM FMAT/PDT also recommends accounting for differences in taxon strata, when possible. Accounting for differences in taxon strata may be useful when additional species are included in the SBRM and could be an operational consideration when evaluating a species to be included in the SBRM. Adding new species groups with different stratification adds more complexity when combining the sea days required to monitor all species within the SBRM.
- The SBRM FMAT/PDT recommends that rarity filters be developed and implemented as appropriate for other ESA listed species such as Atlantic salmon and sturgeon. The SBRM FMAT/PDT also recommends NEFSC and GARFO staff finalizing a draft guidance document for adding new species to SBRM. This document describes a process of adding new species, including the considerations that may depend on several factors such as: operational factors (e.g., data availability, stratification, estimation methods, filters, frequency of analyses), policy factors, spatial management factors (e.g., distinct population segments), and legal factors. Consideration of nonfederally managed species would be beyond the scope of the draft guidance document. The draft guidance document would be considered by NEFSC, GARFO, and NOAA General Counsel (Northeast Section) when determining if a new species can be added. Supporting information on the species encountered on observed trips could be obtained from this report and incorporated into the draft guidance document as part of the data availability for a given FMP or ESA listed species.
- SBRM FMAT/PDT recommends expanding existing VTR audits to reduce and/or prevent “erroneous” fleets. Expanded VTR audits could focus primarily on gear type and mesh size (stratification variables) and could include data leveraging between databases, cross-checking regulations, and use of vessel profiles. One example of data leveraging to improve accurate master VTR data would be to use the observer data to cross-check the number of gear-mesh combinations used during a trip. Additionally, gear code consistency is needed between the fishery dependent data collection systems.
- The SBRM FMAT/PDT recommends the following planned changes (some of which are planned to be implemented in 2021 SBRM annual analysis)
 - The inclusion of chub mackerel in the squid-butterfish-mackerel species group in 2021 SBRM analyses;
 - The consideration of ESA listed species such as sturgeon (Atlantic sturgeon and shortnose sturgeon) as species groups;
 - Expanding the sampling frame for New England and Mid-Atlantic lobster pot fleets to include all vessels using lobster pot gear in future SBRM analyses; and
 - Utilize a PTNS-like system for all fleets as identified in the regional fishery dependent data initiative (implementation date to be determined).

- The SBRM FMAT/PDT recommends continued exclusion of the individual FMP compliance monitoring program trips from future SBRM annual analysis of discard estimation, precision, and sample size analyses for fish.
- The SBRM FMAT/PDT recommends continued use of importance filters for fish/invertebrates and rarity filters for sea turtles. The SBRM Omnibus Amendment requires 30% CV or less to be attained for each species group within that fleet. Some fleet/species combinations contribute very little to the total mortality or discard of the species but may require significant resources to characterize the precision of the estimate. Thus, the use of the importance filter is a key feature to the SBRM in that it focuses the sampling to fleets where it is needed most and not wasted on small, imprecisely estimated discards.
- The SBRM FMAT/PDT recommends continued use of the formulaic prioritization process for transparent determination of how limited funds are allocated. Since SBRM 2014 the use of the formulaic prioritization process has resulted in more fleets with allocated sea days. However, there were instances in which some fleets did not receive the number of sea days needed or initially estimated. A funding shortfall triggered the prioritization process in which 1 fleet in SBRM 2019 and 4 fleets in SBRM 2020 did not receive sufficient sea days. Because of allocation decisions made prior to the prioritization process, 2 fleets in SBRM 2018 did not receive the full number of needed sea days.
- The SBRM FMAT/PDT recommends continued use of the most recent data available to track changes in discarding because of changes in management or fleet behavior when allocating future observer coverage. While an analysis of variance stability was not undertaken in this review, indirect evidence from this review as well as direct evidence from past reviews suggest the assumption that discard variances are stable over time is valid, particularly for a 1-year lag. If fishing behavior changes because of a regulatory change or other reasons, then the relationship between years may weaken in the year following the regulatory change. A similar weakening in the relationship may occur when fish populations change (e.g., if a strong year class is moving through the fishery). These types of analyses should be conducted on a periodic basis. Conducting sample size analyses annually minimizes the lag to 1 year.
- The SBRM FMAT/PDT recommends continued exploration of potential biases in the data collection process and examination of how these might impact sea day allocations. The SBRM FMAT/PDT acknowledges that a comprehensive examination of potential bias in all SBRM fleets is a large task and has been too large to completely accomplish within the annual reporting and 3 year review reporting cycles. Hence, the SBRM FMAT/PDT recommends a dedicated group be formed to examine this topic in detail, such as a Research Track special topic assessment. No evidence of systematic vessel selection bias and no strong evidence of observer bias was detected in the analyses conducted for this report. Recent studies examining observer data for potential bias have mostly focused on groundfish fleets (subcomponents of selected fleets within SBRM). Future work examining all fleets could consider additional trip outcome metrics such as mean number of species reported, number of areas fished, and an evaluation of minimum observer sample size (e.g., could fleets with fewer than 30 observed trips be considered).

The SBRM provides a general structure for defining fisheries into homogeneous groups and objectively allocating observer coverage based on prior information to achieve a preselected precision criterion (30% CV) while following a predetermined set of rules to eliminate fleets with highly imprecise estimates of small amounts of discards. This approach allows for changes in sea day allocation from year to year as new information is obtained. The general structure helps identify gaps in existing coverage and the tradeoffs associated with coverage levels for different species. Additionally, the incorporation of annual refinements supports continual improvements. These refinements address new issues as they arise because of changes in fleet behavior, regulatory changes, and/or advances in statistical techniques. This 3 year review allows examination of the successes and challenges remaining.

The required observer coverage by fleet over the 3 years are generally similar, with some exceptions. The sea day requirements for a particular fleet to achieve the desired 30% CV can vary from year-to-year as the result of sampling, fishing practices, fish population demographics, and other factors that vary from year to year. The number of observer sea days required might change when the total landings, total discards, and/or the relative amount of discards within a fleet change for a species group because this information is used in determining the relative importance of the discards for the species group and fleet. Past analyses have revealed that one of the methodology's main assumptions, variance stability from year to year, is met. However, the effectiveness of the SBRM does not hinge solely on the methodology's assumptions. The amount of funding to support the required sea days is equally important, as well as the ability to accomplish the funded sea days.

Overall, the SBRM represents one of the most comprehensive programs for planning and executing observer monitoring coverage of federally managed fisheries. NMFS made a formal determination on May 7, 2020 that the SBRM is consistent and sufficient with the national guidelines for an SBRM as codified in the Code of Federal Regulations, Title 50 Part 600.1610(a). Following the implementation of the 2015 SBRM Omnibus Amendment, the second 3 years of the program, summarized in this report, illustrate the utility of the approach for monitoring discards in these fisheries and the real-world limitations of implementing an ideal system. The SBRM process contains a formulaic approach to allocate sea days among fleets to stay within the available funds while achieving the precision standard for the most species groups/fleet combinations.

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TABLES

Table 1. Species groups, fleets, and time frames of data used for the discard estimation, precision, and sample size analyses for the 14 fish/invertebrate species groups, and the corresponding sea day schedule for Standardized Bycatch Reporting Methodology (SBRM) 2018, 2019, and 2020.

SBRM	Species Groups	Fleets	Time Frame of Data	References	Sea Day Schedule
2018	14 Fish/inverts (41 species)	68	July 2016- June 2017	Wigley and Tholke 2018	April 2018- March 2019
2019	14 Fish/inverts (41 species)	63	July 2017- June 2018	Wigley and Tholke 2019	April 2019- March 2020
2020	14 Fish/inverts (41 species)	62	July 2018- June 2019	Wigley and Tholke 2020	April 2020- March 2021

Table 2. Time series for most recent sea turtle discard estimates and the Standardized Bycatch Reporting Methodology (SBRM) year informed by these estimates. Cc = Loggerhead (*Caretta caretta*), Cm = Green turtle, (*Chelonia mydas*) Lk = Kemp's ridley (*Lepidochelys kempii*), Dc = Leatherback (*Dermochelys coriacea*), Unk = unidentified hard-shelled species.

Gear Type	Species	Time frame	SBRM Year	Reference
Sink Gillnet	Cc, Lk, Dc, Unk	January 2012 – December 2016	2018, 2019, 2020	Murray 2018
Bottom Otter Trawl (includes Scallop Trawl)	Cc	January 2009 – December 2013	2018, 2019	Murray 2015a
Bottom Otter Trawl (includes Scallop Trawl)	Cc, Lk, Dc, Cm	January 2014 – December 2018	2020	Murray 2020

Table 3. List of management actions associated with monitoring of federal fisheries since the implementation of original Standardized Bycatch Reporting Methodology (SBRM) in 2008. EFH = Essential Fish Habitat, ASM = At-sea Monitoring, NMFS = National Marine Fisheries Service, IFM = Industry-funded Monitoring.

Fishery Management Plan (FMP)	Measures	Reference
Atlantic Mackerel, Squid, and Butterfish Amendment 11	Capacity cap, update EFH, establish recreational mackerel allocation	MAFMC and NMFS 2011
Northeast Multispecies Framework 48	Clarified goals and objectives of ASM	NEFMC 2013b
Atlantic Herring Amendment 5	Improved catch information, enhanced monitoring and sampling of catch at-sea, address bycatch issues	NEFMC 2013a
Skate Framework 2	Improved catch information (i.e., species level reporting)	NEFMC 2014
Standardized Bycatch Reporting Methodology An Omnibus Amendment to the Fishery Management Plans of the Mid-Atlantic and New England Regional Fishery Management Councils	Explained the methods and processes by which bycatch is currently monitored and assessed for Greater Atlantic Region fisheries; determined whether these methods and processes need to be modified and/or supplemented; established standards of precision for bycatch estimation for all Greater Atlantic Region fisheries; and, thereby, documented the SBRM established for all fisheries managed through the FMPs of the Greater Atlantic Region.	NEFMC, MAFMC, NMFS 2015.
Northeast Multispecies Framework 55	Adjusted ASM program to ensure likelihood that discards for groundfish stocks monitored at 30% coefficient of variation.	NEFMC 2016

Table 3, continued. List of management actions associated with monitoring of federal fisheries since the implementation of original Standardized Bycatch Reporting Methodology (SBRM) in 2008. EFH = Essential Fish Habitat, ASM = At-sea Monitoring, NMFS = National Marine Fisheries Service, IFM = Industry-funded Monitoring.

Fishery Management Plan (FMP)	Measures	Reference
Blueline Tilefish Amendment 6	Addition of blueline tilefish (<i>Caulolatilus microps</i>) to tilefish FMP	MAFMC and NMFS 2017
Industry-funded Monitoring Amendment (implementation expected in 2020)	Omnibus amendment establishing cost sharing responsibilities between NMFS and industry for additional monitoring across all New England FMPs except Northeast multispecies and scallops. Establishes IFM program for the herring fishery	NEFMC 2018b
American Lobster Addendum XXVI to Amendment 3	Phased in 100% dealer and harvester trip level reporting; recommended mandatory reporting for federally-permitted harvesters; increased detail on area fished for fishery dependent sampling	ASMFC 2018
Atlantic Mackerel, Squid, and Butterfish Amendment 21.	Added Chub Mackerel (<i>Scomber colias</i>) to the Atlantic Mackerel, Squid, and Butterfish FMP	MAFMC and NMFS 2020
Northeast Multispecies Amendment 23 (under development)	Potential changes to groundfish monitoring and reporting	NEFMC (In progress)
Atlantic Sea Scallop Amendment 21 (draft, under development)	Potential expansion of observer call-in requirement for the Northern Gulf of Maine scallop fishery	NEFMC 2020
SBRM Omnibus Lobster Framework (proposed rule pending)	Expand the sampling frames for lobster pot gear to include all active vessels, not just vessels that submit federal trip reports.	NMFS (In progress)

Table 4. Fleet stratification abbreviations used in fish/invertebrate sections.

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

Table 5. List of the 14 fish and invertebrate species groups (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 implemented 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>
Acadian 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)	Rajidae
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>
SQUID - 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>
SURFCLAM - OCEAN QUAHOG (SCOQ)	
Surfclam	<i>Spisula solidissima</i>
Ocean quahog	<i>Arctica islandica</i>
TILEFISH (TILE)	
Blueline tilefish	<i>Caulolatilus microps</i>
Golden tilefish	<i>Lopholatilus chamaeleonticeps</i>

Table 6. Number of observed (OB) and Vessel Trip Report (VTR) trips and percentage of observer coverage by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. An "*" indicates OB trips greater than VTR trips. "P" indicates fleets for which pilot coverage was assigned. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot
1	Longline, Bottom	OPEN	all	MA	all	9	221	4.1		8	119	6.7		13	140	9.3	
2	Longline, Bottom	OPEN	all	NE	all	15	1,466	1.0		44	932	4.7		53	889	6.0	
3	Hand Line	OPEN	all	MA	all	9	3,509	0.3	P	45	3,133	1.4		39	3,060	1.3	
4	Hand Line	OPEN	all	NE	all	20	2,722	0.7		58	2,761	2.1		53	2,175	2.4	
5	Otter Trawl	OPEN	all	MA	sm	517	3,713	13.9		550	3,663	15.0		631	3,833	16.5	
6	Otter Trawl	OPEN	all	MA	lg	243	3,602	6.7		257	2,722	9.4		210	2,763	7.6	
7	Otter Trawl	OPEN	all	NE	sm	450	4,828	9.3		624	4,094	15.2		392	3,943	9.9	
8	Otter Trawl	OPEN	all	NE	lg	256	5,052	5.1		463	4,660	9.9		440	4,866	9.0	
9	Otter Trawl, Scallop	AA	GEN	MA	sm	4	8	50.0		3	10	30.0			9		P
10	Otter Trawl, Scallop	AA	GEN	MA	lg	2	52	3.8	P		78		P	1	100	1.0	P
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	2	7	28.6	P								
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	9	276	3.3		1	70	1.4	P		17		P
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg										5		P
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm		7		P								
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	1	10	10.0	P								
16	Otter Trawl, Twin	OPEN	all	MA	sm	6	49	12.2	P	9	62	14.5		8	50	16.0	
17	Otter Trawl, Twin	OPEN	all	MA	lg	2	132	1.5	P	9	87	10.3		2	45	4.4	P
18	Otter Trawl, Twin	OPEN	all	NE	sm	5	21	23.8		2	6	33.3	P	4	10	40.0	
19	Otter Trawl, Ruhle	OPEN	all	MA	sm		15		P		12		P		5		P
20	Otter Trawl, Ruhle	OPEN	all	MA	lg						12		P		6		P
21	Otter Trawl, Ruhle	OPEN	all	NE	sm		46		P	3	28	10.7	P		12		P
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	1	9	11.1	P						7		P
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	3	111	2.7	P	5	60	8.3	P	6	57	10.5	
24	Otter Trawl, Shrimp	OPEN	all	MA	sm	1	15	6.7	P	3	214	1.4	P		446		P
25	Otter Trawl, Shrimp	OPEN	all	NE	sm		109		P		78		P		26		P
26	Otter Trawl, Other	OPEN	all	MA	sm		12		P		12		P		7		P
27	Otter Trawl, Other	OPEN	all	MA	lg		10		P								
28	Otter Trawl, Other	OPEN	all	NE	sm		63		P		52		P		81		P
29	Otter Trawl, Other	OPEN	all	NE	lg						8		P		20		P
30	Floating Trap	OPEN	all	MA	all		82		P		66		P		14		P
31	Floating Trap	OPEN	all	NE	all		41		P		177		P		80		P

Table 6, continued. Number of observed (OB) and Vessel Trip Report (VTR) trips and percentage of observer coverage by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. An "*" indicates OB trips greater than VTR trips. "P" indicates fleets for which pilot coverage was assigned. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	296	2,013	14.7		315	1,790	17.6		361	1,918	18.8	
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	235	2,231	10.5		147	1,627	9.0		205	1,634	12.5	
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	157	1,455	10.8		104	1,439	7.2		176	1,251	14.1	
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	2	6	33.3	P		15		P	4	31	12.9	
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	155	2,555	6.1		211	2,283	9.2		136	1,980	6.9	
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	179	3,104	5.8		246	3,069	8.0		115	3,203	3.6	
38	Purse Seine	OPEN	all	MA	all		190		P		228		P		305		P
39	Purse Seine	OPEN	all	NE	all	10	223	4.5		9	331	2.7		5	487	1.0	
40	Dredge, Scallop	AA	GEN	MA	all	41	800	5.1		18	375	4.8		45	1,320	3.4	
41	Dredge, Scallop	AA	GEN	NE	all	66	820	8.0		30	748	4.0		76	1,281	5.9	
42	Dredge, Scallop	AA	LIM	MA	all	82	757	10.8		58	590	9.8		46	694	6.6	
43	Dredge, Scallop	AA	LIM	NE	all	135	919	14.7		157	1,185	13.2		217	2,212	9.8	
44	Dredge, Scallop	OPEN	GEN	MA	all	115	2,536	4.5		96	2,057	4.7		47	1,152	4.1	
45	Dredge, Scallop	OPEN	GEN	NE	all	81	2,820	2.9		63	3,259	1.9		40	3,101	1.3	
46	Dredge, Scallop	OPEN	LIM	MA	all	36	457	7.9		32	360	8.9		20	272	7.4	
47	Dredge, Scallop	OPEN	LIM	NE	all	88	942	9.3		89	911	9.8		68	664	10.2	
48	Danish Seine	OPEN	all	MA	all		10		P		21		P		26		P
49	Danish Seine	OPEN	all	NE	all		3		P								
50	Trawl, Midwater Paired&Single	all	all	NE	sm					15	160	9.4		7	153	4.6	
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	18	18	100.0									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	3	11	27.3		3	43	7.0	P		18		P
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	39	253	15.4									
54	Pots and Traps, Other	OPEN	all	MA	all		18		P		23		P				
55	Pots and Traps, Other	OPEN	all	NE	all		43		P		147		P		357		P
56	Pots and Traps, Fish	OPEN	all	MA	all	11	804	1.4		10	823	1.2		11	711	1.5	
57	Pots and Traps, Fish	OPEN	all	NE	all	17	708	2.4		16	1,132	1.4		10	906	1.1	
58	Pots and Traps, Conch	OPEN	all	MA	all	19	793	2.4		10	798	1.3		11	1,051	1.0	
59	Pots and Traps, Conch	OPEN	all	NE	all	9	1,139	0.8		9	1,051	0.9		9	1,175	0.8	
60	Pots and Traps, Hagfish	OPEN	all	NE	all	2	23	8.7	P		21		P				

Table 6, continued. Number of observed (OB) and Vessel Trip Report (VTR) trips and percentage of observer coverage by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. An "*" indicates OB trips greater than VTR trips. "P" indicates fleets for which pilot coverage was assigned. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot
61	Pots and Traps, Lobster	OPEN	all	MA	all	9	1,446	0.6		9	1,245	0.7		13	1,078	1.2	
62	Pots and Traps, Lobster	OPEN	all	NE	all	20	27,668	0.1		18	28,062	0.1		17	26,526	0.1	
63	Weir	OPEN	all	NE	all		12		P		6		P				
64	Pots and Traps, Crab	OPEN	all	MA	all	5	93	5.4		3	115	2.6	P	5	14	35.7	
65	Pots and Traps, Crab	OPEN	all	NE	all	15	61	24.6		11	69	15.9		12	107	11.2	
66	Beam Trawl	OPEN	all	MA	sm		8		P		33		P		16		P
67	Beam Trawl	OPEN	all	MA	lg						23		P				
68	Beam Trawl	OPEN	all	NE	lg	1	31	3.2	P		34		P		14		P
69	Dredge, Other	OPEN	all	MA	all		213		P		356		P		274		P
70	Dredge, Other	OPEN	all	NE	all										7		P
71	Dredge, Urchin	OPEN	all	NE	all		11		P		14		P		10		P
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	18	2,113	0.9		10	2,031	0.5		12	1,948	0.6	
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	16	2,130	0.8		20	1,899	1.1		35	1,760	2.0	
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	10	185	5.4									
Total						3,445	85,817	4.0		3,796	81,494	4.7		3,558	80,331	4.4	

Table 7. Number of observed (OB) and Vessel Trip Report (VTR) sea days and percentage of observer coverage by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. An "*" indicates OB sea days greater than VTR sea days. "P" indicates fleets for which pilot coverage was assigned. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot
1	Longline, Bottom	OPEN	all	MA	all	101	1,380	7.3		77	1,028	7.5		114	889	12.8	
2	Longline, Bottom	OPEN	all	NE	all	26	1,563	1.7		53	971	5.5		56	942	5.9	
3	Hand Line	OPEN	all	MA	all	11	3,720	0.3	P	55	3,453	1.6		39	3,231	1.2	
4	Hand Line	OPEN	all	NE	all	32	3,013	1.1		71	3,029	2.3		66	2,351	2.8	
5	Otter Trawl	OPEN	all	MA	sm	1,296	7,052	18.4		1,389	8,117	17.1		1,375	8,335	16.5	
6	Otter Trawl	OPEN	all	MA	lg	568	7,591	7.5		650	6,578	9.9		626	6,777	9.2	
7	Otter Trawl	OPEN	all	NE	sm	1,175	11,180	10.5		1,670	10,256	16.3		1,083	10,008	10.8	
8	Otter Trawl	OPEN	all	NE	lg	652	14,424	4.5		1,275	13,349	9.6		1,125	13,045	8.6	
9	Otter Trawl, Scallop	AA	GEN	MA	sm	8	19	42.1		6	23	26.1			18		P
10	Otter Trawl, Scallop	AA	GEN	MA	lg	4	108	3.7	P		172		P	2	209	1.0	P
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	4	18	22.2	P								
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	16	591	2.7		2	145	1.4	P		28		P
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg										12		P
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm		39		P								
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	6	58	10.3	P								
16	Otter Trawl, Twin	OPEN	all	MA	sm	23	201	11.4	P	35	197	17.8		44	223	19.7	
17	Otter Trawl, Twin	OPEN	all	MA	lg	2	161	1.2	P	9	94	9.6		2	49	4.1	P
18	Otter Trawl, Twin	OPEN	all	NE	sm	30	160	18.8		21	33	63.6	P	30	75	40.0	
19	Otter Trawl, Ruhle	OPEN	all	MA	sm		101		P		76		P		36		P
20	Otter Trawl, Ruhle	OPEN	all	MA	lg						21		P		41		P
21	Otter Trawl, Ruhle	OPEN	all	NE	sm		147		P	13	162	8.0	P		42		P
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	7	52	13.5	P						30		P
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	24	970	2.5	P	36	515	7.0	P	53	473	11.2	
24	Otter Trawl, Shrimp	OPEN	all	MA	sm	6	93	6.5	P	19	1,250	1.5	P		2,328		P
25	Otter Trawl, Shrimp	OPEN	all	NE	sm		142		P		107		P		44		P
26	Otter Trawl, Other	OPEN	all	MA	sm		67		P		69		P		38		P
27	Otter Trawl, Other	OPEN	all	MA	lg		46		P								
28	Otter Trawl, Other	OPEN	all	NE	sm		143		P		254		P		360		P
29	Otter Trawl, Other	OPEN	all	NE	lg						15		P		123		P
30	Floating Trap	OPEN	all	MA	all		82		P		66		P		14		P
31	Floating Trap	OPEN	all	NE	all		41		P		178		P		113		P

Table 7, continued. Number of observed (OB) and Vessel Trip Report (VTR) sea days and percentage of observer coverage by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. An "*" indicates OB sea days greater than VTR sea days. "P" indicates fleets for which pilot coverage was assigned. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	315	2,033	15.5		328	1,889	17.4		387	2,002	19.3	
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	246	2,297	10.7		151	1,695	8.9		214	1,731	12.4	
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	191	1,687	11.3		132	1,689	7.8		191	1,439	13.3	
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	2	8	25.0	P		15		P	4	31	12.9	
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	183	3,545	5.2		276	3,074	9.0		183	2,558	7.2	
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	282	4,637	6.1		371	4,503	8.2		189	4,529	4.2	
38	Purse Seine	OPEN	all	MA	all		200		P		234		P		305		P
39	Purse Seine	OPEN	all	NE	all	20	454	4.4		24	712	3.4		11	813	1.4	
40	Dredge, Scallop	AA	GEN	MA	all	77	1,552	5.0		35	666	5.3		78	2,182	3.6	
41	Dredge, Scallop	AA	GEN	NE	all	135	1,620	8.3		55	1,375	4.0		153	2,537	6.0	
42	Dredge, Scallop	AA	LIM	MA	all	717	5,967	12.0		416	4,022	10.3		321	4,646	6.9	
43	Dredge, Scallop	AA	LIM	NE	all	1,254	8,014	15.6		1,215	8,787	13.8		1,687	16,150	10.4	
44	Dredge, Scallop	OPEN	GEN	MA	all	219	4,896	4.5		172	3,419	5.0		78	1,908	4.1	
45	Dredge, Scallop	OPEN	GEN	NE	all	148	4,313	3.4		121	4,490	2.7		62	4,097	1.5	
46	Dredge, Scallop	OPEN	LIM	MA	all	363	4,236	8.6		269	3,060	8.8		172	2,085	8.2	
47	Dredge, Scallop	OPEN	LIM	NE	all	843	9,234	9.1		868	8,622	10.1		612	6,019	10.2	
48	Danish Seine	OPEN	all	MA	all		10		P		38		P		26		P
49	Danish Seine	OPEN	all	NE	all		3		P								
50	Trawl, Midwater Paired&Single	all	all	NE	sm					56	570	9.8		31	505	6.1	
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	78	79	98.7									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	13	56	23.2		17	174	9.8	P		76		P
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	154	836	18.4									
54	Pots and Traps, Other	OPEN	all	MA	all		18		P		23		P				
55	Pots and Traps, Other	OPEN	all	NE	all		53		P		147		P		365		P
56	Pots and Traps, Fish	OPEN	all	MA	all	13	821	1.6		11	834	1.3		11	735	1.5	
57	Pots and Traps, Fish	OPEN	all	NE	all	17	717	2.4		16	1,141	1.4		10	928	1.1	
58	Pots and Traps, Conch	OPEN	all	MA	all	19	797	2.4		10	800	1.3		12	1,069	1.1	
59	Pots and Traps, Conch	OPEN	all	NE	all	9	1,147	0.8		9	1,051	0.9		9	1,180	0.8	
60	Pots and Traps, Hagfish	OPEN	all	NE	all	11	219	5.0	P		241		P				

Table 7, continued. Number of observed (OB) and Vessel Trip Report (VTR) sea days and percentage of observer coverage by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. An "*" indicates OB sea days greater than VTR sea days. "P" indicates fleets for which pilot coverage was assigned. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot	OB	VTR	Percent Coverage	Pilot
61	Pots and Traps, Lobster	OPEN	all	MA	all	16	1,864	0.9		15	1,765	0.8		25	1,661	1.5	
62	Pots and Traps, Lobster	OPEN	all	NE	all	22	35,751	0.1		18	36,310	<0.1		17	34,614	<0.1	
63	Weir	OPEN	all	NE	all		12		P		6		P				
64	Pots and Traps, Crab	OPEN	all	MA	all	19	190	10.0		11	239	4.6	P	22	51	43.1	
65	Pots and Traps, Crab	OPEN	all	NE	all	125	422	29.6		102	509	20.0		118	666	17.7	
66	Beam Trawl	OPEN	all	MA	sm		23		P		131		P		49		P
67	Beam Trawl	OPEN	all	MA	lg						66		P				
68	Beam Trawl	OPEN	all	NE	lg	1	43	2.3	P		43		P		30		P
69	Dredge, Other	OPEN	all	MA	all		213		P		426		P		310		P
70	Dredge, Other	OPEN	all	NE	all										7		P
71	Dredge, Urchin	OPEN	all	NE	all		11		P		14		P		10		P
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	51	4,148	1.2		26	4,020	0.6		38	3,668	1.0	
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	51	3,129	1.6		53	2,754	1.9		107	2,573	4.2	
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	69	1,191	5.8									
Total						9,654	159,652	6.0		10,166	149,725	6.8		9,400	151,438	6.2	

Table 8. Data sources used in most recent sea turtle discard estimates and Standardized Bycatch Reporting Methodology (SBRM) year informed by these estimates (see reference documents for more detailed information, including effort metrics used in bycatch analyses). Data represented cover a 5-year time span. VTR = Vessel Trip Report.

Gear Type	Observed trips	VTR trips	% Coverage (trips)	SBRM Year	Reference
Sink Gillnet	4,902	51,533	10%	2018, 2019, 2020	Murray 2018
Bottom Otter Trawl (includes Scallop Trawl)	4,100	77,590	5%	2018, 2019	Murray 2015a
Bottom Otter Trawl (includes Scallop Trawl)	7,703	78,082	10%	2020	Murray 2020

Table 9. Observed catch weight (kept and discarded, live weight, lb) from observed trips for each of the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups, the 14 SBRM species groups combined, the non-SBRM species, and all species combined for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). This summary includes data that cannot be classified to a fleet; “all species combined” excludes sea turtles, marine mammals, and sea birds.

	SBRM 2018		SBRM 2019		SBRM 2020	
Species Group	Kept	Discarded	Kept	Discarded	Kept	Discarded
ATLANTIC SALMON (<i>Salmo salar</i>)	0	0	0	0	0	0
BLUEFISH (<i>Pomatomus saltatrix</i>)	202,368	14,876	78,875	6,524	102,091	7,563
FLUKE (<i>Paralichthys dentatus</i>) - SCUP (<i>Stenotomus chrysops</i>) - BLACK SEA BASS (<i>Centropristis striata</i>)	2,101,779	1,047,096	2,390,036	1,432,519	2,336,864	876,878
HERRING, ATLANTIC (<i>Clupea harengus</i>)	22,480,262	24,771	6,268,028	40,031	2,316,085	25,455
LARGE MESH GROUND FISH	1,749,327	376,561	3,688,812	409,718	4,365,506	362,709
MONKFISH (<i>Lophius americanus</i>)	1,559,921	759,866	2,906,687	905,187	2,204,598	884,389
RED DEEPSEA CRAB (<i>Chaceon quinquedens</i>)	997,806	331,725	764,761	206,065	946,430	193,305
SEA SCALLOP (<i>Placopecten magellanicus</i>)	26,053,376	3,027,684	26,206,364	1,266,175	26,789,505	1,549,471
SKATE COMPLEX (Rajidae)	2,744,629	4,037,875	3,331,573	4,443,707	2,477,589	3,295,448
SMALL MESH GROUND FISH	1,094,294	363,969	1,561,569	420,965	1,152,903	546,002
SPINY DOGFISH (<i>Squalus acanthias</i>)	1,621,281	1,188,161	1,149,559	1,014,394	1,540,842	912,229
SQUID (<i>Doryteuthis [Amerigo] pealeii</i> , <i>Illex illecebrosus</i>) - BUTTERFISH (<i>Peprilus triacanthus</i>) - MACKEREL (<i>Scomber scombrus</i>)	11,226,217	567,983	17,210,627	847,819	10,206,541	955,664
SURFCLAM (<i>Spisula solidissima</i>) - OCEAN QUAHOG (<i>Arctica islandica</i>)	3,748,153	16,142	3,401,510	17,379	5,300,770	17,597
TILEFISH	108,571	3,469	133,849	1,155	195,904	1,796
14 SBRM Species Groups, Combined	75,687,982	11,760,177	69,092,248	11,011,639	59,935,628	9,628,505
Non-SBRM species	2,446,974	5,970,372	1,558,404	6,087,006	1,893,246	4,920,244
ALL SPECIES, COMBINED	78,134,957	17,730,550	70,650,652	17,098,645	61,828,874	14,548,749

Table 10. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See Table 4 for fleet stratification abbreviations.

Species Group: BLUEFISH (Pomatomus saltatrix)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline,	Bottom	OPEN	all	MA	all	22	0.0	32.8	25	608.9	57.8	15	153.0	16.6
2	Longline,	Bottom	OPEN	all	NE	all							2	0.0	2.0
3	Hand Line		OPEN	all	MA	all	33	149.6	0.0	33	281.4	2.0	25	233.4	2.5
4	Hand Line		OPEN	all	NE	all									
5	Otter Trawl		OPEN	all	MA	sm	38	6,557.1	3,492.8	35	11,806.1	1,581.3	35	29,762.0	1,111.7
6	Otter Trawl		OPEN	all	MA	lg	19	2,386.6	44.4	14	2,195.2	165.3	10	2,591.3	100.1
7	Otter Trawl		OPEN	all	NE	sm	34	8,850.1	3,119.5	34	11,175.6	3,281.7	30	3,515.9	1,175.5
8	Otter Trawl		OPEN	all	NE	lg	9	805.9	12.0	7	898.7	29.5	3	246.0	194.4
9	Otter Trawl, Scallop		AA	GEN	MA	sm									
10	Otter Trawl, Scallop		AA	GEN	MA	lg									
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm									
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg									
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg									
16	Otter Trawl, Twin		OPEN	all	MA	sm	67	14.1	1,009.8	33	5.0	54.0			
17	Otter Trawl, Twin		OPEN	all	MA	lg									
18	Otter Trawl, Twin		OPEN	all	NE	sm				50	0.0	119.0			
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm				100	334.9	45.3			
22	Otter Trawl, Ruhle		OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg									
24	Otter Trawl, Shrimp		OPEN	all	MA	sm									
25	Otter Trawl, Shrimp		OPEN	all	NE	sm									
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: BLUEFISH (Pomatomus saltatrix)

						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	50	40,449.0	199.7	50	12,880.3	130.6	38	29,598.3	334.8
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	32	109,359.5	248.8	20	3,790.6	71.6	21	7,884.3	1,388.3
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	16	1,449.7	328.9	13	486.2	38.3	5	266.3	77.5
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	100	735.0	5.0				25	1.0	0.0
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	21	29,372.9	824.8	16	27,000.9	371.0	26	25,805.8	1,011.1
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	12	732.4	433.7	10	494.9	319.2	3	71.0	91.5
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all									
41	Dredge, Scallop	AA	GEN	NE	all									
42	Dredge, Scallop	AA	LIM	MA	all									
43	Dredge, Scallop	AA	LIM	NE	all	1	0.0	2.0	1	0.0	8.0			
44	Dredge, Scallop	OPEN	GEN	MA	all									
45	Dredge, Scallop	OPEN	GEN	NE	all									
46	Dredge, Scallop	OPEN	LIM	MA	all									
47	Dredge, Scallop	OPEN	LIM	NE	all									
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	5	0.0	998.0						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all				10	0.0	1.0			
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all							8	1.0	0.0
62	Pots and Traps, Lobster	OPEN	all	NE	all									

Species Group: BLUEFISH (Pomatomus saltatrix)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all									
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all									
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	90	50.0	3,263.0						
Total						28	200,911.9	14,015.2	24	71,958.7	6,275.6	22	100,129.3	5,506.0

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: FLUKE (Paralichthys dentatus) - SCUP (Stenotomus chrysops) - BLACK SEA BASS (Centropristis striata)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline, Bottom	OPEN	all	MA	all	22	8.6	2.0				23	44.3	23.7
2	Longline, Bottom	OPEN	all	NE	all				2	0.0	1.3	15	6.1	17.3
3	Hand Line	OPEN	all	MA	all	56	211.7	30.7	61	1,814.0	557.2	55	956.8	410.3
4	Hand Line	OPEN	all	NE	all	10	42.6	2.8						
5	Otter Trawl	OPEN	all	MA	sm	94	1,053,407.0	447,521.3	92	869,903.1	398,363.8	95	1,044,349.7	337,757.9
6	Otter Trawl	OPEN	all	MA	lg	97	478,704.6	42,280.5	98	588,977.5	102,917.4	98	588,641.8	56,372.1
7	Otter Trawl	OPEN	all	NE	sm	78	417,357.4	407,295.5	77	725,401.8	738,235.8	74	404,631.9	328,649.7
8	Otter Trawl	OPEN	all	NE	lg	62	94,547.7	63,735.5	45	97,862.4	77,827.3	53	198,042.4	85,639.4
9	Otter Trawl, Scallop	AA	GEN	MA	sm	100	72.4	2,238.0				50	0.0	95.0
10	Otter Trawl, Scallop	AA	GEN	MA	lg	50	0.0	16.6				100	9.9	1.0
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	25	0.0	1.4						
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	67	30.2	23.4				100	91.9	10.9
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg									
16	Otter Trawl, Twin	OPEN	all	MA	sm	100	542.3	2,659.7	100	1,519.7	10,025.0			
17	Otter Trawl, Twin	OPEN	all	MA	lg				56	292.3	228.8			
18	Otter Trawl, Twin	OPEN	all	NE	sm				100	40.3	185.5			
19	Otter Trawl, Ruhle	OPEN	all	MA	sm									
20	Otter Trawl, Ruhle	OPEN	all	MA	lg									
21	Otter Trawl, Ruhle	OPEN	all	NE	sm				100	28,004.1	15,929.3			
22	Otter Trawl, Ruhle	OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg							14	60.1	0.0
24	Otter Trawl, Shrimp	OPEN	all	MA	sm									
25	Otter Trawl, Shrimp	OPEN	all	NE	sm									
26	Otter Trawl, Other	OPEN	all	MA	sm									
27	Otter Trawl, Other	OPEN	all	MA	lg									
28	Otter Trawl, Other	OPEN	all	NE	sm									
29	Otter Trawl, Other	OPEN	all	NE	lg									

Species Group: <i>FLUKE (Paralichthys dentatus)</i> - <i>SCUP (Stenotomus chrysops)</i> - <i>BLACK SEA BASS (Centropristis striata)</i>														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	8	76.1	27.0	10	11.0	31.6	7	49.6	37.3
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	23	330.7	102.7	15	67.5	39.3	13	143.6	113.5
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	40	1,097.1	789.9	38	577.6	780.5	36	1,341.9	1,558.2
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	100	96.2	30.5						
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	27	10,729.0	1,388.9	26	13,380.2	1,465.7	37	7,884.4	1,893.3
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	34	4,415.7	5,299.8	24	2,413.3	2,885.0	38	4,009.4	4,238.1
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	80	133.9	439.7	61	29.9	246.4	62	120.1	413.0
41	Dredge, Scallop	AA	GEN	NE	all	26	0.0	85.9	17	0.0	31.4	24	16.1	339.6
42	Dredge, Scallop	AA	LIM	MA	all	77	847.1	10,063.9	74	294.3	3,512.7	65	285.9	2,164.9
43	Dredge, Scallop	AA	LIM	NE	all	71	279.6	24,796.1	70	261.9	15,361.9	65	208.4	21,412.7
44	Dredge, Scallop	OPEN	GEN	MA	all	65	1,280.1	2,805.4	69	1,590.7	3,666.8	70	410.8	830.5
45	Dredge, Scallop	OPEN	GEN	NE	all	38	35.0	1,421.0	30	7.0	3,454.0	23	90.9	205.4
46	Dredge, Scallop	OPEN	LIM	MA	all	69	267.4	3,820.9	53	689.9	4,991.0	80	447.2	1,963.4
47	Dredge, Scallop	OPEN	LIM	NE	all	52	233.3	11,716.6	67	273.9	22,028.5	37	23.9	3,482.7
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all	100	11,439.9	4,333.0	100	5,234.4	1,531.8	100	6,617.7	3,098.3
57	Pots and Traps, Fish	OPEN	all	NE	all	100	3,506.4	3,087.1	94	1,425.9	835.6	100	1,389.5	818.3
58	Pots and Traps, Conch	OPEN	all	MA	all	11	0.0	1.2	40	0.0	7.4	27	0.0	0.8
59	Pots and Traps, Conch	OPEN	all	NE	all	56	0.0	4.1	56	0.0	8.6	44	0.0	5.0
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	44	403.7	677.4	56	345.3	298.3	31	56.2	17.3
62	Pots and Traps, Lobster	OPEN	all	NE	all	10	2.0	2.3	6	3.0	99.5	6	0.0	34.1

Species Group: <i>FLUKE (Paralichthys dentatus)</i> - <i>SCUP (Stenotomus chrysops)</i> - <i>BLACK SEA BASS (Centropristis striata)</i>														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	22	0.0	63.1	40	2.0	32.3	50	6.2	112.5
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	19	15.5	39.6	35	0.0	215.7	43	0.0	538.2
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	100	55.0	2,942.0						
Total						54	2,080,168.2	1,039,745.5	54	2,340,423.0	1,405,795.4	54	2,259,936.7	852,254.6

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: HERRING, ATLANTIC (Clupea harengus)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline,	Bottom	OPEN	all	MA	all									
2	Longline,	Bottom	OPEN	all	NE	all									
3	Hand Line		OPEN	all	MA	all									
4	Hand Line		OPEN	all	NE	all	10	1.0	0.0	2	0.5	0.0	2	0.2	0.0
5	Otter Trawl		OPEN	all	MA	sm	8	16,102.4	875.7	9	2,407.2	1,622.3	8	455.9	575.4
6	Otter Trawl		OPEN	all	MA	lg	2	0.0	201.3	1	0.0	55.8			
7	Otter Trawl		OPEN	all	NE	sm	21	859,342.6	4,233.6	27	288,055.9	37,898.3	22	65,728.1	24,189.2
8	Otter Trawl		OPEN	all	NE	lg	13	104,141.0	313.7	10	0.0	351.3	14	26.3	612.6
9	Otter Trawl, Scallop		AA	GEN	MA	sm									
10	Otter Trawl, Scallop		AA	GEN	MA	lg									
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm									
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg									
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg									
16	Otter Trawl, Twin		OPEN	all	MA	sm									
17	Otter Trawl, Twin		OPEN	all	MA	lg									
18	Otter Trawl, Twin		OPEN	all	NE	sm									
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm									
22	Otter Trawl, Ruhle		OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg	33	0.0	160.0				43	0.0	14.0
24	Otter Trawl, Shrimp		OPEN	all	MA	sm									
25	Otter Trawl, Shrimp		OPEN	all	NE	sm									
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: HERRING, ATLANTIC (Clupea harengus)

						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	< 1	0.3	0.3	< 1	0.0	2.6			
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	< 1	0.0	1.0						
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl									
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	1	45.4	10.8	2	1.4	2.0	3	2.2	1.3
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl									
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all	100	3,271,128.0	3.7	100	2,060,978.0	2.8	100	893,241.0	1.8
40	Dredge, Scallop	AA	GEN	MA	all									
41	Dredge, Scallop	AA	GEN	NE	all				3	0.0	2.0			
42	Dredge, Scallop	AA	LIM	MA	all									
43	Dredge, Scallop	AA	LIM	NE	all									
44	Dredge, Scallop	OPEN	GEN	MA	all									
45	Dredge, Scallop	OPEN	GEN	NE	all				2	0.0	0.4			
46	Dredge, Scallop	OPEN	LIM	MA	all	3	0.0	0.3						
47	Dredge, Scallop	OPEN	LIM	NE	all	5	0.0	4.8	2	0.0	1.4	1	0.0	0.2
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm				100	3,688,311.0	53.1	90	1,332,779.0	5.1
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	100	7,123,032.0	4,723.8						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	100	133,255.0	58.6	100	228,274.0	0.9			
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	92	10,853,274.0	14,170.7						
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all									
62	Pots and Traps, Lobster	OPEN	all	NE	all									

<i>Species Group: HERRING, ATLANTIC (Clupea harengus)</i>														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all									
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all									
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm									
Total						10	22,360,321.7	24,758.3	11	6,268,028.0	39,992.9	13	2,292,232.7	25,399.6

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: LARGE MESH GROUND FISH															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline	Bottom	OPEN	all	MA	all	78	12.9	111.9	50	177.4	43.9	62	34.9	162.
2	Longline	Bottom	OPEN	all	NE	all	67	16,462.4	986.9	27	21,540.9	1,764.4	17	13,229.7	1,284.
3	Hand Line		OPEN	all	MA	all	22	0.0	6.5	13	4.8	10.6	3	0.0	15.
4	Hand Line		OPEN	all	NE	all	15	1,537.9	159.3	47	26,388.4	1,626.2	28	8,235.5	843.
5	Otter Trawl		OPEN	all	MA	sm	70	6,309.4	32,125.7	71	907.5	34,301.0	76	694.9	43,212.
6	Otter Trawl		OPEN	all	MA	lg	75	5,531.5	18,088.9	66	1,235.3	18,683.6	70	2,811.3	11,125.
7	Otter Trawl		OPEN	all	NE	sm	79	137,804.9	113,949.3	84	601,880.0	135,126.6	88	560,146.4	76,140.
8	Otter Trawl		OPEN	all	NE	lg	91	1,057,698.0	89,745.4	97	2,407,664.1	115,072.6	94	3,076,878.1	132,038.
9	Otter Trawl, Scallop		AA	GEN	MA	sm	75	0.0	100.2				25	0.0	3.
10	Otter Trawl, Scallop		AA	GEN	MA	lg	100	0.0	8.7						
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm	100	0.0	53.1						
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg	67	0.0	258.6				100	0.0	2.
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg	100	0.0	60.0						
16	Otter Trawl, Twin		OPEN	all	MA	sm	83	0.0	48.0	78	0.0	67.9			
17	Otter Trawl, Twin		OPEN	all	MA	lg				78	50.1	86.2			
18	Otter Trawl, Twin		OPEN	all	NE	sm									
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm				67	0.0	28.2			
22	Otter Trawl, Ruhle		OPEN	all	NE	lg	100	55,998.0	12,747.9						
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg	100	90,156.4	34,913.2	100	177,539.9	15,774.4	100	285,003.0	28,539.
24	Otter Trawl, Shrimp		OPEN	all	MA	sm	100	565.0	83.8	100	232.2	300.0			
25	Otter Trawl, Shrimp		OPEN	all	NE	sm							100	0.0	20.
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: LARGE MESH GROUND FISH

						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	1	9.0	0.4	1	0.0	4.5	1	0.0	8.6
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	22	0.0	127.5	29	2.7	79.8	23	3.2	324.4
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	7	87.4	63.4	6	20.2	33.2	4	73.7	11.2
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	62	202,795.5	5,199.6	75	254,418.1	6,302.8	70	199,866.9	7,026.6
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	25	5,162.2	1,294.5	39	20,453.7	7,500.9	30	4,934.6	3,939.7
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	51	0.0	342.7	39	0.0	74.7	49	0.0	133.3
41	Dredge, Scallop	AA	GEN	NE	all	97	30.5	1,448.6	90	0.0	411.7	75	2.2	298.8
42	Dredge, Scallop	AA	LIM	MA	all	62	7.0	1,949.8	69	0.0	633.7	83	2.6	1,013.3
43	Dredge, Scallop	AA	LIM	NE	all	83	164.3	22,679.6	87	196.6	30,838.7	91	506.3	30,849.2
44	Dredge, Scallop	OPEN	GEN	MA	all	71	9.3	1,077.1	74	3.1	484.0	91	1.1	470.1
45	Dredge, Scallop	OPEN	GEN	NE	all	95	16.8	3,880.8	97	18.0	1,921.9	93	5.5	1,563.6
46	Dredge, Scallop	OPEN	LIM	MA	all	89	0.0	1,398.1	59	0.0	1,165.4	75	8.9	309.1
47	Dredge, Scallop	OPEN	LIM	NE	all	90	150.3	21,135.2	89	321.4	17,835.9	96	409.7	15,055.5
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm				33	9,904.1	0.0	30	3,584.9	0.0
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	55	40,956.4	1,282.1						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	35	24,068.0	310.0						
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all	27	38.8	0.0	20	13.0	0.0	18	3.1	39.6
57	Pots and Traps, Fish	OPEN	all	NE	all				12	4.0	1.2	18	1.6	2.0
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	56	47.6	28.7	22	24.3	14.0	31	44.8	23.2
62	Pots and Traps, Lobster	OPEN	all	NE	all	35	84.0	28.9	28	0.0	13.1	29	13.2	60.3

Species Group: LARGE MESH GROUND FISH														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all	27	0.9	15.2	27	0.0	5.6	33	2.0	12.7
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	33	0.0	9.1	20	0.0	6.0	17	0.0	1.8
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	44	0.0	28.6	65	3.8	256.3	66	2.1	131.6
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	40	0.0	32.0						
Total						54	1,645,704.4	365,779.3	61	3,523,003.6	390,469.0	58	4,156,500.2	354,662.8

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: MONKFISH (Lophius americanus)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline	Bottom	OPEN	all	MA	all	67	0.0	185.3	38	3.3	23.0	62	86.4	267.
2	Longline	Bottom	OPEN	all	NE	all	13	74.8	0.0	9	728.7	0.0			
3	Hand Line		OPEN	all	MA	all									
4	Hand Line		OPEN	all	NE	all				2	0.0	1.3			
5	Otter Trawl		OPEN	all	MA	sm	40	17,767.2	41,195.5	40	23,516.2	33,443.3	49	26,750.2	32,136.
6	Otter Trawl		OPEN	all	MA	lg	52	41,879.0	60,383.7	56	68,730.5	37,966.0	61	27,080.5	40,121.
7	Otter Trawl		OPEN	all	NE	sm	38	15,315.7	16,934.6	50	49,815.1	15,642.4	51	33,286.7	20,066.
8	Otter Trawl		OPEN	all	NE	lg	75	459,187.5	69,547.2	83	1,477,252.6	85,915.1	78	818,443.0	73,672.
9	Otter Trawl, Scallop		AA	GEN	MA	sm	100	80.7	2,375.1				75	0.0	465.
10	Otter Trawl, Scallop		AA	GEN	MA	lg	100	0.0	168.1				100	162.8	51.
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm	100	111.3	313.0						
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg	100	58.6	605.3	100	0.0	2.2	100	77.5	224.
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg	100	0.0	214.0						
16	Otter Trawl, Twin		OPEN	all	MA	sm	67	375.4	505.7	67	705.8	4,300.7			
17	Otter Trawl, Twin		OPEN	all	MA	lg				100	1,207.7	65.0			
18	Otter Trawl, Twin		OPEN	all	NE	sm				100	11.7	114.3			
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm				67	47.7	0.0			
22	Otter Trawl, Ruhle		OPEN	all	NE	lg	100	33.2	10.0						
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg	100	988.0	115.2	100	8,146.2	68.8	100	4,208.6	189.
24	Otter Trawl, Shrimp		OPEN	all	MA	sm	100	942.8	658.6	100	1,953.2	474.3			
25	Otter Trawl, Shrimp		OPEN	all	NE	sm							100	76.4	0.
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: MONKFISH (<i>Lophius americanus</i>)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	4	130.6	0.0	1	37.8	6.2	3	138.1	11.5
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	7	295.9	36.5	5	90.5	12.0	9	169.0	76.6
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	90	345,149.1	4,555.7	92	263,249.8	5,160.1	92	432,810.9	10,680.4
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	38	11,931.2	376.2	43	17,913.5	456.8	45	9,985.3	418.9
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	91	536,854.2	15,599.9	84	811,356.2	21,729.9	93	712,158.1	29,044.9
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	95	721.2	1,433.7	100	514.2	1,208.8	96	976.8	2,184.7
41	Dredge, Scallop	AA	GEN	NE	all	70	1,064.8	6,799.3	77	242.1	4,140.1	92	1,566.0	7,437.6
42	Dredge, Scallop	AA	LIM	MA	all	98	4,477.4	59,302.1	98	3,419.9	41,848.6	100	1,995.3	23,058.6
43	Dredge, Scallop	AA	LIM	NE	all	97	34,311.6	237,533.1	97	40,029.5	287,225.4	100	32,413.9	399,623.2
44	Dredge, Scallop	OPEN	GEN	MA	all	91	4,898.2	7,880.6	97	8,610.9	9,203.8	98	4,336.2	6,332.3
45	Dredge, Scallop	OPEN	GEN	NE	all	91	5,750.6	13,497.2	86	6,825.3	10,423.6	73	1,393.7	2,231.2
46	Dredge, Scallop	OPEN	LIM	MA	all	100	4,873.6	49,557.2	100	2,313.8	34,782.3	100	10,811.9	26,709.9
47	Dredge, Scallop	OPEN	LIM	NE	all	88	23,101.2	147,163.5	94	32,176.3	294,646.5	90	7,936.3	194,151.1
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	33	3.1	6.0	33	4.5	7.5	23	69.1	7.9
62	Pots and Traps, Lobster	OPEN	all	NE	all									

Species Group: MONKFISH (Lophius americanus)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all							25	22.9	9.0
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	61	230.0	296.6	80	106.6	1,786.0	92	378.7	1,867.1
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	50	186.0	1,902.4	65	0.0	7,480.5	63	0.0	6,418.1
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	10	43.1	0.0						
Total						53	1,510,836.0	739,151.3	55	2,819,009.5	898,134.5	58	2,127,334.1	877,459.3

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: RED DEEPPSEA CRAB (Chaceon quinquedens)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline,	Bottom	OPEN	all	MA	all	11	0.0	4.6	13	0.0	2.0			
2	Longline,	Bottom	OPEN	all	NE	all									
3	Hand Line		OPEN	all	MA	all									
4	Hand Line		OPEN	all	NE	all									
5	Otter Trawl		OPEN	all	MA	sm	1	3,809.0	5,930.8	< 1	0.0	1,243.7			
6	Otter Trawl		OPEN	all	MA	lg	1	0.0	2,486.0	< 1	0.0	3,637.1			
7	Otter Trawl		OPEN	all	NE	sm	1	0.0	284.5	< 1	0.0	1.1	2	1.0	44.
8	Otter Trawl		OPEN	all	NE	lg	12	0.0	9,247.2	14	0.0	1,040.2	17	3.1	921.
9	Otter Trawl, Scallop		AA	GEN	MA	sm									
10	Otter Trawl, Scallop		AA	GEN	MA	lg									
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm									
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg									
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg									
16	Otter Trawl, Twin		OPEN	all	MA	sm									
17	Otter Trawl, Twin		OPEN	all	MA	lg									
18	Otter Trawl, Twin		OPEN	all	NE	sm									
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm									
22	Otter Trawl, Ruhle		OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg							14	0.0	0.
24	Otter Trawl, Shrimp		OPEN	all	MA	sm	100	0.0	7,302.5	100	630.0	1,194.0			
25	Otter Trawl, Shrimp		OPEN	all	NE	sm							100	0.0	586.
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: RED DEEPSEA CRAB (Chaceon quinquedens)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm									
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg									
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl									
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg				< 1	0.0	0.4	1	0.0	0.8
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl									
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	2	0.0	0.3						
41	Dredge, Scallop	AA	GEN	NE	all				3	0.0	0.9			
42	Dredge, Scallop	AA	LIM	MA	all	1	0.0	0.9	2	0.0	1.2			
43	Dredge, Scallop	AA	LIM	NE	all				3	0.0	3.3			
44	Dredge, Scallop	OPEN	GEN	MA	all									
45	Dredge, Scallop	OPEN	GEN	NE	all							3	0.0	0.7
46	Dredge, Scallop	OPEN	LIM	MA	all	3	0.0	2.0						
47	Dredge, Scallop	OPEN	LIM	NE	all									
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all				11	129.0	1,378.0	8	125.3	103.0
62	Pots and Traps, Lobster	OPEN	all	NE	all	10	0.0	12.0				6	0.0	1.9

Species Group: RED DEESEA CRAB (Chaceon quinquedens)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all	100	39,726.0	16,960.0	100	17,898.0	8,439.0	100	55,897.0	21,600.0
65	Pots and Traps, Crab	OPEN	all	NE	all	100	954,271.0	289,481.1	100	746,104.1	183,500.0	100	890,404.0	169,999.4
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all									
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all									
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm									
Total						4	997,806.0	331,711.9	4	764,761.1	200,440.9	10	946,430.4	193,258.8

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: SEA SCALLOP (Placopecten magellanicus)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline	Bottom	OPEN	all	MA	all	11	0.2	0.0						
2	Longline	Bottom	OPEN	all	NE	all	13	0.0	4.0	2	0.0	0.4	4	0.0	3.2
3	Hand Line		OPEN	all	MA	all									
4	Hand Line		OPEN	all	NE	all	5	0.5	0.0	2	0.5	0.0	2	0.0	0.7
5	Otter Trawl		OPEN	all	MA	sm	12	6,670.3	24,698.7	9	4,291.9	7,491.2	11	7,129.9	14,319.5
6	Otter Trawl		OPEN	all	MA	lg	16	2,298.9	10,291.7	19	21,038.6	14,811.1	21	27,655.0	7,576.2
7	Otter Trawl		OPEN	all	NE	sm	8	3,078.2	12,572.2	8	2,664.5	5,003.9	8	1,577.2	3,573.7
8	Otter Trawl		OPEN	all	NE	lg	23	10,268.6	3,063.7	29	6,913.0	2,574.9	23	3,935.9	2,981.0
9	Otter Trawl, Scallop		AA	GEN	MA	sm	100	25,614.8	3,503.2				100	22,332.7	50.0
10	Otter Trawl, Scallop		AA	GEN	MA	lg	100	13,877.8	1,626.0				100	7,880.2	360.3
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm	100	14,835.7	53.0						
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg	89	35,374.9	1,279.0	100	6,305.8	0.0	100	3,257.0	380.0
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg	100	4,288.1	0.0						
16	Otter Trawl, Twin		OPEN	all	MA	sm									
17	Otter Trawl, Twin		OPEN	all	MA	lg				100	37,519.2	413.1			
18	Otter Trawl, Twin		OPEN	all	NE	sm									
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm									
22	Otter Trawl, Ruhle		OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg							14	0.0	0.8
24	Otter Trawl, Shrimp		OPEN	all	MA	sm									
25	Otter Trawl, Shrimp		OPEN	all	NE	sm									
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: SEA SCALLOP (Placopecten magellanicus)

						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm				< 1	0.1	0.0			
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg									
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	9	353.0	10.2	13	16.8	26.3	9	76.6	37.4
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	< 1	1.0	0.0	1	0.0	20.5	1	12.0	12.5
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	8	288.9	160.5	7	54.1	71.9	7	72.5	33.4
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	100	277,680.6	67,180.0	100	114,337.6	4,547.4	100	315,623.7	25,822.2
41	Dredge, Scallop	AA	GEN	NE	all	100	474,432.9	44,450.7	100	197,799.8	4,866.2	100	486,714.2	27,591.8
42	Dredge, Scallop	AA	LIM	MA	all	100	4,823,914.4	728,313.4	100	3,458,421.7	121,024.6	100	3,162,370.4	80,419.4
43	Dredge, Scallop	AA	LIM	NE	all	100	9,340,824.0	1,750,952.5	99	11,588,595.9	559,345.6	100	15,633,337.6	1,091,472.6
44	Dredge, Scallop	OPEN	GEN	MA	all	100	624,493.4	52,370.0	100	583,391.6	31,016.3	100	252,915.5	19,945.9
45	Dredge, Scallop	OPEN	GEN	NE	all	100	349,058.3	12,153.0	100	251,770.2	8,494.2	100	157,870.6	5,084.8
46	Dredge, Scallop	OPEN	LIM	MA	all	100	2,833,022.2	71,535.8	100	2,223,161.9	36,382.0	100	1,262,314.9	27,810.3
47	Dredge, Scallop	OPEN	LIM	NE	all	100	7,198,466.2	234,635.1	100	7,669,853.7	456,229.9	100	5,429,531.5	227,317.7
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	11	0.0	0.2						
62	Pots and Traps, Lobster	OPEN	all	NE	all							6	0.0	0.6

Species Group: SEA SCALLOP (Placopecten magellanicus)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	50	3,092.7	812.8	70	1,644.0	1,878.2	58	4,968.6	6,441.1
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	38	643.7	3,839.6	30	843.5	8,063.1	40	3,228.1	7,503.6
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm									
Total						31	26,042,579.2	3,023,505.2	24	26,168,624.4	1,262,261.0	29	26,782,803.9	1,548,738.8

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

<i>Species Group: SKATE COMPLEX (Rajidae)</i>														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline, Bottom	OPEN	all	MA	all	56	15.2	14,202.9	75	0.0	1,377.1	69	47.8	14,806.1
2	Longline, Bottom	OPEN	all	NE	all	73	10.0	1,343.8	55	1,451.7	4,914.6	75	1,226.4	3,116.7
3	Hand Line	OPEN	all	MA	all	11	0.0	1.0	9	0.0	11.0	18	0.0	25.2
4	Hand Line	OPEN	all	NE	all									
5	Otter Trawl	OPEN	all	MA	sm	89	98,191.4	595,155.5	88	119,022.4	624,628.1	90	137,119.1	535,523.3
6	Otter Trawl	OPEN	all	MA	lg	97	378,864.9	597,790.9	98	253,700.6	722,693.6	98	424,164.6	436,577.2
7	Otter Trawl	OPEN	all	NE	sm	77	37,319.5	251,055.4	80	125,129.1	260,365.0	80	51,015.0	181,795.0
8	Otter Trawl	OPEN	all	NE	lg	97	480,531.5	669,494.3	99	1,034,454.6	1,039,405.0	97	613,482.1	785,427.7
9	Otter Trawl, Scallop	AA	GEN	MA	sm	100	0.0	9,273.4				100	0.0	1,407.0
10	Otter Trawl, Scallop	AA	GEN	MA	lg	100	0.0	1,272.1				100	0.0	1,164.2
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	100	0.0	11,556.6						
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	100	0.0	12,299.4	100	0.0	403.1	100	204.9	1,218.7
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	100	0.0	10,286.0						
16	Otter Trawl, Twin	OPEN	all	MA	sm	83	0.0	3,391.1	100	0.0	1,767.3			
17	Otter Trawl, Twin	OPEN	all	MA	lg				100	1,724.7	11,027.8			
18	Otter Trawl, Twin	OPEN	all	NE	sm				100	0.0	240.3			
19	Otter Trawl, Ruhle	OPEN	all	MA	sm									
20	Otter Trawl, Ruhle	OPEN	all	MA	lg									
21	Otter Trawl, Ruhle	OPEN	all	NE	sm				100	0.0	999.5			
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	100	0.0	17,538.1						
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	0.0	18,484.5	83	53.7	10,043.6	86	1,653.7	32,680.9
24	Otter Trawl, Shrimp	OPEN	all	MA	sm	100	0.0	105.9	67	0.0	173.9			
25	Otter Trawl, Shrimp	OPEN	all	NE	sm									
26	Otter Trawl, Other	OPEN	all	MA	sm									
27	Otter Trawl, Other	OPEN	all	MA	lg									
28	Otter Trawl, Other	OPEN	all	NE	sm									
29	Otter Trawl, Other	OPEN	all	NE	lg									

Species Group: SKATE COMPLEX (Rajidae)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	7	3.2	235.5	6	8.6	128.4	6	16.3	106.5
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	64	1,329.5	5,955.1	65	6,957.1	3,328.1	64	1,767.0	2,820.0
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	92	372,720.6	115,804.6	94	234,139.9	66,658.7	99	408,724.5	30,142.6
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	53	9,282.6	6,036.5	70	16,236.8	20,191.2	83	13,019.7	6,815.3
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	89	1,297,024.0	132,928.5	94	1,427,810.7	183,899.1	94	799,387.6	40,982.6
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	100	0.0	9,971.4	100	0.0	6,170.1	96	0.0	8,164.1
41	Dredge, Scallop	AA	GEN	NE	all	97	0.0	12,186.0	100	0.0	4,704.1	99	0.0	5,842.2
42	Dredge, Scallop	AA	LIM	MA	all	100	22.5	166,514.1	100	43.0	72,541.8	100	0.0	40,219.6
43	Dredge, Scallop	AA	LIM	NE	all	99	29.0	514,951.2	99	35.0	554,017.0	100	28.0	775,885.0
44	Dredge, Scallop	OPEN	GEN	MA	all	100	3,641.8	91,447.4	100	2,525.2	82,649.2	100	226.0	50,002.7
45	Dredge, Scallop	OPEN	GEN	NE	all	100	0.0	42,038.5	97	0.0	30,237.6	98	76.8	11,979.1
46	Dredge, Scallop	OPEN	LIM	MA	all	100	0.0	182,266.0	100	0.0	113,044.0	100	0.0	77,189.4
47	Dredge, Scallop	OPEN	LIM	NE	all	95	0.0	464,474.1	100	0.0	492,488.1	99	2,235.8	185,084.4
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm				7	0.0	5.0			
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all	9	0.0	1.2	10	0.0	1.1			
57	Pots and Traps, Fish	OPEN	all	NE	all				6	1.6	0.0			
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	22	1.2	17.8	22	3.5	0.0	23	1.3	6.5
62	Pots and Traps, Lobster	OPEN	all	NE	all	10	2.0	3.0						

Species Group: SKATE COMPLEX (Rajidae)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all							8	0.0	3.0
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all	100	0.0	46.0						
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	89	0.0	3,045.4	100	0.0	2,358.8	100	0.0	3,273.2
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	94	0.0	9,120.3	90	0.0	30,039.2	97	910.0	27,958.2
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	60	0.0	3,333.0						
Total						75	2,678,988.8	3,973,626.5	78	3,223,298.2	4,340,511.4	79	2,455,306.4	3,260,216.4

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: SMALL MESH GROUND FISH														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline, Bottom	OPEN	all	MA	all	33	3.0	23.5	38	3.6	36.8	46	28.4	40.3
2	Longline, Bottom	OPEN	all	NE	all	13	12.5	1.0	11	11.2	23.0	6	52.9	1.6
3	Hand Line	OPEN	all	MA	all				4	9.6	0.0	8	14.4	0.0
4	Hand Line	OPEN	all	NE	all				2	5.4	0.0			
5	Otter Trawl	OPEN	all	MA	sm	43	160,946.1	59,464.6	49	209,699.8	91,774.1	65	241,002.3	149,096.0
6	Otter Trawl	OPEN	all	MA	lg	28	1,105.2	2,002.3	40	5,154.8	4,585.1	51	2,773.4	5,791.8
7	Otter Trawl	OPEN	all	NE	sm	55	823,241.2	245,635.9	78	1,311,841.4	245,916.1	85	887,033.1	309,062.5
8	Otter Trawl	OPEN	all	NE	lg	62	38,009.3	28,753.9	70	12,161.1	34,406.2	70	11,962.4	24,341.5
9	Otter Trawl, Scallop	AA	GEN	MA	sm							25	0.0	26.0
10	Otter Trawl, Scallop	AA	GEN	MA	lg	50	0.0	0.4						
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	100	0.0	17.9						
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	22	3.8	56.1				100	8.9	7.1
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	100	0.0	35.0						
16	Otter Trawl, Twin	OPEN	all	MA	sm	33	0.0	4,549.6	44	0.0	3,325.5			
17	Otter Trawl, Twin	OPEN	all	MA	lg				11	0.9	33.0			
18	Otter Trawl, Twin	OPEN	all	NE	sm				100	0.0	4,273.3			
19	Otter Trawl, Ruhle	OPEN	all	MA	sm									
20	Otter Trawl, Ruhle	OPEN	all	MA	lg									
21	Otter Trawl, Ruhle	OPEN	all	NE	sm				67	3.0	131.0			
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	100	0.0	153.5						
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	0.0	302.7	83	6.7	392.7	86	28.1	533.8
24	Otter Trawl, Shrimp	OPEN	all	MA	sm	100	3,874.6	512.3	67	1,215.4	558.0			
25	Otter Trawl, Shrimp	OPEN	all	NE	sm							100	64.3	157.0
26	Otter Trawl, Other	OPEN	all	MA	sm									
27	Otter Trawl, Other	OPEN	all	MA	lg									
28	Otter Trawl, Other	OPEN	all	NE	sm									
29	Otter Trawl, Other	OPEN	all	NE	lg									

Species Group: SMALL MESH GROUND FISH														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm							< 1	1.9	0.0
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg							< 1	0.0	0.7
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	2	0.5	3.4	4	1.6	4.0	4	2.9	4.6
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	30	5,792.0	459.0	28	3,273.3	713.6	37	1,856.7	580.0
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	7	417.6	46.9	14	749.5	210.4	9	375.6	97.2
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all	25	3,224.0	0.0	45	965.0	1.1	29	1,071.0	0.0
40	Dredge, Scallop	AA	GEN	MA	all	12	0.0	3.7	22	0.0	3.8	55	2.0	35.3
41	Dredge, Scallop	AA	GEN	NE	all	36	0.0	51.7	70	1.9	183.4	91	0.0	1,552.2
42	Dredge, Scallop	AA	LIM	MA	all	48	0.4	594.7	64	17.3	1,419.1	70	0.0	1,105.3
43	Dredge, Scallop	AA	LIM	NE	all	58	11.5	4,111.2	78	44.0	14,451.5	77	12.0	27,676.4
44	Dredge, Scallop	OPEN	GEN	MA	all	39	4.0	92.7	40	21.1	195.2	77	0.0	91.2
45	Dredge, Scallop	OPEN	GEN	NE	all	51	2.5	489.6	41	12.2	354.0	50	0.0	107.9
46	Dredge, Scallop	OPEN	LIM	MA	all	61	5.1	277.9	59	0.0	289.1	85	1.4	902.2
47	Dredge, Scallop	OPEN	LIM	NE	all	56	16.3	3,619.0	65	2.2	9,920.9	57	0.6	5,285.6
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm				20	908.0	0.2	30	88.0	0.0
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	45	4,606.0	18.0						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	33	0.0	0.8	67	194.0	0.0			
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	29	36,589.0	282.6						
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all	9	18.8	0.0	20	2.6	0.0	9	16.7	1.6
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all							9	0.0	8.8
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	56	45.1	6.0	33	390.8	0.0	46	1,141.8	32.9
62	Pots and Traps, Lobster	OPEN	all	NE	all	10	3.2	0.0	11	0.0	10.9	12	3.4	4.2

Species Group: SMALL MESH GROUND FISH														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all	20	0.0	3.2				8	0.0	1.0
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all				10	0.0	0.6	8	0.0	1.4
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all				25	0.0	45.8	20	0.0	52.4
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm									
Total						38	1,077,931.7	351,569.1	48	1,546,696.4	413,258.4	46	1,147,542.2	526,598.5

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: SPINY DOGFISH (Squalus acanthias)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline	Bottom	OPEN	all	MA	all	67	22,942.8	1,665.3	50	8,243.6	0.0	69	31,312.0	880.
2	Longline	Bottom	OPEN	all	NE	all	80	42,830.0	4,653.6	82	165,659.0	15,682.2	87	240,461.0	14,173.
3	Hand Line		OPEN	all	MA	all				2	0.0	4.0	10	0.0	26.
4	Hand Line		OPEN	all	NE	all	45	14,220.9	0.0	67	572.3	162.8	68	1,020.6	44.
5	Otter Trawl		OPEN	all	MA	sm	46	56,582.1	520,274.7	40	12,828.1	310,714.8	46	22,037.1	350,096.
6	Otter Trawl		OPEN	all	MA	lg	48	15,711.7	137,386.1	46	26,497.5	94,105.5	46	5,018.1	68,244.
7	Otter Trawl		OPEN	all	NE	sm	32	24,302.3	200,026.9	42	4,627.0	243,149.8	39	4,589.5	171,806.
8	Otter Trawl		OPEN	all	NE	lg	52	9,361.8	159,457.8	52	4,729.6	152,040.7	46	3,115.1	173,419.
9	Otter Trawl, Scallop		AA	GEN	MA	sm	100	0.0	7,070.7				50	0.0	1,324.
10	Otter Trawl, Scallop		AA	GEN	MA	lg	50	0.0	151.6				100	0.0	9.
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm									
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg	22	0.0	37.0				100	0.0	37.
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg									
16	Otter Trawl, Twin		OPEN	all	MA	sm	67	0.0	3,689.1	44	0.0	9,755.0			
17	Otter Trawl, Twin		OPEN	all	MA	lg				33	0.0	33.1			
18	Otter Trawl, Twin		OPEN	all	NE	sm				100	0.0	5,900.0			
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm				67	0.0	753.2			
22	Otter Trawl, Ruhle		OPEN	all	NE	lg	100	0.0	246.9						
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg	67	0.0	4,083.5	50	0.0	258.4	86	0.0	3,578.
24	Otter Trawl, Shrimp		OPEN	all	MA	sm	33	0.0	2.3						
25	Otter Trawl, Shrimp		OPEN	all	NE	sm							100	0.0	6.
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: SPINY DOGFISH (<i>Squalus acanthias</i>)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	28	287,344.1	28,137.2	25	173,910.0	34,008.1	38	585,990.5	18,734.1
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	68	620,670.9	22,738.7	52	245,389.4	6,858.3	68	484,906.6	14,244.9
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	55	3,487.7	4,969.1	66	1,357.0	5,220.2	68	585.3	5,880.7
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	50	0.0	56.0						
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	65	484,924.3	25,299.8	69	444,447.7	85,556.4	52	119,992.3	31,905.3
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	42	14,156.4	3,879.8	53	22,927.1	10,188.2	38	2,916.1	4,761.8
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all	8	0.0	239.2						
40	Dredge, Scallop	AA	GEN	MA	all	37	0.0	175.7	17	0.0	32.6	11	0.0	242.0
41	Dredge, Scallop	AA	GEN	NE	all	5	0.0	14.3	10	0.0	29.6	13	0.0	70.5
42	Dredge, Scallop	AA	LIM	MA	all	46	0.0	3,949.6	55	0.0	2,170.9	33	0.0	829.4
43	Dredge, Scallop	AA	LIM	NE	all	35	0.0	3,465.9	49	0.0	5,051.9	53	14.2	11,984.5
44	Dredge, Scallop	OPEN	GEN	MA	all	22	0.0	611.6	19	19.7	233.1	21	0.0	179.5
45	Dredge, Scallop	OPEN	GEN	NE	all	16	0.0	71.5	8	0.0	66.5	3	0.0	2.4
46	Dredge, Scallop	OPEN	LIM	MA	all	31	0.0	609.7	38	0.0	453.5	35	0.0	150.8
47	Dredge, Scallop	OPEN	LIM	NE	all	34	0.0	5,167.7	46	0.0	3,057.9	32	0.0	676.3
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm				20	0.0	1,083.0	40	3,864.0	5,542.0
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	10	0.0	168.4						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	67	0.0	1,838.7	100	0.0	7,127.0			
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	15	0.0	7,174.5						
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	11	0.0	7.0	11	0.0	3.0	8	4.2	0.0
62	Pots and Traps, Lobster	OPEN	all	NE	all	5	0.0	4.0						

Species Group: SPINY DOGFISH (Squalus acanthias)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all							8	0.0	1.5
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	33	0.0	80.4	30	0.0	174.4	42	0.0	973.4
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	38	0.0	156.0	40	0.0	852.1	40	0.0	7,683.9
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	20	0.0	12,518.0						
Total						42	1,596,535.0	1,160,078.3	45	1,111,208.0	994,726.2	45	1,505,826.6	887,508.7

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

Species Group: SQUID (Doryteuthis [Amerigo] pealeii, Illex illecebrosus) - BUTTERFISH (Peprilus triacanthus) - MACKEREL (Scomber scombrus)															
						SBRM 2018			SBRM 2019			SBRM 2020			
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline	Bottom	OPEN	all	MA	all	11	0.5	0.0				8	0.4	0.
2	Longline	Bottom	OPEN	all	NE	all				5	0.0	1.9			
3	Hand Line		OPEN	all	MA	all	11	0.0	2.4						
4	Hand Line		OPEN	all	NE	all	35	9,853.1	0.0	13	1,135.5	7.2	13	735.2	0.
5	Otter Trawl		OPEN	all	MA	sm	87	1,884,182.1	234,227.1	89	6,347,794.0	226,587.9	93	3,545,367.2	319,081.
6	Otter Trawl		OPEN	all	MA	lg	55	2,384.0	2,564.8	58	3,017.5	3,113.8	61	200,936.1	3,402.
7	Otter Trawl		OPEN	all	NE	sm	92	5,423,335.5	262,590.9	96	8,127,788.1	475,572.5	96	5,003,108.2	480,328.
8	Otter Trawl		OPEN	all	NE	lg	58	4,164.6	5,333.1	45	2,938.0	5,701.1	60	1,687.1	5,522.
9	Otter Trawl, Scallop		AA	GEN	MA	sm	25	0.0	2.0				75	0.0	1.
10	Otter Trawl, Scallop		AA	GEN	MA	lg									
11	Otter Trawl, Scallop		OPEN	GEN	MA	sm	100	0.2	4.5						
12	Otter Trawl, Scallop		OPEN	GEN	MA	lg	56	6.3	30.7				100	1.1	0.
13	Otter Trawl, Scallop		OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop		OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop		OPEN	LIM	MA	lg	100	99.0	0.0						
16	Otter Trawl, Twin		OPEN	all	MA	sm	100	143,514.0	34,745.9	100	249,400.0	41,452.4			
17	Otter Trawl, Twin		OPEN	all	MA	lg									
18	Otter Trawl, Twin		OPEN	all	NE	sm				100	135,718.0	37,513.4			
19	Otter Trawl, Ruhle		OPEN	all	MA	sm									
20	Otter Trawl, Ruhle		OPEN	all	MA	lg									
21	Otter Trawl, Ruhle		OPEN	all	NE	sm				100	26.2	106.0			
22	Otter Trawl, Ruhle		OPEN	all	NE	lg	100	0.0	23.0						
23	Otter Trawl, Haddock Separator		OPEN	all	NE	lg	67	0.0	10.0	33	1.0	340.9	71	23.0	93.
24	Otter Trawl, Shrimp		OPEN	all	MA	sm	100	0.0	1,234.6	100	3.1	3,403.0			
25	Otter Trawl, Shrimp		OPEN	all	NE	sm							100	0.0	1,618.
26	Otter Trawl, Other		OPEN	all	MA	sm									
27	Otter Trawl, Other		OPEN	all	MA	lg									
28	Otter Trawl, Other		OPEN	all	NE	sm									
29	Otter Trawl, Other		OPEN	all	NE	lg									

Species Group: SQUID (<i>Doryteuthis [Amerigo] pealeii</i> , <i>Illex illecebrosus</i>) - BUTTERFISH (<i>Peprilus triacanthus</i>) - MACKEREL (<i>Scomber scombrus</i>)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	41	3,275.2	272.8	31	1,301.8	14.4	28	5,196.2	357.8
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	17	305.1	38.6	13	94.1	18.9	16	214.2	81.3
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	3	0.7	7.1	13	152.7	44.6	5	25.0	2.2
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	15	271.3	27.8	25	282.9	196.5	24	365.9	249.9
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	2	81.0	1.4	8	205.3	58.5	9	76.0	36.3
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all	67	5,221.0	2.6	64	9,101.0	1.3	86	10,444.0	4.0
40	Dredge, Scallop	AA	GEN	MA	all	29	1.0	7.3	28	0.8	3.8	43	0.5	27.0
41	Dredge, Scallop	AA	GEN	NE	all				10	0.0	3.3	4	0.0	1.6
42	Dredge, Scallop	AA	LIM	MA	all	57	37.3	271.7	50	13.7	145.4	61	0.6	123.2
43	Dredge, Scallop	AA	LIM	NE	all	59	21.3	440.9	43	12.4	404.4	41	18.1	266.8
44	Dredge, Scallop	OPEN	GEN	MA	all	46	34.0	101.9	19	0.0	29.4	47	0.0	31.0
45	Dredge, Scallop	OPEN	GEN	NE	all	12	1.8	6.9	21	0.0	8.4	20	1.9	6.2
46	Dredge, Scallop	OPEN	LIM	MA	all	69	8.5	192.9	66	9.0	97.5	75	4.0	295.0
47	Dredge, Scallop	OPEN	LIM	NE	all	56	5.7	551.5	60	5.1	499.4	44	8.2	474.8
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm				80	495,503.0	19.0	50	702,231.0	1.2
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	60	115,624.0	15.2						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	100	431,235.4	568.7	100	1,350,897.0	9.2			
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	77	2,691,453.0	336.3						
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all									
62	Pots and Traps, Lobster	OPEN	all	NE	all									

Species Group: SQUID (<i>Doryteuthis [Amerigo] pealeii</i> , <i>Illex illecebrosus</i>) - BUTTERFISH (<i>Peprilus triacanthus</i>) - MACKEREL (<i>Scomber scombrus</i>)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all									
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all				5	0.0	0.2			
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	90	252.4	2,329.0						
Total						49	10,715,368.0	545,941.6	49	16,725,400.2	795,354.3	51	9,470,443.9	812,006.0

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

<i>Species Group: SURFCLAM (Spisula solidissima) - OCEAN QUAHOG (Arctica islandica)</i>														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline, Bottom	OPEN	all	MA	all									
2	Longline, Bottom	OPEN	all	NE	all									
3	Hand Line	OPEN	all	MA	all									
4	Hand Line	OPEN	all	NE	all									
5	Otter Trawl	OPEN	all	MA	sm	1	0.0	143.2	2	0.0	151.1	2	0.4	65.1
6	Otter Trawl	OPEN	all	MA	lg	7	0.0	605.7	6	0.0	1,507.5	8	0.0	353.3
7	Otter Trawl	OPEN	all	NE	sm	1	0.0	7.8	3	3.3	60.6	2	0.0	73.5
8	Otter Trawl	OPEN	all	NE	lg	4	0.0	130.2	5	0.0	124.3	7	78.9	836.6
9	Otter Trawl, Scallop	AA	GEN	MA	sm	25	0.0	204.0						
10	Otter Trawl, Scallop	AA	GEN	MA	lg									
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	50	0.0	16.0						
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	11	0.0	45.0						
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	100	0.0	75.0						
16	Otter Trawl, Twin	OPEN	all	MA	sm									
17	Otter Trawl, Twin	OPEN	all	MA	lg				44	0.0	26.4			
18	Otter Trawl, Twin	OPEN	all	NE	sm									
19	Otter Trawl, Ruhle	OPEN	all	MA	sm									
20	Otter Trawl, Ruhle	OPEN	all	MA	lg									
21	Otter Trawl, Ruhle	OPEN	all	NE	sm									
22	Otter Trawl, Ruhle	OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg									
24	Otter Trawl, Shrimp	OPEN	all	MA	sm									
25	Otter Trawl, Shrimp	OPEN	all	NE	sm									
26	Otter Trawl, Other	OPEN	all	MA	sm									
27	Otter Trawl, Other	OPEN	all	MA	lg									
28	Otter Trawl, Other	OPEN	all	NE	sm									
29	Otter Trawl, Other	OPEN	all	NE	lg									

Species Group: SURFCLAM (Spisula solidissima) - OCEAN QUAHOG (Arctica islandica)

						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm									
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg				1	0.0	1.5			
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl									
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg									
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl				< 1	1.0	0.0	1	0.0	0.8
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all	10	0.0	29.1				13	0.0	38.9
41	Dredge, Scallop	AA	GEN	NE	all	6	0.0	4.7	13	0.0	6.4	14	0.0	62.8
42	Dredge, Scallop	AA	LIM	MA	all	22	96.8	418.5	9	0.0	27.7			
43	Dredge, Scallop	AA	LIM	NE	all	15	0.0	792.8	10	0.0	514.2	3	0.0	896.0
44	Dredge, Scallop	OPEN	GEN	MA	all	15	0.0	128.3	6	0.0	22.3	2	0.0	0.8
45	Dredge, Scallop	OPEN	GEN	NE	all	6	1.0	59.3	13	0.0	112.2	18	0.0	38.6
46	Dredge, Scallop	OPEN	LIM	MA	all	8	0.0	372.0	19	0.0	112.3	15	0.0	80.0
47	Dredge, Scallop	OPEN	LIM	NE	all	11	2.2	246.2	17	5.7	318.8	13	2.8	620.1
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all									
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all				11	0.4	0.0			
62	Pots and Traps, Lobster	OPEN	all	NE	all									

Species Group: SURFCLAM (Spisula solidissima) - OCEAN QUAHOG (Arctica islandica)														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	100	1,517,019.8	12,413.0	100	1,071,902.4	5,117.0	100	1,818,797.7	8,623.3
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	100	2,231,033.6	421.0	100	2,329,585.7	8,826.8	100	3,481,890.1	5,846.8
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm									
Total						7	3,748,153.3	16,111.8	5	3,401,498.5	16,929.1	7	5,300,769.9	17,536.6

Table 10, continued. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded, live lb) on observed trips by fleet for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017), SBRM 2019 (July 2017 through June 2018), and SBRM 2020 (July 2018 through June 2019). Dark shading indicates fleets not considered in annual SBRM analyses. Light shading indicates confidential fleets in annual SBRM analyses. See [Table 4](#) for fleet stratification abbreviations.

<i>Species Group: TILEFISH</i>														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
1	Longline, Bottom	OPEN	all	MA	all	100	103,006.1	582.5	100	128,664.7	62.3	100	192,323.8	397.6
2	Longline, Bottom	OPEN	all	NE	all									
3	Hand Line	OPEN	all	MA	all	11	282.2	0.0				5	155.2	0.0
4	Hand Line	OPEN	all	NE	all									
5	Otter Trawl	OPEN	all	MA	sm	11	2,448.1	1,201.8	7	1,804.4	317.6	6	1,070.8	245.9
6	Otter Trawl	OPEN	all	MA	lg	6	339.0	241.0	2	83.9	47.8	5	305.6	170.9
7	Otter Trawl	OPEN	all	NE	sm	8	1,756.3	1,106.0	9	2,731.6	555.5	11	1,079.9	410.1
8	Otter Trawl	OPEN	all	NE	lg	2	80.4	0.8	1	50.4	0.0	< 1	1.7	0.0
9	Otter Trawl, Scallop	AA	GEN	MA	sm									
10	Otter Trawl, Scallop	AA	GEN	MA	lg									
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm									
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg									
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg									
16	Otter Trawl, Twin	OPEN	all	MA	sm	33	16.0	118.1	22	28.3	27.9			
17	Otter Trawl, Twin	OPEN	all	MA	lg									
18	Otter Trawl, Twin	OPEN	all	NE	sm				50	15.2	24.0			
19	Otter Trawl, Ruhle	OPEN	all	MA	sm									
20	Otter Trawl, Ruhle	OPEN	all	MA	lg									
21	Otter Trawl, Ruhle	OPEN	all	NE	sm									
22	Otter Trawl, Ruhle	OPEN	all	NE	lg									
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg									
24	Otter Trawl, Shrimp	OPEN	all	MA	sm	33	4.0	0.0						
25	Otter Trawl, Shrimp	OPEN	all	NE	sm									
26	Otter Trawl, Other	OPEN	all	MA	sm									
27	Otter Trawl, Other	OPEN	all	MA	lg									
28	Otter Trawl, Other	OPEN	all	NE	sm									
29	Otter Trawl, Other	OPEN	all	NE	lg									

Species Group: TILEFISH

						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
30	Floating Trap	OPEN	all	MA	all									
31	Floating Trap	OPEN	all	NE	all									
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm							1	12.9	5.3
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	1	151.7	0.0						
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl									
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm									
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg									
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	5	414.0	28.2	3	260.7	76.6	7	322.4	62.3
38	Purse Seine	OPEN	all	MA	all									
39	Purse Seine	OPEN	all	NE	all									
40	Dredge, Scallop	AA	GEN	MA	all									
41	Dredge, Scallop	AA	GEN	NE	all									
42	Dredge, Scallop	AA	LIM	MA	all									
43	Dredge, Scallop	AA	LIM	NE	all									
44	Dredge, Scallop	OPEN	GEN	MA	all									
45	Dredge, Scallop	OPEN	GEN	NE	all									
46	Dredge, Scallop	OPEN	LIM	MA	all									
47	Dredge, Scallop	OPEN	LIM	NE	all									
48	Danish Seine	OPEN	all	MA	all									
49	Danish Seine	OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single	all	all	NE	sm									
51	Trawl, Midwater Paired&Single	AA	all	NE	sm									
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm									
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm									
54	Pots and Traps, Other	OPEN	all	MA	all									
55	Pots and Traps, Other	OPEN	all	NE	all									
56	Pots and Traps, Fish	OPEN	all	MA	all				10	0.0	2.5			
57	Pots and Traps, Fish	OPEN	all	NE	all									
58	Pots and Traps, Conch	OPEN	all	MA	all									
59	Pots and Traps, Conch	OPEN	all	NE	all									
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	22	28.2	0.0	11	34.2	0.0	8	18.8	13.3
62	Pots and Traps, Lobster	OPEN	all	NE	all									

Species Group: TILEFISH														
						SBRM 2018			SBRM 2019			SBRM 2020		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	% Trips	Kept	Discarded	% Trips	Kept	Discarded	% Trips	Kept	Discarded
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all									
65	Pots and Traps, Crab	OPEN	all	NE	all									
66	Beam Trawl	OPEN	all	MA	sm									
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all									
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all									
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all									
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all									
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm									
Total						7	108,525.9	3,278.4	6	133,673.4	1,114.2	5	195,291.1	1,305.4

Table 11. Observed encounters with turtles for Standardized Bycatch Reporting Methodology Year 2018 (July 2016 – June 2017). Cc = Loggerhead (*Caretta caretta*), Lk = Kemp's ridley (*Lepidochelys kempii*), Dc = Leatherback (*Dermochelys coriacea*), Cm = Green (*Chelonia mydas*), Unk = Unidentified hard-shelled species.

Gear Type	Turtle Species			
	Cc	Lk	Dc	Cm
Scallop Dredge	0	1	0	0
Sink Gillnet	2	0	2	0
Bottom Otter Trawl (includes Scallop Trawl and Twin Trawl)	5	3	1	1
Total	9	4	3	1

Table 12. Observed encounters with turtles for Standardized Bycatch Reporting Methodology Year 2019 (July 2017 – June 2018). Cc = Loggerhead (*Caretta caretta*), Lk = Kemp's ridley (*Lepidochelys kempii*), Dc = Leatherback (*Dermochelys coriacea*), Cm = Green (*Chelonia mydas*), Unk = Unidentified hard-shelled species.

Gear Type	Turtle Species				
	Cc	Lk	Dc	Cm	Unk
Scallop Dredge	0	0	0	0	0
Sink Gillnet	1	4	0	2	1
Bottom Otter Trawl (includes Scallop Trawl and Twin Trawl)	6	3	1	1	0
Total	8	7	1	3	2

Table 13. Observed encounters with turtles for Standardized Bycatch Reporting Methodology Year 2020 (July 2018 – June 2019). Cc = Loggerhead (*Caretta caretta*), Lk = Kemp's ridley (*Lepidochelys kempii*), Dc = Leatherback (*Dermochelys coriacea*), Cm = Green (*Chelonia mydas*), Unk = Unidentified hard-shelled species.

Gear Type	Turtle Species				
	Cc	Lk	Dc	Cm	Unk
Scallop Dredge	2	0	0	0	0
Sink Gillnet	5	1	0	0	2
Bottom Otter Trawl (includes Scallop Trawl and Twin Trawl)	9	1	1	0	0
Total	16	2	1	0	2

Table 14. Observed turtles in older time periods which informed sea days in either Standardized Bycatch Reporting Methodology (SBRM) years 2018, 2019, or 2020. Cc = Loggerhead (*Caretta caretta*), Lk = Kemp's ridley (*Lepidochelys kempii*), Dc = Leatherback (*Dermochelys coriacea*), Cm = Green (*Chelonia mydas*), Unk = Unidentified hard-shelled species.

Gear Type	SBRM Year	Time frame	Reference	Cc	Lk	Dc	Cm	Unk
Sink Gillnet	2018, 2019, 2020	January 2012 – December 2016	Murray 2018	27	7	2	0	8
Bottom Otter Trawl (includes Scallop Trawl and Twin Trawl)	2018, 2019	January 2009 – December 2013	Murray 2015a	101	1	4	2	1
Bottom Otter Trawl (includes Scallop Trawl and Twin Trawl)	2020	January 2014 – December 2018	Murray 2020	50	5	3	2	0

Table 15. Vessel Trip Report landings (kept, live lb), estimated discards (live lb) and associated coefficient of variation (CV) for 14 Standardized Bycatch Reporting Methodology (SBRM) species groups for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). These CVs were not used in annual SBRM sample size analyses.

	SBRM 2018			SBRM 2019			SBRM 2020		
Species Group	Kept	Discarded	CV	Kept	Discarded	CV	Kept	Discarded	CV
ATLANTIC SALMON (<i>Salmo salar</i>)	0	0		0	0		0	0	
BLUEFISH (<i>Pomatomus saltatrix</i>)	1,980,046	217,699	0.271	1,032,178	48,077	0.221	724,128	67,013	0.209
FLUKE (<i>Paralichthys dentatus</i>) - SCUP (<i>Stenotomus chrysops</i>) - BLACK SEA BASS (<i>Centropristis striata</i>)	20,650,313	9,454,300	0.096	19,452,630	11,218,437	0.106	19,132,394	9,258,768	0.105
HERRING, ATLANTIC (<i>Clupea harengus</i>)	119,525,863	153,808	0.572	100,924,325	259,401	0.280	80,721,985	201,646	0.301
LARGE MESH GROUND FISH	33,185,704	6,177,690	0.073	35,672,793	4,348,118	0.057	42,234,207	4,646,818	0.073
MONKFISH (<i>Lophius americanus</i>)	17,715,918	11,242,466	0.071	20,743,019	14,404,915	0.070	20,076,595	16,167,473	0.086
RED DEEPSEA CRAB (<i>Chaceon quinque-dens</i>)	3,331,410	1,652,662	0.231	3,450,685	1,615,276	0.268	4,055,401	1,066,977	0.217
SEA SCALLOP (<i>Placopecten magellanicus</i>)	399,231,522	40,654,689	0.094	427,467,223	20,802,709	0.141	496,705,975	28,801,698	0.078
SKATE COMPLEX (Rajidae)	26,846,467	61,440,218	0.055	26,721,234	56,285,022	0.055	28,200,173	48,208,383	0.077
SMALL MESH GROUND FISH	13,689,590	3,950,430	0.159	12,093,365	3,265,639	0.115	12,304,551	5,495,201	0.103
SPINY DOGFISH (<i>Squalus acanthias</i>)	22,820,200	12,978,486	0.104	14,731,599	9,262,266	0.105	15,292,543	11,043,563	0.095
SQUID (<i>Doryteuthis [Amerigo] pealeii</i> , <i>Illex illecebrosus</i>) - BUTTERFISH (<i>Peprilus triacanthus</i>) - MACKEREL (<i>Scomber scombrus</i>)	70,781,689	4,445,115	0.140	106,302,138	5,368,926	0.154	96,764,724	9,962,041	0.177
SURFCLAM (<i>Spisula solidissima</i>) - OCEAN QUAHOG (<i>Arctica islandica</i>)	455,286,545	1,806,938	0.563	450,290,855	1,639,066	0.677	432,692,890	1,483,588	0.635
TILEFISH	1,317,949	31,614	0.249	1,509,866	8,202	0.207	1,463,207	17,780	0.220

Table 16. Vessel Trip Report landings (kept, live lb), estimated discards (live lb), and associated coefficient of variation (CV) for the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups combined, by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Light shading indicates confidential fleets. Dark shading indicates fleets not considered, and blanks indicate fleets with no observer data in annual SBRM analyses. These CVs were not used in annual SBRM sample size analyses. See Table 4 for fleet stratification abbreviations.

						SBRM 2018			SBRM 2019			SBRM 2020		
Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Kept	Discarded	CV	Kept	Discarded	CV	Kept	Discarded	CV
1	Longline, Bottom	OPEN	all	MA	all	1,643,691	214,605	0.666	1,576,176	19,376	0.426	1,505,392	105,462	0.435
2	Longline, Bottom	OPEN	all	NE	all	6,336,502	757,063	0.907	4,309,280	490,600	0.239	4,116,046	297,158	0.141
3	Hand Line	OPEN	all	MA	all	327,239	6,229	0.694	261,958	54,278	0.349	237,011	27,151	0.615
4	Hand Line	OPEN	all	NE	all	2,222,016	6,599	0.588	2,306,305	206,256	0.256	1,134,573	76,889	0.176
5	Otter Trawl	OPEN	all	MA	sm	21,721,179	12,868,811	0.090	41,351,074	11,257,235	0.098	43,672,477	15,772,840	0.079
6	Otter Trawl	OPEN	all	MA	lg	12,888,606	11,710,518	0.096	10,454,308	9,846,170	0.075	11,615,330	6,320,584	0.111
7	Otter Trawl	OPEN	all	NE	sm	61,275,706	12,673,371	0.096	61,973,548	13,098,412	0.080	61,970,392	17,333,236	0.114
8	Otter Trawl	OPEN	all	NE	lg	48,380,632	27,968,037	0.105	52,768,389	20,926,256	0.120	56,839,965	20,176,230	0.164
9	Otter Trawl, Scallop	AA	GEN	MA	sm	38,901	38,484	0.275				40,317		
10	Otter Trawl, Scallop	AA	GEN	MA	lg	273,753	63,982	0.445	387,000			492,781	97,091	0.000
11	Otter Trawl, Scallop	OPEN	GEN	MA	sm	61,744	85,326	0.108						
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	1,308,864	512,012	0.299	251,606	16,209	0.000	25,134		
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									
14	Otter Trawl, Scallop	OPEN	LIM	MA	sm									
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	62,243	152,017	0.000						
16	Otter Trawl, Twin	OPEN	all	MA	sm	1,038,141	408,163	0.139	1,189,225	386,508	0.341			
17	Otter Trawl, Twin	OPEN	all	MA	lg				414,126	115,282	0.302			
18	Otter Trawl, Twin	OPEN	all	NE	sm				152,798	56,142	0.000			
19	Otter Trawl, Ruhle	OPEN	all	MA	sm	273,414								
20	Otter Trawl, Ruhle	OPEN	all	MA	lg				16,834					
21	Otter Trawl, Ruhle	OPEN	all	NE	sm	1,517,081			751,598	458,761	0.119	693,753		
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	180,166	135,917	0.000				70,769		
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	2,805,177	2,048,363	0.141	2,492,141	531,628	0.071	3,105,873	845,295	0.158
24	Otter Trawl, Shrimp	OPEN	all	MA	sm	4,270	40,976	0.000	3,007	875,783	0.660	19,048		
25	Otter Trawl, Shrimp	OPEN	all	NE	sm	194,950			120,435			69,357		
26	Otter Trawl, Other	OPEN	all	MA	sm	114,143								
27	Otter Trawl, Other	OPEN	all	MA	lg									
28	Otter Trawl, Other	OPEN	all	NE	sm	324,228			815,604			1,615,065		
29	Otter Trawl, Other	OPEN	all	NE	lg							123,200		

Table 16, continued. Vessel Trip Report landings (kept, live lb), estimated discards (live lb), and associated coefficient of variation (CV) for the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups combined, by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Light shading indicates confidential fleets. Dark shading indicates fleets not considered, and blanks indicate fleets with no observer data in annual SBRM analyses. These CVs were not used in annual SBRM sample size analyses. See Table 4 for fleet stratification abbreviations.

						SBRM 2018			SBRM 2019			SBRM 2020			
Fleet Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	Kept	Discarded	CV	Kept	Discarded	CV	Kept	Discarded	CV
30	Floating Trap		OPEN	all	MA	all							794		
31	Floating Trap		OPEN	all	NE	all	10,504			13,381			4,384		
32	Gillnet, Sink, Anchor, Drift		OPEN	all	MA	sm	2,312,035	220,692	0.350	1,283,012	300,978	0.173	2,944,604	100,853	0.150
33	Gillnet, Sink, Anchor, Drift		OPEN	all	MA	lg	6,378,608	291,561	0.124	2,952,510	106,811	0.181	3,989,963	164,518	0.193
34	Gillnet, Sink, Anchor, Drift		OPEN	all	MA	xl	5,163,692	988,738	0.107	5,695,211	973,527	0.254	5,363,696	333,568	0.144
35	Gillnet, Sink, Anchor, Drift		OPEN	all	NE	sm	20,740	2,104	0.000	2,386			0	0	
36	Gillnet, Sink, Anchor, Drift		OPEN	all	NE	lg	8,736,042	787,151	0.287	6,846,983	1,437,391	0.188	5,622,718	953,781	0.226
37	Gillnet, Sink, Anchor, Drift		OPEN	all	NE	xl	17,442,003	3,033,635	0.081	18,055,328	3,077,307	0.104	20,651,805	2,726,341	0.159
38	Purse Seine		OPEN	all	MA	all	0			0			11		
39	Purse Seine		OPEN	all	NE	all	49,967,871	9,849	0.658	48,831,365	151	0.441	37,651,756	111	0.780
40	Dredge, Scallop		AA	GEN	MA	all	4,739,975	1,370,172	0.243	1,884,391	133,198	0.252	6,621,185	788,752	0.214
41	Dredge, Scallop		AA	GEN	NE	all	4,451,449	603,842	0.128	3,717,758	280,438	0.174	6,342,177	598,032	0.120
42	Dredge, Scallop		AA	LIM	MA	all	69,222,452	14,939,000	0.125	58,137,895	3,895,464	0.092	74,745,881	3,344,796	0.151
43	Dredge, Scallop		AA	LIM	NE	all	110,358,100	30,139,849	0.111	150,726,183	18,442,255	0.068	262,552,802	39,023,138	0.063
44	Dredge, Scallop		OPEN	GEN	MA	all	12,051,591	2,963,912	0.097	10,385,800	2,178,865	0.075	5,875,383	1,806,593	0.096
45	Dredge, Scallop		OPEN	GEN	NE	all	7,541,948	1,237,260	0.148	7,611,759	1,427,942	0.146	7,260,523	765,555	0.188
46	Dredge, Scallop		OPEN	LIM	MA	all	56,629,542	6,052,295	0.096	45,136,451	4,216,148	0.142	27,736,180	2,961,081	0.153
47	Dredge, Scallop		OPEN	LIM	NE	all	126,866,058	14,878,759	0.088	147,211,797	24,885,953	0.122	103,120,758	13,002,915	0.109
48	Danish Seine		OPEN	all	MA	all									
49	Danish Seine		OPEN	all	NE	all									
50	Trawl, Midwater Paired&Single		all	all	NE	sm				56,144,411	11,052	0.614	40,356,096	115,936	0.897
51	Trawl, Midwater Paired&Single		AA	all	NE	sm	6,651,575	7,665	0.260						
52	Trawl, Midwater Paired&Single		OPEN	all	MA	sm	3,987,192	9,011	0.733	16,098,715	78,157	0.586			
53	Trawl, Midwater Paired&Single		OPEN	all	NE	sm	66,193,957	135,248	0.683						
54	Pots and Traps, Other		OPEN	all	MA	all									
55	Pots and Traps, Other		OPEN	all	NE	all				8,744			9,625		
56	Pots and Traps, Fish		OPEN	all	MA	all	335,852	145,960	0.256	285,501	99,688	0.168	346,797	196,076	0.270
57	Pots and Traps, Fish		OPEN	all	NE	all	181,143	166,258	0.179	282,389	181,105	0.408	264,450	166,961	0.286

Table 16, continued. Vessel Trip Report landings (kept, live lb), estimated discards (live lb), and associated coefficient of variation (CV) for the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups combined, by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Light shading indicates confidential fleets. Dark shading indicates fleets not considered, and blanks indicate fleets with no observer data in annual SBRM analyses. These CVs were not used in annual SBRM sample size analyses. See Table 4 for fleet stratification abbreviations.

						SBRM 2018			SBRM 2019			SBRM 2020		
Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Kept	Discarded	CV	Kept	Discarded	CV	Kept	Discarded	CV
58	Pots and Traps, Conch	OPEN	all	MA	all	7,292	92	0.899	120	441	0.631	3,865	398	0.385
59	Pots and Traps, Conch	OPEN	all	NE	all	1,077	442	0.599	1,402	1,013	0.647	462,527	1,369	1.034
60	Pots and Traps, Hagfish	OPEN	all	NE	all									
61	Pots and Traps, Lobster	OPEN	all	MA	all	177,963	76,912	1.148	118,041	126,457	0.651	128,598	8,530	0.342
62	Pots and Traps, Lobster	OPEN	all	NE	all	50,383	104,075	0.659	67,833	350,146	2.139	182,463	540,185	0.802
63	Weir	OPEN	all	NE	all									
64	Pots and Traps, Crab	OPEN	all	MA	all	305,231	183,508	0.398	241,029	153,115	0.126	89,060	36,221	0.120
65	Pots and Traps, Crab	OPEN	all	NE	all	2,893,361	1,130,605	0.233	3,209,542	1,127,782	0.315	3,812,063	1,003,866	0.230
66	Beam Trawl	OPEN	all	MA	sm	30,000			1,101,402			422,013		
67	Beam Trawl	OPEN	all	MA	lg									
68	Beam Trawl	OPEN	all	NE	lg									
69	Dredge, Other	OPEN	all	MA	all	0			170			0		
70	Dredge, Other	OPEN	all	NE	all									
71	Dredge, Urchin	OPEN	all	NE	all							0		
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	241,345,504	2,399,228	0.429	256,425,795	2,489,891	0.453	246,539,038	2,892,091	0.342
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	216,577,371	1,442,160	0.247	195,241,703	4,211,884	0.198	187,444,910	2,725,981	0.210
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	2,074	703,626	0.211						
Confidential fleets						2,148,638	492,031	0.178	660,365			11,959,924	1,111,365	0.147
Other minor fleets						589,348			417,127			516,243		
TOTAL						1,186,363,217	154,206,116	0.036	1,220,391,910	128,526,054	0.038	1,250,368,773	136,420,948	0.038

Note: There was a single confidential fleet with observer data in SBRM 2019; to prevent exposing confidential information, the discard estimate for this fleet has been aggregated into "Other minor fleets"

Table 17. Standardized Bycatch Reporting Methodology (SBRM) sea day standard (Step 5 Sea Days Needed COMBINED), sea days allocated (Step 12 Sea Day Allocated for April-March), and observed days for April-March by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Industry-funded scallop (IFS) fleets are not shown by fleet. Totals are for all fleets (agency-funded and industry-funded scallop fleets combined), and subtotals for agency-funded and IFS fleets are given. Dark gray shading indicates fleets not considered in the annual SBRM analyses. Yellow shading indicates fleets in which sea days were reduced via the prioritization process because of a shortfall in funding. Orange shading indicates fleets in which the next largest sea day values were used but no prioritization occurred. Light gray shading indicates fleets with Northeast Fisheries Observer Program limitations; ASM = At-sea Monitoring; MMPA = Marine Mammal Protection Act. See Table 4 for fleet stratification abbreviations.

						SBRM 2018			SBRM 2019			SBRM 2020		
Fleet						Step 5	Step 12		Step 5	Step 12		Step 5	Step 12	In-progress
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	2018 Sea Days Needed COMBINED	Sea Days Allocated for April 2018 - March 2019 (TOTAL)	Observed Days April 2018-March 2019	2019 Sea Days Needed COMBINED	Sea Days Allocated for April 2019 - March 2020 (TOTAL)	Observed Days April 2019-March 2020	2020 Sea Days Needed COMBINED	Sea Days Allocated for April 2020 - March 2021 (TOTAL)	Observed Days April 2020-March 2021
1	Longline, Bottom	OPEN	all	MA	all	84	84	122	107	107	89	84	84	
2	Longline, Bottom	OPEN	all	NE	all	53	53	56	35	35	31	17	17	
3	Hand Line	OPEN	all	MA	all	75	75	51	14	14	34	14	14	
4	Hand Line	OPEN	all	NE	all	13	13	83	13	13	72	13	13	
5	Otter Trawl	OPEN	all	MA	sm	1670	1670	1202	2169	1557	1445	1122	643	
6	Otter Trawl	OPEN	all	MA	lg	1477	1477	521	1072	1072	762	753	364	
7	Otter Trawl	OPEN	all	NE	sm	1105	1105	1155	740	740	842	988	988	
8	Otter Trawl	OPEN	all	NE	lg	565	565	907	1590	1590	1317	840	594	
16	Otter Trawl, Twin	OPEN	all	MA	sm	58	58	44	55	55	22	51	51	
17	Otter Trawl, Twin	OPEN	all	MA	lg	14	14	4	13	13	3	6	6	
18	Otter Trawl, Twin	OPEN	all	NE	sm	67	67	30	16	16	7	22	22	
20	Otter Trawl, Ruhle	OPEN	all	MA	lg				6	6	0	15	15	
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	15	15	4			8	9	9	
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	107	107	53	105	105	62	102	102	
30	Floating Trap	OPEN	all	MA	all	9	0		6	0		6	0	
31	Floating Trap	OPEN	all	NE	all	6	0		12	0		21	0	
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	528	528	255	341	341	241	288	288	
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	217	217	220	207	207	205	387	387	
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	142	142	159	339	339	236	212	212	
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	8	8	0	6	6	11	3	3	
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	405	405	300	181	181	164	225	225	
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	105	105	241	180	180	170	209	209	
38	Purse Seine	OPEN	all	MA	all	7	0		6	0	0	6	0	
39	Purse Seine	OPEN	all	NE	all	18	18	23	19	19	7	14	14	
50	Trawl, Midwater Paired&Single	all	all	NE	sm				42	42	54	31	31	
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	43	43	0						
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	16	16	3	38	38	7	13	13	
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	44	44	41						
56	Pots and Traps, Fish	OPEN	all	MA	all	12	12	11	12	12	8	13	13	
57	Pots and Traps, Fish	OPEN	all	NE	all	9	9	15	9	9	9	15	15	
58	Pots and Traps, Conch	OPEN	all	MA	all	12	12	12	12	12	9	13	13	
59	Pots and Traps, Conch	OPEN	all	NE	all	9	9	9	12	12	9	12	12	
60	Pots and Traps, Hagfish	OPEN	all	NE	all	94	94	0	133	133	78			
61	Pots and Traps, Lobster	OPEN	all	MA	all	16	16	19	19	19	24	20	20	
62	Pots and Traps, Lobster	OPEN	all	NE	all	17	17	18	17	17	17	255	255	

Table 17, continued. Standardized Bycatch Reporting Methodology (SBRM) sea day standard (Step 5 Sea Days Needed COMBINED), sea days allocated (Step 12 Sea Day Allocated for April-March), and observed days for April-March by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Industry-funded scallop (IFS) fleets are not shown by fleet. Totals are for all fleets (agency-funded and industry-funded scallop fleets combined), and subtotals for agency-funded and IFS fleets are given. Dark gray shading indicates fleets not considered in the annual SBRM analyses. Yellow shading indicates fleets in which sea days were reduced via the prioritization process because of a shortfall in funding. Orange shading indicates fleets in which the next largest sea day values were used but no prioritization occurred. Light gray shading indicates fleets with Northeast Fisheries Observer Program limitations; ASM = At-sea Monitoring; MMPA = Marine Mammal Protection Act. See [Table 4](#) for fleet stratification abbreviations.

						SBRM 2018			SBRM 2019			SBRM 2020		
Fleet						Step 5	Step 12		Step 5	Step 12		Step 5	Step 12	In-progress
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	2018 Sea Days Needed COMBINED	Sea Days Allocated for April 2018 - March 2019 (TOTAL)	Observed Days April 2018-March 2019	2019 Sea Days Needed COMBINED	Sea Days Allocated for April 2019 - March 2020 (TOTAL)	Observed Days April 2019-March 2020	2020 Sea Days Needed COMBINED	Sea Days Allocated for April 2020 - March 2021 (TOTAL)	Observed Days April 2020-March 2021
63	Weir	OPEN	all	NE	all	3	0		3	0	0			
64	Pots and Traps, Crab	OPEN	all	MA	all	30	30	28	29	29	0	22	22	
65	Pots and Traps, Crab	OPEN	all	NE	all	80	80	101	90	90	116	79	79	
71	Dredge, Urchin	OPEN	all	NE	all	3	0		6	0		3	0	
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	24	24	31	24	24	38	33	33	
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	151	151	131	35	35	43	428	42	
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	208	208	0			0			
Total						10568			9304			7666		
Agency-funded fleet subtotal						7519	7491	5849	7713	7068	6140	6344	4808	
Industry-funded scallop fleet subtotal (IFS fleets not shown)						3049	4101	3365	1591	3711	2887	1322	1890	
TOTAL (excludes ASM days, MMPA days, and prioritized days not allocated)							11592	9214		10779	9027		6698	

Note: the total for “Observed Days April 2018-March 2019” (SBRM 2018) does not include 3 observed sea days conducted erroneously in the New England shrimp trawl fleet and the total for “Observed Days April 2019 – March 2020” (SBRM 2019) does not include 4 observed sea days which could not be associated with an SBRM fleet because of missing mesh size.

Table 18. Average annual and 5 year pooled estimates with coefficient of variation (CV) of turtle interactions by gear type. Cc = Loggerhead (*Caretta caretta*), Lk = Kemp's ridley (*Lepidochelys kempii*), Dc = Leatherback (*Dermochelys coriacea*), Cm = Green (*Chelonia mydas*), Unk = unidentified hard-shelled species.

Gear Type	Year	Average Annual Estimate	5 Year Estimate	CV	Species	Region	Reference
Sink Gillnet	2012-2016	141	705	0.29	Cc	Mid-Atlantic & Georges Bank (combined)	Murray 2018
Sink Gillnet	2012-2016	29	145	0.43	Lk	Mid-Atlantic & Georges Bank (combined)	Murray 2018
Sink Gillnet	2012-2016	5	27	0.71	Dc	Mid-Atlantic & Georges Bank (combined)	Murray 2018
Sink Gillnet	2012-2016	22	112	0.37	Unk	Mid-Atlantic & Georges Bank (combined)	Murray 2018
Bottom & Scallop Otter Trawl	2009-2013	231	1156	0.13	Cc	Mid-Atlantic	Murray 2015a
Bottom & Scallop Otter Trawl	2014-2018	114	571	0.29	Cc	Mid-Atlantic	Murray 2020
Bottom & Scallop Otter Trawl	2014-2018	9	46	0.45	Lk	Mid-Atlantic	Murray 2020
Bottom & Scallop Otter Trawl	2014-2018	4	20	0.72	Dc	Mid-Atlantic	Murray 2020
Bottom & Scallop Otter Trawl	2014-2018	3	17	0.73	Cm	Mid-Atlantic	Murray 2020
Bottom & Scallop Otter Trawl	2014-2018	2	12	0.70	Cc	Georges Bank	Murray 2020
Bottom & Scallop Otter Trawl	2014-2018	1	6	1.0	Dc	Georges Bank	Murray 2020

Table 19. Estimated sea day needs/year to monitor loggerhead turtle (*Caretta caretta*) interactions to achieve a 30% coefficient of variation by Standardized Bycatch Reporting Methodology year.

Gear Type	Sea Days 2018	Sea Days 2019	Sea Days 2020	Reference
Sink Gillnet	887	887	887	Murray 2018
Bottom Otter Trawl (includes Scallop Trawl)	3,309	3,309	2,668	Murray 2015a, 2020

Table 20. Number of cells (fleet-species group) by Standardized Bycatch Reporting Methodology (SBRM) performance classification (“Not Applicable,” “Unknown,” “Met [filtered out],” “Not Met [filtered out],” “Met,” and “Not Met”) for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). The performance classifications corresponding to the associated box number used in [Figure 14](#) are given. CV = coefficient of variation. Erroneous fleets included in “Not Applicable.”

SBRM Performance Classification	Number of cells (fleet and species group)			Box # used in Figure 14
	SBRM 2018	SBRM 2019	SBRM 2020	
NOT APPLICABLE: SBRM performance standard was not applicable. Variance of discard estimate was not available. Not considered in annual SBRM analysis.	308	350	364	1
UNKNOWN: SBRM performance standard was unknown. Variance of discard estimate was not used in annual sample size analysis because of no or insufficient observer coverage. Pilot coverage.	196	196	154	2, 3 ,4
MET (filtered out): SBRM performance standard was met (CV ≤ 30%). Variance of discard estimate was not used in annual sample size analysis because of the importance filter (filtered out). Nonpilot coverage.	303	271	306	5, 7b
NOT MET (filtered out): SBRM performance standard was not met (CV > 30%). Variance of discard estimate was not used in annual sample size analysis because of the importance filter (filtered out). Nonpilot coverage.	174	170	163	7a
MET: SBRM performance standard was met (CV ≤ 30%). Variance of discard estimate was used in annual sample size analysis. Nonpilot coverage.	44	43	44	9
NOT MET: SBRM performance standard was not met (CV > 30%). Variance of discard was used in annual sample size analysis. Nonpilot coverage.	11	6	5	8
Total (14 SBRM species groups x 74 fleets)	1036	1036	1036	

Table 21. Number of fleets by Standardized Bycatch Reporting Methodology (SBRM) performance classifications and SBRM species groups for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). "NOT APPLICABLE" indicates fleets not considered in annual SBRM analyses; "UNKNOWN" indicates the coefficient of variation (CV) was unknown because of insufficient observer coverage (pilot fleets); "MET" indicates the CV was less than or equal to 30% or discard equal 0; "NOT MET" indicates the CV was greater than 30%. "FILTERED OUT" indicates nonpilot cells where the variance of the discard estimate was not used in the annual SBRM sample size analyses because of the importance filter. Erroneous fleets included in "Not Applicable."

Species Group	SBRM Performance Classification	SBRM 2018	SBRM 2019	SBRM 2020
ATLANTIC SALMON (<i>Salmo salar</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	0	0	0
	NOT MET	0	0	0
	FILTERED OUT	38	35	37
BLUEFISH (<i>Pomatomus saltatrix</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	0	0	0
	NOT MET	0	0	0
	FILTERED OUT	38	35	37
FLUKE (<i>Paralichthys dentatus</i>) - SCUP (<i>Stenotomus chrysops</i>) - BLACK SEA BASS (<i>Centropristis striata</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	6	5	4
	NOT MET	1	0	1
	FILTERED OUT	31	30	32
HERRING, ATLANTIC (<i>Clupea harengus</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	0	0	0
	NOT MET	0	0	0
	FILTERED OUT	38	35	37
LARGE MESH GROUND FISH	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	5	4	5
	NOT MET	0	0	0
	FILTERED OUT	33	31	32
MONKFISH (<i>Lophius americanus</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	8	8	9
	NOT MET	2	2	1
	FILTERED OUT	28	25	27
RED DEEPSEA CRAB (<i>Chaceon quinquedens</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	1	0	1
	NOT MET	3	2	0
	FILTERED OUT	34	33	36
SEA SCALLOP (<i>Placopecten magellanicus</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	2	1	1
	NOT MET	0	1	0
	FILTERED OUT	36	33	36

Table 21, continued. Number of fleets by Standardized Bycatch Reporting Methodology (SBRM) performance classifications and SBRM species groups for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). "NOT APPLICABLE" indicates fleets not considered in annual SBRM analyses; "UNKNOWN" indicates the coefficient of variation (CV) was unknown because of insufficient observer coverage (pilot fleets); "MET" indicates the CV was less than or equal to 30% or discard equal 0; "NOT MET" indicates the CV was greater than 30%. "FILTERED OUT" indicates nonpilot cells where the variance of the discard estimate was not used in the annual SBRM sample size analyses because of the importance filter. Erroneous fleets included in "Not Applicable."

Species Group	SBRM Performance Classification	SBRM 2018	SBRM 2019	SBRM 2020
SKATE COMPLEX (Rajidae)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	13	12	11
	NOT MET	0	0	0
	FILTERED OUT	25	23	26
SMALL MESH GROUND FISH	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	3	5	4
	NOT MET	0	0	0
	FILTERED OUT	35	30	33
SPINY DOGFISH (<i>Squalus acanthias</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	4	7	7
	NOT MET	5	1	3
	FILTERED OUT	29	27	27
SQUID (<i>Doryteuthis [Amerigo] pealeii</i> , <i>Illex illecebrosus</i>) - BUTTERFISH (<i>Peprilus triacanthus</i>) - MACKEREL (<i>Scomber scombrus</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	2	1	2
	NOT MET	0	0	0
	FILTERED OUT	36	34	35
SURFCLAM (<i>Spisula solidissima</i>) - OCEAN QUAHOG (<i>Arctica islandica</i>)	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	0	0	0
	NOT MET	0	0	0
	FILTERED OUT	38	35	37
TILEFISH	NOT APPLICABLE	22	25	26
	UNKNOWN	14	14	11
	MET	0	0	0
	NOT MET	0	0	0
	FILTERED OUT	38	35	37

Table 22. Number of Standardized Bycatch Reporting Methodology (SBRM) species groups by SBRM performance classification (Unknown, Met, and Not Met) by SBRM fleets for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Dark shading indicates fleets not considered in annual SBRM analyses (“Not Applicable”); “UNK” indicates the coefficient of variation (CV) was unknown because of insufficient observer coverage (pilot fleets); “MET” indicates the CV was less than or equal to 30% or discards equal 0; “NOT MET” indicates the CV was greater than 30%. “Filtered out” indicates nonpilot cells where the variance of the discard estimate was not used in the annual SBRM sample size analyses because of the importance filter. Erroneous fleets are excluded. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Unk	Not Met	Met	Filtered out	Unk	Not Met	Met	Filtered out	Unk	Not Met	Met	Filtered out
1	Longline, Bottom	OPEN	all	MA	all	0	0	0	14	0	0	0	14	0	0	0	14
2	Longline, Bottom	OPEN	all	NE	all	0	1	0	13	0	0	1	13	0	0	1	13
3	Hand Line	OPEN	all	MA	all	14	0	0	0	0	0	0	14	0	0	0	14
4	Hand Line	OPEN	all	NE	all	0	0	0	14	0	0	0	14	0	0	0	14
5	Otter Trawl	OPEN	all	MA	sm	0	1	6	7	0	1	4	9	0	0	7	7
6	Otter Trawl	OPEN	all	MA	lg	0	1	4	9	0	0	4	10	0	0	4	10
7	Otter Trawl	OPEN	all	NE	sm	0	1	5	8	0	0	6	8	0	0	6	8
8	Otter Trawl	OPEN	all	NE	lg	0	1	6	7	0	1	5	8	0	0	6	8
10	Otter Trawl, Scallop	AA	GEN	MA	lg	14	0	0	0	14	0	0	0	14	0	0	0
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	0	0	0	14	14	0	0	0	14	0	0	0
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg									14	0	0	0
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	14	0	0	0								
16	Otter Trawl, Twin	OPEN	all	MA	sm	14	0	0	0	0	0	0	14	0	0	0	14
17	Otter Trawl, Twin	OPEN	all	MA	lg	14	0	0	0	0	0	0	14	14	0	0	0
18	Otter Trawl, Twin	OPEN	all	NE	sm	0	0	0	14	14	0	0	0	0	0	0	14
20	Otter Trawl, Ruhle	OPEN	all	MA	lg					14	0	0	0	14	0	0	0
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	14	0	0	0					14	0	0	0
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	14	0	0	0	14	0	0	0	0	0	1	13
30	Floating Trap	OPEN	all	MA	all	14	0	0	0	14	0	0	0	14	0	0	0
31	Floating Trap	OPEN	all	NE	all	14	0	0	0	14	0	0	0	14	0	0	0
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	0	1	0	13	0	0	1	13	0	0	0	14
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	0	0	1	13	0	0	0	14	0	0	1	13
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	0	0	1	13	0	0	1	13	0	0	0	14
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	14	0	0	0	14	0	0	0	0	0	0	14
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	0	1	0	13	0	0	1	13	0	1	0	13
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	0	0	2	12	0	0	3	11	0	1	2	11
38	Purse Seine	OPEN	all	MA	all	14	0	0	0	14	0	0	0	14	0	0	0
39	Purse Seine	OPEN	all	NE	all	0	0	0	14	0	0	0	14	0	0	0	14

Table 22, continued. Number of Standardized Bycatch Reporting Methodology (SBRM) species groups by SBRM performance classification (Unknown, Met, and Not Met) by SBRM fleets for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Dark shading indicates fleets not considered in annual SBRM analyses (“Not Applicable”); “UNK” indicates the coefficient of variation (CV) was unknown because of insufficient observer coverage (pilot fleets); “MET” indicates the CV was less than or equal to 30% or discards equal 0; “NOT MET” indicates the CV was greater than 30%. “Filtered out” indicates nonpilot cells where the variance of the discard estimate was not used in the annual SBRM sample size analyses because of the importance filter. Erroneous fleets are excluded. See Table 4 for fleet stratification abbreviations.

Fleet						SBRM 2018				SBRM 2019				SBRM 2020				
Row	Gear	Type	Access Area	Trip Category	Region	Mesh Group	Unk	Not Met	Met	Filtered out	Unk	Not Met	Met	Filtered out	Unk	Not Met	Met	Filtered out
40	Dredge	Scallop	AA	GEN	MA	all	0	0	0	14	0	0	0	14	0	0	0	14
41	Dredge	Scallop	AA	GEN	NE	all	0	0	0	14	0	0	0	14	0	0	0	14
42	Dredge	Scallop	AA	LIM	MA	all	0	0	3	11	0	0	2	12	0	0	2	12
43	Dredge	Scallop	AA	LIM	NE	all	0	0	5	9	0	0	5	9	0	0	6	8
44	Dredge	Scallop	OPEN	GEN	MA	all	0	0	1	13	0	0	1	13	0	0	1	13
45	Dredge	Scallop	OPEN	GEN	NE	all	0	0	2	12	0	0	0	14	0	0	0	14
46	Dredge	Scallop	OPEN	LIM	MA	all	0	0	2	12	0	0	2	12	0	0	2	12
47	Dredge	Scallop	OPEN	LIM	NE	all	0	1	3	10	0	1	5	8	0	0	2	12
50	Trawl, Midwater Paired&Single	all	all	NE		sm					0	0	0	14	0	0	0	14
51	Trawl, Midwater Paired&Single	AA	all	NE		sm	0	0	0	14								
52	Trawl, Midwater Paired&Single	OPEN	all	MA		sm	0	0	0	14	14	0	0	0	14	0	0	0
53	Trawl, Midwater Paired&Single	OPEN	all	NE		sm	0	0	0	14								
56	Pots and Traps, Fish	OPEN	all	MA		all	0	0	0	14	0	0	0	14	0	0	0	14
57	Pots and Traps, Fish	OPEN	all	NE		all	0	0	1	13	0	0	0	14	0	0	0	14
58	Pots and Traps, Conch	OPEN	all	MA		all	0	0	0	14	0	0	0	14	0	0	0	14
59	Pots and Traps, Conch	OPEN	all	NE		all	0	0	0	14	0	0	0	14	0	0	0	14
60	Pots and Traps, Hagfish	OPEN	all	NE		all	14	0	0	0	14	0	0	0				
61	Pots and Traps, Lobster	OPEN	all	MA		all	0	0	0	14	0	1	0	13	0	0	0	14
62	Pots and Traps, Lobster	OPEN	all	NE		all	0	0	0	14	0	0	0	14	0	1	0	13
63	Weir	OPEN	all	NE		all	14	0	0	0	14	0	0	0				
64	Pots and Traps, Crab	OPEN	all	MA		all	0	1	0	13	14	0	0	0	0	0	0	14
65	Pots and Traps, Crab	OPEN	all	NE		all	0	0	1	13	0	1	0	13	0	0	1	13
71	Dredge	Urchin	OPEN	all	NE	all	14	0	0	0	14	0	0	0	14	0	0	0
72	Dredge	Ocean Quahog/Surfclam	OPEN	all	MA	all	0	0	0	14	0	0	1	13	0	1	0	13
73	Dredge	Ocean Quahog/Surfclam	OPEN	all	NE	all	0	1	1	12	0	1	1	12	0	1	2	11
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA		sm	0	1	0	13								
Total							196	11	44	477	196	6	43	441	154	5	44	469

Table 23. List of fleets and Standardized Bycatch Reporting Methodology (SBRM) species groups with associated coefficient of variation (CV) for which the SBRM performance classification was “Not Met” for nonpilot cells for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See Table 4 for fleet stratification abbreviations and Table 5 for SBRM species group abbreviation.

SBRM Year	Fleet Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Species Group	CV
2018	2	Longline, Bottom	OPEN	all	NE	all	DOG	1.290
2018	5	Otter Trawl	OPEN	all	MA	sm	RCRAB	0.509
2018	6	Otter Trawl	OPEN	all	MA	lg	MONK	0.324
2018	7	Otter Trawl	OPEN	all	NE	sm	DOG	0.310
2018	8	Otter Trawl	OPEN	all	NE	lg	RCRAB	1.105
2018	32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	DOG	0.361
2018	36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	DOG	0.425
2018	47	Dredge, Scallop	OPEN	LIM	NE	all	FSB	0.440
2018	64	Pots and Traps, Crab	OPEN	all	MA	all	RCRAB	0.398
2018	73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	MONK	0.981
2018	74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	DOG	0.403
2019	5	Otter Trawl	OPEN	all	MA	sm	MONK	0.327
2019	8	Otter Trawl	OPEN	all	NE	lg	DOG	0.331
2019	47	Dredge, Scallop	OPEN	LIM	NE	all	SCAL	0.312
2019	61	Pots and Traps, Lobster	OPEN	all	MA	all	RCRAB	0.585
2019	65	Pots and Traps, Crab	OPEN	all	NE	all	RCRAB	0.315
2019	73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	MONK	0.357
2020	36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	DOG	0.343
2020	37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	DOG	0.341
2020	62	Pots and Traps, Lobster	OPEN	all	NE	all	FSB	1.019
2020	72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	MONK	0.362
2020	73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	DOG	0.930

Table 24. Standardized Bycatch Reporting Methodology (SBRM) standard trips needed to achieve a 30% coefficient of variation, Vessel Trip Report (VTR) trips, the percentage of standard trips to the VTR trips, and the determining species group, by fleet and SBRM year. “P” indicates standard trips were based on pilot coverage, Minimum pilot coverage (MPC) indicates that all cells within the fleet were filtered out, and the number of trips is based on pilot coverage to maintain coverage. Dark shading represents fleets not considered in annual analysis. Erroneous fleets are excluded. See Table 4 for fleet stratification abbreviations and Table 5 for species group abbreviations.

Fleet						SBRM Standard Trips			VTR Trips			Percentage of SBRM Standard Trips to VTR trips			SBRM Species Group (FISH)		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	2018 SBRM	2019 SBRM	2020 SBRM	2018 SBRM	2019 SBRM	2020 SBRM	2018 SBRM	2019 SBRM	2020 SBRM	2018 SBRM	2019 SBRM	2020 SBRM
1	Longline, Bottom	OPEN	all	MA	all	12	12	12	221	119	140	5%	10%	9%	MPC	MPC	MPC
2	Longline, Bottom	OPEN	all	NE	all	50	33	16	1466	932	889	3%	4%	2%	DOG	DOG	DOG
3	Hand Line	OPEN	all	MA	all	71	12	12	3509	3133	3060	2%	<1%	<1%	P	MPC	MPC
4	Hand Line	OPEN	all	NE	all	12	12	12	2722	2761	2175	<1%	<1%	1%	MPC	MPC	MPC
5	Otter Trawl	OPEN	all	MA	sm	1165	633	296	3713	3663	3833	31%	17%	8%	RCRAB	MONK	GFS
6	Otter Trawl	OPEN	all	MA	lg	280	187	148	3602	2722	2763	8%	7%	5%	MONK	MONK	DOG
7	Otter Trawl	OPEN	all	NE	sm	477	296	389	4828	4094	3943	10%	7%	10%	DOG	GFL	SBM
8	Otter Trawl	OPEN	all	NE	lg	2122	555	313	5052	4660	4866	42%	12%	6%	RCRAB	DOG	SKATE
10	Otter Trawl, Scallop	AA	GEN	MA	lg	6	6	6	52	78	100	12%	8%	6%	P	P	P
12	Otter Trawl, Scallop	OPEN	GEN	MA	lg	12	9	3	276	70	17	4%	13%	18%	MPC	P	P
13	Otter Trawl, Scallop	OPEN	GEN	NE	lg			3			5			60%			P
15	Otter Trawl, Scallop	OPEN	LIM	MA	lg	6			10			60%			P		
16	Otter Trawl, Twin	OPEN	all	MA	sm	12	12	12	49	62	50	24%	19%	24%	P	MPC	MPC
17	Otter Trawl, Twin	OPEN	all	MA	lg	12	12	6	132	87	45	9%	14%	13%	P	MPC	P
18	Otter Trawl, Twin	OPEN	all	NE	sm	9	3	3	21	7	10	43%	43%	30%	MPC	P	MPC
20	Otter Trawl, Ruhle	OPEN	all	MA	lg		3	3		12	6		25%	50%		P	P
22	Otter Trawl, Ruhle	OPEN	all	NE	lg	3		3	9		7	33%		43%	P		P
23	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	12	12	12	111	60	57	11%	20%	21%	P	P	MPC/GFL
30	Floating Trap	OPEN	all	MA	all	9	6	6	82	66	14	11%	9%	43%	P	P	P
31	Floating Trap	OPEN	all	NE	all	6	12	12	41	177	80	15%	7%	15%	P	P	P
32	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	398	118	12	2013	1790	1918	20%	7%	1%	DOG	DOG	MPC
33	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	73	12	141	2231	1627	1634	3%	1%	9%	DOG	MPC	DOG
34	Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	32	124	12	1455	1439	1251	2%	9%	1%	SKATE	SKATE	MPC
35	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	6	6	3	6	15	31	100%	40%	10%	P	P	MPC
36	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	292	135	174	2555	2283	1980	11%	6%	9%	DOG	DOG	DOG
37	Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	70	123	148	3104	3069	3203	2%	4%	5%	MONK	MONK	DOG

Table 24, continued. Standardized Bycatch Reporting Methodology (SBRM) standard trips needed to achieve a 30% coefficient of variation, Vessel Trip Report (VTR) trips, the percentage of standard trips to the VTR trips, and the determining species group, by fleet and SBRM year. “P” indicates standard trips were based on pilot coverage, Minimum pilot coverage (MPC) indicates that all cells within the fleet were filtered out, and the number of trips is based on pilot coverage to maintain coverage. Dark shading represents fleets not considered in annual analysis. Erroneous fleets are excluded. See Table 4 for fleet stratification abbreviations and Table 5 for species group abbreviations.

Fleet					SBRM Standard Trips			VTR Trips			Percentage of SBRM Standard Trips to VTR trips			SBRM Species Group (FISH)			
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	2018 SBRM	2019 SBRM	2020 SBRM	2018 SBRM	2019 SBRM	2020 SBRM	2018 SBRM	2019 SBRM	2020 SBRM	2018 SBRM	2019 SBRM	2020 SBRM
38	Purse Seine	OPEN	all	MA	all	7	6	6	190	228	305	4%	3%	2%	P	P	P
39	Purse Seine	OPEN	all	NE	all	9	9	9	223	331	487	4%	3%	2%	MPC	MPC	MPC
40	Dredge, Scallop	AA	GEN	MA	all	12	9	9	800	375	1320	2%	2%	1%	MPC	MPC	MPC
41	Dredge, Scallop	AA	GEN	NE	all	12	3	12	820	748	1281	1%	<1%	1%	MPC	MPC	MPC
42	Dredge, Scallop	AA	LIM	MA	all	47	16	14	757	590	694	6%	3%	2%	MONK	MONK	MONK
43	Dredge, Scallop	AA	LIM	NE	all	51	47	71	919	1185	2212	6%	4%	3%	FSB	GFL	DOG
44	Dredge, Scallop	OPEN	GEN	MA	all	12	12	12	2536	2057	1152	<1%	1%	1%	MPC/SKATE	MPC/SKATE	MPC/SKATE
45	Dredge, Scallop	OPEN	GEN	NE	all	71	12	12	2820	3259	3101	3%	<1%	<1%	MONK	MPC	MPC
46	Dredge, Scallop	OPEN	LIM	MA	all	12	12	18	457	360	272	3%	3%	7%	MPC/MONK	MPC/SKATE	MONK
47	Dredge, Scallop	OPEN	LIM	NE	all	181	96	50	942	911	664	19%	11%	8%	FSB	SCAL	MONK
50	Trawl, Midwater Paired&Single	all	all	NE	sm		12	9		160	153		8%	6%		MPC	MPC
51	Trawl, Midwater Paired&Single	AA	all	NE	sm	9			18			50%			MPC		
52	Trawl, Midwater Paired&Single	OPEN	all	MA	sm	3	9	3	11	43	18	27%	21%	17%	MPC	P	P
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	12			253			5%			MPC		
56	Pots and Traps, Fish	OPEN	all	MA	all	12	12	12	804	823	711	1%	1%	2%	MPC	MPC	MPC
57	Pots and Traps, Fish	OPEN	all	NE	all	9	9	12	708	1132	906	1%	1%	1%	MPC/FSB	MPC	MPC
58	Pots and Traps, Conch	OPEN	all	MA	all	12	12	12	793	798	1051	2%	2%	1%	MPC	MPC	MPC
59	Pots and Traps, Conch	OPEN	all	NE	all	9	12	12	1139	1051	1175	1%	1%	1%	MPC	MPC	MPC
60	Pots and Traps, Hagfish	OPEN	all	NE	all	9	12		23	21		39%	57%		P	P	
61	Pots and Traps, Lobster	OPEN	all	MA	all	12	12	12	1446	1245	1078	1%	1%	1%	MPC	MPC/RCRAB	MPC
62	Pots and Traps, Lobster	OPEN	all	NE	all	12	12	196	27668	28062	26526	<1%	<1%	1%	MPC	MPC	FSB
63	Weir	OPEN	all	NE	all	3	3		12	6		25%	50%		P	P	
64	Pots and Traps, Crab	OPEN	all	MA	all	12	12	6	93	115	14	13%	10%	43%	MPC/RCRAB	P	MPC
65	Pots and Traps, Crab	OPEN	all	NE	all	12	12	12	61	69	107	20%	17%	11%	MPC/RCRAB	MPC/RCRAB	MPC/RCRAB
71	Dredge, Urchin	OPEN	all	NE	all	3	6	3	11	14	10	27%	43%	30%	P	P	P
72	Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	12	12	17	2113	2031	1948	1%	1%	1%	MPC	MPC/MONK	MONK
73	Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	103	24	293	2130	1899	1760	5%	1%	17%	MONK	MONK	DOG
74	Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	32			185			17%			DOG		
Total(Erroneous fleets excluded)						5,837	2,726	2,569	85,192	80,439	79,022	7%	3%	3%			

Table 25. Number of unobserved (Unobs) and observed (Obs) Vessel Trip Report trips, mean trip duration (days), mean kept weight of all species (lb, live weight), and difference of means for each metric (Diff) for fleets with 30 or more observed trips in Standardized Bycatch Reporting Method (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See Table 4 for fleet stratification abbreviations.

Fleet Row Gear Type	Access Area	Trip Category	Region	Mesh Group	SBRM Year	Number of Trips		Mean Trip Duration (days)			Mean Kept Weight of all species (lb)		
						Unobs	Obs	Unobs	Obs	Diff	Unobs	Obs	Diff
2 Longline, Bottom	OPEN	all	NE	all	2019	883	49	1.03	1.18	-0.15	4672	3866	806
2 Longline, Bottom	OPEN	all	NE	all	2020	822	67	1.06	1.04	0.02	4708	3800	908
3 Hand Line	OPEN	all	MA	all	2019	3096	37	1.10	1.03	0.08	147	109	39
4 Hand Line	OPEN	all	NE	all	2019	2698	63	1.09	1.43	-0.34	881	946	-65
5 Otter Trawl	OPEN	all	MA	sm	2018	3293	420	1.83	2.43	-0.59	5881	7667	-1787
5 Otter Trawl	OPEN	all	MA	sm	2019	3206	457	2.17	2.51	-0.33	10841	15933	-5092
5 Otter Trawl	OPEN	all	MA	sm	2020	3280	553	2.18	2.16	0.01	11894	9451	2443
6 Otter Trawl	OPEN	all	MA	lg	2018	3174	428	2.07	2.41	-0.35	3603	3983	-380
6 Otter Trawl	OPEN	all	MA	lg	2019	2362	360	2.41	2.47	-0.06	3982	3800	182
6 Otter Trawl	OPEN	all	MA	lg	2020	2380	383	2.40	2.75	-0.35	4248	4588	-340
7 Otter Trawl	OPEN	all	NE	sm	2018	4418	410	2.28	2.69	-0.41	12108	20230	-8122
7 Otter Trawl	OPEN	all	NE	sm	2019	3549	545	2.47	2.71	-0.24	14432	20133	-5701
7 Otter Trawl	OPEN	all	NE	sm	2020	3589	354	2.52	2.74	-0.22	15539	18257	-2718
8 Otter Trawl	OPEN	all	NE	lg	2018	4466	586	2.80	3.26	-0.46	9565	11067	-1503
8 Otter Trawl	OPEN	all	NE	lg	2019	3912	748	2.84	2.99	-0.15	11317	12717	-1400
8 Otter Trawl	OPEN	all	NE	lg	2020	4051	815	2.65	2.84	-0.19	11590	13363	-1773
32 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	2018	1804	209	1.01	1.00	0.01	1967	2406	-439
32 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	2019	1548	242	1.06	1.04	0.02	1971	1426	545
32 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	2020	1597	321	1.04	1.05	0.00	2187	2655	-468
33 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	2018	2008	223	1.03	1.04	-0.01	3103	3340	-237
33 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	2019	1491	136	1.04	1.10	-0.07	2454	2182	272
33 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	2020	1448	186	1.06	1.04	0.02	2867	3093	-225
34 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	2018	1296	159	1.15	1.27	-0.12	3531	4006	-475
34 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	2019	1323	116	1.17	1.23	-0.06	3971	4427	-455
34 Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xl	2020	1064	187	1.15	1.14	0.01	4297	4552	-255
36 Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	2018	2227	328	1.37	1.51	-0.14	3464	3455	9
36 Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	2019	1968	315	1.33	1.45	-0.12	3114	2808	305
36 Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	2020	1762	218	1.27	1.45	-0.18	2982	2369	613
37 Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	2018	2708	397	1.48	1.59	-0.11	5699	5167	532
37 Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	2019	2606	463	1.45	1.56	-0.10	5964	5494	470
37 Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xl	2020	2933	270	1.40	1.59	-0.20	6452	6501	-49
40 Dredge, Scallop	AA	GEN	MA	all	2018	756	44	1.94	1.89	0.06	5861	7020	-1158
40 Dredge, Scallop	AA	GEN	MA	all	2020	1276	44	1.66	1.59	0.06	4964	6531	-1567
41 Dredge, Scallop	AA	GEN	NE	all	2018	758	62	1.98	1.95	0.03	5280	7247	-1967
41 Dredge, Scallop	AA	GEN	NE	all	2019	718	30	1.84	1.87	-0.03	4916	6267	-1351
41 Dredge, Scallop	AA	GEN	NE	all	2020	1206	75	1.98	1.96	0.02	4867	6298	-1431

Table 25, continued. Number of unobserved (Unobs) and observed (Obs) Vessel Trip Report (VTR) trips, mean trip duration (days), mean kept weight of all species (lb, live weight), and difference of means for each metric (Diff) for fleets with 30 or more observed trips in Standardized Bycatch Reporting Method (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Table 4](#) for fleet stratification abbreviations.

Fleet		Access Area	Trip Category	Region	Mesh Group	SBRM Year	Number of Trips		Mean Trip Duration(days)			Mean Kept Weight of all species (lb)		
Row	Gear Type						Unobs	Obs	Unobs	Obs	Diff	Unobs	Obs	Diff
42	Dredge, Scallop	AA	LIM	MA	all	2018	679	78	7.78	8.77	-0.99	90093	103211	-13118
42	Dredge, Scallop	AA	LIM	MA	all	2019	534	56	6.79	7.09	-0.30	97336	110025	-12689
42	Dredge, Scallop	AA	LIM	MA	all	2020	647	47	6.67	7.00	-0.33	106706	121452	-14746
43	Dredge, Scallop	AA	LIM	NE	all	2018	795	124	8.67	9.02	-0.35	118241	131905	-13664
43	Dredge, Scallop	AA	LIM	NE	all	2019	1029	156	7.36	7.79	-0.44	125534	138157	-12622
43	Dredge, Scallop	AA	LIM	NE	all	2020	1994	218	7.26	7.72	-0.46	117643	128332	-10689
44	Dredge, Scallop	OPEN	GEN	MA	all	2018	2424	112	1.93	1.85	0.09	4721	5608	-888
44	Dredge, Scallop	OPEN	GEN	MA	all	2019	1961	96	1.66	1.73	-0.07	5018	5858	-840
44	Dredge, Scallop	OPEN	GEN	MA	all	2020	1104	48	1.66	1.60	0.05	5078	5623	-545
45	Dredge, Scallop	OPEN	GEN	NE	all	2018	2739	81	1.52	1.80	-0.28	2641	4483	-1842
45	Dredge, Scallop	OPEN	GEN	NE	all	2019	3194	65	1.36	2.02	-0.65	2236	7315	-5078
45	Dredge, Scallop	OPEN	GEN	NE	all	2020	3061	40	1.32	1.55	-0.23	2328	3910	-1582
46	Dredge, Scallop	OPEN	LIM	MA	all	2018	418	39	9.18	10.18	-1.00	121496	149852	-28356
46	Dredge, Scallop	OPEN	LIM	MA	all	2019	329	31	8.51	8.39	0.12	125245	126812	-1567
47	Dredge, Scallop	OPEN	LIM	NE	all	2018	845	97	9.82	9.69	0.12	133906	141408	-7502
47	Dredge, Scallop	OPEN	LIM	NE	all	2019	824	87	9.43	9.76	-0.33	161032	166918	-5887
47	Dredge, Scallop	OPEN	LIM	NE	all	2020	596	68	9.07	8.99	0.09	154798	159731	-4933
53	Trawl, Midwater Paired&Single	OPEN	all	NE	sm	2018	200	53	3.21	3.68	-0.47	257031	282283	-25251

Table 26. The coefficient of variation (CV) of total discards for individual stocks assessed between 2018 and 2020, as available from stock assessment reports, supporting documents, or the Northeast Fisheries Science Center Population Dynamics Branch assessment software (NEFSC PDB Stock Assessment Efficiency Initiative July 29, 2020), for fish and invertebrate species in the Standardized Bycatch Reporting Methodology. CCGM = Cape Cod/Gulf of Maine; EGB = Eastern Georges Bank; GB = Georges Bank; GM = Gulf of Maine; MAFMC = Mid-Atlantic Fishery Management Council; SEDAR = Southeast Data, Assessment, and Review; SAW = Stock Assessment Workshop; SNEMA = Southern New England/Mid-Atlantic; SSC = Science and Statistical Committee.

Assessment/Stock	Discard CV				Source
	2016	2017	2018	2019	
American plaice, GB (<i>Hippoglossoides platessoides</i>)	0.19	0.13	0.17		2019 Assessment Reports
American plaice, GM	0.12	0.13	0.11		2019 Assessment Reports
Atlantic cod, EGB (<i>Gadus morhua</i>)	0.45	0.17	0.21	1.09	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Atlantic cod, GB	0.16	0.20	0.11	0.22	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Atlantic cod, GM	0.16	0.15	0.27	0.10	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Atlantic halibut (<i>Hippoglossus hippoglossus</i>)	0.19	0.15	0.17	0.17	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Atlantic herring (<i>Clupea harengus</i>)	only total catch reported				2020 Assessment Reports
Atlantic mackerel (<i>Scomber scombrus</i>)	0.17	0.26	0.23	0.38	pers. comm. K. Curti, NEFSC
Atlantic wolffish (<i>Anarhichas lupus</i>)	0.16	0.20	0.18	0.09	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Black Sea Bass (<i>Centropristis striata</i>)	0.18	0.14	0.11	0.11	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Bluefish (<i>Pomatomus saltatrix</i>)	No discards estimated				
Butterfish (<i>Peprilus triacanthus</i>)	0.17	0.15	0.14	0.17	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Fluke (<i>Paralichthys dentatus</i>)	0.07	0.06	0.06	0.08	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Haddock, EGB (<i>Melanogrammus aeglefinus</i>)	0.22	0.18	0.16	0.14	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Haddock, GB	0.13	0.11	0.18	0.08	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Haddock, GM	0.14	0.13	0.12	0.11	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Longfin inshore squid (<i>Doryteuthis [Amerigo] pealeii</i>)	0.28	0.17	0.19	0.32	2020 Assessment Reports
Monkfish, Northern (<i>Lophius americanus</i>)	0.10	0.11	0.12		2019 Operational Assessment
Monkfish, Southern	0.07	0.08	0.07		2019 Operational Assessment
Northern shortfin squid (<i>Illex illecebrosus</i>)	No discards estimated				
Ocean pout (<i>Zoarces americanus</i>)	0.27	0.21	0.15	0.21	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Ocean quahog (<i>Arctica islandica</i>)	Negligible discards, CV > 0.30				pers. comm. D. Hennen, NEFSC

Table 26, continued. The coefficient of variation (CV) of total discards for individuals stocks assessed between 2018 and 2020, as available from stock assessment reports, supporting documents, or the Northeast Fisheries Science Center Population Dynamics Branch assessment software (NEFSC PDB Stock Assessment Efficiency Initiative, July 29, 2020), for fish and invertebrates species in the Standardized Bycatch Reporting Methodology. CCGM = Cape Cod/Gulf of Maine; EGB = Eastern Georges Bank; GB = Georges Bank; GM = Gulf of Maine; MAFMC = Mid-Atlantic Fishery Management Council; SEDAR = Southeast Data, Assessment and Review; SAW = Stock Assessment Workshop; SNEMA = Southern New England/Mid-Atlantic; SSC = Science and Statistical Committee.

Assessment/Stock	Discard CV				Source
	2016	2017	2018	2019	
Pollock (<i>Pollachius virens</i>)	0.19	0.19	0.21	0.20	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Red hake, Northern (<i>Urophycis chuss</i>)	0.24	0.11	0.11	0.12	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Red hake, Southern	0.29	0.15	0.10	0.14	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Acadian Redfish (<i>Sebastes fasciatus</i>)	0.14	0.51	0.18	0.13	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Scup (<i>Stenotomus chrysops</i>)	0.08	0.04	0.08	0.07	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Sea Scallops (<i>Placopecten magellanicus</i>)	0.07	0.15	0.21	0.09	2020 Assessment Reports
Silver hake, Northern (<i>Merluccius bilinearis</i>)	0.14	0.12	0.13	0.11	pers. comm. L. Alade, NEFSC
Silver hake, Southern	0.20	0.14	0.15	0.12	pers. comm. L. Alade, NEFSC
Skate Complex (Rajidae)	time period not applicable				2008 Data Poor Workshop
Spiny dogfish (<i>Squalus acanthias</i>)	2018 CVs varied by gear type, <0.30				2019 MAFMC SSC Sept 10, 2019
Surfclam (<i>Spisula solidissima</i>)	Negligible discards, CV > 0.30				pers. comm. D. Hennen, NEFSC
Tilefish, Blueline (<i>Caulolatilus microps</i>)	No CVs, negligible discards				2017 MAFMC Data Update
Tilefish, Golden (<i>Lopholatilus chamaeleonticeps</i>)	No discards estimated				2017 SEDAR 50
White hake (<i>Urophycis tenuis</i>)	0.20	0.31	0.19		2019 Assessment Reports
Windowpane flounder, Northern	0.13	0.17	0.19	0.16	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Windowpane flounder, Southern	0.08	0.09	0.08	0.08	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Winter flounder, GB (<i>Pseudopleuronectes americanus</i>)	0.37	0.26	0.31	0.39	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Winter flounder, GM	0.26	0.19	0.18	0.13	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Winter flounder, SNEMA	0.10	0.13	0.10	0.09	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Witch flounder (<i>Glyptocephalus cynoglossus</i>)	0.10	0.11	0.09	0.09	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Yellowtail flounder, CCGM (<i>Limanda ferruginea</i>)	0.27	0.12	0.12		2019 Assessment Reports
Yellowtail flounder, GB	0.77	0.20	0.52	0.37	NEFSC PDB Stock Assessment Efficiency Initiative (July 29, 2020)
Yellowtail flounder, SNEMA	0.16	0.27	0.10		2019 Assessment Reports

FIGURES

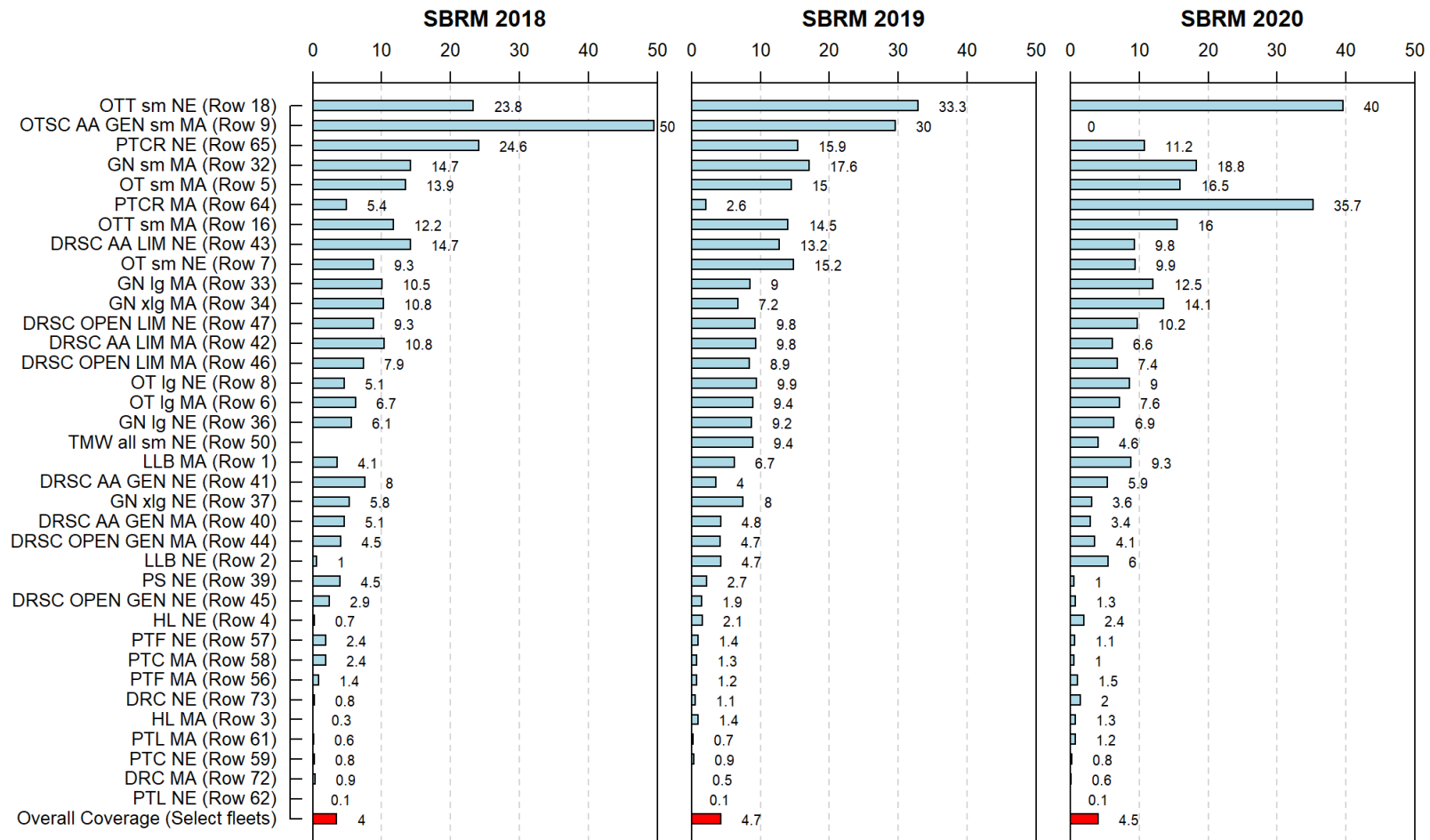


Figure 1. Percentage of Vessel Trip Report (VTR) trips observed for 36 selected fleets for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Selected fleets represent fleets for which discards were estimated in 2 of the 3 SBRM years. Bars represent the ratio of total observed trips over total VTR trips for each fleet. See Appendix Table 1 for fleet name abbreviations.

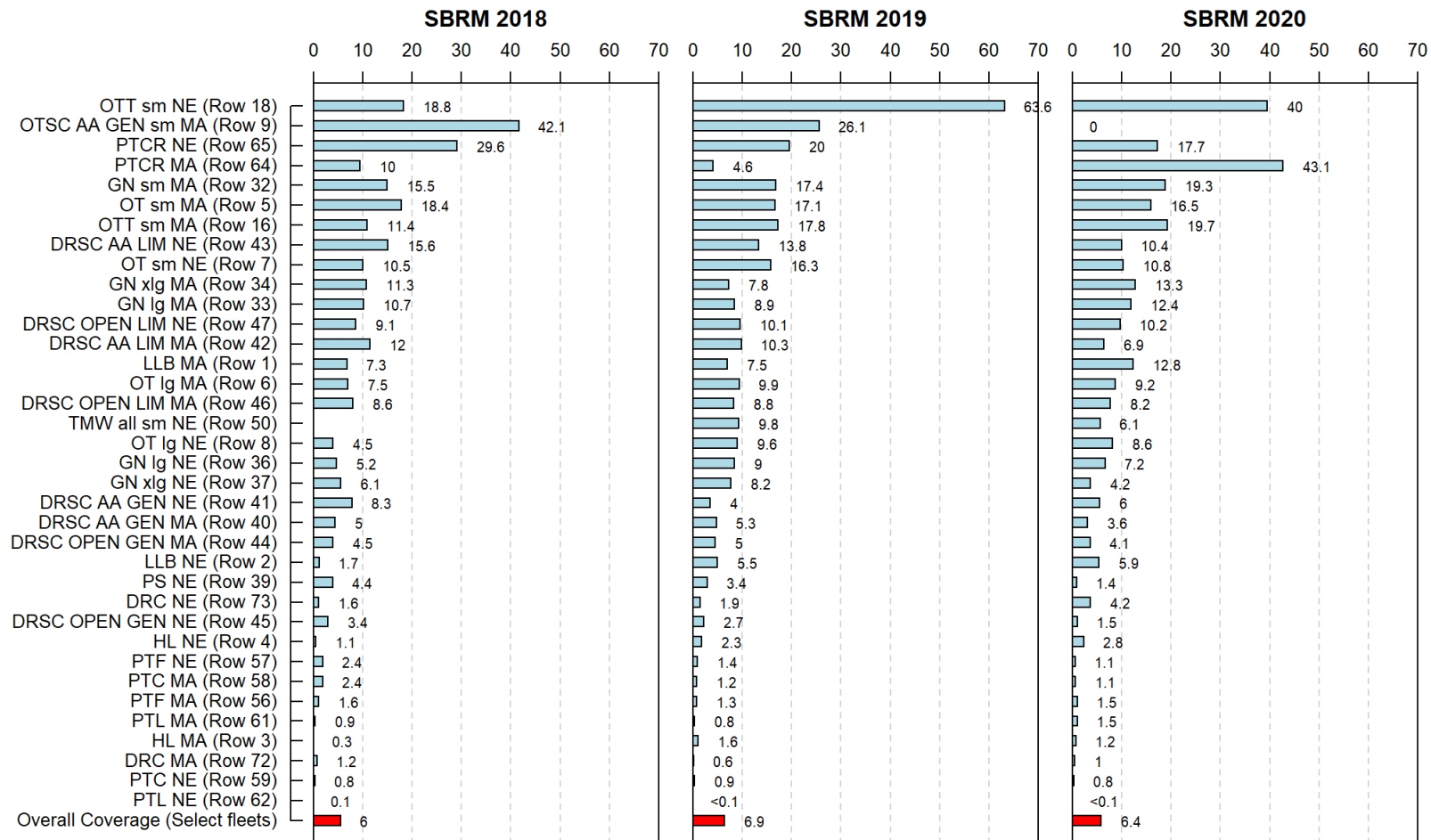


Figure 2. Percentage of Vessel Trip Report (VTR) sea days observed for 36 selected fleets for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Selected fleets represent fleets for which discards were estimated in 2 of the 3 SBRM years. Bars represent the ratio of total observed trips over total VTR sea days for each fleet. See Appendix Table 1 for fleet name abbreviations.

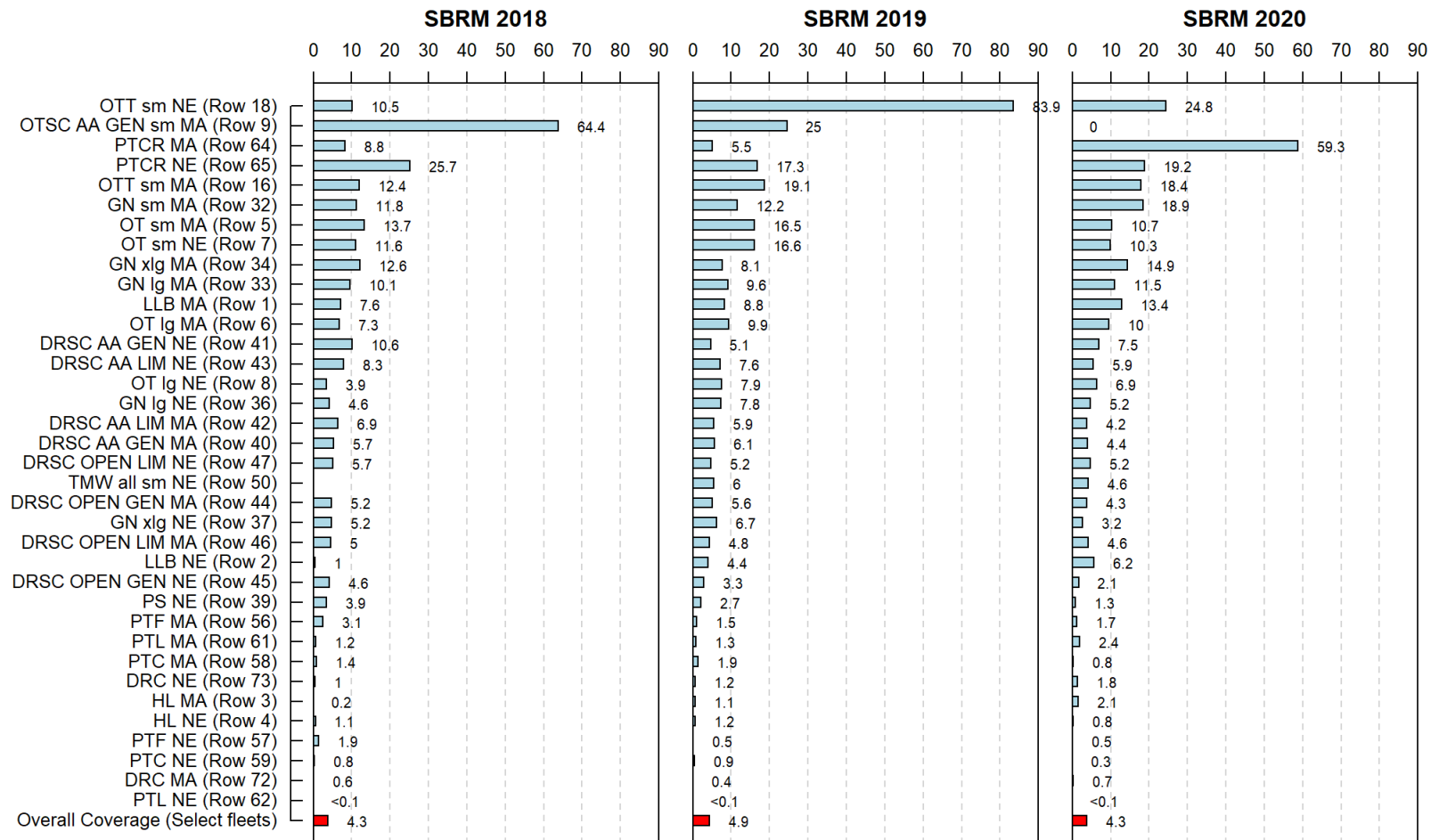


Figure 3. Percentage of Vessel Trip Report (VTR) landings observed for 36 selected fleets for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Selected fleets represent fleets for which discards were estimated in 2 of the 3 SBRM years. Bars represent the ratio of total observed landings over the total VTR landings for each fleet. See Appendix Table 1 for fleet name abbreviations.

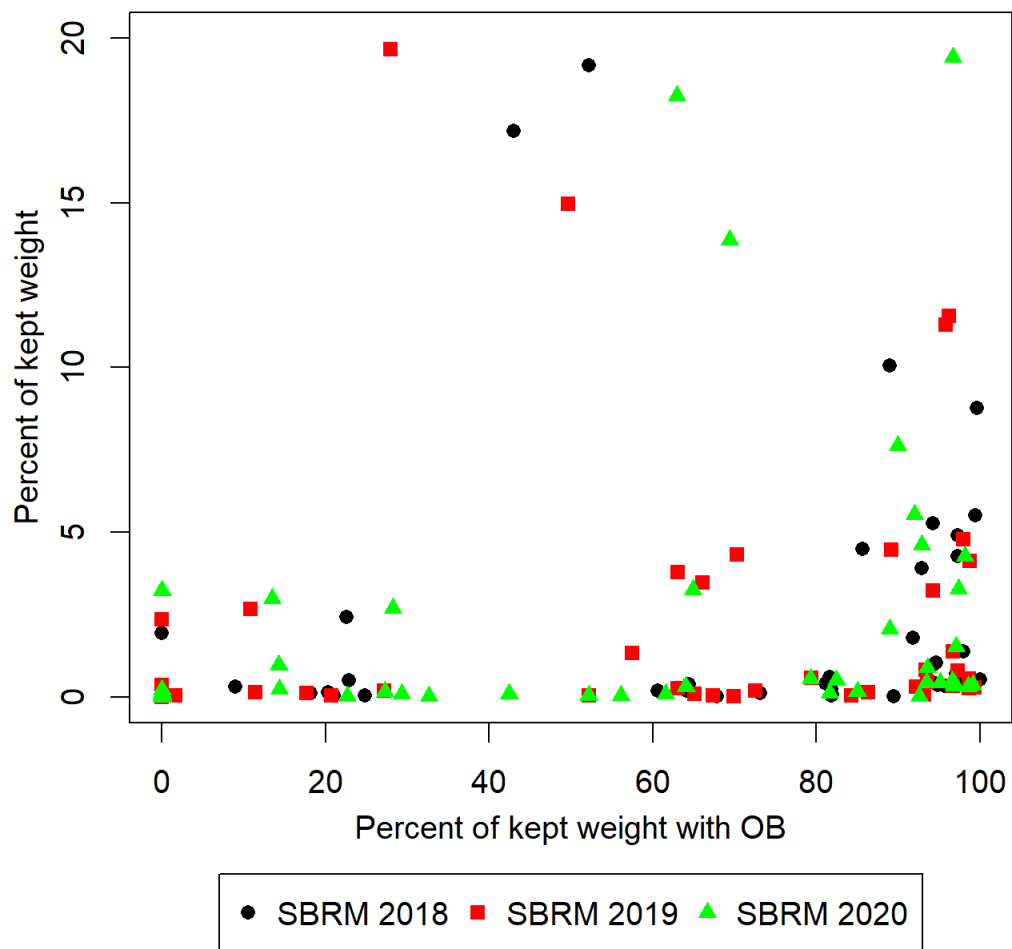


Figure 4. Percentage of Vessel Trip Report kept weight of all species with observer (OB) coverage and the percentages of kept weight of all species across all fleets, by fleet and Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data).

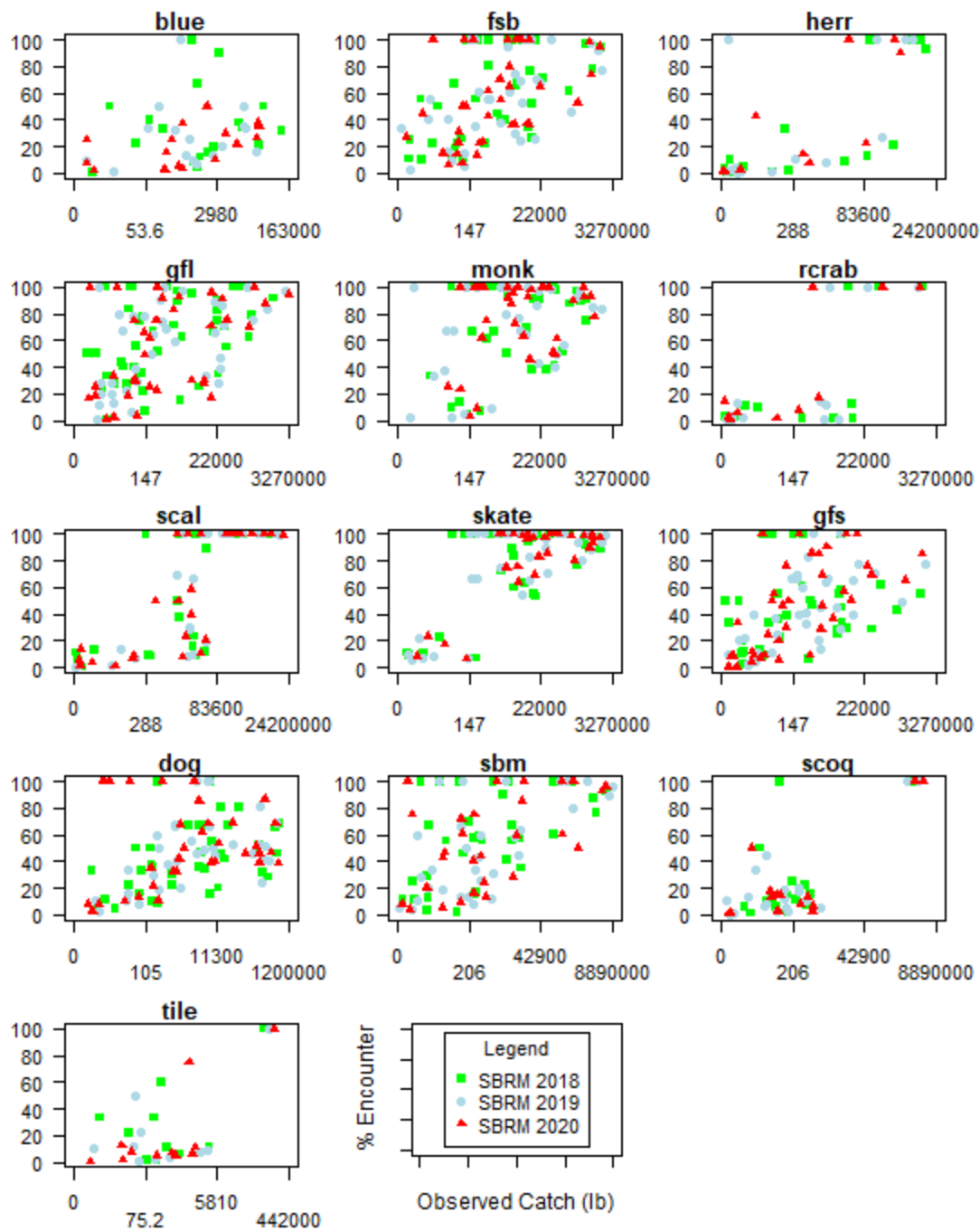


Figure 5. Percentage of observed trips which encountered each species group and observed catch weight (kept and discarded; live weight, lb, log scale) on observed trips by Standardized Bycatch Reporting Methodology (SBRM) species group for SBRM 2018 (July 2016 through June 2017 data; green square), SBRM 2019 (July 2017 through June 2018 data; blue circle), and SBRM 2020 (July 2018 through June 2019 data; red triangle). Each symbol represents a year and fleet. See Table 5 for species group abbreviations. Note: Atlantic salmon (*Salmo salar*) was not encountered from July 2016 through June 2019.

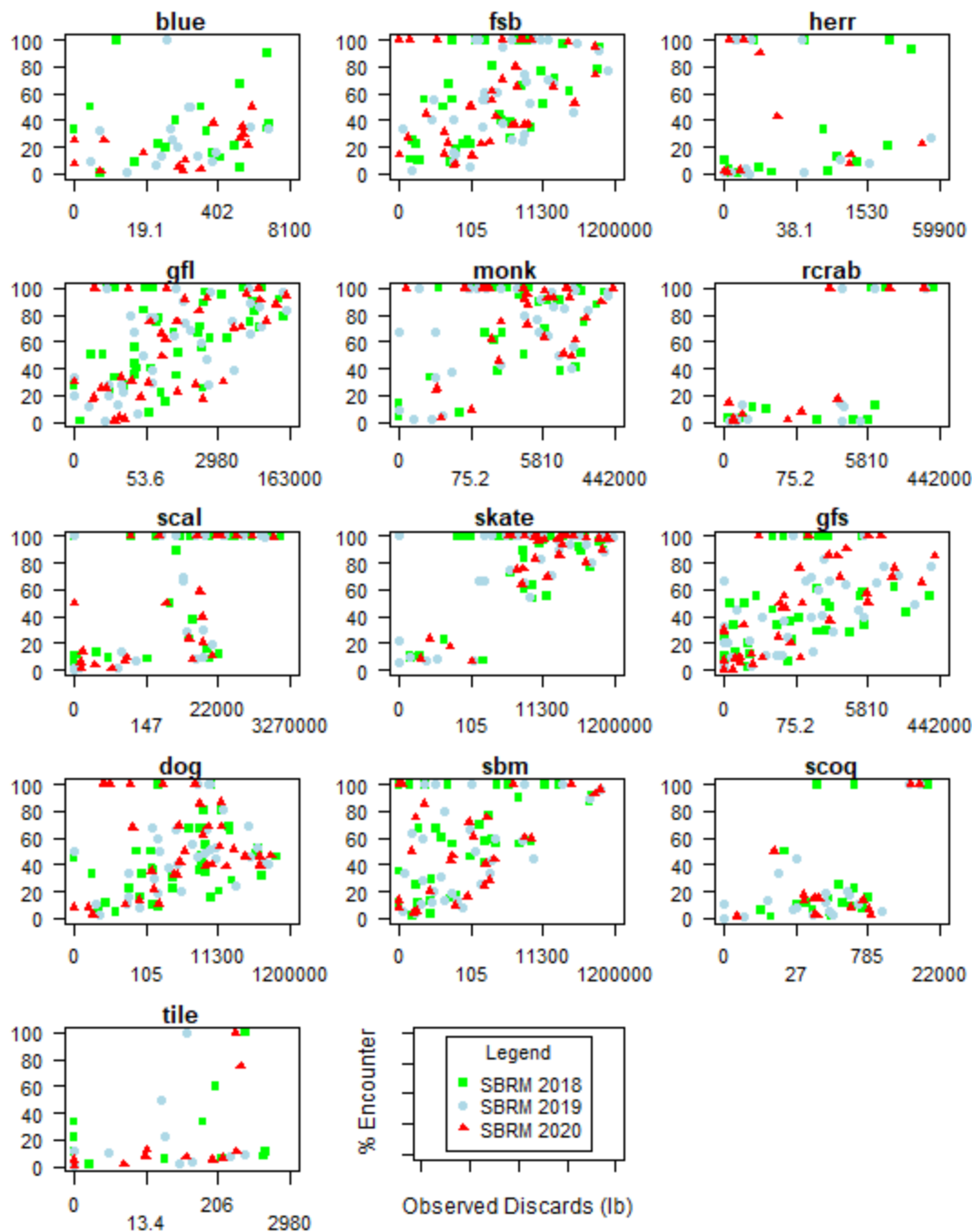


Figure 6. Percentage of observed trips which encountered each species group and observed discards weight (live weight, lb, log scale) on observed trips by Standardized Bycatch Reporting Methodology (SBRM) species group for SBRM 2018 (July 2016 through June 2017 data; green square), SBRM 2019 (July 2017 through June 2018 data; blue circle), and SBRM 2020 (July 2018 through June 2019 data; red triangle). Each symbol represents a year and fleet. See [Table 5](#) for species group abbreviations. Note: Atlantic salmon (*Salmo salar*) was not encountered from July 2016 through June 2019.

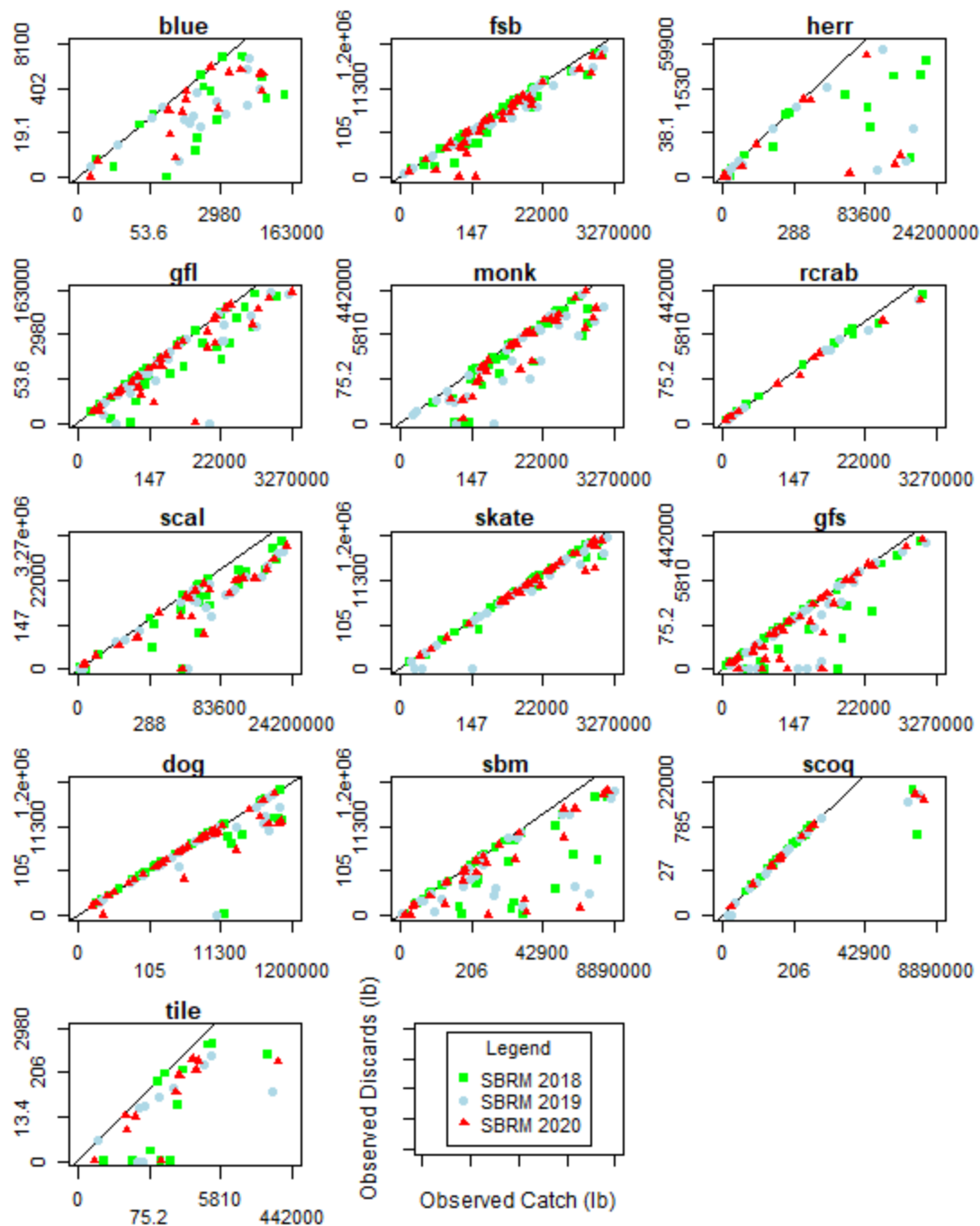


Figure 7. Observed discards (live weight, lb, log scale) and observed catch weight (kept and discard live weight, lb, log scale) on observed trips by Standardized Bycatch Reporting Methodology (SBRM) species group for 2018 (July 2016 through June 2017 data; green square), SBRM 2019 (July 2017 through June 2018 data; blue circle), and SBRM 2020 (July 2018 through June 2019 data; red triangle). Each symbol represents a year and fleet. See [Table 5](#) for species group abbreviations. Note: Atlantic salmon (*Salmo salar*) was not encountered from July 2016 through June 2019.

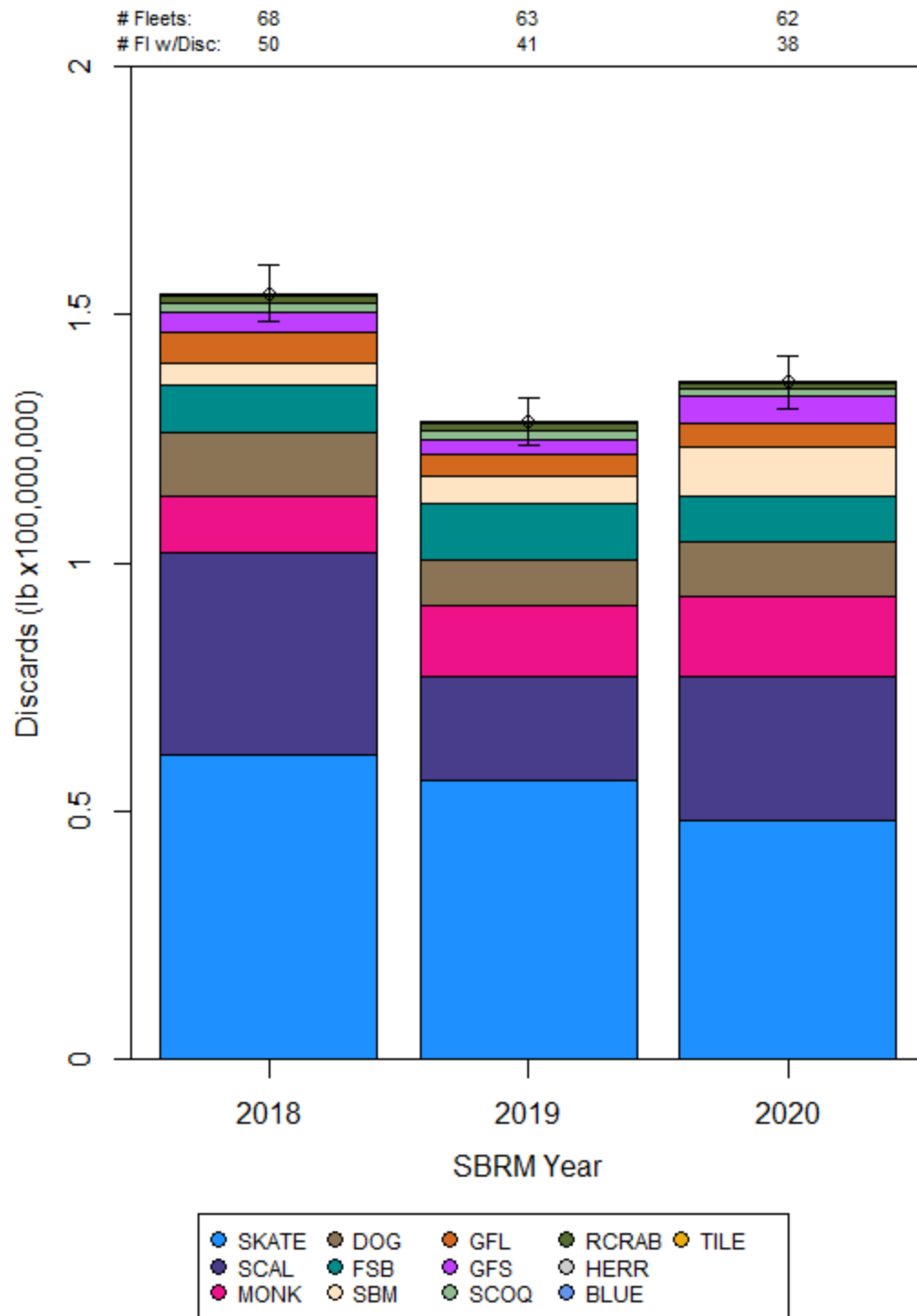


Figure 8. Estimated discards (live weight, lb) for the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). One standard error of the annual total estimated discard is given. The number of fleets (# Fleets) and number of fleets with estimated discards (#Fl w/Disc) are also given. See [Table 5](#) for species group abbreviations.

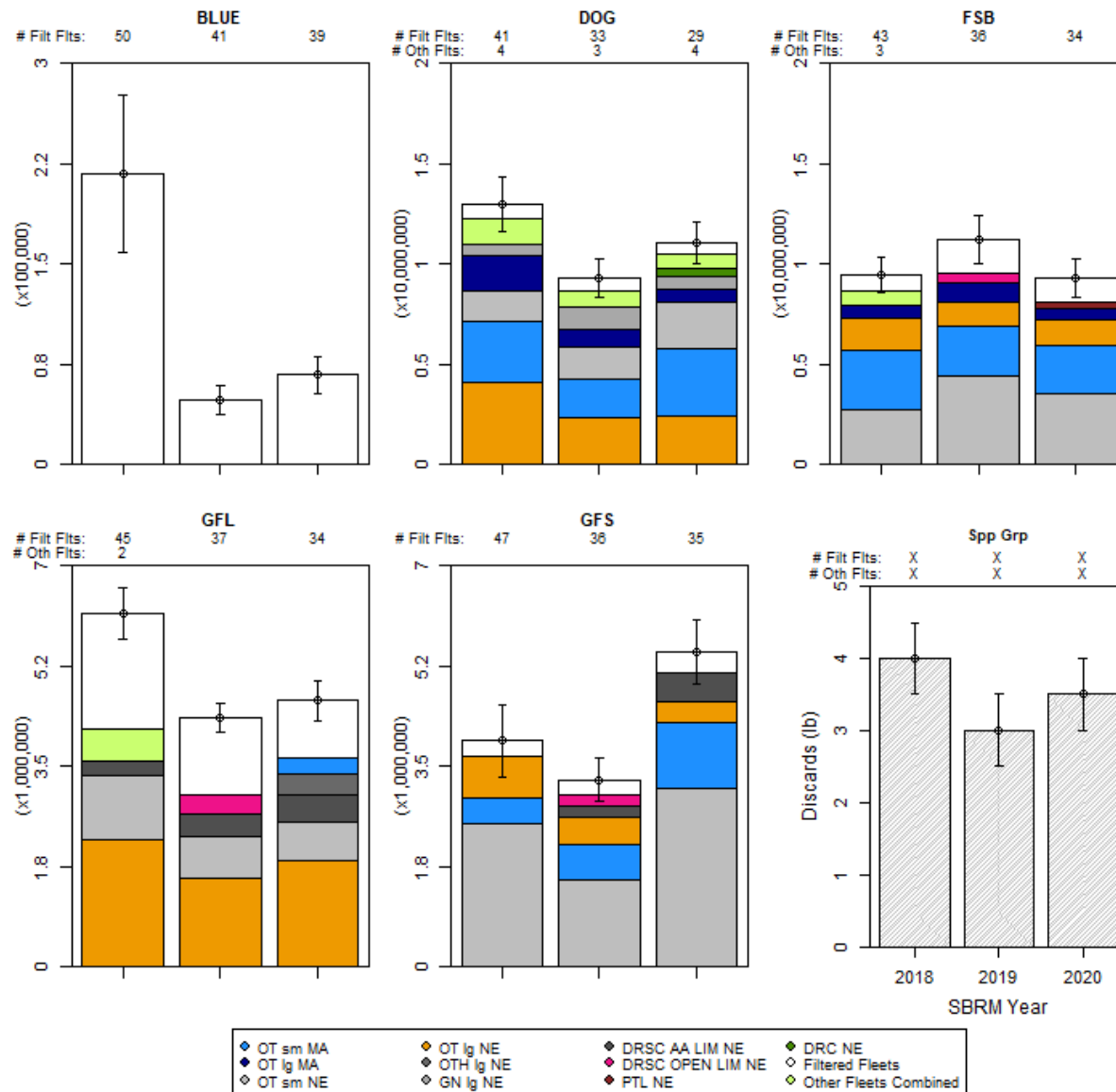


Figure 9. Estimated discards (live weight, lb) for each of the 14 Standardized Bycatch Reporting Methodology (SBRM) species group by fleet for 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). One standard error of the annual total estimated discard is given. The number of fleets that have been aggregated into the group of fleets that were filtered out "Filtered Fleets" (# Filt Flts) and the number of fleets that have been grouped into "Other Fleets Combined" (# Oth Flts; fleets that were not filtered out yet individually comprised a relatively small amount of total estimated discards) are also given. See [Table 5](#) for species group abbreviations and [Appendix Table 1](#) for fleet name abbreviations.

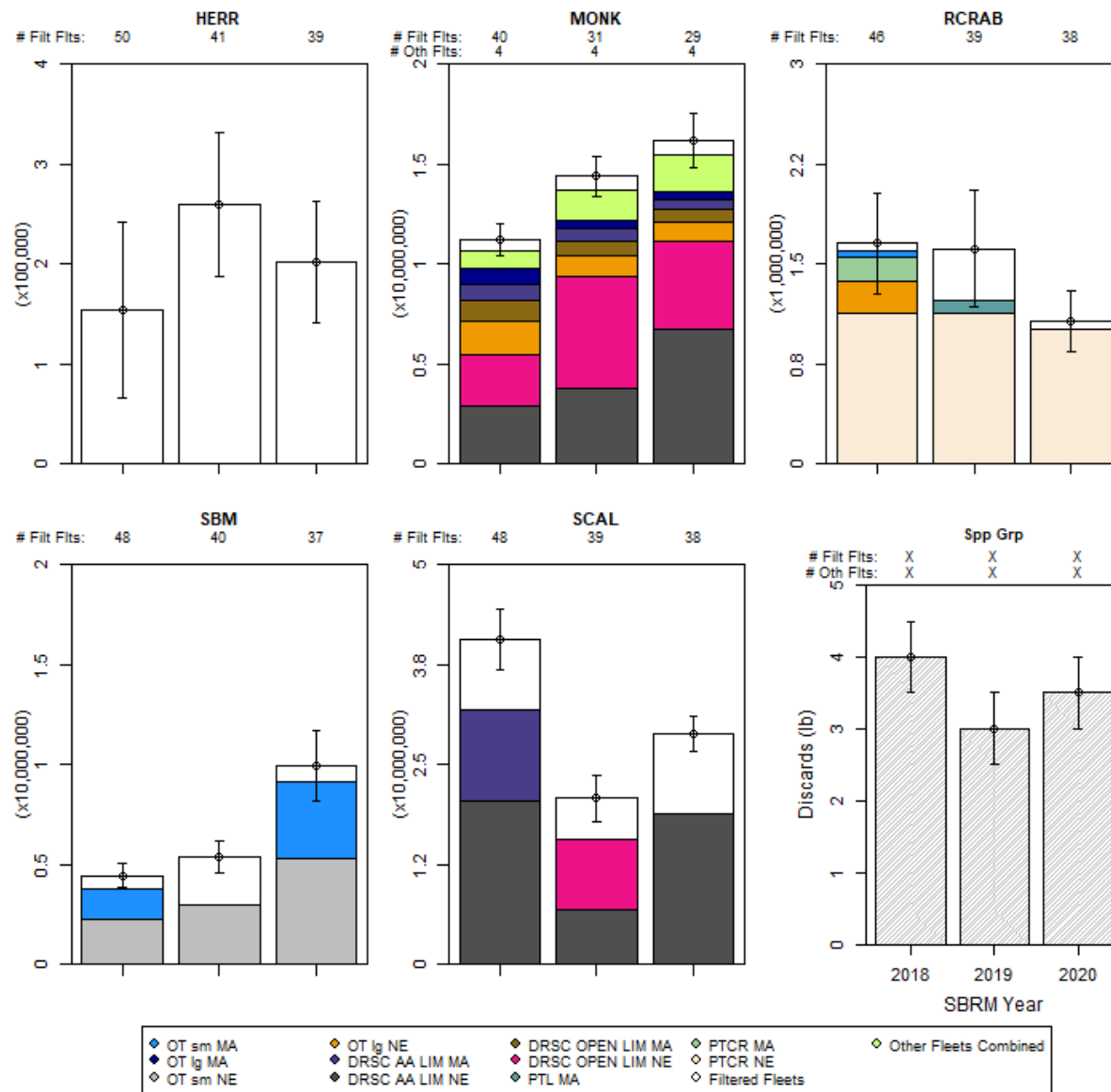


Figure 9, continued. Estimated discards (live weight, lb) for each of the 14 Standardized Bycatch Reporting Methodology (SBRM) species group by fleet for 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). One standard error of the annual total estimated discard is given. The number of fleets that have been aggregated into the group of fleets that were filtered out “Filtered Fleets” (# Filt Flts) and the number of fleets that have been grouped into “Other Fleets Combined” (# Oth Flts; fleets that were not filtered out yet individually comprised a relatively small amount of total estimated discards) are also given. See [Table 5](#) for species group abbreviations and [Appendix Table 1](#) for fleet name abbreviations.

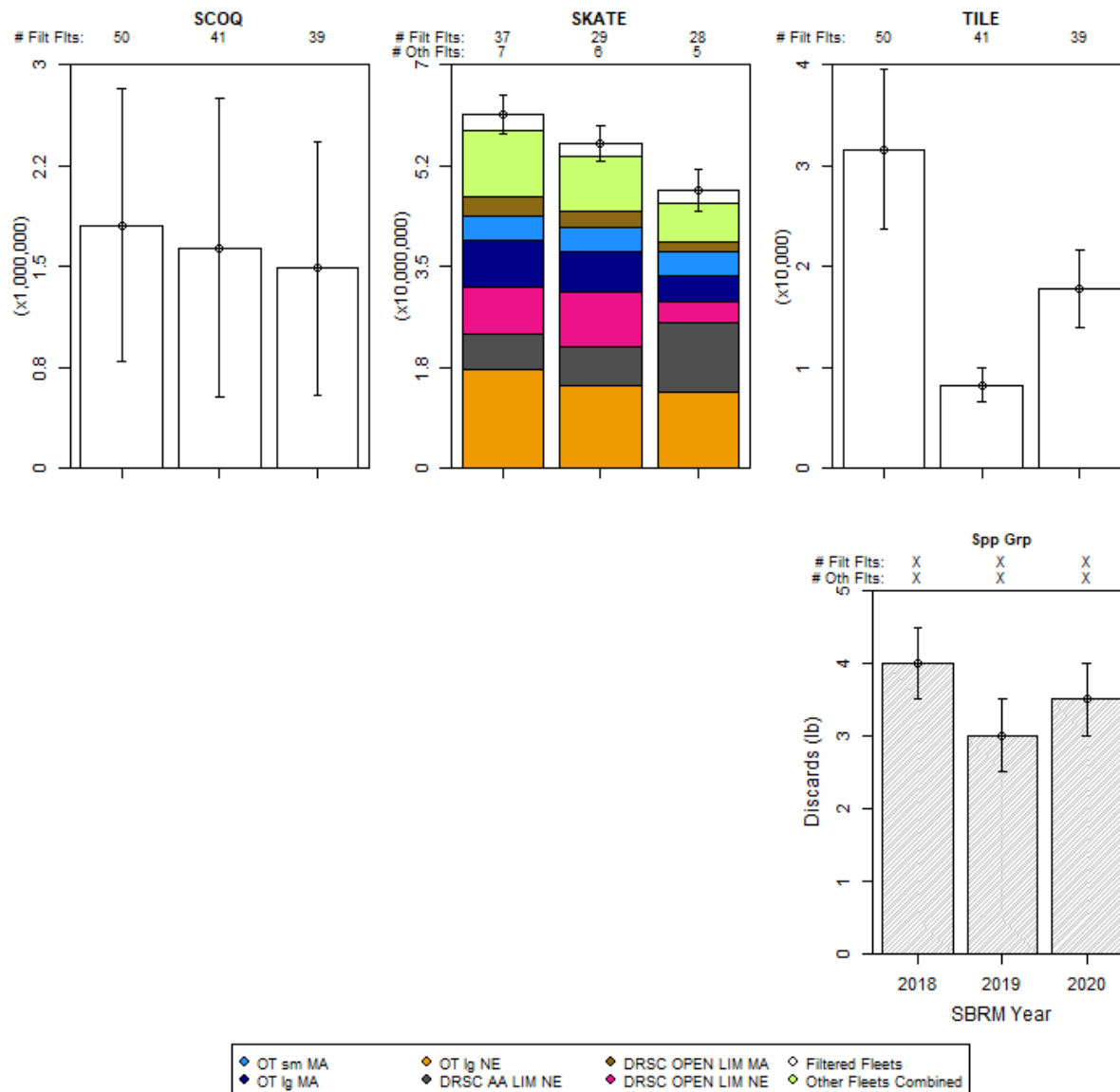


Figure 9, continued. Estimated discards (live weight, lb) for each of the 14 Standardized Bycatch Reporting Methodology (SBRM) species group by fleet for 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). One standard error of the annual total estimated discard is given. The number of fleets that have been aggregated into the group of fleets that were filtered out “Filtered Fleets” (# Filt Flts) and the number of fleets that have been grouped into “Other Fleets Combined” (# Oth Flts; fleets that were not filtered out yet individually comprised a relatively small amount of total estimated discards) are also given. See [Table 5](#) for species group abbreviations and [Appendix Table 1](#) for fleet name abbreviations.

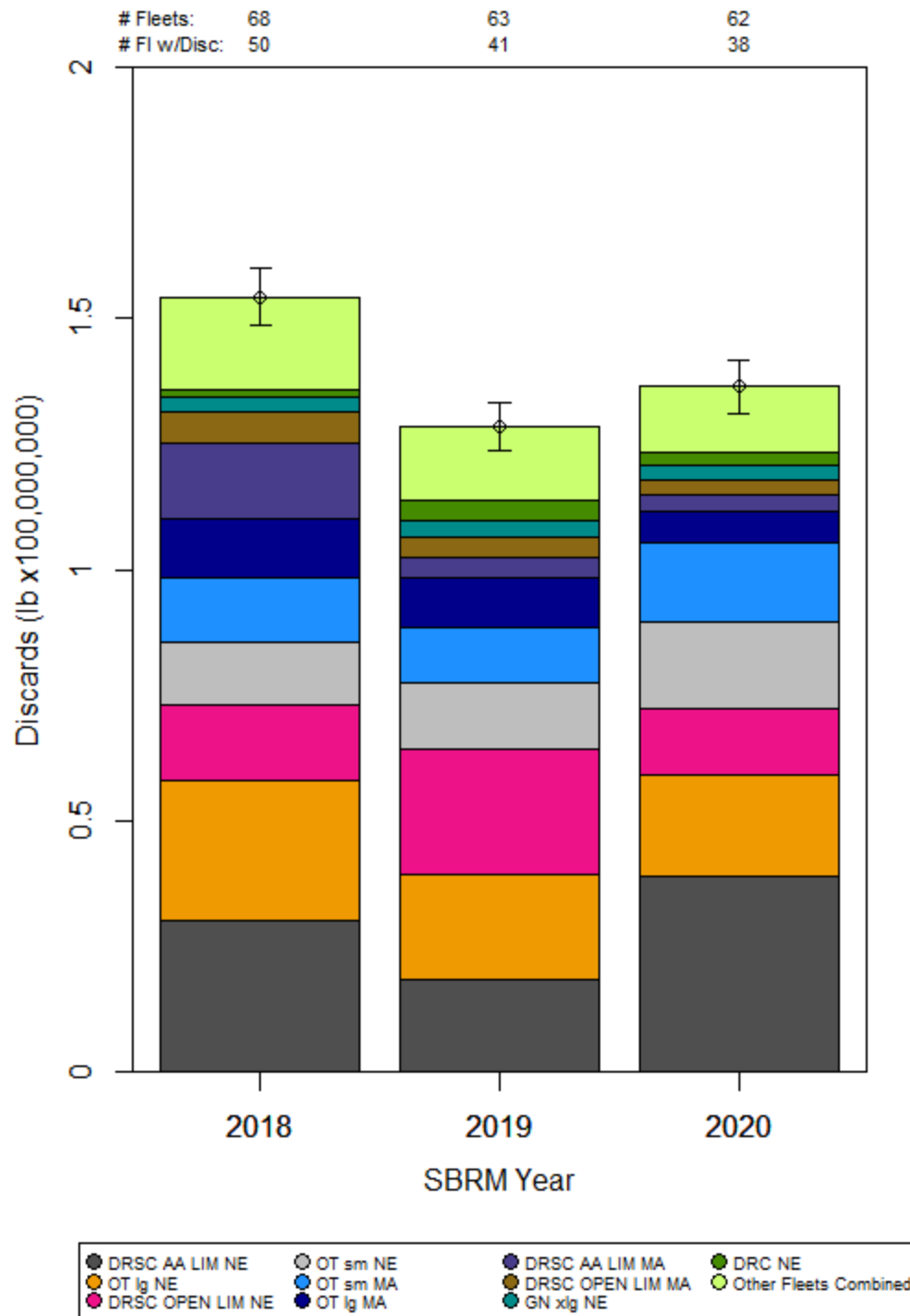


Figure 10. Estimated discards (live weight, lb) for the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups (COMBINED) by fleet for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). Fleets that comprise a relatively small amount of total discards have been grouped in “Other Fleets Combined.” One standard error of the annual total estimated discard is given. The number of fleets (#Fleets) in the annual analysis and number of fleets with estimated discards (# F1 w/Disc) is also given. See [Appendix Table 1](#) for fleet name abbreviations.

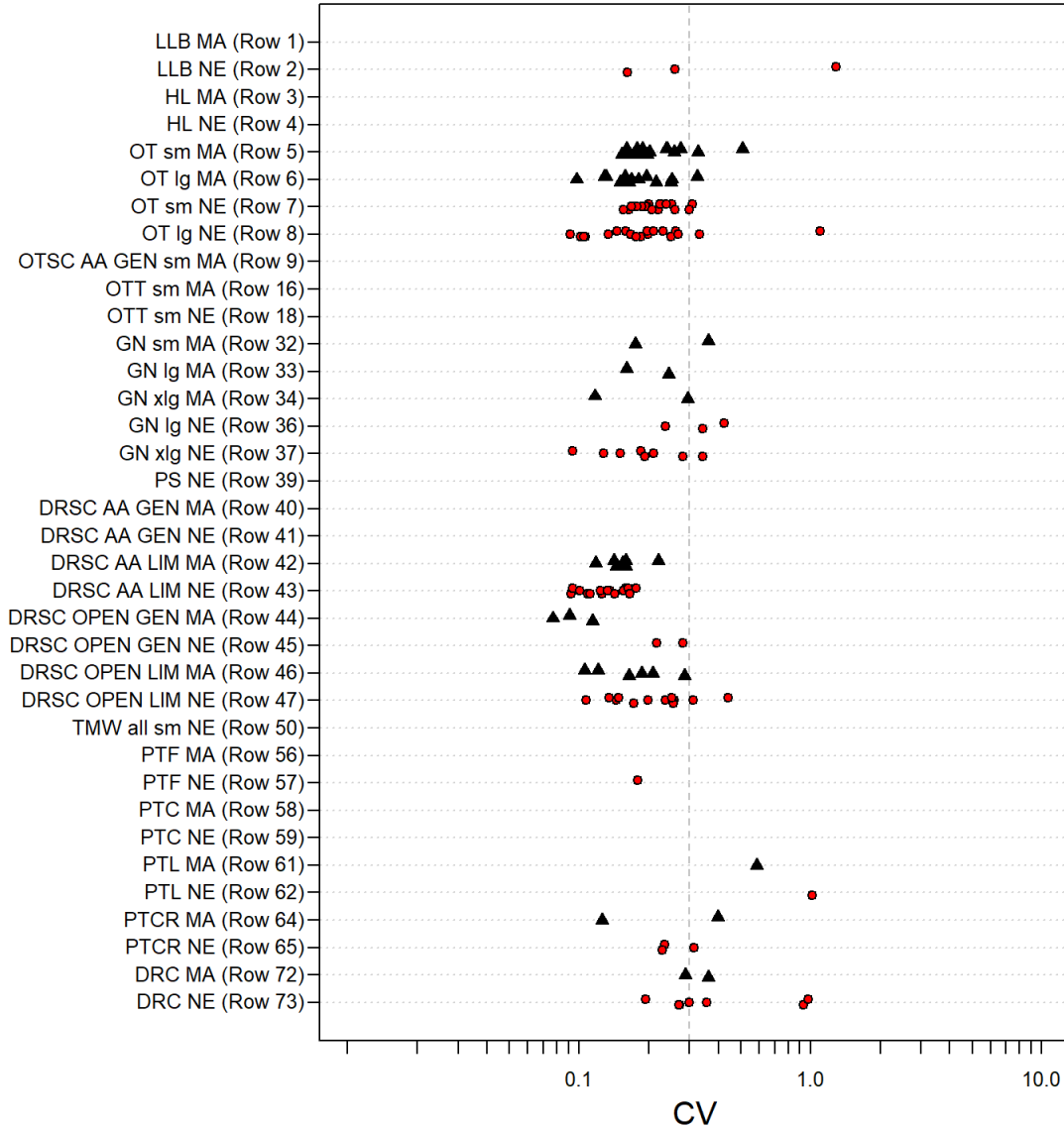


Figure 11. Precision (coefficient of variation, CV) of estimated discards for each of the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups by selected fleet for 3 SBRM years (2018 through 2020). The 36 selected fleets are: Rows 1-9, 16, 18, 32-34, 36, 37, 39, 40-47, 50, 56-59, 61, 62, 64, 65, 72, and 73. Each point represents a separate species group and SBRM year. Red circles denote New England fleets, and black triangles denote Mid-Atlantic fleets. Dashed line represents 30% CV. Only precision of estimated discards used in the annual sample size analysis to determine the SBRM sea day standard are shown. Fleets with no symbols indicate fleets in which discards for all species groups were filtered out via the importance filter process. See [Appendix Table 1](#) for fleet name abbreviations. See [Table 23](#) for a listing of the fleets and species groups by SBRM year that had CV greater than 30%.

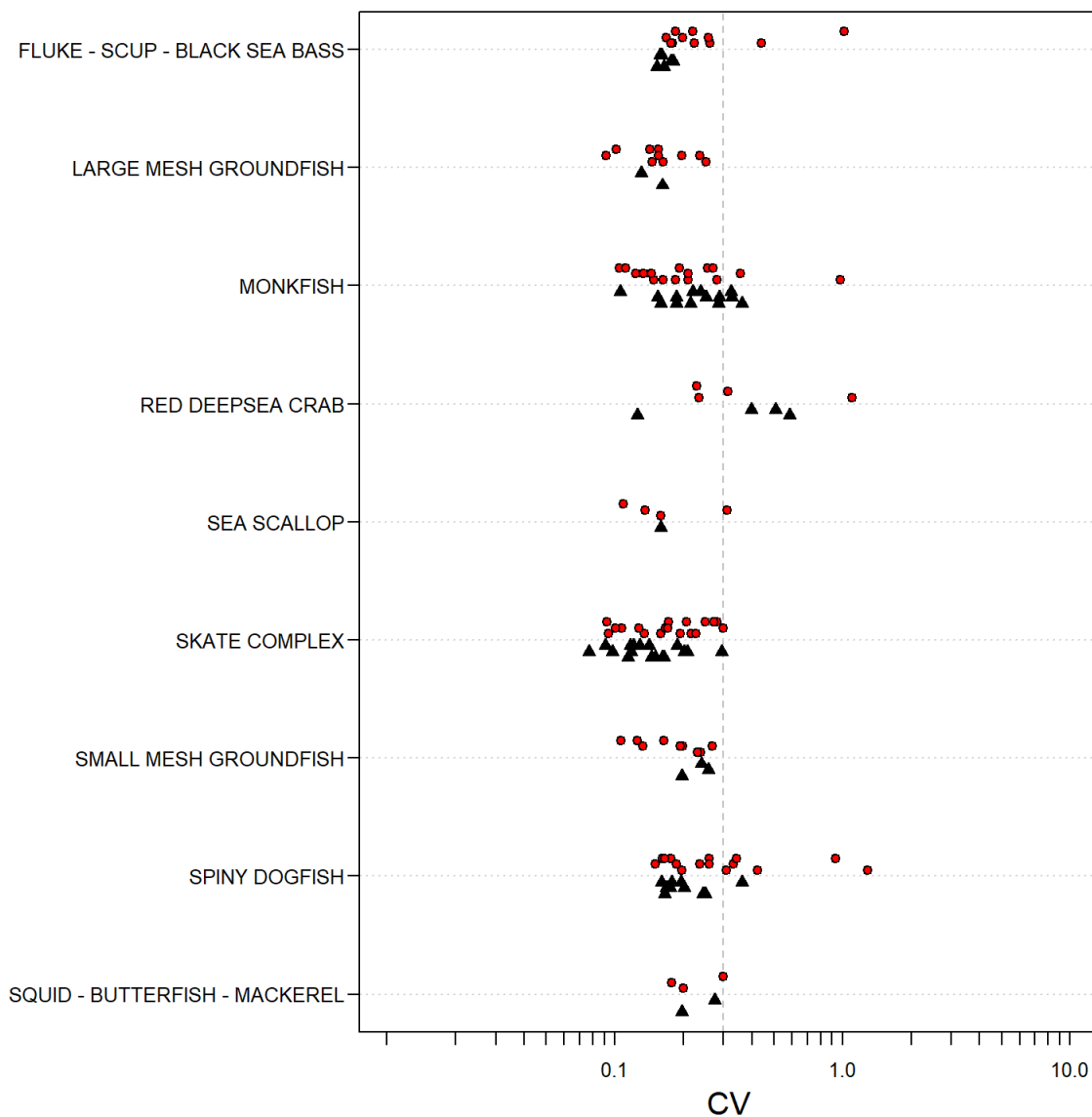


Figure 12. Precision (coefficient of variation, CV) of estimated discards for 9 of the 14 Standardized Bycatch Reporting Methodology (SBRM) species groups by selected fleet for 3 SBRM years (2018 through 2020). The 36 selected fleets are: Rows 1-9, 16, 18, 32-34, 36, 37, 39, 40-47, 50, 56-59, 61, 62, 64, 65, 72, and 73. Each point represents a separate fleet and SBRM year. Red circles denote New England fleets, and black triangles denote Mid-Atlantic fleets. Dashed line represents 30% CV. Only precision of estimated discards for species groups used in the annual sample size analysis to determine the SBRM sea day standard are shown (9 of 14 species groups were used and are shown.)

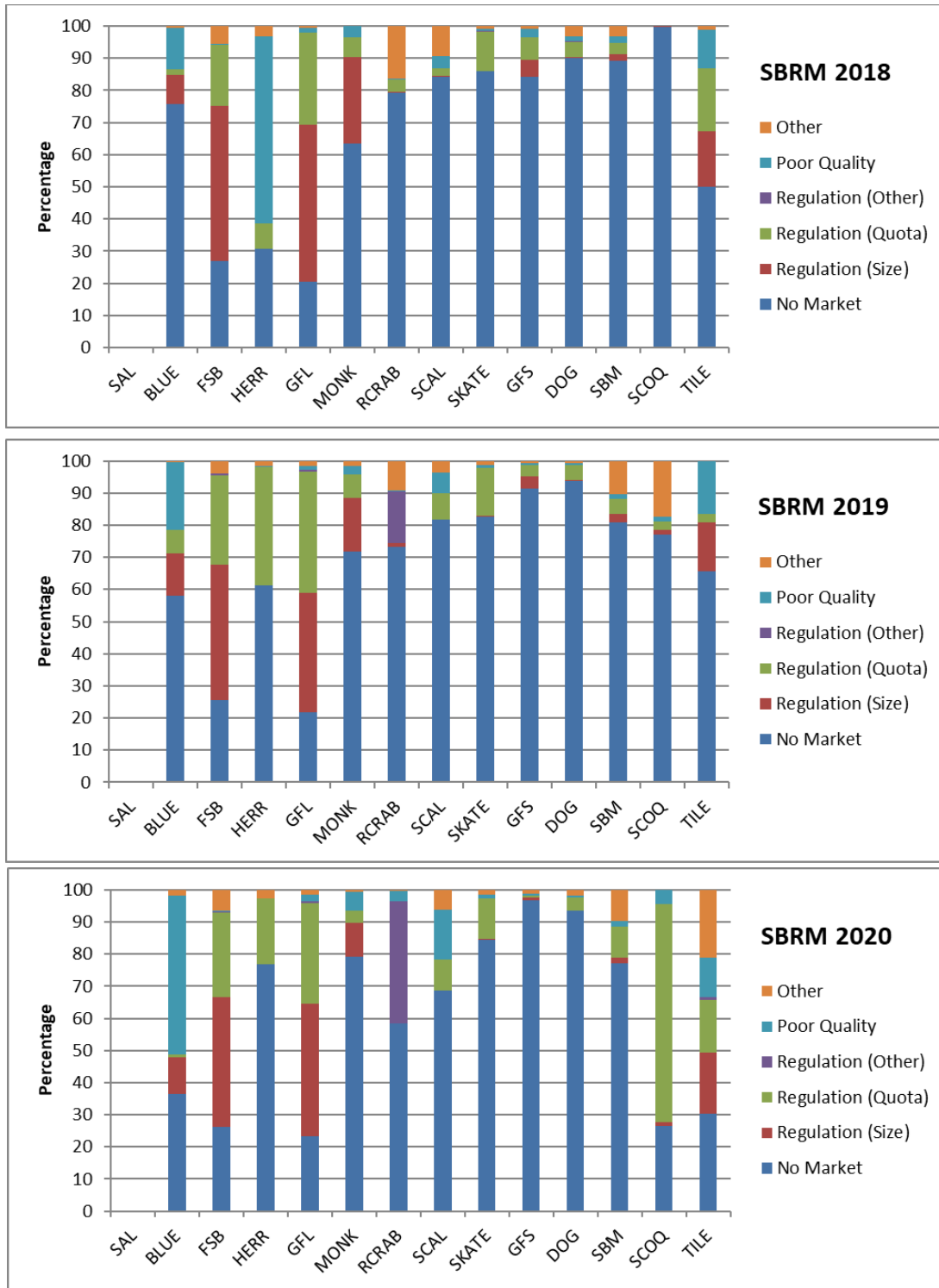


Figure 13. Percentage of discards by 6 discard reasons for 14 Standardized Bycatch Reporting Methodology (SBRM) species groups for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Table 5](#) for species group abbreviations; see [Appendix Table 3](#) for discard reasons associated with each discard reason group.

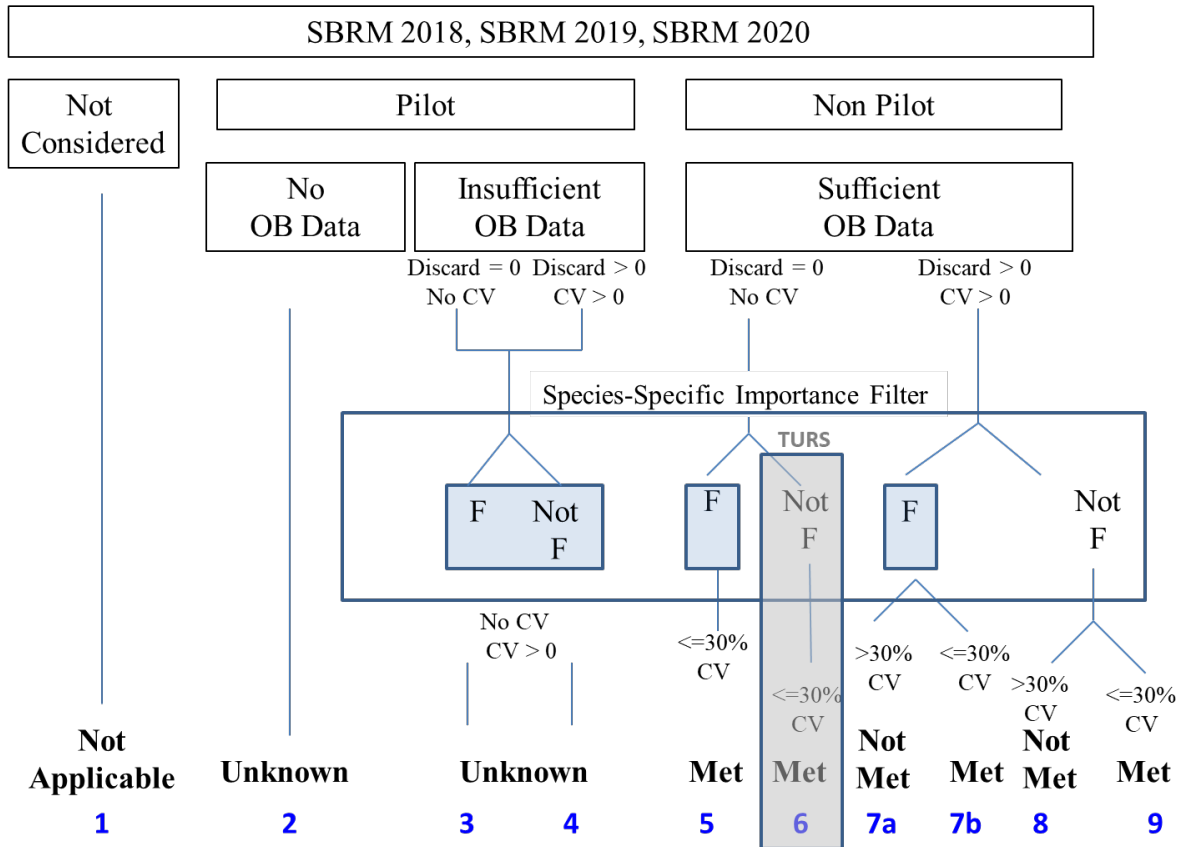


Figure 14. Standardized Bycatch Reporting Methodology (SBRM) performance classifications (“Not Applicable,” “Unknown,” “Not Met,” and “Met”) and the associated characteristics of the SBRM fleets and species groups (cells) for SBRM 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). “F” represents the cells that were filtered out through the importance filter; “Not F” represents cells that were not filtered out through the importance filter. The blue shaded boxes indicate cells that were not used in the annual sample size analysis because of pilot coverage or the importance filter (filtered out); “OB” represents observer data; “CV” represents coefficient of variation. The blue numbers correspond to the SBRM performance classification boxes presented in [Table 20](#). Box 6 is no longer used because turtles (TURS) are not filtered via fish analyses.

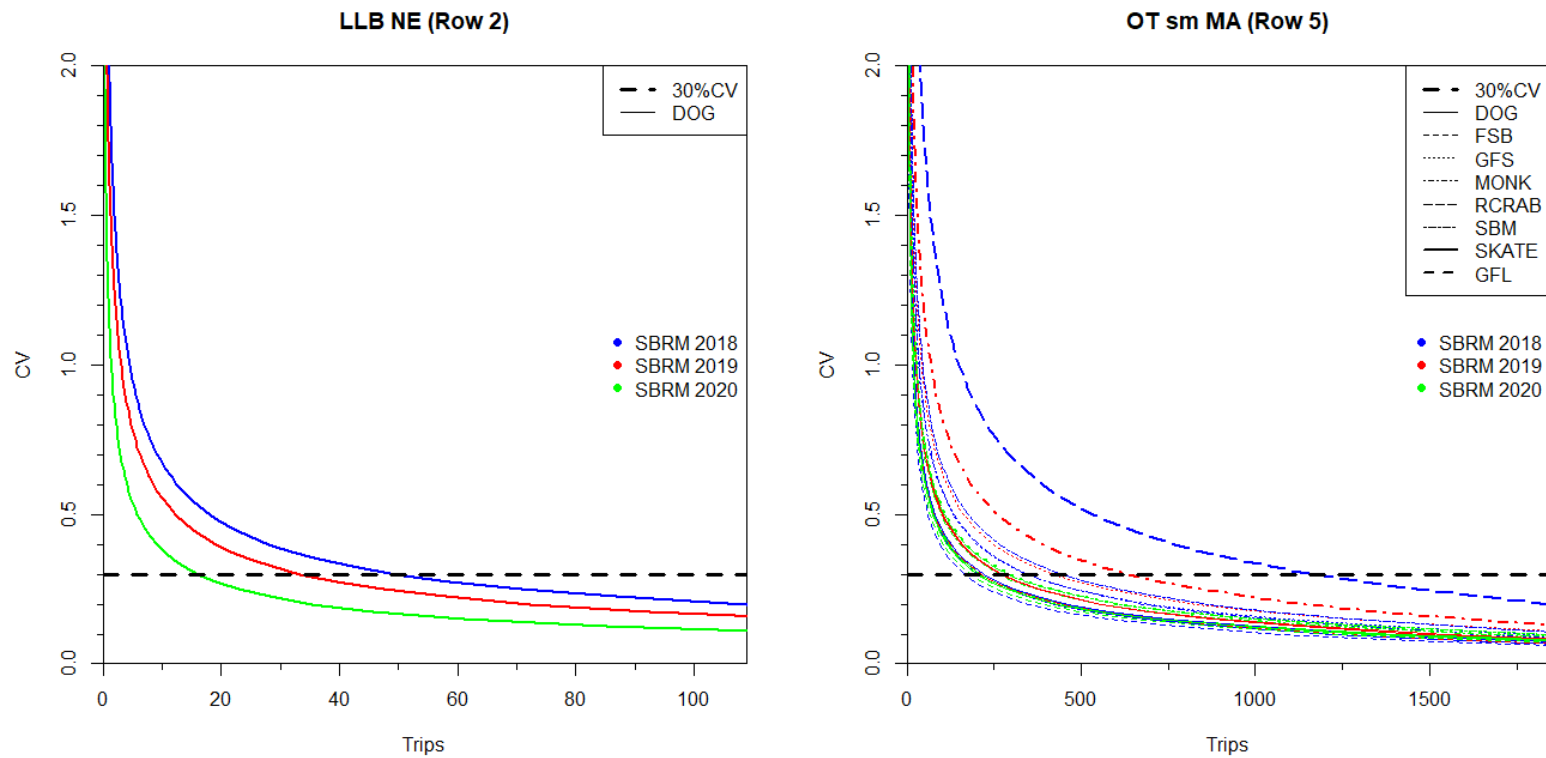


Figure 15. Number of trips needed for 9 selected fleets by fish/invertebrate species groups, fleet, and Standardized Bycatch Reporting Methodology (SBRM) year for SBRM 2018, 2019, and 2020. Information compiled from the annual analyses (Figure 3 in Wigley and Tholke 2018, 2019, 2020). See [Table 5](#) for species group abbreviations. CV = coefficient of variation; horizontal dashed line indicates the 30% CV.

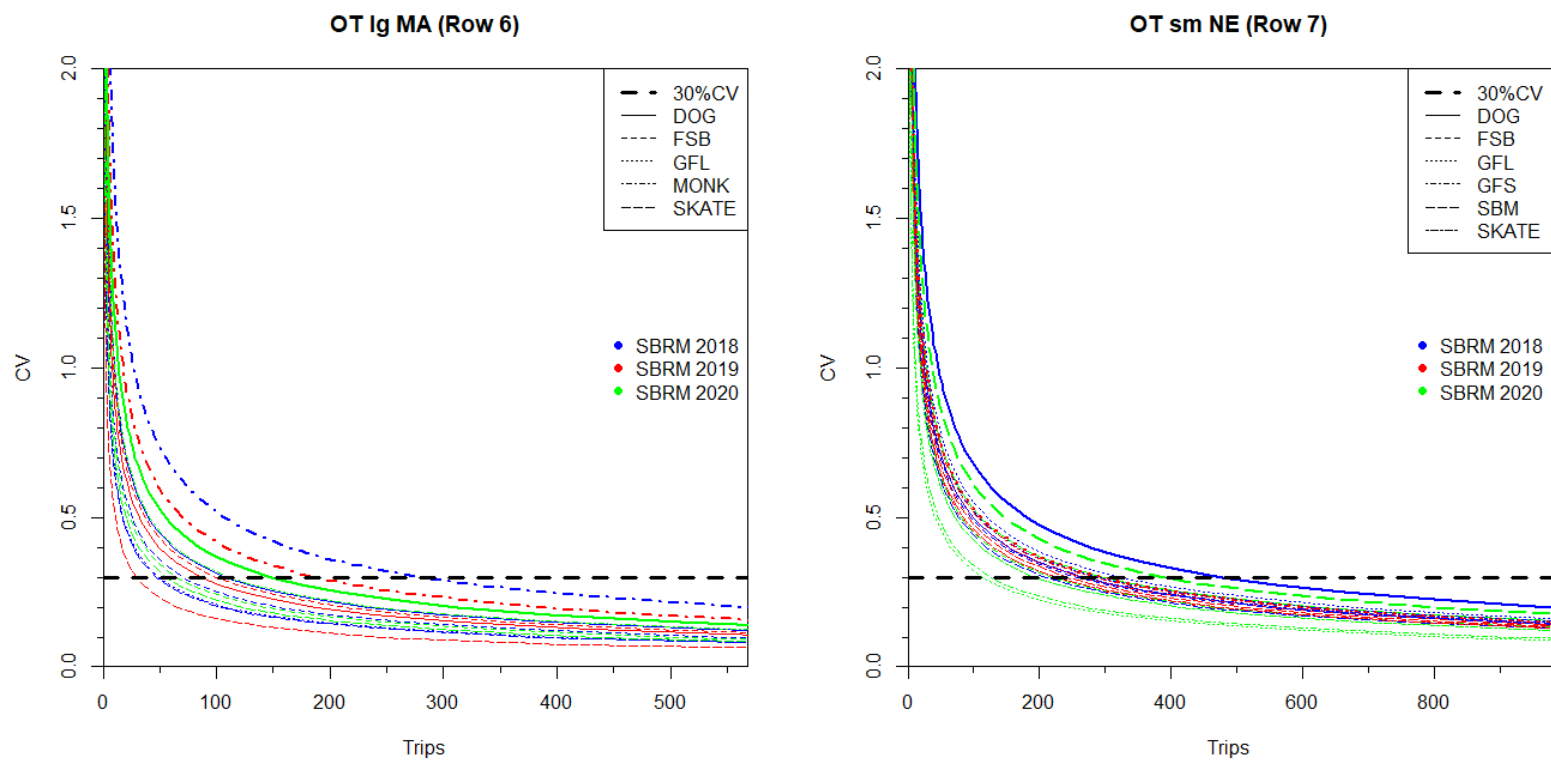


Figure 15, continued. Number of trips needed for 9 selected fleets by fish/invertebrate species groups, fleet, and Standardized Bycatch Reporting Methodology (SBRM) year for SBRM 2018, 2019, and 2020. Information compiled from the annual analyses (Figure 3 in Wigley and Tholke 2018, 2019, 2020). See [Table 5](#) for species group abbreviations. CV = coefficient of variation; horizontal dashed line indicates the 30% CV.

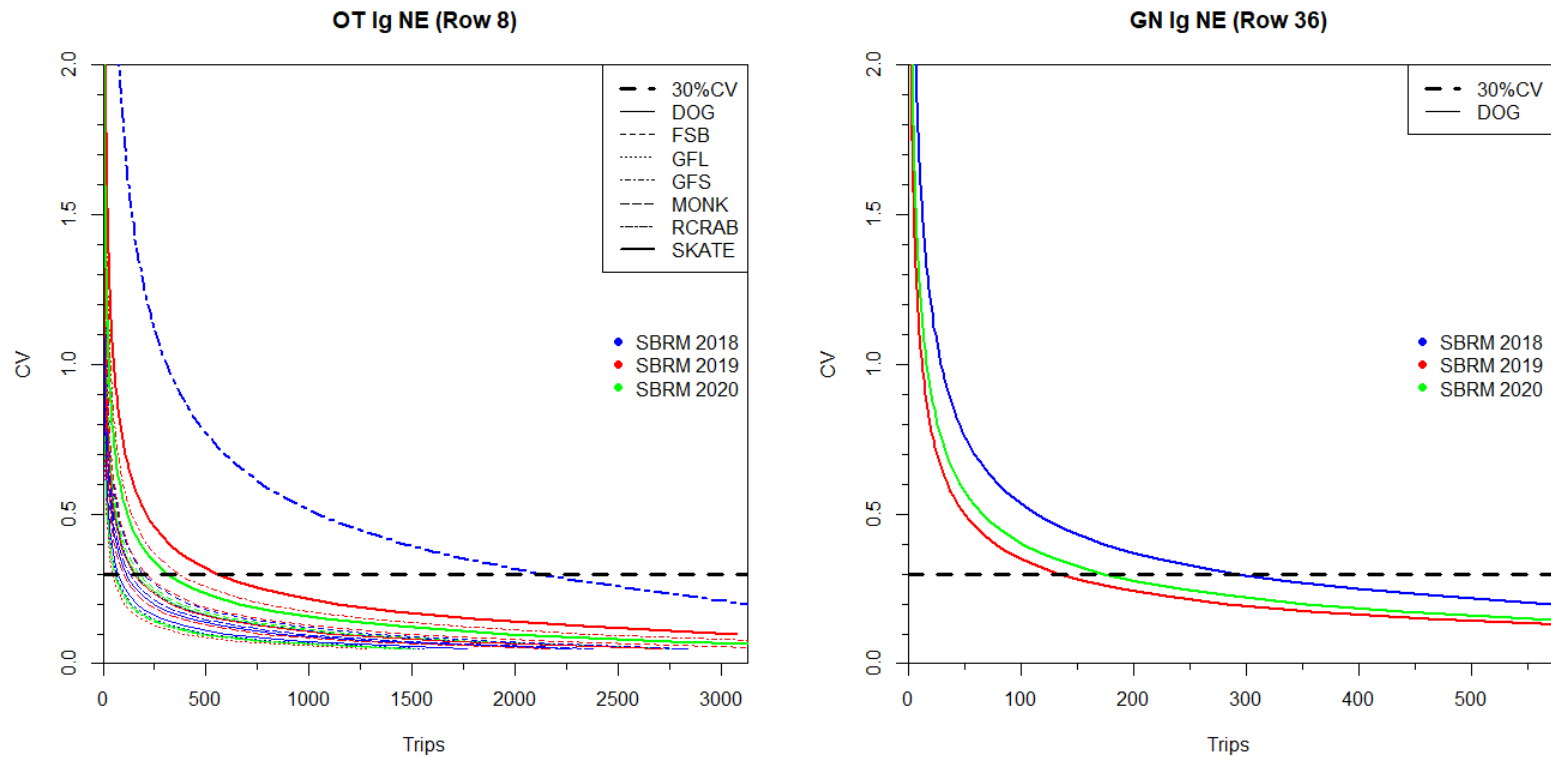


Figure 15, continued. Number of trips needed for 9 selected fleets by fish/invertebrate species groups, fleet, and Standardized Bycatch Reporting Methodology (SBRM) year for SBRM 2018, 2019, and 2020. Information compiled from the annual analyses (Figure 3 in Wigley and Tholke 2018, 2019, 2020). See [Table 5](#) for species group abbreviations. CV = coefficient of variation; horizontal dashed line indicates the 30% CV.

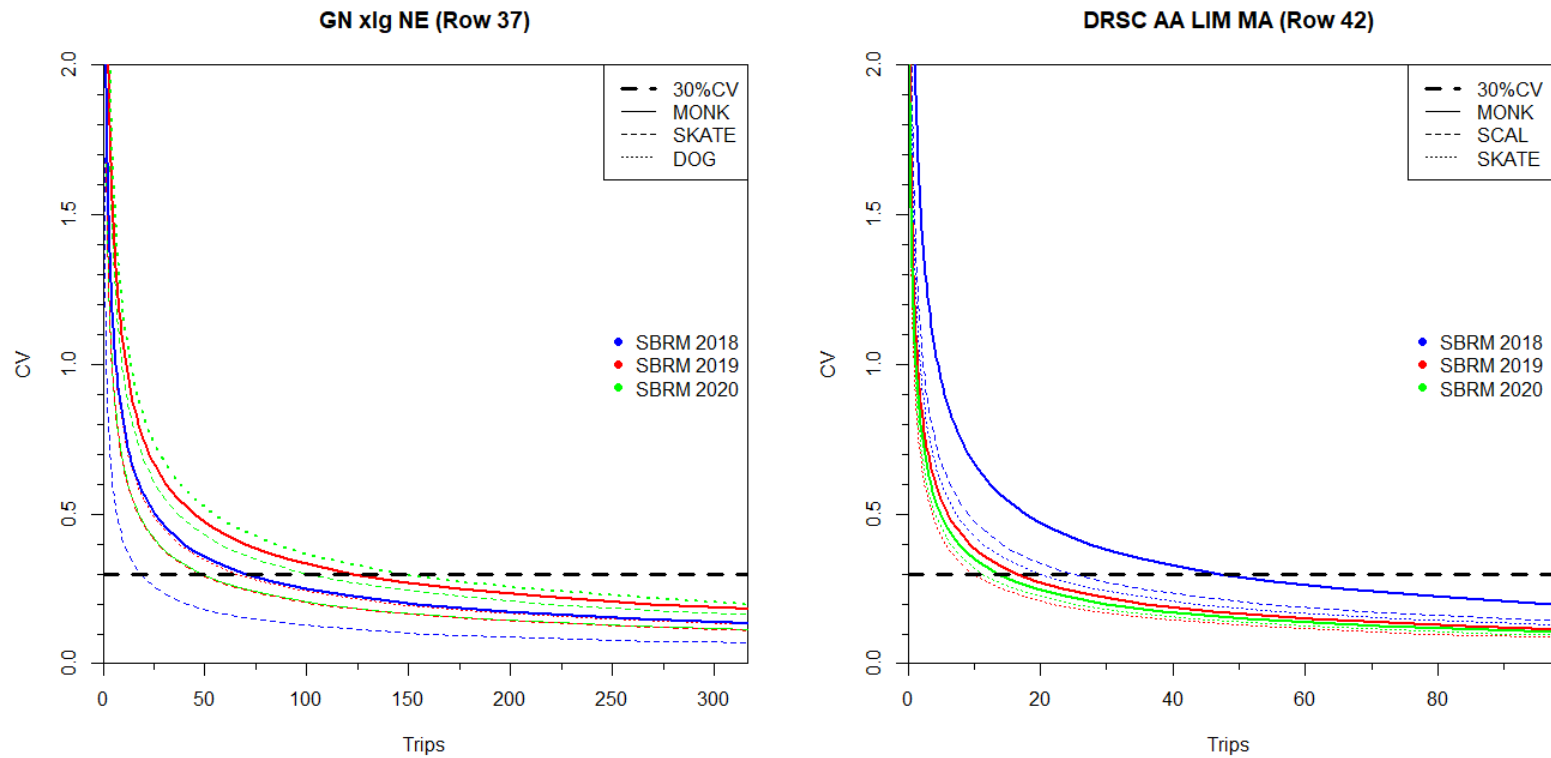


Figure 15, continued. Number of trips needed for 9 selected fleets by fish/invertebrate species groups, fleet, and Standardized Bycatch Reporting Methodology (SBRM) year for SBRM 2018, 2019, and 2020. Information compiled from the annual analyses (Figure 3 in Wigley and Tholke 2018, 2019, 2020). See [Table 5](#) for species group abbreviations. CV = coefficient of variation; horizontal dashed line indicates the 30% CV.

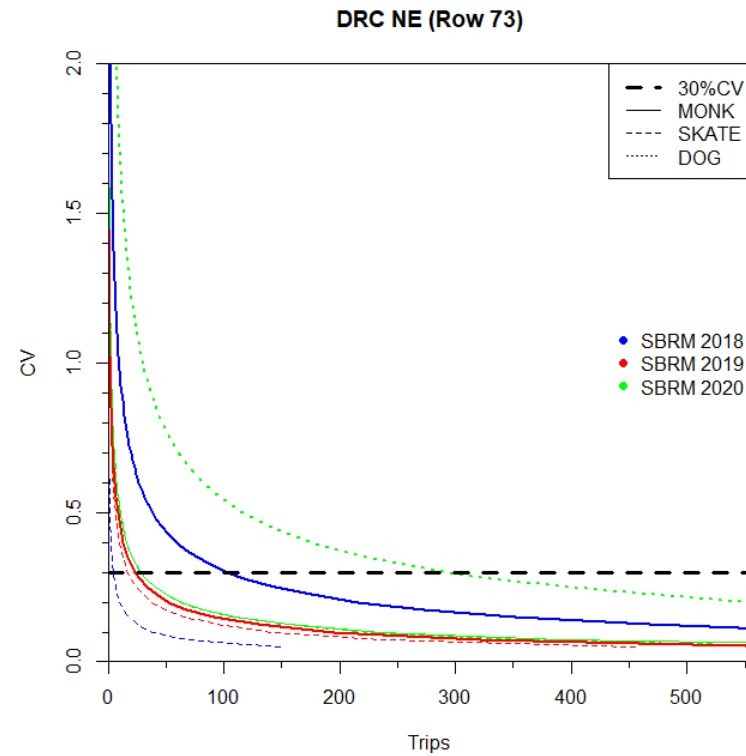


Figure 15, continued. Number of trips needed for 9 selected fleets by fish/invertebrate species groups, fleet, and Standardized Bycatch Reporting Methodology (SBRM) year for SBRM 2018, 2019, and 2020. Information compiled from the annual analyses (Figure 3 in Wigley and Tholke 2018, 2019, 2020). See [Table 5](#) for species group abbreviations. CV = coefficient of variation; horizontal dashed line indicates the 30% CV.

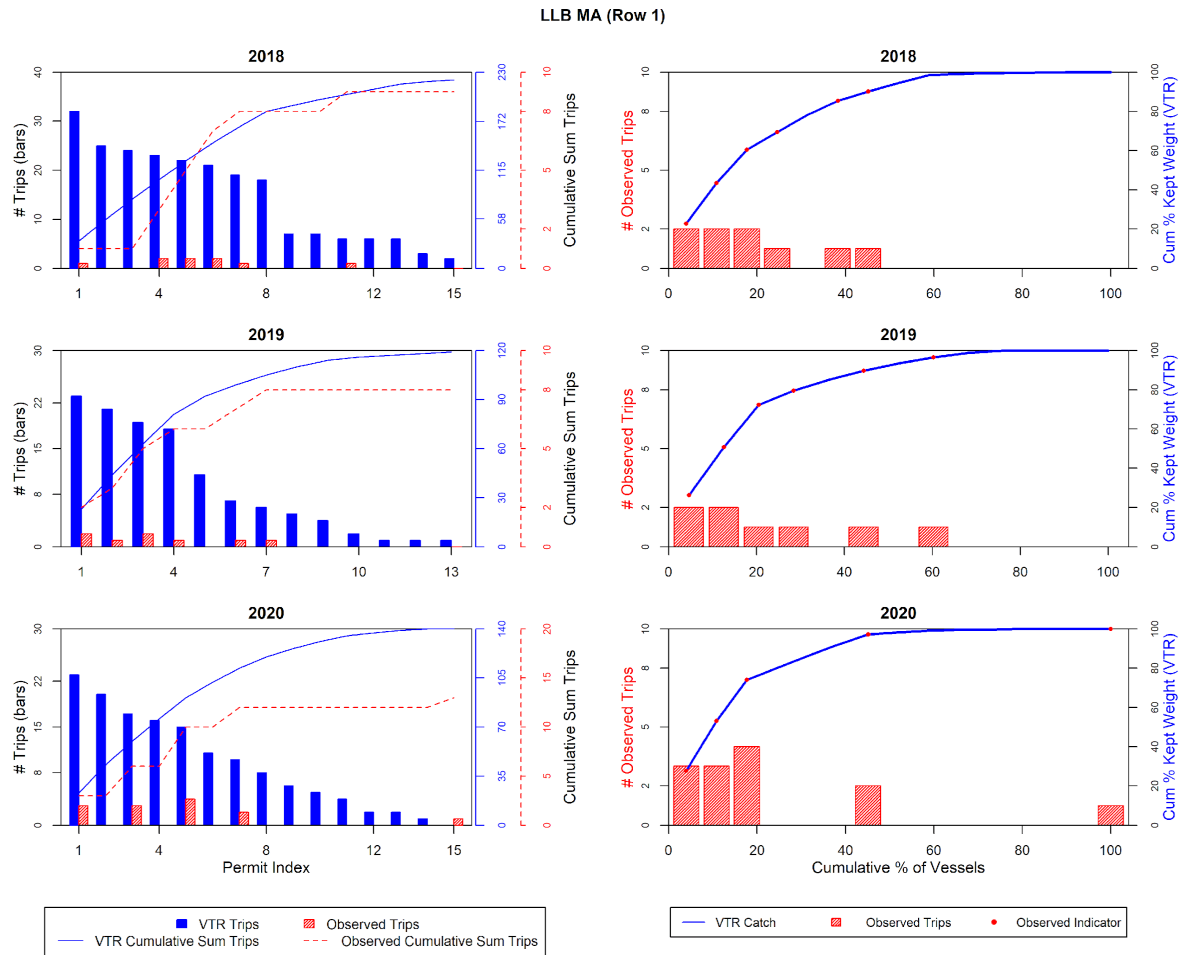


Figure 16. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

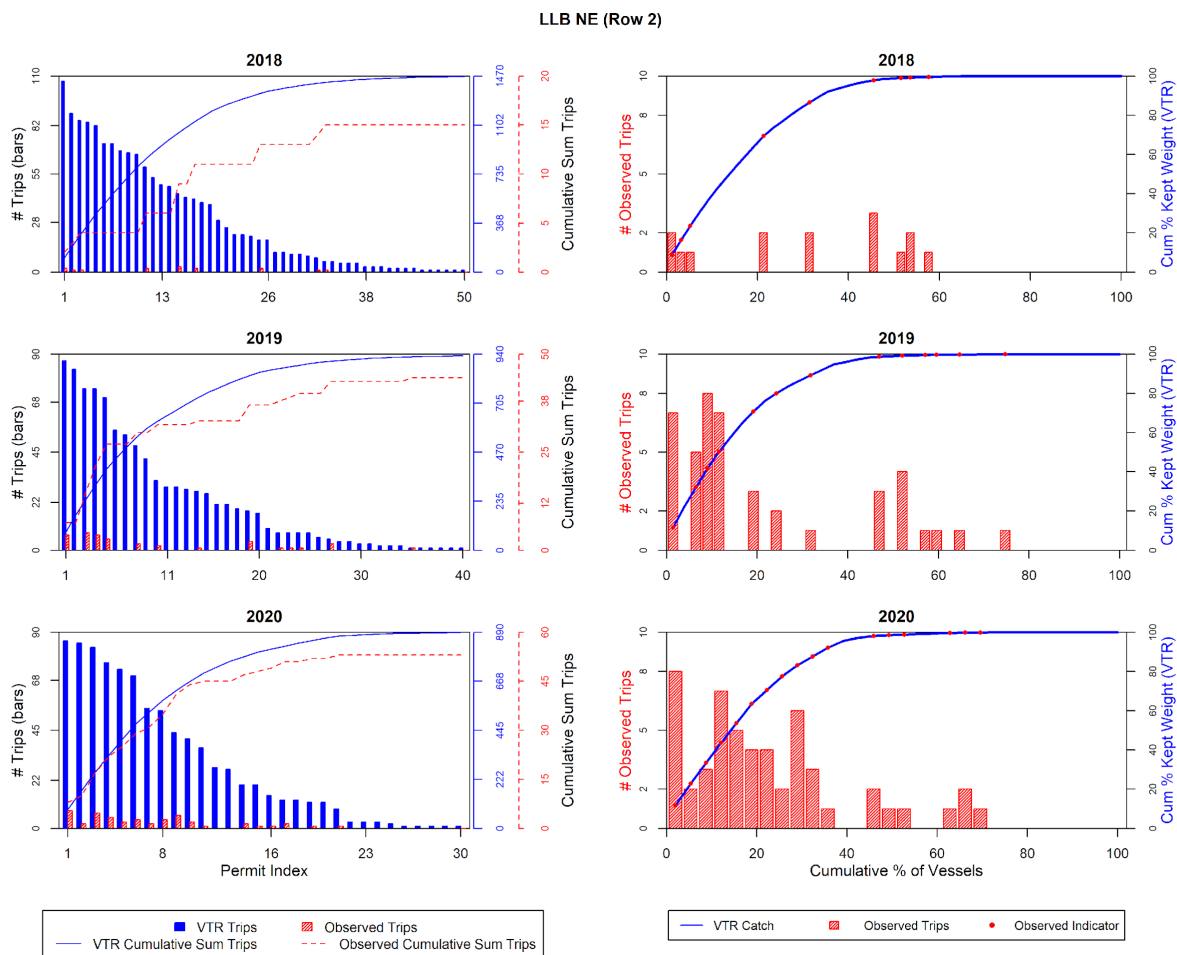


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

HL MA (Row 3)

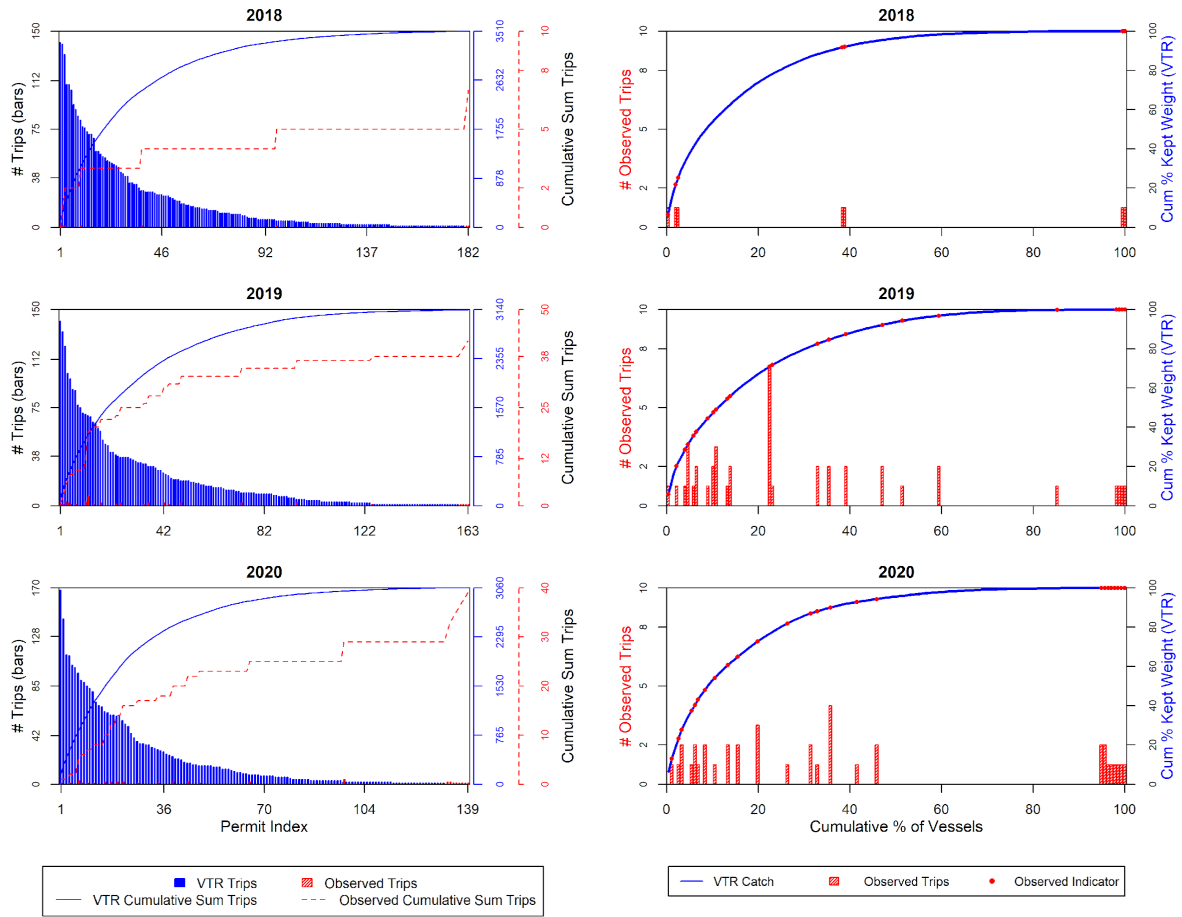


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

HL NE (Row 4)

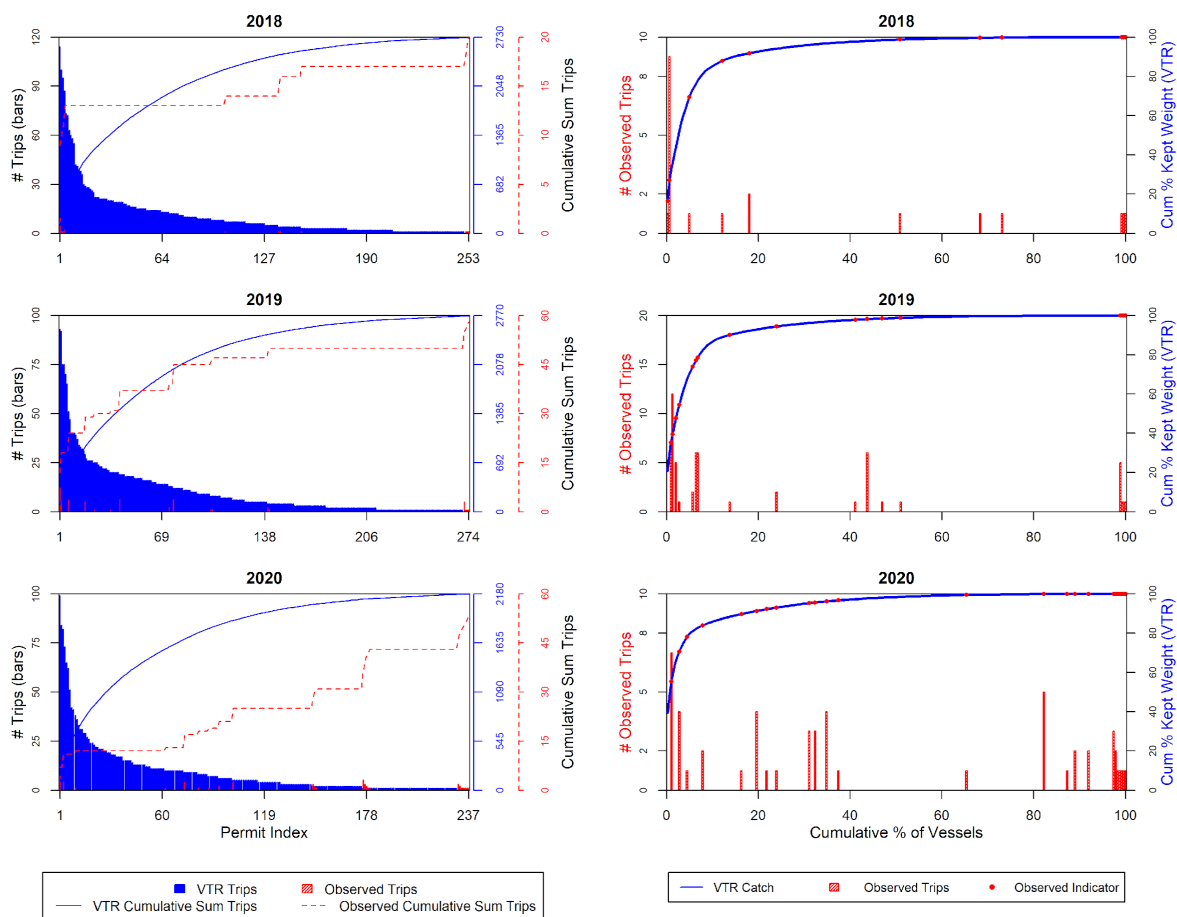


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

OT sm MA (Row 5)

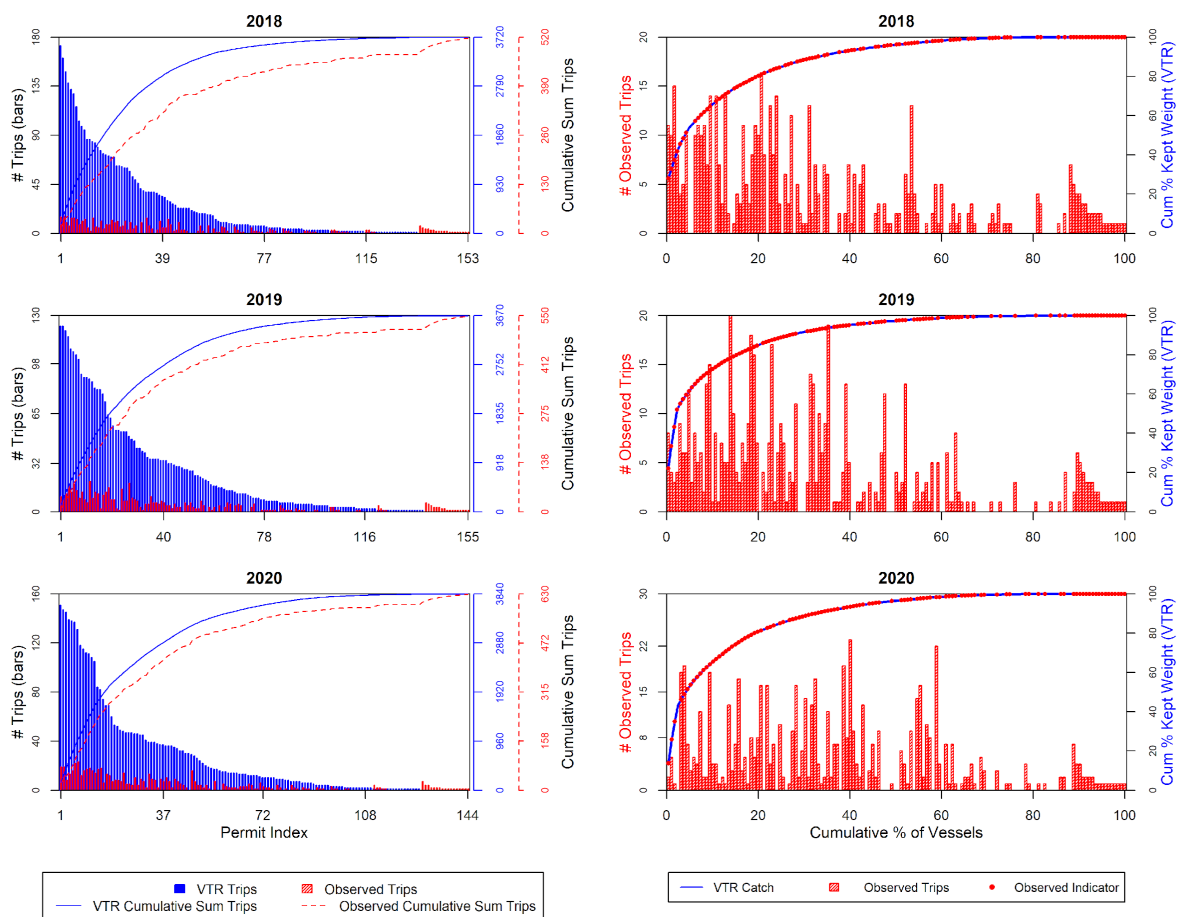


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

OT Ig MA (Row 6)

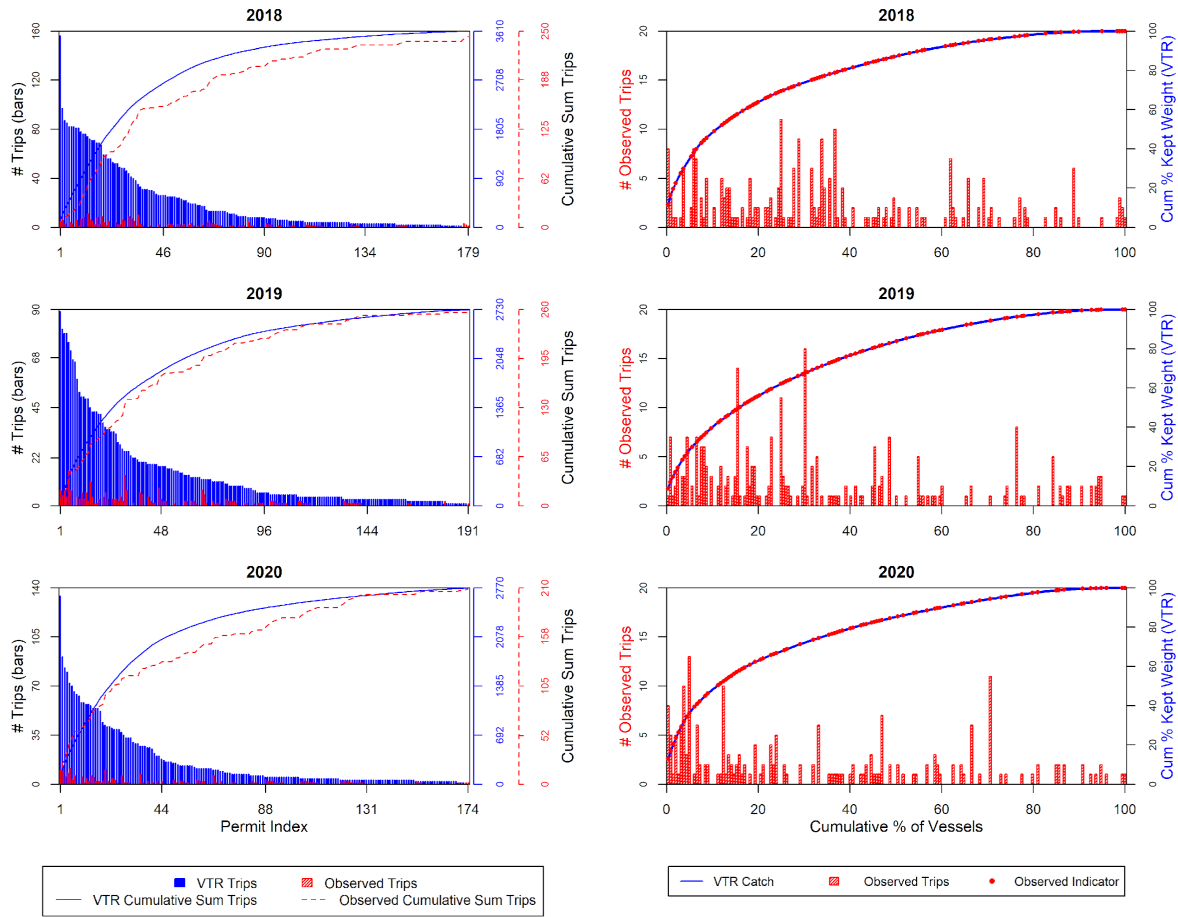


Figure 16, continued. Number of trips (bars; left- plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

OT sm NE (Row 7)

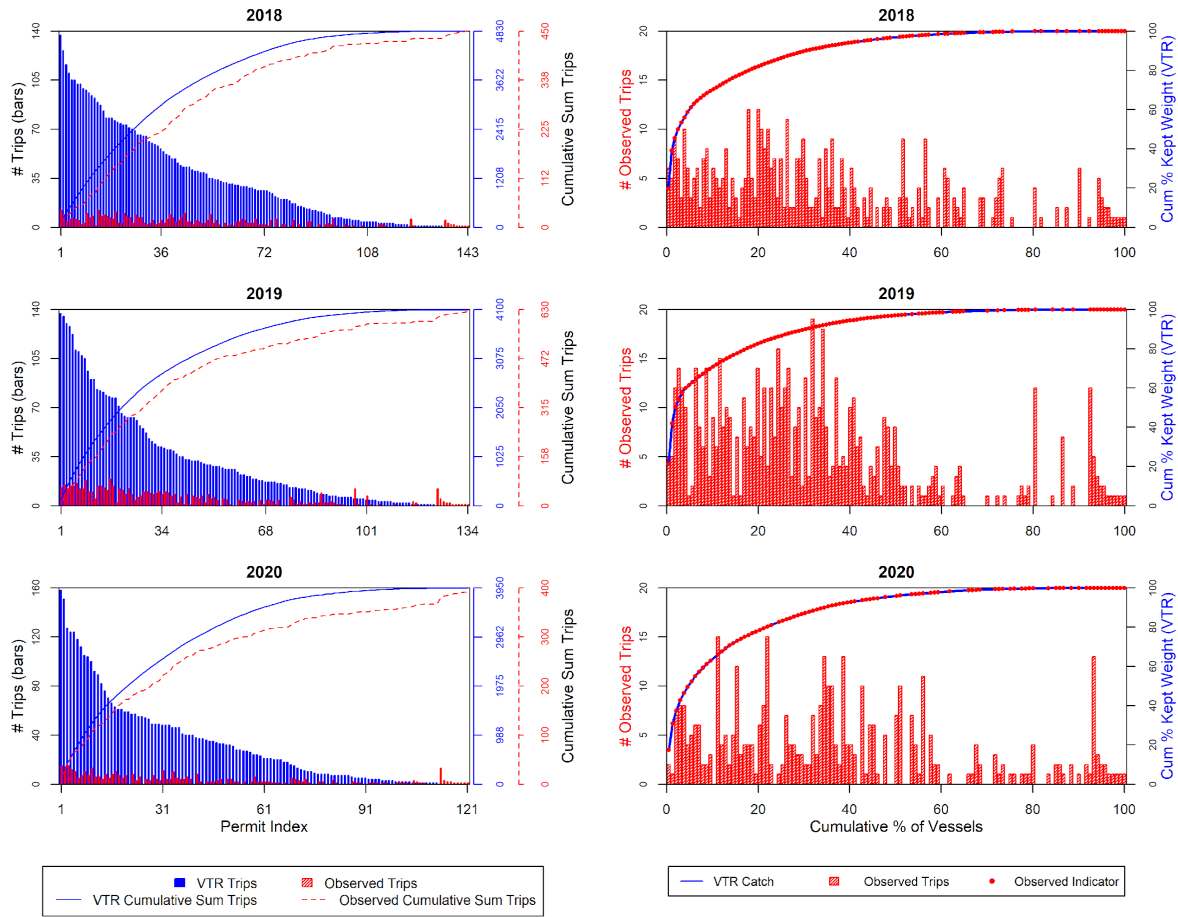


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

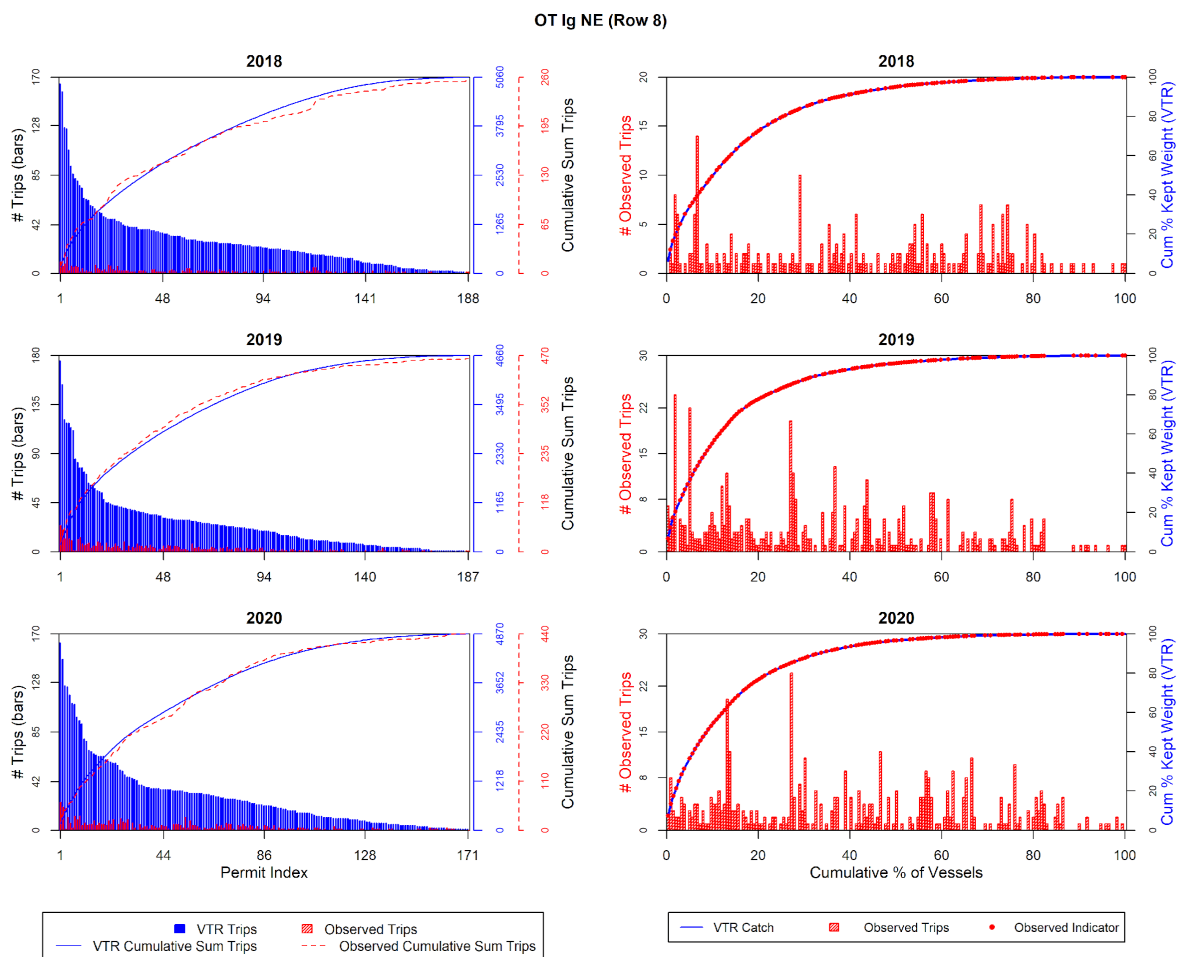


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

OTSC AA GEN sm MA (Row 9)

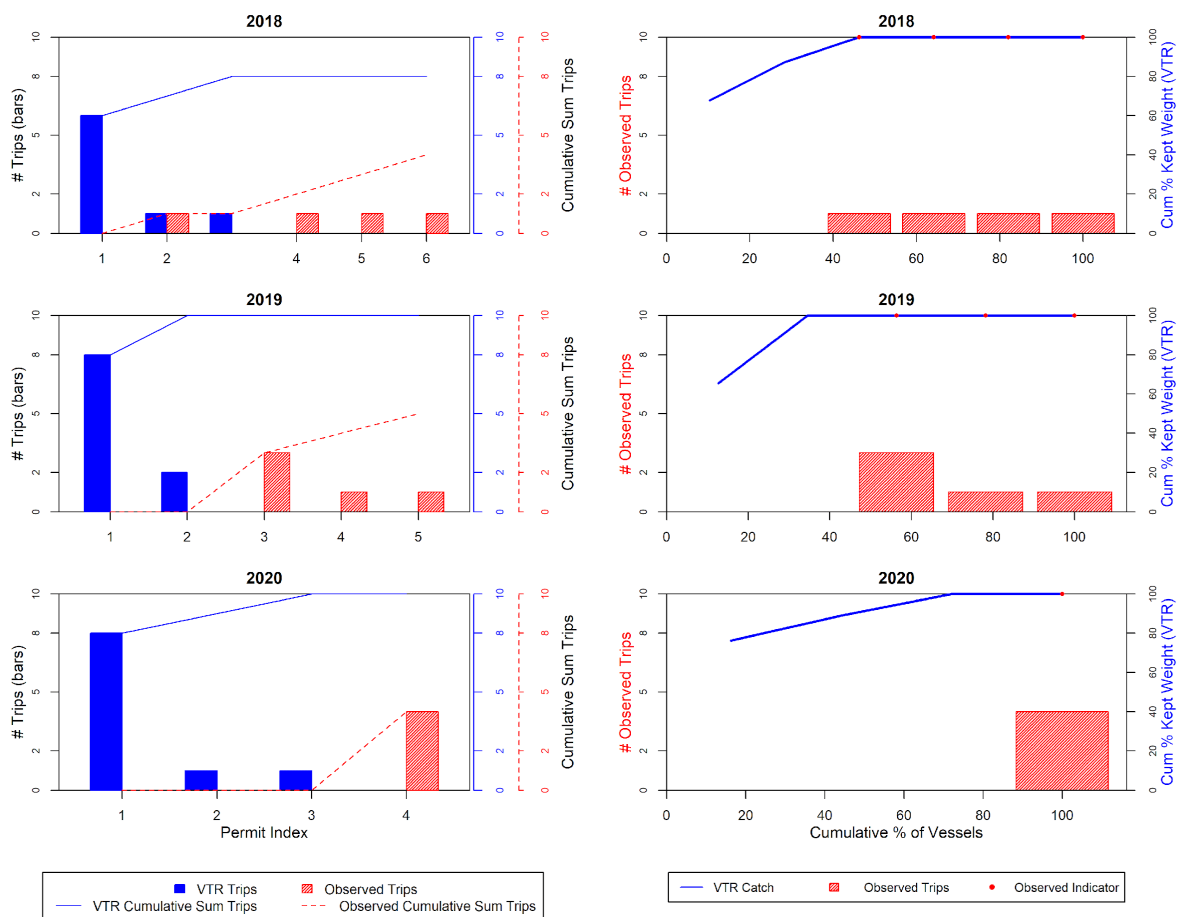


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

OTT sm MA (Row 16)

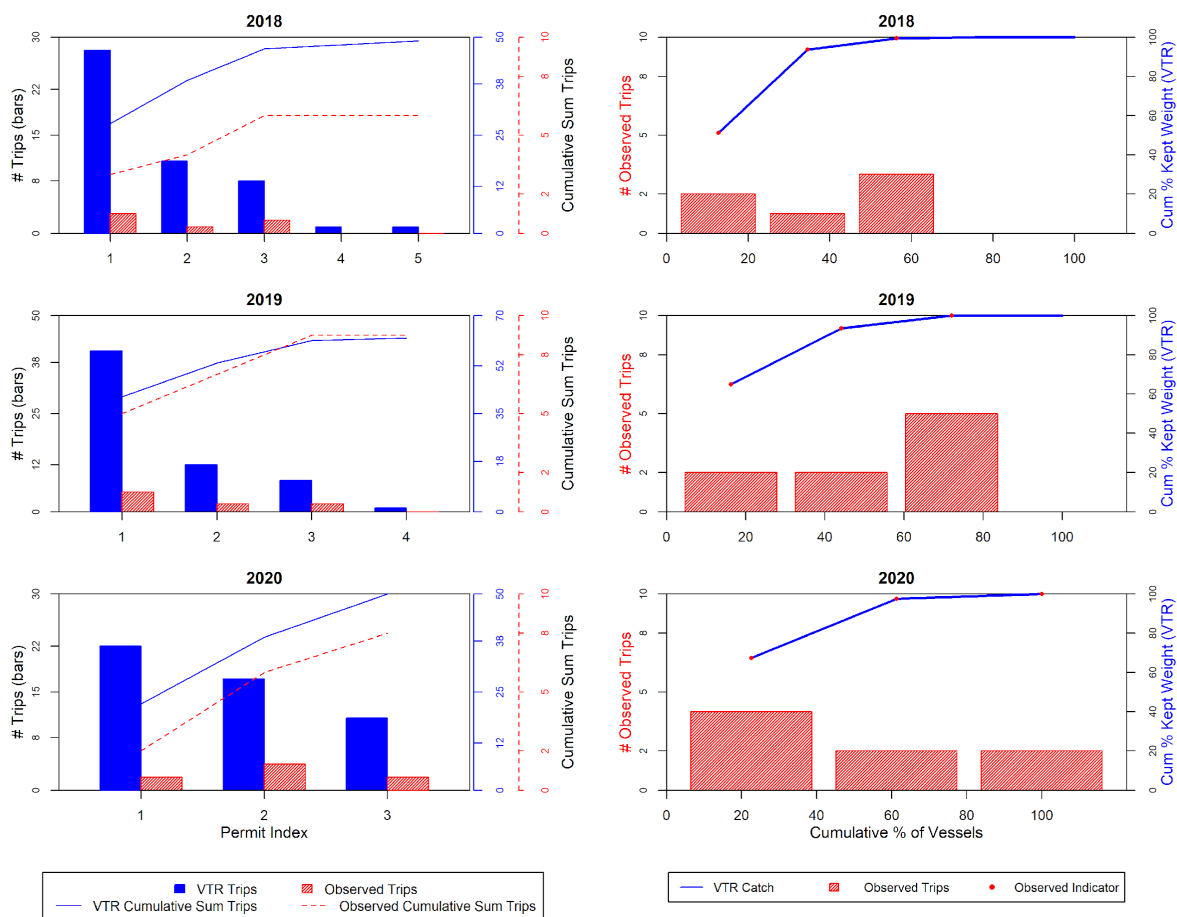


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

OTT sm NE (Row 18)

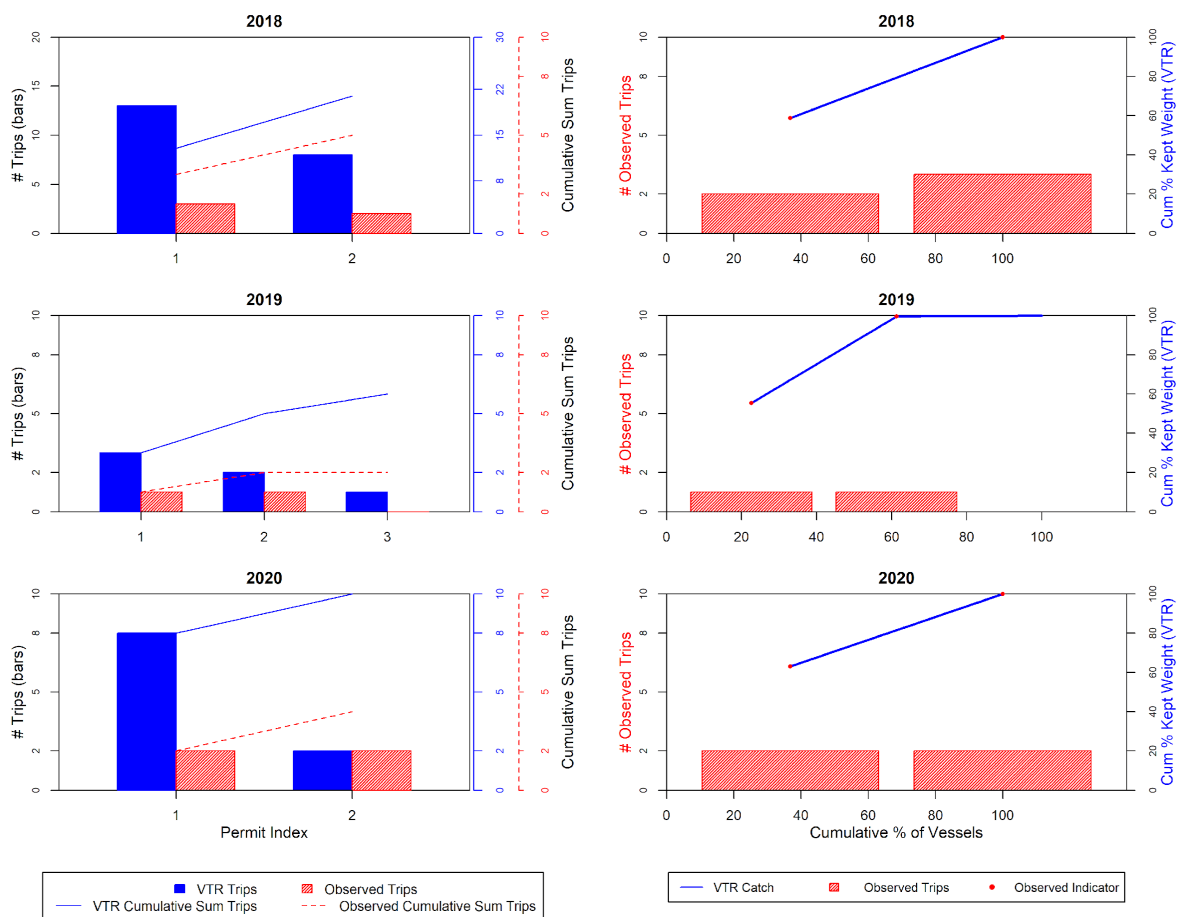


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

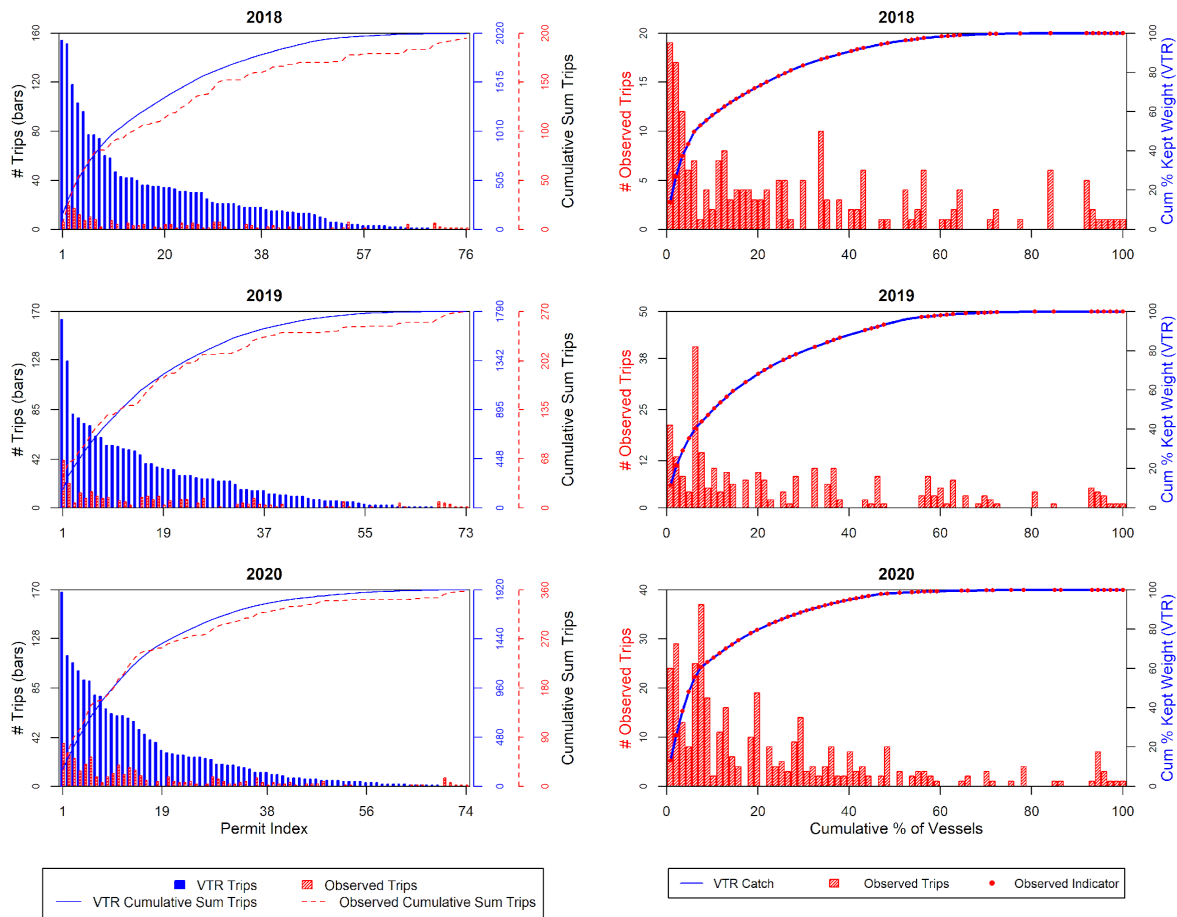


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

GN Ig MA (Row 33)

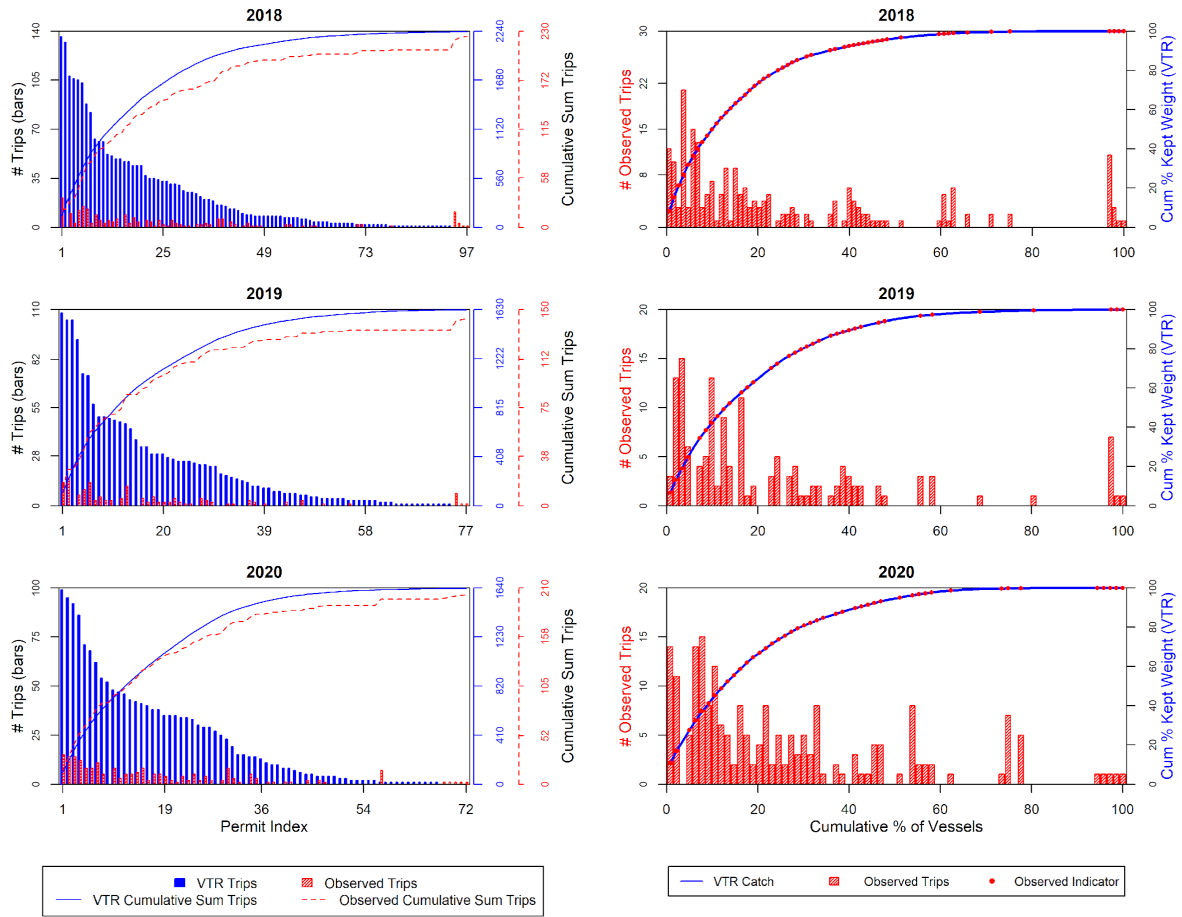


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

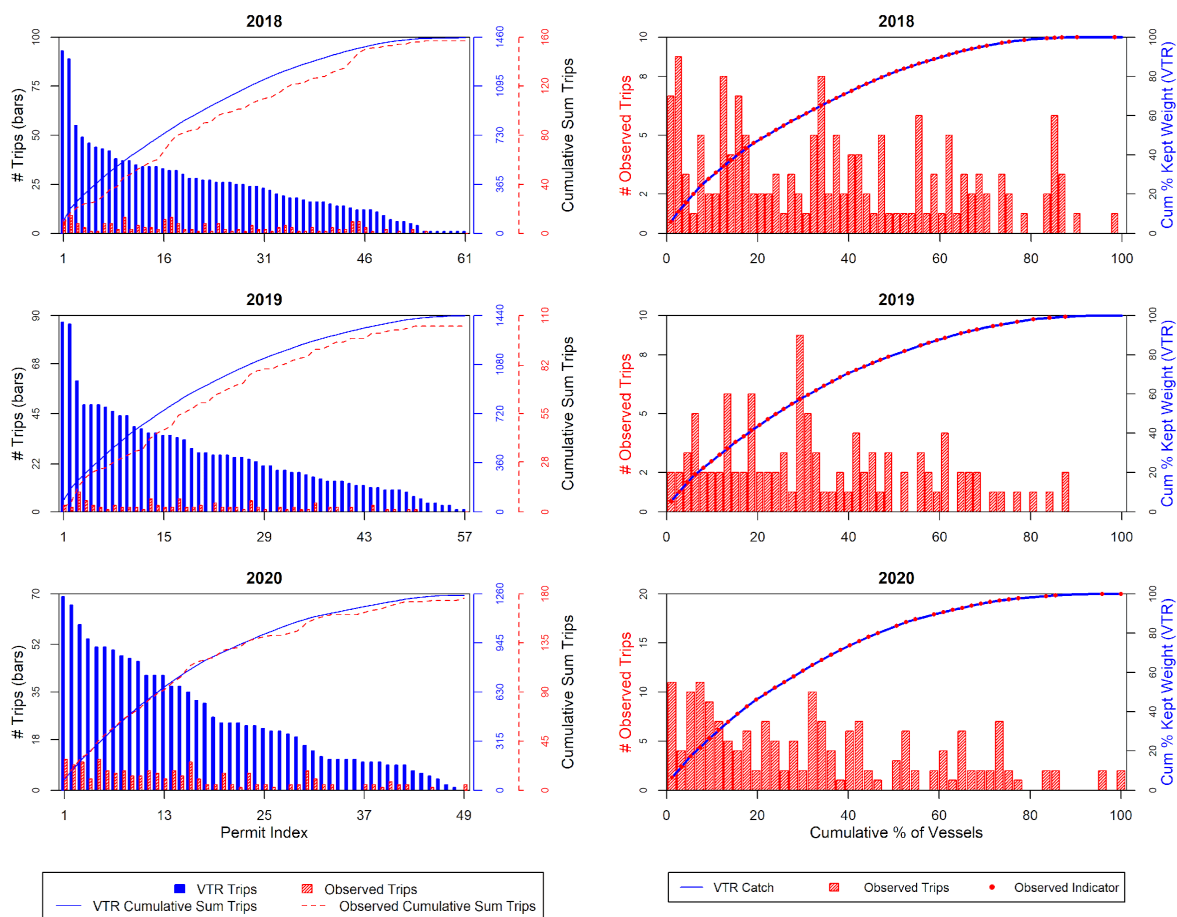


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

GN Ig NE (Row 36)

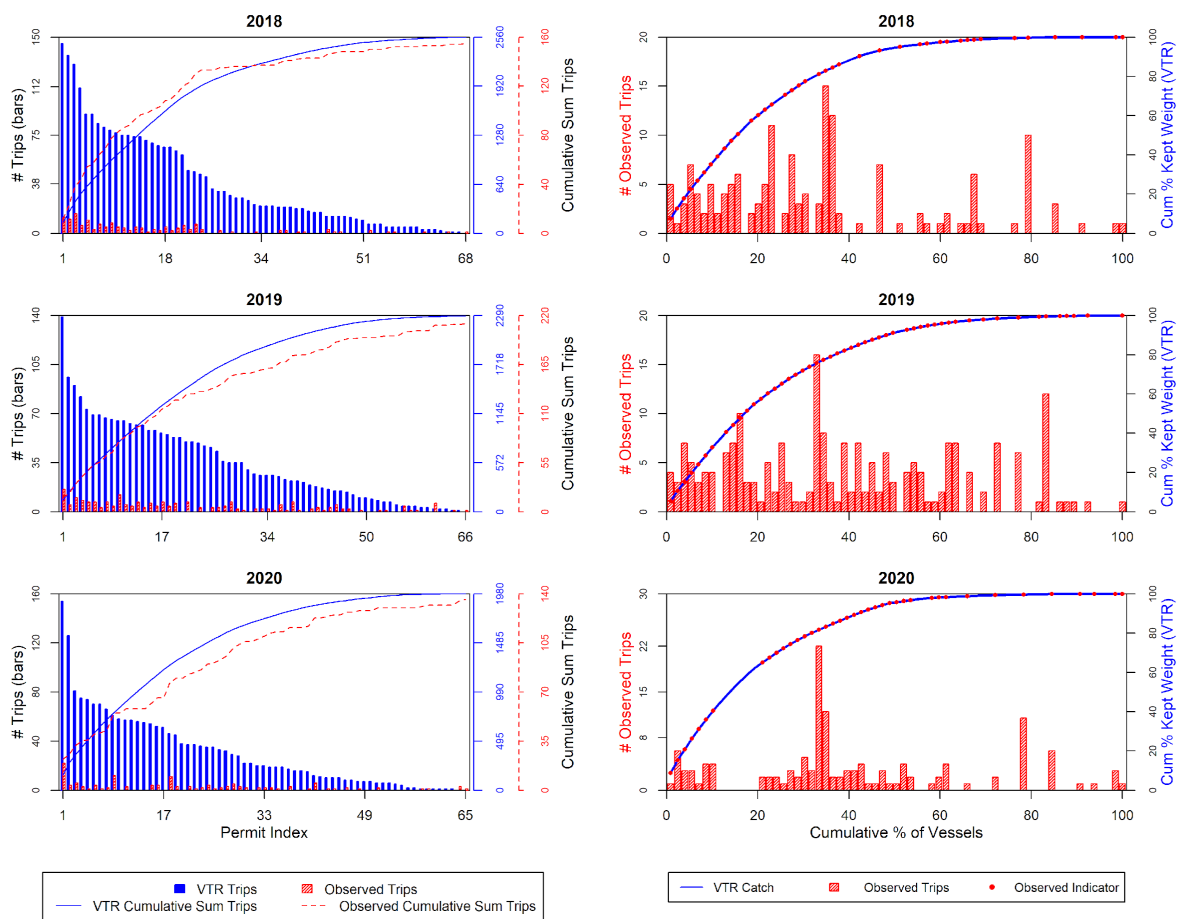


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

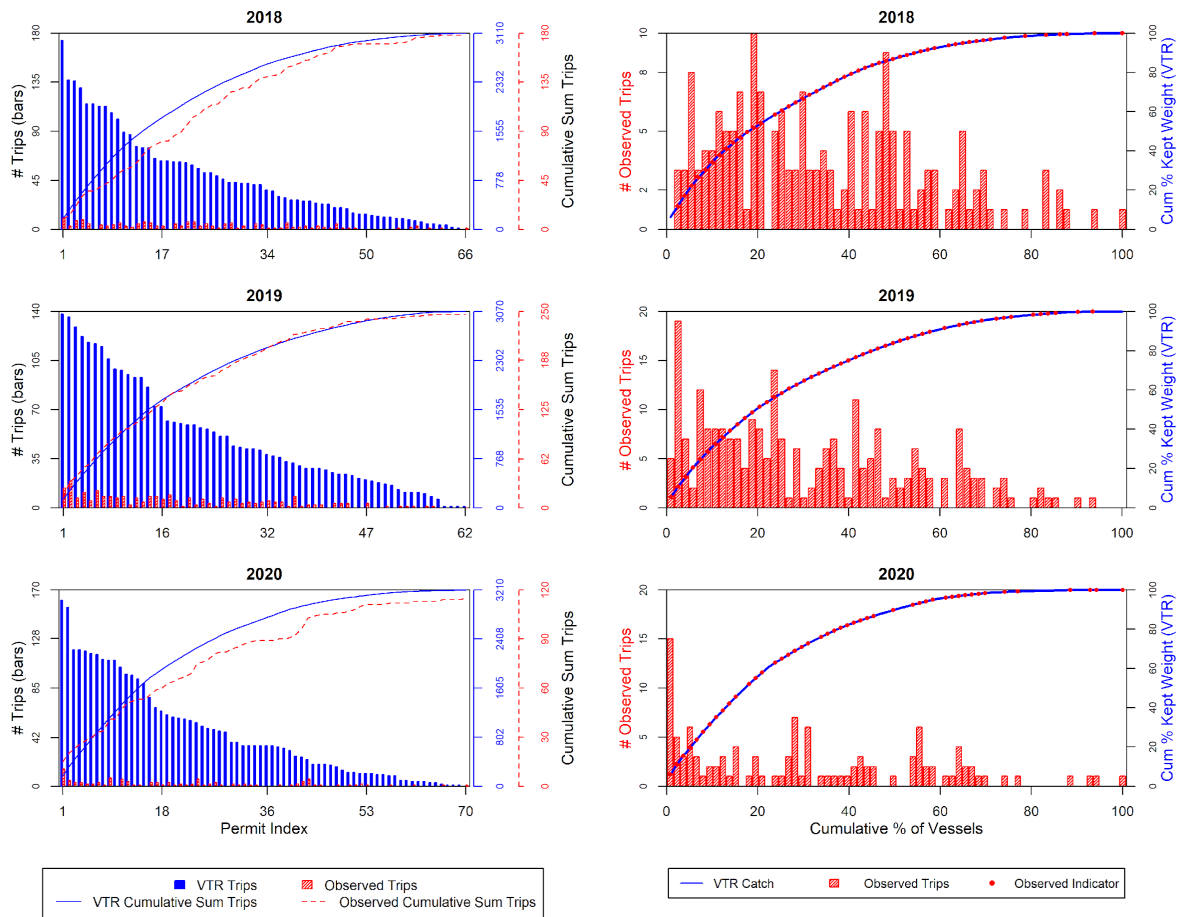


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

PS NE (Row 39)

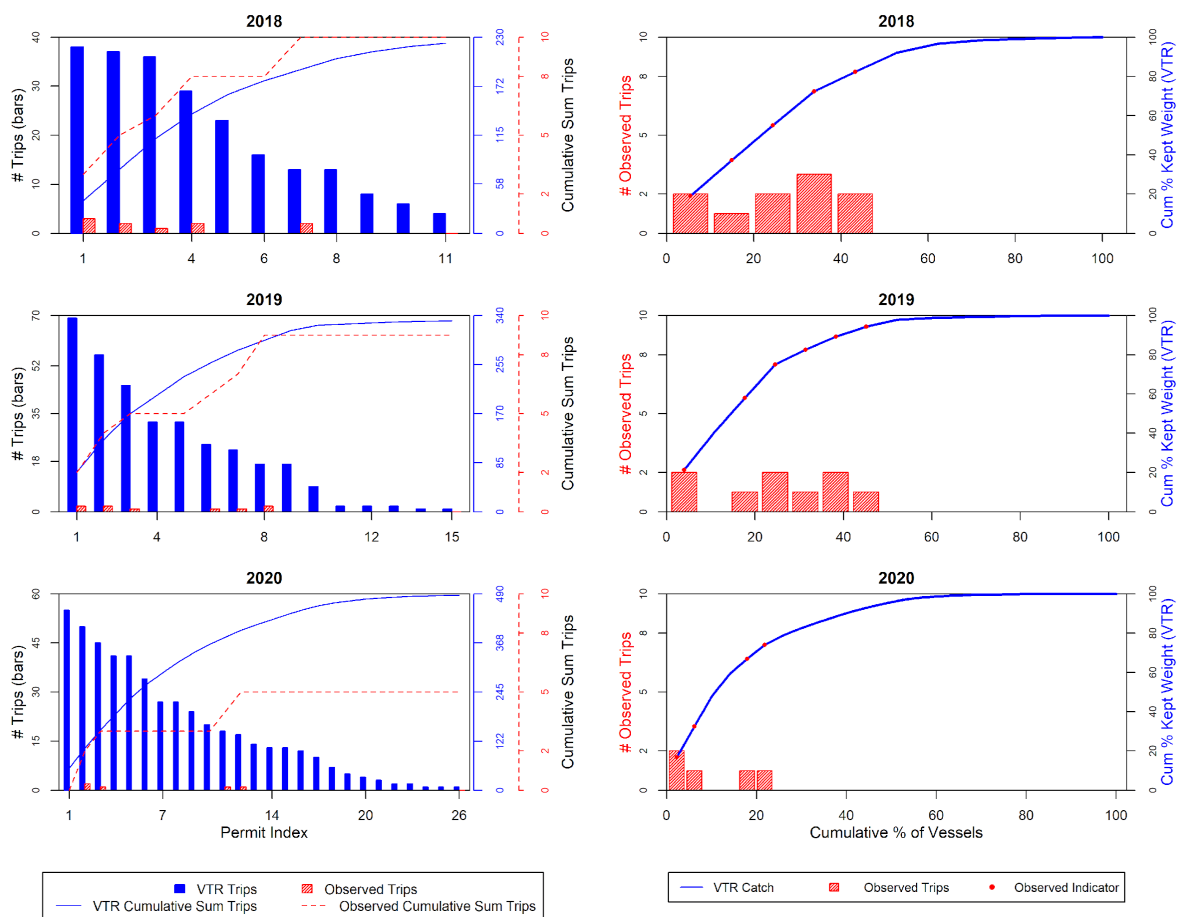


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

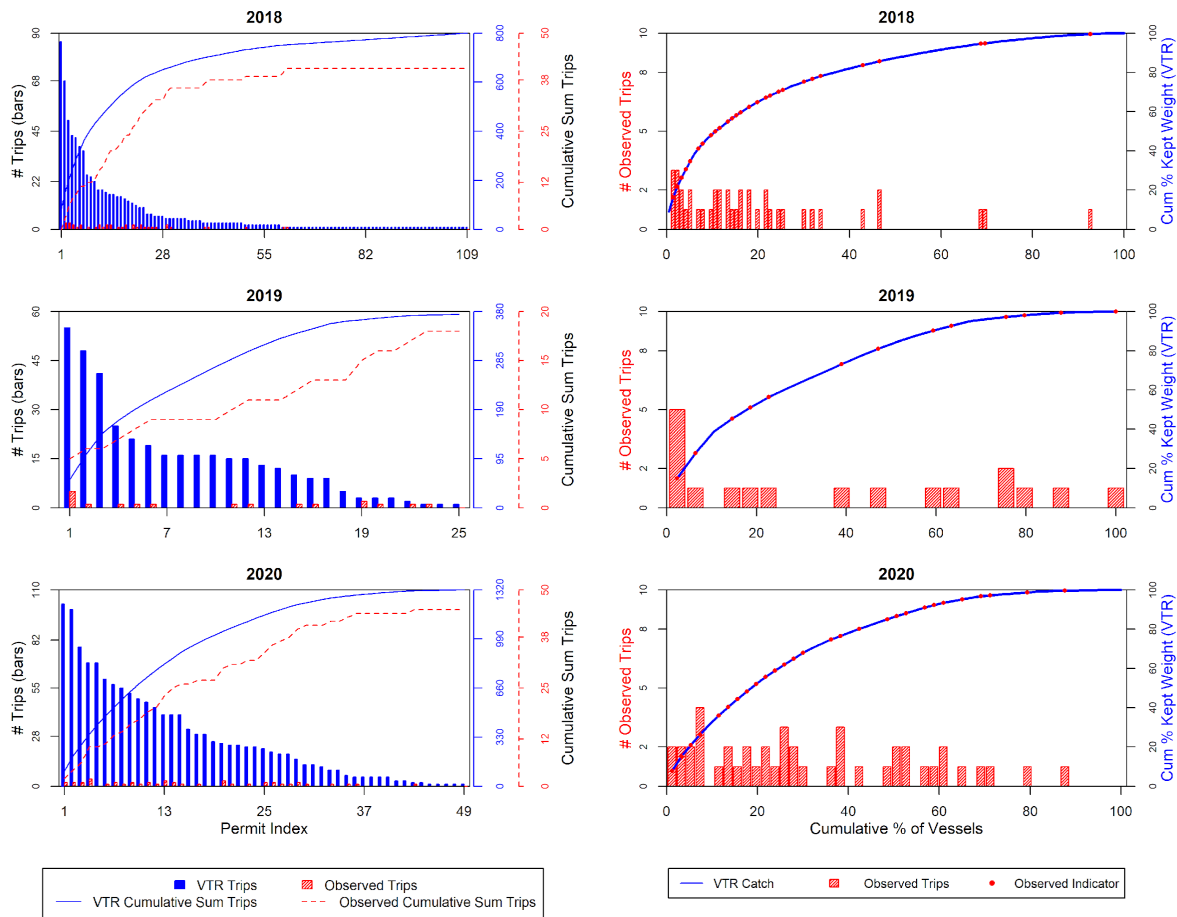


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

DRSC AA GEN NE (Row 41)

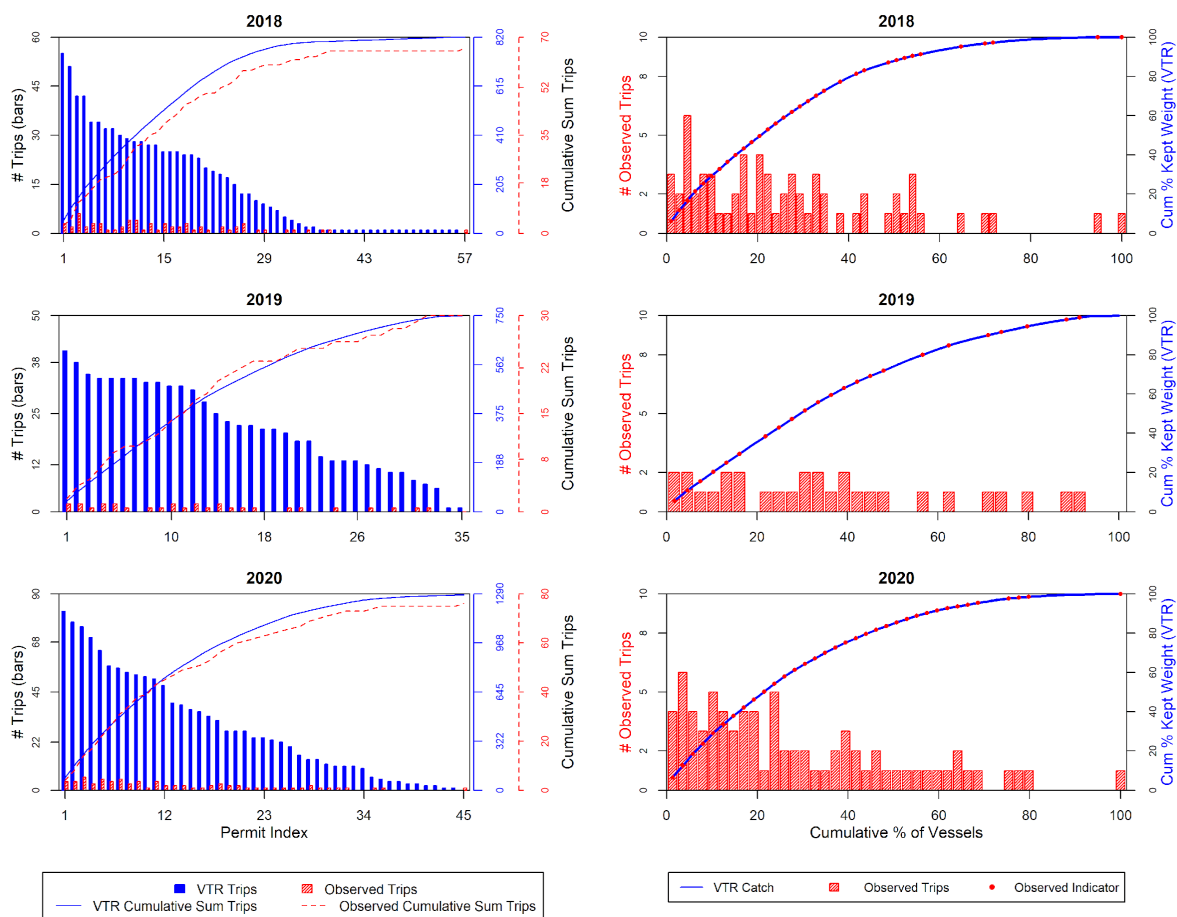


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

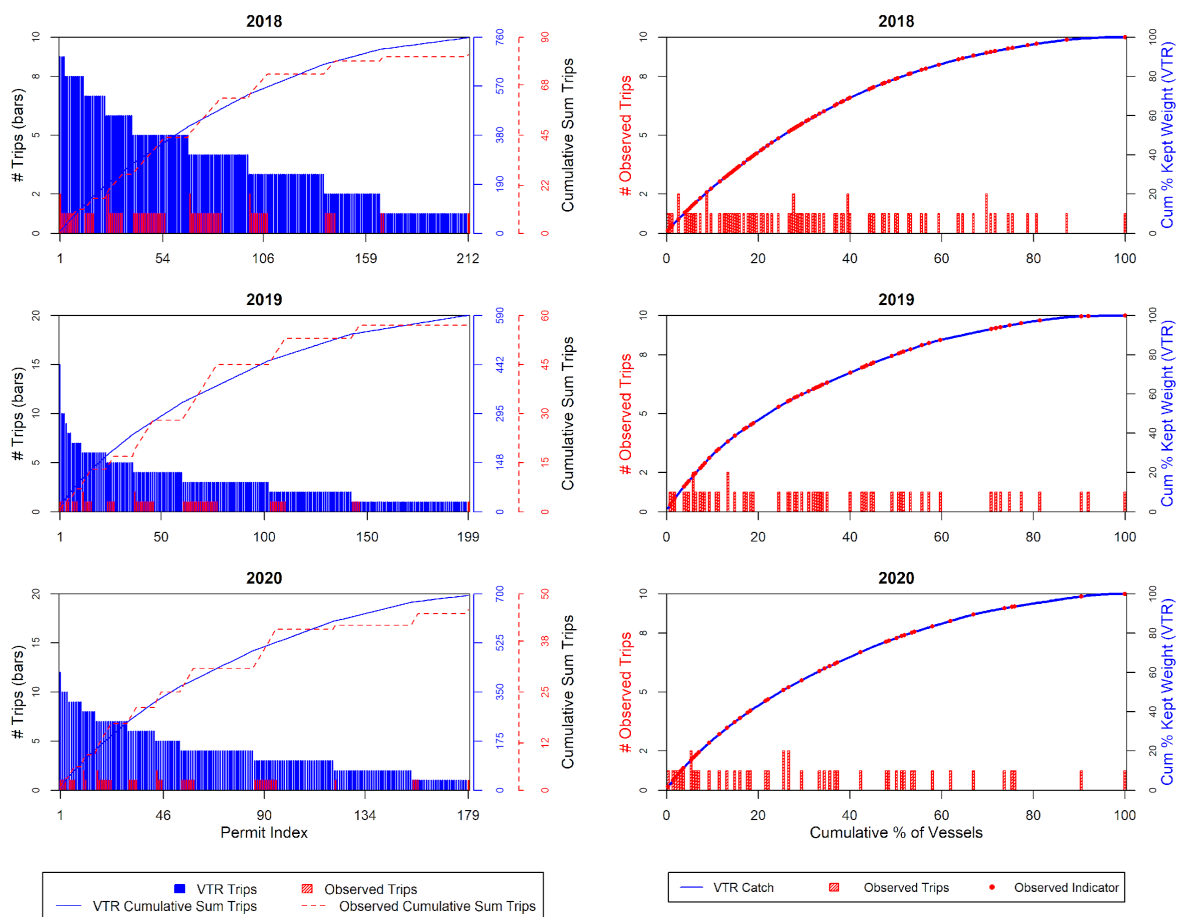


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

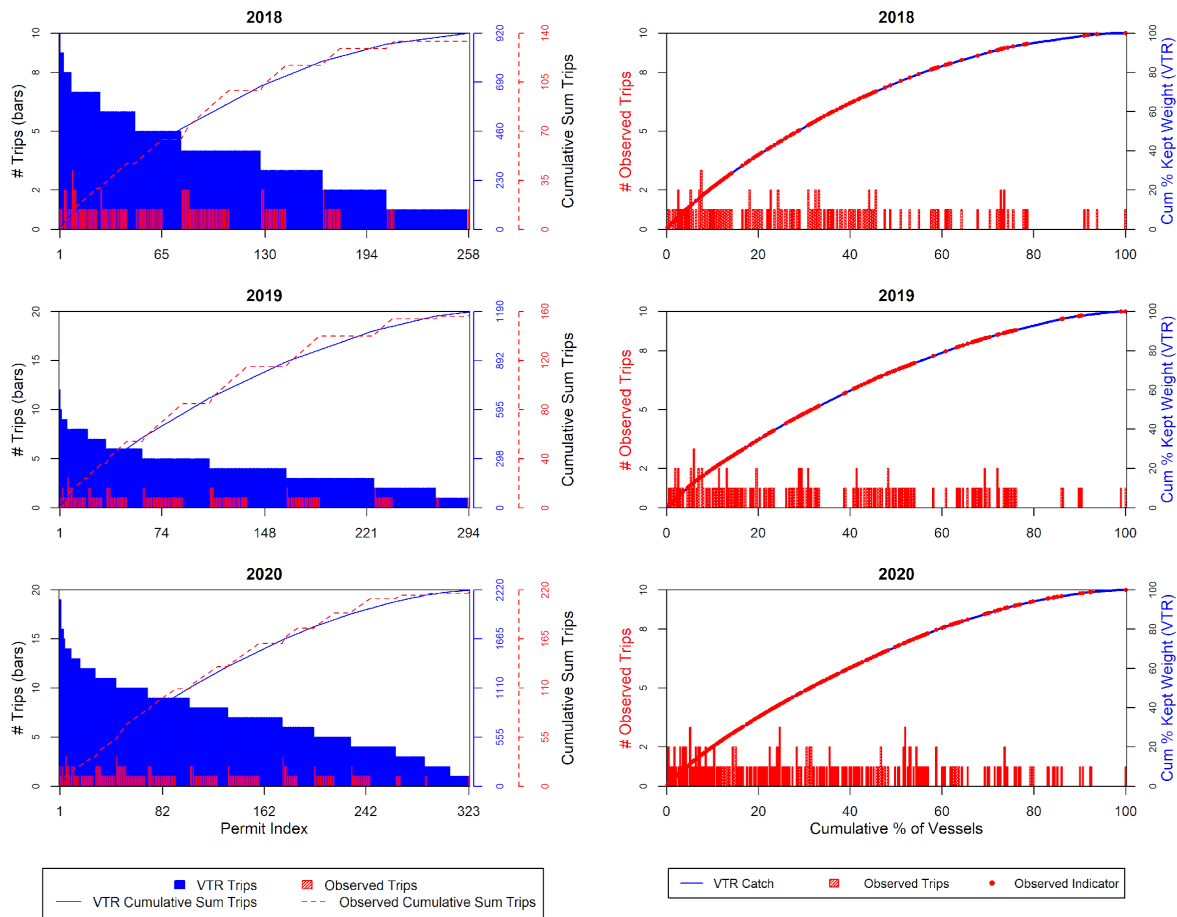


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

DRSC OPEN GEN MA (Row 44)

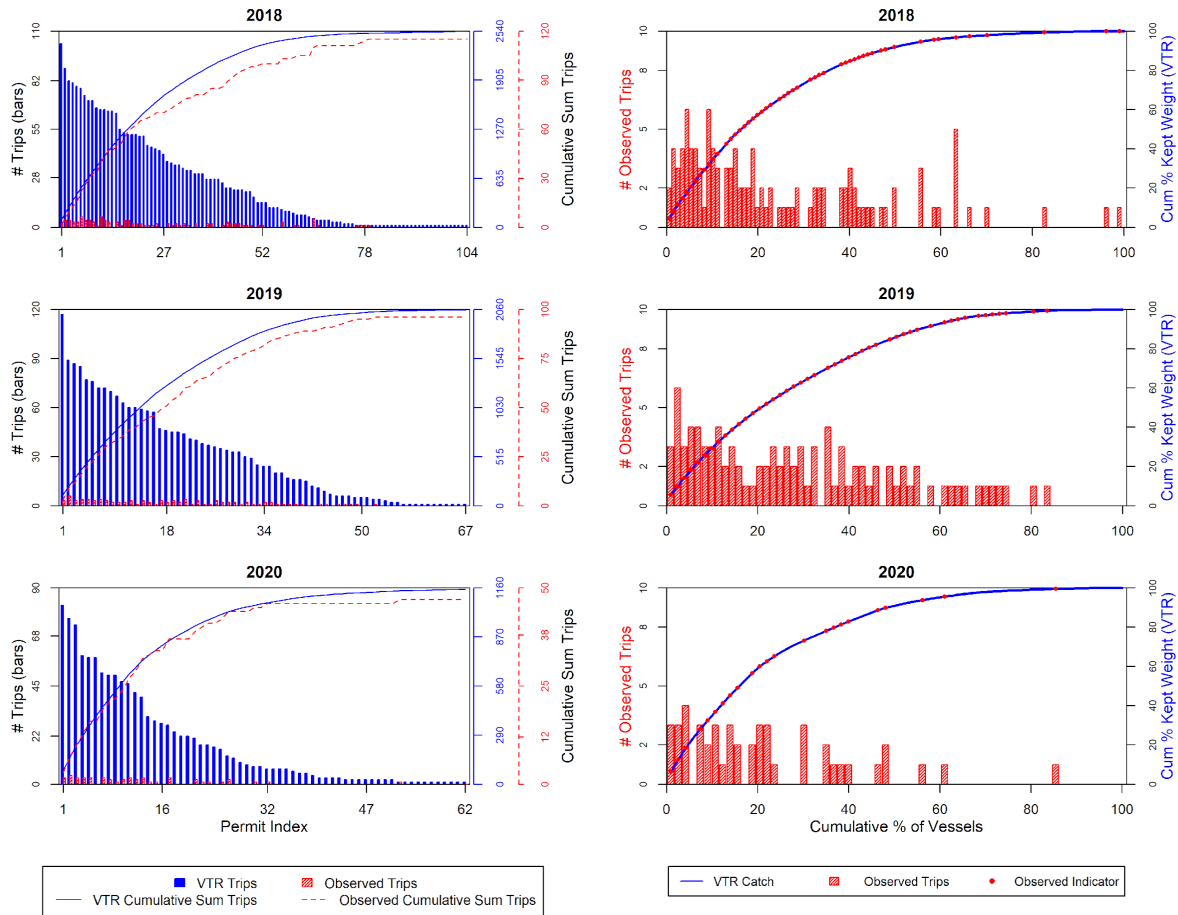


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

DRSC OPEN GEN NE (Row 45)

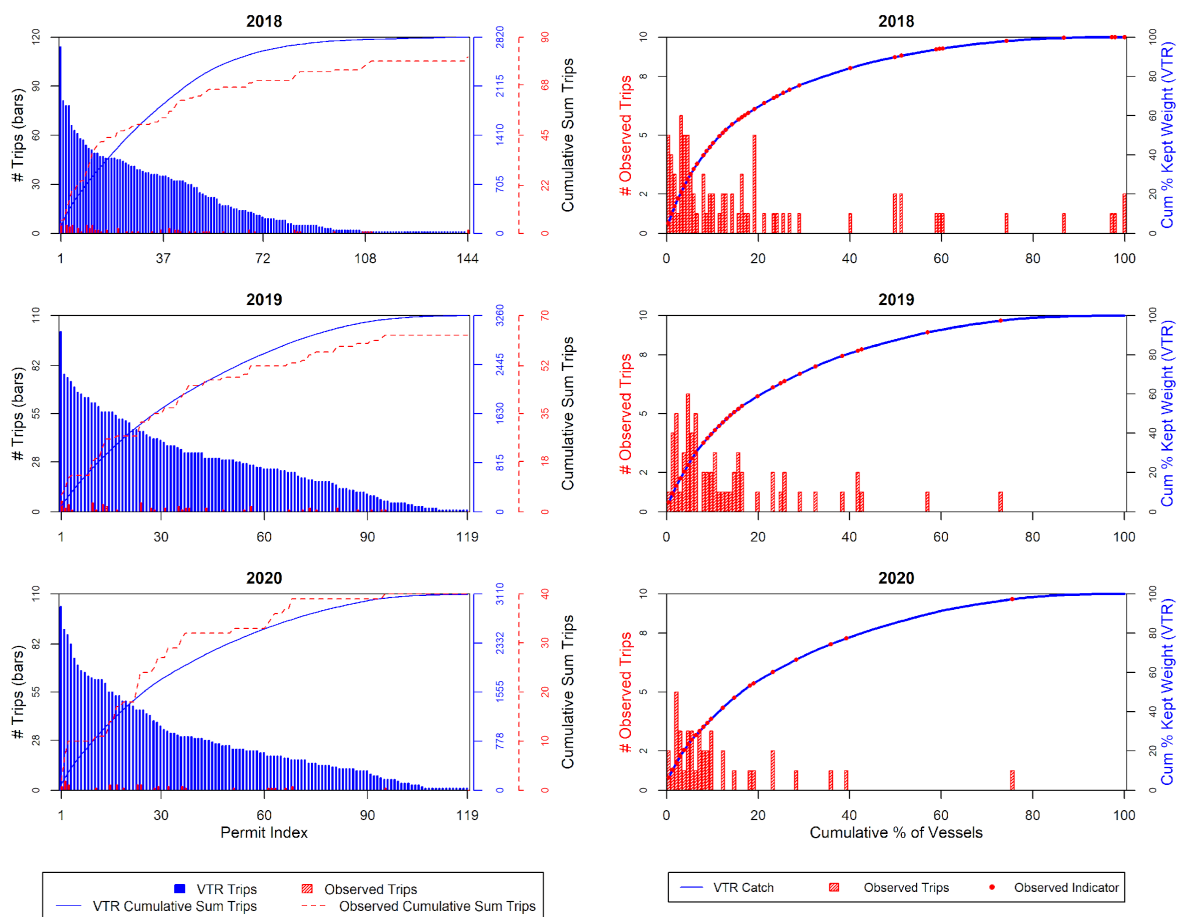


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

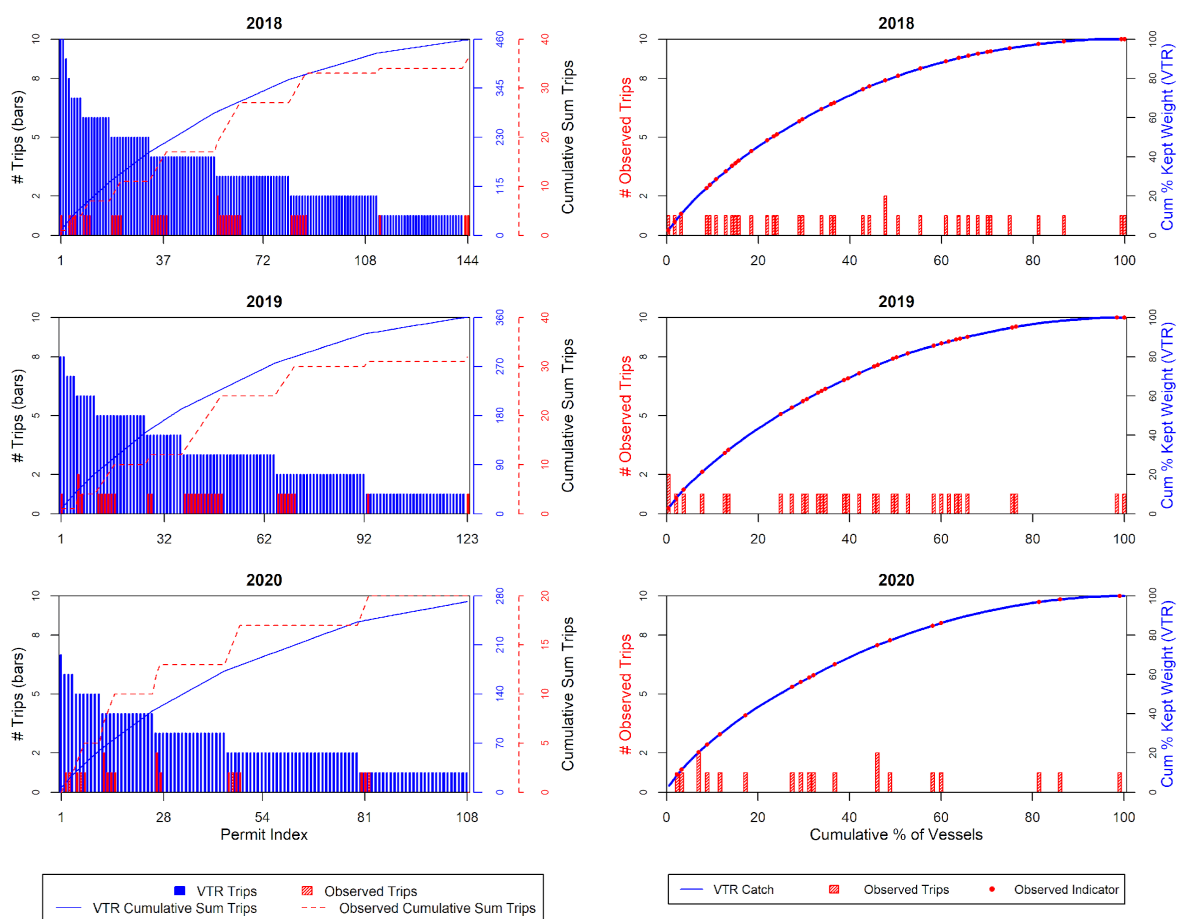


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

DRSC OPEN LIM NE (Row 47)

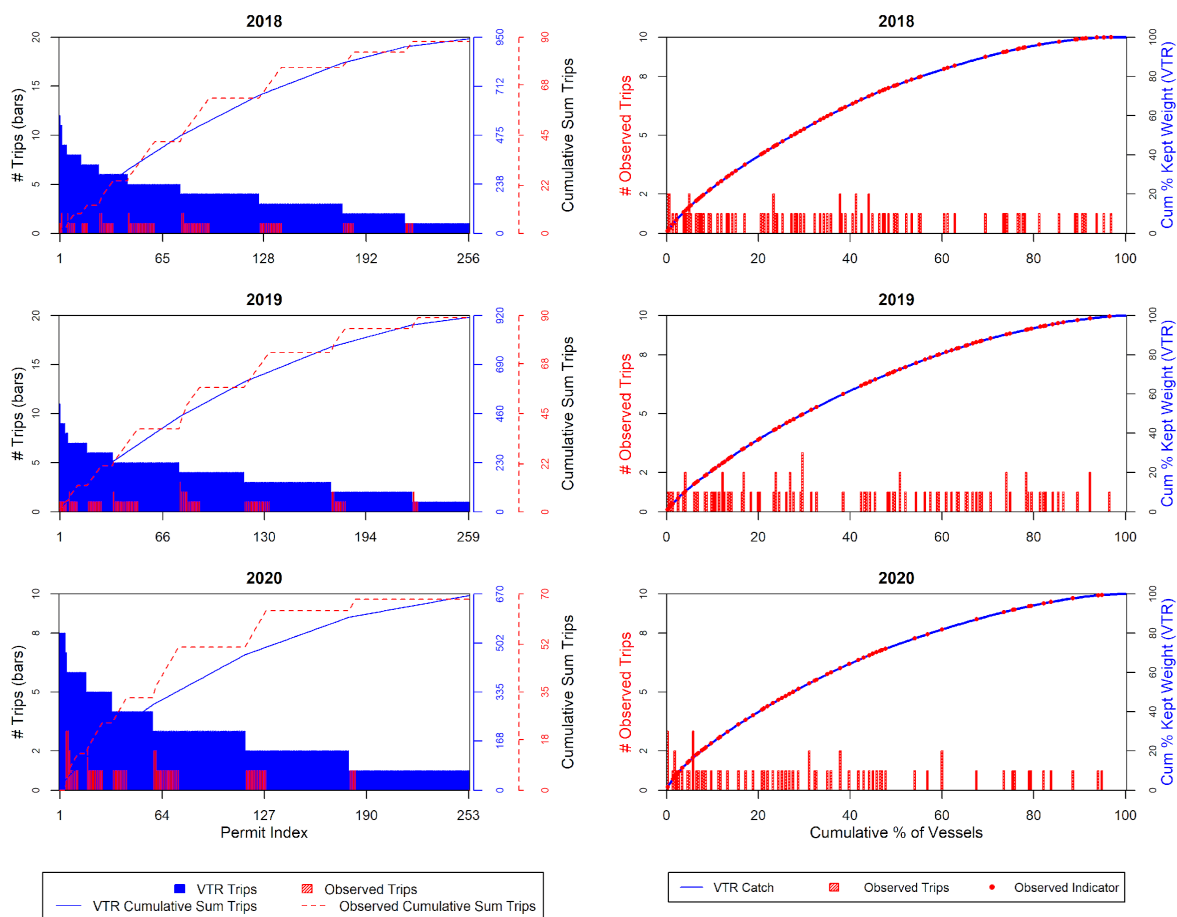


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

TMW all sm NE (Row 50)

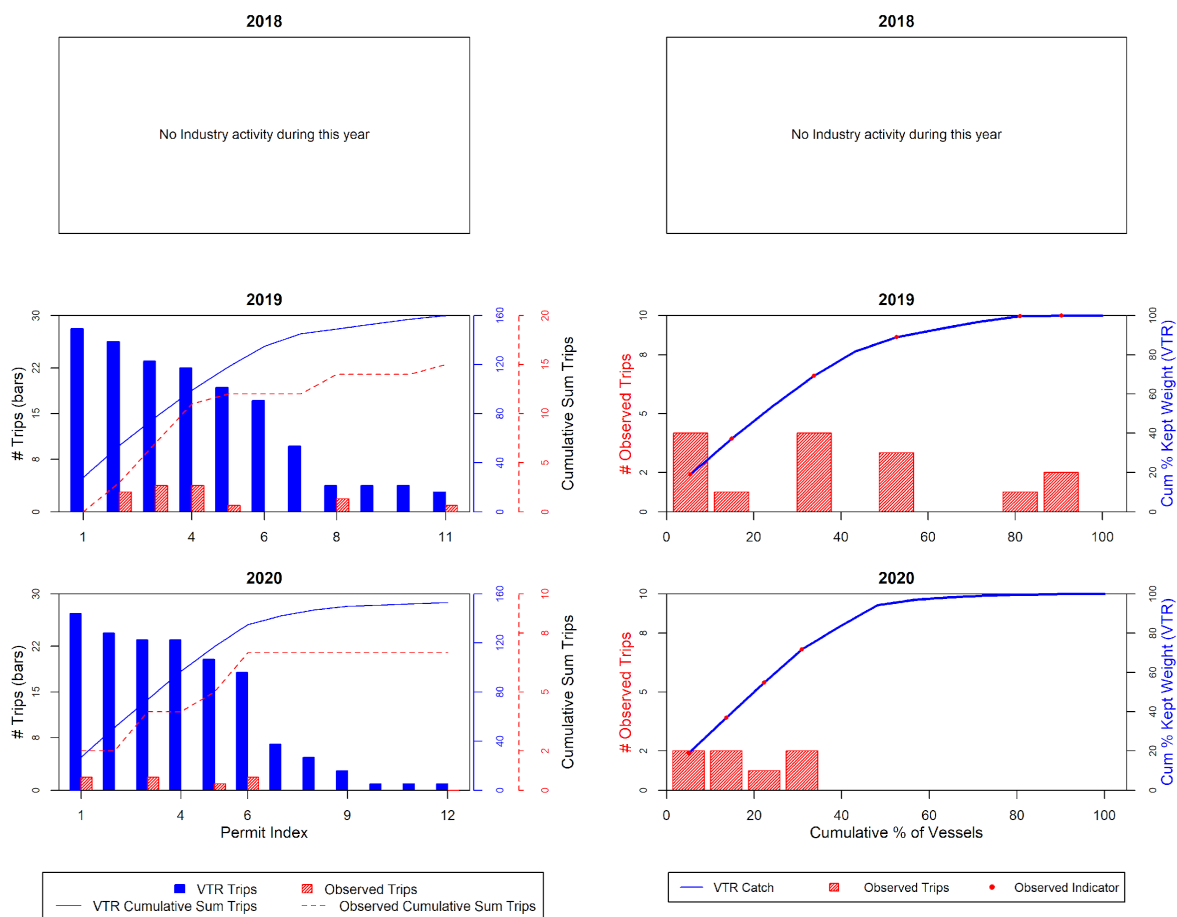


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

PTF MA (Row 56)

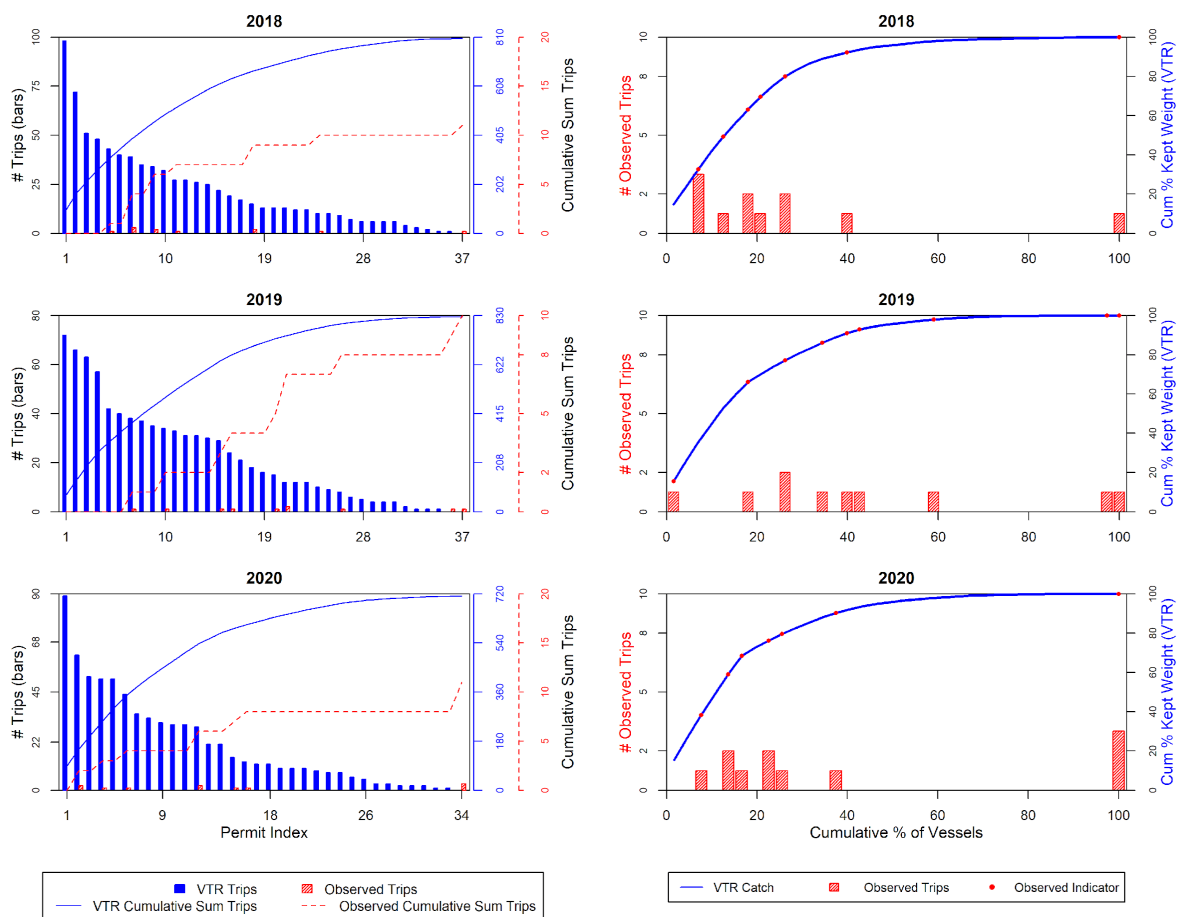


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

PTF NE (Row 57)

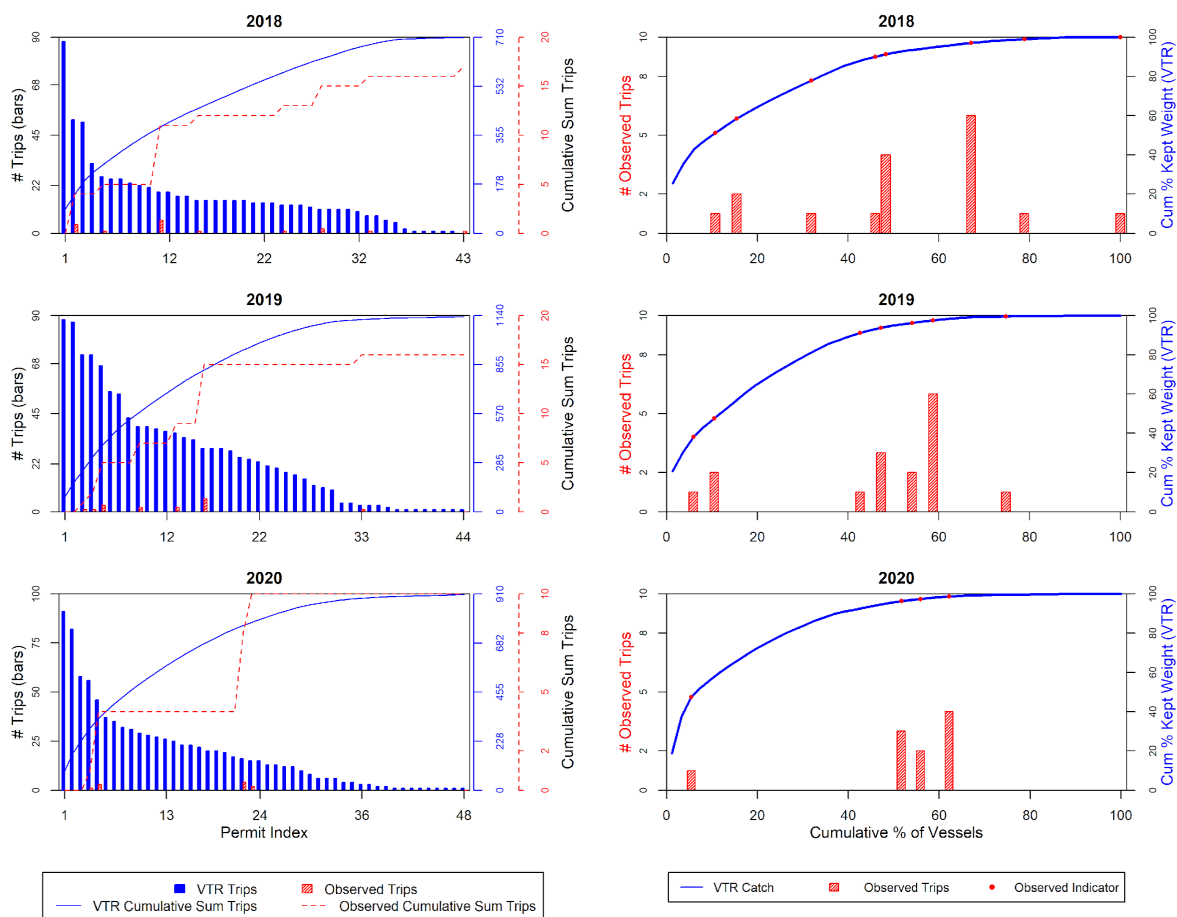


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

PTC MA (Row 58)

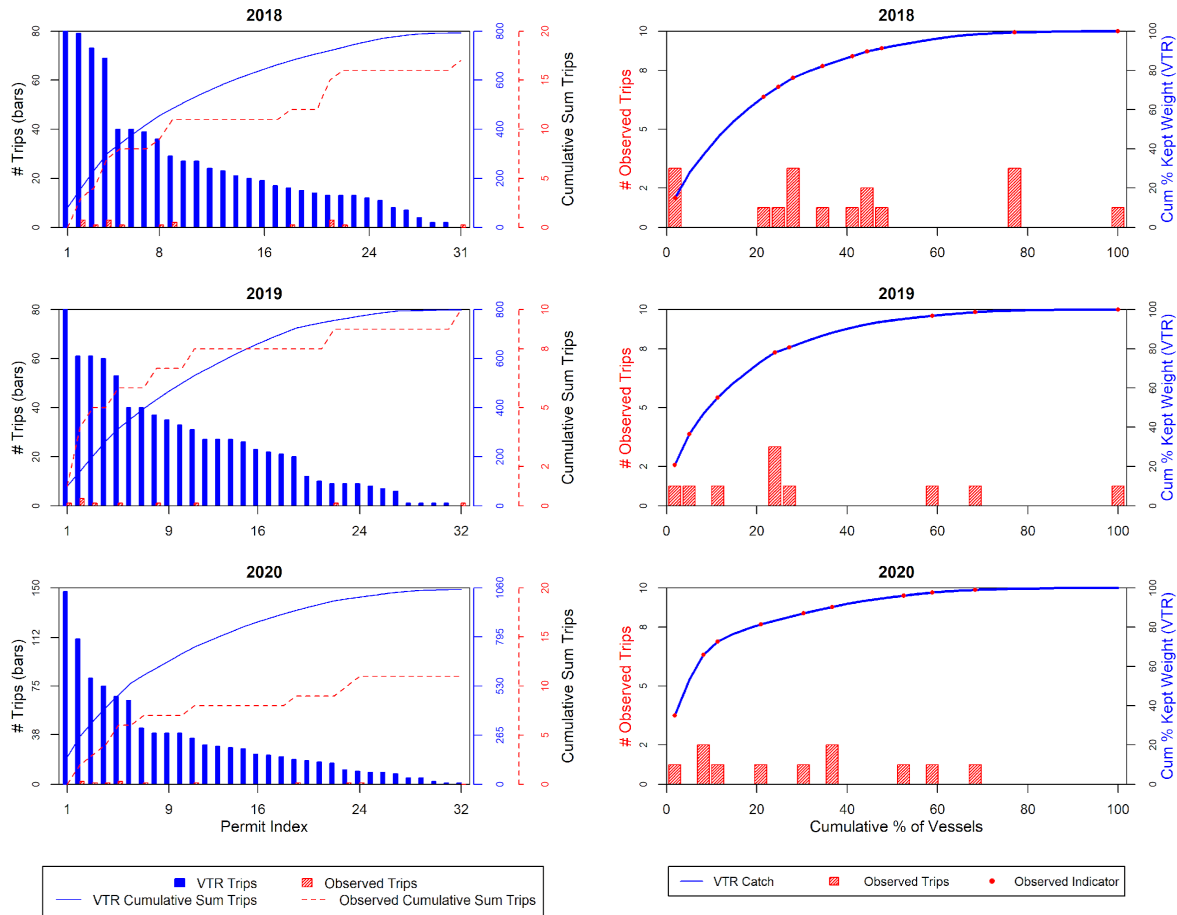


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

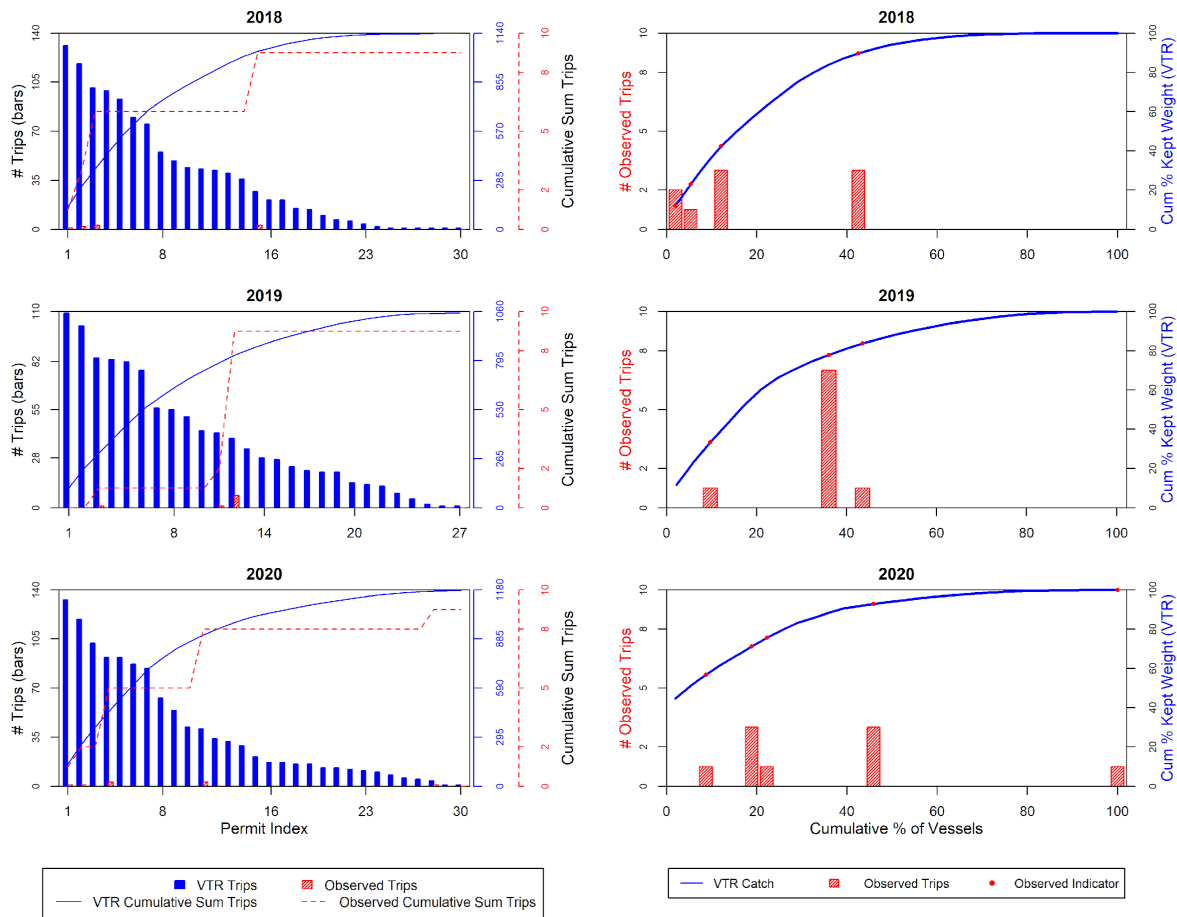


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

PTL MA (Row 61)

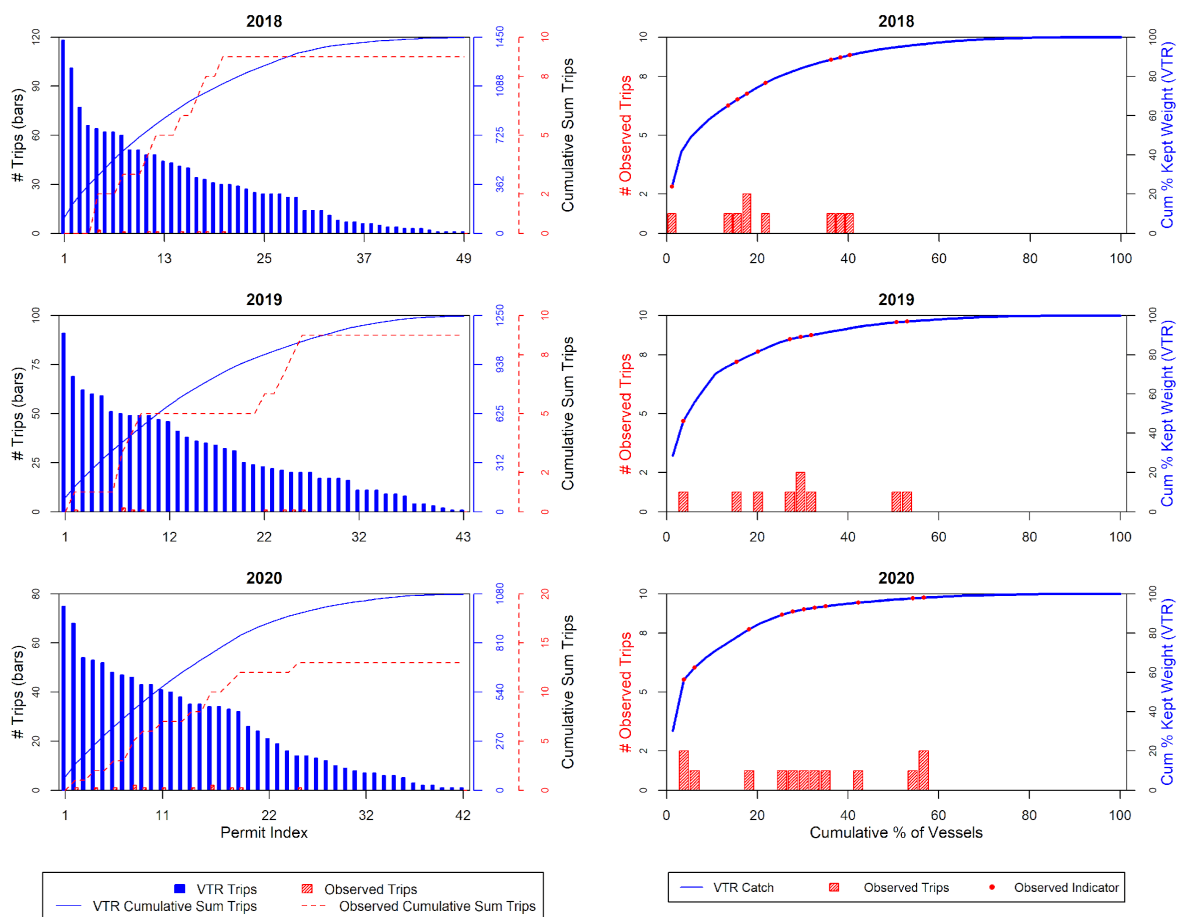


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

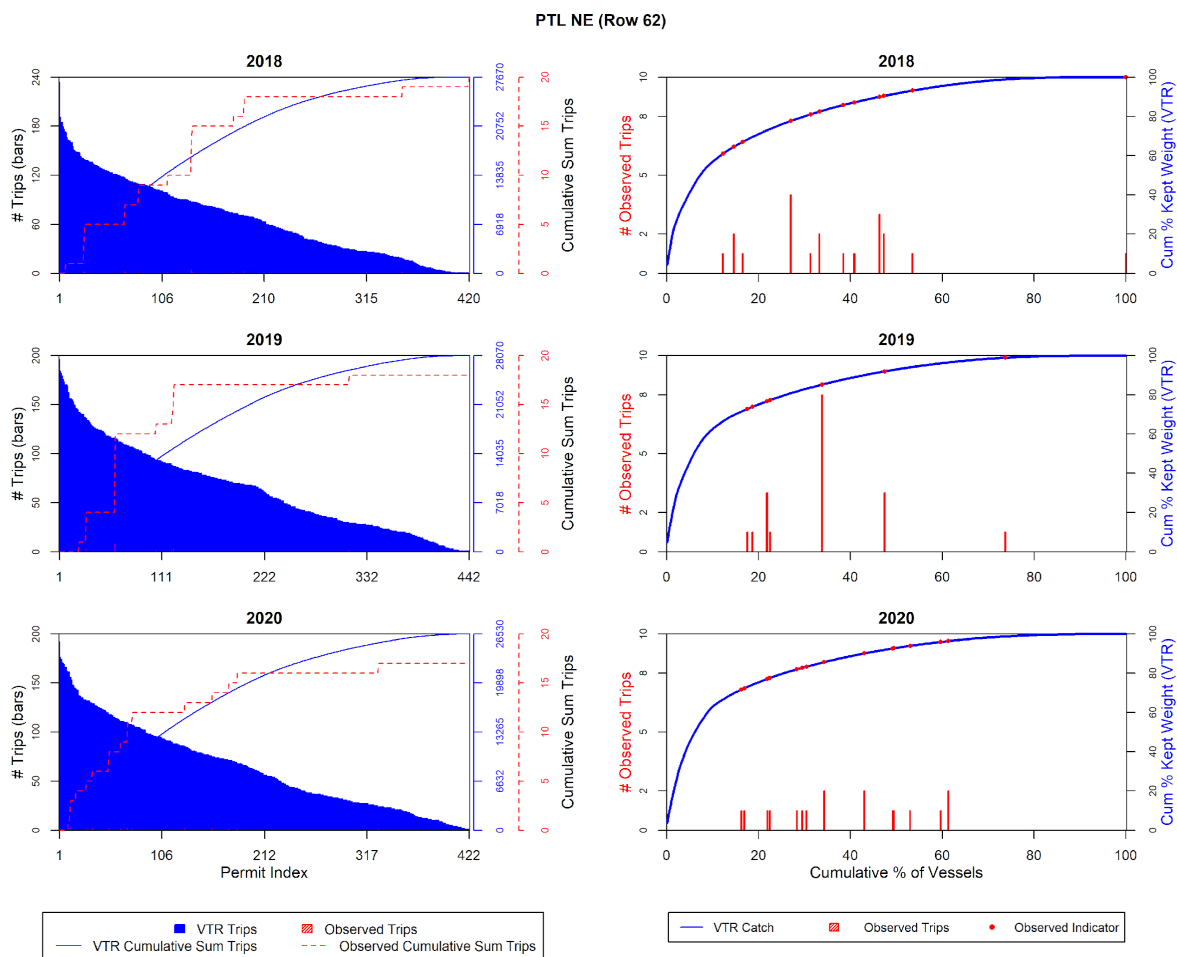


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

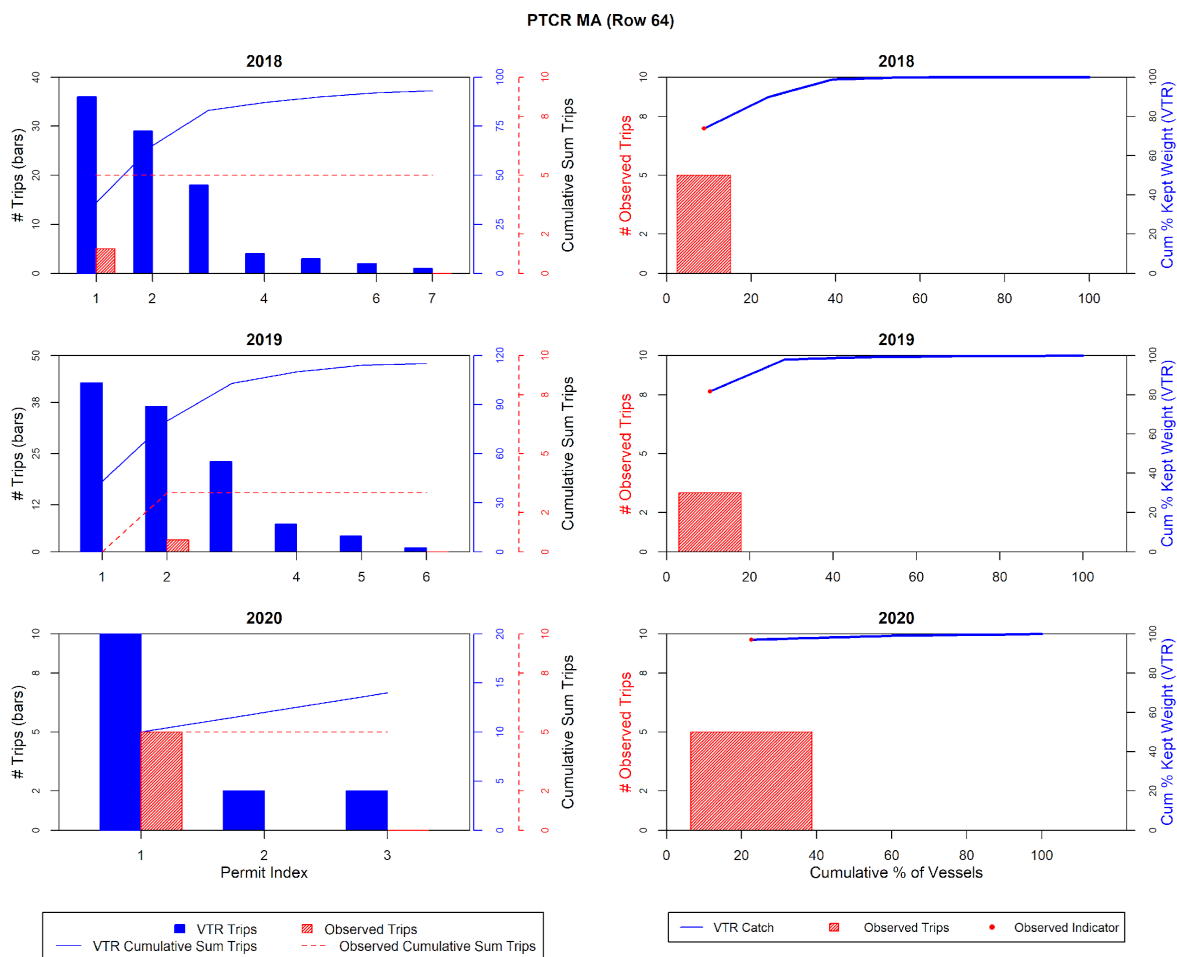


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

PTCR NE (Row 65)

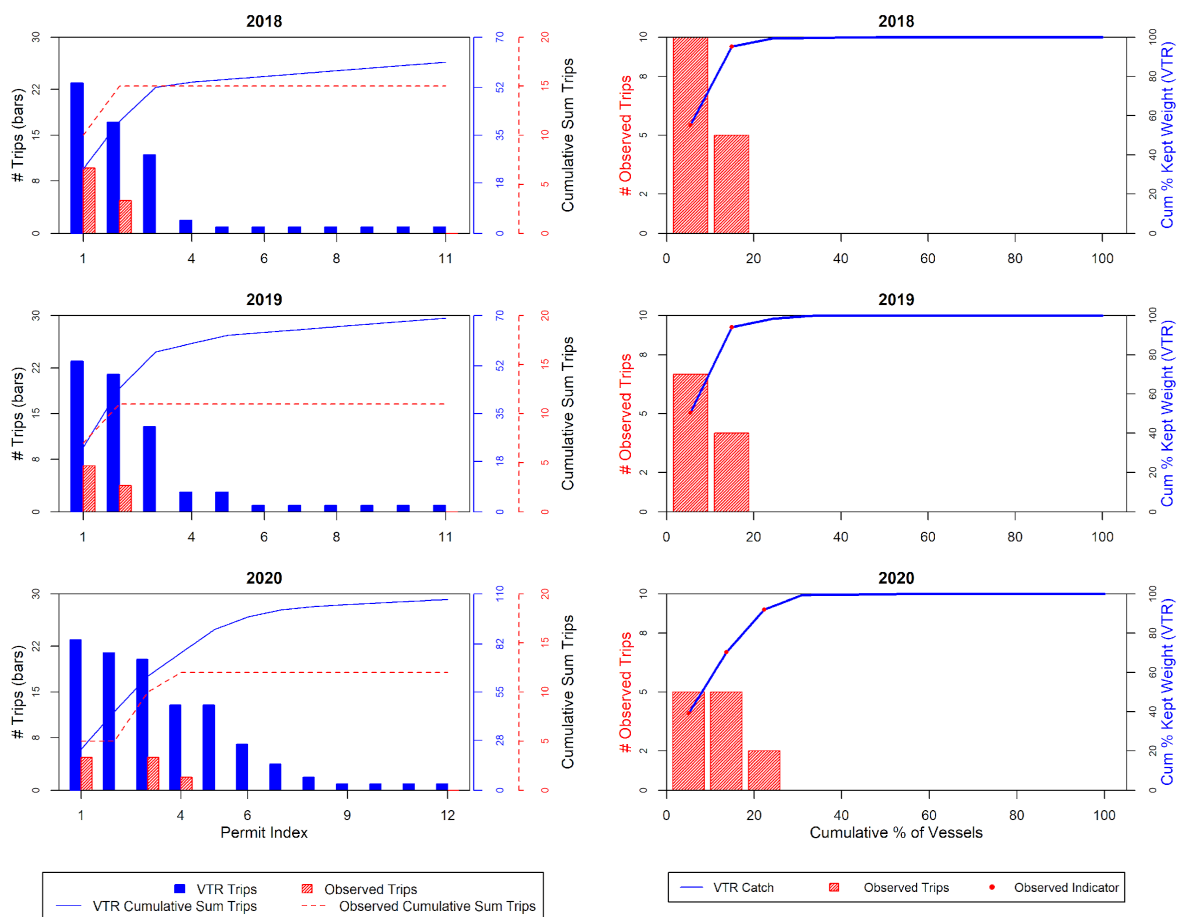


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

DRC MA (Row 72)

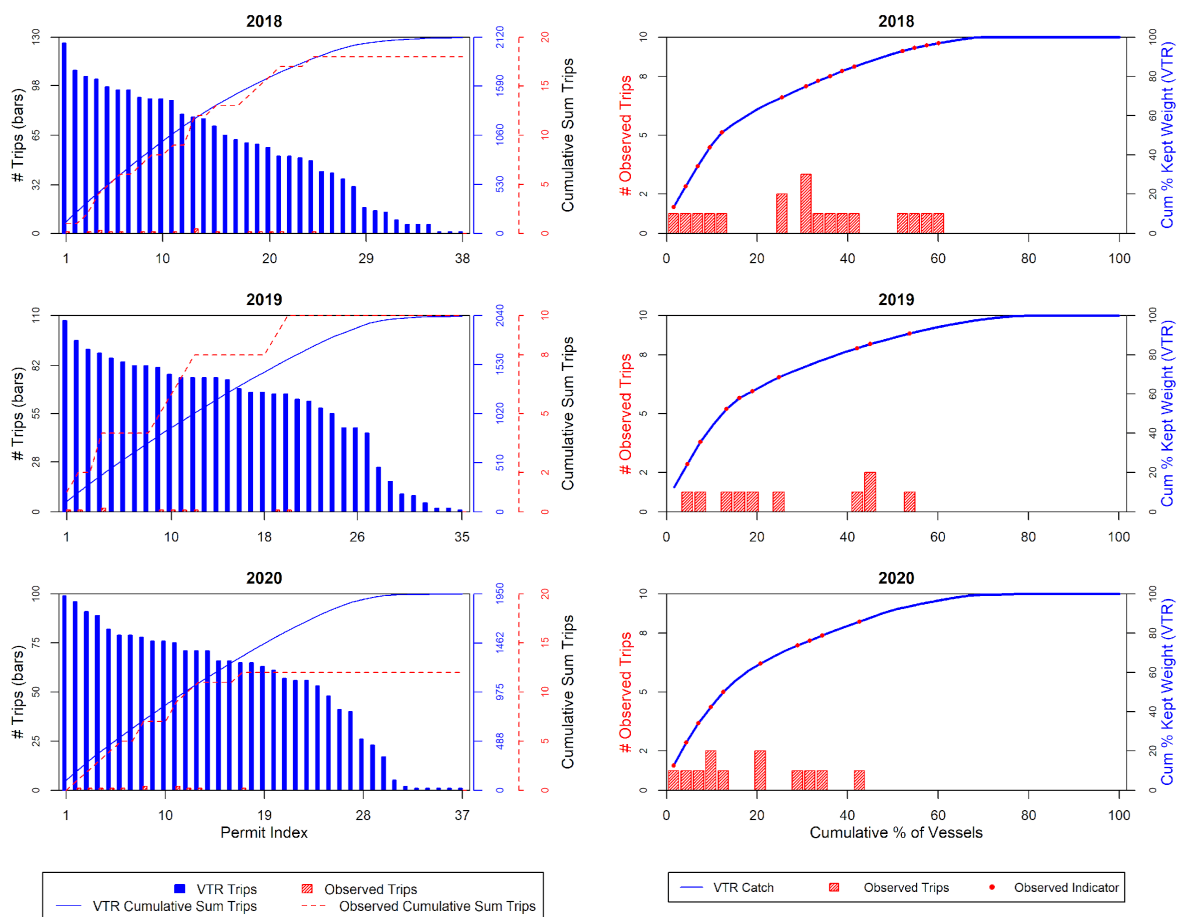


Figure 16, continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

DRC NE (Row 73)

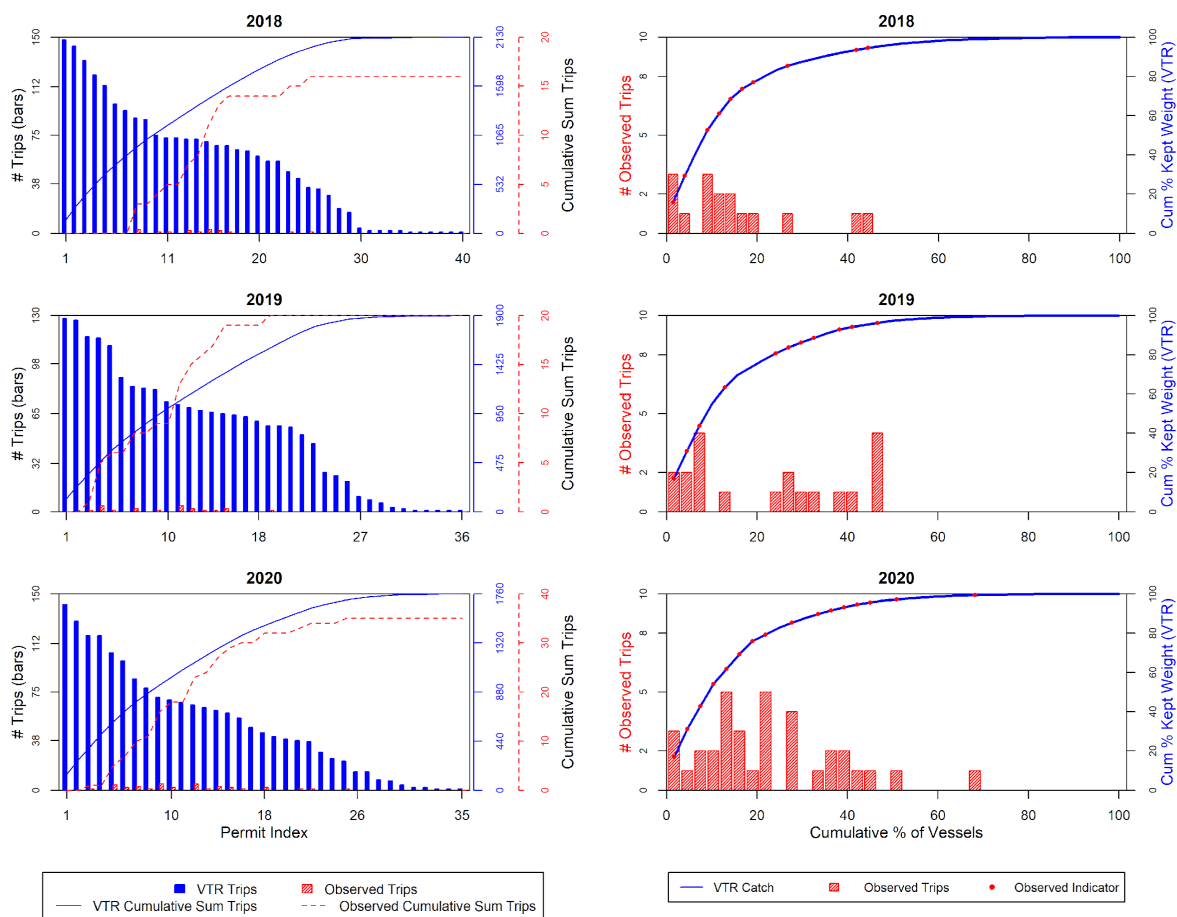


Figure 16 continued. Number of trips (bars; left plots) by vessel and their cumulative sum (lines) by data set (Vessel Trip Report [VTR; blue solid] and observer [Observed; red dashed]) and the cumulative percentage of kept weight of all species on VTR trips by vessel (right plots) for 1 of 36 selected fleets by Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data), SBRM 2019 (July 2017 through June 2018 data), and SBRM 2020 (July 2018 through June 2019 data). See [Appendix Table 1](#) for fleet name abbreviations.

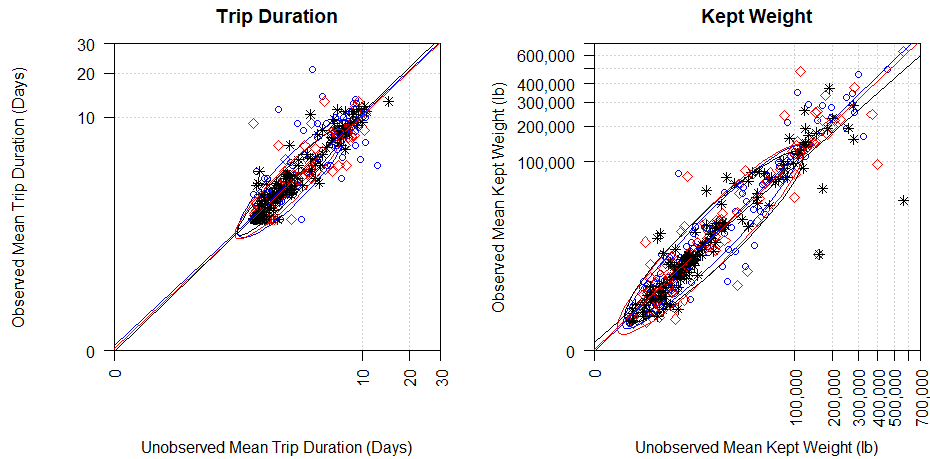


Figure 17. Comparison of mean trip duration (days; left) and mean kept weight of all species (live weight, lb; right) for unobserved and observed Vessel Trip Report trips for Standardized Bycatch Reporting Methodology (SBRM) 2018 (July 2016 through June 2017 data; blue circle), SBRM 2019 (July 2017 through June 2018 data; red diamond), and SBRM 2020 (July 2018 through June 2019 data; black star). A fourth root transformation was used. Each symbol represents the mean of an individual stratum (SBRM year and fleet); ellipse represents the 68% confidence interval for each SBRM year.

APPENDIX TABLES

Appendix Table 1. List of fleets, fleet name abbreviations, and row numbers used in the 2018, 2019, and 2020 annual Standardized Bycatch Reporting Methodology (SBRM) analyses and the row numbers used in this report (2020 3-year Review). See [Table 4](#) for fleet stratification abbreviations.

Fleet Gear Type	Access Area	Trip Category	Region	Mesh Group	Fleet Name Abbreviation	Row Number			
						SBRM 2018	SBRM 2019	SBRM 2020	2020 3-year Review
Longline, Bottom	OPEN	all	MA	all	LLB MA	1	1	1	1
Longline, Bottom	OPEN	all	NE	all	LLB NE	2	2	2	2
Hand Line	OPEN	all	MA	all	HL MA	3	3	3	3
Hand Line	OPEN	all	NE	all	HL NE	4	4	4	4
Otter Trawl	OPEN	all	MA	sm	OT sm MA	5	5	5	5
Otter Trawl	OPEN	all	MA	lg	OT lg MA	6	6	6	6
Otter Trawl	OPEN	all	NE	sm	OT sm NE	7	7	7	7
Otter Trawl	OPEN	all	NE	lg	OT lg NE	8	8	8	8
Otter Trawl, Scallop	AA	GEN	MA	sm	OTSC AA GEN sm MA	9	9	9	9
Otter Trawl, Scallop	AA	GEN	MA	lg	OTSC AA GEN lg MA	10	10	10	10
Otter Trawl, Scallop	OPEN	GEN	MA	sm	OTSC OPEN GEN sm MA	11			11
Otter Trawl, Scallop	OPEN	GEN	MA	lg	OTSC OPEN GEN lg MA	12	11	11	12
Otter Trawl, Scallop	OPEN	GEN	NE	lg	OTSC OPEN GEN lg NE			12	13
Otter Trawl, Scallop	OPEN	LIM	MA	sm	OTSC OPEN LIM sm MA	13			14
Otter Trawl, Scallop	OPEN	LIM	MA	lg	OTSC OPEN LIM lg MA	14			15
Otter Trawl, Twin	OPEN	all	MA	sm	OTT sm MA	15	12	13	16
Otter Trawl, Twin	OPEN	all	MA	lg	OTT lg MA	16	13	14	17
Otter Trawl, Twin	OPEN	all	NE	sm	OTT sm NE	17	14	15	18
Otter Trawl, Ruhle	OPEN	all	MA	sm	OTR sm MA	18	15	16	19
Otter Trawl, Ruhle	OPEN	all	MA	lg	OTR lg MA		16	17	20
Otter Trawl, Ruhle	OPEN	all	NE	sm	OTR sm NE	19	17	18	21
Otter Trawl, Ruhle	OPEN	all	NE	lg	OTR lg NE	20		19	22
Otter Trawl, Haddock Separator	OPEN	all	NE	lg	OTH lg NE	21	18	20	23
Otter Trawl, Shrimp	OPEN	all	MA	sm	OTSH sm MA	22	19	21	24
Otter Trawl, Shrimp	OPEN	all	NE	sm	OTSH sm NE	23	20	22	25
Otter Trawl, Other	OPEN	all	MA	sm	OTO sm MA	25	21	23	26
Otter Trawl, Other	OPEN	all	MA	lg	OTO lg MA	26			27
Otter Trawl, Other	OPEN	all	NE	sm	OTO sm NE	27	22	24	28
Otter Trawl, Other	OPEN	all	NE	lg	OTO lg NE		23	25	29
Floating Trap	OPEN	all	MA	all	FT MA	28	24	26	30
Floating Trap	OPEN	all	NE	all	FT NE	29	25	27	31
Gillnet, Sink, Anchor, Drift	OPEN	all	MA	sm	GN sm MA	30	26	28	32
Gillnet, Sink, Anchor, Drift	OPEN	all	MA	lg	GN lg MA	31	27	29	33

Appendix Table 1, continued. List of fleets, fleet name abbreviations, and row numbers used in the 2018, 2019, and 2020 annual Standardized Bycatch Reporting Methodology (SBRM) analyses and the row numbers used in this report (2020 3-year Review). See [Table 4](#) for fleet stratification abbreviations.

Fleet Gear Type	Access Area	Trip Category	Region	Mesh Group	Fleet Name Abbreviation	Row Number			
						SBRM 2018	SBRM 2019	SBRM 2020	2020 3-year Review
Gillnet, Sink, Anchor, Drift	OPEN	all	MA	xlg	GN xlg MA	32	28	30	34
Gillnet, Sink, Anchor, Drift	OPEN	all	NE	sm	GN sm NE	33	29	31	35
Gillnet, Sink, Anchor, Drift	OPEN	all	NE	lg	GN lg NE	34	30	32	36
Gillnet, Sink, Anchor, Drift	OPEN	all	NE	xlg	GN xlg NE	35	31	33	37
Purse Seine	OPEN	all	MA	all	PS MA	36	32	34	38
Purse Seine	OPEN	all	NE	all	PS NE	37	33	35	39
Dredge, Scallop	AA	GEN	MA	all	DRSC AA GEN MA	38	34	36	40
Dredge, Scallop	AA	GEN	NE	all	DRSC AA GEN NE	39	35	37	41
Dredge, Scallop	AA	LIM	MA	all	DRSC AA LIM MA	40	36	38	42
Dredge, Scallop	AA	LIM	NE	all	DRSC AA LIM NE	41	37	39	43
Dredge, Scallop	OPEN	GEN	MA	all	DRSC OPEN GEN MA	42	38	40	44
Dredge, Scallop	OPEN	GEN	NE	all	DRSC OPEN GEN NE	43	39	41	45
Dredge, Scallop	OPEN	LIM	MA	all	DRSC OPEN LIM MA	44	40	42	46
Dredge, Scallop	OPEN	LIM	NE	all	DRSC OPEN LIM NE	45	41	43	47
Danish Seine	OPEN	all	MA	all	DS MA	46	42	44	48
Danish Seine	OPEN	all	NE	all	DS NE	47			49
Trawl, Midwater Paired&Single	all	all	NE	sm	TMW all sm NE		43	45	50
Trawl, Midwater Paired&Single	AA	all	NE	sm	TMW AA sm NE	48			51
Trawl, Midwater Paired&Single	OPEN	all	MA	sm	TMW OPEN sm MA	49	44	46	52
Trawl, Midwater Paired&Single	OPEN	all	NE	sm	TMW OPEN sm NE	50			53
Pots and Traps, Other	OPEN	all	MA	all	PTO MA	51	45		54
Pots and Traps, Other	OPEN	all	NE	all	PTO NE	52	46	47	55
Pots and Traps, Fish	OPEN	all	MA	all	PTF MA	53	47	48	56
Pots and Traps, Fish	OPEN	all	NE	all	PTF NE	54	48	49	57
Pots and Traps, Conch	OPEN	all	MA	all	PTC MA	55	49	50	58
Pots and Traps, Conch	OPEN	all	NE	all	PTC NE	56	50	51	59
Pots and Traps, Hagfish	OPEN	all	NE	all	PTH NE	57	51		60
Pots and Traps, Lobster	OPEN	all	MA	all	PTL MA	58	52	52	61
Pots and Traps, Lobster	OPEN	all	NE	all	PTL NE	59	53	53	62
Weir	OPEN	all	NE	all	WR NE	60	54		63
Pots and Traps, Crab	OPEN	all	MA	all	PTCR MA	61	55	54	64
Pots and Traps, Crab	OPEN	all	NE	all	PTCR NE	62	56	55	65

Appendix Table 1, continued. List of fleets, fleet name abbreviations, and row numbers used in the 2018, 2019, and 2020 annual Standardized Bycatch Reporting Methodology (SBRM) analyses and the row numbers used in this report (2020 3-year Review). See [Table 4](#) for fleet stratification abbreviations.

Fleet Gear Type	Access Area	Trip Category	Region	Mesh Group	Fleet Name Abbreviation	Row Number			
						SBRM 2018	SBRM 2019	SBRM 2020	2020 3-year Review
Beam Trawl	OPEN	all	MA	sm	BT sm MA	63	57	56	66
Beam Trawl	OPEN	all	MA	lg	BT lg MA		58		67
Beam Trawl	OPEN	all	NE	lg	BT lg NE	64	59	57	68
Dredge, Other	OPEN	all	MA	all	DRO MA	65	60	58	69
Dredge, Other	OPEN	all	NE	all	DRO NE			59	70
Dredge, Urchin	OPEN	all	NE	all	DRU NE	66	61	60	71
Dredge, Ocean Quahog/Surfclam	OPEN	all	MA	all	DRC MA	67	62	61	72
Dredge, Ocean Quahog/Surfclam	OPEN	all	NE	all	DRC NE	68	63	62	73
Otter Trawl, Twin, Shrimp	OPEN	all	MA	sm	OTISH sm MA	24			74

Appendix Table 2. Individual species (in alphabetical order) encountered on observed trips for July 2016 through June 2019. Individual species listed reflects the unique species codes of living and nonliving matter used by observers. Common and scientific names are taken directly from the Observer Database System. Some species have not been identified to the species level, such as starfish, sponge, and sea cucumbers, and there are some cases when species cannot be positively identified and are recorded as a species group not known (e.g., “flounder, NK”).

COMMON NAME	SCIENTIFIC NAME
ALEWIFE	ALOSA PSEUDOHARENGUS
ALLIGATORFISH	ASPIDOPHOROIDES MONOPTERYGIUS
AMBERJACK, NK	SERIOLA SP
ANCHOVY, BAY	ANCHOA MITCHILLI
ANCHOVY, NK	ENGRAULIDAE
ANCHOVY, STRIPED	ANCHOA HEPSETUS
ANEMONE, NK	ANTHOZOA
ARGENTINE, ATLANTIC	ARGENTINA SILUS
BARRACUDA, NK	SPHYRAENIDAE SP
BARRELFISH	HYPEROGLYPHE PERCIFORMIS
BASS, STRIPED	MORONE SAXATILIS
BATFISH, ATLANTIC	DIBRANCHUS ATLANTICUS
BATFISH, NK	OGCOEPHALIDAE
BEARDFISH	POLYMIXIA LOWEI
BIRD, NK	AVES
BLENNY, NK (FISH)	BLENNIIDAE
BLUEFISH	POMATOMUS SALTATRIX
BLUESPOTTED CORNETFISH	FISTULARIA TABACARIA
BOARFISH, DEEPBODY	ANTIGONIA CAPROS
BONE, NK	BONES
BONITO, ATLANTIC	SARDA SARDA
BULLET MACKEREL	AUXIS ROCHEI
BUTTERFISH	PEPRILUS TRIACANTHUS
CLAM, BLOODARC	ANADARA OVALIS
CLAM, NK	BIVALVIA
CLAM, RAZOR	ENSIS DIRECTUS
CLAM, SURF	SPISULA SOLIDISSIMA
CLAPPER, CLAM	
CLAPPER, NK	
CLAPPER, OCEAN QUAHOG	
CLAPPER, SCALLOP	
COBIA	RACHYCENTRON CANADUM
COD, ATLANTIC	GADUS MORHUA
CORAL, SOFT, NK	ALCYONACEA
CORAL, STONY, NK	SCLERACTINIA
CORMORANT, DBL CREST	PHALACROCORAX AURITUS
CORMORANT, NK	PHALACROCORAX SP
CRAB, BLUE	CALLINECTES SAPIDUS
CRAB, CANCER, NK	CANCER SP
CRAB, CANCER, NK (MARKET CLAWS)	CANCER SP
CRAB, DEEPSEA, RED	CHACEON (GERYON) QUINQUEDENS
CRAB, HERMIT, NK	PAGUROIDEA SP
CRAB, HORSESHOE	LIMULUS POLYPHEMUS
CRAB, JONAH	CANCER BOREALIS
CRAB, JONAH (MARKET CLAWS)	CANCER BOREALIS
CRAB, LADY	OVALIPES OCELLATUS
CRAB, NORTHERN STONE	LITHODES MAJA

COMMON NAME	SCIENTIFIC NAME
CRAB, ROCK	CANCER IRRORATUS
CRAB, ROCK (MARKET CLAWS)	CANCER IRRORATUS
CRAB, SNOW	CHIONOECETES OPILIO
CRAB, SPECKLED, NK	ARENAEUS CRIBRARIUS
CRAB, SPIDER, NK	LIBINIA PELIA SP
CRAB, SPIDER, PORTLY	LIBINIA EMARGINATA
CRAB, TRUE, NK	BRACHYURA
CROAKER, ATLANTIC	MICROPOGONIAS UNDULATUS
CUNNER (YELLOW PERCH)	TAUTOGOLABRUS ADSPERSUS
CUSK	BROSME BROSME
CUSK-EEL, NK	OPHIDIIDAE
CUTLASSFISH, ATL	TRICHIURUS LEPTURUS
DEBRIS, FISHING GEAR	FISHING GEAR DEBRIS
DEBRIS, GLASS	GLASS DEBRIS
DEBRIS, METAL	METAL DEBRIS
DEBRIS, NK	UNKNOWN DEBRIS
DEBRIS, PLASTIC	PLASTIC DEBRIS
DEBRIS, ROCK	ROCK DEBRIS
DEBRIS, WOOD	WOOD DEBRIS
DOGFISH, CHAIN	SOYLIORHINUS RETIFER
DOGFISH, NK	MUSTELUS, SQUALUS SP
DOGFISH, SMOOTH	MUSTELUS CANIS
DOGFISH, SPINY	SQUALUS ACANTHIAS
DOLPHIN, BOTTLENOSE	TURSIOPS TRUNCATUS
DOLPHIN, COMMON (OLD SADDLEBACK)	DELPHINUS DELPHIS (COMMON)
DOLPHIN, NK (MAMMAL)	DELPHINIDAE
DOLPHIN, RISSOS	GRAMPUS GRISEUS
DOLPHIN, WHITESIDED	LAGENORHYNCHUS ACUTUS
DOLPHINFISH (MAHI MAHI)	CORYPHAENA HIPPURUS
DORY, BUCKLER (JOHN)	ZENOPSIS CONCHIFERA
DORY, NK	ZEIDAE
DOVEKIE	ALLE ALLE
DRAGONFISH, BOA	STOMIAS BOA
DRUM, BANDED	LARIMUS FASCIATUS
DRUM, BLACK	POGONIAS CROMIS
DRUM, NK	SCIAENIDAE
DRUM, RED	SCIAENOPS OCELLATUS
ECHINODERM, NK	ECHINODERMATA
EEL, AMERICAN	ANGUILLA ROSTRATA
EEL, CONGER	CONGER OCEANICUS
EEL, NK	ANGUILLIFORMES
EEL, ROCK (GUNNEL)	PHOLIS GUNNELUS
EEL, SAND LANCE, NK	AMMODYTIDAE
EEL, SLENDER SNIPE	NEMICHTHYS SCOLOPACEUS
EELGRASS	ZOSTERA MARINA
EELPOUT, NK	LYCENCHELYS, LYCODES SP
EGGS, ELASMOBRANCH, NK	
EGGS, NK	
EIDER, COMMON	
FILEFISH, NK	BALISTIDAE
FISH EGGS, NK	
FISH, NK	OSTEICHTHYES
FLOUNDER, AMERICAN PLAICE	HIPPOGLOSSOIDES PLATESSOIDES
FLOUNDER, FOURSPOT	PARALICHTHYS OBLONGUS
FLOUNDER, GULFSTREAM	CITHARICHTHYS ARCTIFRONS
FLOUNDER, LEFT EYE, NK	BOTHIDAE

COMMON NAME	SCIENTIFIC NAME
FLOUNDER, NK	PLEURONECTIFORMES
FLOUNDER, SAND DAB (WINDOWPANE)	SCOPHTALMUS AQUOSUS
FLOUNDER, SOUTHERN	PARALICHTHYS LETHOSTIGMA
FLOUNDER, SUMMER (FLUKE)	PARALICHTHYS DENTATUS
FLOUNDER, WINTER (BLACKBACK)	PLEURONECTES AMERICANUS
FLOUNDER, WITCH (GREY SOLE)	GLYPTOCEPHALUS CYNOGLOSSUS
FLOUNDER, YELLOWTAIL	PLEURONECTES FERRUGINEUS
FULMAR, NORTHERN	FULMARUS GLACIALIS
GANNET, NORTHERN	SULA BASSANUS
GAPER, RED EYE	CHAUNAX STIGMAEUS
GARFISH (NEEDLEFISH)	BELONIDAE
GRENADIER, COMMON (MARLINSPIKE)	NEZUMIA BAIRDII
GRENADIER, NK	MACROURIDAE
GROUND FISH, NK	GADIDAE
GROUPE, NK	SERRANIDAE
GROUPE, SNOWY	EPINEPHELUS NIVEATUS
GRUNT, NK	HAEMULON, ANISOTREMUS SP
GULL, GREAT BLK-BACK	LARUS MARINUS
GULL, HERRING	LARUS ARGENTATUS
GULL, NK	LARINAE
HADDOCK	MELANOGRAMMUS AEGLEFINUS
HAGFISH, ATLANTIC	MYXINE GLUTINOSA
HAKE, LONGFIN	UROPHYCIS CHESTERI
HAKE, NK	UROPHYCIS, MERLUCCIOUS, PHYSICIS SP
HAKE, RED (LING)	UROPHYCIS CHUSS
HAKE, RED/WHITE MIX	UROPHYCIS SP
HAKE, SILVER (WHITING)	MERLUCCIOUS BILINEARIS
HAKE, SOUTHERN	UROPHYCIS FLORIDANA
HAKE, SPOTTED	UROPHYCIS REGIA
HAKE, WHITE	UROPHYCIS TENUIS
HALIBUT, ATLANTIC	HIPPOGLOSSUS HIPPOGLOSSUS
HALIBUT, GREENLAND	REINHARDTIUS HIPPOGLOSSOIDES
HARVESTFISH	PEPRILUS ALEPIDOTUS
HERRING, ATLANTIC	CLUPEA HARENGUS
HERRING, ATLANTIC THREAD	OPISTHONEMA OGILINUM
HERRING, BLUEBACK	ALOSA AESTIVALIS
HERRING, NK	CLUPEIDAE
HERRING, RIVER	ALOSA
HERRING, ROUND	ETRUMEUS TERES
HOGCHOCKER	TRINECTES MACULATUS
HOGFISH	LACHNOLAIMUS MAXIMUS
HOUNDFISH	TYLOSURUS CROCODILUS
INVERTEBRATE, NK	INVERTEBRATA
JACK, CREVALLE	CARANX HIPPOS
JACK, NK	CARANGIDAE
JELLYFISH, NK	SCYPHOZOA
KINGFISH, GULF	MENTICIRRHUS LITTORALIS
KINGFISH, NK	MENTICIRRHUS SP
KINGFISH, NORTHERN	MENTICIRRHUS SAXATILIS
KINGFISH, SOUTHERN	MENTICIRRHUS AMERICANUS
LADYFISH	ELOPS SAURUS
LAMPREY, NK	PETROMYZONTIDAE
LANTERNFISH, NK	MYCTOPHIDAE
LIZARDFISH	SYNODONTIDAE SP
LOBSTER, AMERICAN	HOMARUS AMERICANUS
LOOKDOWN	SELENE VOMER

COMMON NAME	SCIENTIFIC NAME
LOON, COMMON	GAVIA IMMER
LOON, NK	GAVIIDAE
LOON, RED-THROATED	GAVIA STELLATA
LUMPFISH	CYCLOPTERUS LUMPUS
MACKEREL, ATLANTIC	SCOMBER SCOMBRUS
MACKEREL, ATLANTIC CHUB	SCOMBER COLIAS
MACKEREL, FRIGATE	AUXIS THAZARD
MACKEREL, KING	SCOMBEROMORUS CAVALLA
MACKEREL, NK	SCOMBER SCOMBRUS
MACKEREL, SNAKE, NK	GEMPYLIDAE
MACKEREL, SPANISH	SCOMBEROMORUS MACULATUS
MARINE MAMMAL, NK	CETACEA/PINNIPEDIA
MARLIN, NK	ISTIOPHORIDAE
MENHADEN, ATLANTIC	BREVOORTIA TYRANNUS
MOLA, NK	MOLIDAE
MOLA, OCEAN SUNFISH	MOLA MOLA
MOLA, SHARPTAIL	MOLA LANCEOLATA
MOLLUSCA EGGS, NK	
MOLLUSK, NK	MOLLUSCA
MONKFISH (GOOSEFISH)	LOPHIUS AMERICANUS
MOONFISH, ATLANTIC	SELENE SETAPINNIS
MULLET, NK	MUGILIDAE
MULLET, STRIPED	MUGIL CEPHALUS
MURRE, NK	URIA SP
MURRE, THIN-BILLED	URIA AALGE
MUSSEL, NK	MYTILUS MODIOLUS SP
NEEDLEFISH, ATLANTIC	STRONGYLURA MARINA
OCEAN POUT	MACROZOARCES AMERICANUS
OCTOPUS, NK	OCTOPUS SP
OILFISH	RUETTUS PRETIOSUS
OYSTER, COMMON	CRASSOSTREA VIRGINICA
PELICAN, BROWN	PELECANUS OCCIDENTALIS
PERCH, SAND	DIPLECTRUM FORMOSUM
PERCH, WHITE	MORONE AMERICANA
PIGFISH	ORTHOPRISTIS CHRYSOPTERA
PILOTFISH	NAUCRATES DUCTOR
PINFISH	LAGONDON RHOMBOIDES
PIPEFISH/SEAHORSE,NK	SYNGNATHIDAE
POLLOCK	POLLACHIUS VIRENS
POMFRET, BIGSCALE	TARATICHTHYS LONGIPINNIS
POMPANO, FLORIDA	TRACHINOTUS CAROLINUS
PORGY, NK	SPARIDAE
PORPOISE, HARBOR	PHOCOENA PHOCOENA
PORPOISE/DOLPHIN, NK	PHOCOENIDAE/DELPHINIDAE
PUFFER, NK (BURRFISH)	TETRAODONTIDAE
PUFFER, NORTHERN	SPHOERIDES MACULATUS
PUFFIN, ATLANTIC	FRATERCULA ARCTICA
QUAHOG, HARD SHELL CLAM	MERCENARIA MERCENARIA;M.CAMPECHIENSIS
QUAHOG, OCEAN (BLACK CLAM)	ARTICA ISLANDICA
RAVEN, SEA	HEMITRIPTERUS AMERICANUS
RAY, BULLNOSE	MYLIOBATIS FREMINVILLEI
RAY, BUTTERFLY, NK	GYMNURA SP
RAY, BUTTERFLY, SMOOTH	GYMNURA MICRURA
RAY, BUTTERFLY, SPINY	GYMNURA ALTAVELA
RAY, COWNOSE	RHINOPTERA BONASUS
RAY, EAGLE, NK	MYLIOBATIDAE

COMMON NAME	SCIENTIFIC NAME
RAY, NK	RAJIFORMES
RAY, TORPEDO	TORPEDO NOBILIANA
RAZORBILL	ALCA TORDA
REDFISH, NK	SEBASTES
REMORA, NK	ECHENEIDAE
RIBBONFISH, NK	TRACHIPTERIDAE
RIBBONFISH, SCALLOPED	ZU CRISTATUS
ROCKLING, FOURBEARD	ENCHELYOPUS CIMBRIUS
ROSEFISH, BLACK BELLY	HELICOLENUS DACTYLOPTERUS
ROUGHY, BIG	GEPHYROBERYX DARWINI
ROUGHY, NK	TRACHICHTHYIDAE
RUNNER, BLUE	CARANX CRYSOS
SAND DOLLAR	ECHINARACHNIUS PARMA
SAURY, ATLANTIC	SCOMBERESOX SAURUS
SCAD, BIGEYE	SELAR CRUMENOPHTHALMUS
SCAD, MACKEREL	DECAPTERUS MACARELLUS
SCAD, ROUGH	TRACHURUS LATHAMI
SCALLOP, BAY	ARGOPECTEN IRRADIANS
SCALLOP, ICELANDIC	CHLAMYS ISLANDICA
SCALLOP, NK	PECTINIDAE
SCALLOP, SEA	PATINOPECTEN, PLACOPECTEN SP
SCORPIONFISH, NK	SCORPAENIDAE
SCOTER, BLACK	MELANITTA NIGRA
SCOTER, SURF	MELANITTA PERSPICILLATA
SCOTER, WHITE-WINGED	MELANITTA DEGLANDI
SCULPIN, LONGHORN	MYOXOCEPHALUS OCTODECIMSPINOSUS
SCULPIN, NK	COTTIDAE
SCUP	STENOTOMUS CHRYSOPS
SEA BASS, BLACK	CENTROPRISTIS STRIATA
SEA BASS, NK	CENTROPRISTIS ANTHIAS SP
SEA CUCUMBER, NK	HOLOTHUROIDEA
SEA PANSY	RENILLA RENIFORMIS
SEA PEN, NK	PENNATULACEA
SEA POTATO	LEATHESIA DIFFORMIS
SEA ROBIN, ARMORED	PERISTEDION MINIATUM
SEA ROBIN, NK	TRIGLIDAE SP
SEA ROBIN, NORTHERN	PRIONOTUS CAROLINUS
SEA ROBIN, STRIPED	PRIONOTUS EVOLANS
SEA SQUIRT, NK	ASCIDIACEA
SEA URCHIN, NK	STRONGYLOCENTROTUS SP
SEAL, GRAY	HALICHOERUS GRYPUS
SEAL, HARBOR	PHOCA VITULINA CONCOLOR
SEAL, HARP	PHOCA GROENLANDICA
SEAL, NK	PHOCIDAE
SEATROUT (WEAKFISH), SPOTD	CYNOSCION NEBULOSUS
SEATROUT, NK	CYNOSCION SP
SEAWEED, NK	PHAEOPHYTA
SHAD, AMERICAN	ALOSA SAPIDISSIMA
SHAD, GIZZARD	DOROSOMA CEPEDIANUM
SHAD, HICKORY	ALOSA MEDIOCRIS
SHARK, ATL ANGEL	SQUATINA DUMERILI
SHARK, ATL SHARPNOSE	RHIZOPRIONODON TERRAENOVA
SHARK, BASKING	CETORHINUS MAXIMUS
SHARK, BIGNOSE	CARCHARHINUS ALTIMA
SHARK, BLACK TIP	CARCHARHINUS LIMBATUS
SHARK, BLACKNOSE	CARCHARHINUS ACRONOTUS

COMMON NAME	SCIENTIFIC NAME
SHARK, BLUE (BLUE DOG)	PRIONACE GLAUCA
SHARK, BONNETHEAD	SPHYRNA TIBURO
SHARK, CARCHARHINID,NK	CARCHARHINUS SP
SHARK, DUSKY	CARCHARHINUS OBSCURUS
SHARK, FINETOOTH	APRIONODON ISODON
SHARK, HAMMERHEAD, GREAT	SPHYRNA MOKARRAN
SHARK, HAMMERHEAD, SCALLOPED	SPHYRNA LEWIN
SHARK, HAMMERHEAD, SMOOTH	SPHYRNA ZYGAENA
SHARK, HAMMERHEAD,NK	SPHYRNIDAE
SHARK, MAKO, NK	ISURUS SP
SHARK, MAKO, SHORTFIN	ISURUS OXYRINCHUS
SHARK, NIGHT	CARCHARHINUS SIGNATUS
SHARK, NK	SQUALIFORMES
SHARK, PELAGIC	LAMNIFORMES
SHARK, PORBEAGLE (MACKEREL SHARK)	LAMNA NASUS
SHARK, SAND TIGER	ODONTASPIS TAURUS
SHARK, SANDBAR (BROWN SHARK)	CARCHARHINUS PLUMBEUS
SHARK, SEVENGILL SHARPNOSE	HEPTRANCHIAS PERLO
SHARK, SILKY	CARCHARHINUS FALCIFORMIS
SHARK, SPINNER	CARCHARHINUS BREVIPINNA
SHARK, THRESHER	ALOPIAS VULPINUS
SHARK, THRESHER, BIGEYE	ALOPIAS SUPERCILIOSUS
SHARK, TIGER	GALEOCERDO CUVIER
SHARK, WHITE	CARCHARODON CARCHARIAS
SHEARWATER, CORYS	PUFFINUS DIOMEDEA
SHEARWATER, GREATER	PUFFINUS GRAVIS
SHEARWATER, MANX	PUFFINUS PUFFINUS
SHEARWATER, NK	PUFFINUS SP
SHEARWATER, SOOTY	PUFFINUS GRISEUS
SHEEPSHEAD	ARCHOSARGUS PROBATOCEPHALUS
SHELL, NK	SHELL
SHELL, SCALLOP	
SHELLFISH, NK	BIVALVIA
SHORTSPINE BOARFISH	ANTIGONIA COMBATIA
SHRIMP, MANTIS	HALIOTIDAE
SHRIMP, NK	CARIDEA
SHRIMP, PANDALID (NORTHERN)	PANDALUS BOREALIS,SICYONA SP
SHRIMP, PENAEID (SOUTHERN)	PENAEUS SP
SHRIMP, ROYAL RED	PLEOTICUS ROBUSTUS
SHRIMP, SCARLET	PLESIOPENAEUS EDWARDSIANUS
SILVERSIDE, ATLANTIC	MENIDIA MENIDIA
SKATE, BARNDOR	RAJA LAEVIS
SKATE, BARNDOR	RAJA LAEVIS
SKATE, CLEARNOSE	RAJA EGLANTERIA
SKATE, CLEARNOSE	RAJA EGLANTERIA
SKATE, LITTLE	RAJA ERIANCEA
SKATE, LITTLE	RAJA ERIANCEA
SKATE, LITTLE/WINTER, NK	LEUCORAJA
SKATE, LITTLE/WINTER, NK	LEUCORAJA
SKATE, NK	RAJIDAE
SKATE, NK	RAJIDAE
SKATE, ROSETTE	RAJA GARMANI
SKATE, SMOOTH	RAJA SENTA
SKATE, THORNY	RAJA RADIATA
SKATE, THORNY	RAJA RADIATA
SKATE, WINTER (BIG)	RAJA OCELLATA

COMMON NAME	SCIENTIFIC NAME
SKATE, WINTER (BIG)	RAJA OCELLATA
SLENDER SNIPEFISH	MACRORHAMPHOSUS GRACILIS
SNAIL, MOONSHELL, NK	NATICIDAE
SNAIL, NK	GASTROPODA
SNAKEBLENNY	LUMPENUS LUMPRETAEFORMIS
SNAPPER, NK	LUTJANIDAE
SNAPPER, VERMILLION	RHOMBOPLITES AURORUBENS
SNIPEFISH, LONGSPINE	MACRORAMPHOSUS SCOLOPAX
SNIPEFISH, NK	CENTRISCIDAE
SPADEFISH	CHAETODIPTERUS FABER
SPONGE, NK	PORIFERA
SPOT	LEIOSTOMUS XANTHURUS
SQUID EGGS, ATL LONG-FIN	LOLIGO PALEI (EGGS)
SQUID, ATL LONG-FIN	LOLIGO PEALEI
SQUID, NK	LOLIGINIDAE
SQUID, SHORT-FIN	ILLEX ILLECEBROSUS
SQUIRRELFISH, NK	HOLOCENTRIDAE
STARFISH, BRITTLE, NK	OPHIUROIDEA
STARFISH, SEASTAR, NK	ASTEROIDEA
STARGAZER, NK	URANOSCOPIDAE SP
STARGAZER, NORTHERN	ASTROSCOPUS GUTTATUS
STINGRAY, ATLANTIC	DASYATIS SABINA
STINGRAY, BLUNTNOSE	DASYATIS SAY
STINGRAY, NK	DASYATIDAE
STINGRAY, PELAGIC	DASYATIS VIOLACEA
STINGRAY, ROUGHTAIL	DASYATIS CENTROURA
STINGRAY, SOUTHERN	DASYATIS AMERICANA
STOMACH CONTENTS FISH, NK	FOOD HABITS, FISH
STORM PETREL, NK	HYDROBATIDAE
STORM PETREL, WILSON	OCEANITES OCEANICUS
STURGEON, ATLANTIC	ACIPENSER OXYRHYNCHUS
STURGEON, NK	ACIPENSERIDAE
SWORDFISH	XIPHIAS GLADIUS
TAUTOG (BLACKFISH)	TAUTOGA ONITIS
TILEFISH, BLUELINE	CAULOLATILUS MICRIPS
TILEFISH, GOLDEN	LOPHOLATILUS CHAMAELEONTICEPS
TILEFISH, NK	MALACANTHIDAE
TOADFISH, NK	BATRACHOIDIDAE
TOADFISH, OYSTER	OPSANUS TAU
TRIGGERFISH, NK (LEATHERJACKET)	BALISTIDAE
TRIPLETAIL	LOBOTES SURINAMENSIS
TUNA, ALBACORE	THUNNUS ALALUNGA
TUNA, BLACKFIN	THUNNUS ATLANTICUS
TUNA, BLUEFIN	THUNNUS THYNNUS
TUNA, LITTLE (FALSE ALBACORE)	EUTHYNNUS ALLETTERATUS
TUNA, NK	EUTHYNNUS THUNNUS SP
TUNA, SKIPJACK	KATSUWONUS PELAMIS
TUNA, YELLOWFIN	THUNNUS ALBACARES
TURTLE, GREEN	CHELONIA MYDAS
TURTLE, KEMPS RIDLEY	LEPIDOCHELYS KEMPI
TURTLE, LEATHERBACK	DERMOCHELYS CORIACEA
TURTLE, LOGGERHEAD	CARETTA CARETTA
TURTLE, NK	CHELONIOIDEA
TURTLE, NK HARD-SHELL	CHELONIIDAE
TURTLE, TERRAPIN	MALACLEMYS TERRAPIN
UNKNOWN LIVING MATTER	

COMMON NAME	SCIENTIFIC NAME
WEAKFISH (SQUETEAGUE SEA TROUT)	CYNOSCION REGALIS
WHALE, MINKE	BALAENOPTERA ACUTOROSTRATA
WHALE, NK	CETACEA, WHALE
WHALE, PILOT, NK	GLOBICEPHALA SP
WHALE, TOOTHED, NK	ODONTOCETI
WHELK, CHanneLED (SMOOTH)	BUSYCON CANALICULATIUM
WHELK, KNOBBED	BUSYCON CARICA
WHELK, LIGHTNING	BUSYCON SINISTRUM
WHELK, NK, CONCH	MELONGENIDAE
WHELK, TRUE UNC	BUCCINIDAE
WHITING, BLACK (HAKE, OFFSHORE)	MERLUCCIOUS ALBIDUS
WOLFFISH, ATLANTIC	ANARHICHAS LUPUS
WOLFFISH, NORTHERN	ANARHICHAS DENTICULATUS
WORM, NK	ANNELIDA
WRECKFISH	POLYPRION AMERICANUS
WRYMOUTH	CRYTACANTHODES MACULATUS

Appendix Table 3. Discard reason categories used and the associated discard fish dispositions. Fish disposition descriptions taken directly from the Observer Database System.

Discard Reason Category	FISH DISPOSITION Code	FISH DISPOSITION Description
No Market	001	NO MARKET, REASON NOT SPECIFIED
	002	NO MARKET, TOO SMALL
	003	NO MARKET, TOO LARGE
	005	NO MARKET, WONT KEEP UNTIL TRIP END
	006	NO MARKET, BUT RETAINED BY VESSEL FOR ALTERNATE PROGRAM
	007	NO MARKET, BUT RETAINED FOR OBSERVER FOR SCIENTIFIC PURPOSES
	008	NO MARKET, BROUGHT ONBOARD ONLY FOR THE PURPOSE OF OBSERVER SAMPLING
Regulation (Size)	012	REGULATIONS PROHIBIT RETENTION, TOO SMALL
	013	REGULATIONS PROHIBIT RETENTION, TOO LARGE
Regulation (Quota)	004	NO MARKET, QUOTA FILLED
	014	REGULATIONS PROHIBIT RETENTION, QUOTA FILLED
	015	REGULATIONS PROHIBIT RETENTION, NO QUOTA IN AREA
	025	REGULATIONS PROHIBIT ANY RETENTION
Regulation (Other)	009	DISCARDED, FEMALE
	011	REGULATIONS PROHIBIT RETENTION, REASON NOT SPECIFIED
	022	REGULATIONS PROHIBIT RETENTION, V-NOTCHED
	023	REGULATIONS PROHIBIT RETENTION, SOFT-SHELL
	024	REGULATIONS PROHIBIT RETENTION, WITH EGGS
Poor Quality	030	POOR QUALITY, GRAY MEAT/PARASITES OBSERVED
	031	POOR QUALITY, REASON NOT SPECIFIED
	032	POOR QUALITY, SAND FLEA DAMAGE
	033	POOR QUALITY, SEAL DAMAGE
	034	POOR QUALITY, SHARK DAMAGE
	035	POOR QUALITY, CETACEAN DAMAGE
	036	POOR QUALITY, HAGFISH DAMAGE
	037	POOR QUALITY, SHELL DISEASE
	038	POOR QUALITY, GEAR DAMAGE
Other	000	DISCARDED, UNKNOWN REASON
	040	NOT BROUGHT ON BOARD, OPERATIONAL DISCARDS
	041	NOT BROUGHT ON BOARD, REASON NOT SPECIFIED
	042	NOT BROUGHT ON BOARD, GEAR DAMAGE PREVENTED CAPTURE
	043	NOT BROUGHT ON BOARD, FELL OUT/OFF OF GEAR
	044	NOT BROUGHT ON BOARD, CONSIDERED TO HAVE NO MARKET VALUE
	045	NOT BROUGHT ON BOARD, SAFETY REASON
	046	NOT BROUGHT ON BOARD, MECHANICAL FAILURE
	047	NOT BROUGHT ON BOARD, SPINY DOG CLOGGING PUMP
	048	NOT BROUGHT ON BOARD, VESSEL CAPACITY FILLED
	049	NOT BROUGHT ON BOARD, NOT ENOUGH FISH TO PUMP ABOARD
	052	INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD)
	053	DEBRIS
	054	EMPTY SHELLS
	062	UPGRADED
	063	RETAINING ONLY CERTAIN SIZE BETTER PRICE TRIP QUOTA IN EFFECT
	064	RETAINING ONLY CERTAIN SIZE FOR BEST PRICE BECAUSE OF PRICE DIFFERENCE
	070	NOT BROUGHT ON BOARD, QUALITY OF FISH
	071	NOT BROUGHT ON BOARD, CLOGGED PUMP OTHER
	099	DISCARDED, OTHER

Note: Fish disposition codes “039” = POOR QUALITY, PREVIOUSLY DISCARDED and “090” = DISCARDED BY OBSERVER, INTENDED KEPT CATCH have been excluded from this report.

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