APPENDICES

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Appendix A
NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy

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Northeast Fisheries Science Center Reference Document 05-09

NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy

by

Paul J. Rago, Susan E. Wigley, and Michael J. Fogarty

August 2005

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NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy

by

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Executive Summary

This report describes the standardized methodology used to estimate bycatch rates of finfish by commercial fisheries in the Northeast. In this report, bycatch is defined as the observed discarded catch, summed over from eleven different groundfish species. Estimates of unobserved discards are not considered. All retained catches are included whether or not the catches were incidental to the target species. Emphasis is placed on the methods used to define the sampling frame (i.e., the population of commercial fishing trips to be sampled), appropriate stratification, and efficient allocation of sampling effort to these strata. Efficient allocation of sampling effort within a stratified survey design improves the precision of the estimate of overall discard rates. Accuracy of sample estimates is evaluated by comparing various performance measures (e.g., landings, trip duration) between vessels with and without observers present. Although formal statistical distinctions between accuracy and bias of estimators and estimates can be made, in this report we use the terms interchangeably and less formally. A biased estimator is inaccurate; an accurate estimator is unbiased.

This report focuses on bycatch estimates based on discard to kept ratios. Use of this ratio is appropriate for trawl, gillnet and longline fisheries in the Northeast US. A formal assessment of bycatch estimates based on the ratio of discards to fishing effort is not considered in this report. Estimators based on ratios of total discard to fishing effort are more appropriate for fisheries that do not target groundfish, such as the sea scallop and herring fisheries. Evaluations of groundfish bycatch in these fisheries are being conducted by technical committees for their respective fishery management plans.

The Northeast Fisheries Science Center allocates observer sea days to monitor bycatch in commercial fisheries along the Northeast coast. These fisheries are diverse and therefore it is necessary to stratify commercial trips into fleet sectors (strata) with similar characteristics. Data from Northeast Fisheries Observer Program and the Fishing Vessel Trip Report are used together to define the size of the sample and the size of the strata, respectively. We define a total of 227 fisheries for 2005 observer coverage, consisting of three major gear types, four mesh sizes, two levels of trip durations, six port areas, and four seasonal quarters. The total fishing effort for April 2003 to March 2004 in the defined strata comprises 43,703 trips. Our examination of efficacy of observer coverage included results from 1,103 trips and 2,704 sea days. Every effort has been made to make the sampling program synoptic (i.e., cover all the major fisheries that discard commercially important species) and robust to sources of uncertainty. In particular, we utilize discard information at the trip level as opposed to the tow level. Sampling selection relies on observable properties of the strata, rather than desired outcomes (e.g., a targeted “cod” trip). Trips within strata are also assigned a probability of obtaining useful information relative to the species group of interest. The “usefulness” of a trip is conditional on the likelihood that a trip will catch one or more of the species within a predefined group of species.

Our analysis of sea-day allocations and use of optimization methods to improve allocations rest on two primary assumptions. First, the extant data are sufficient to obtain consistent estimates of the underlying variance of the discard ratio per stratum. Consistency is ensured if the samples are representative. Second, the relative size of the strata, i.e., the total number of trips, remains

constant from year to year. This is a more tenuous assumption, as the balance of fishing effort can change in response to changes in resource abundance or regulations. Both of these assumptions are inherent in the use of retrospective data to improve a future sampling program.

The observer sea-day allocation model developed here represents an extension of Neyman optimal allocation (Cochran 1977). Observer trips are allocated to strata as a function of their contribution to the total variance, the expected number of observer days per trip, and the probability that a trip will provide information on one or more of the species groups of interest. The essential features of the sampling design and allocation process are summarized below.

- Strata are defined on the basis of observable properties of the fleet sector
- The sample unit within a stratum is a trip
- The primary response variables are total discards and kept weights of groups of species. Eleven groundfish species constitute one group, monkfish another group, and summer flounder-scup-sea bass, a third group
- The probability of obtaining information on one or more of the species groups from a future trip in a stratum is estimated from analysis of observer data
- An estimate of the probability of not obtaining any information about one of the three species groups is incorporated to allow appropriate increases in sample sizes commensurate with this risk
- Expected average trip durations are defined for each stratum
- Total observer days at sea serve as a constraint on the allocation process
- Additional constraints can be imposed on the minimum and maximum numbers of samples per stratum
- Unsampled strata use imputed (or borrowed) values from adjacent strata to ensure that some information is used for sample selection
- Imputation also identifies gaps in coverage and allows for updates of the population frame as new data are acquired
- Discard ratios and standard errors incorporate the approximate covariance of the ratio
- The precision of the overall discard/kept ratio is the primary performance measure in the allocation process.
- Total variance can be minimized subject to a total observer day constraint, or the number of observer days can be minimized subject to a desired level of precision

Results from the optimization model are used as a tool to improve observer coverage. Some post-processing of the optimized sea days is needed to fine-tune coverage across fleet sectors. Where feasible, the fine-tuning of sea-day allocation capitalizes on the multi-purpose attributes of observer coverage oriented toward assessment of non-finfish species (e.g., acquire data in the sea scallop fishery from trips designed to evaluate turtle bycatch rates.)

Presently the model is based on aggregate Discard/Kept (D/K) ratios. These ratios are relevant to most fisheries but, of course, the Discard/Effort (D/E) ratio is important in others. D/E ratio data have been prepared but not yet implemented in the model. D/E ratios are relevant for fisheries such as sea scallops, northern shrimp, and herring. It should be noted that one of the primary difficulties of implementing the D/E methodology is the selection of an appropriate unit of effort.

The “trip” level of effort may be the most useful but additional work will be necessary before extending the methodology to optimally allocate observer coverage to these fisheries.

The optimization methodology addresses the precision of the overall D/K ratio in the context of multiple objectives and limited resources. The issue of accuracy/bias is addressed by comparing various properties of vessels with and without observers onboard. Bias -- the systematic difference between the estimated and true value -- is addressed by first ensuring that the vessel trips are representative, and that a variety of quality assurance/control procedures are employed to accurately monitor vessel performance. Refusals to take an observer and other forms of non-response by industry are possible sources of bias. These sources are addressed via increased use of Enforcement personnel. For these concerns, the NEFSC observer program is consistent with the recommendations of the NMFS National Working Group on Bycatch (NMFS 2004).

Babcock et al. (2003) assert that increases in sampling effort are sufficient to reduce bias. If the presence of observers onboard alters the vessels fishing patterns, then it can be argued that all observed trips yield potentially biased results. If the unobserved vessel fishes with different methods in different areas and so forth, then the increases in sample size can only reduce but not eliminate the scope for bias. A variety of statistical techniques for inferring bias can be applied, but a review of the literature suggests that these techniques have been only moderately successful. Independent measures of vessel behavior may be possible from Vessel Monitoring System data, but such analyses can only detect gross changes from observed trips. Where possible, verification by independent data sources is encouraged, but one should be careful to avoid the problems of incorrectly assuming that a particular methodology is completely unbiased.

Several tests were conducted to address the potential sources of bias by comparing measures of performance for vessels with and without observers present. Bias can arise if the vessels with observers on board consistently catch more or less than other vessels, if the average trip durations change, or if vessels fish in different areas. Each of these hypotheses was tested by comparing observable properties in strata having vessels with and without observers. Average catches (pounds landed) for observed and total trips compare favorably, following an expected linear relationship. The expected difference of the stratum specific means and standard deviations for both kept weight of groundfish and total trip duration was near zero. The frequency distribution of these differences provided no evidence of systematic bias. The mean difference between average catch rates of 238 pounds was not significantly different from zero ($p=0.59$, $df=84$). A paired t-test of the stratum specific standard deviations of pounds kept suggested no significant difference from zero ($p=0.08$). A similar analysis of average trip duration revealed a strong correlation between observed and unobserved trips (Figure 7) and a suggestion that the observed trips were about a half-day longer when the observer was on board ($p = 0.01$). A paired t-test of the difference in stratum specific standard deviations of trip length was not significantly different from zero ($p = 0.60$) (Figure 8B). Some skewing of the differences in mean trip durations was observed, with observed trips being slightly longer.

Two measures of spatial coherence suggest that the spatial distribution of fishing effort for trips having observers closely matches the spatial distribution of all trips. The null hypothesis of

observer proportions equal to the VTR proportions was rejected ($P<0.05$) in 20 of 65 comparisons. Of these 20 cases, 10 involved ports in Southern New England and the Mid-Atlantic region where landings of New England groundfish are expected to be low. Of the remaining ten cases, five involved the large and extra-large gill net fisheries that mainly target monkfish. Thus, the null hypothesis of equivalent spatial distribution of sampling was rejected in only 5 of 50 fleet sectors, a rejection rate only slightly higher than due to chance alone.

A paper by Murawski et al. (2005 in press) presents information on the spatial distribution of otter trawl fishing effort for vessels with Vessel Monitoring Systems (VMS) with the distribution of tows on observed trips. Qualitatively, the spatial distributions match very well with high concentrations of effort near the boundaries of the existing closed areas on Georges Bank and within the Gulf of Maine. Moreover, the effort concentration profiles deduced from VMS data coincided almost exactly with the profiles derived from observed trips. Overall, these comparisons suggest strong coherency between the two independent measures of fishing locations.

An assessment of the sources of uncertainty in the design and data collected in the Northeast Fisheries Observer program indicates that the level of precision in the discard ratios (d/k) for the New England Groundfish fisheries as a whole is high and there is little evidence of bias. However, at finer temporal and spatial scales, precision of the discard ratios will generally be lower than the aggregate. Precision of the discards estimates will also be lower for individual species, age groups and size classes.

Introduction

Estimation of bycatch in any commercial fishery is a difficult task. At the level of an individual trip, bycatch occurs sporadically over wide geographical ranges. Proper quantification typically requires presence of trained observers. The commercial marine fisheries of the Northeastern US comprise many vessels of widely different sizes, targeting multiple species in a variety of habitats. Overlaying the complexity of the fleet and target species is a complex regulatory environment that constrains fleet behaviors. Since many stocks are in rebuilding phases, the effects of restrictions on landings per trip, and therefore revenue per trip, are difficult to predict. The Northeast Fisheries Observer Program (NEFOP) addresses this complexity by first ensuring that the data obtained from any trip are of the highest quality. This is achieved through a rigorous training program, standardized on-board data collection protocols, and thorough auditing of data. To allow for extrapolation from the sample data to the fleet as a whole, these procedures must be embedded in a statistical sampling design. This report provides a summary of the issues relevant to the design and analysis of the observer sampling program particularly with respect to the allocation of observer days to achieve desired levels of precision.

The NEFOP program incorporates the following important features:

1. Definition of a sampling frame across all relevant fisheries
2. Identification of strata based on observable properties
3. Development of rules for imputing variance estimates in unsampled strata (i.e., "borrowing" estimates from appropriate strata)
4. Use of a trip as the sample unit (rather than individual tow)
5. Definition of discards by species groups, corresponding to the major finfish species within the Northeast US.
6. Use of discard to kept ratios (d/k) for species groups as the primary response variable.
7. Estimation of approximate variances for d/k for groups of species, rather than individual species
8. Allocation of sampling effort based on reduction in total variance of the d/k estimate, subject to total cost constraints.
9. Allowance for observer coverage in remaining fisheries not included in the sampling frame, owing to other priorities (e.g., protected species concerns).
10. Where feasible, capitalize on the multi-purpose attributes of observer coverage oriented toward assessment of non-finfish species (e.g., acquire data in sea scallop fishery from trips designed to evaluate turtle bycatch rates.)

In this report we describe the foundations of our standardized approach for bycatch reporting methodologies and the primary sources of uncertainty.

Background

The Northeast Fisheries Science Center (NEFSC) routinely allocates observer coverage to monitor bycatch (fish, invertebrates, and protected species) in the commercial fisheries in the Mid-Atlantic and New England regions. The observer coverage is administered in units of 'sea

days'. Based on the daily cost of an observer at sea, the available funds determine the number of potential sea days. However, for the New England groundfish fishery, the number of sea days is presently mandated to be 5% coverage of the fishery. The projected fishing activity (in days) for the year is estimated by the available days-at-sea allowed under the Northeast Multispecies Fishery Management Plan. Thus, in a given year, the NEFSC has a mixture of mandated sea days and non-mandated sea days to monitor bycatch in the Northeast region (North Carolina to Maine) for various fisheries.

Allocation of sea days is guided by an optimization algorithm that is based on generalization of the well-known Neyman allocation principle in survey sampling. Precision of the overall estimate of the discard ratio is improved by allocating samples to strata with the greatest contribution to the total variance, subject to an overall constraint on available resources. In this application, "resources" refers to the total number of observer days available. Improvement of the allocation process requires an evaluation of the current sampling design and precision of estimators. The ability to improve the design is contingent on the reliability of the stratum-specific variances and the persistence of these estimates in the future (or at least the next sampling period).

The optimization algorithm can be used to (1) minimize the variance of the discard estimate subject to a given number of sea days, or (2) minimize the number of sea days subject to a desired level of precision. Results from the optimization model are used as a tool to improve the coverage. However, the model does not incorporate information regarding sampling for protected species, nor does it include information for fisheries where the discard ratio may be more appropriately measured by a discard to effort ratio (d/e). Thus the model predictions are conditioned to exploit the multipurpose utility of the protected species sampling, and coverage in important fisheries (like sea scallops) is ensured by reserving some additional days to "level out" sampling that may be required for either protected species or closed area trips.

This report will describe: 1) the fishery identification and data sources used; 2) imputation rules for unobserved fisheries; 3) sampling theory and optimization methods; 4) application of the model to observer coverage; and 5) address accuracy issues discussed by Babcock et al. (2003)

Definition of Strata -- Fishery Identification

Diverse commercial fisheries are prosecuted off the Northeastern coast of the USA. These fisheries vary in size (number of trips) and have varying bycatch rates. To monitor these fisheries with at-sea observers, it is necessary to stratify the trips into fleet sectors with similar characteristics. For this report, fleet sectors are defined as strata within a survey design.

Commercial fishing trips are partitioned into fleet sectors using five classification variables: calendar quarter, gear type, mesh size, geographical region, and trip length. These classification variables are selected because they are generally known *before* a trip occurs. Using these criteria it is possible to generate a list of candidate vessels for each stratum, which simultaneously enables a random selection process and reduces the number of repeat trips on vessels. This is a

critical aspect for both strata definition and sample selection. One cannot base a sampling design on the outcome of a sample observation. In this exercise, it is not possible to select a sampling design that specifically improves the precision of cod discards, since that objective is dependent on the realization of the actual sample. However, it is possible to select samples that will improve the probability of obtaining improved discard estimates by estimating the expected proportion of trips that catch species groups of interest.

Calendar quarter was considered the most feasible temporal unit to capture seasonal variations in fishing activity and bycatch rates over the full range of fisheries. Although some management regulations operate at a finer scale (e.g. weekly), quarterly data can be further subdivided if finer resolution is needed. Otter trawl, gillnet and longline gear were defined as the three major gear types for finfish. Otter trawl and gillnet trips were classified into four mesh size groups: Small (less than 3.99 inch mesh); Medium (between 3.99 and 5.49 inch mesh); Large (between 5.5 and 7.99 inch mesh) and XLarge (8.0 inch mesh or greater). Additionally, trips are classified into six geographical regions based upon the port of departure: ports located within Maine and New Hampshire (ME_NH); Massachusetts (N_MA, excluding Bristol county); Connecticut, RI, and Bristol county, MA (SNE); New Jersey - New York (NJ/NY); Maryland and Delaware (MD/DE); Virginia and North Carolina (VA/NC). Trip length serves as a surrogate for spatial resolution (inshore vs. offshore). Otter trawl trips are further classified into two trip length categories: day trips and multi-day trips. Longline and gillnet gears are not partitioned by trip length.

Due to the mixture of species caught during a trip, it is not sufficient to classify trips with regard to target species because discard of target and non-target species may occur. To account for target and non-target discard, trips in each fleet sector are classified into one or more of three species groups: New England groundfish (NEGF); summer flounder, scup and black sea bass (FSB); and monkfish (MONK). There is often overlap between trips which catch NEGF, FSB and MONK. The estimated number of trips and sea days needed to cover these fleet sectors may be overestimated when the trips are assumed to be independent, therefore the overlapping nature of the fishing fleets are taken into account. Sampling fractions, and how the overlap is accounted for, are described in a later section.

Eleven species constitute the New England groundfish species group: cod, haddock, yellowtail flounder, American plaice, witch flounder, winter flounder, redfish, pollock, white hake, windowpane, and halibut. If a trip catches (retains or discards) at least 1 of the 11 large-mesh regulated species, the trip is categorized as NEGF trip and the hail weights of the 11 species are summed to form an aggregate species total for NEGF. Similarly, if a trip catches (retains or discards) either summer flounder, black sea bass or scup, the trip is categorized as a FSB trip and the hail weights of these species are summed to form an aggregate species total for FSB. If a trip catches (retains or discards) monkfish, then the trip is categorized as a MONK trip. A trip may be categorized to one or more of the three species groups.

Data Sources

Trip characteristics are recorded in both the NEFOP and Fishing Vessel Trip Reports (VTR) data sets. Together, these databases are used to define the size of the sample and the size of the strata, respectively. Data from each source are retrieved and prepared separately before the two sets are combined (Figure 1).

Fishing Vessel Trip Report Data

Beginning in June 1994, the Northeast Region's data collection system was changed from a voluntary to a mandatory reporting system for USA fishermen and dealers who catch and buy/sell groundfish species regulated by the Northeast Multi-species Fishery Management Plan. The mandatory reporting system consists of two components: 1) dealer reporting and 2) vessel trip reporting. Each component contains information needed for fishery management and stock assessment analyses: the dealer reports contain total landings by market category, while the vessel trip reports contain information on area fished, kept and discarded portions of the catch, and fishing effort. The VTR data has been routinely used in management analyses and peer reviewed stock assessments. Details on example applications of the VTR to stock assessments may be found in a large number of reports of the Stock Assessment Review Committee (SARC). Reports prepared since 2000 may be found at http://www.nefsc.noaa.gov/nefsc/saw/. Earlier reports are available by contacting saw_reports@noaa.gov.

In this report, the VTR data are used to: 1) define the sampling frame of the commercial fishing trips, and 2) evaluate the accuracy of the observer data with respect to area fished, kept pounds, and trip length. The VTR data are the only synoptic data source for vessel activity, area fished and fishing effort for commercial fisheries. The Vessel Monitoring System data and the Days-At-Sea data systems cover only portions of the fisheries and therefore are limited in use.

The VTR data can be used as a basis for defining the sampling frame, because all federally permitted vessels are required to file a VTR for each fishing trip (see NMFS-NERO *http://www.nero.noaa.gov/ro/fso/vtr_inst.pdf*). These self-reported data constitute the basis of the fishing activity of the commercial fleets. The VTR trip data are collapsed into fleet sectors and species groups as defined above. For each species group within a fleet sector, the number of trips that caught the species group, the average number of days absent, and the weight of the species in the species group are calculated.

The limitations of self-reported catch data are well known (e.g., Walsh et al. 2002, NMFS 2004). Limitations of the initial data VTR data sets were described by the SARC in 1996 (NMFS 1996). Since then, many of these limitations have been addressed. In particular, subsequent peer-reviews through numerous SARCs and a review by the National Research Council (1998) have identified the strengths, weaknesses, and appropriate uses of the VTR data from the Northeast.

The validity of VTR data as a basis for a sampling frame is supported by comparisons with total landings data from dealer records. All dealers which buy and sell groundfish regulated by federal

FMPs are required to report 100% of the landings. These data are generally thought to constitute a near census of landings of groundfish. The NRC (1998) noted that misreporting of landings is "usually a significant issue only when fisheries are managed by setting a total allowable catch." On this basis, the magnitude of misreporting by dealers would be low as Northeast groundfish stocks have been managed primarily through effort controls. A comparison of total groundfish landings from VTR and Dealer records for calendar year 2003 reveals close agreement between the two sources:

Species	VTR Landings (mt)	Dealer Landings (mt)	Difference (mt)	Pecent Difference
Cod	8240	8692	452	5.2%
Winter flounder	5321	5714	393	6.9%
Witch flounder	2971	3108	137	4.4%
Yellowtail flounder	5208	5530	322	5.8%
American Plaice	2204	2415	211	8.7%
Windowpane flounder	102	60	-42	-70%
Haddock	5778	5874	96	1.6%
White Hake	2268	3305	1037	31.4%
Halibut	11	13	2	15.4%
Redfish	338	360	22	6.1%
Pollock	3839	4188	349	8.3%
Total	36281	39258	2977	7.6%

For the three major species, cod, haddock and yellowtail flounder, the percentage differences range from 1.6% to 5.8%. Only windowpane flounder, white hake and halibut exhibit large percentage differences. Total landings of windowpane flounder and halibut represent small fractions of the total (0.3% of VTR and 0.2% Dealer) landings and these percentage differences are considered negligible. Large percentage differences for white hake may be attributable to confusion between white hake and red hake. White hake can be difficult to distinguish from red hake (sp) and may be identified simply as "hake" by both dealers and fishermen. The overall difference of 7.6% is dominated by large differences in the landings of white hake. Excluding white hake from the comparison reduces the overall percentage difference to 5.4%.

Other measures to ensure the validity of the VTR database include routine auditing procedures, standardized data entry protocols and compliance reviews (pers. comm. Greg Power, Chief, Fisheries Information Section, Northeast Regional Office, NMFS).

Northeast Fisheries Observer Program Data

The NEFOP employs trained, sea-going observers to collect catch data by species and disposition (retained and discarded). Biological samples, gear characteristics data, and economic information are also collected. For the optimization data set, only observed hauls from trips classified as 'standard sea sampling trips' are used. Observed trips that were aborted or which

used a 'limited' fish sampling protocol (no discard data collected) are excluded. Hail weight can be reported in round or dressed weights; if kept hail weights are reported as 'dressed', then the hail weight is converted to round (live) weight using Commercial Fisheries Database System (CFDBS) conversion factors for the species. All discard hail weights are assumed to be round (live) weight.

The NEFOP data are collapsed into strata as defined above. For each stratum, the number of observed trips that caught one or more of the three species groups is calculated. For each fleet sector and species group, the number of observed trips, number of observed hauls, average trip length (in days), kept weight of all species in the species group, discarded weight of all species in species group, and the number of observed days are calculated. A discard ratio and the variance of the ratio are calculated for each stratum (fleet sector and species group).

Optimization Data Set

The VTR and NEFOP data sets are concatenated by fleet sector and species group. A list of variables and their definitions are presented in Table 1. Not all VTR fleet activity may have NEFOP coverage (Table 2). When fleet sectors do not have observer coverage, imputed values are used (Table 3). The imputed values are derived from NEFOP data from similar fleet sectors, thus providing an estimate for the non-observed fleets. Details of the imputation process are provided in the following section.

The optimization tool is flexible and allows the user to select the entire input data set, or a subset. To allocate sea days for an entire year, four calendar quarters of data are used. Using the most recent available data, given the time needed for data entry and auditing, the year consists of calendar quarter 3 and 4 from year -1 and calendar quarter 1 and 2 from the current year.

The three gear types (otter trawl, gillnet, and longline) used in the optimization data set are gear types for which fishing regulations allow finfish to be retained, thus a discard to kept ratio estimator (d/k) is used. Fisheries using other gear types where regulations may prohibit groundfish possession are excluded from the current optimization process because a d/k ratio is not appropriate for these cases.

Imputation rules for unobserved fisheries

Not all of the fishery strata had observed trips between April 2003 and March 2004. To account for the expected variance of the estimates in the missing cells, it was necessary to develop a standardized procedure to handle both missing and minimal levels (e.g., a single trip) of observer coverage. This procedure is referred to hereafter as 'imputation' and the estimates derived by the imputation are referred to 'imputed values'. Imputed values are derived by sequentially relaxing the fleet sector classification. The fleet sectors for each species group (NEGF, FSB, and MONK) are imputed separately. The imputed values fill in missing values for the unobserved strata. Fishery strata are defined with respect to rigid definitions of categorical variables such as region

or quarter. A stratum with missing data must be filled with data from similar strata. To identify suitable candidate strata as "donor" or "parent" cells, it is necessary to "relax" the definitions of the strata. For example, if no trips occur in the Jan.-Mar. quarter, one might relax the definition to include data from the Jan-Jun. half year. The objective process of relaxing strata definitions to impute data is described below.

A fleet sector was not imputed if:

1) VTR number of trips = 0 (no imputation needed when there is no fleet activity for the species group);

2) VTR number of trips > 0 and standard error was not missing (no imputation needed when there is fleet activity for the species group and there is a standard error of the observer d/k ratio); and

3) VTR number of trips > 0 and total observed kept pounds = 0 (no imputation needed when there is fleet activity for the species group and the standard error cannot be calculated); otherwise, the fleet sector was imputed.

The imputation uses three increasing levels of aggregated NEFOP data (using the same data and calculation methods as the original calculations of observed d/k ratio and associated statistics). Three of the five stratification factors are relaxed (region, mesh size and calendar quarter). Gear type and trip length are used, but their stratification is not relaxed. Trip length is not relaxed because the average trip length is used to determine the number of sea days needed to obtain the desired precision level. Gear type is not relaxed because of fundamental differences in catches (retained and discarded) occur using these gear types.

Level 1: Calendar quarter is relaxed to half year and the six geographic regions are relaxed to two regions (NE region = ME/NH, N_MA, SNE; MA region = NY/NJ, DE/MD, NC/VA); gear, mesh size and trip length categories are maintained.

Level 2: Calendar quarter is relaxed to an entire year, the six geographic regions are relaxed to two regions (as in Level 1), and the four mesh groups are relaxed to two mesh groups (SMALL = small and medium mesh groups; LARGE = none, large, and Xlarge mesh groups); gear and trip length categories are maintained.

Level 3: Calendar quarter is relaxed to an entire year (as in Level 2), the six regions are relaxed to one region (all six regions combined), and the four mesh groups are relaxed into one mesh group. This level served as a 'catch-all' for all remaining fleets sectors that required imputation.

The VTR-NEFOP data set is merged with Level 1 NEFOP data; if a fleet sector needs imputed values, based on the criteria list above, then the imputed values from the observed trips in Level 1 are transferred to the corresponding VTR-NEFOP fleet sector and species group only if the trips in the Level 1 data set are greater than 1. Data from Level 2 and Level 3 are subsequently merged with the VTR-NEFOP. When imputed values are used in the VTR-NEFOP data set,

the fleet sector and species group is 'flagged' with the imputation level used. All fleet sectors that need imputation obtain values at one of the three levels.

Below is a summary of the number of fleet sectors, by imputation level and species group used in the 2005 sea day allocation.

	Species group		
Imputation Level	NEGF	FSB	MONK
Level 0 (no imputation)	150	116	111
Level 1	30	51	44
Level 2	27	41	35
Level 3	20	19	37
Total	227	227	227

To include all fisheries using otter trawl, gillnet and longline gear in the optimization, approximately 33% to 50% of the mean discard rates and variances are imputed or 'borrowed'.

When a fleet sector and species group is imputed, five variables (number of observed trips, observed d/k ratio, total observed kept pounds, standard error of the d/k ratio, and number of observed days) are estimated with imputed values. Because the aggregated NEFOP data at each level have more observations than the original VTR-NEFOP fleet sector, the imputed values need to be rescaled before they are used. Except for the imputed d/k ratio, the imputed values for the number of observed trips, the total observed kept pounds, the standard error and the number of observed days are re-scaled using a sampling fraction represented by the ratio of the total NEFOP trips for that level, fleet sector and species group to the total VTR trips for that level, fleet sector and species group. Equations used to re-scale imputed values within stratum h are:

T_{vtr} = total VTR trips of $Level_i$
T_{obs} = total NEFOP trips for $Level_i$
$T_{imp,h} = (T_{obs} / T_{vtr}) * Trips_{vtr,h}$;
$Kept_{imp} = (T_{imp,h} / T_{obs}) *$ NEFOP kept pounds sum in $Level_i$
$SE_{imp} = (T_{obs} / T_{imp,h})^{1/2} *$ NEFOP standard error in $Level_i$
$Days_{imp} = (T_{imp,h} / T_{obs}) *$ total number of NEFOP days in $Level_i$
$T_{imp,h}$ is rounded to a whole number, if $T_{imp,h} < 1$, then $T_{imp,h} = 1$;

where $Level_i$ denotes Imputation Level 1, Level 2 or Level 3.

Sampling Theory and Optimization Methods

Fishing trips are considered the primary sample unit in estimating d/k ratios. Fishing trips generally catch multiple species, some of which are not landed owing to various regulations or market conditions. We defined three major groups of species: (1) New England groundfish, (2) summer flounder, scup and sea bass, and (3) monkfish. Fishing trips in a given stratum may catch species from one or more of these groups. The degree of overlap among species groups has important implications for the efficacy of sampling within strata, i.e., the number of samples necessary to achieve a desired level of precision. Because some fraction of trips provide information on more than one species group, estimates of sample size based on the assumption of independence, will overestimate the number of required trips. Developing estimators that explicitly account for the magnitude of overlap can circumvent this potential inefficiency. There are two ways to approach this estimation. One is based on the pattern of overall trips from the vessel trip reports. The second is based on the pattern in observer sampled trips. In theory, if the observed trips are a representative sample, the proportions in the vessel trip reports and observer trips should be the same. In practice, the proportions in the observed trips will deviate from those in the VTRs due to sampling variability and other factors. The selection of observed trips reflects a practical mix of vessel availability, knowledge of vessel operations, familiarity, and safety considerations. These are, of course, important factors for program management, but it must be recognized that these factors introduce bias into estimates.

Both approaches follow the algorithm described below. Let I_{hij} be an indicator variable denoting the presence or absence of species group j within trip i in stratum h. Then I_{hij} =1 if species group j is present, else 0. A design matrix can be used to describe each unique trip within a stratum. The design matrix appends to each trip record a set of indicator variables that identify the presence/absence of species groups caught. The following table illustrates a hypothetical case with 7 trips in stratum h.

Example 1

	I_{h_1}	I_{h_2}	I_{h_3}
	j=1	j=2	j=3
Trip ID	NEGF	Monk	FSB
1	1	0	0
2	1	1	0
3	1	1	1
4	1	0	1
5	0	1	1
6	0	1	0
7	0	0	1
Sum	4	4	4
n_h=7	n_{h1}	n_{h2}	n_{h3}

In this simple example, four of the seven trips caught New England groundfish, four trips caught monkfish, and four caught summer flounder, scup or sea bass. If all of these trips (or trip types) are equally likely, then the probability of obtaining a sample that yields information on NEGF is 4/7 and so forth. The probability of obtaining information on species j is the sum of the species

group specific trips within the stratum (i.e., n_{hj}) divided by the total number of unique trips within the stratum (n_h). Note that

$$n_h \neq \sum_{j=1}^{3} n_{hj}$$

owing to the overlap in coverage for some trips. The probability that a random trip provides information on species group j is defined as

$$\hat{p}_{hj} = \frac{n_{hj}}{n_h} \qquad (1)$$

For each stratum, the probabilities can be computed that a random sample will contain information about species group j. The basis for the probability estimator can either be the observed set of trips within a stratum <u>or</u> the total set of trips represented in the VTRs. Applying the same set of indicator variables to the VTR data, one can obtain the population estimates of these quantities as

$$\hat{P}_{hj} = \frac{N_{hj}}{N_h} \qquad (2)$$

Eq. 1 establishes the basis for a random sample from the set of observed trips. Eq. 2 establishes the same basis from the VTR. On first principles, Eq. 2 is a better estimator if a representative sample can be taken in a stratum. Eq. 1 is more appropriate if the set of observed trips within a stratum is representative of those trips available for observation.

Using Eq. 1 or 2, it is now possible to examine the effects of altered sample sizes. Let n'_h represent the new total number of trips to be taken in stratum h. For the purpose of evaluating the expected change in variance in the component species groups, the n'_{hj} for each species group need to be redefined. This is accomplished using the equation

$$n'_{hj} = \hat{p}_{hj} n'_h \qquad (3)$$

if Eq. 1 is used , or

$$n'_{hj} = \hat{P}_{hj} n'_h \qquad (4)$$

if Eq. 2 (based on VTR) is used to estimate the expected probabilities that a trip in stratum h will capture fish from species group j.

Another worked example will reinforce the basic concept of the expected proportions of samples likely to sample species group j. Consider a stratum with 10 observed trips with Eq.1 used to estimate p'_{hj}.

Example 2

Trip ID	I_{h_1} j=1 NEGF	I_{h_2} j=2 Monk	I_{h_3} j=3 FSB
1	1	1	0
2	1	0	0
3	1	0	1
4	1	1	0
5	1	1	1
6	0	0	1
7	0	0	1
8	1	0	1
9	0	1	0
10	0	1	0
Sum	7	4	5
n_h=10	n_{h1}	n_{h2}	n_{h3}
p_{hj}	7/10	4/10	5/10

If the n_h were increased to n'_h=30 then the revised estimates of n'_{hj} would be

$$\hat{n}'_{h1} = \left(\frac{7}{10}\right)30 = 21$$

$$\hat{n}'_{h2} = \left(\frac{4}{10}\right)30 = 12$$

$$\hat{n}'_{h1} = \left(\frac{5}{10}\right)30 = 15$$

Thus, adding 20 trips to stratum h would translate into an expected increase of 14 trips for NEGF (i.e., 21-7), 8 trips for monkfish (i.e., 12-8) and 10 trips for FSB (i.e., 15-5). The increase in the total number of trips for a stratum differs with respect to the pattern of information in the sample. The allowance for non-integer numbers of trips is considered to have a negligible effect. In practice, the actual implementation of a sampling strategy would be based on rounding to the nearest integer, and subject to a lower bound constraint, say n_{hj}= 2.

Example 2 could be repeated for estimates derived from the VTR data. For such an example, the universe of trips would be much larger.

Measures of Overlap

Venn diagrams of the number of trips in the VTR and NEFOP depict the degree of overlap between the three species groups in the two data sets. In the April 2003-March 2004 VTR

database, half of the trips (22,274 trips out of 43,703 trips) are unique to the species groups (Figure 2), while in the NEFOP database, a third of the trips (286 trips out of 1,103 trips) are unique to the species groups (Figure 3). The sampling fractions (NEFOP trips divided by VTR trips) are given in Figure 4. The numbers of trips (and days) in the Venn diagrams are based on whole trips, and therefore slight differences occur in the number of trips between the Venn diagram and d/k ratio analyses (e.g. there are trips in d/k ratio analysis which used two different mesh sizes during a trip).

Observers Days at Sea Constraints

While trips constitute the sampling unit, the total number of sampling units is constrained by the total number of days available during any interval. To consider this component of the sampling design, it is necessary to consider the average trip duration in stratum h. Let t_{hi} be the trip duration (days) for the i-th trip in stratum h. The total number of observed trips in stratum h is n_h and the total number of observed days is Σt_{hi} The average trip duration is estimated as

$$\bar{t}_h = \frac{\sum_{i=1}^{n_h} t_{hi}}{n_h} \qquad (5)$$

The actual number of future observer days that will be required under some new sampling intensity (n'_h) is proportional to n'_h / n_h . Eq. 5 can also be defined in terms of the durations of the trips in the VTR database. The expected total number of days allocated to stratum h is defined as

$$T_h = \bar{t}_h n_h = \sum_{i=1}^{n_h} t_{hi} \qquad (6)$$

regardless of whether observer or VTR data are used. The average trip duration in stratum h is not influenced by the number of trips allocated, as long as the trips selected are representative of the basis used to define the species composition of the trips. Recall that either the observer database or the VTR database can be used. Thus the total number of observer days allocated to stratum h under some new allocation is

$$T_h^{'} = \bar{t}_h n_h^{'} \qquad (7)$$

The grand total number of days at sea that would be allocated given some new set $\{n'_h\}$ would be

$$T^{'} = \sum_{h=1}^{H} \bar{t}_h n_h^{'} \qquad (8)$$

Some key points in this derivation are:

- It is not possible to derive any real-world sampling program without considering the key uncertainties related to the probability that the trip will be "successful" and that the cost of sea days may vary.
- The number of successful trips, relative to the objective of reducing the variance of the estimate, is a random variable, based on a probability estimate. The expected number of actual trips may not actually result in information necessary to improve the precision of the estimate.
- The "cost" per trip is expressed as the expected duration. Actual duration may also vary within strata, although the stratification is designed reduce the variation in this component.

Optimization is a technique for maximizing (or minimizing) some quantity of interest subject to one or more constraints. Constraints are the key concept. In this application, we consider upper and lower bounds on the size of the sample within a strata, a total constraint on the number of available days, and a constraints related to acceptable levels of precision. For problems that do not explicitly consider dynamic (i.e., time dependent) processes, a variety of optimization methods can be used including linear and nonlinear programming. For this project, the optimization program, Premium Solver Platform (Version 5.5) developed by Frontline Systems, Inc. (2003) was used.

To address the optimization problem, the overall variance of the discard to kept ratio must first be estimated. The discard ratio for species group j in stratum h is the sum of discard weight over all trips divided by sum of kept weights over all trips:

$$\hat{R}_{jh} = \frac{\sum_{i=1}^{n_h} d_{ijh}}{\sum_{i=1}^{n_h} k_{ijh}} \qquad (9)$$

where d_{ijh} is the discards for species group j within trip i in stratum h and k_{ijh} is the kept portion of the catch. R_{jh} is the discard rate for species group j in stratum h. The stratum weighted discard to kept ratio for species group j is obtained by weighted sum of discard ratios over all strata:

$$\hat{R}_j = \sum_{h=1}^{H} \left(\frac{N_h}{\sum_{h=1}^{H} N_h} \right) \hat{R}_{jh} I_h \qquad (10)$$

The variable I_h is a zero/one indicator of whether or not a stratum is included in the computation. The indicator variable can be considered as a composite measure of the suitability of stratum h in the estimator. The indicator variable allows a stratum to be filtered on the basis of one or more metrics. A more complete description of the various types of filtering is described in the next section.

The approximate variance of the estimate of R_{jh} is obtained from a first order Taylor series expansion about the mean:

$$V\left(\hat{R}_{jh}\right)=\frac{1}{(n_{jh}-1)n_{jh}\bar{k}_{jh}^{2}}\left[\left(\sum_{i=1}^{n_{jh}}d_{ijh}\right)^{2}+\hat{R}_{jh}^{2}\left(\sum_{i=1}^{n_{jh}}k_{ijh}\right)^{2}-2\hat{R}_{jh}\left(\sum_{i=1}^{n_{jh}}d_{ijh}\right)\left(\sum_{i=1}^{n_{jh}}k_{ijh}\right)\right] \tag{11}$$

where d_{ijh} is the total discard weight of species group j in trip i within stratum h, k_{ijh} is the total kept weight of species group j in trip i within stratum h, nj_h is the sample size (number of trips) that caught species group j in stratum h, and k_{jh} bar is the mean kept landing of species group j within stratum h. Note that in this formulation of the variance, the finite population correction factor (fpc), i.e., one minus the sampling fraction within the stratum, has been omitted. This has been done to improve readability. The fpc is included however, in Eq. 11 for the total variance of the d/k ratio.

The variance of the d/k ratio for species group j over the entire set of strata is estimated using standard sampling theory methodology for a stratified random design as

$$V\left(\hat{R}_{j}\right)=\sum_{h=1}^{H}\left(\frac{N_{h}-n_{jh}}{N_{h}}\right)\left(\frac{N_{h}}{\sum_{h=1}^{H}N_{h}}\right)^{2}V\left(\hat{R}_{jh}\right)I_{h} \tag{12}$$

The overall coefficient of variation for the discard/kept ratio is defined as

$$CV_{j}=\frac{\sqrt{V(\hat{R}_{j})}}{\hat{R}_{j}} \tag{13}$$

It is now possible to define an overall estimate of the relative precision of the d/k ratio across all species groups as

$$CV = \sum_{j=1}^{3} \lambda_j CV_j \qquad (14)$$

where λ_j is an arbitrary weighting factor for species group j. In this formulation, the λ_j can be used as binary factors (0,1) to examine the allocations individually for species groups.

The optimization tool evaluates the potential improvements in the precision of the discard ratio through reallocation of the number of trips to individual strata. Equation 11 illustrates that the variance of the ratio decreases as the number of trips (n_h) increases. Assuming that the data yield representative estimates of the stratum specific variances, then the reduction in total variance can be examined as a function of alternative allocation schemes for each stratum. If n^*_h is defined as the optimal number of trips taken in stratum h, then the variance of the overall ratio is estimated as

$$V\left(\hat{R}_j^*\right) = \sum_{h=1}^{H} \left(\frac{N_h - n_{jh}}{N_h} \right) \left(\frac{N_h}{\sum_{h=1}^{H} N_h} \right)^2 \left(\frac{n_{jh}}{n_{jh}^*} \right) V\left(\hat{R}_{jh}\right) I_h \qquad (15)$$

The optimization problem can now be posed as the minimization of the CV of the composite ratio estimate, subject to a total days at sea constraint (T_C) and constraints on the number of trips per stratum.

$$\begin{aligned} &\min \sum_{j=1}^{3} \lambda_j CV_j \\ &\textit{subject to} \\ &2 \le n_{jh}^* \le N_h \qquad , \forall_h \qquad (16) \\ &T_C^* \ge \sum_{h=1}^{H} \bar{t}_h n_h^* \end{aligned}$$

Alternatively, the optimization problem can be defined with the objective of minimizing the total number of days at sea, subject to an acceptable coefficient of variation (CV_{CRIT}). This version of the model can be written as:

$$
\begin{aligned}
&\min \sum_{h=1}^{H} \bar{t}_h n_h^* \\
&\textit{subject to} \\
&2 \le n_{jh}^* \le N_h \qquad ,\forall_h \\
&CV_{CRIT} \ge \sum_{j=1}^{3} \lambda_j CV_j
\end{aligned}
\tag{17}
$$

Another relevant consideration is that a trip may not yield information on any of the target species groups. In some strata, for example, a number of trips fail to capture groundfish, monkfish or the summer flounder, scup and sea bass mixture. To protect against this possibility, it is desirable to inflate the optimal number of trip estimates by the ratio of N_h to N'_h where N_h is the total number of trips in stratum h and N'_h is the number of trips that obtained information on one or more of the species groups.

Application of the Model

Using the optimization algorithm to minimize the variance of the discard estimates subject to a given number of sea days, the allocation of observer sea days for the Mid-Atlantic (M-A) and New England (NE) regions was optimized separately and the resulting allocated sea days combined. Separate analyses were conducted because of differential sea days constraints (mandated sea days for New England groundfish versus non-mandated sea days for the Mid-Atlantic region). Before the optimization began, a portion of the available sea days were set aside to cover fisheries which do not enter the optimization process (e.g. scallop dredge fishery). For these fisheries, sea days are allocated proportional to fishing effort (number of trips or number of days fished).

The Mid-Atlantic optimization used data from the SNE, NJ/NY, DE/MD and VA/NC regions with the species weighting coefficients set to 1 for both FSB and MONK and to 0 for NEGF. The NE optimization used data from the SNE, N_MA, and ME-NH regions, with the species weighting coefficients set to 1 for NEGF and to 0 for both FSB and MONK. Data from the SNE region were included in both optimizations due to the intersection of the NE and M-A regions. Stratum indexes were applied to reduce the data set to contain only the relevant fisheries.

Below is a summary of the indexes and thresholds used in the NE and M-A sea day optimizations.

NE region trip and landings setting and thresholds

Switch	***Setting***	***Threshold (fraction)***	***Description of Filters that Operate on Entire Strata***
I(L_negf%)	1	0.0025	Landings of NEGF<Threshold=>0, else 1
I(L_fsb%)	(All)	0.0001	Landings of FSB<Threshold=>0, else 1
I(L_monk%)	(All)	0.0001	Landings of Monk<Threshold=>0, else 1
sum(I(L_all%))	(All)	NA	If any of Landings indices for NEGF,FSB or Monk=1 then =>1, else 0
I(Nh_negf%)	1	0.0001	Trips of NEGF<Threshold=>0, else 1
I(Nh_fsb%)	(All)	0.0001	Trips of FSB<Threshold=>0, else 1
I(Nh_monk%)	(All)	0.0001	Trips of Monk<Threshold=>0, else 1
I(%TotVTR_3sp)	1	0.00005	Filter on % of total landings of 3 species groups
Filter on All Trips	0	NA	Excludes entire Strata if value=0

M-A region trip and landings settings and thresholds

Switch	***Setting***	***Threshold (fraction)***	***Description of Filters that Operate on Entire Strata***
I(L_negf%)	(All)	0.0025	Landings of NEGF<Threshold=>0, else 1
I(L_fsb%)	1	0.0001	Landings of FSB<Threshold=>0, else 1
I(L_monk%)	1	0.0001	Landings of Monk<Threshold=>0, else 1
sum(I(L_all%))	(All)	NA	If any of Landings indices for NEGF,FSB or Monk=1 then =>1, else 0
I(Nh_negf%)	(All)	0.0001	Trips of NEGF<Threshold=>0, else 1
I(Nh_fsb%)	1	0.0001	Trips of FSB<Threshold=>0, else 1
I(Nh_monk%)	1	0.0001	Trips of Monk<Threshold=>0, else 1
I(%TotVTR_3sp)	1	0.00005	Filter on % of total landings of 3 species groups
Filter on All Trips	0	NA	Excludes entire Strata if value=0

NE and M-A regions d/k ratio thresholds

	Threshold (d/k ratio)	***Description of Filters that Operate on Individual Cells (Species within Strata)***	***Number of Cells Included***	***Number of Cells Excluded***
Max d/k_NEGF	1	Maximum d/k ratio used for NEGF. Values>Threshold excluded	25	11
Max d/k_FSB	2	Maximum d/k ratio used for FSB. Values>Threshold excluded	32	4
Max d/k_Monk	2	Maximum d/k ratio used for Monkfish. Values>Threshold excluded	33	3

Some ‘post-processing’ of the allocation of optimized sea days was necessary. Even though one or more indicator variables (i.e., filters) were applied during optimization, it was necessary to fine-tune the sea day allocations by applying a minimum and maximum amount of coverage, and to maintain coverage of fishing activity throughout the year. The optimized sea days were multiplied by the average trip duration for each stratum to estimate the projected number of observed trips. If the projected number of observed trips was less than 3 trips per strata, then the sea days were redistributed to other strata representing more relevant fisheries. If the number of

potential observed trips in a stratum exceeded 15% of the VTR trips, then the sea days in that stratum were reduced to the number of sea days representing 15% (potential observer trips/VTR trips) coverage. The sea days from strata exceeding the 15% coverage cap were reassigned to other strata.

The number of unique vessels and the vessel selection protocols in a stratum limit the number of trips that can be observed in that stratum. The number of unique vessels varies among strata; in the 2005 sea day optimization, the number of unique vessels in a stratum ranged between 1 and 146 vessels, with 85% of the strata having 50 vessels or less. The vessel selection protocols state a vessel is not to be observed more than twice during a month. As an approximate guide for balancing between the potential number of observed trips and the number of unique vessels in a stratum, a 15% trip coverage cap was selected to prevent assigning more sea days to a stratum than the number of vessels could support. The 15% cap prevented clustering of sampling effort, particularly in instances where the estimate of the variance of d/k might be imprecise. In these instances, the optimization model will tend to allocate large number of trips to such strata to reduce the standard error of the estimate. When the analysis was restricted to the relevant strata for the New England groundfish fisheries, the 15% cap was binding in only 4 of 33 strata for the observer coverage allocation scheme based on 2,708 observer days.

The diagnostics within the optimization tool were used to evaluate the imputation process. The optimization algorithm calculates the d/k ratios and the variance estimates for 'all data' and for 'data without imputed values'. Generally, the d/k ratios and variance estimates were similar between the 'all data' and 'data without imputed values' for each species groups. This indicates that the imputation generally provided consistent values across the three levels of aggregation.

Precision, Bias and Sampling Intensity: A Rebuttal to E.A Babcock et al. (2003)

Understanding the sampling properties of estimates of bycatch derived from observer programs and other sources with respect to accuracy and bias is critical. This section reviews issues related to bycatch estimation in observer programs with an emphasis on potential biases that may exist. The NMFS national bycatch report (NMFS 2004) emphasizes that wherever possible, attempts to detect and guard against bias should be made in observer programs. The report strongly advocates the development of rigorous randomization procedures in sample selection to help ensure representative sampling. All can agree that with unlimited resources, the more observer coverage the better. The real issue however is how to allocate finite resources to meet multiple requirements for stock assessment and protected species evaluation. The cases that Babcock et al. (2003) point to as success stories typically have relative few boats involved compared to many other fisheries. These cases are not representative overall of the issues facing program managers.

Babcock et al. (2003) insufficiently distinguish between two very different types of bias. The first type arises when non-representative sampling occurs. The second type is related to the statistical properties of the consistency of the estimators. These two types of bias are very different and it is important to be clear which type of bias is under consideration. The second type of bias is typically reduced with sufficiently large sample size. However, this may not be

addressed by increases in sample size if fishermen refuse to take observers, if certain classes of boats cannot accommodate observers, etc. Babcock et al. (2003) take as an article of faith that increasing the number of trips will reduce bias. Some of the solutions identified by Babcock et al. (2003) for correcting bias (e.g. the use of bootstrap estimators) apply to correcting bias of the second type. However, no amount of bootstrapping will overcome non-representative sampling.

The mean square error (MSE) of an estimate is composed of two elements, the variance of the estimate and the square of the bias (defined as the difference between the mean of the sample and the true population value). The MSE therefore comprises two additive elements. Cochran (1977) notes that if bias is less than 10% of the standard deviation of the estimate, the effect of this bias on the accuracy of the estimate is negligible. As noted by Babcock et al. (2003), most work on the properties of estimates derived from observer programs have focused on the variance component, with far fewer studies examining bias. For reasons described in detail below, we believe that estimating the bias of the first type is more difficult than intimated by Babcock et al. (2003). It is nonetheless important to try to estimate this quantity. Focusing on the precision part of the MSE in certain analyses does not imply that bias is unimportant, or that it should be dismissed as insolvable as suggested by Babcock et al. (2003)

A critical element of the arguments developed by Babcock et al. (2003) appears to be that increasing the number of trips sampled will, by itself, reduce bias of the first type. This assertion, if true, is important. However, no corroborative evidence is provided. The argument is that fishermen will change behavior if they are subjected to a higher probability of being included in a sample, or of being sampled more frequently by observers. In essence, fishermen will be less likely to fish in a non-typical manner when an observer is on board if the probability of selection is higher. This may not be true if say a particular fishing trip has a 20% chance of being selected vs. a 10% chance and if the fishermen do not know in advance how many trips they may have to accommodate within a specified time period. In any event, we doubt that this can be calculated unless a model of human behavior is part of the estimation procedure.

Babcock et al. (2003) report that Sampson (2002) detected statistically significant differences between a multivariate indicator of landings composition by participants in the Enhanced Data Collection Project (EDCP) of the Oregon Department of Fish and Wildlife and the composition of landings by the entire groundfish trawl fleet. This analysis is used to indicate that biases exist in voluntary programs such as the EDCP and that it is possible to use similar approaches to identify bias in observer programs in general. What Babcock et al. do not report is that Sampson indicated that the multivariate analysis employed (Principal Components Analysis) was only "moderately successful" in capturing the properties of the data. The first three principal components accounted for 15.4, 12.0, and 8.0 % of the variance `respectively for trips landing more than 10,000 lbs in which hake comprised less than 50% of the total (designated "Big" trips by Sampson). For trips less than 10,000 lbs in which hake comprised less than 50% of the total ("Small" trips), the first three principal components accounted for 13.7, 10.4, and 9.0% of the variance. Sampson (2002) reported significant differences between the participants in the EDCP and the total fleet in the 1st and 3rd principal components for both Big and Small trips and concluded that the EDCP fleet may not be representative of the entire fleet. However, because the first three PCs captured only a moderate fraction of the variance, these analyses should be viewed with caution. It is worth noting that Sampson provided canonical variable plots of PCA 1

against PCA 2 (Figure 6a and 6b of his report) in which both the information from the EDCP and the whole fleet are superimposed and these show that the data from the EDCP do not appear to be markedly different from the total fleet. A truly important bias should show up clearly in these plots, which take into account more of the variance of the samples than the individual t-tests actually used in the report.

The general issue of testing for bias in observer data using landings data raises some important questions concerning the inferences that can be drawn. In particular, if no significant differences are detected between observer and landings data, this does not guarantee that there is no bias in the estimates of discards.

The other major source of information that could be used to test the representativeness of observer data is to test against self-reported estimates by fishermen. Sampson (2002) made such an analysis for the EDCP data and detected differences. In this case, it was inferred that the self-reported estimates were not accurate. In contrast, Liggens (1997) found no differences between observer data for catch and discards against fleet wide estimates. In general, self-reported estimates are rightly viewed with caution and this is the most commonly available type of discard information against which to compare observer data.

To deal with logistical constraints and their effect on observer programs, Babcock et al. (2003) cite the work of Cotter et al. (2002) using a probability proportional to size (PPS) sampling allocation procedure. However, Cotter et al. (2002) concluded that this approach did not markedly improve the performance of the estimators.

Babcock et al. (2003) refer to the method of collapsing strata as an *ad hoc* procedure when, in fact, it is a very well established method (see Cochran 1977). Bias can occur using this method if an investigator deliberately chooses similar strata to combine. However, methods in which objective rules for combining strata are employed are much less likely to cause bias.

Babcock et al. (2003) assert that Fogarty and Gabriel (2002) assumed that the sampling fraction did not matter. In fact, Fogarty and Gabriel (2002) noted that the sampling fraction does affect the precision of the estimate through the finite population correction factor. The effect indicated by Babcock et al. (2003) is a very well established property of the statistical estimators employed. Fogarty and Gabriel (2002) noted in their analysis that "Ignoring the finite population correction factor results in an overestimate of the standard error…" Fogarty and Gabriel (2002) did not include the FPC in their estimates so as to provide a conservative estimate of the variance (e.g. biased on the high side). This is very different than assuming that the sampling fraction does not matter.

Recommendations made by the NMFS National Working Group on Bycatch (NMFS 2004) largely address the issues of major concern – the importance of obtaining representative sampling, careful consideration of stratification, etc. We recommend that information from observer trips (catch, trip duration, number of hauls/tows, fishing location etc.) also be checked against independent sources of information to see if differences can be detected. The only solution that Babcock et al. (2003) provide when such a bias is detected is to increase the number of trips covered by observers. As noted above, this may or may not be effective. Other solutions

to the problem need to be explored, as well as increasing observer coverage when analyses indicate it is cost-effective to do so given finite resources and competing programmatic needs.

An Evaluation of Bias in the Northeast Fisheries Observer (Sea Sampling) Program

Several tests were conducted to address the potential sources of bias. We compared several measures of performance for vessels with and without observers present. Bias can arise if the observed trips within a stratum are not representative of the other vessels within the stratum. Such bias could arise if the vessels with observers on board consistently catch more or less than other vessels, if the average trip durations change, or if vessels fish in different areas. Each of these hypotheses was tested by comparing observable properties in strata having data from vessels with and without observers.

All vessels are required to report the total trip landings, the number of days absent from port, and the primary statistical area fished. Average catches (pounds landed) for observed and total trips compare favorably (Figure 5), and follow an expected linear relationship. If the observed and unobserved trips within a stratum measure the same underlying process, one would expect no statistical difference in the average catches (and the standard deviations) between the VTR and observer data sets. An examination of the distribution of these differences (Figures 6A and 6B) indicates no evidence of systematic bias. The mean difference of 238 pounds in average catch rates between the two data sets is not significantly different from zero ($p=0.59$, $df=84$). As well, a paired t-test of the stratum specific standard deviations of pounds kept showed no significant difference from zero ($p=0.08$). A strong correlation was detected in trip duration between observed and unobserved trips (Figure 7), with observed trips averaging about a half-day longer ($p = 0.01$) (Figure 8A). However, the difference in stratum specific standard deviations of trip length was not significantly different from zero ($p = 0.60$) (Figure 8B). Some skewing of the differences in mean trip durations is evident, with observed trips being slightly longer.

Two measures of spatial coherence were also examined. Within stratum **h** the expected number of observer trips by statistical area **j** as the product of the proportion of VTR trips in Statistical Area **j** and stratum **h** ($\mathbf{V_{jh}}$) and the number of observed trips in stratum $\mathbf{n_h}$. Thus, $\mathbf{E_{jh} = V_{jh} * n_h}$. These expectations can then be compared to the actual frequencies ($\mathbf{O_{jh}}$) of observed trips by statistical area. Results of these analyses indicate that the spatial distribution of fishing effort for trips with observers on board closely matches the spatial distribution of trips for the stratum as a whole (Table 4). It was possible to compute chi-square statistics for 65 strata. The null hypothesis of observer proportions equal to VTR proportions was rejected ($P<0.05$) in 20 of the 65 comparisons. Of these 20 cases, 11 were from ports in Southern New England and Mid-Atlantic states. Of the remaining nine cases, five involved the large and extra-large gill net fisheries that land both groundfish and monkfish. Thus, the null hypothesis of equivalent spatial distribution of sampling was rejected in only 4 of 50 cases, a rejection rate only slightly higher than expected from chance alone.

As a final measure of the potential spatial bias, a paper by Murawski et al. (2005 in press) is instructive. In this paper, information is presented on the spatial distribution of otter trawl fishing effort for vessels with Vessel Monitoring Systems (VMS) and compared with the

distribution of fishing effort from observed trips (Figure 9). Qualitatively, the spatial distributions match very well with high concentrations of effort near the boundaries of existing closed areas on Georges Bank and within the Gulf of Maine. Moreover, the effort concentration profiles deduced from VMS data coincide almost exactly with the profiles derived from the observed trips. Overall, these comparisons suggest strong coherency between these two independent measures of fishing locations.

Sources of Uncertainty

In the Northeast, every effort is made to ensure representative observer coverage. This is accomplished by stratifying the fleet into homogeneous spatial, temporal and gear groups and by randomly selecting vessels from these strata. Stratification and randomization of sampling units are basic principles of survey design (e. g. Cochran 1977; Thompson 2002) and have been used in previous studies of bycatch to improve both "knowledge of the fleet" (Cotter et al. 2002) and precision of estimates (Allen et al. 2002; Borges et al. 2004). VTR data are used to produce a list of fishing vessels, by quarter and fleet sector. The vessel list contains a randomly ordered list of all vessels that participated in each fleet sector. To obtain a representative sample of the fleet, the NEFOP Area Coordinators use this vessel list, in addition to their local knowledge of fleet activity, to identify vessels on which to place observers. Vessels are required to take an observer if requested to do so. The NEFOP has standard protocols regarding vessel selection. A vessel, using the same gear, is not observed more than twice in the same month— this prevents repeated observations from the same vessel. The NEFOP Area Coordinators have protocols for documenting refusals; a refusal occurs when a vessel owner/captain is asked to take an observer and the owner/captain declines — or agrees but does not follow through (i.e. the vessel leaves the dock without the observer on board). Refusals are forwarded to Law Enforcement. A vessel owner can be prosecuted for failing to take an observer.

An objective process is used for imputation of missing values in unsampled strata. The imputation methodology helps identify gaps in sampling strategy and is an important component for ongoing improvements of the survey design. Stratoudakis et al. (1999) employed a post-stratification technique of "collapsing strata" as a way of dealing with unsampled strata. Our method of imputing means and variances for unsampled strata builds on this approach by utilizing information in comparable strata as a basis for initial sample allocation. Imputation represents a tradeoff between a realistic survey consistent with known fishing patterns and a less realistic pooled survey. Excessive imputation, however, can be indicative of an overly ambitious stratification approach; utilizing the observer data at an unrealistically fine temporal or spatial scale (say daily estimates in a small area) not only leads to an excessive extrapolation, but also violates the premise that observations in the current year are sufficient to predict patterns in the following year.

Persistence of annual patterns is critical to the estimation of an 'optimal' scheme. As regulations change and fishing patterns shift, using data based on fleet activity in the preceding year may be problematic. Using the current year's fishing activity pattern to predict future fishing patterns within strata cannot account for changes induced by variations in resource abundance, revenues, or management regimens. In a study of discards in the North Sea, Statoudakis et al. (1998)

reported immediate increases in discarding rates following increases in minimum size limits, but noted consistent patterns over time and among gears for higher value species such as cod and haddock. Without a predictive model of human behavior, it is not possible to anticipate fine-scale changes in fishing patterns. Rochet et al. (2002) were unable to find reliable predictor variables for prediction of bycatch but it should be noted that their study examined only 26 trips, about two orders of magnitude less than the number of trips considered in this report.

A related source of uncertainty is the ability to make inferences about specific species, stocks or age groups. Our evaluation of the Northeast Observer Program considers discard to kept ratios at the level of species groups. This approach is consistent with recent literature (Allen et al. 2001, Borges et al. 2004). An optimal strategy for New England Groundfish as a group however, will not necessarily be optimal for age 2 haddock on Georges Bank. The precision of discard information required at this level will typically exceed the nominal levels predicted as a result of optimal sampling. Figure 10 illustrates the relationship between the coefficient of variation for the overall New England groundfish discard ratio estimate as a function of total observer days allotted to this fishery. Assuming that 2,708 sea days can be allocated in an optimal manner in 2005, the predicted CV of the d/k ratio is well below 4%. The predicted CV drops to 2.5% at about 4,000 days and drops to about 1% at 20,000 days (about 50% coverage). The continuously decreasing slope of the relationship between CV and observer sea days reflects the reduced effectiveness of additional days as a way of improving overall precision.

Several important points are relevant to the interpretation of Figure 10. First, any non-optimal allocation of sampling effort will tend to increase the overall CV of the d/k ratio. Non-optimal allocations occur when the desired sampling plan cannot be followed, or when the pattern of landings among the strata in the current year differs from the pattern used as a basis for the optimal allocation scheme. Second, the CV of the overall d/k ratio is smaller than the precision of the individual components. Thus, the CV of the d/k ratio for a particular gear type or for a d/k ratio based on a finer temporal or spatial scale will generally be greater than the composite estimate. This property is illustrated in Figures 11 and 12 for quarterly estimates in the New England groundfish otter trawl and gillnet fisheries, respectively. Note that the number of observed otter trawl trips would need to be tripled to reduce the CV of the d/k ratio from 20% to 10%.

The coefficient of variation (CV) of the d/k ratios for New England groundfish are well below the 20% - 30% CV range established by the Atlantic Coastal Cooperative Statistics Program (ACCSP) for high priority commercial fisheries (ACCSP 2001) and by NMFS's National Working Group on Bycatch (NWGB) (NMFS 2004). The NWGB recommends: "For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20-30% CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch then the recommended goal for estimates of total catch is a CV of 20-30% (NMFS 2004). Assuming that landings are known without error, the precision of estimated total discard for New England groundfish equals the precision of the d/k ratio for this fishery.

A decrease in precision of the d/k ratio is also expected for any single species analysis. For example, the CV of the d/k ratio for haddock alone will probably be much greater than the CV of

the d/k ratio for the overall groundfish complex. Once again, it is important to remember that the sampling program must be based on observable properties of the strata, not on the outcome of the experiment. Any efforts to improve the precision of the d/k ratio for a single species will come at the expense of reduced precision for other species. Moreover, oversampling of a particular group of vessels may introduce undesirable properties (e.g., repeat trips on a single vessel) that can make the sampling less representative.

An exact definition of an acceptable level of bias and precision depends on the objectives of the analyses and the levels of acceptable risk to the fishery resource and the fishery. The acceptable level of risk must be defined externally by managers but should, at a minimum, consider the risk of stock collapse if management actions are compromised by imprecise information on discards. From the analyses presented in this report, it would appear that the level of precision is high for the groundfish resource as a whole and that there little evidence of bias in the discard rates.

Presently the optimization model uses aggregate d/k ratios, which are appropriate for most fisheries; however, for other fisheries, d/e ratios are more appropriate. The optimization algorithm can handle datasets containing either type of ratio, but not both in the same set (without external weighting). Input data sets with d/e ratios have been developed, but have not yet been incorporated into the overall process. A comparison of the precision of alternative estimators of discard ratios is the subject of ongoing research.

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Table 1. The variables, their description, their associated species group, data source, and units of the input data set of the optimization algorithm.

Variable Name	***Definition***	***Species Group***	***Data Source***	***Units***
year	Year			categories
negear	gear type			categories
qtr	quarter of year			number
mesh	mesh size			categories
region	state grouping, port of departure			categories
trp	Trip Duration (days)			categories
alltrips	Total number of trips, all species	ALL	VTR	trip
allmnda	Ave number of days absent, all species	ALL	VTR	days
vcount	Total number of VTR trips for 3 sp. Groups	3 Sp Grp	VTR	trip
ocount	Total number of observed trips that caught one or more of the 3 sp groups	3 Sp Grp	VTR	trip
vnegfntrips	Number of VTR trips that caught NEGF	NEGF	VTR	trip
vgfda	Total VTR days absent for trips that caught Groundfish	NEGF	VTR	days
vgftotal	Total VTR pounds(all sp) landed for trips landing groundfish	NEGF	VTR	pounds
vgflb	VTR pounds landed—groundfish	NEGF	VTR	pounds
vgfmnda	VTR average days absent—groundfish	NEGF	VTR	days
onegf	Sum of the "0/1 flags" for observed trips that caught NEGF	NEGF	OBS	trip
ogfntrips	Number of observed trips that caught NEGF	NEGF	OBS	trip
ogfparent	Flag indicating if values of d/k are observed (=1) or imputed (=0)	NEGF	OBS	flag
ogfnewcv	Desired CV closest to 0.30--intermediate value	NEGF	OBS	number
ogfnewntrips	Number of Observed trips necessary to achieve CV=ogfxnewcv	NEGF	OBS	trip
ogfxnewcv	Desired CV=0.30 --exact value	NEGF	OBS	number
ogfavgtriplen	Ave Trip Length in days for observed trips	NEGF	OBS	days
ogfntows	Number of observed Tows	NEGF	OBS	tows
ogfksums	Kept—observed	NEGF	OBS	pounds
ogfdsums	Discarded—observed	NEGF	OBS	pounds
ogfdkratio	d/k ratio	NEGF	OBS	number
ogfse	SE of d/k ratio	NEGF	OBS	number
ogfcv	CV of mean d/k ratio	NEGF	OBS	number
ogfseadays	Number of sea days needed to achieve CV=0.3 (=avg triplen x newntrips)	NEGF	OBS	days
ogfndays	Number of observed days	NEGF	OBS	days
vfsbntrips	Number of VTR Trips that caught FSB	FSB	VTR	trip
vfsbda	Total VTR days absent for trips that caught FSB	FSB	VTR	days
vfsbtotal	Total VTR pounds (all sp) landed for trips landing FSB	FSB	VTR	pounds
vfsblb	VTR pounds landed—FSB	FSB	VTR	pounds
vfsbmnda	VTR average days absent—FSB	FSB	VTR	days
ofsb	Sum of the "0/1 flags" for observed trips that caught FSB	FSB	OBS	trip
ofsbntrips	Number of observed trips that caught FSB	FSB	OBS	trip
ofsbparent	Flag indicating if values of d/k are observed (=1) or imputed (=0)	FSB	OBS	flag
ofsbnewcv	Desired CV closest to 0.30--intermediate value	FSB	OBS	number
ofsbnewntrips	Number of Observed trips necessary to achieve CV=ofsbxnewcv	FSB	OBS	trip
ofsbxnewcv	Desired CV=0.30 --exact value	FSB	OBS	number

ofsbavgtriplen	Ave Trip Length in days for observed trips	FSB	OBS	days
ofsbntows	Number of observed Tows	FSB	OBS	Tows
ofsbksums	Kept—observed	FSB	OBS	pounds
ofsbdsums	Discarded—observed	FSB	OBS	pounds
ofsbdkratio	d/k ratio	FSB	OBS	number
ofsbse	SE of d/k ratio	FSB	OBS	number
ofsbcv	CV of mean d/k ratio	FSB	OBS	number
ofsbseadays	Number of sea days needed to achieve CV=0.3 (=avg triplen x newntrips)	FSB	OBS	days
ofsbndays	Number of observed days	FSB	OBS	days
vmonkntrips	Number of VTR Trips that caught Monk	Monk	VTR	trip
vmonkda	Total VTR days absent for trips that caught monk	Monk	VTR	days
vmonktotal	Total VTR pounds (all sp) landed for trips landing Monkfish	Monk	VTR	pounds
vmonklb	VTR pounds landed---Monk	Monk	VTR	pounds
vmonkmnda	VTR average days absent—Monk	Monk	VTR	days
omonk	Sum of the "0/1 flags" for observed trips that caught Monkfish	Monk	OBS	trip
omkntrips	Number of observed trips that caught Monk	Monk	OBS	trip
omkparent	Flag indicating if values of d/k are observed (=1) or imputed (=0)	Monk	OBS	flag
omknewcv	Desired CV closest to 0.30--intermediate value	Monk	OBS	number
omknewntrips	Number of Observed trips necessary to achieve CV=omkxnewcv	Monk	OBS	trip
omkxnewcv	Desired CV=0.30 --exact value	Monk	OBS	number
omkavgtriplen	Ave Trip Length in days for observed trips	Monk	OBS	days
omkntows	Number of observed Tows	Monk	OBS	Tows
omkksums	Kept—observed	Monk	OBS	pounds
omkdsums	Discarded—observed	Monk	OBS	pounds
omkdkratio	d/k ratio	Monk	OBS	number
omkse	SE of d/k ratio	Monk	OBS	number
omkcv	CV of mean d/k ratio	Monk	OBS	number
omkseadays	Number of sea days needed to achieve CV=0.3 (=avg triplen x newntrips)	Monk	OBS	days
omkndays	Number of observed days	Monk	OBS	days
onegfcpue	Observer Catch(kept) per unit effort (lbs/day) for NEGF	NEGF	OBS	lbs/day
ofsbcpue	Observer Catch (kept) per unit effort (lbs/day) for FSB	FSB	OBS	lbs/day
omkcpue	Observer Catch (kept) per unit effort (lbs/day) for Monk	Monk	OBS	lbs/day
alltotal	Total number of pounds of all species landed in this cell	ALL	VTR	pounds
vnegfcpue	VTR Landings per unit effort (lbs/day) for NEGF	NEGF	VTR	lbs/day
vfsbcpue	VTR Landings per unit effort (lbs/day) for FSB	FSB	VTR	lbs/day
vmkcpue	VTR Landings per unit effort (lbs/day) for Monk	Monk	VTR	lbs/day
L_negf%	Fraction of NEGF landings in stratum h	NEGF	VTR	unitless
L_fsb%	Fraction of FSB landings in stratum h	FSB	VTR	unitless
L_monk%	Fraction of Monk landings in stratum h	Monk	VTR	unitless
Nh_negh%	Fraction of NEGF trips in stratum h	NEGF	VTR	unitless
Nh_fsb%	Fraction of FSB trips in stratum h	FSB	VTR	unitless
Nh_monk%	Fraction of Monk trips in stratum h	Monk	VTR	unitless
I(L_negf%)	Indicator {0,1} for Fraction of NEGF landings in stratum h	NEGF	VTR	switch
I(L_fsb%)	Indicator {0,1} for Fraction of FSB landings in stratum h	FSB	VTR	switch
I(L_monk%)	Indicator {0,1} for Fraction of Monk landings in stratum h	Monk	VTR	switch
sum(I(L_all%))	Indicator {0,1} for composite landings. =0 if all species specific indicators=0,else 1	3 Sp Grp	VTR	switch
I(Nh_negf%)	Indicator {0,1} for Fraction of NEGF trips in stratum h	NEGF	VTR	switch
I(Nh_fsb%)	Indicator {0,1} for Fraction of FSB trips in stratum h	FSB	VTR	switch

I(Nh_monk%)	Indicator {0,1} for Fraction of Monk trips in stratum h	Monk	VTR	switch
sum(I(Nh_all%)	Indicator {0,1} for composite TRIPS. =0 if all species specific indicators=0,else 1	3 Sp Grp	VTR	switch
I(onegfcpue)	Indicator {0,1} for observer CPUE in stratum h for NEGF. 1=> exceeds threshold, else 0	NEGF	OBS	switch
I(ofsbcpue)	Indicator {0,1} for observer CPUE in stratum h for FSB. 1=> exceeds threshold, else 0	FSB	OBS	switch
I(omkcpue)	Indicator {0,1} for observer CPUE in stratum h for Monk. 1=> exceeds threshold, else 0	Monk	OBS	switch
I(vnegfcpue)	Indicator {0,1} for VTR CPUE in stratum h for NEGF. 1=> exceeds threshold, else 0	NEGF	VTR	switch
I(vfsbcpue)	Indicator {0,1} for VTR CPUE in stratum h for FSB. 1=> exceeds threshold, else 0	FSB	VTR	switch
I(vmkcpue)	Indicator {0,1} for VTR CPUE in stratum h for Monk. 1=> exceeds threshold, else 0	Monk	VTR	switch
I(d/k_negf)	Indicator {0,1} for Obsvr d/k ratio in stratum h for NEGF. 1=> exceeds threshold,else 0	NEGF	OBS	switch
I(d/k_fsb)	Indicator {0,1} for Obsvr d/k in stratum h for FSB. 1=> exceeds threshold, else 0	FSB	OBS	switch
I(d/k_monk)	Indicator {0,1} for Obsvr d/k in stratum h for Monk. 1=> exceeds threshold, else 0	Monk	OBS	switch
Total VTR 3spgroup	Sum of landings by strata for each species group	3 Sp Grp	VTR	switch
%Total VTR 3 group	Percent of landings of sum of 3 sp groups in strata	3 Sp Grp	VTR	switch
I(%TotVTR_3sp)	flag for total landings of 3 species groups	3 Sp Grp	VTR	switch
ogfimp_level	Indicator {0,1,2,3} of imputation level	NEGF	OBS	category
ofsbimp_level	Indicator {0,1,2,3} of imputation level	FSB	OBS	category
omonkimp_level	Indicator {0,1,2,3} of imputation level	Monk	OBS	category

Table 2. Number of trips, by strata, in the Fishing Vessel Trip Reports (VTR) and Northeast Fisheries Observer Program (NEFOP) data sets used in the 2005 sea day optimization.

				QUARTER							
				1		2		3		4	
Region	**Gear**	**Mesh**	**Trip length**	VTR	NEFOP	VTR	NEFOP	VTR	NEFOP	VTR	NEFOP
DE/MD	Otter Trawl	Large	day			95	0	188	0	52	0
			multi-day	17	0	31	0	8	1	21	0
		Medium	day							1	0
			multi-day	8	2	5	0			5	0
		Small	day	3	0	14	0	3	0	24	0
			multi-day			1	0				
	Gillnet	Medium		1	0	1	0				
		Small		4	0	1	0	1	0		
		XLarge		12	0	19	0	2	0	8	0
ME_NH	Longline	None		20	0	68	0	6	0	5	0
	Otter Trawl	Large	day	187	0	102	2	512	6	568	1
			multi-day	315	9	279	5	479	9	439	15
		Medium	day							1	0
			multi-day			1	0				
		Small	day					1	1	1	0
			multi-day							1	0
		XLarge	day			3	0	1	0	10	0
			multi-day	1	0						
	Gillnet	Large		75	0	242	0	823	10	375	3
		Medium								1	0
		None				1	0	10	0	1	0
		Small						3	0		
		XLarge		19	0	77	0	573	14	247	0
N_MA	Longline	None		407	6	28	1	186	0	243	0
	Otter Trawl	Large	day	789	20	739	21	2015	54	1232	34
			multi-day	501	7	382	13	551	10	613	9
		Medium	day			11	1	1	0		
			multi-day			2	4	3	0	2	1
		Small	day	13	0	119	2	3	1	15	2
			multi-day	12	2	57	2	3	3	15	2
		XLarge	day			1	0				
			multi-day					2	0	1	0
	Gillnet	Large		1061	81	367	83	1481	94	1024	64
		Medium		1	0					2	0
		None		2	0	1	0	22	0	1	0
		Small		4	0	1	0	3	0	8	0
		XLarge		191	11	174	37	694	33	540	35
NC/VA	Otter Trawl	Large	day	2	0	5	0			3	0
			multi-day	542	17	117	0			226	3
		Medium	day	4	0	3	0				
			multi-day	35	7	20	0			15	2
		Small	multi-day	12	4	4	0	2	0	13	0
		XLarge	multi-day	4	0	4	0				
	Gillnet	Large		9	0	46	0	11	0	43	0
		Medium		19	0	5	0			10	0
		Small		2	0	8	0	4	1	15	0
		XLarge		38	0	161	0			35	0
NJ/NY	Longline	None		45	0	5	0				
	Otter Trawl	Large	day	426	4	1878	6	936	0	847	0
			multi-day	342	4	421	3	580	0	199	1
		Medium	day	13	1	267	21	464	5	458	4
			multi-day	170	22	42	5	4	1	64	3
		Small	day	29	0	629	5	894	0	465	0
			multi-day	209	8	99	3	105	1	150	5
		XLarge	day			4	0	31	0	20	0
			multi-day	7	0	2	0	1	0	2	0
	Gillnet	Large				72	0	70	0	29	0
		Medium				49	0	81	0	31	0
		None				2	0			4	0
		Small		2	0	8	0	49	0	51	0
		XLarge		418	0	699	1	166	0	995	0
SNE	Otter Trawl	Large	day	273	2	996	20	1399	2	731	2
			multi-day	571	37	515	8	621	21	525	25
		Medium	day			72	3	41	1	158	2
			multi-day	25	1	19	1	4	2	23	0
		Small	day	11	0	104	6	304	2	333	10
			multi-day	503	12	269	8	188	5	373	7
		XLarge	day			2	0			7	0
			multi-day	3	0	1	0	4	0	11	0
	Gillnet	Large		21	1	124	9	170	3	66	2
		Medium						1	0		
		None		1	0	1	0			1	0
		Small				4	0				
		XLarge		314	13	684	38	202	10	582	28

Table 3. Summary of fleet sectors (strata), by species group, that are imputed (1) and not imputed (0); blank cells indicate no fleet activity.

				QUARTER											
				1			2			3			4		
Region	**Gear**	**Mesh**	**Trip lengtl**	NEGF	FSB	MONK	NEGF	FSB	MONK	NEGF	FSB	MONK	NEGF	FSB	MONK
DE/MD	Otter Trawl	Large	day				0	1	1	0	1	1	0	1	1
			multi-day	0	1	1	0	1	1	0	1	1	0	1	1
		Medium	day										0	1	0
			multi-day	0	0	1	0	1	1				0	1	0
		Small	day	0	1	1	0	1	1	0	1	0	0	1	1
			multi-day				0	1	0						
	Gillnet	Medium		0	1	0	0	1	0						
		Small		0	1	0	0	1	0	0	0	1			
		XLarge		0	0	1	0	1	1	0	0	1	0	0	1
ME_NH	Longline	None		1	0	0	1	0	0	1	0	0	1	0	0
	Otter Trawl	Large	day	1	0	1	0	1	0	0	1	0	1	1	1
			multi-day	0	0	0	0	0	0	0	1	0	0	1	0
		Medium	day										0	1	0
			multi-day				1	0	1						
		Small	day							1	0	0	1	0	1
			multi-day										1	0	1
		XLarge	day				1	0	1	1	0	1	0	0	1
			multi-day	0	0	1									
	Gillnet	Large		1	0	1	1	1	1	0	1	0	0	1	1
		Medium											1	0	1
		None					1	0	1	1	0	1	1	0	1
		Small								1	0	1			
		XLarge		1	0	1	1	1	1	0	0	0	1	1	1
N_MA	Longline	None		0	0	0	1	0	0	1	0	0	1	0	0
	Otter Trawl	Large	day	0	1	0	0	0	0	0	1	0	0	1	0
			multi-day	0	1	0	0	0	0	0	0	0	0	1	0
		Medium	day				1	1	1	1	0	1			
			multi-day				0	0	0	1	0	1	1	0	1
		Small	day	1	0	1	0	0	0	0	1	0	0	0	0
			multi-day	0	1	0	0	1	0	0	0	0	0	0	0
		XLarge	day				0	1	0						
			multi-day							1	0	1	1	0	1
	Gillnet	Large		0	1	0	0	0	0	0	0	0	0	1	0
		Medium		1	0	0							1	0	1
		None		1	0	1	0	0	1	1	0	1	1	0	0
		Small		1	0	0	1	0	1	1	0	1	1	0	1
		XLarge		0	0	0	0	0	0	0	0	0	0	0	0
NC/VA	Otter Trawl	Large	day	0	1	0	0	1	1				1	1	1
			multi-day	0	0	0	0	1	1				1	0	0
		Medium	day	0	1	0	0	1	0						
			multi-day	0	0	0	0	1	1				0	0	1
		Small	multi-day	0	0	0	0	1	1	0	1	0	0	1	0
		XLarge	multi-day	0	1	1	0	1	1						
	Gillnet	Large		0	1	1	0	1	1	0	1	0	0	1	1
		Medium		0	1	1	0	1	1				0	1	1
		Small		0	0	1	0	1	1	0	0	0	0	1	1
		XLarge		0	1	1	0	1	1				0	1	1
NJ/NY	Longline	None		1	0	0	1	0	0						
	Otter Trawl	Large	day	0	0	0	0	0	0	1	1	1	1	1	1
			multi-day	0	0	0	1	0	0	1	1	1	0	1	1
		Medium	day	1	1	0	0	0	0	0	0	0	0	0	0
			multi-day	0	0	0	0	0	0	1	0	0	0	0	0
		Small	day	1	1	1	0	0	0	1	1	1	1	1	1
			multi-day	0	0	0	0	0	0	1	0	0	1	0	0
		XLarge	day				1	1	1	0	1	1	0	1	1
			multi-day	0	1	1	0	0	1	0	1	0	0	1	0
	Gillnet	Large					1	1	1	0	1	1	0	1	1
		Medium					1	1	1	1	1	1	1	1	0
		None					0	1	1				0	1	1
		Small		0	0	1	1	1	0	1	1	0	1	1	1
		XLarge		0	1	1	1	1	1	1	1	1	1	1	1
SNE	Otter Trawl	Large	day	0	0	0	0	0	0	1	0	1	0	0	0
			multi-day	0	0	0	0	0	0	0	0	0	0	0	0
		Medium	day				0	0	1	0	1	1	0	0	0
			multi-day	0	1	1	1	1	1	0	1	0	1	1	1
		Small	day	1	1	1	0	0	0	0	0	1	0	0	0
			multi-day	0	0	0	0	0	0	0	1	0	0	0	0
		XLarge	day				0	1	1				0	1	1
			multi-day	1	1	1	0	1	1	1	0	1	0	1	1
	Gillnet	Large		1	0	1	0	0	0	1	0	1	1	0	1
		Medium								0	1	0			
		None		1	0	1	0	0	1				0	1	0
		Small					0	1	1						
		XLarge		0	0	0	0	0	0	0	0	0	0	0	0

Table 4. Summary of contingency table analyses of spatial distribution of VTR and observed trips. Expected value of observed trips is based on proportions of VTR trips by Statistical Area. Critical value of Chi-Square statistics is based on alpha level of 0.05. Degrees of freedom are based on number of Statistical Areas reported in VTR database.

Quarter	Gear	Mesh	Region	Trip Duration	Chi Sqr Test Statistic	df	Chi Sqr Crit Value	Signif Level
3	Gill Net	Large	ME_NH	all	41.92	6	12.59	0.000
3	Gill Net	XLarge	ME_NH	all	32.19	4	9.49	0.000
3	Gill Net	Large	N_MA	all	36.92	11	19.68	0.000
3	Gill Net	XLarge	NJ/NY	all	20.30	5	11.07	0.001
4	Gill Net	XLarge	N_MA	all	16.89	4	9.49	0.002
4	Gill Net	Large	ME_NH	all	14.76	4	9.49	0.005
4	Gill Net	XLarge	NJ/NY	all	10.46	2	5.99	0.005
2	Gill Net	XLarge	ME_NH	all	12.06	7	14.07	0.098
2	Gill Net	Large	NC/VA	all	3.06	2	5.99	0.216
1	Gill Net	XLarge	NC/VA	all	2.15	2	5.99	0.341
1	Gill Net	Large	SNE	all	0.40	1	3.84	0.527
4	Gill Net	Large	N_MA	all	2.69	4	9.49	0.611
2	Gill Net	Large	N_MA	all	6.10	8	15.51	0.636
2	Gill Net	XLarge	N_MA	all	1.48	3	7.81	0.687
1	Gill Net	XLarge	N_MA	all	1.23	3	7.81	0.746
3	Gill Net	XLarge	N_MA	all	2.29	5	11.07	0.808
1	Gill Net	Large	N_MA	all	1.29	4	9.49	0.862
2	Longline	None	ME_NH	all	1.15	3	7.81	0.764
1	Longline	None	N_MA	all	1.63	7	14.07	0.977
2	Trawl	Large	N_MA	1day	243.29	6	12.59	0.000
2	Trawl	Medium	SNE	2+day	120.00	3	7.81	0.000
3	Trawl	Large	NJ/NY	1day	80.97	13	22.36	0.000
2	Trawl	Large	NJ/NY	1day	61.00	5	11.07	0.000
4	Trawl	Large	ME_NH	2+day	49.91	9	16.92	0.000
1	Trawl	Small	NJ/NY	1day	32.36	3	7.81	0.000
4	Trawl	Medium	NJ/NY	2+day	28.00	2	5.99	0.000
3	Trawl	Large	N_MA	1day	37.19	9	16.92	0.000
4	Trawl	Small	NJ/NY	1day	15.00	2	5.99	0.001
4	Trawl	Small	N_MA	2+day	14.00	2	5.99	0.001
1	Trawl	Large	NC/VA	2+day	29.65	13	22.36	0.005
2	Trawl	Small	DE/MD	1day	8.67	3	7.81	0.034
1	Trawl	Medium	SNE	2+day	4.00	1	3.84	0.046
2	Trawl	Large	NC/VA	2+day	14.28	8	15.51	0.075
2	Trawl	Large	N_MA	2+day	22.66	15	25.00	0.092
2	Trawl	Small	NJ/NY	1day	13.22	8	15.51	0.105
2	Trawl	Large	DE/MD	2+day	13.03	8	15.51	0.111
4	Trawl	Large	SNE	2+day	2.00	1	3.84	0.157
3	Trawl	Large	ME_NH	1day	14.30	10	18.31	0.160
4	Trawl	Large	NC/VA	2+day	19.92	15	25.00	0.175
2	Trawl	Small	NJ/NY	2+day	7.58	5	11.07	0.181
3	Trawl	Small	NJ/NY	1day	1.00	1	3.84	0.317
1	Trawl	Large	SNE	2+day	3.81	4	9.49	0.432
4	Trawl	Small	N_MA	1day	0.60	1	3.84	0.439
2	Trawl	Medium	N_MA	1day	0.50	1	3.84	0.480
4	Trawl	Large	NC/VA	1day	7.45	8	15.51	0.489
2	Trawl	Large	DE/MD	1day	0.41	1	3.84	0.520
4	Trawl	Small	NJ/NY	2+day	8.01	9	16.92	0.533
4	Trawl	Medium	NC/VA	2+day	0.33	1	3.84	0.564
2	Trawl	Small	SNE	1day	1.00	2	5.99	0.607
4	Trawl	Large	N_MA	1day	5.25	7	14.07	0.630
1	Trawl	Small	N_MA	2+day	1.67	3	7.81	0.644
1	Trawl	Large	NJ/NY	1day	3.08	5	11.07	0.687
4	Trawl	Large	NJ/NY	2+day	0.71	2	5.99	0.700
1	Trawl	Large	N_MA	1day	6.29	10	18.31	0.790
3	Trawl	Large	ME_NH	2+day	3.02	6	12.59	0.807
4	Trawl	Large	N_MA	2+day	5.87	10	18.31	0.826
1	Trawl	Large	N_MA	2+day	1.08	4	9.49	0.897
1	Trawl	Large	ME_NH	1day	3.40	8	15.51	0.907
3	Trawl	Large	N_MA	2+day	2.06	6	12.59	0.914
1	Trawl	Large	NJ/NY	2+day	2.00	6	12.59	0.920
4	Trawl	Large	ME_NH	1day	0.39	3	7.81	0.943
2	Trawl	Large	ME_NH	2+day	4.43	11	19.68	0.956
1	Trawl	Large	ME_NH	2+day	0.85	6	12.59	0.991
3	Trawl	Large	DE/MD	1day	0.81	6	12.59	0.992
2	Trawl	Large	ME_NH	1day	1.67	9	16.92	0.996

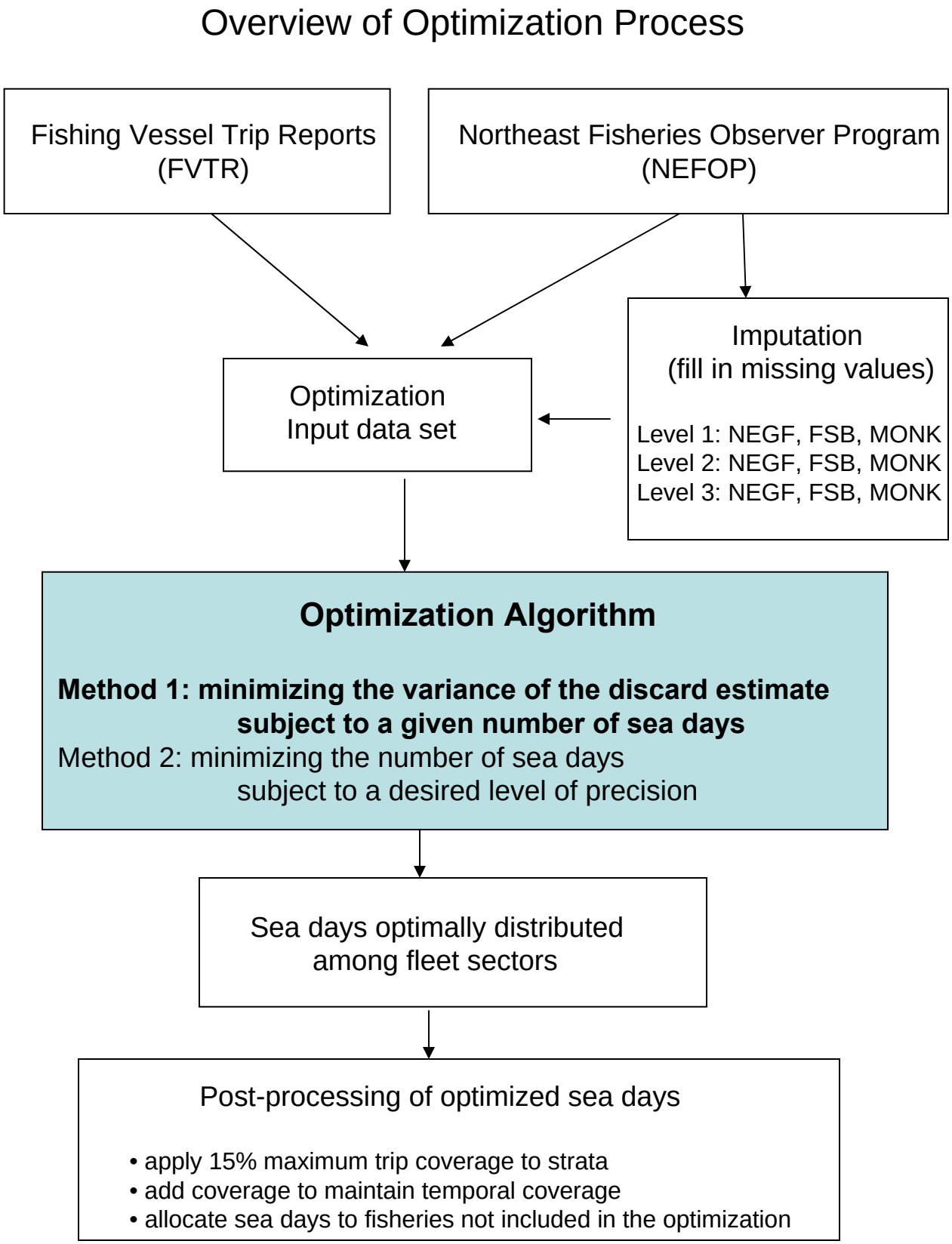
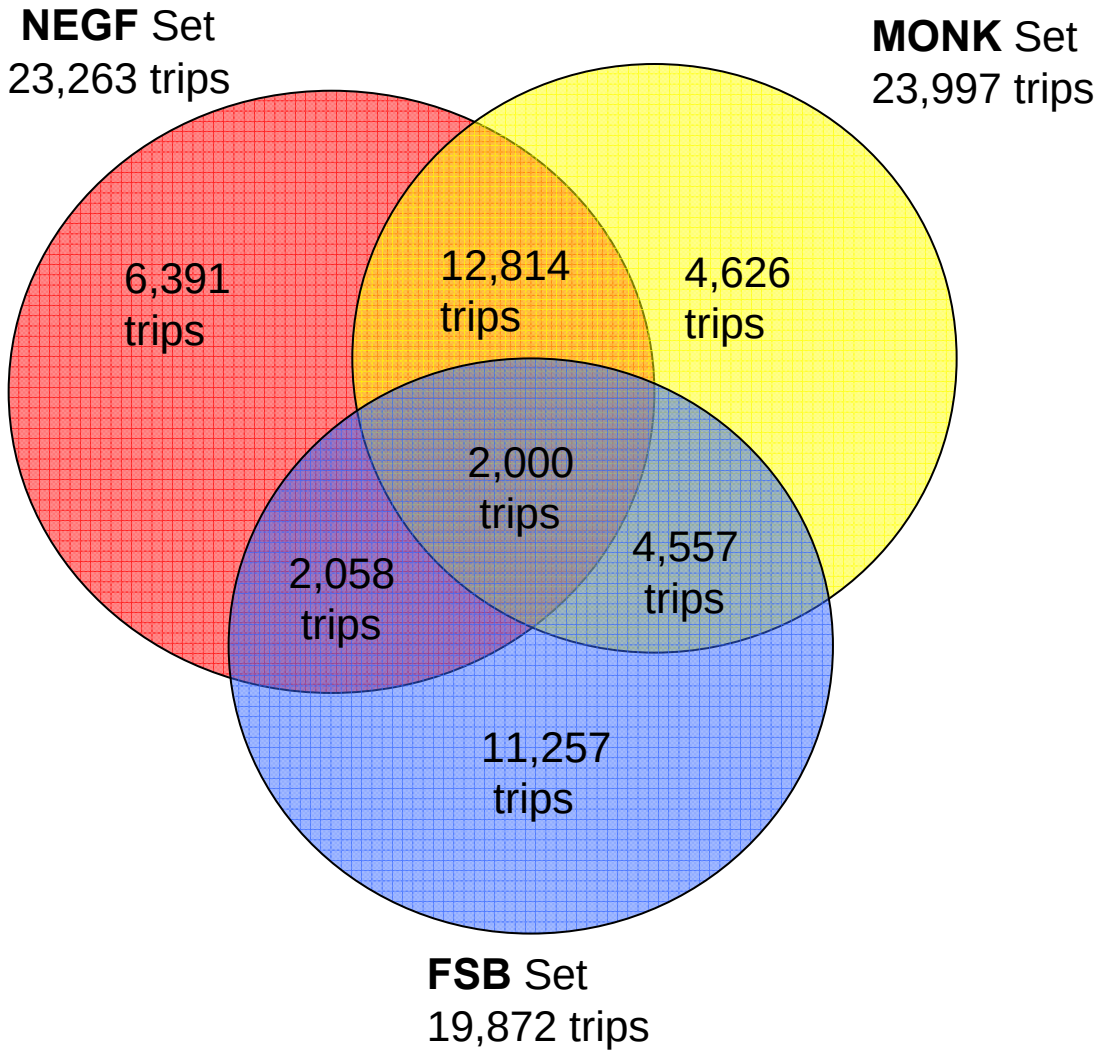


Figure 1. An overview of the optimization process used to allocate sea days to fisheries in the Northeast region.

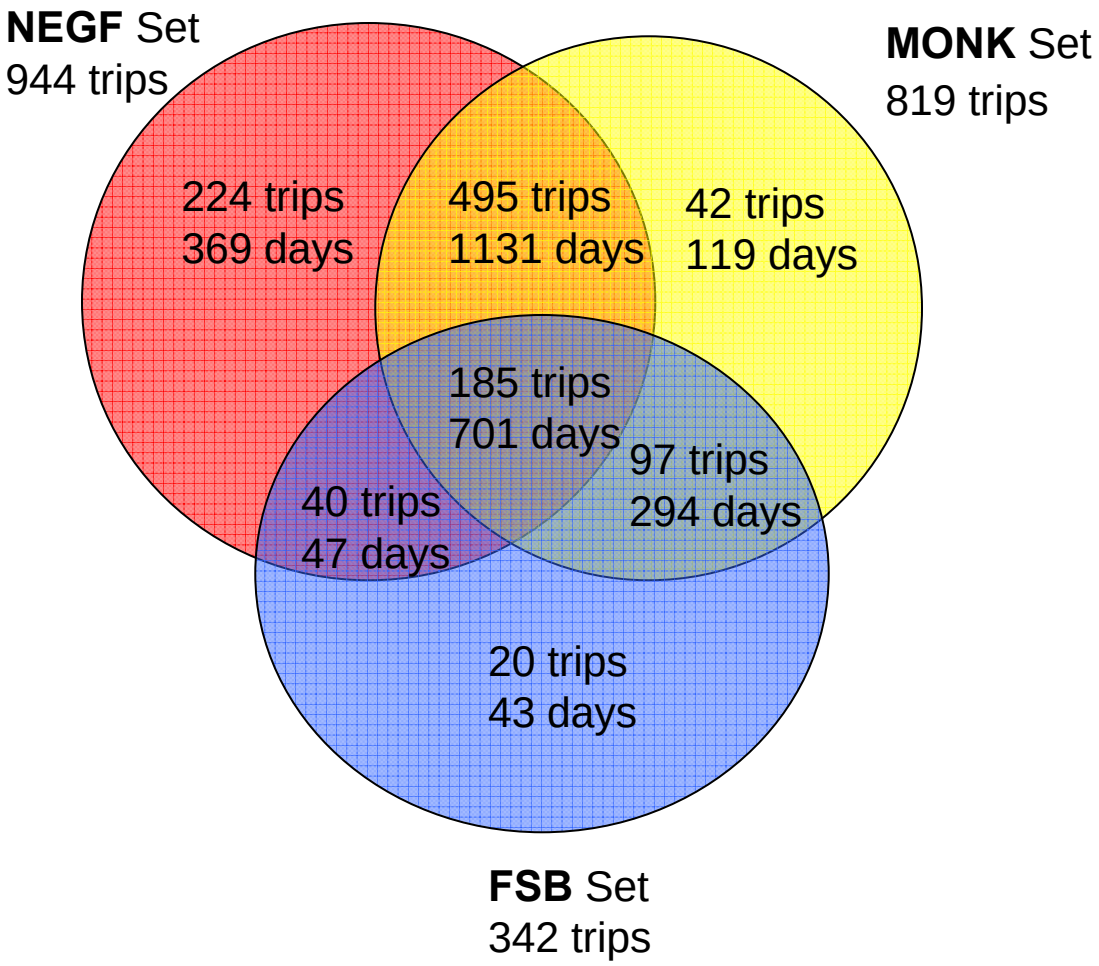
Number of trips in 2003/2004 VTR data subsets for otter trawl, gillnet and longline trips
(43,703 trips)



Total Unique Trips: 43,703
Total Trips with Overlap: 21,429
Sum of Trip Sets: 67,132

Figure 2. Number of trips in the 2003/2004 Vessel Trip Report (VTR), by data subsets (New England groundfish -NEGF; Monkfish - MONK; and summer flounder, scup and black sea bass - FSB) for otter trawl, gillnet and longline trips.

Number of trips and sea days
in the 2003/2004 Observer data subsets
for otter trawl, gillnet and longline trips
(1,103 trips and 2,704 sea days)

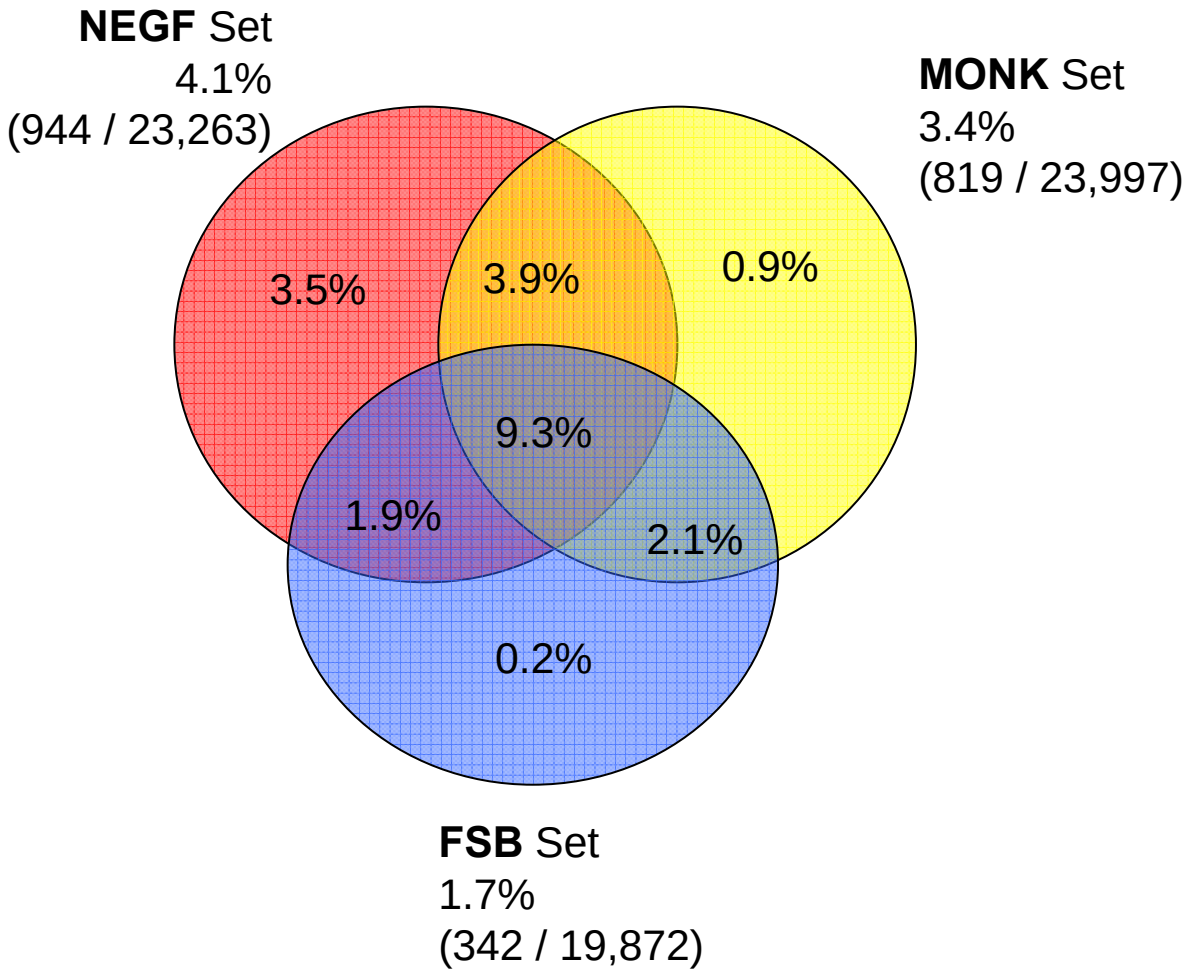


Total Unique Trips: 1,103
Total Trips with Overlap: 817
Sum of Trip Sets: 2,105

Figure 3. Number of trips and sea days in the 2003/2004 Northeast Fisheries Observer Program, by data subsets (New England groundfish - NEFG; Monkfish - MONK; and summer flounder, scup and black sea bass - FSB) for otter trawl, gillnet and longline trips.

Sampling Fraction: 2003/2004 Observer trips/VTR trips for otter trawl, gillnet and longline trips

(43,703 unique trips)



Total Unique Trips: 2.5% (1,103 / 43,703)
Total Trips with Overlap: 3.8% (817/ 21,429)
Sum of Trip Sets: 3.1% (2,105 / 67,132)

Figure 4. The sampling fraction of 2003/2004 Observed trips to Vessel Trip Report trips, by data subset (New England groundfish - NEGF; Monkfish - MONK; and summer flounder, scup and black sea bass - FSB) for otter trawl, gillnet and longline trips.

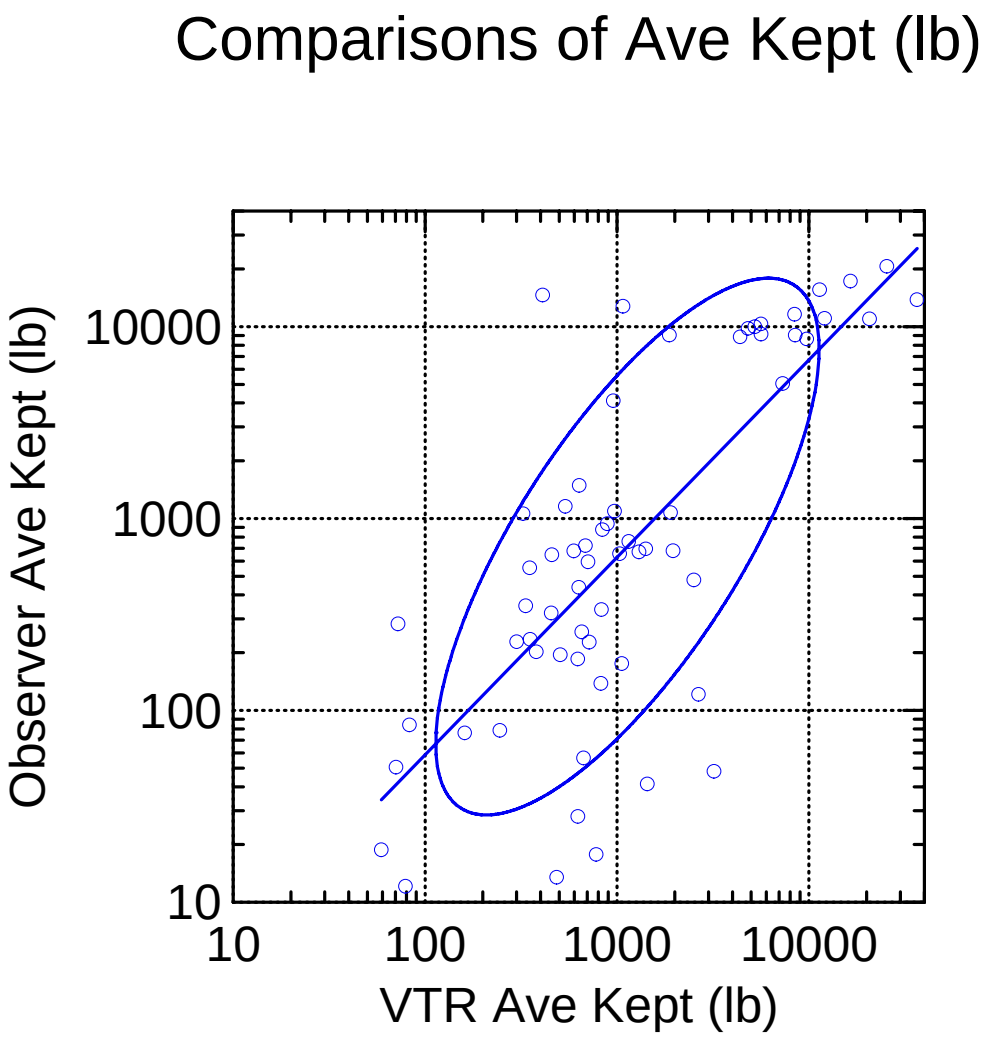
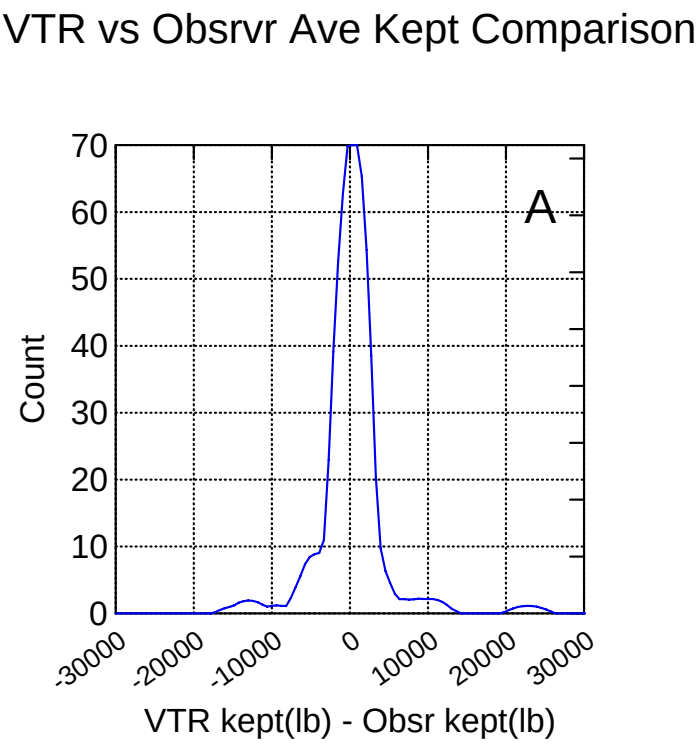


Figure 5. Comparison of average kept pounds of groundfish (natural log scale) in the Northeast Fisheries Observer Program and Vessel Trip Report data sets for 2003/2004. Each point represents the mean of an individual stratum.



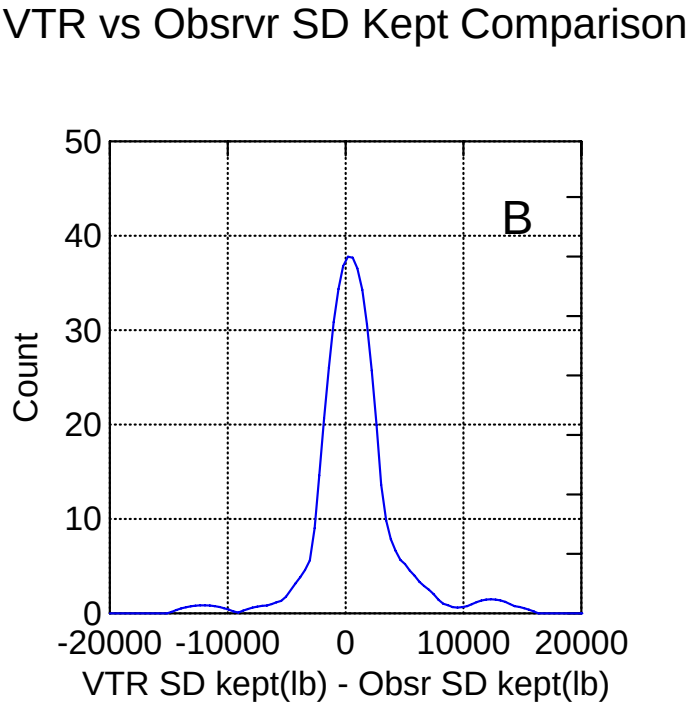


Figure 6. The distribution of differences between the average kept pounds (A) and the standard deviation (SD) of average kept pounds (B) of groundfish in the Northeast Fisheries Observer Program (Obsrvr) and the Vessel Trip Report (VTR) data for 2003/2004. Histograms are non-parametric smooths of the stratum specific differences.

Comparisons of Ave Trip Duration

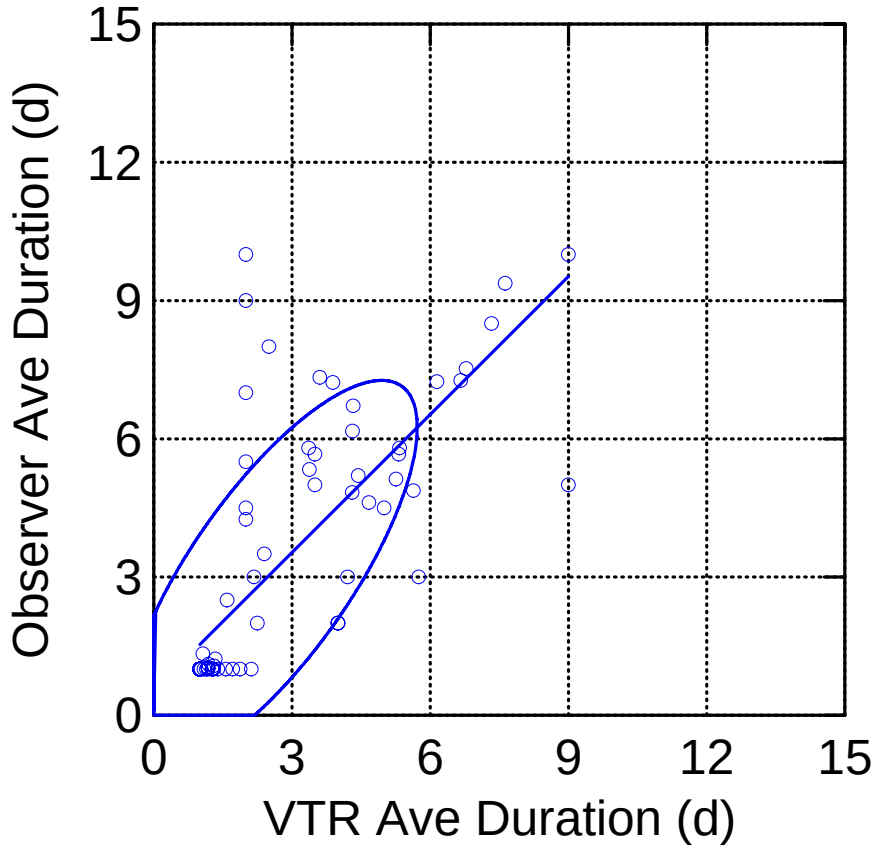


Figure 7. Comparison of average trip duration (in days) for trips that caught groundfish in the Northeast Fisheries Observer Program and Vessel Trip Report (VTR) data sets for 2003/2004. Each point represents the mean of an individual stratum.

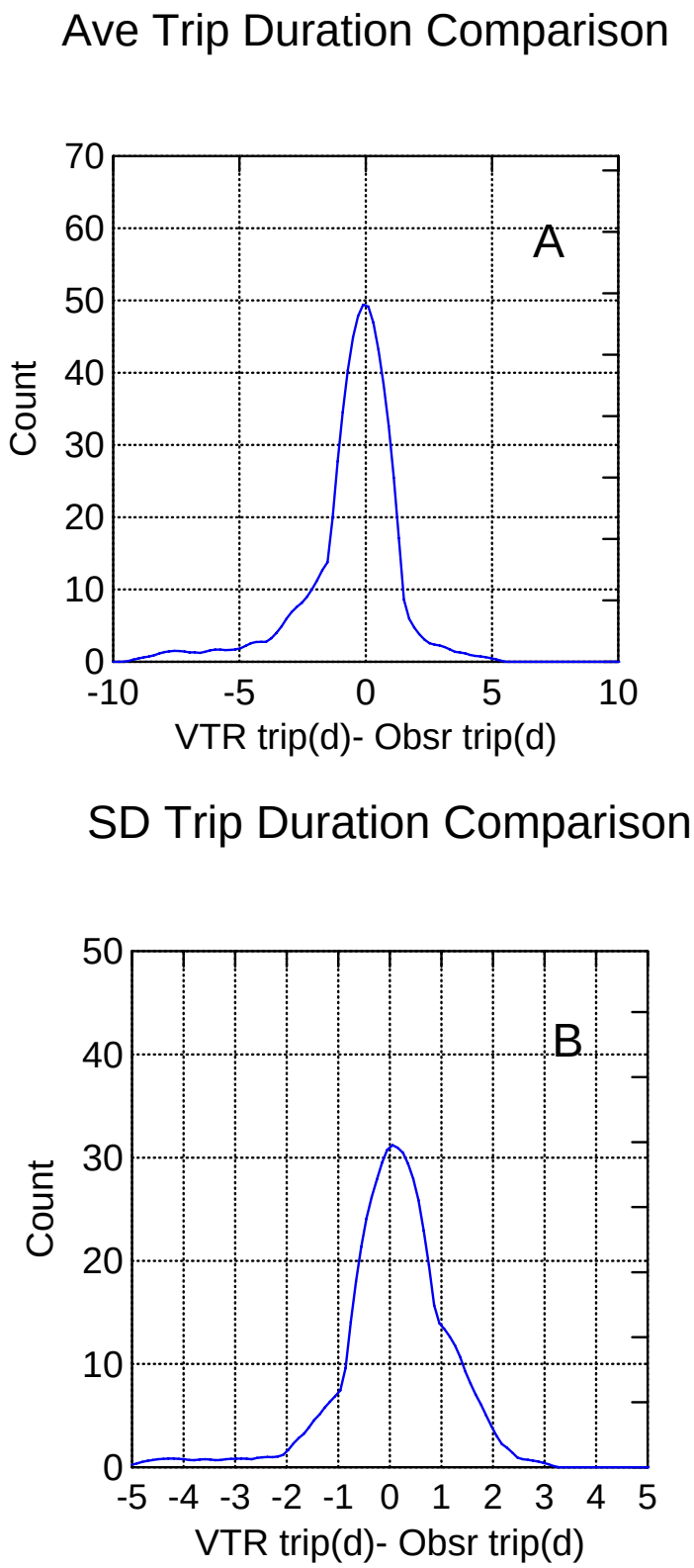


Figure 8. The distribution of differences in average trip duration (in days) (A) and the standard deviation of average trip duration (B) of trips that caught groundfish in the Northeast Fisheries Observer Program (Obsrvr) and the Vessel Trip Report (VTR) data for 2003/2004. Histograms are non-parametric smooths of the stratum specific differences.

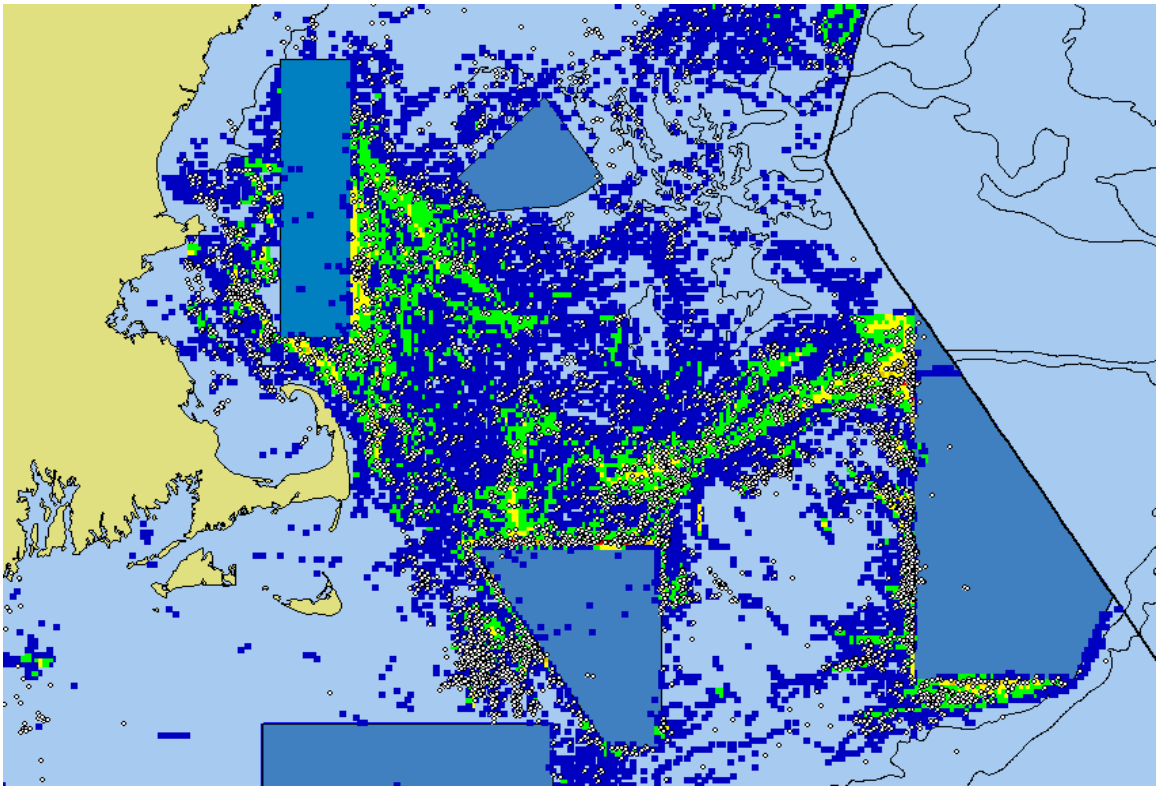


Figure 9. Locations of otter trawl fishing effort (color squares) in 2003 from vessels using VMS (vessel monitoring systems). Locations are plotted only for vessels speeds <= 3.5 knots and data are aggregated to 1' square. Blue squares represent 1-8 hours, green 9 – 25 hours; yellow 26-63 hours; orange 64 – 145 hours, and red 146 – 309 hours. Observed otter trawl tows (white circles) in 2003. Locations are the starting positions of each tow. Taken from Murawski et al. (article in press).

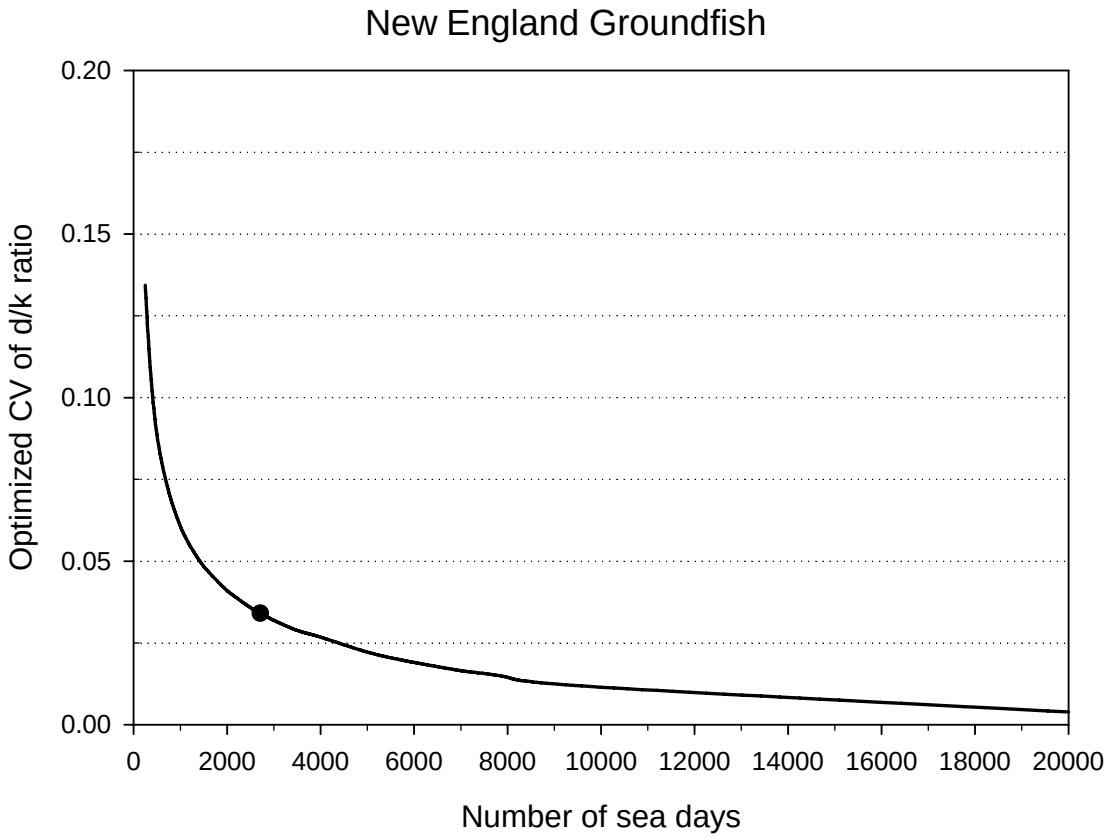


Figure 10. The optimized coefficient of variation (CV) of the discard to kept ratio (d/k) for New England groundfish over a range of sea days; 2,708 sea days (solid circle) are allocated to cover New England groundfish fisheries in 2005.

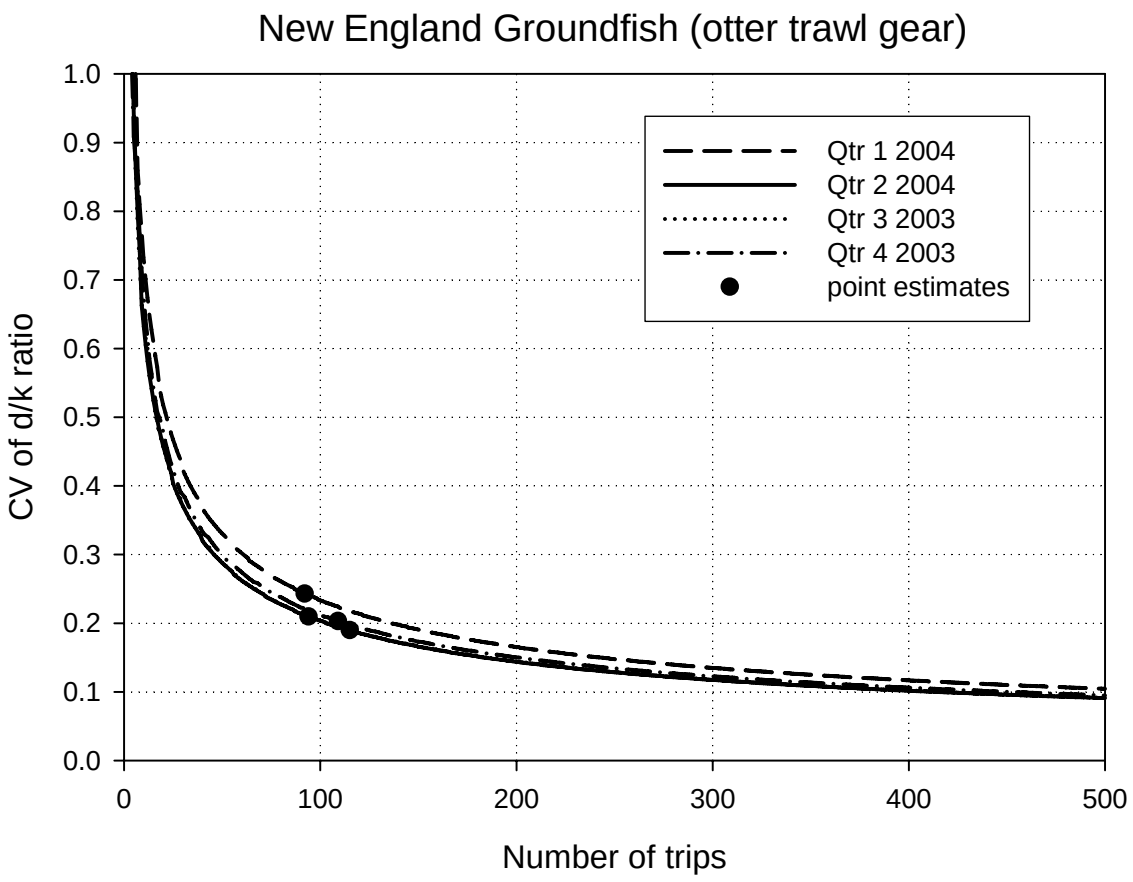


Figure 11. The 2003/2004 point estimates of the coefficient of variation (CV) of the discard to kept (d/k) ratio for New England groundfish caught with otter trawl gear, and the expected coefficient of variation of the discard to kept ratio over a range of sample sizes (number of trips).

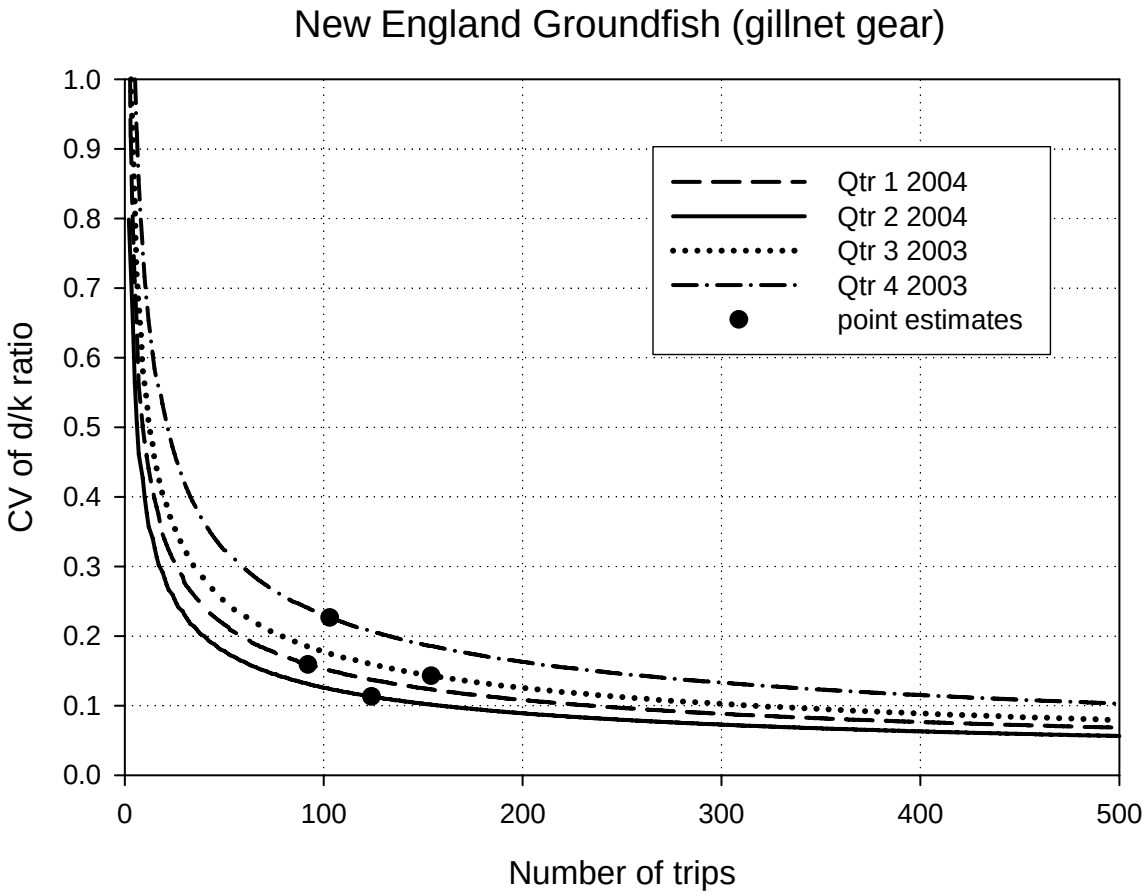


Figure 12. The 2003/2004 point estimates of the coefficient of variation (CV) of the discard to kept (d/k) ratio for New England groundfish caught with gillnet gear, and the expected coefficient of variation of the discard to kept ratio over a range of sample sizes (number of trips).

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Appendix B
Detailed Tables and Figures from Chapter 5

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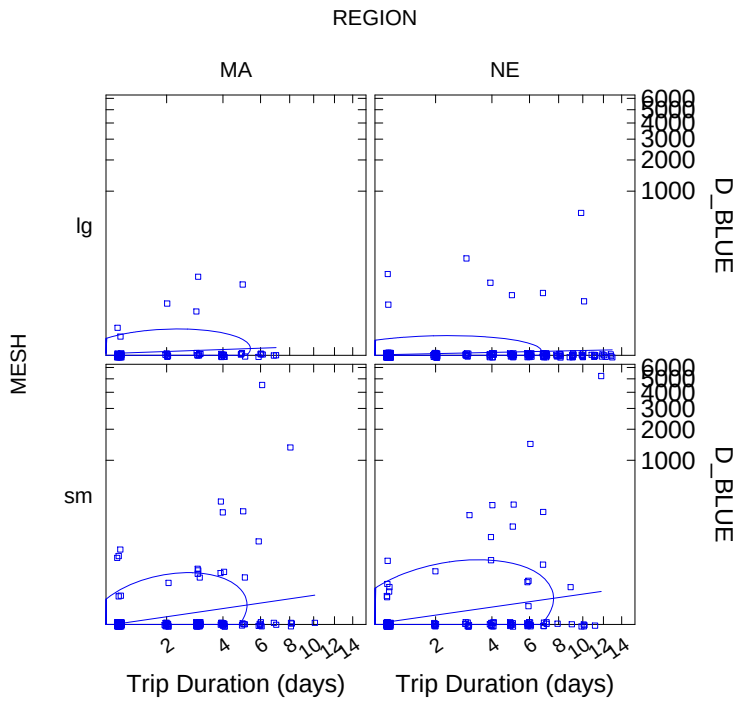


Figure B-1a. Comparison of bluefish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

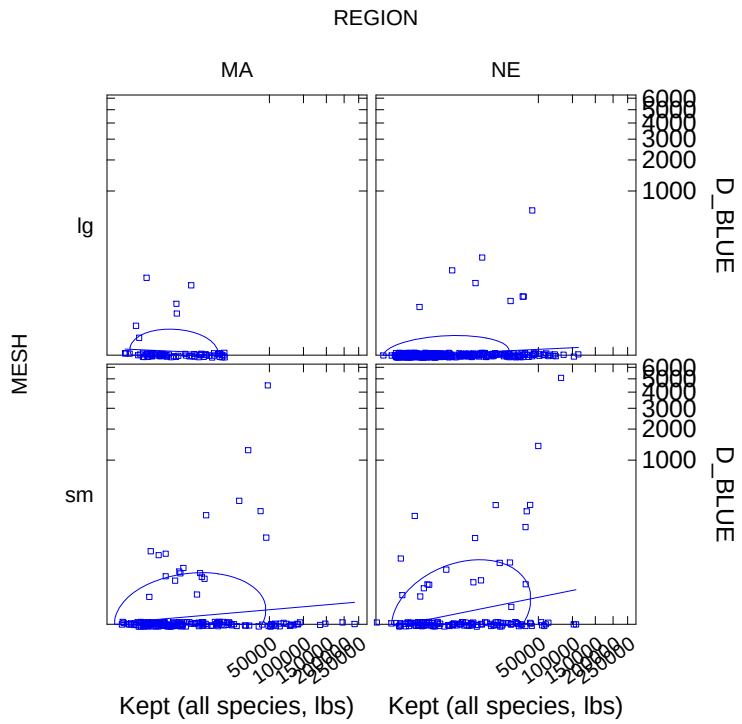


Figure B-1b. Comparison of bluefish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

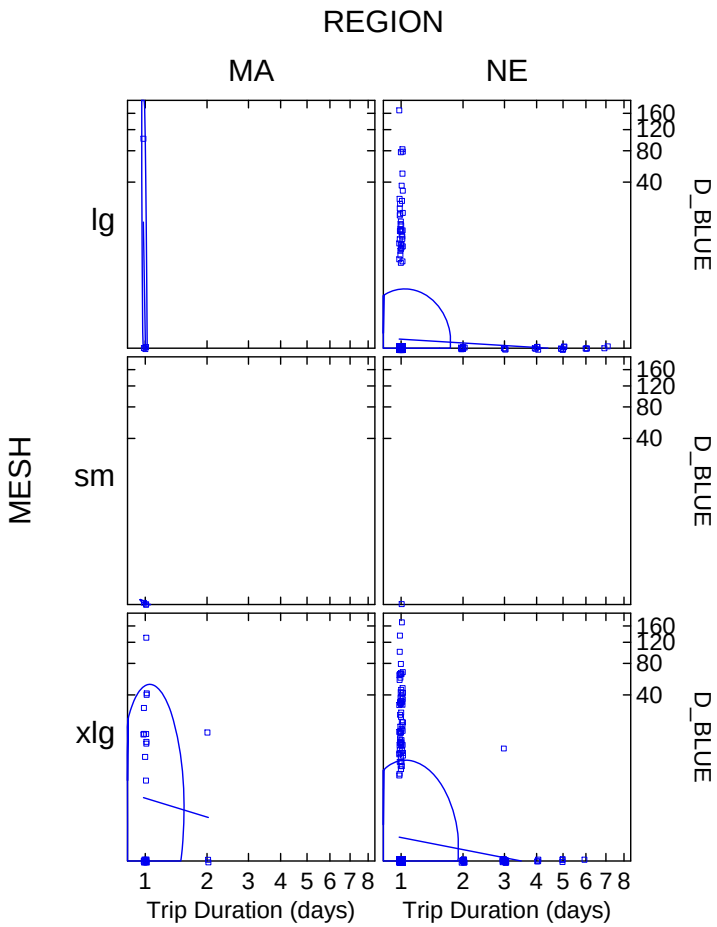


Figure B-1c. Comparison of bluefish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

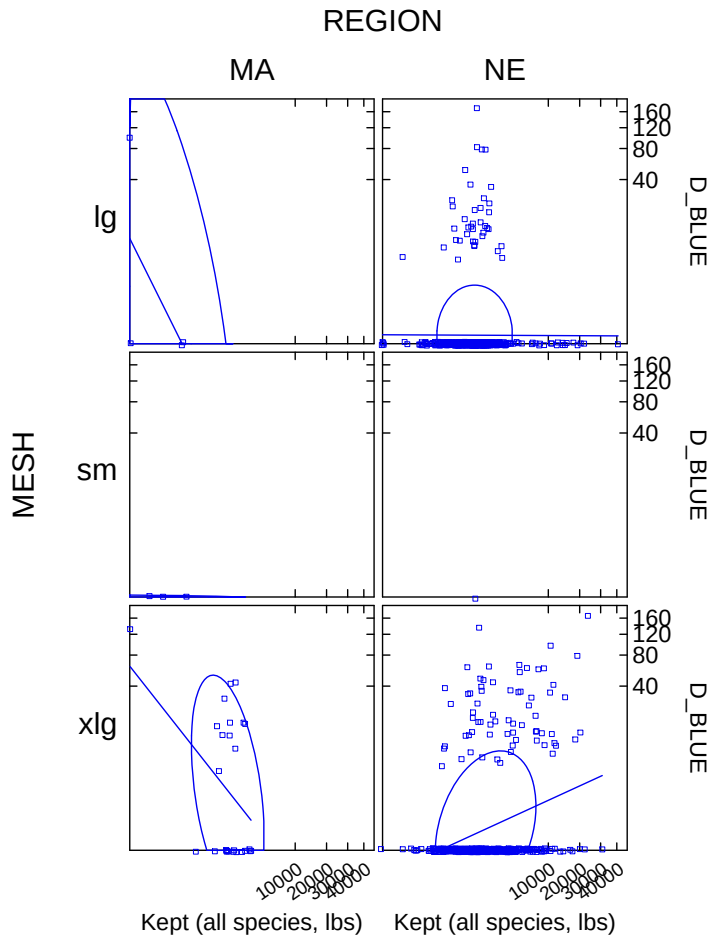


Figure B-1d. Comparison of bluefish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

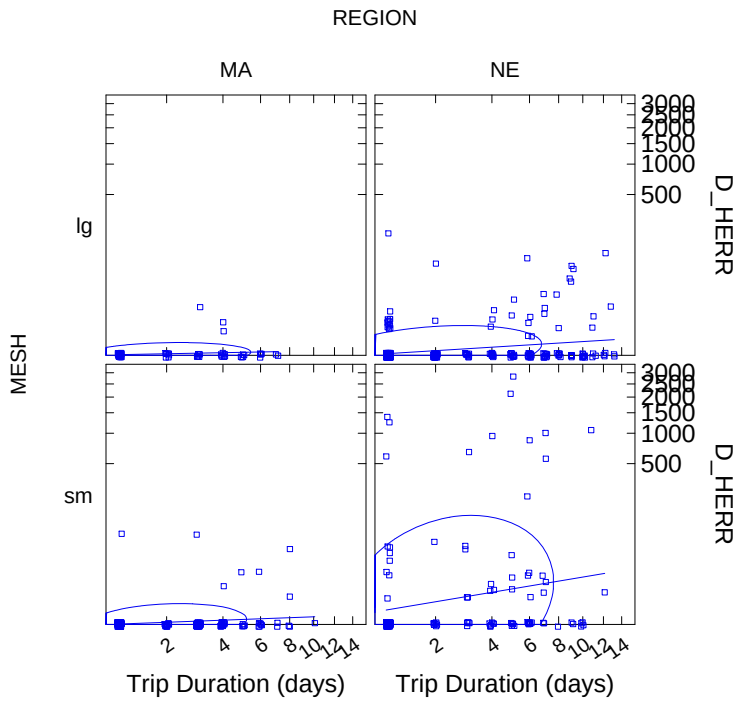


Figure B-1e. Comparison of herring discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

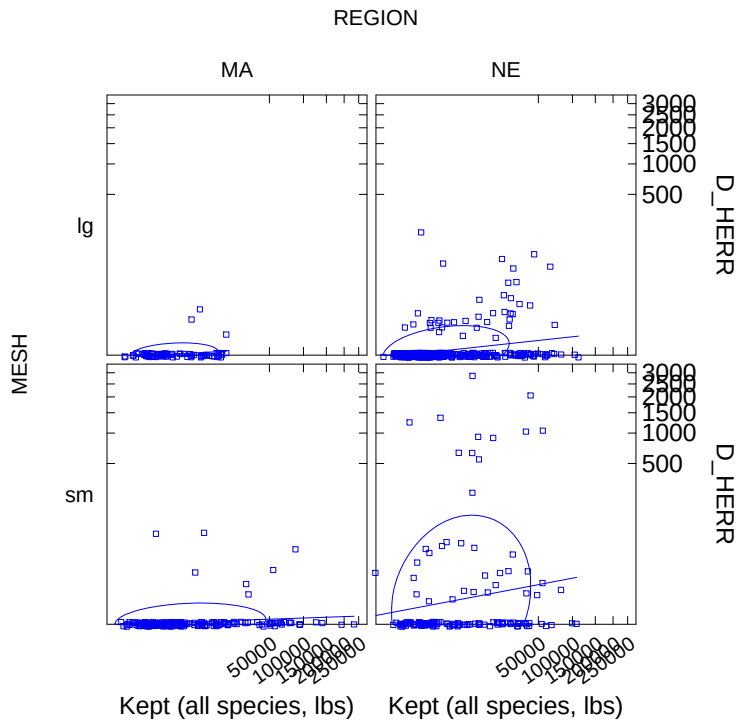


Figure B-1f. Comparison of herring discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

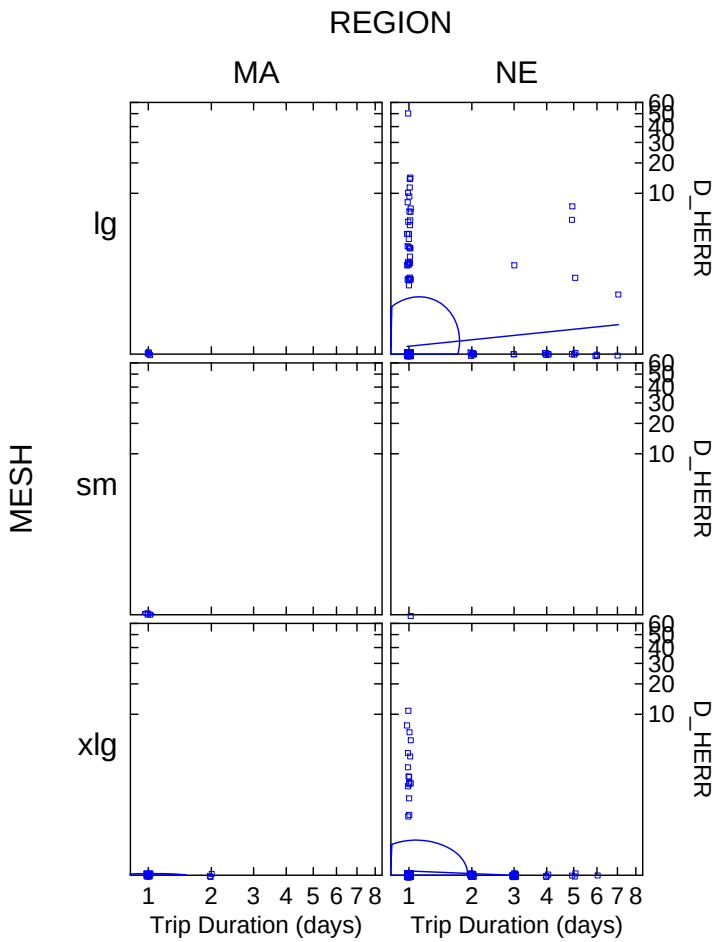


Figure B-1g. Comparison of herring discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

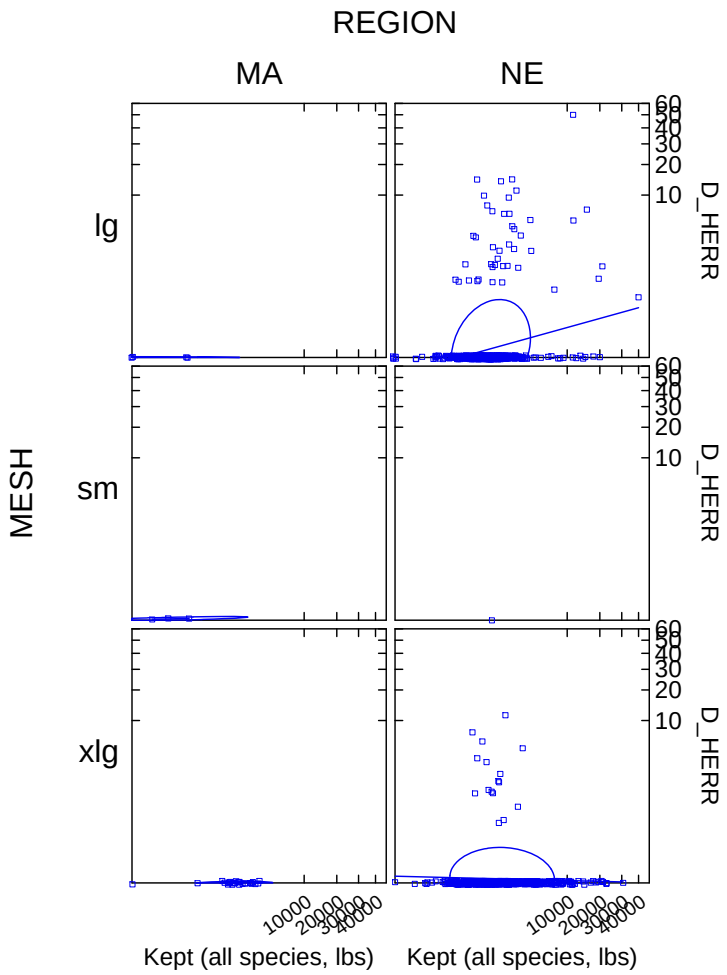


Figure B-1h. Comparison of herring discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

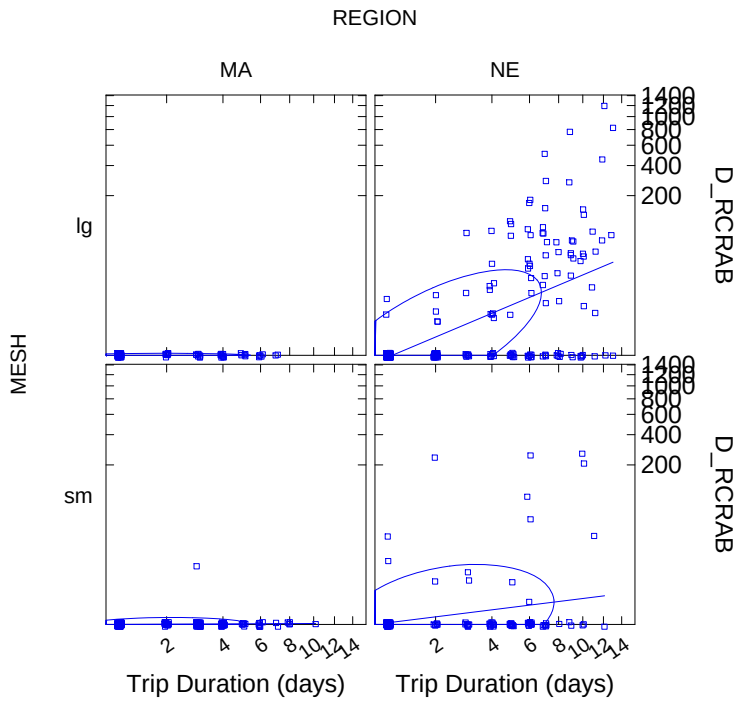


Figure B-1i. Comparison of red crab discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

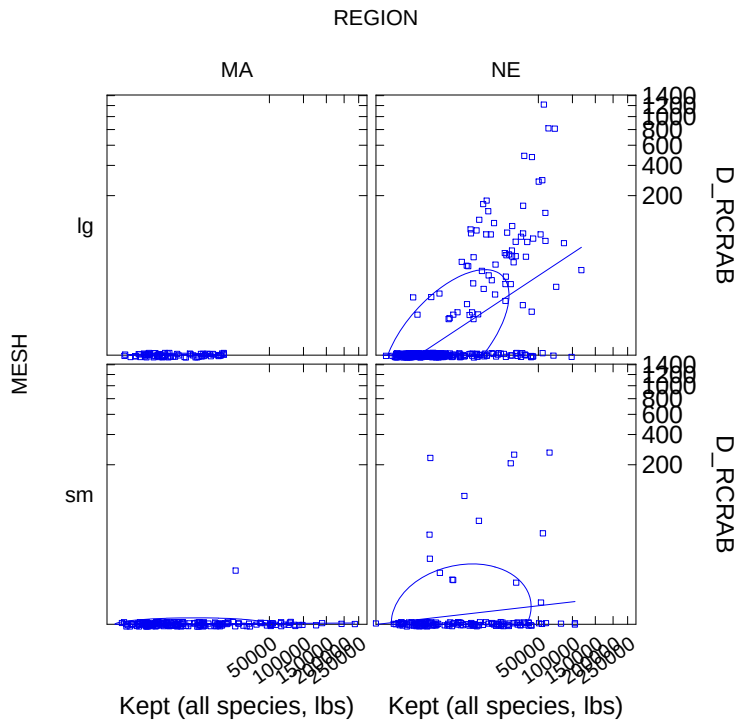


Figure B-1j. Comparison of red crab discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

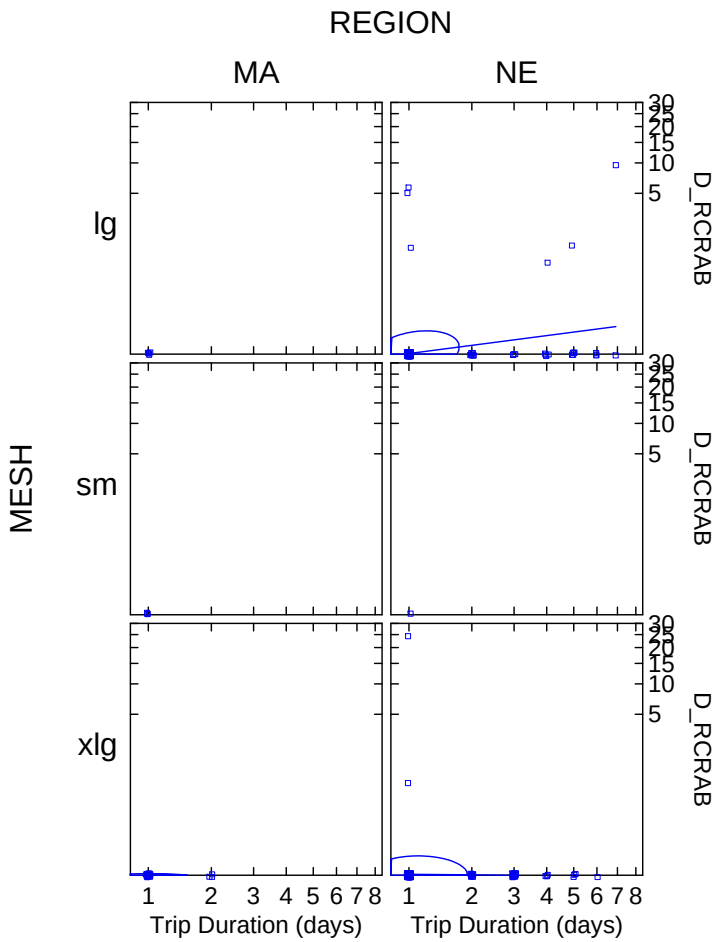


Figure B-1k. Comparison of red crab discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

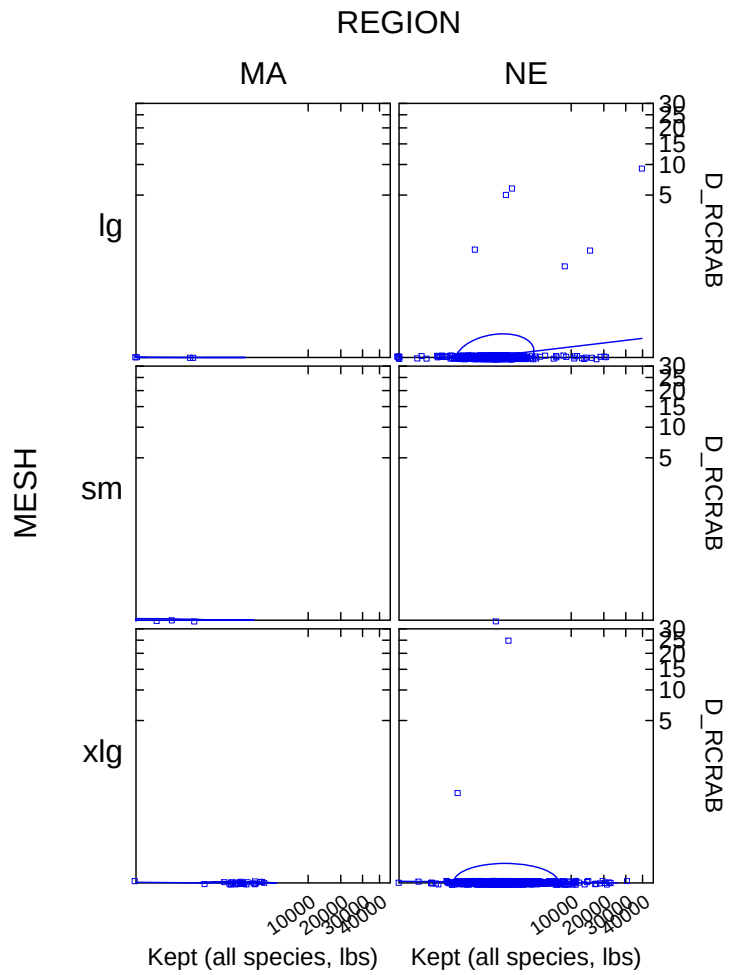


Figure B-1l. Comparison of red crab discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

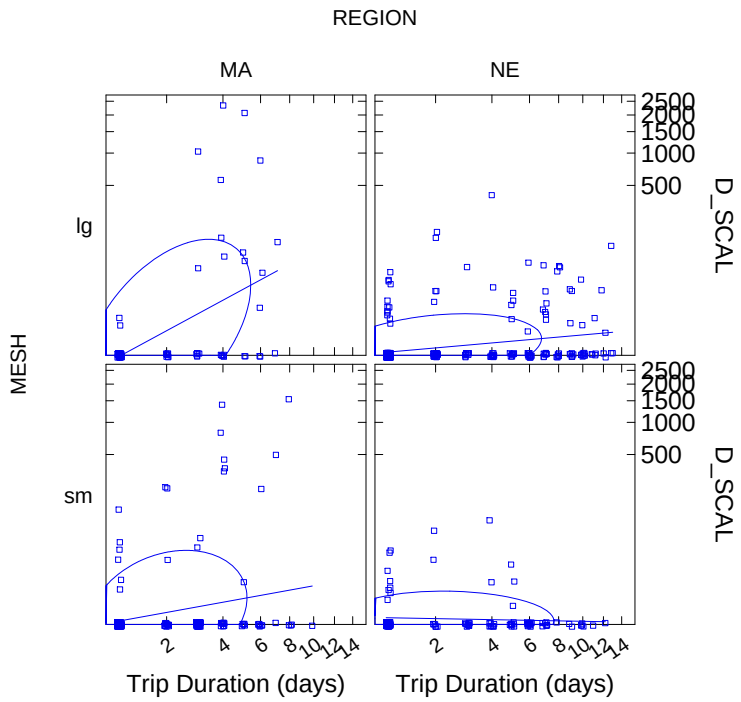


Figure B-1m. Comparison of scallop discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

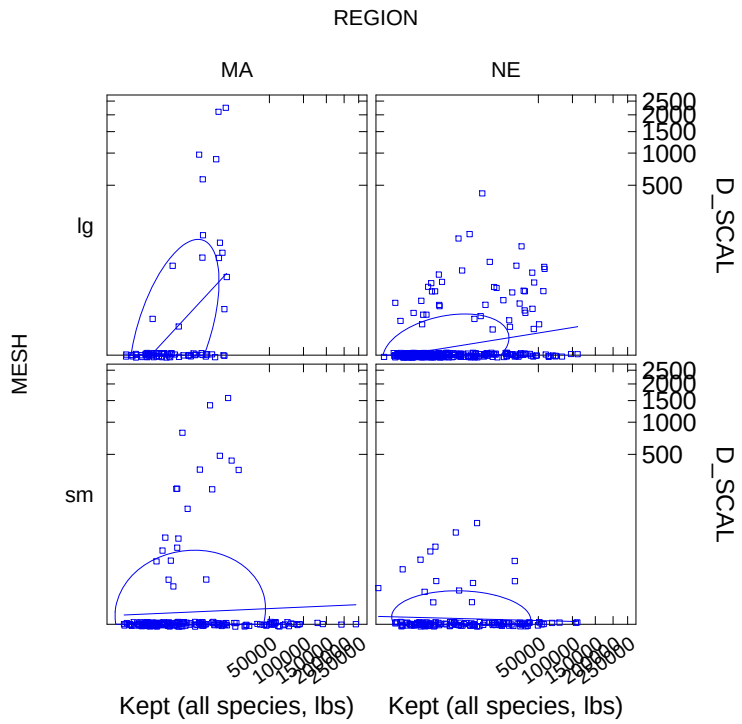


Figure B-1n. Comparison of scallop discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

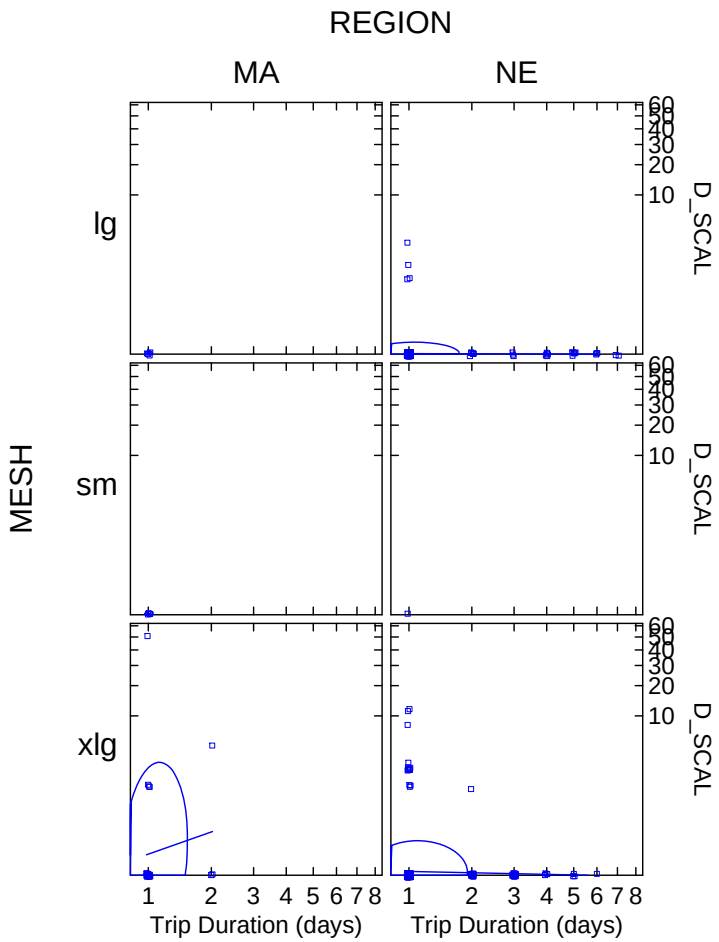


Figure B-1o. Comparison of scallop discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

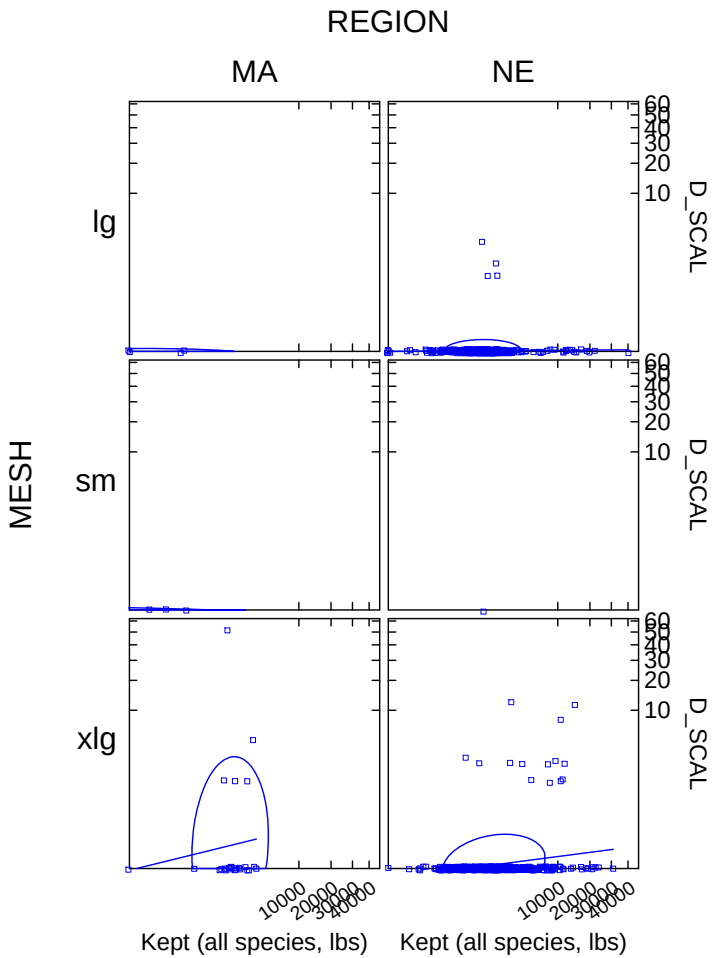


Figure B-1p. Comparison of scallop discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

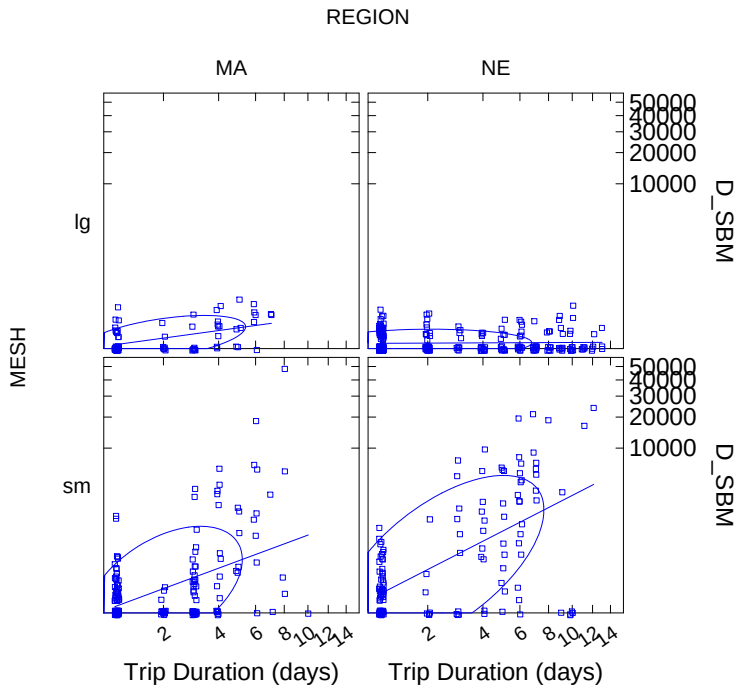


Figure B-1q. Comparison of squid-butterfish-mackerel discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

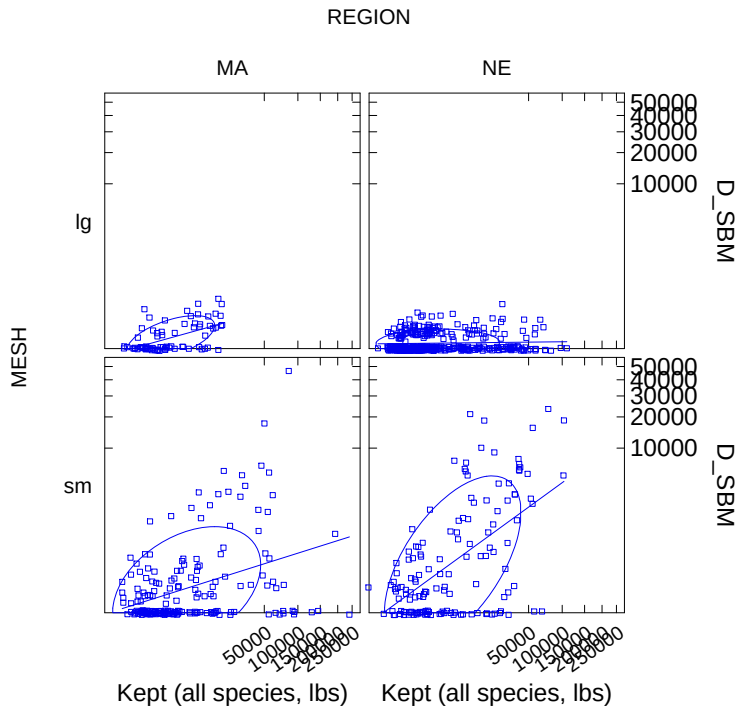


Figure B-1r. Comparison of squid-butterfish-mackerel discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

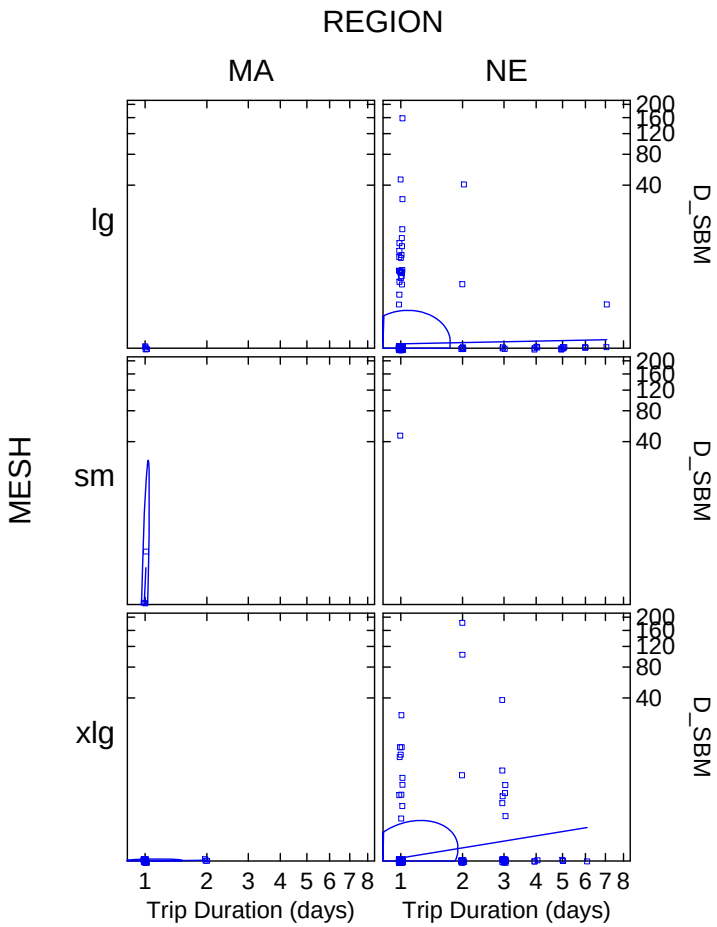


Figure B-1s. Comparison of squid-butterfish-mackerel discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

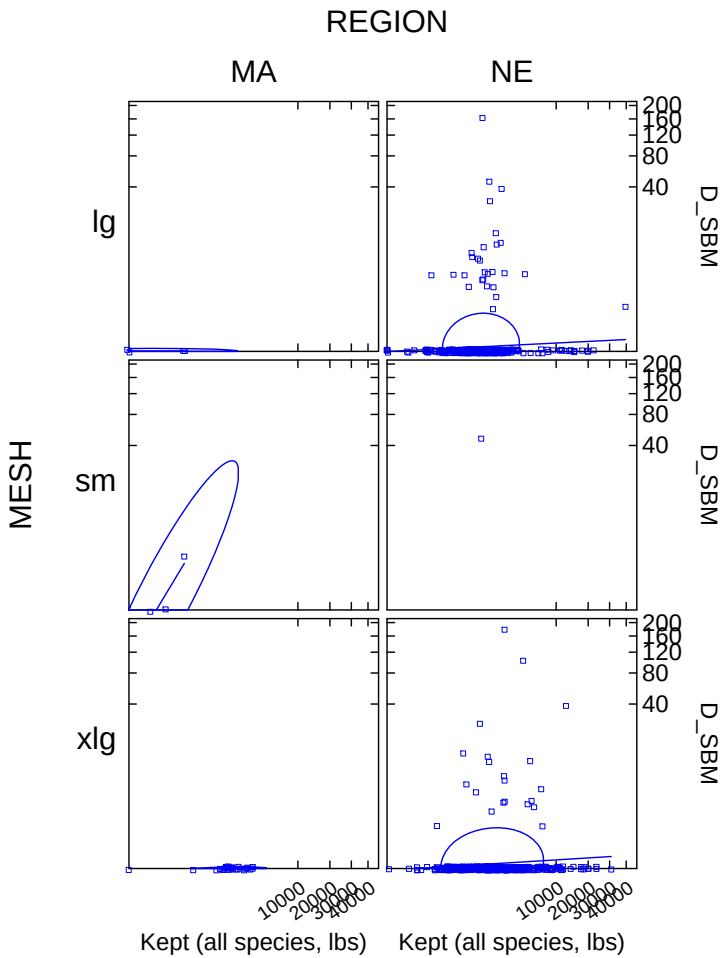


Figure B-1t. Comparison of squid-butterfish-mackerel discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

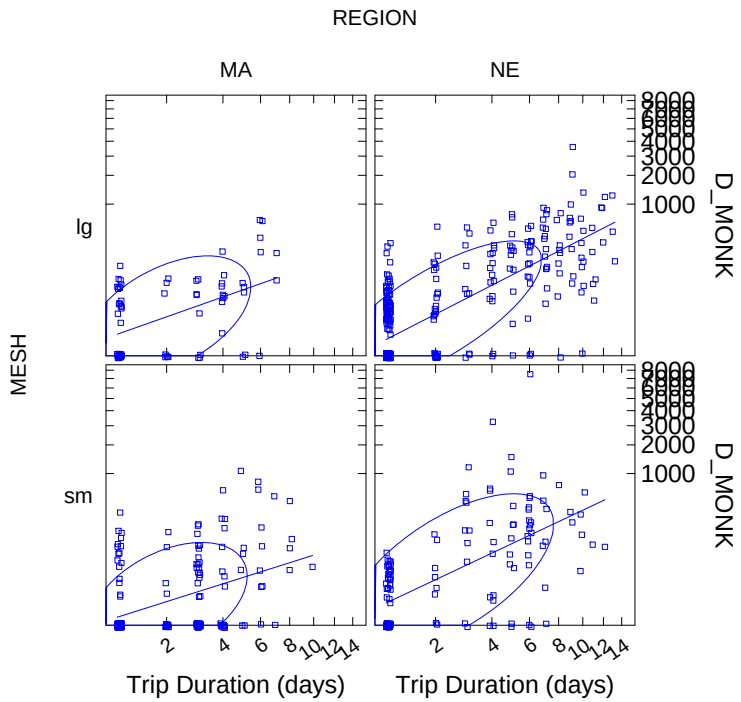


Figure B-1u. Comparison of monkfish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

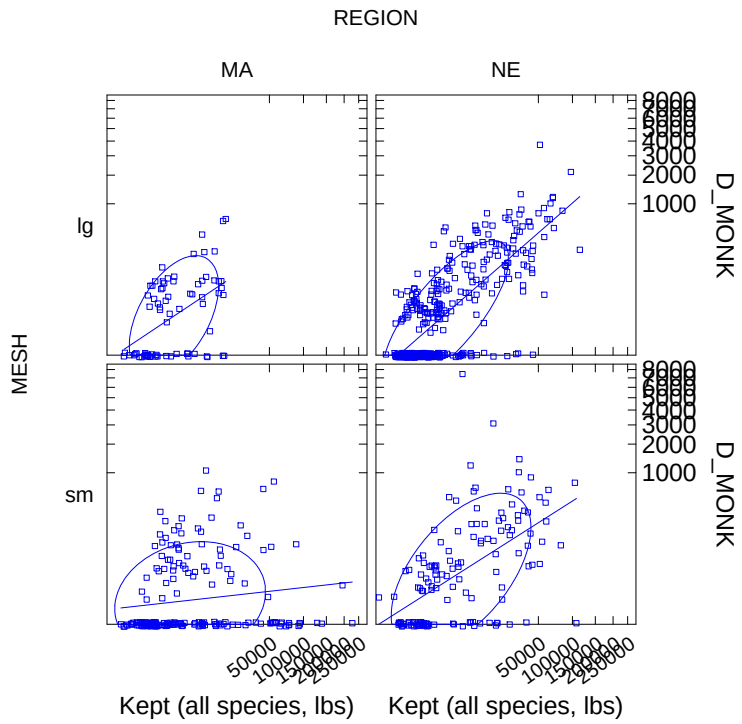


Figure B-1v. Comparison of monkfish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches)); fourth root transformation used, each dot represents a trip.

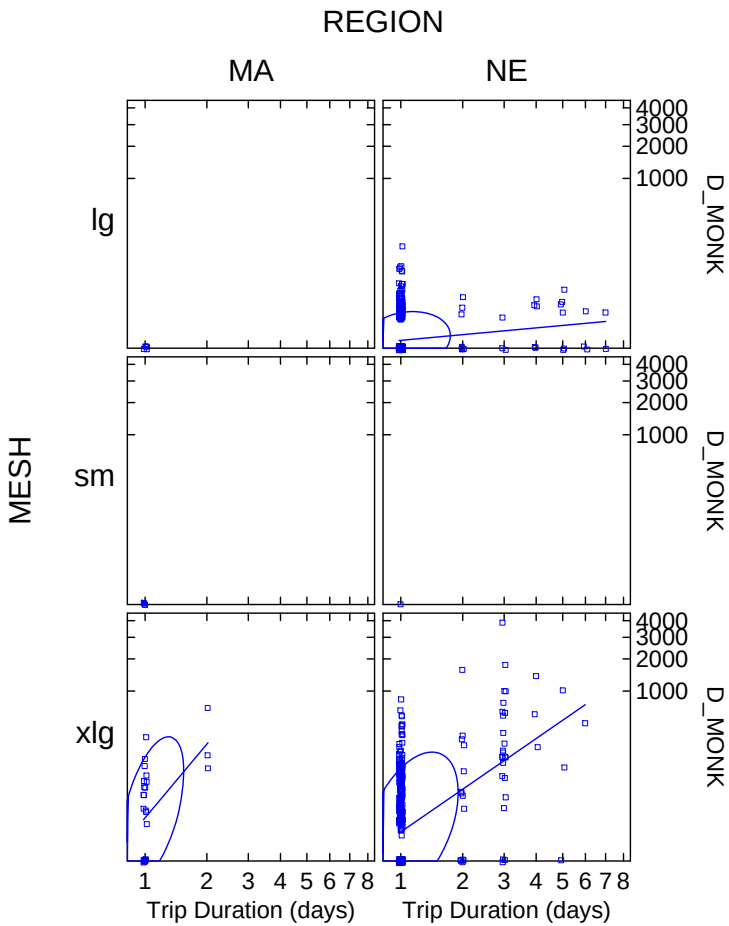


Figure B-1w. Comparison of monkfish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

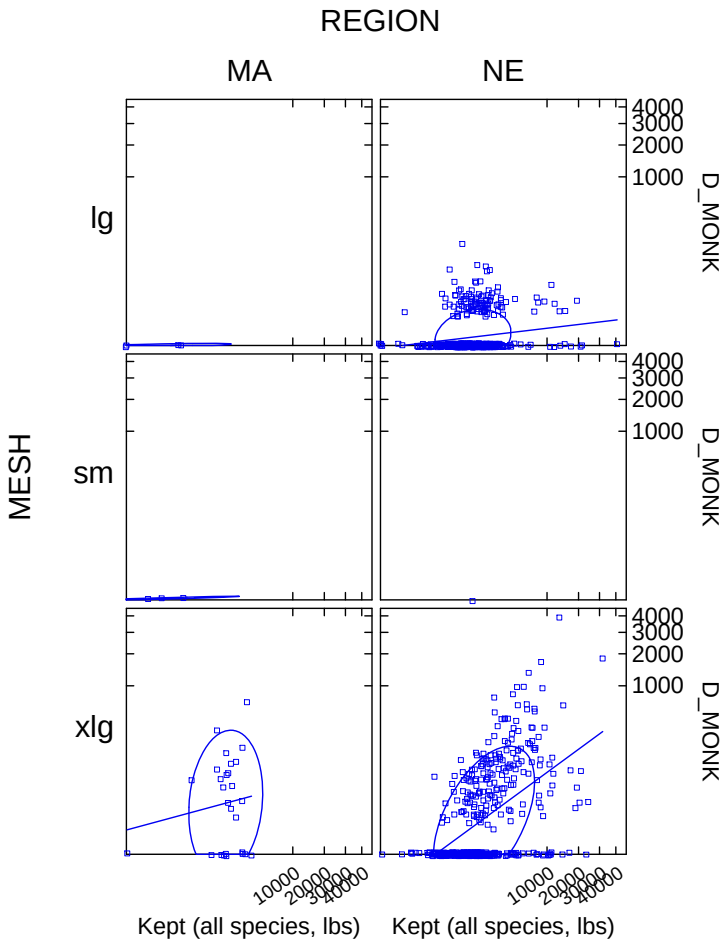


Figure B-1x. Comparison of monkfish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

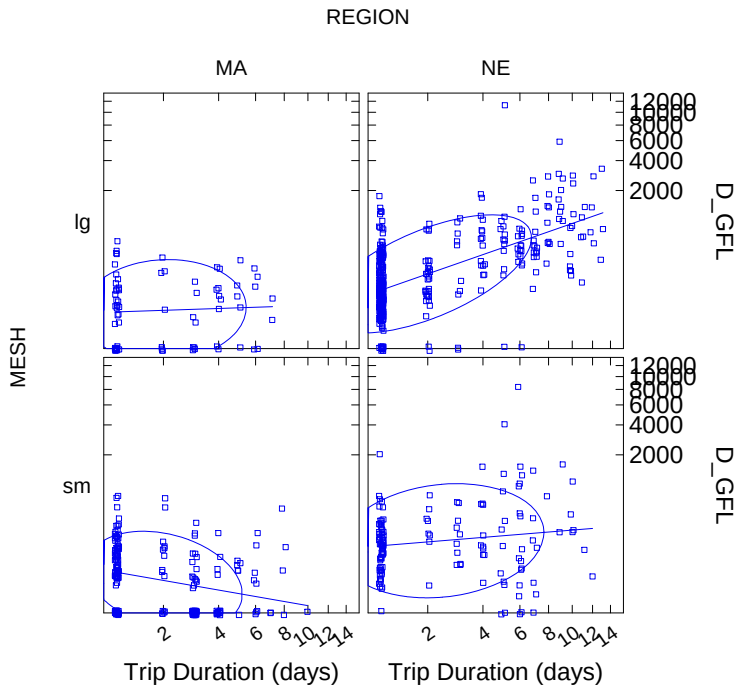


Figure B-1y. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

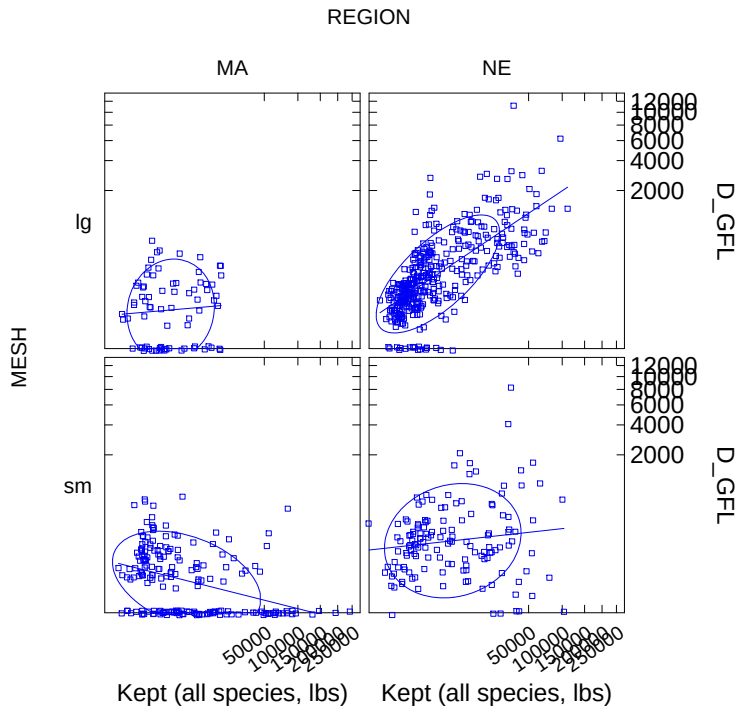


Figure B-1z. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

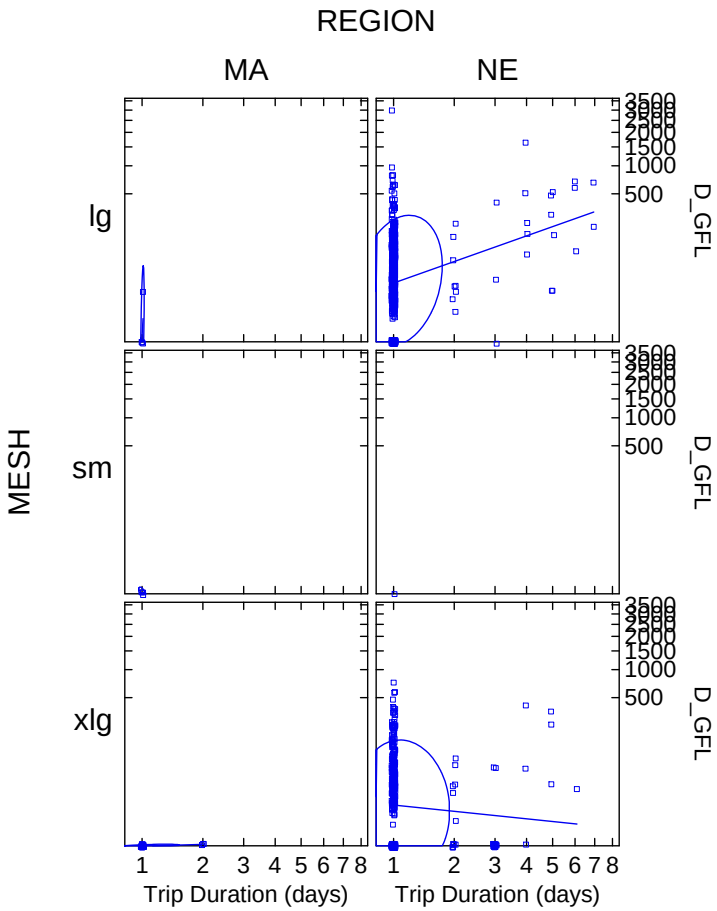


Figure B-1aa. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

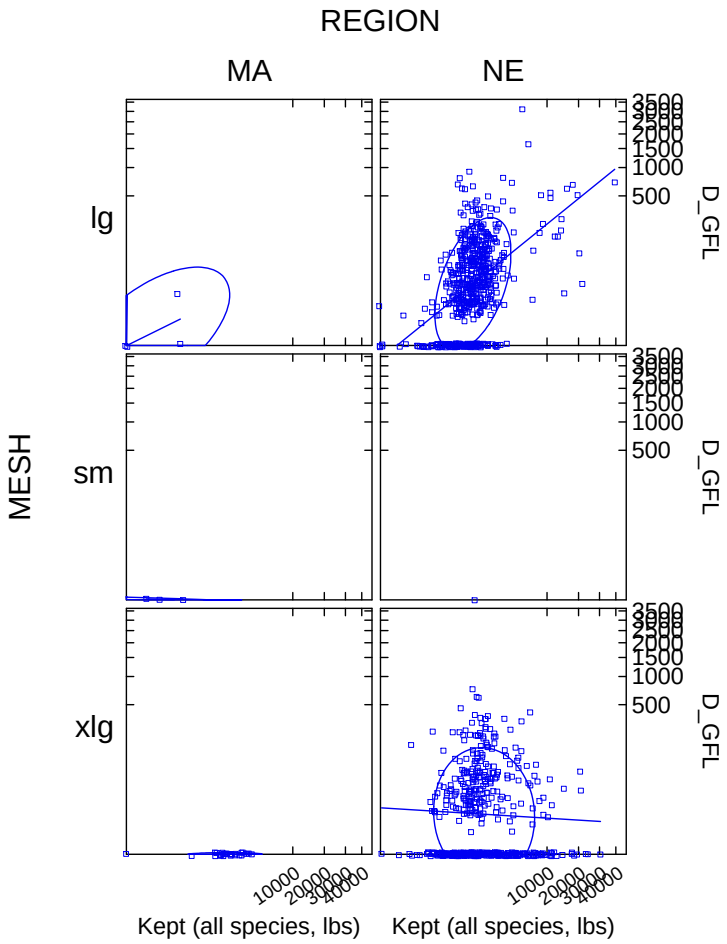


Figure B-1bb. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

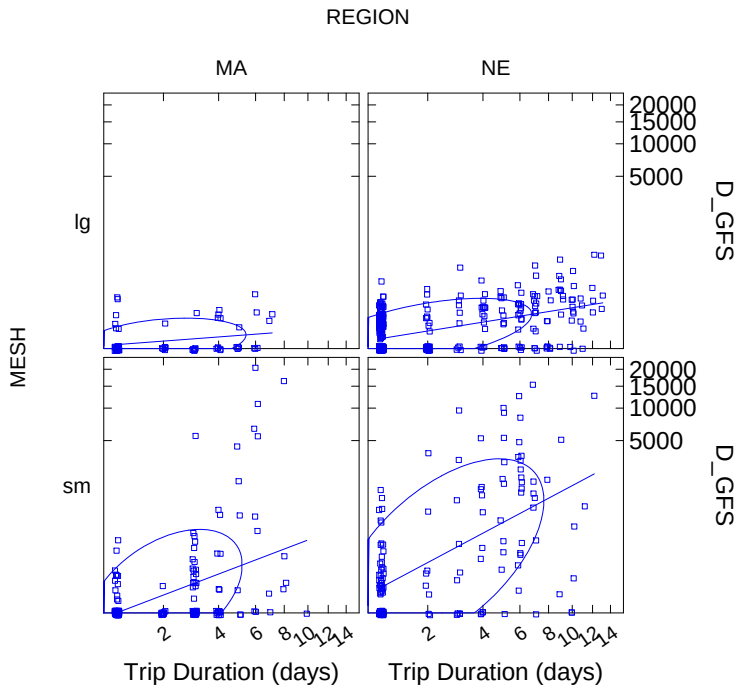


Figure B-1cc. Comparison of Northeast multispecies (small-mesh) discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

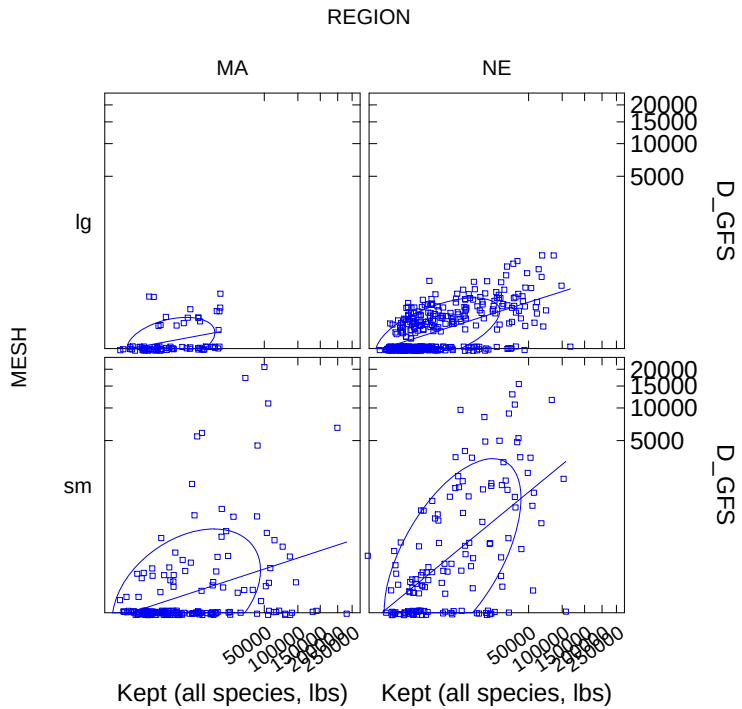


Figure B-1dd. Comparison of Northeast multispecies (small-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

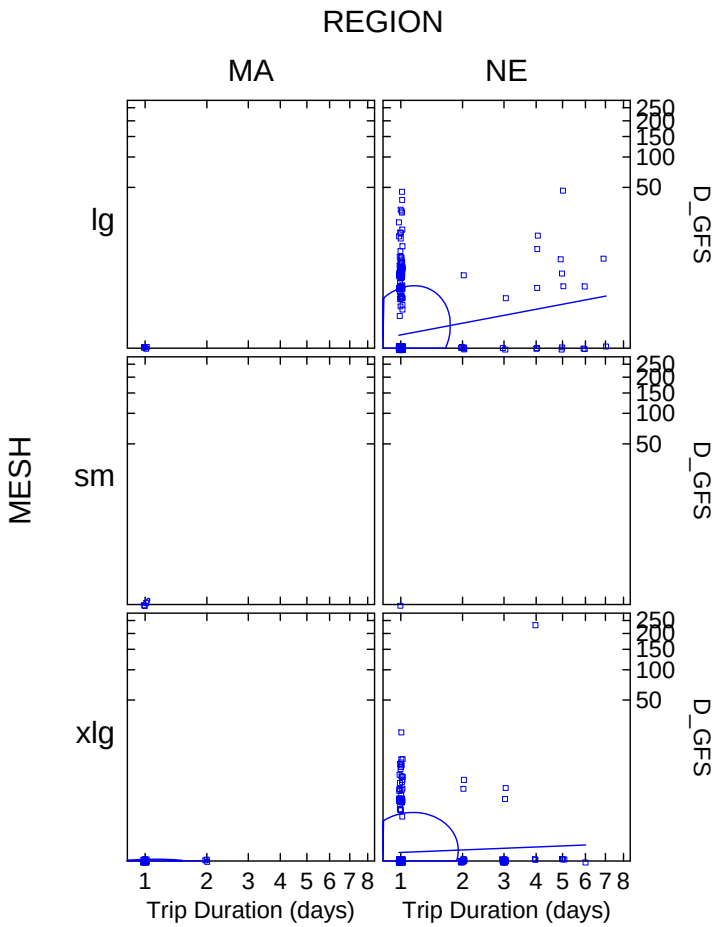


Figure B-1ee. Comparison of Northeast multispecies (small-mesh) discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

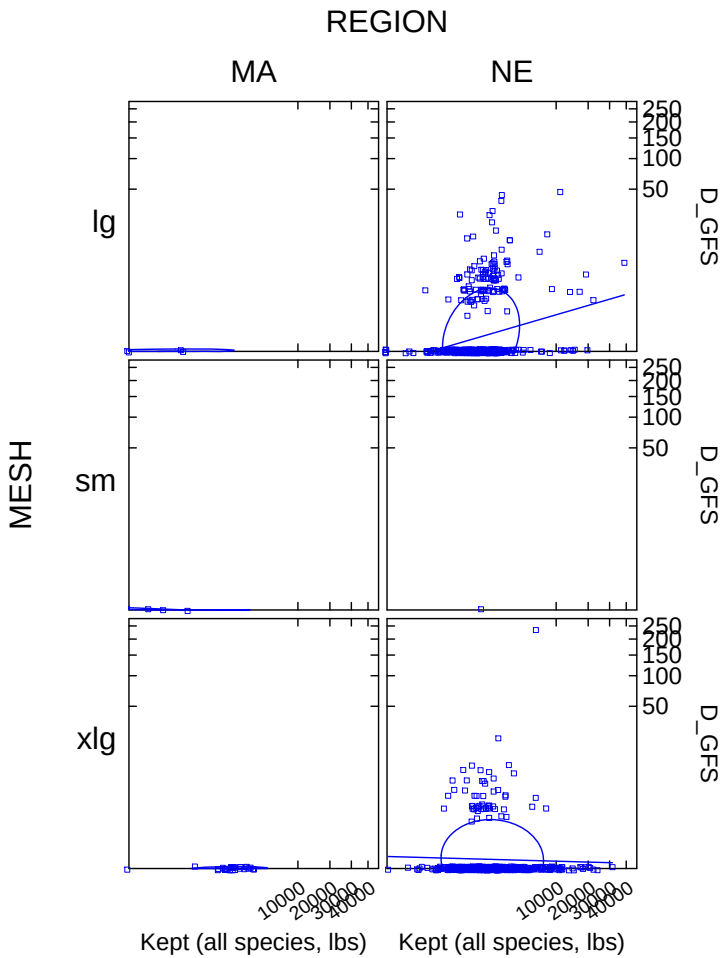


Figure B-1ff. Comparison of Northeast multispecies (small-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

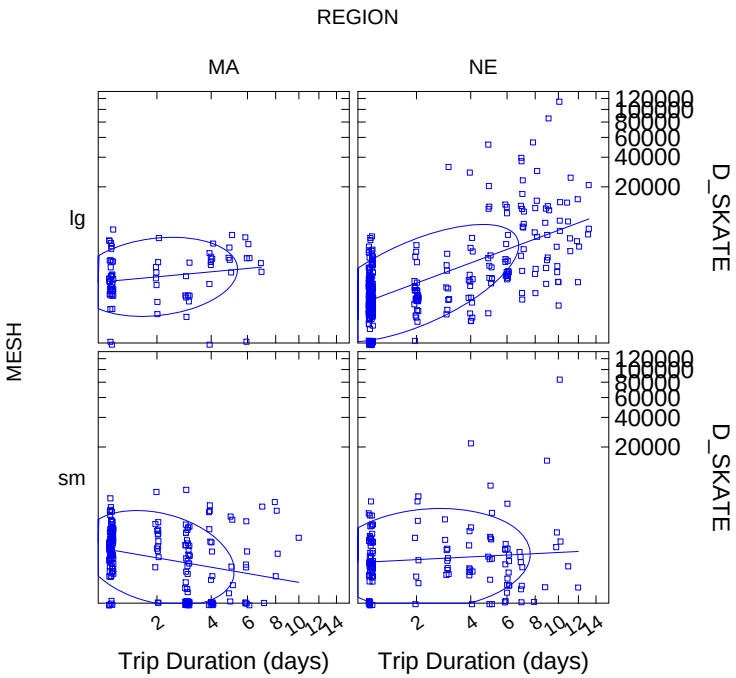


Figure B-1gg. Comparison of skates discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

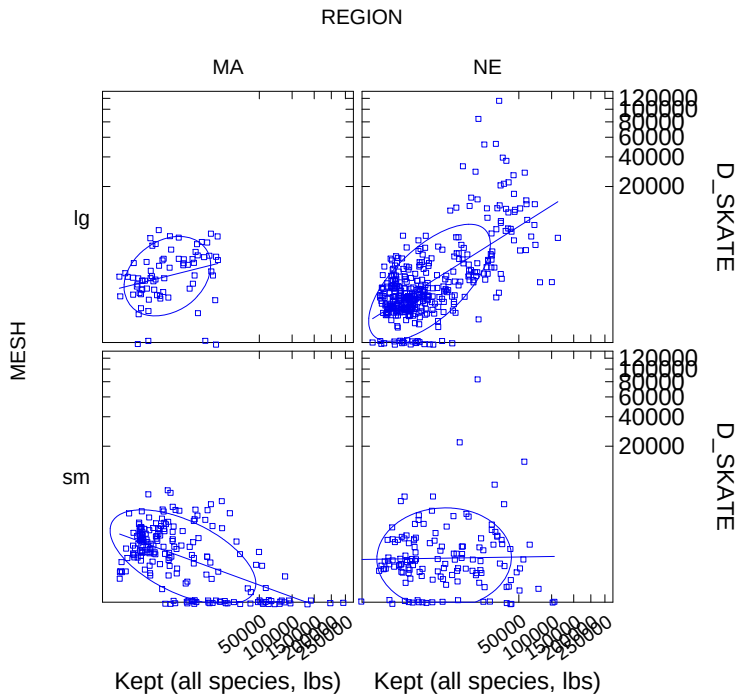


Figure B-1hh. Comparison of skates discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

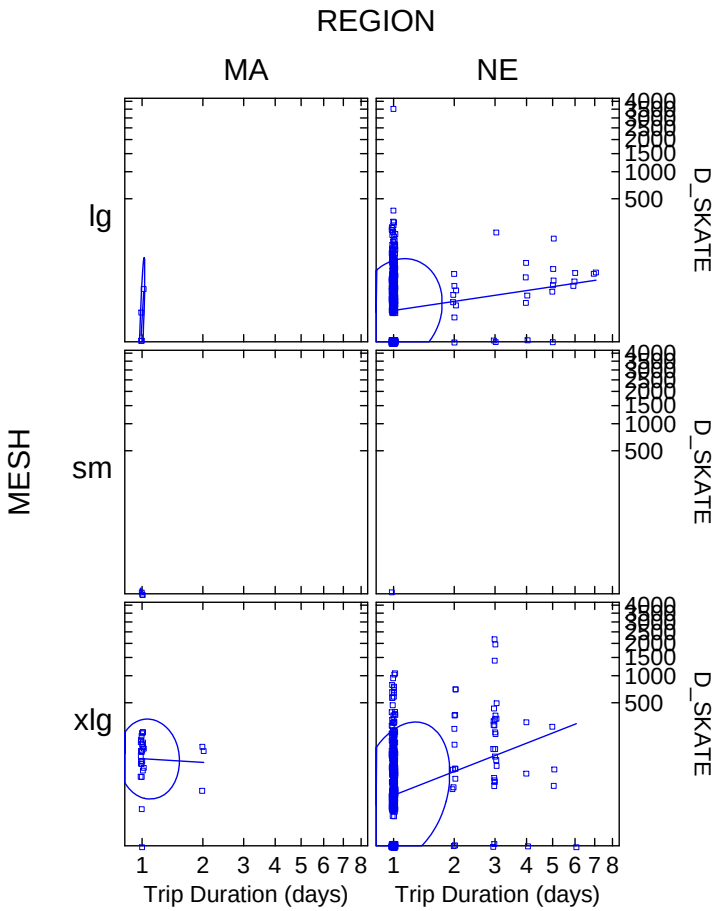


Figure B-1ii. Comparison of skates discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

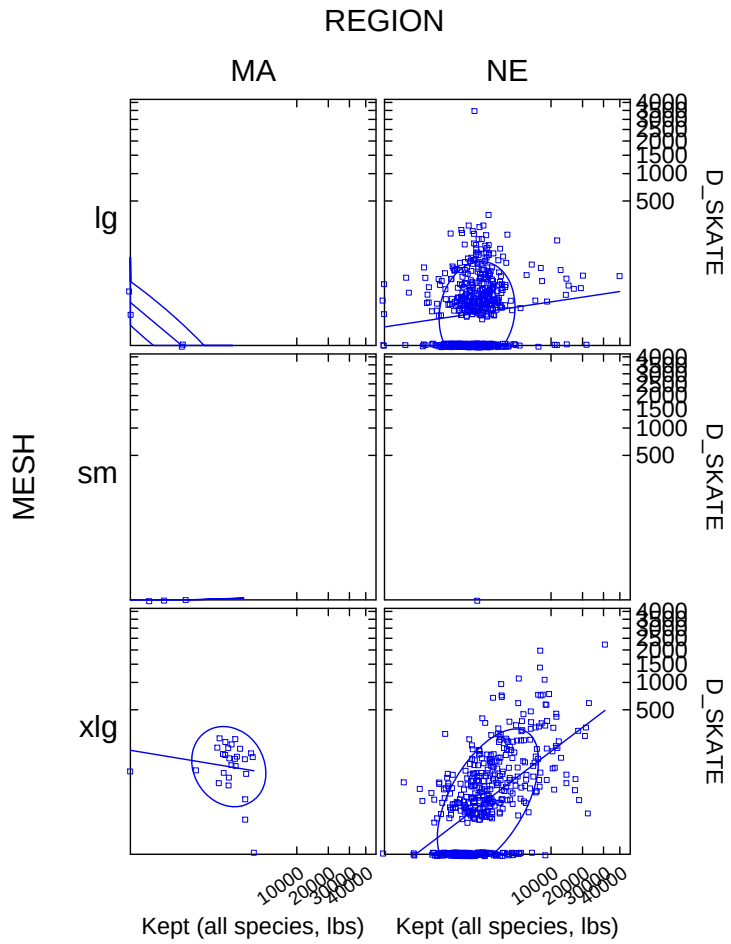


Figure B-1jj. Comparison of skates discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

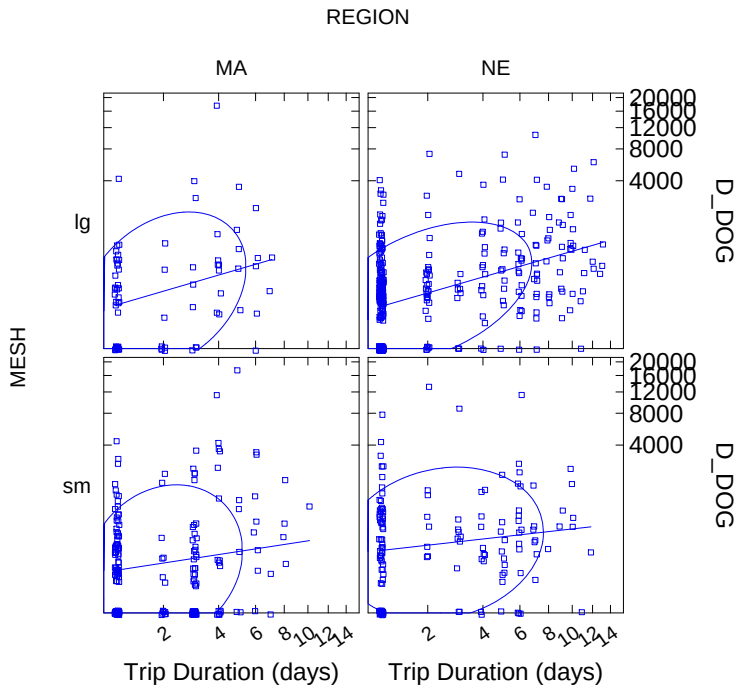


Figure B-1kk. Comparison of spiny dogfish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

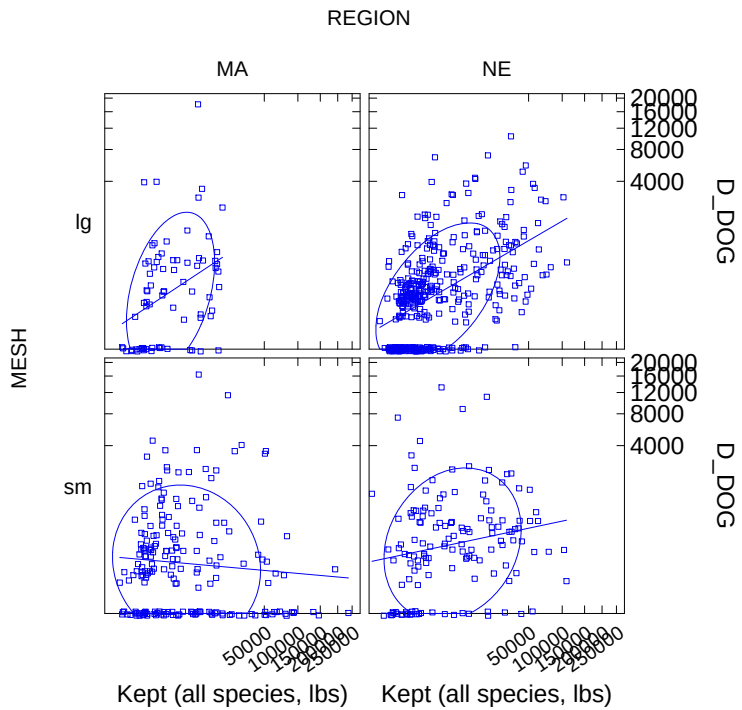


Figure B-1ll. Comparison of spiny dogfish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

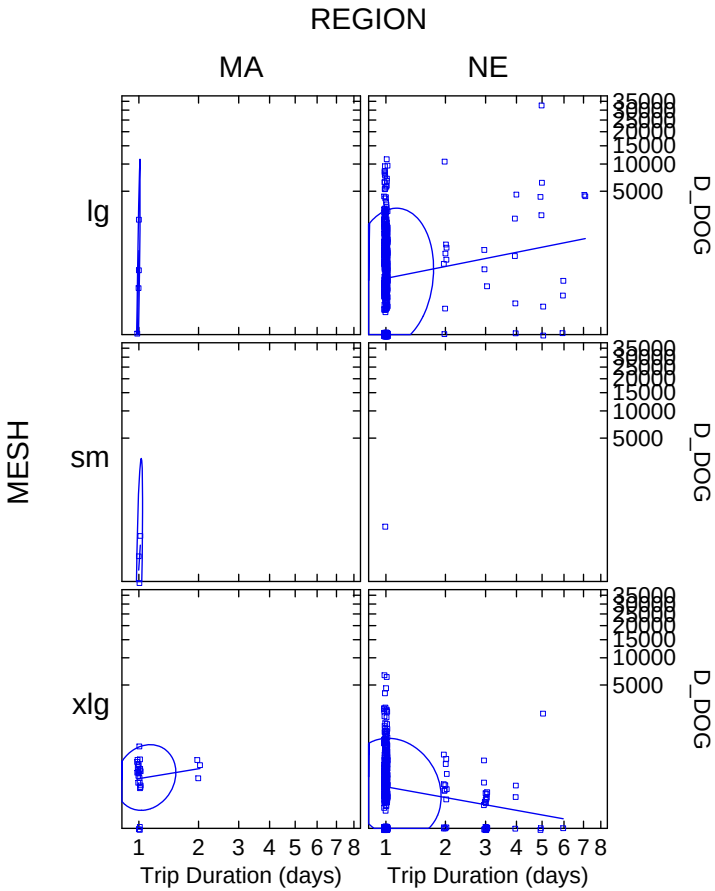


Figure B-1mm. Comparison of spiny dogfish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

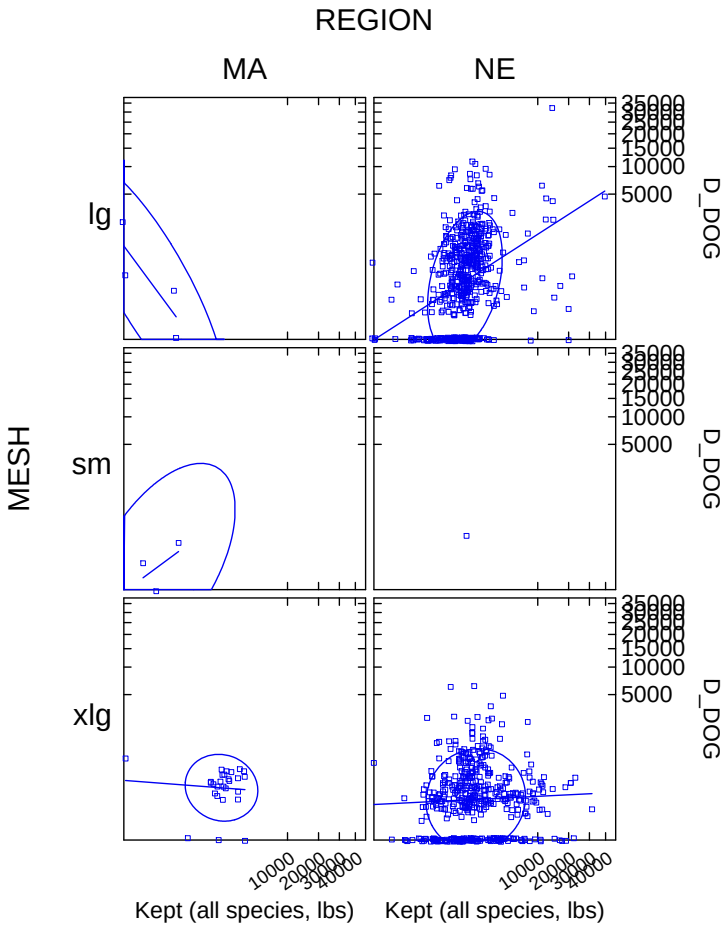


Figure B-1nn. Comparison of spiny dogfish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

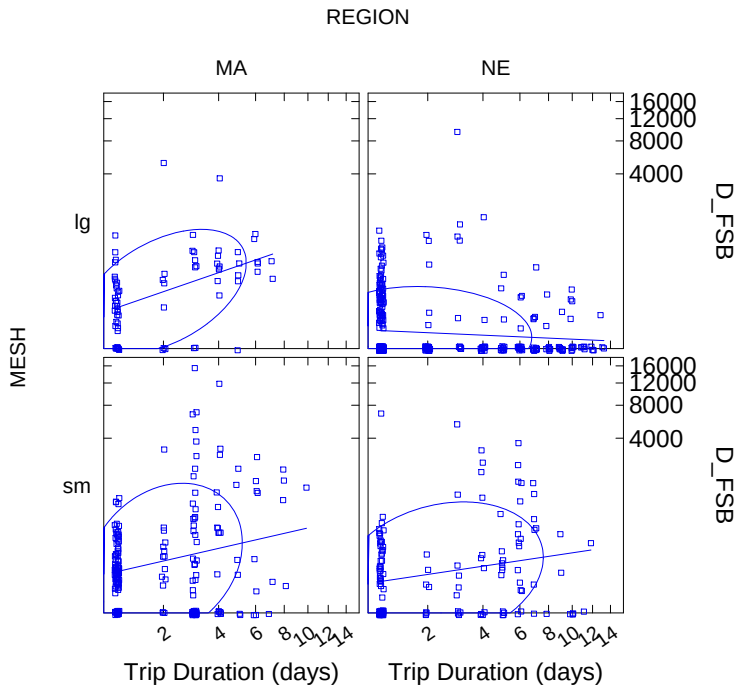


Figure B-1oo. Comparison of fluke-scup-black sea bass discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (; sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

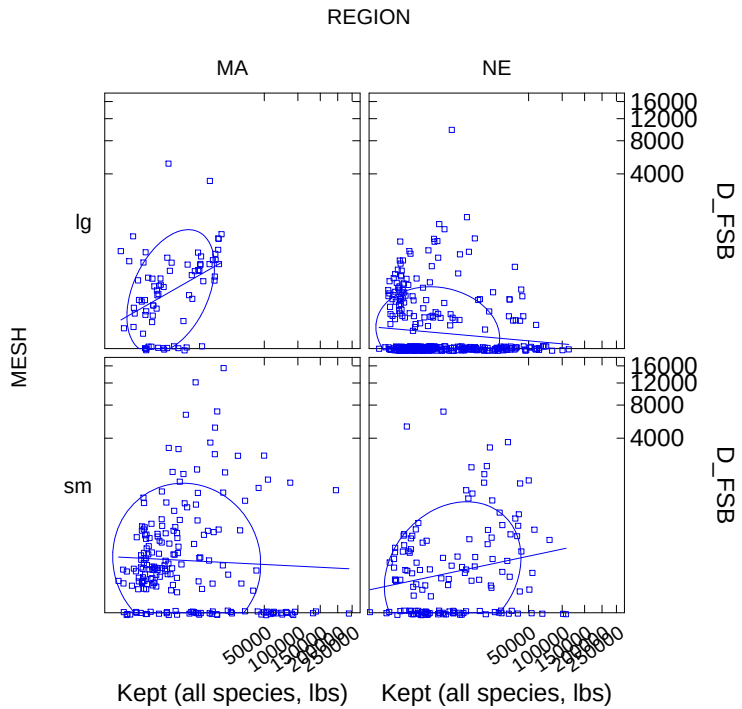


Figure B-1pp. Comparison of fluke-scup-black sea bass discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

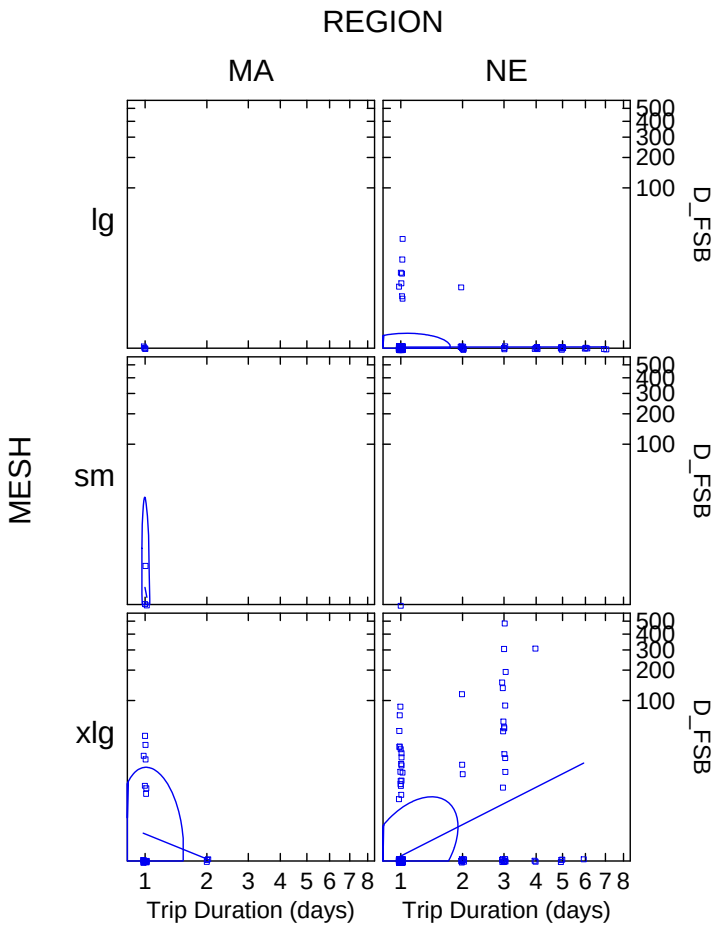


Figure B-1qq. Comparison of fluke-scup-black sea bass discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

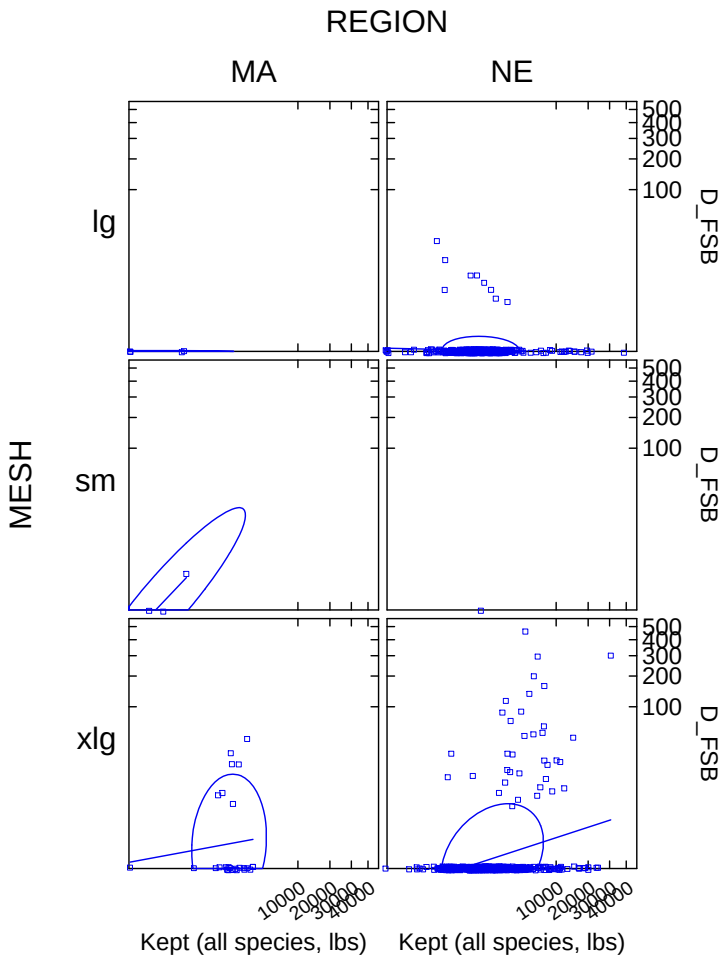


Figure B-1rr. Comparison of fluke-scup-black sea bass discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

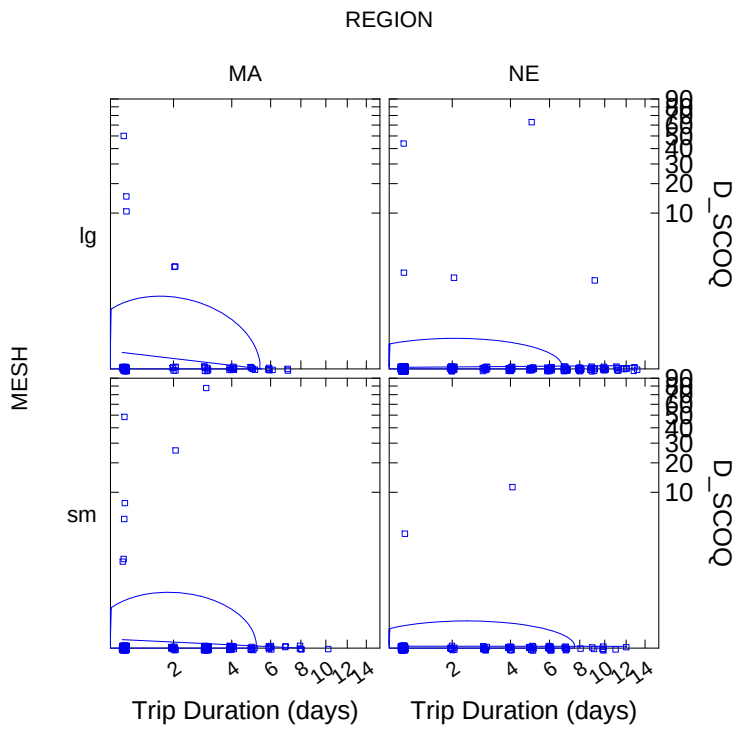


Figure B-1ss. Comparison of surfclams/quahogs discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

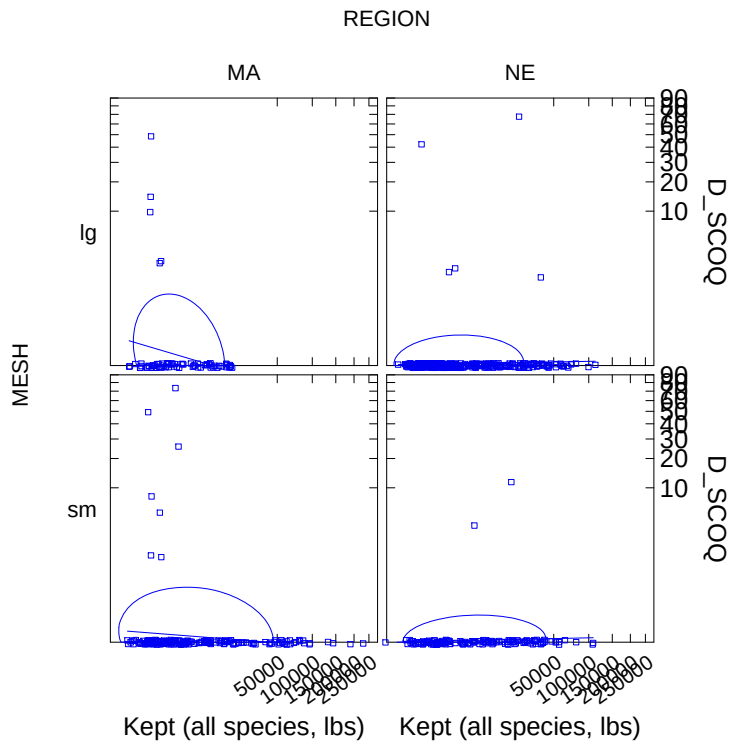


Figure B-1tt. Comparison of surfclams/quahogs discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

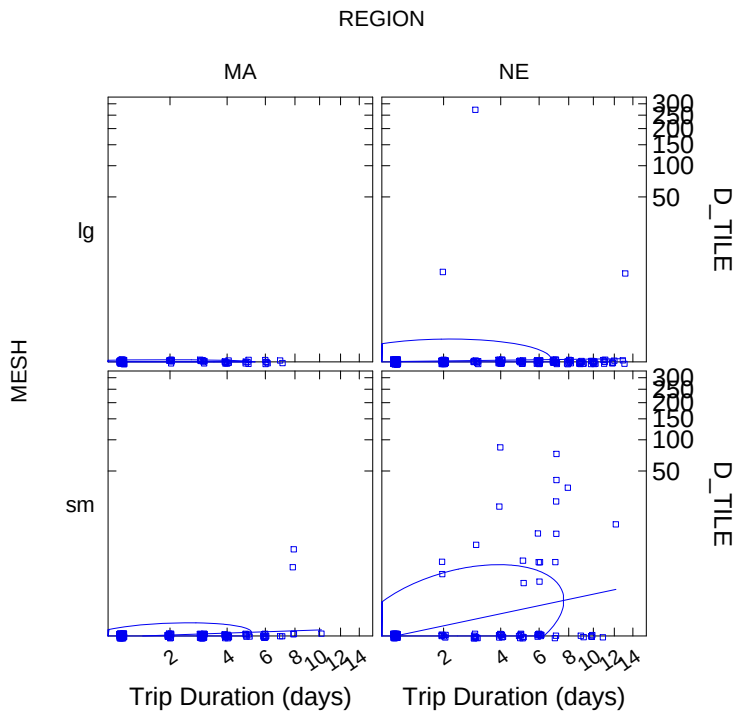


Figure B-1uu. Comparison of tilefish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

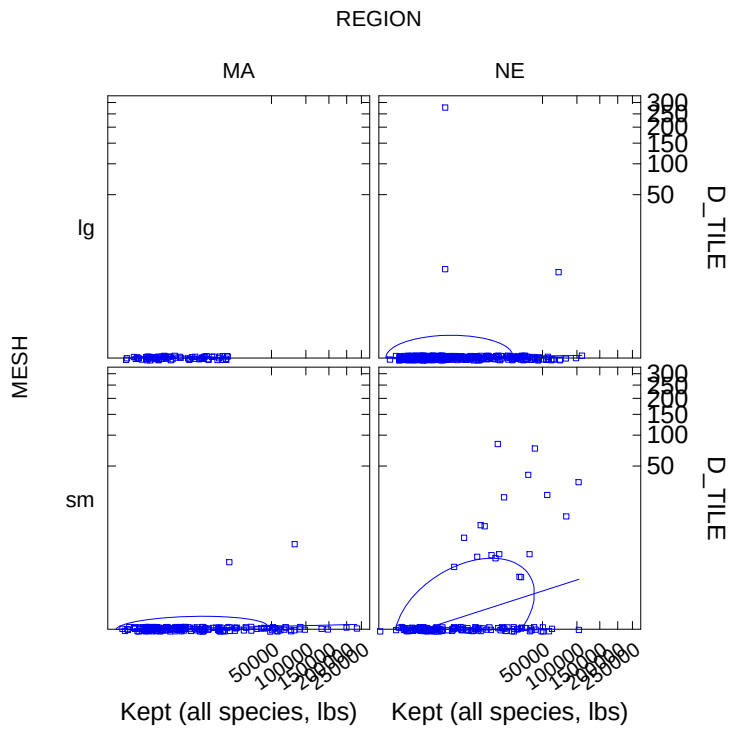


Figure B-1vv. Comparison of tilefish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

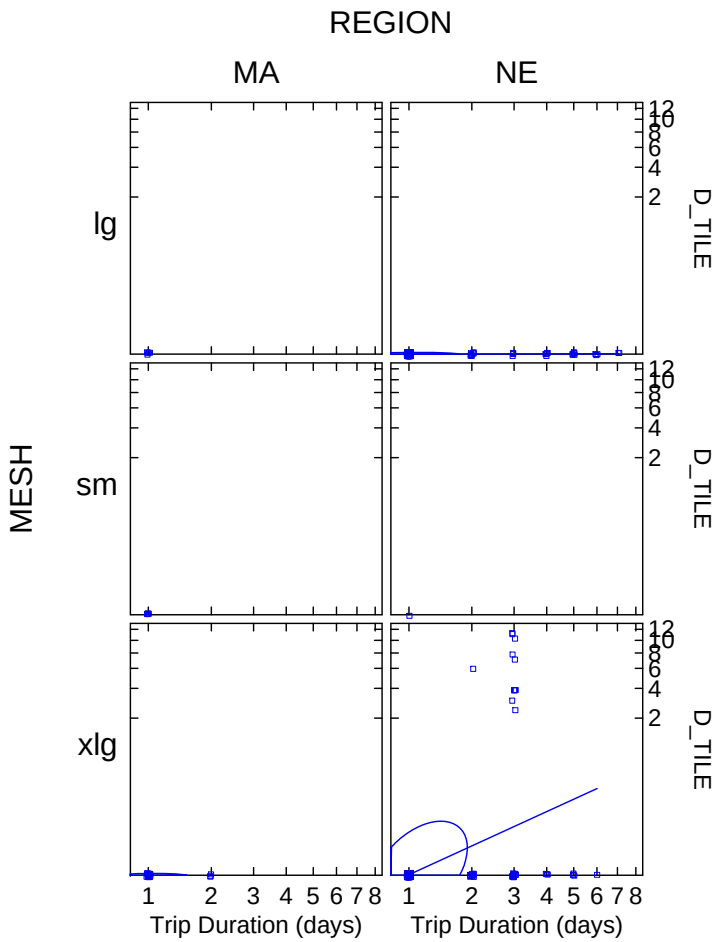


Figure B-1ww. Comparison of tilefish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

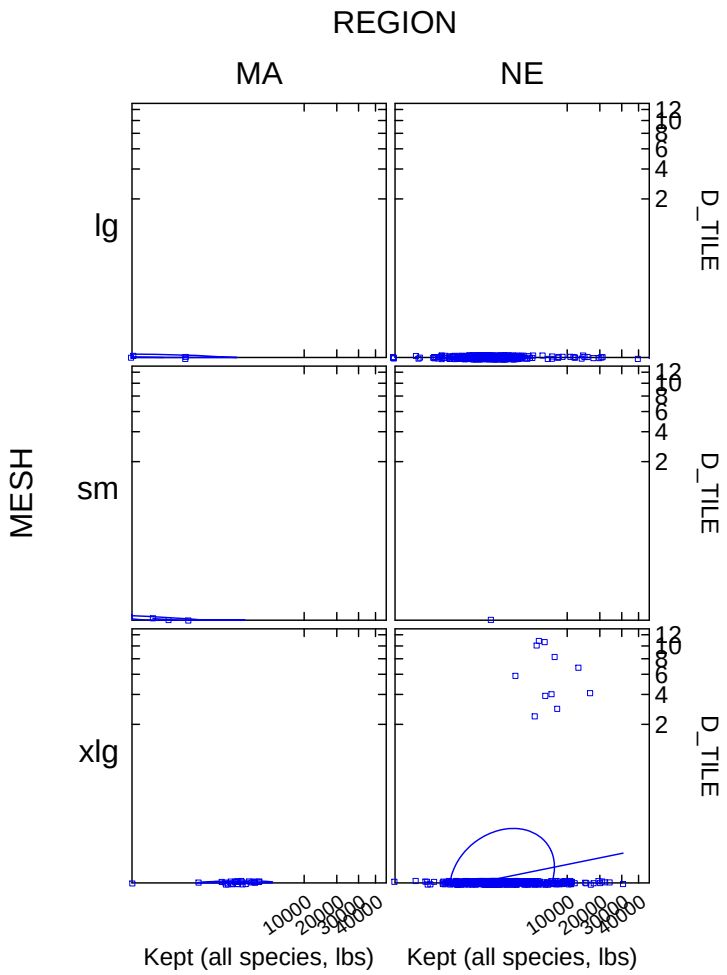


Figure B-1xx. Comparison of tilefish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

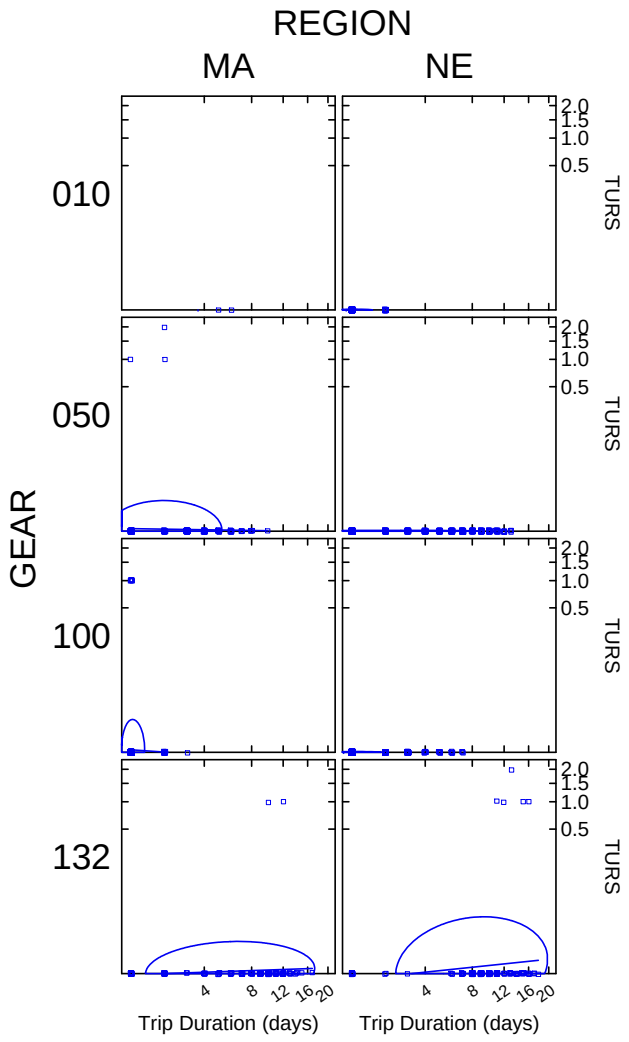


Figure B-2a. Comparison of sea turtles and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

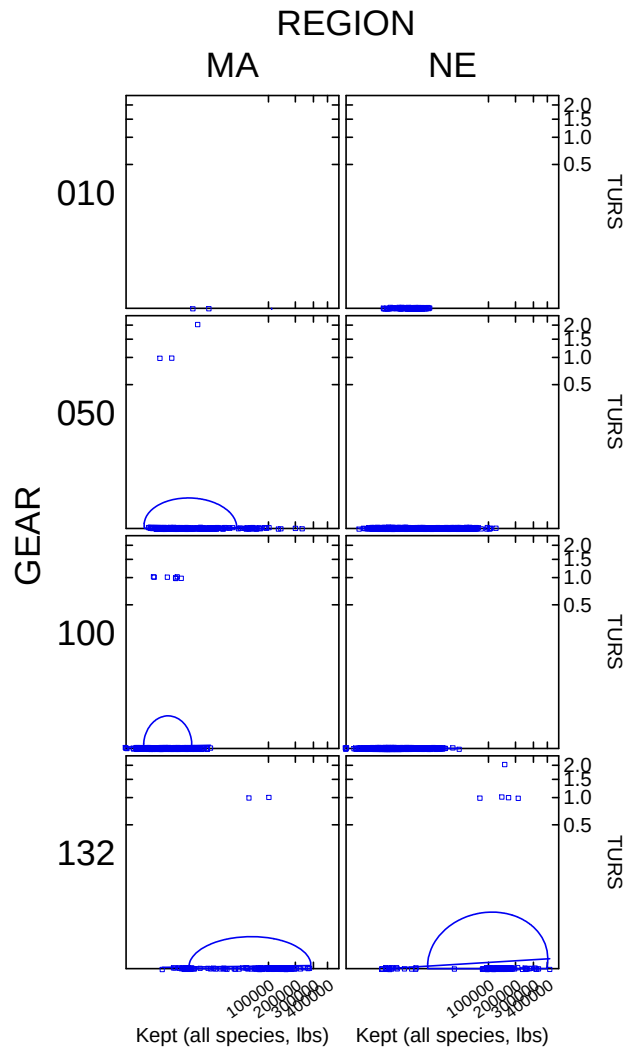


Figure B-2b. Comparison of sea turtles and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

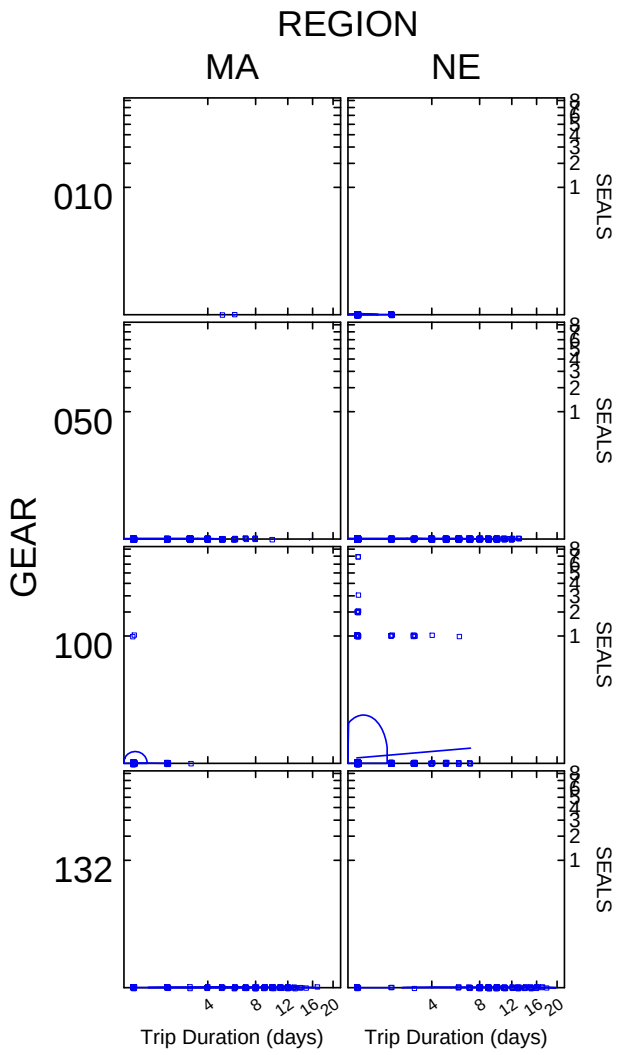


Figure B-2c. Comparison of seals and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

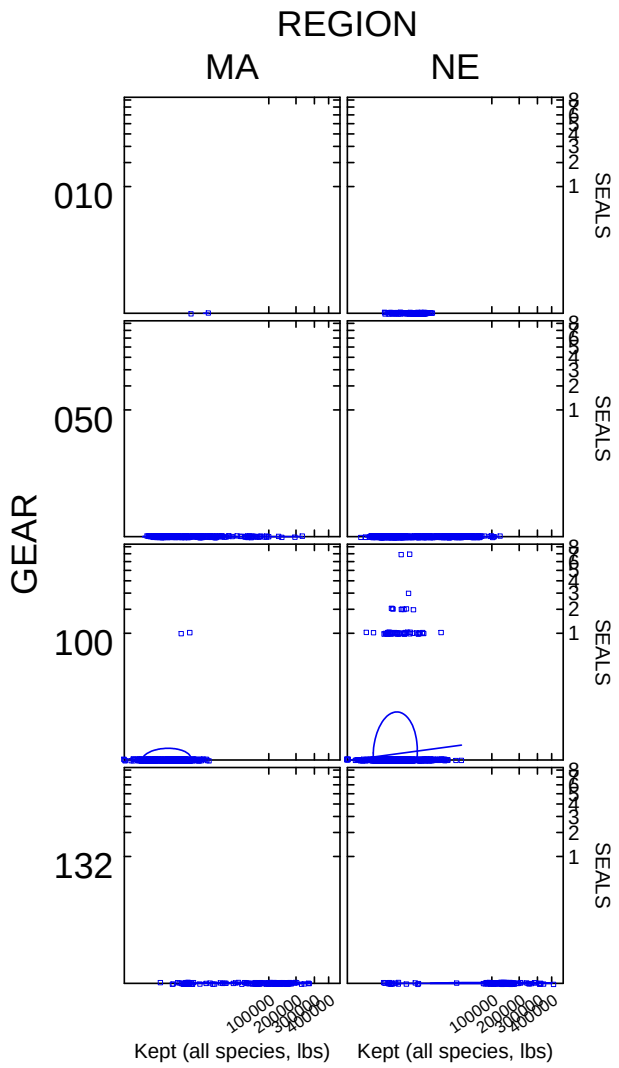


Figure B-2d. Comparison of seals and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

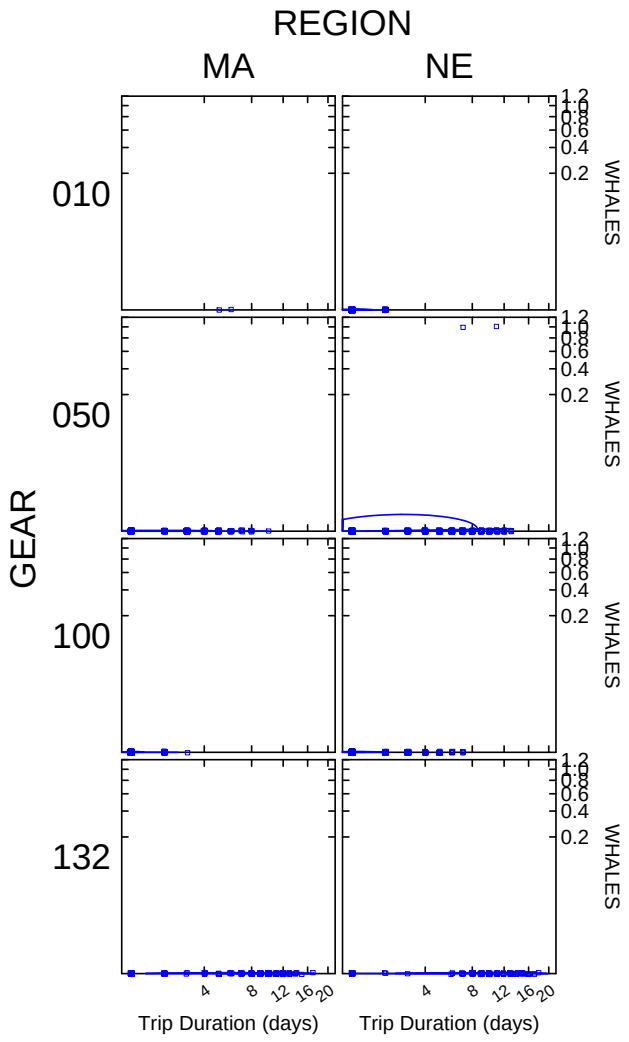


Figure B-2e. Comparison of whales and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

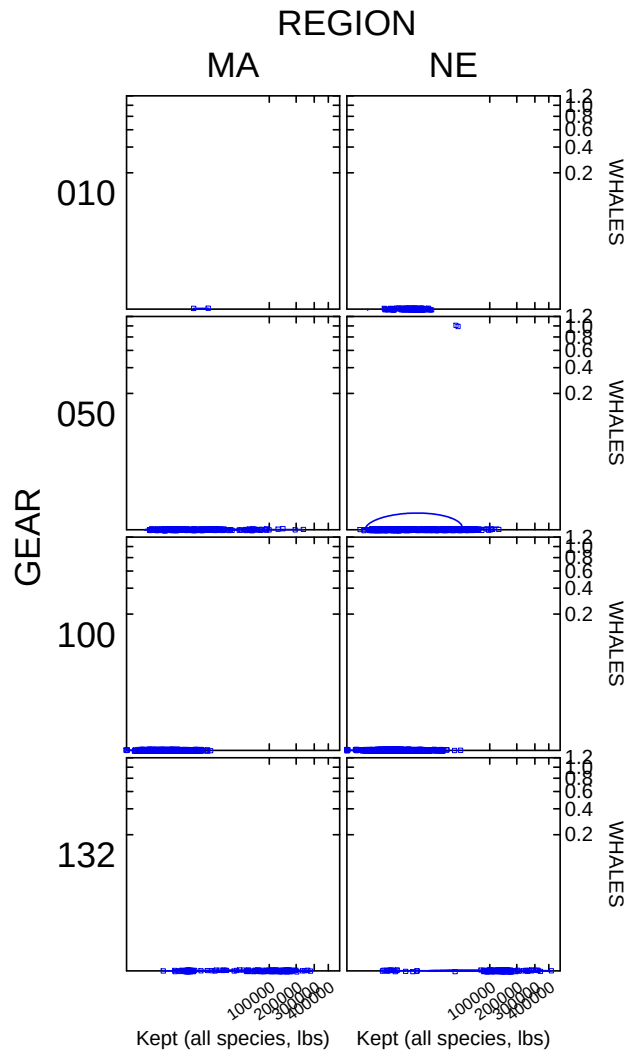


Figure B-2f. Comparison of whales and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

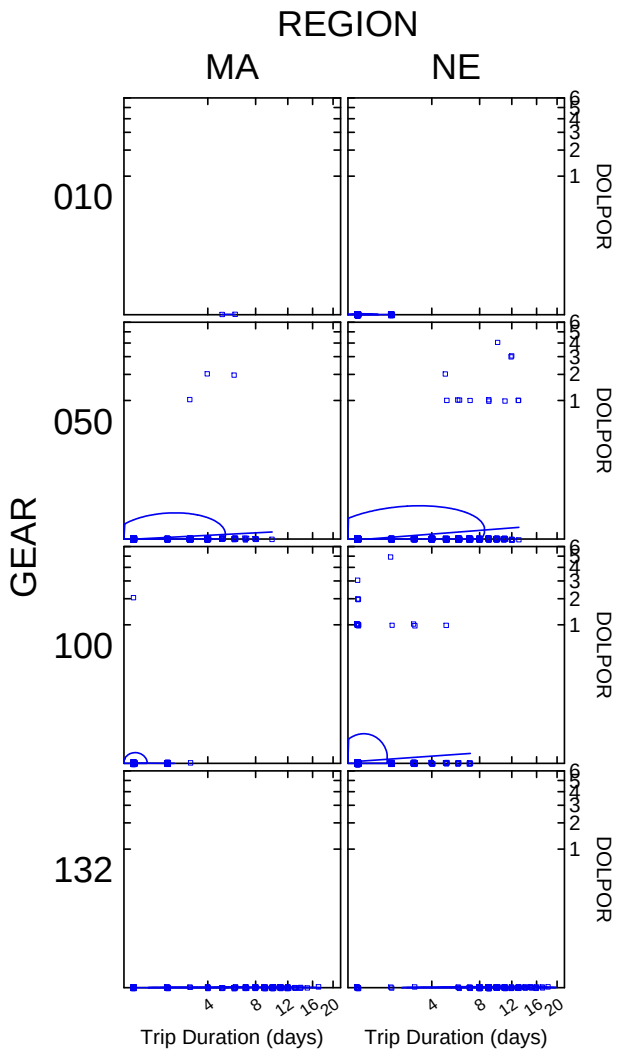


Figure B-2g. Comparison of dolphins/porpoises and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

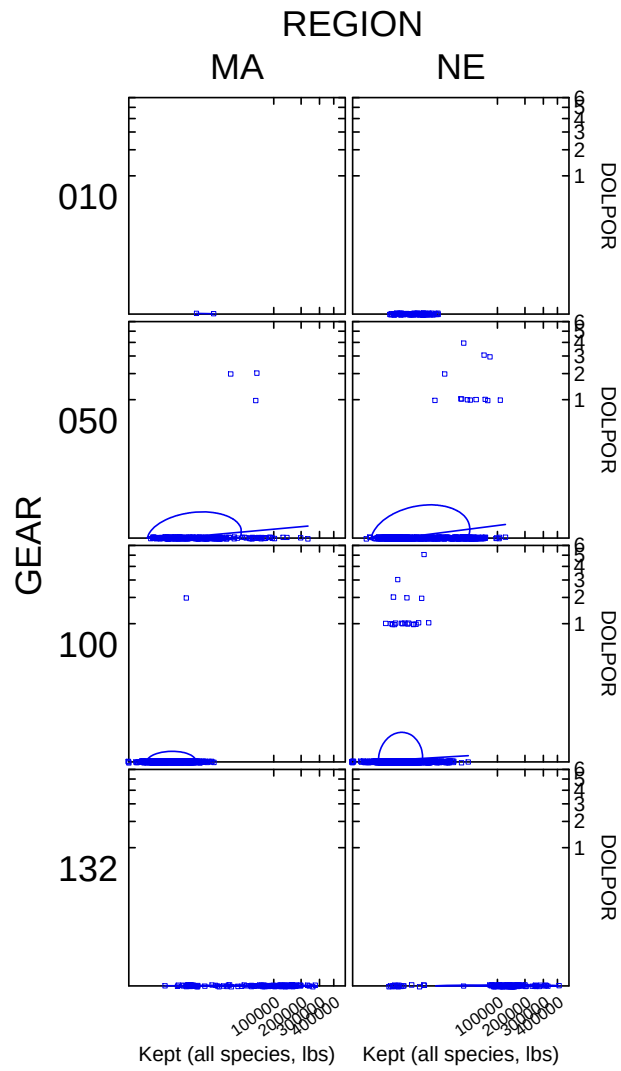


Figure B-2h. Comparison of dolphins/porpoises and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

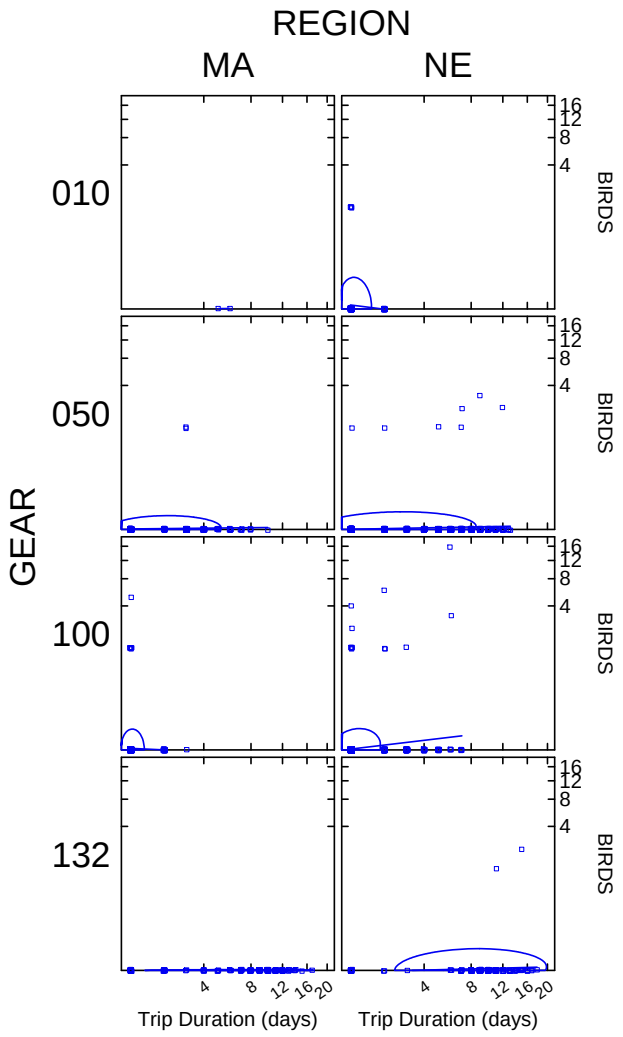


Figure B-2i. Comparison of sea birds and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

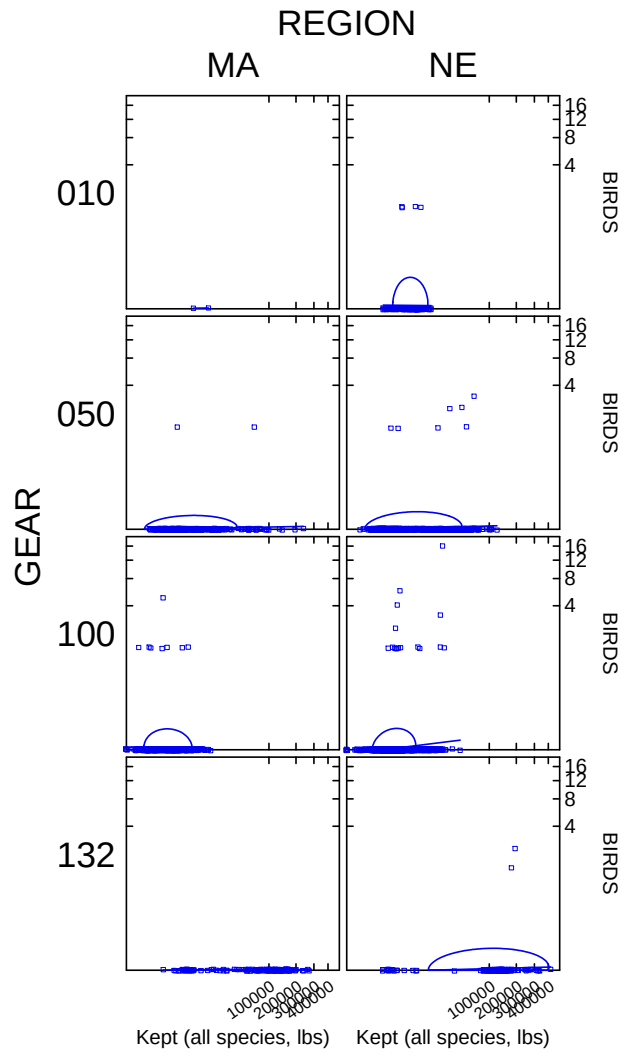


Figure B-2j. Comparison of sea birds and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

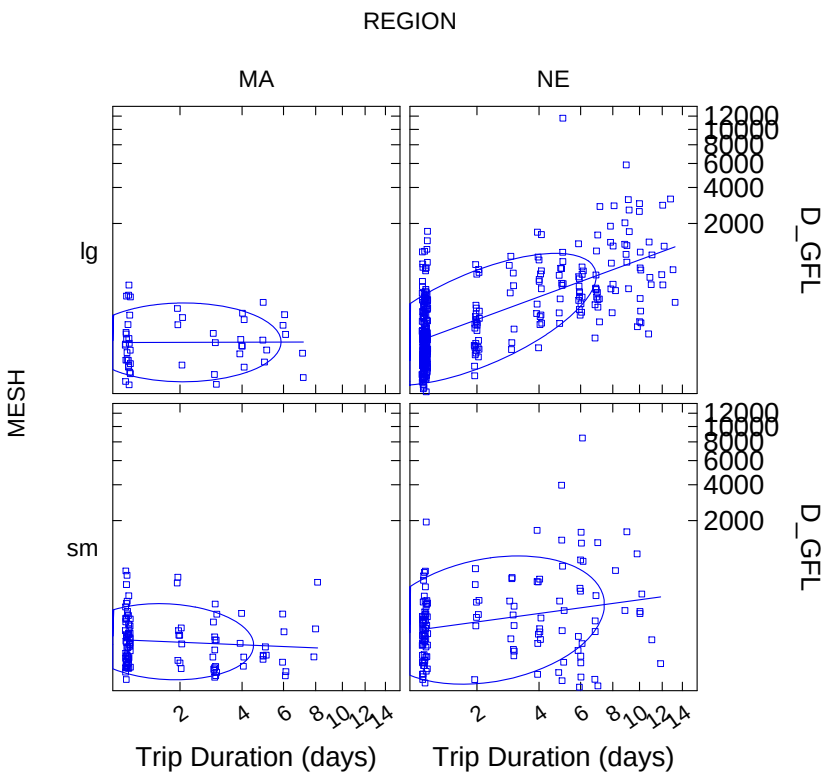


Figure B-3a. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded.

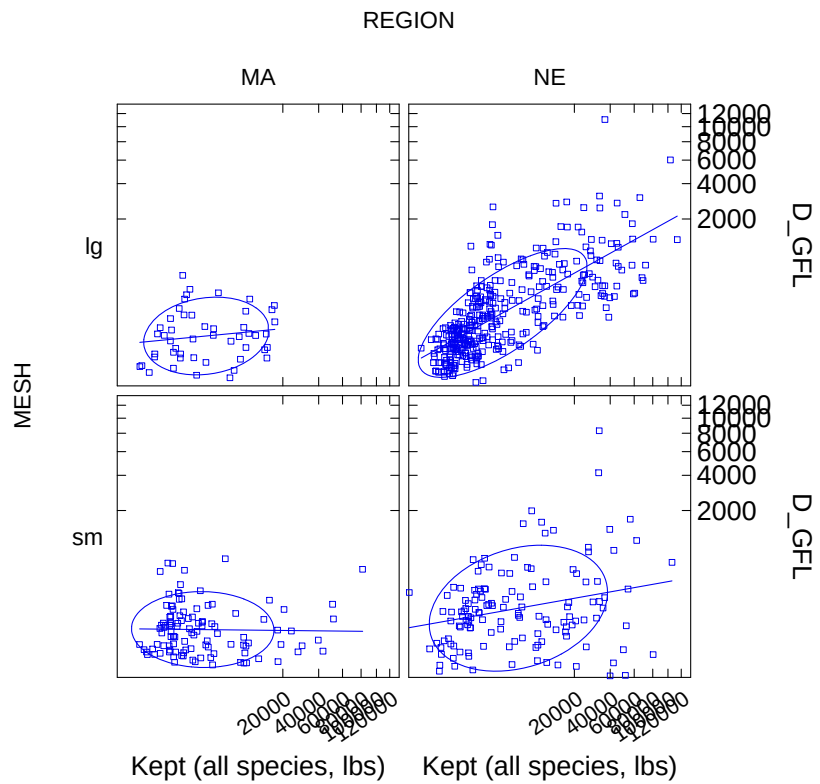


Figure B-3b. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded

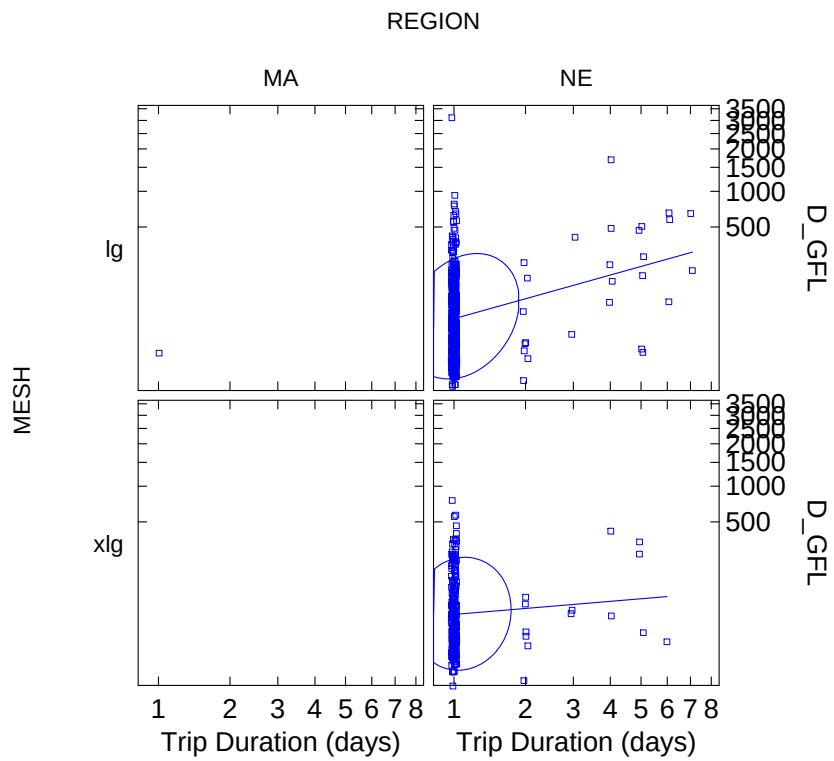


Figure B-3c. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded.

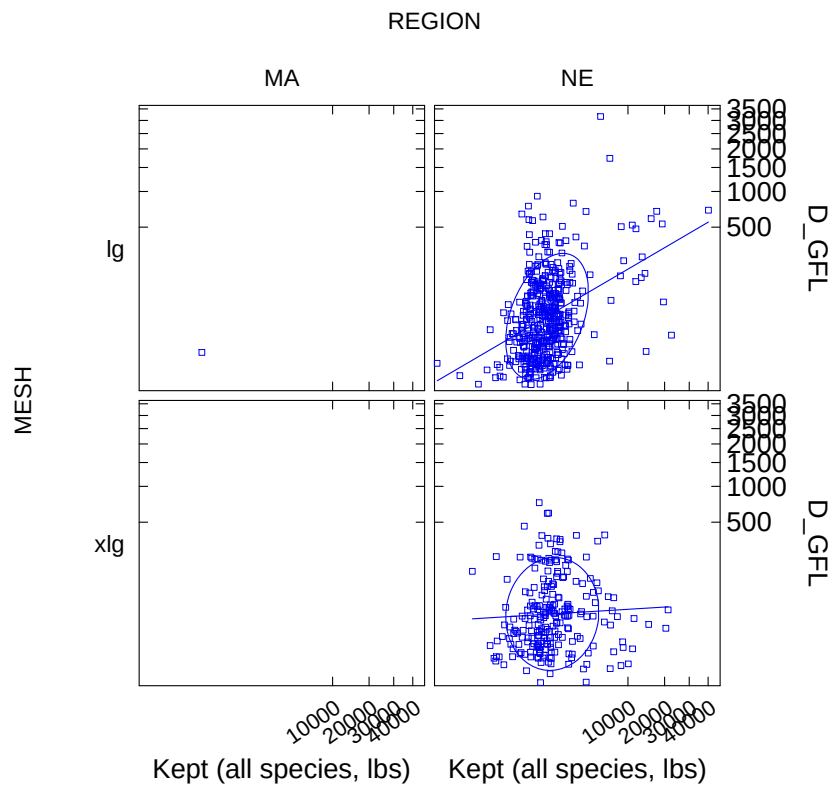


Figure B-3d. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded.

010,NE

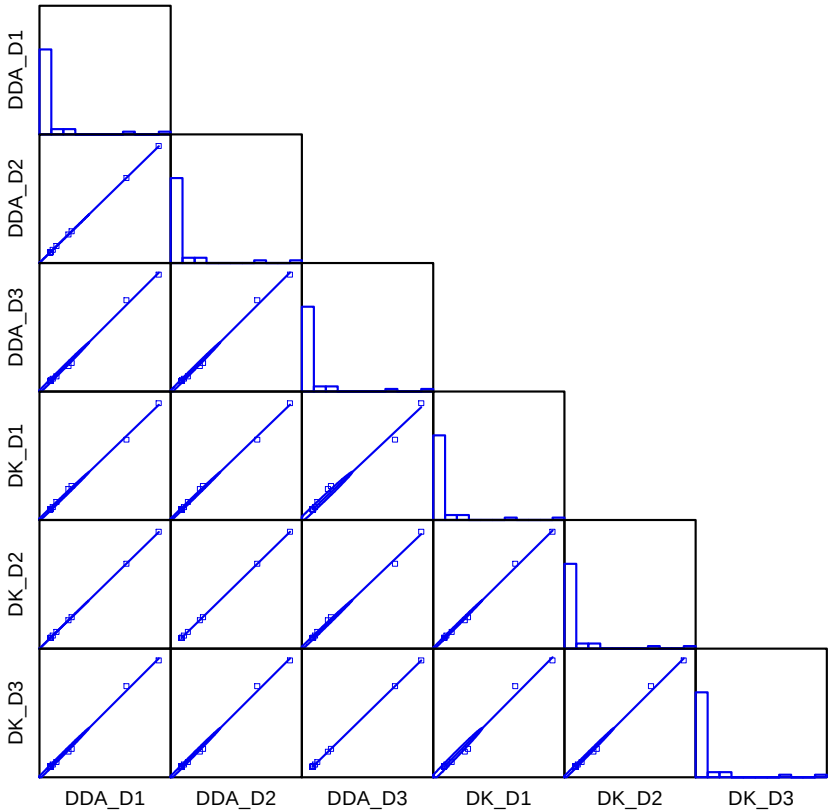


Figure B-4a. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England longline; each dot represents a species group and mesh size.

050,MA

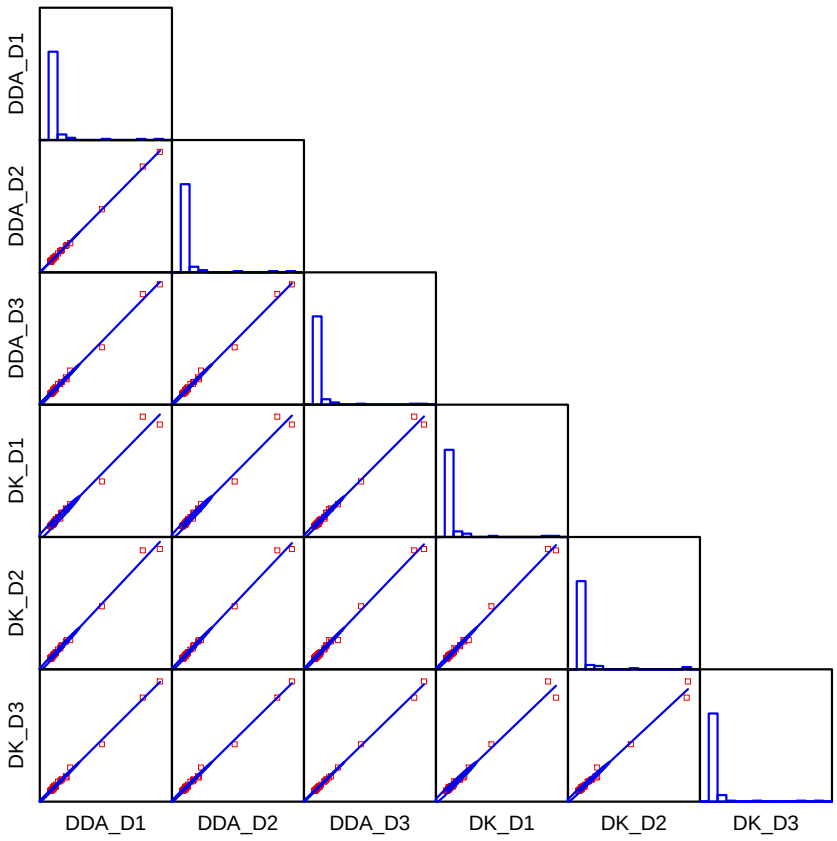


Figure B-4b. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

050,NE

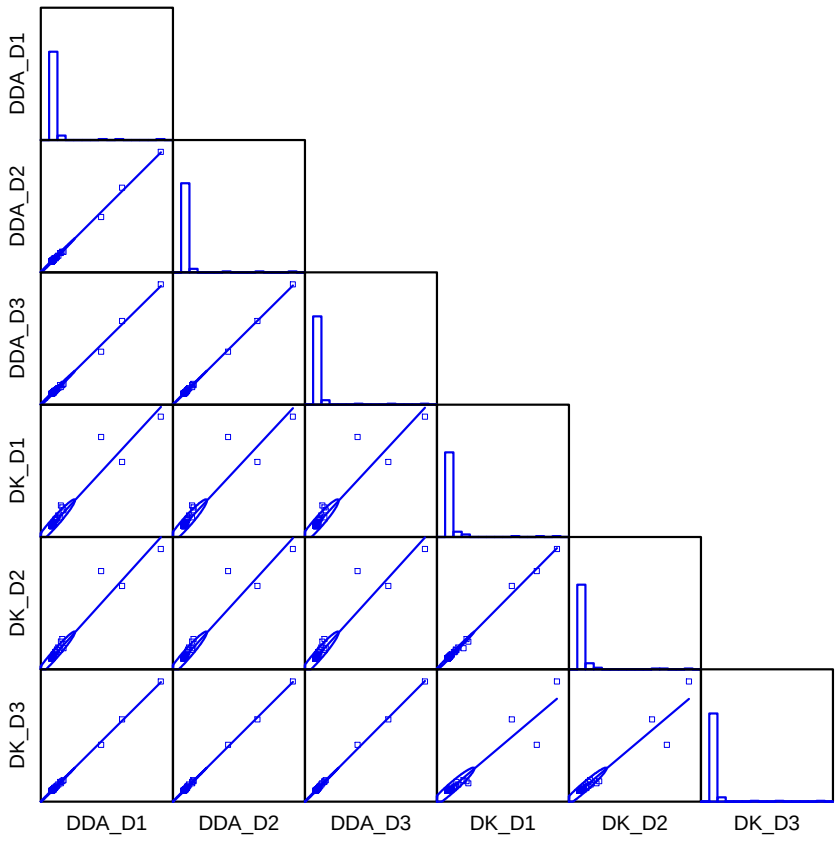


Figure B-4c. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England otter trawl; each dot represents a species group and mesh size.

132,MA

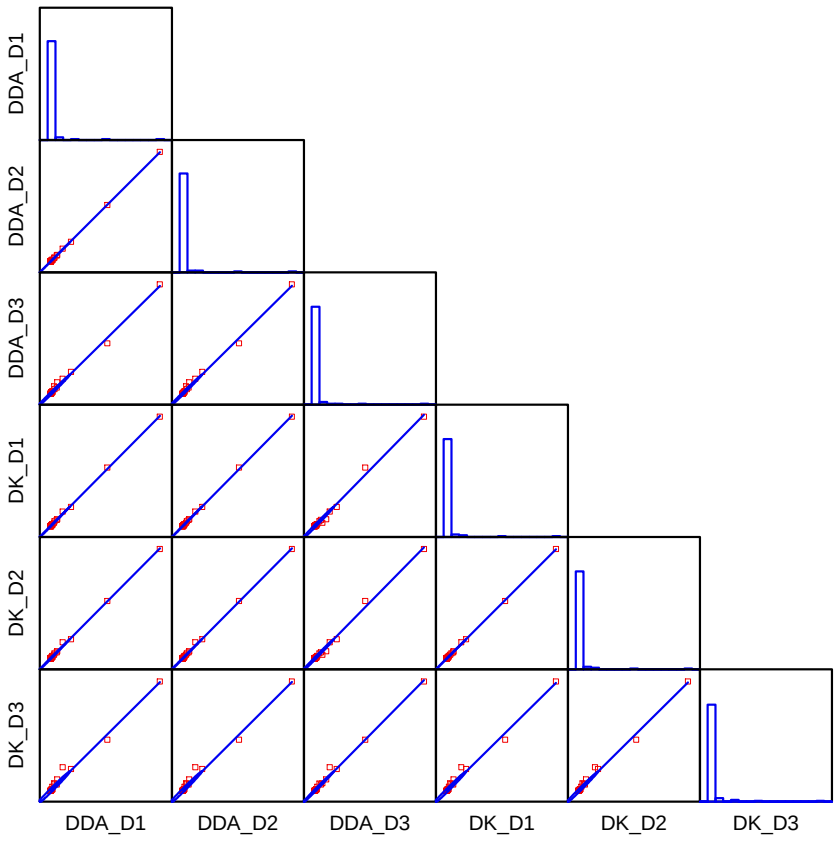


Figure B-4d. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic scallop dredge; each dot represents a species group and mesh size.

132,NE

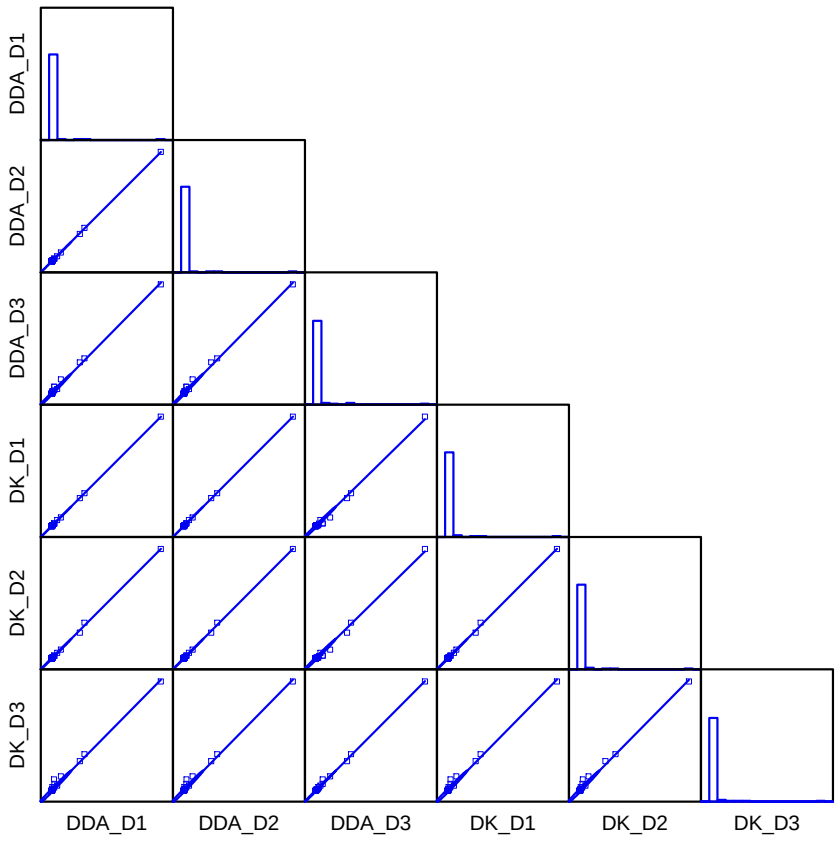


Figure B-4e. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England scallop dredge; each dot represents a species group and mesh size.

100,MA

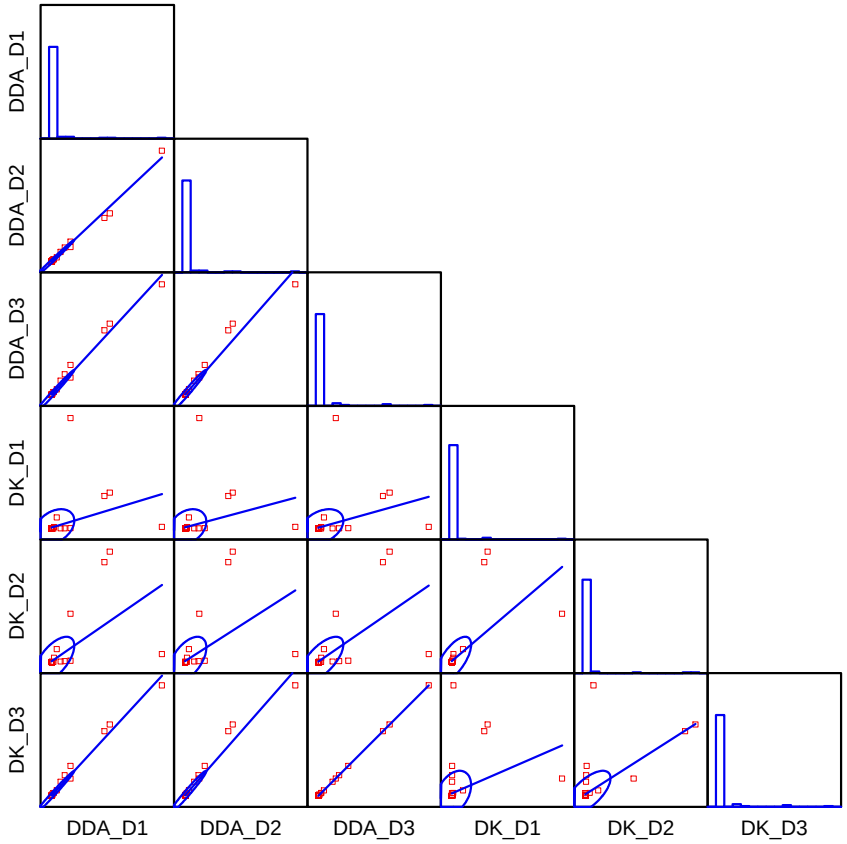


Figure B-4f. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic gillnet; each dot represents a species group and mesh size.

100,NE

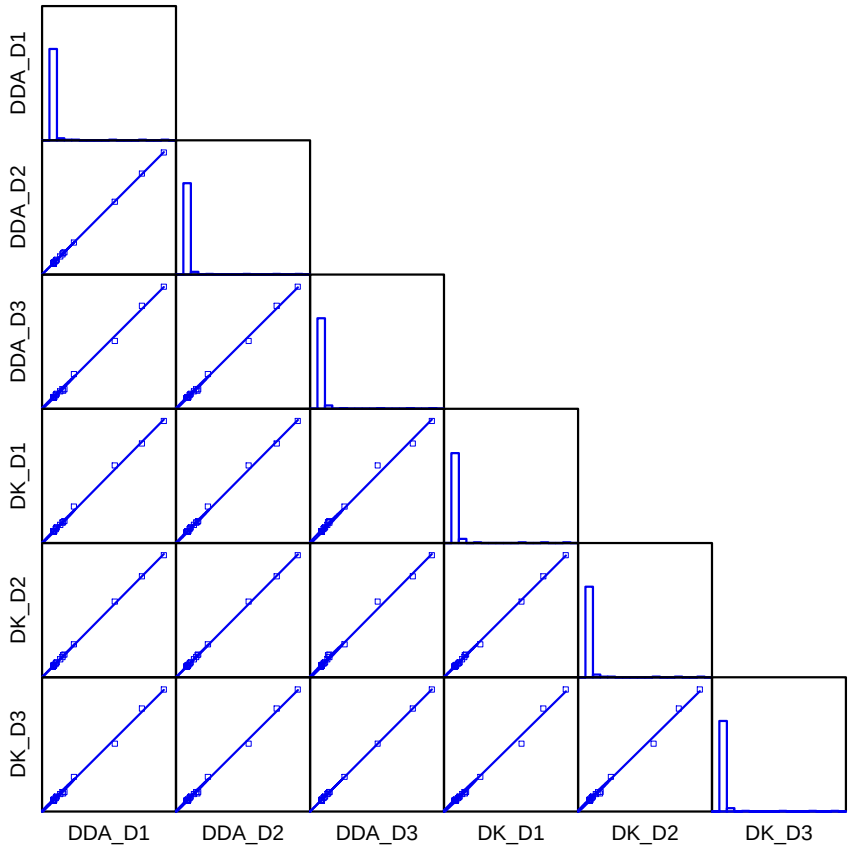


Figure B-4g. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England gillnet; each dot represents a species group and mesh size.

010,NE

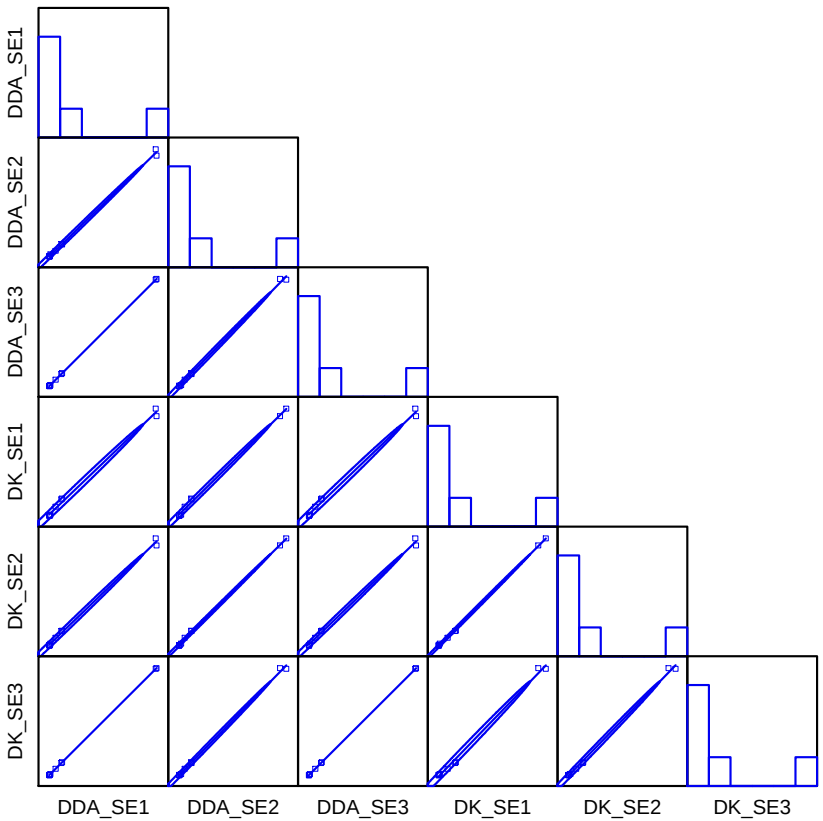


Figure B-5a. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England longline; each dot represents a species group and mesh size.

050,MA

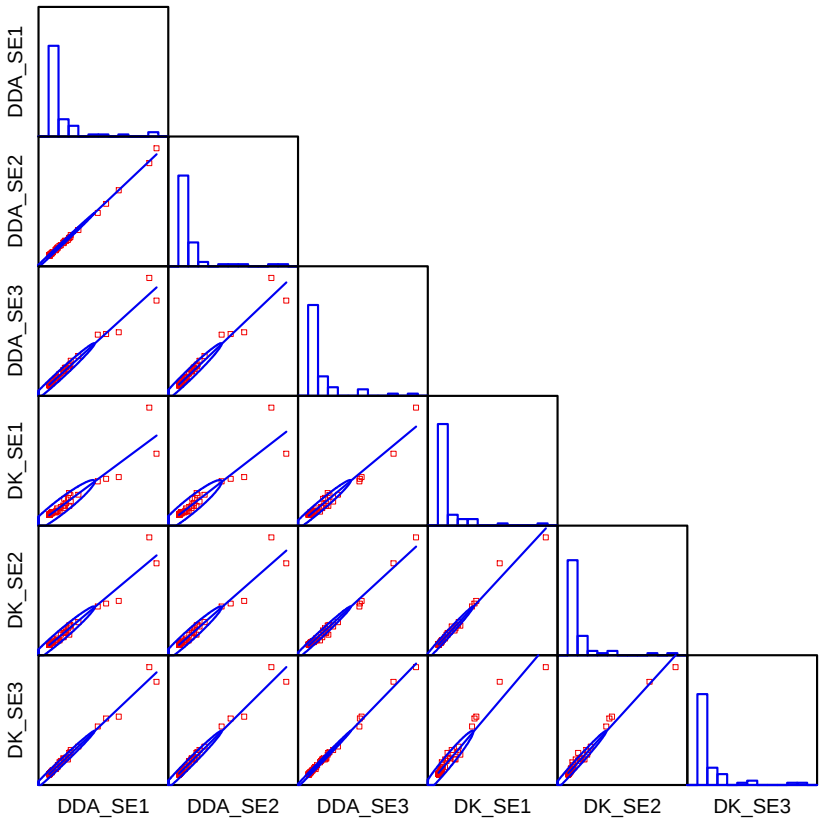


Figure B-5b. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

050,NE

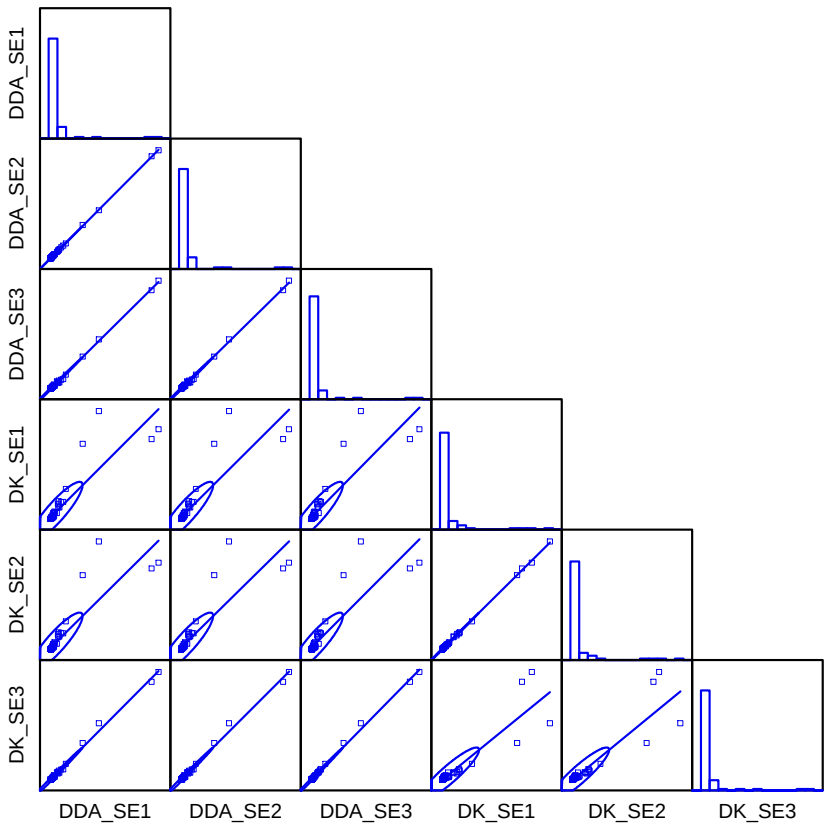


Figure B-5c. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England otter trawl; each dot represents a species group and mesh size.

132,MA

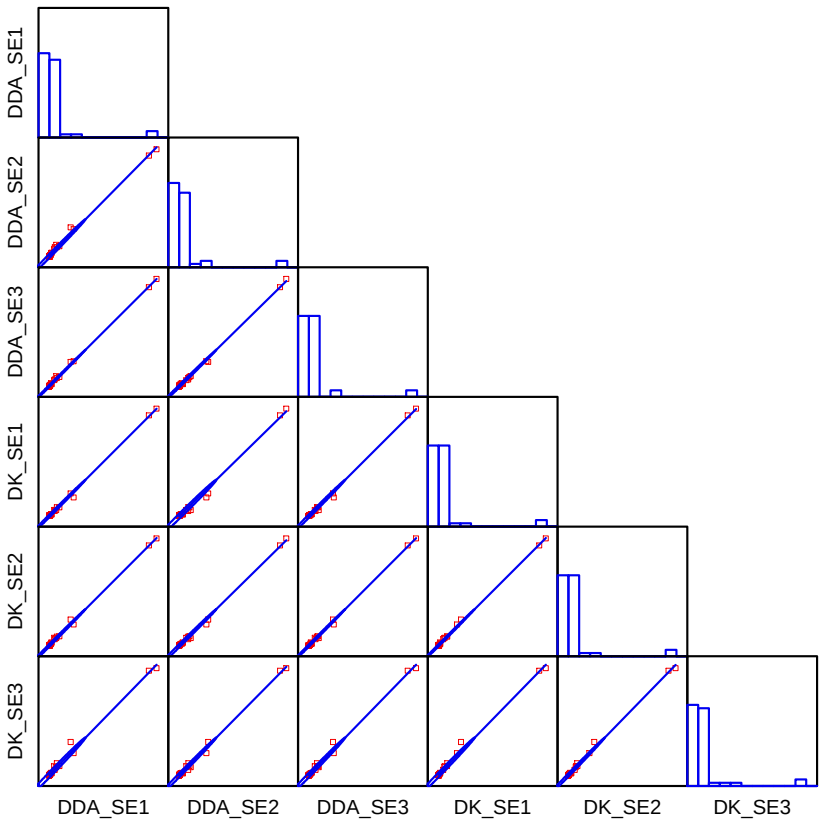


Figure B-5d. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic scallop dredge each dot represents a species group and mesh size

132,NE

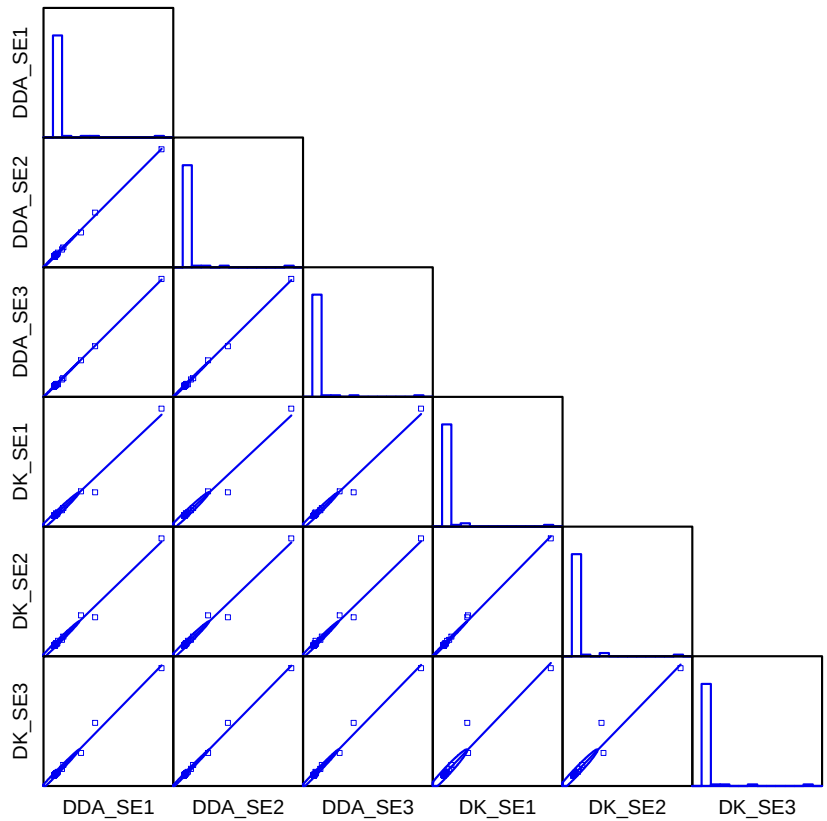


Figure B-5e. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England scallop dredge each dot represents a species group and mesh size

100,MA

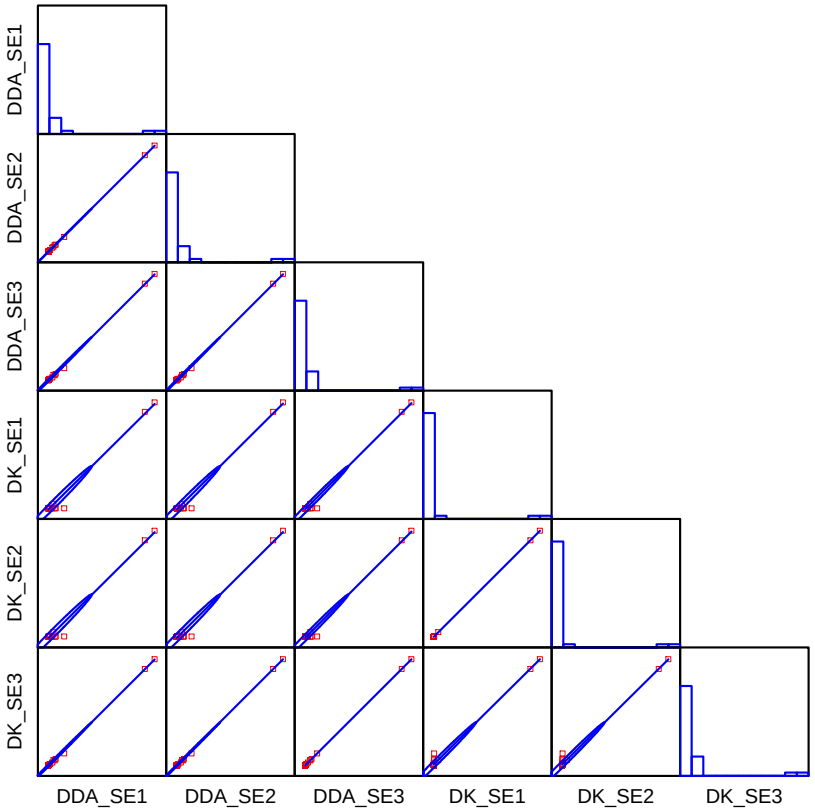


Figure B-5f. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic gillnet each dot represents a species group and mesh size.

100,NE

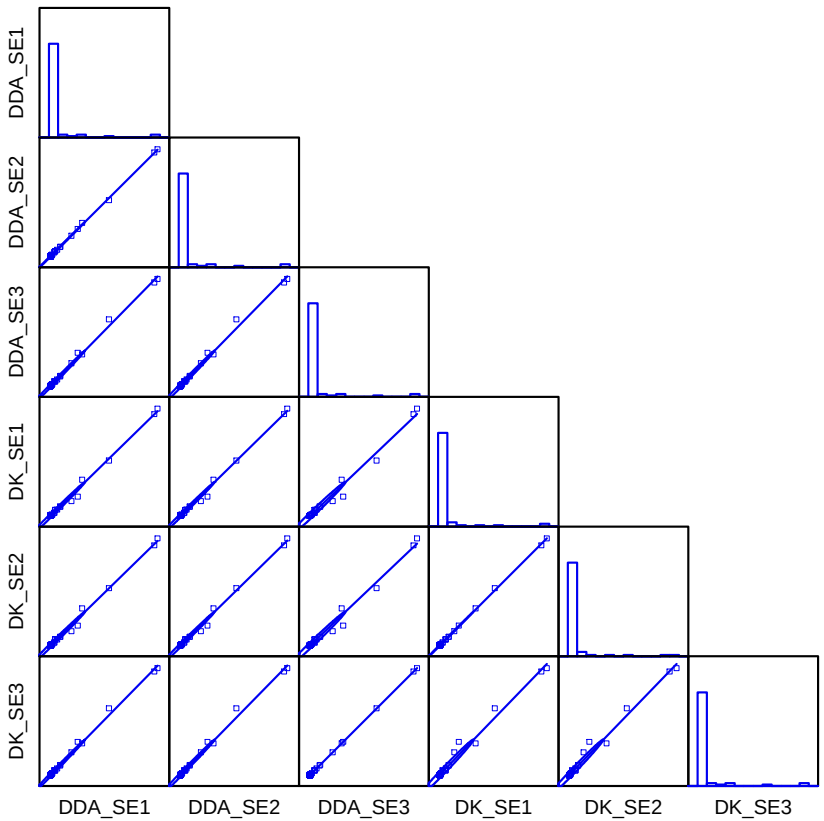


Figure B-5g. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England gillnet each dot represents a species group and mesh size.

010,NE

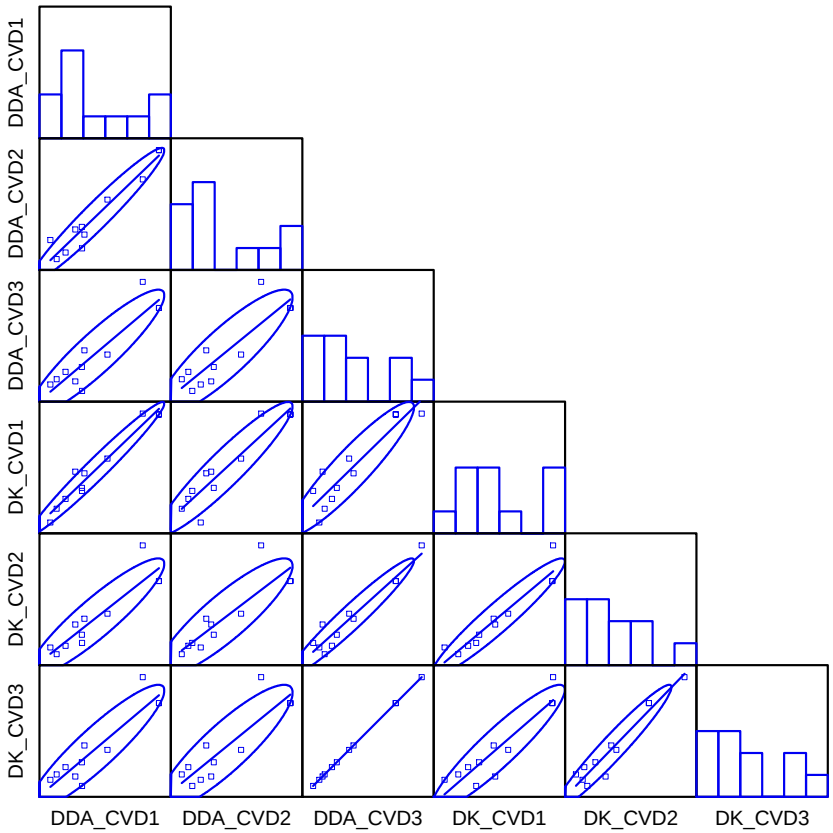


Figure B-5h. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England longline; each dot represents a species group and mesh size.

050,MA

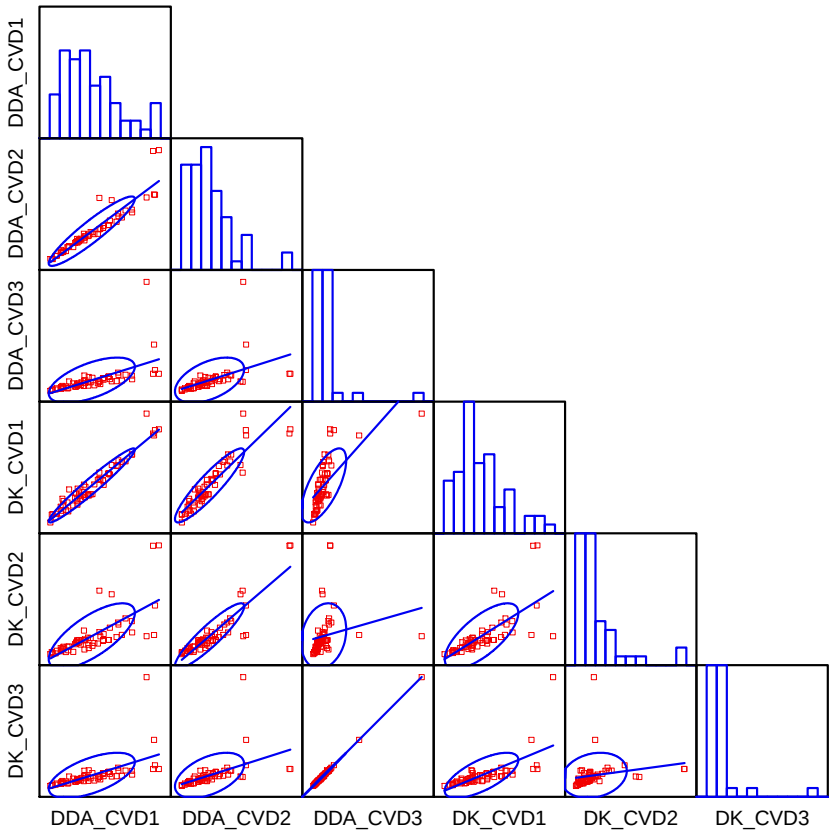


Figure B-5i. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

050,NE

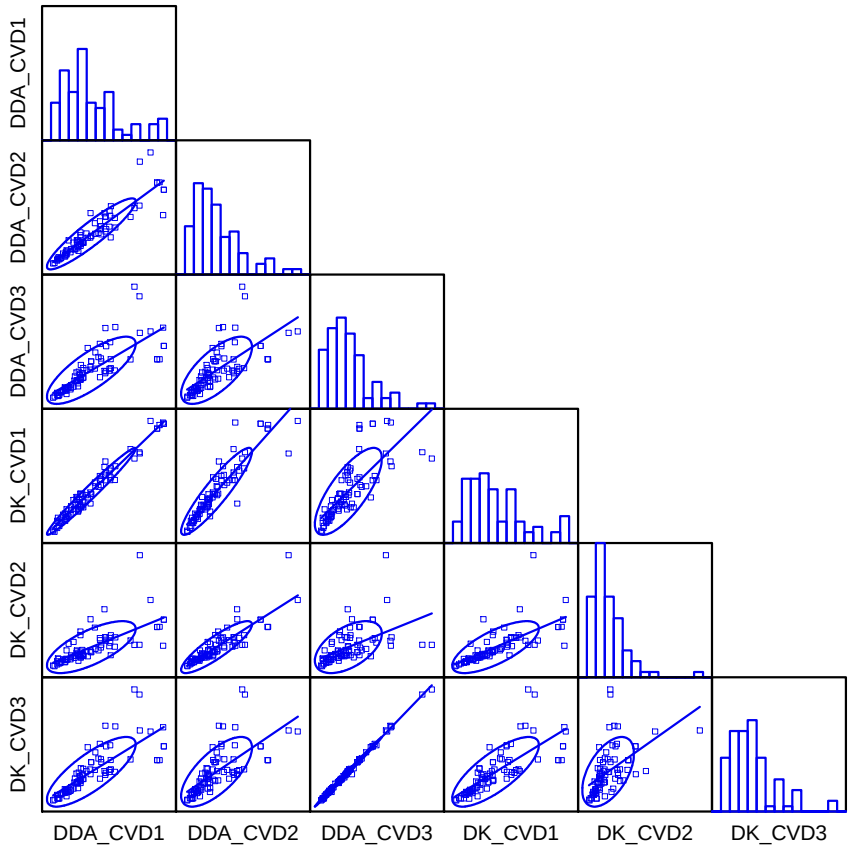


Figure B-5j Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England otter trawl; each dot represents a species group and mesh size.

132,MA

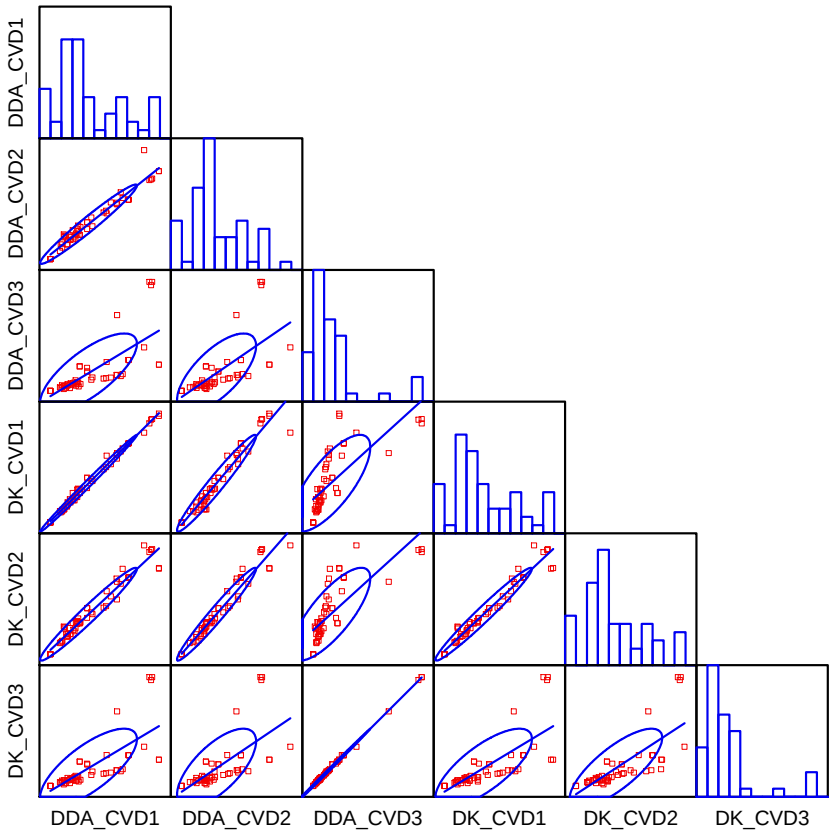


Figure B-5k. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic scallop dredge each dot represents a species group and mesh size

132,NE

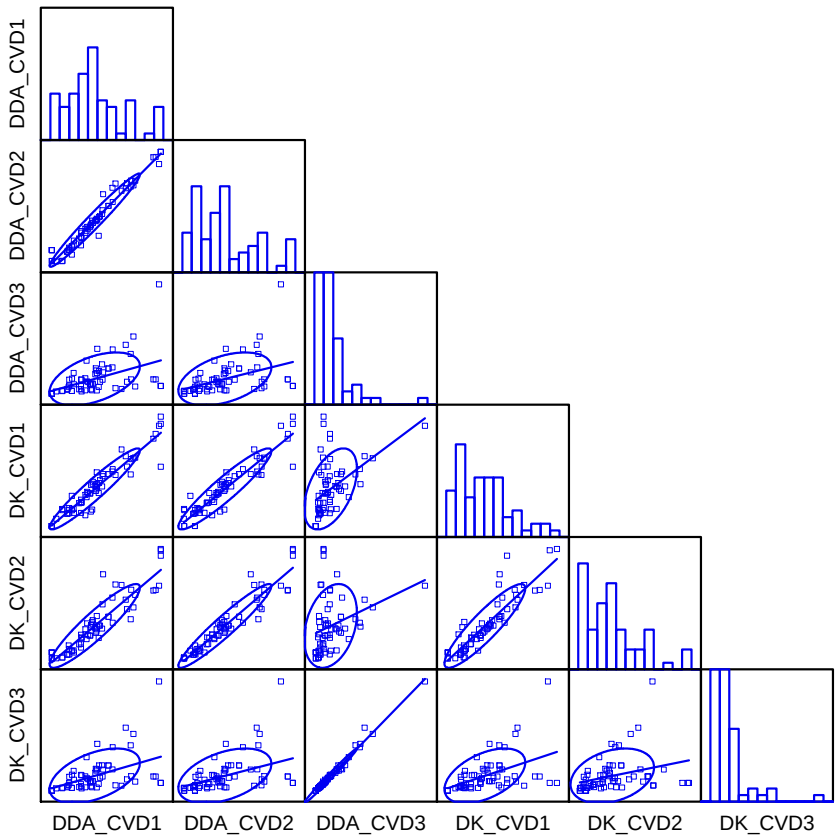


Figure B-5l. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England scallop dredge each dot represents a species group and mesh size

100,MA

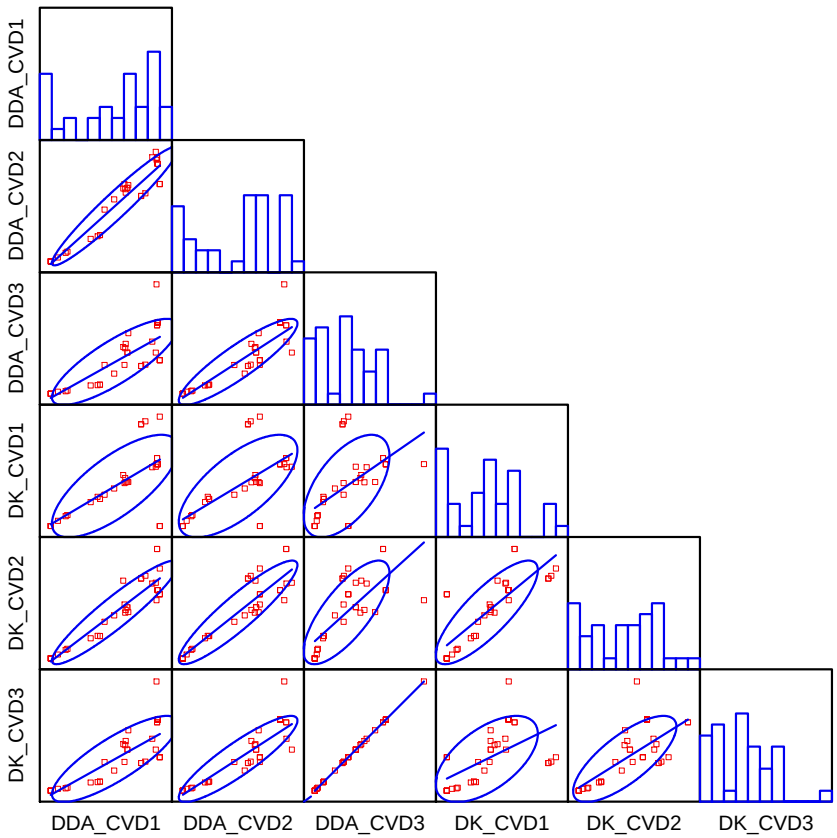


Figure B-5m. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic gillnet each dot represents a species group and mesh size.

100,NE

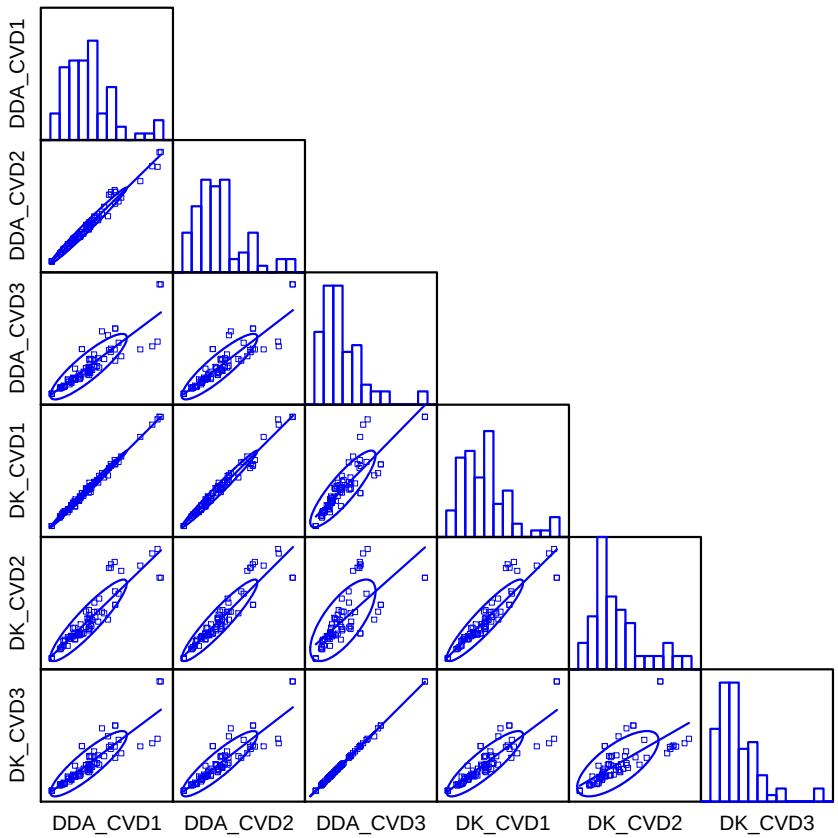
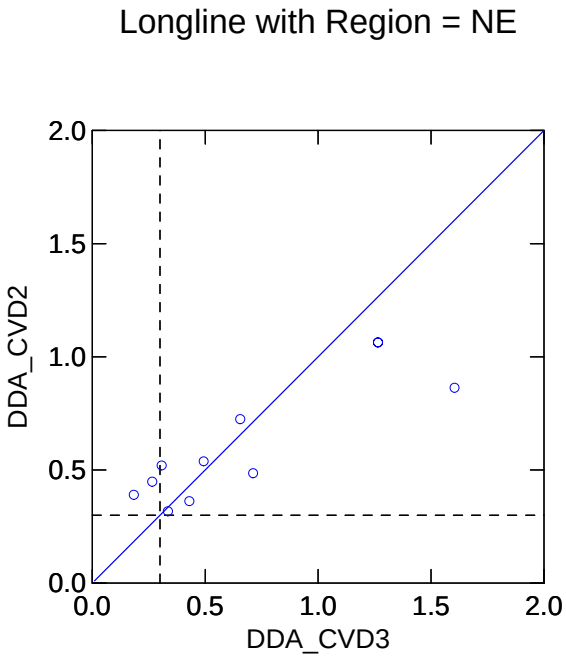


Figure B-5n. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England gillnet each dot represents a species group and mesh size.



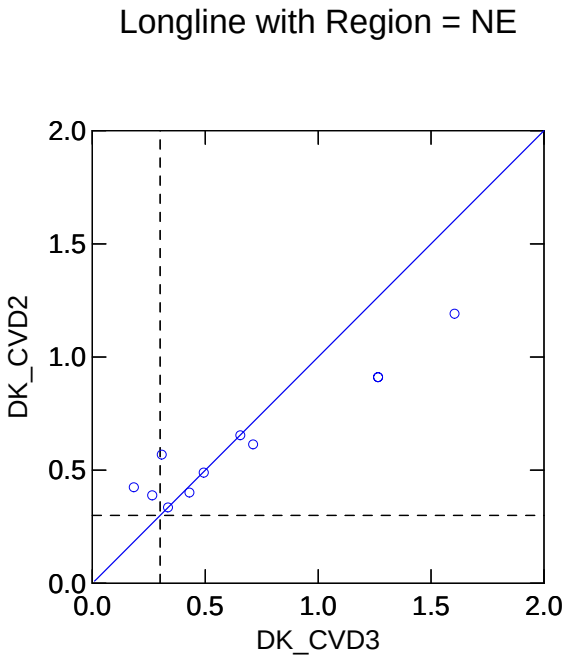


Figure B-6a. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England longline; each dot represents a species group and mesh size.

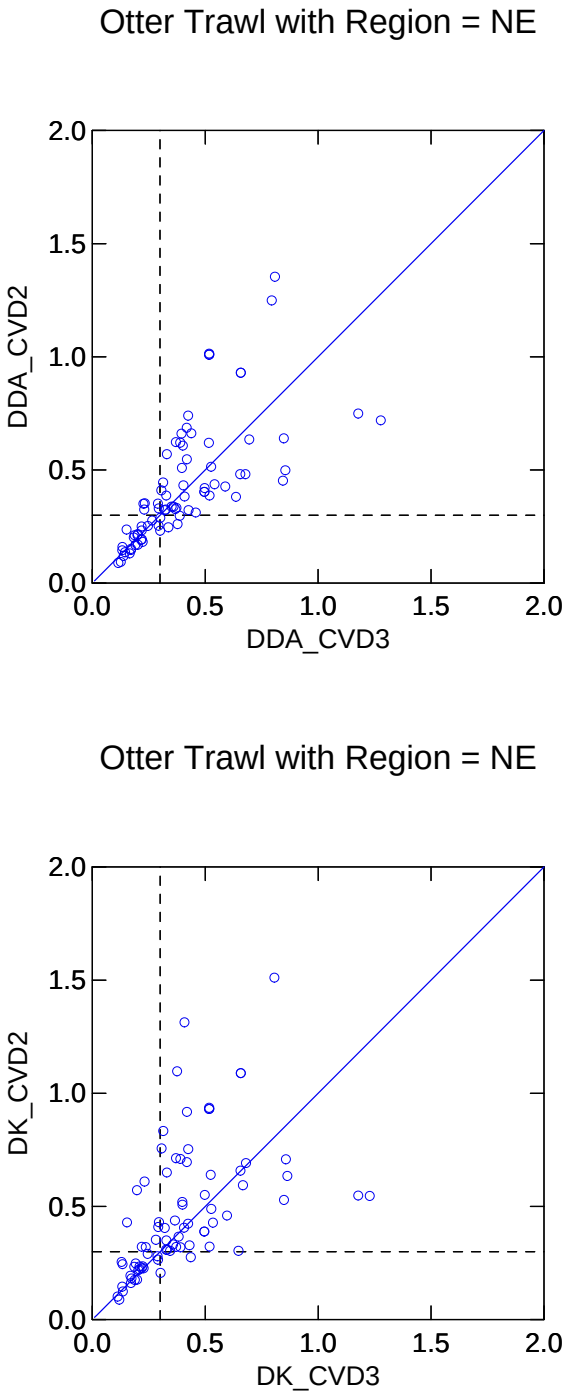


Figure B-6b. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3)for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England otter trawl; each dot represents a species group and mesh size.

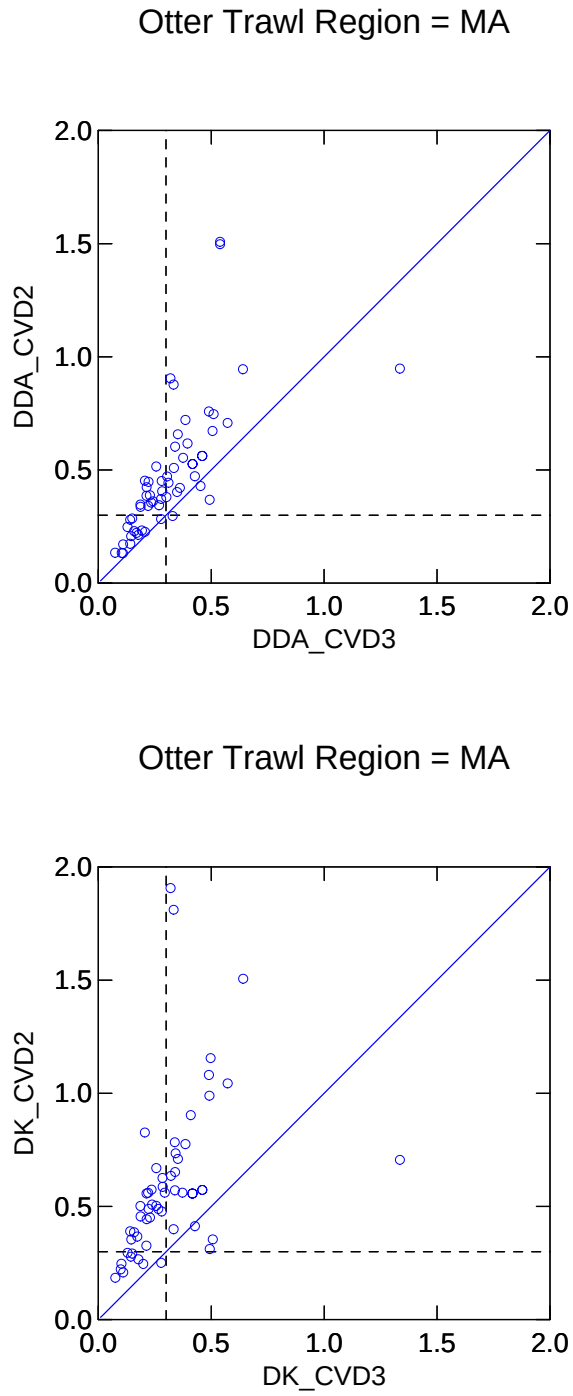
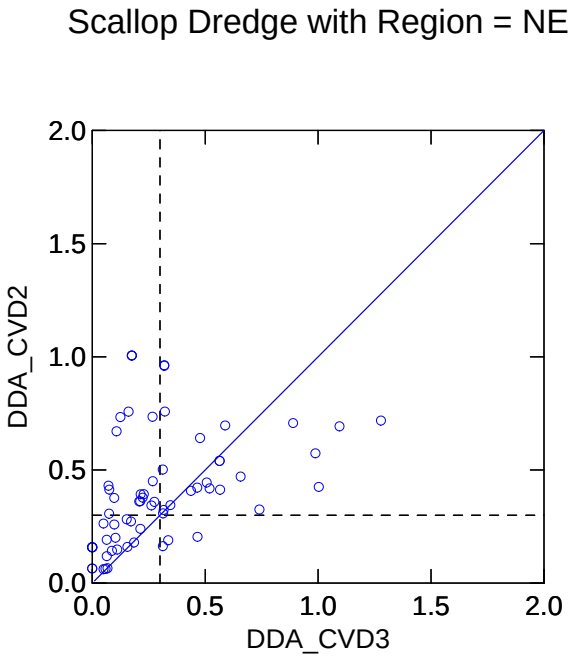
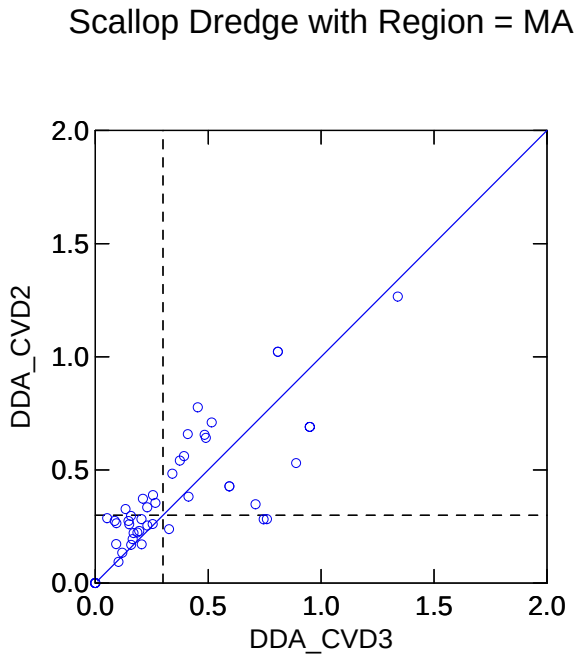


Figure B-6c. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3)for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.





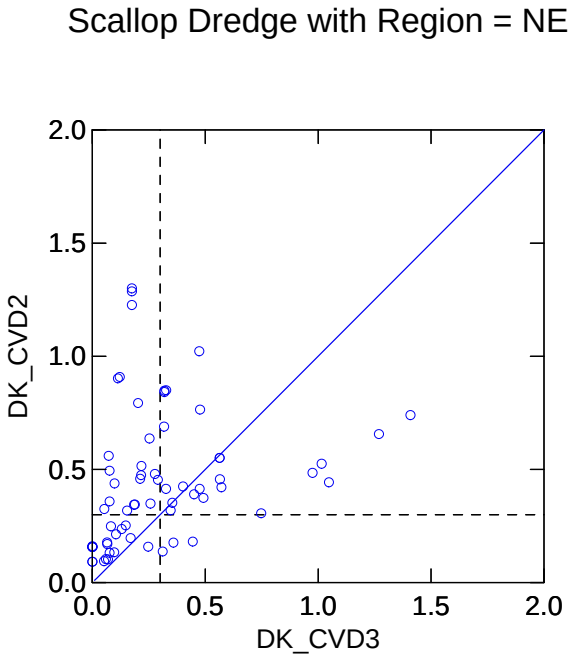


Figure B-6d. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England scallop dredge; each dot represents a species group and mesh size.

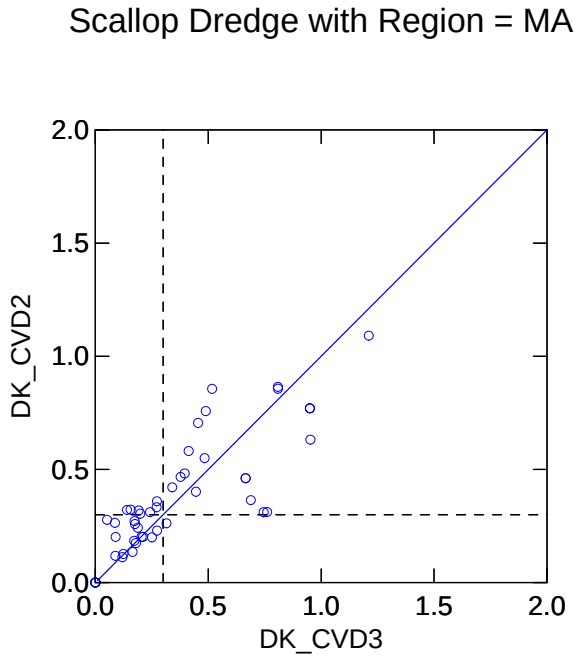


Figure B-6e. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

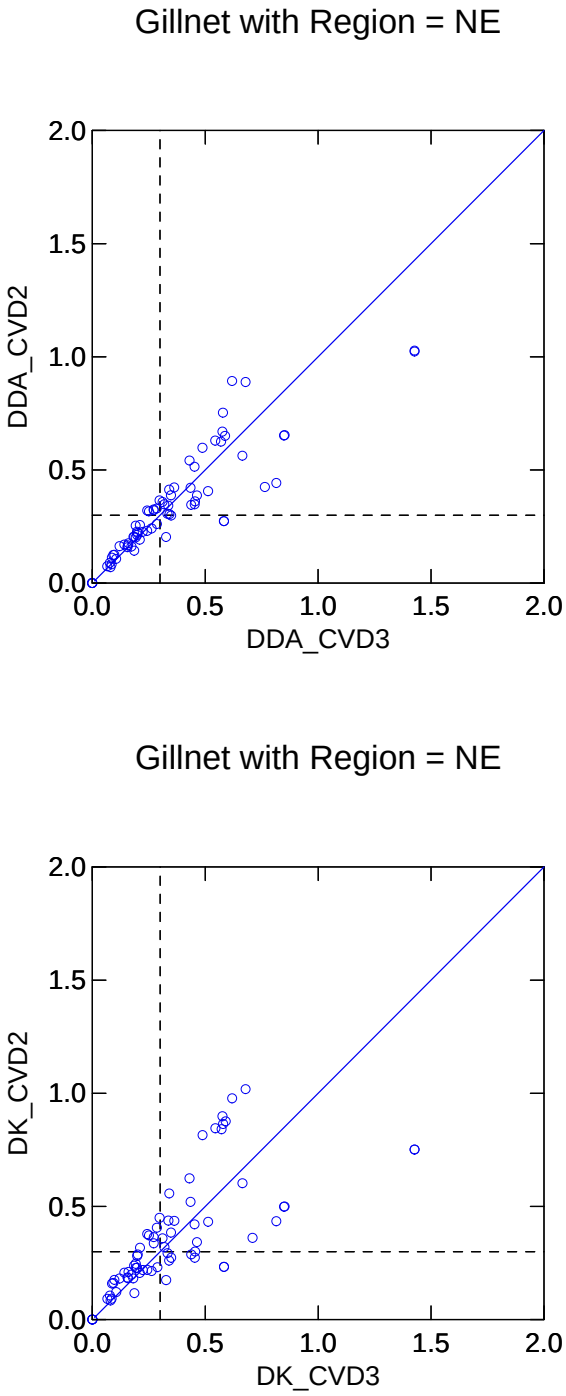


Figure B-6f. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England gillnet; each dot represents a species group and mesh size.

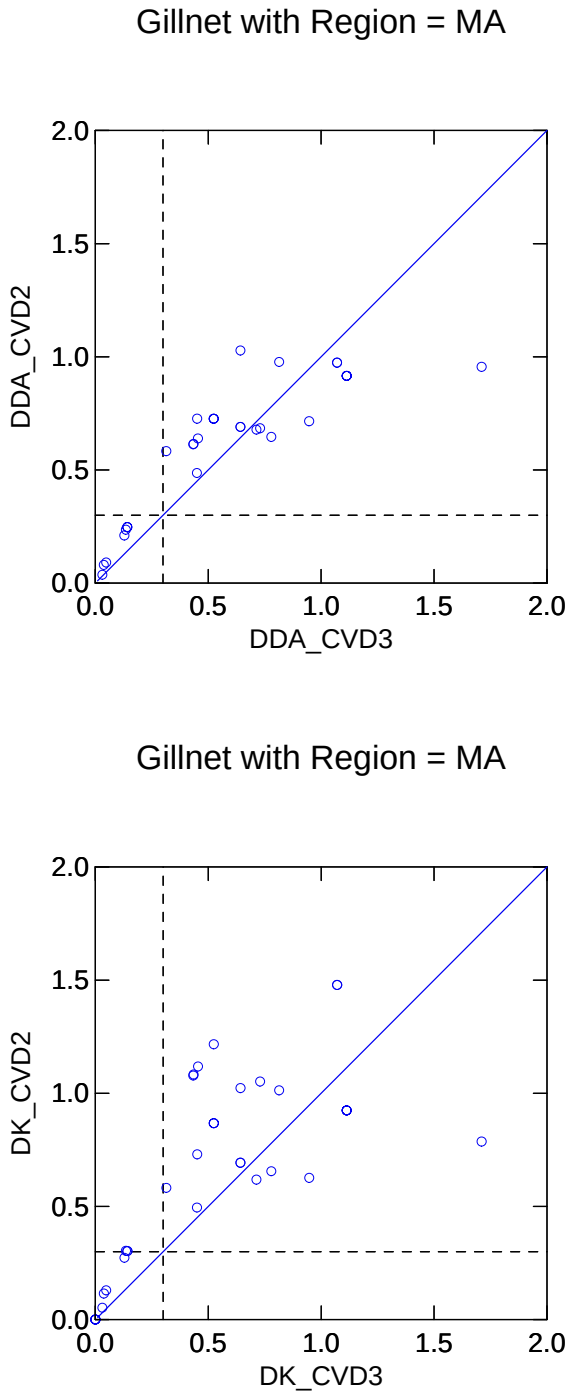
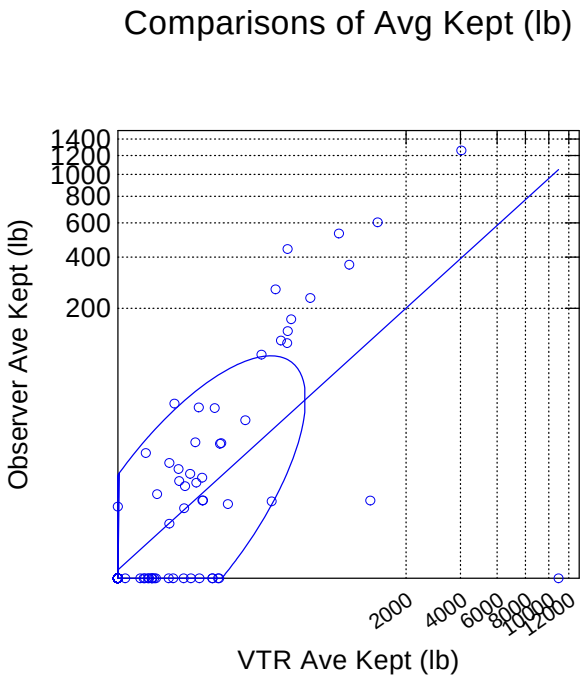
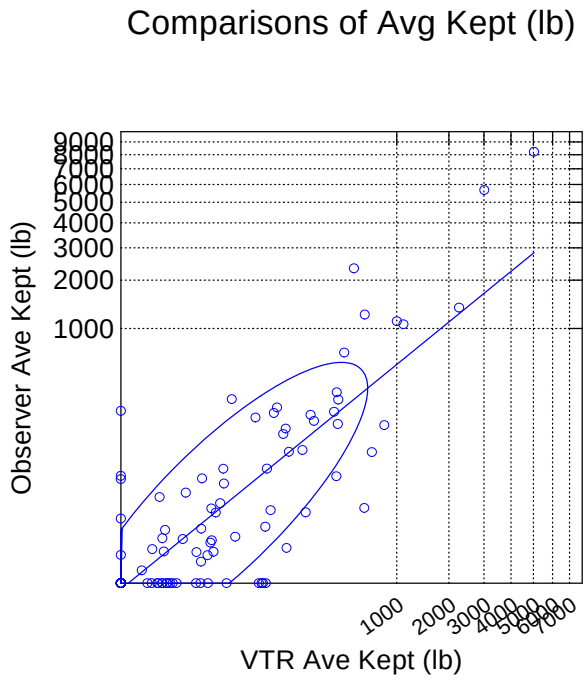


Figure B-6g. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for Mid-Atlantic gillnet; each dot represents a species group and mesh size.

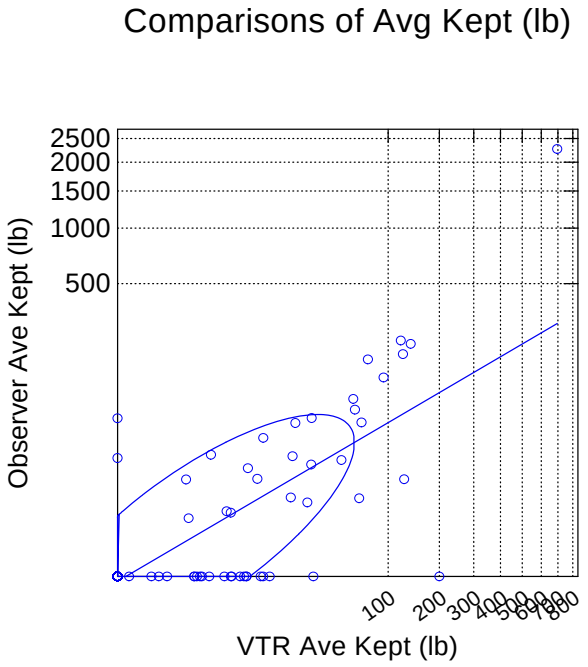
Bluefish



Fluke-Scup-Black Sea Bass



Spiny Dogfish



Northeast multispecies (Large-mesh)

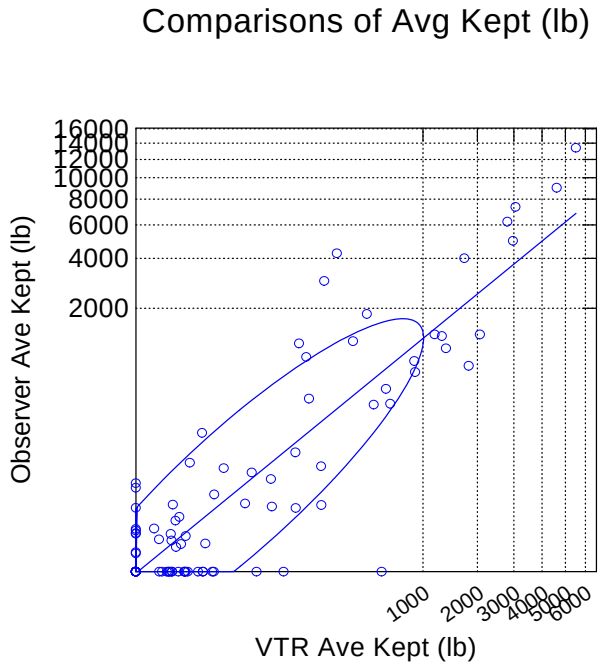
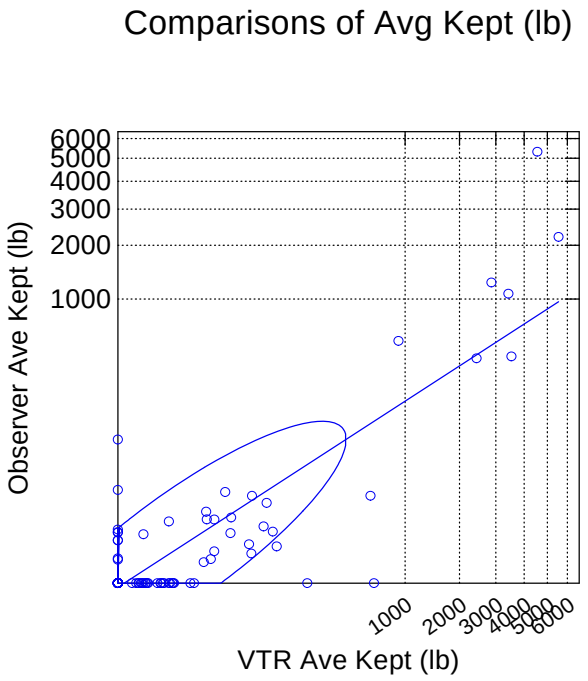
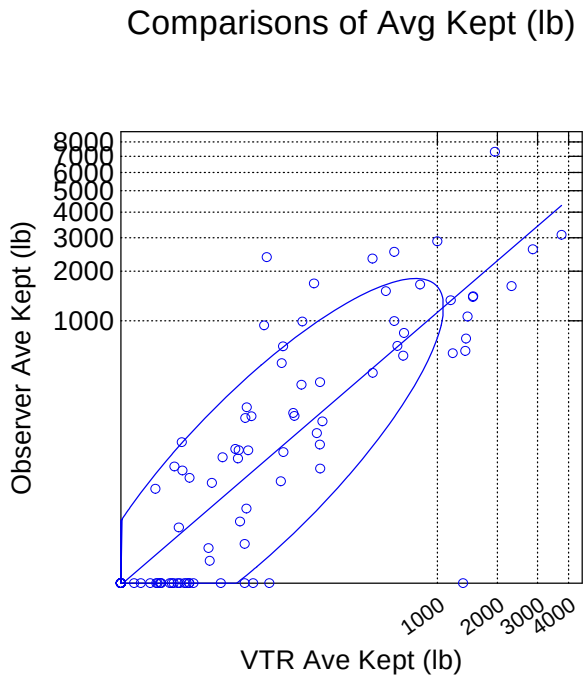


Figure B-7. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

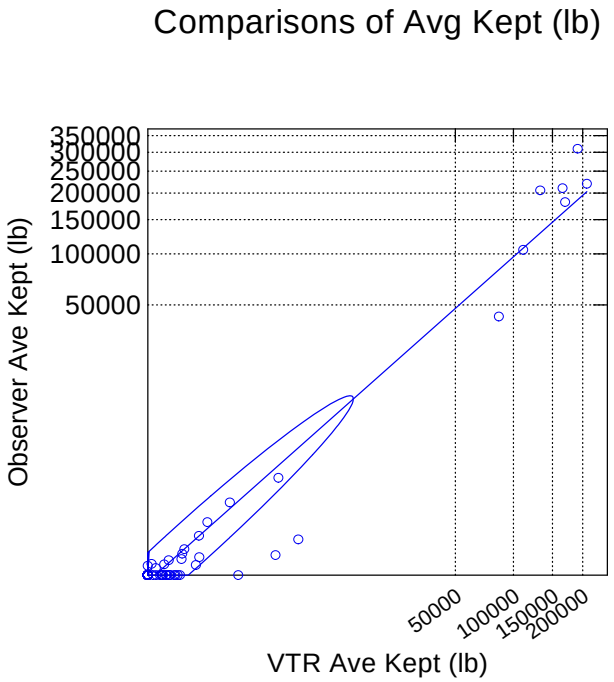
Northeast multispecies (Small-mesh)



Monkfish



Herring



Red Crab

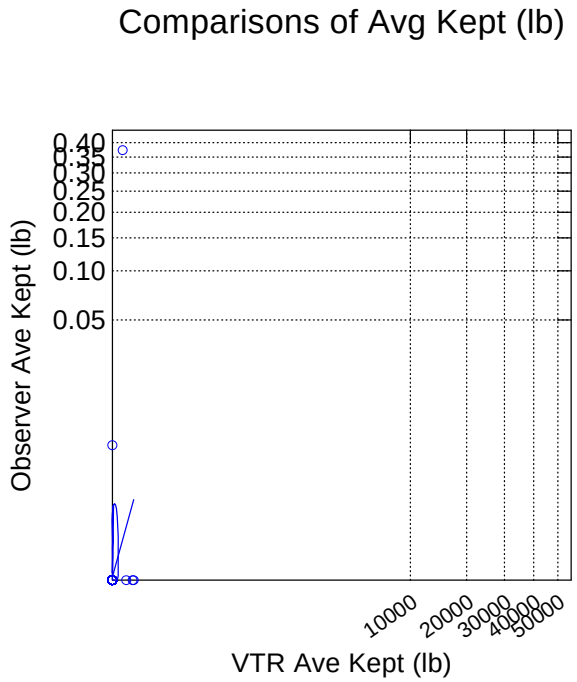
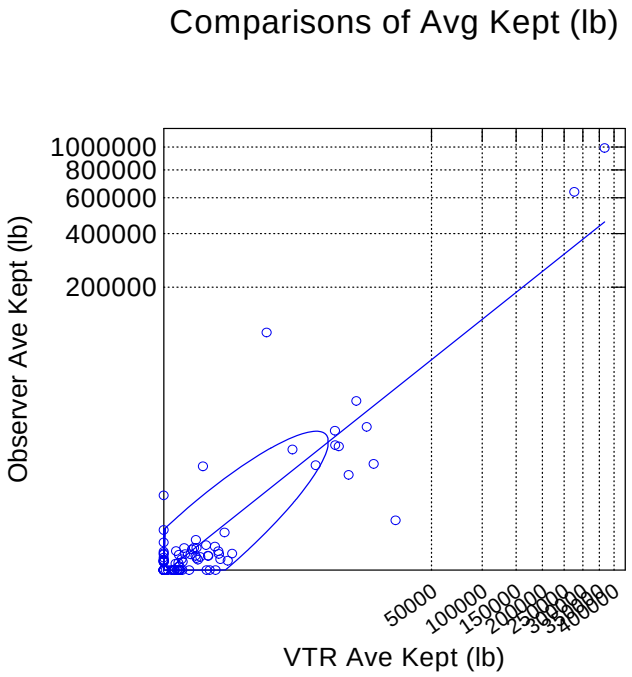
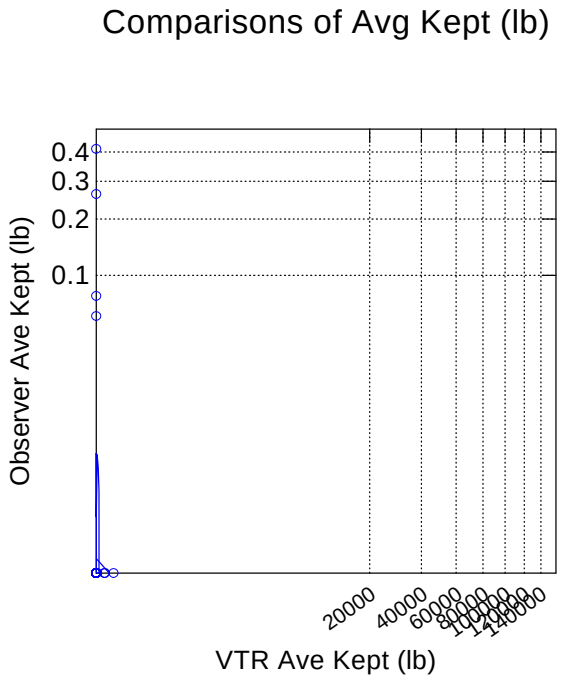


Figure B-7 continued. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

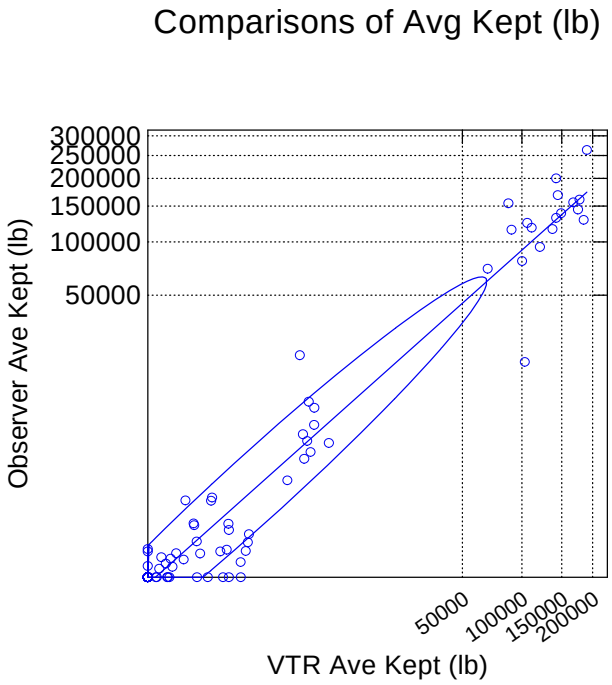
Mackerel-Squid-Butterfish



Surfclam – Ocean Quahog



Scallops



Skate Complex

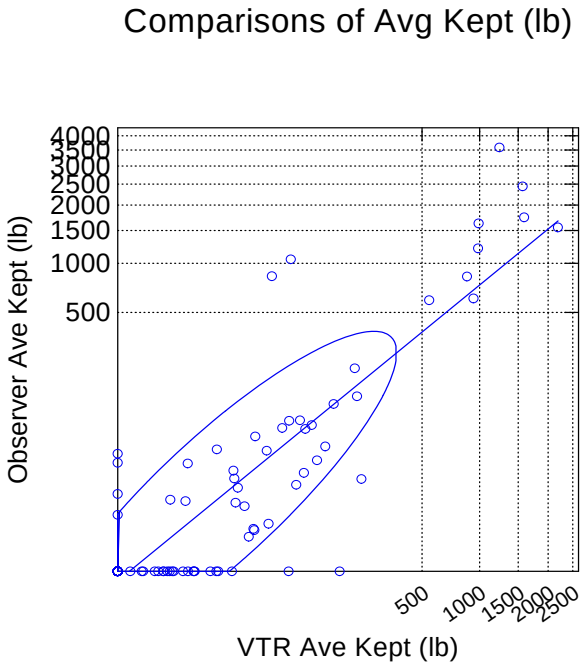
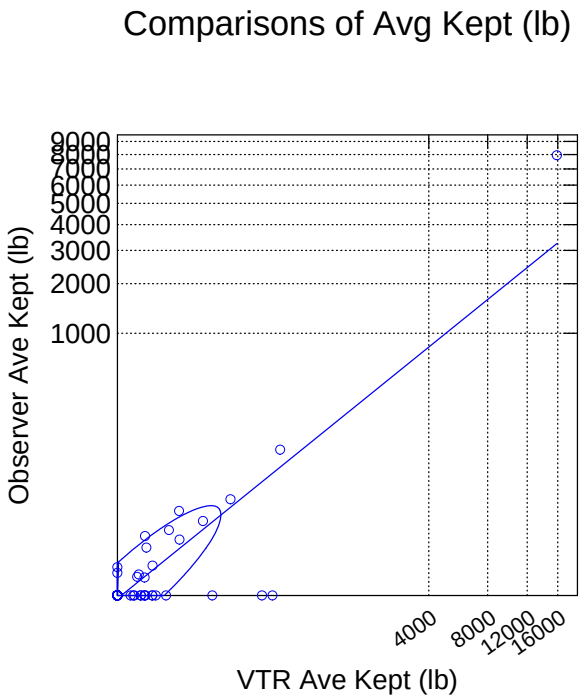


Figure B-7 continued. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

Tilefish



All Species

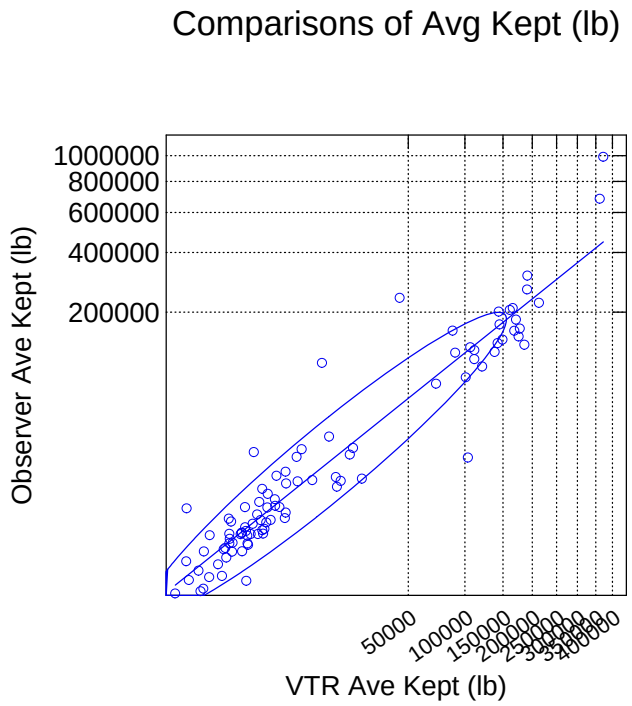
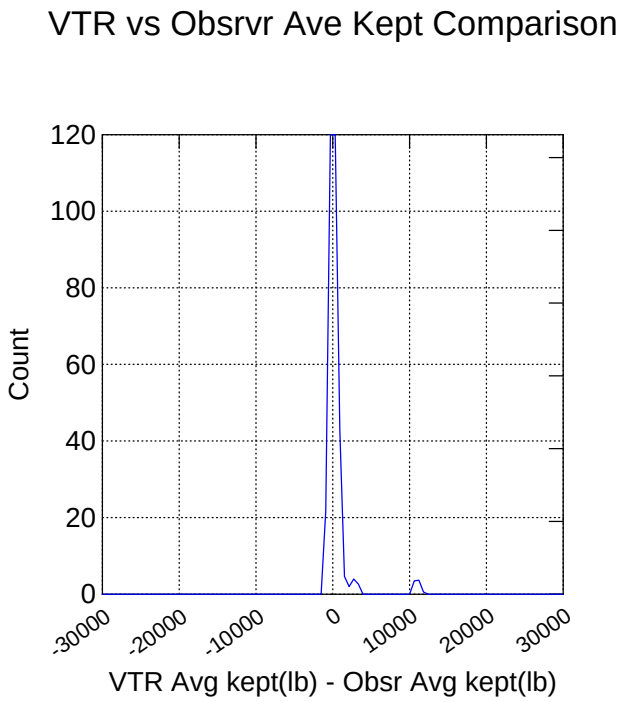
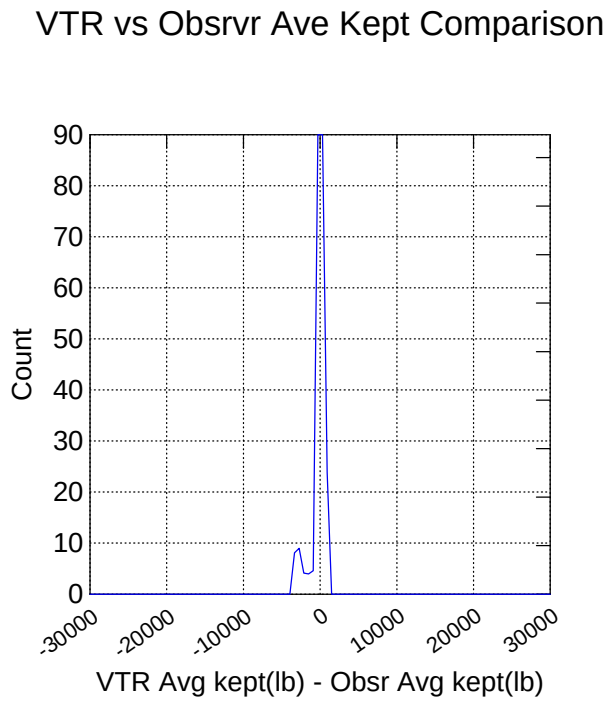


Figure B-7 continued. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

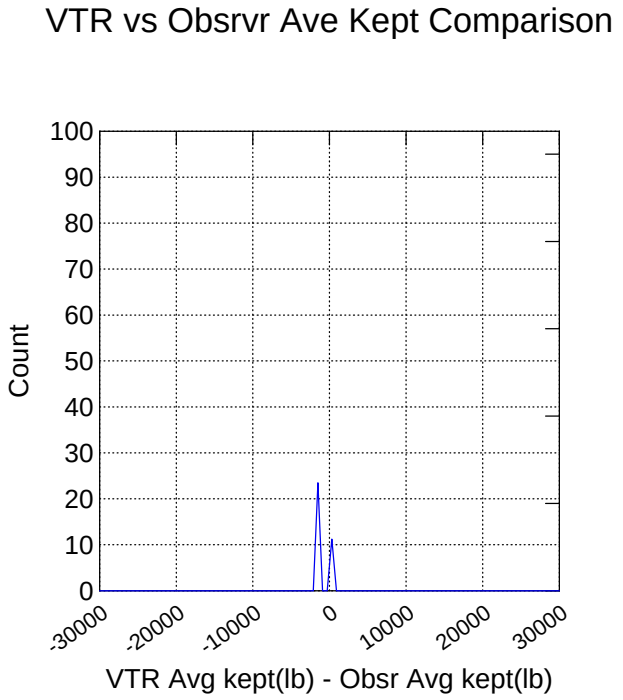
Bluefish



Fluke-Scup-Black Sea Bass



Spiny Dogfish



Northeast multispecies (Large-mesh)

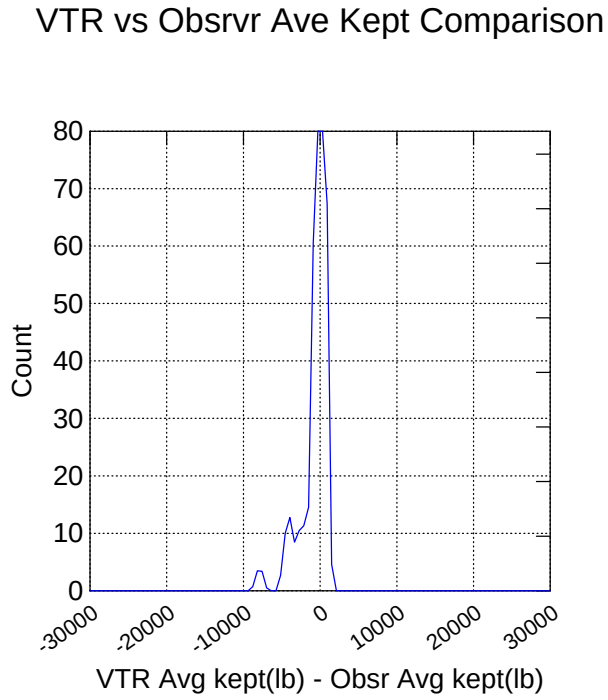
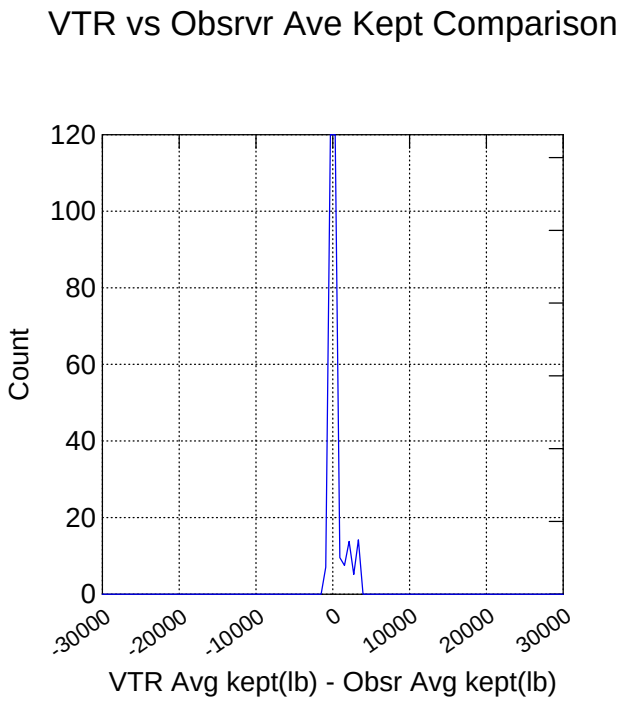
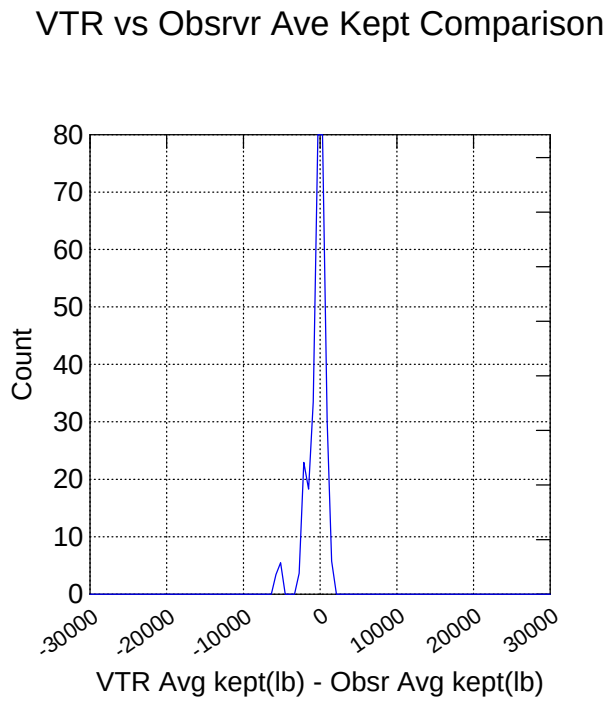


Figure B-8. The distribution of differences in the average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

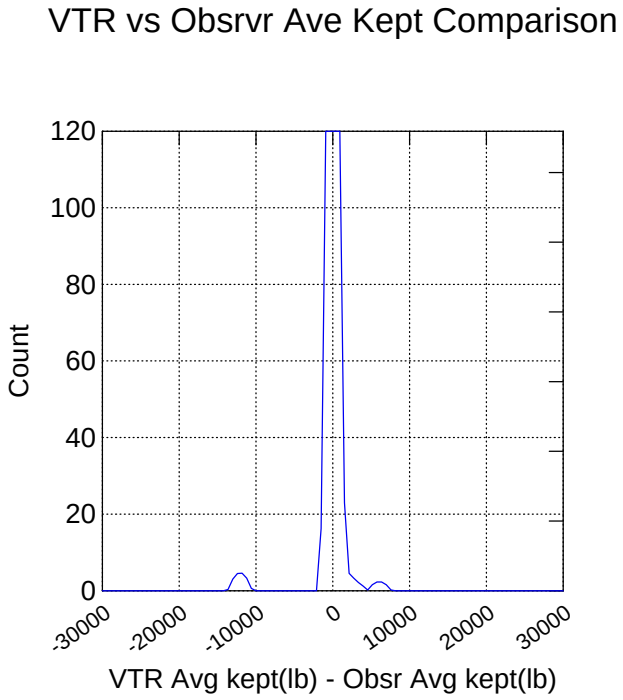
Northeast multispecies (Small-mesh)



Monkfish



Herring



Mackerel-Squid-Butterfish

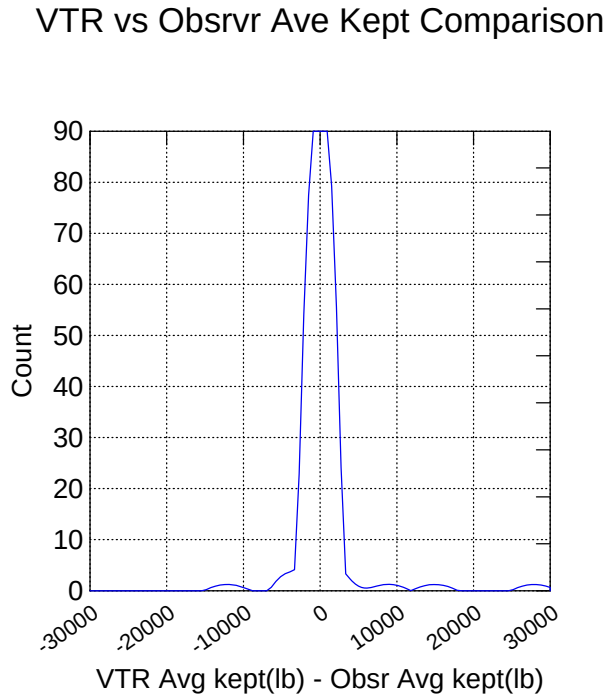
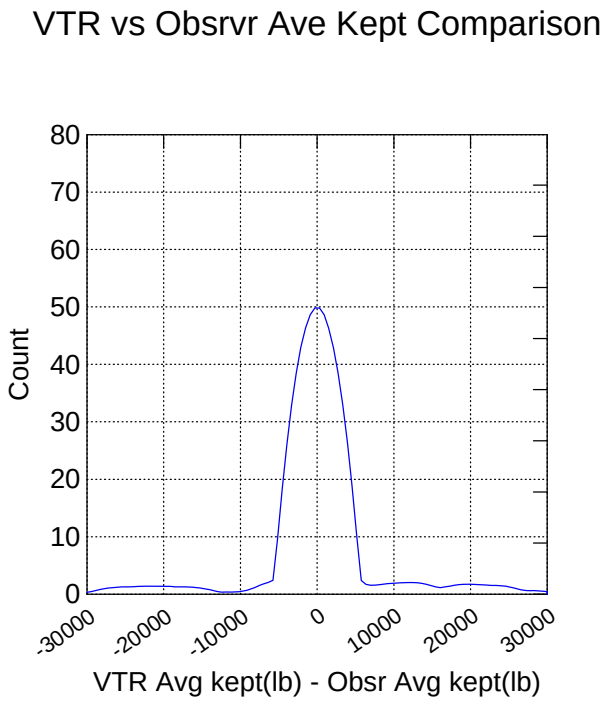
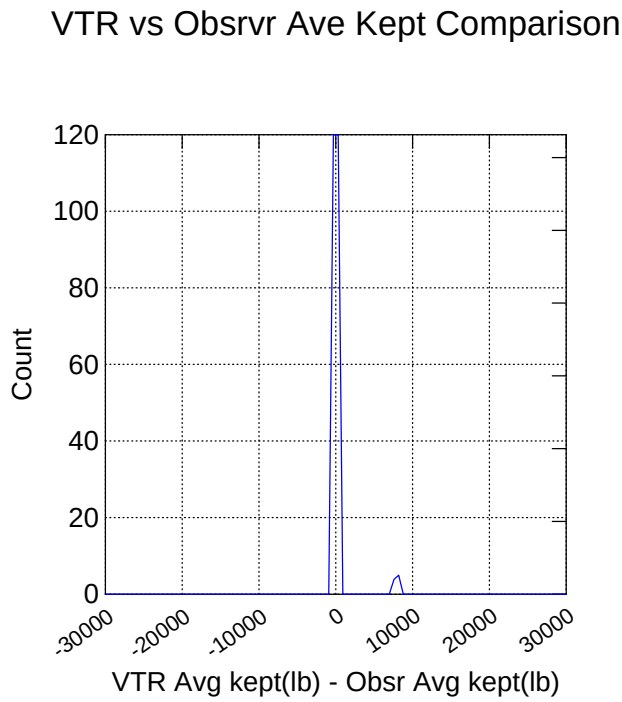


Figure B-8 continued. The distribution of differences in the average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

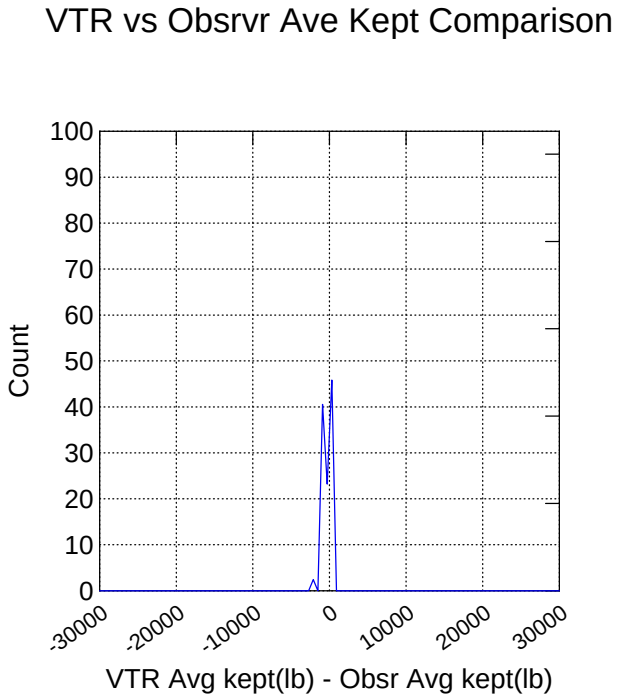
Scallops



Tilefish



Skate Complex



All species

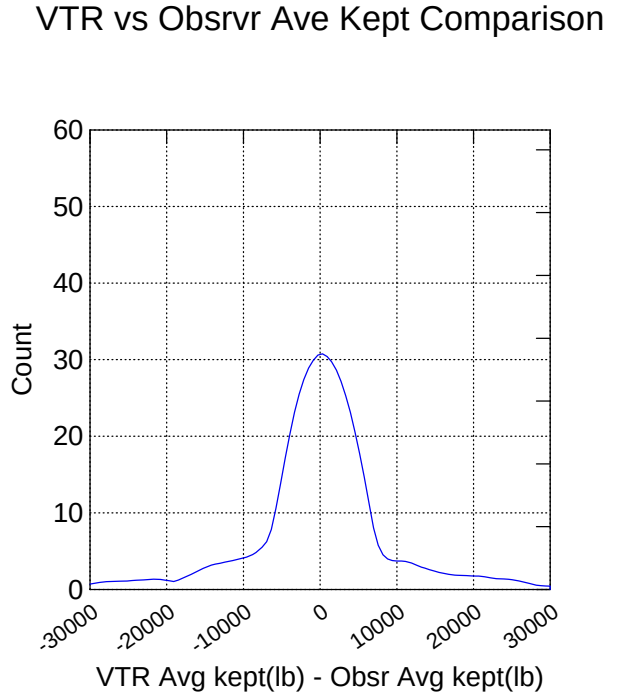
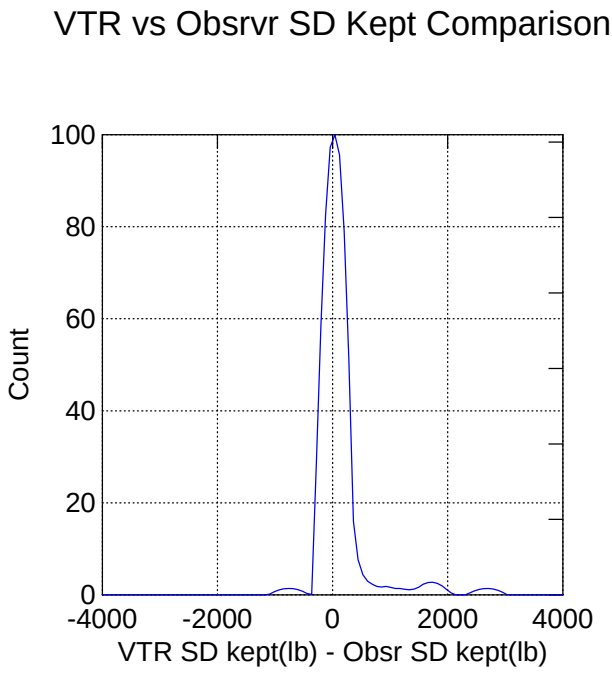
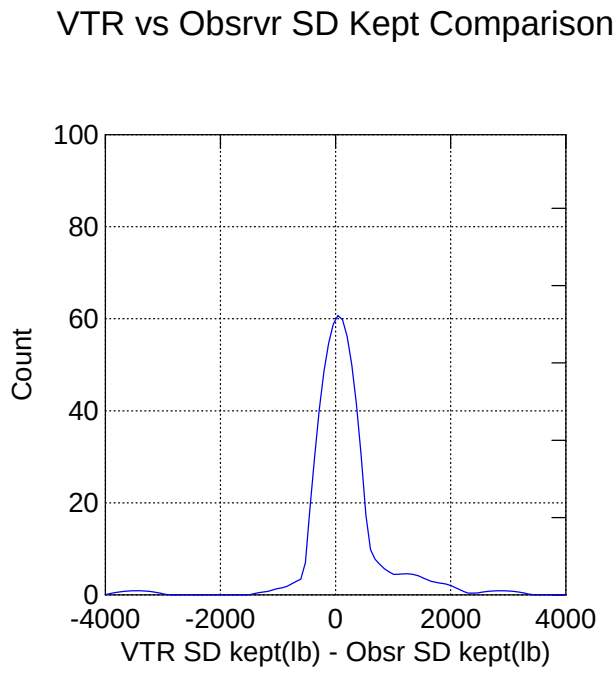


Figure B-8 continued. The distribution of differences in the average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

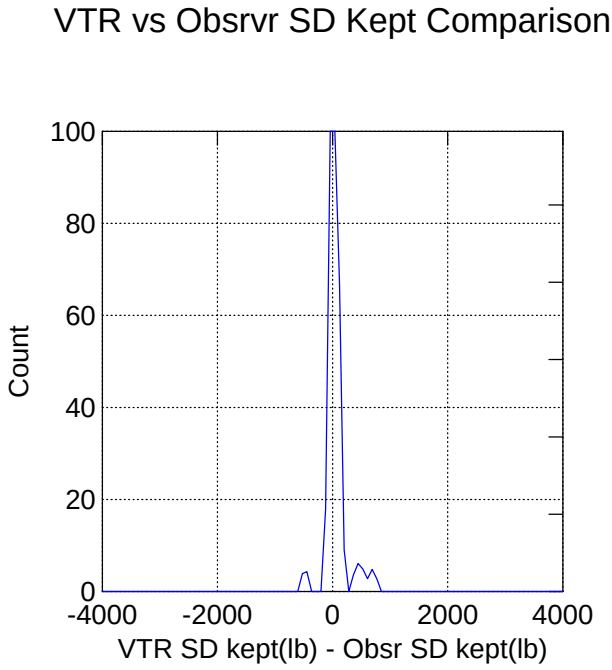
Bluefish



Fluke-Scup-Black Sea Bass



Spiny Dogfish



Northeast multispecies (Large-mesh)

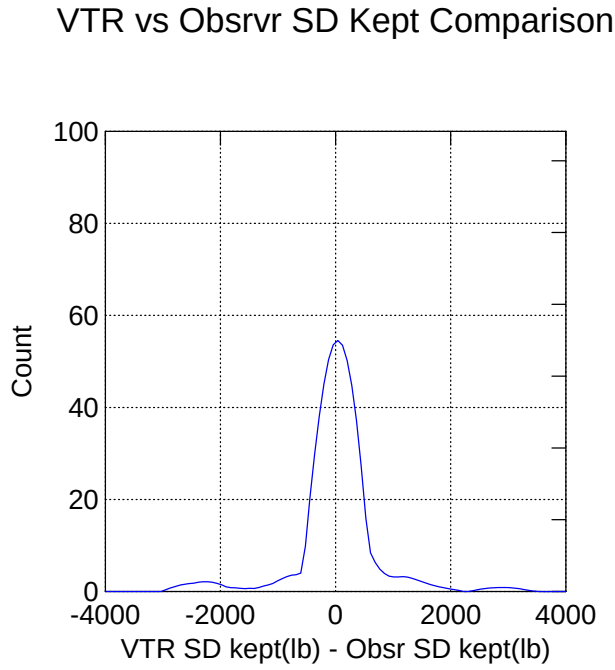
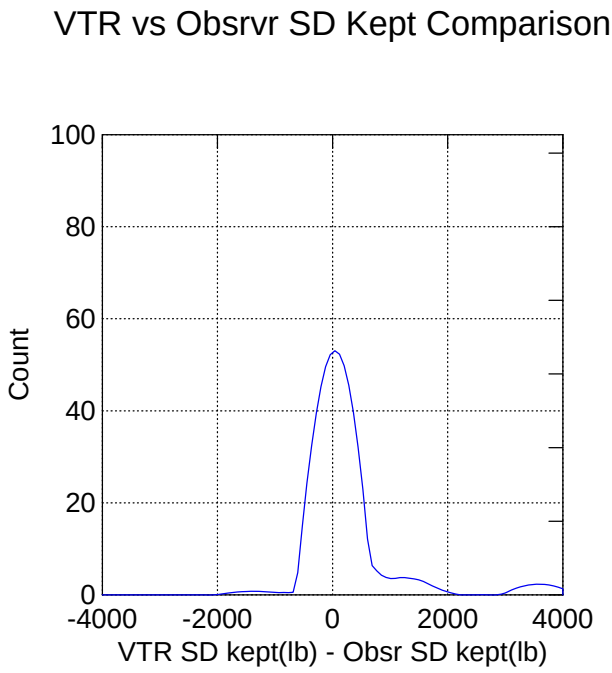
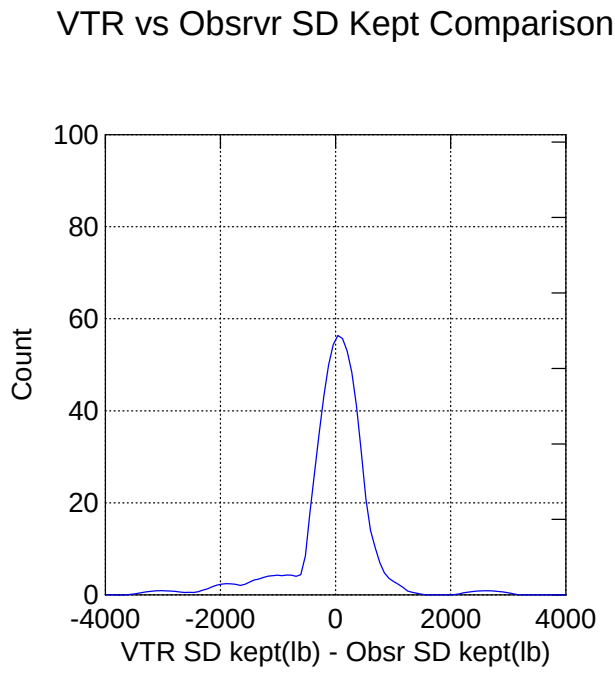


Figure B-9. The distribution of difference between the standard deviation of average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

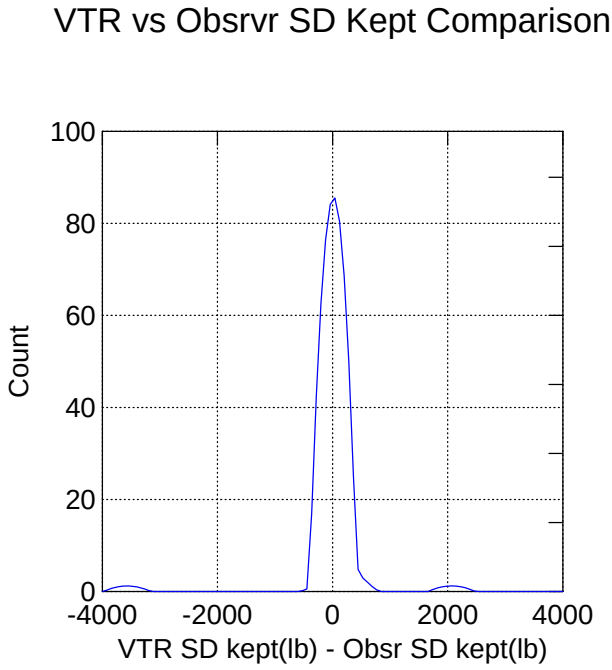
Northeast multispecies (small-mesh)



Monkfish



Herring



Mackerel-Squid-butterfish

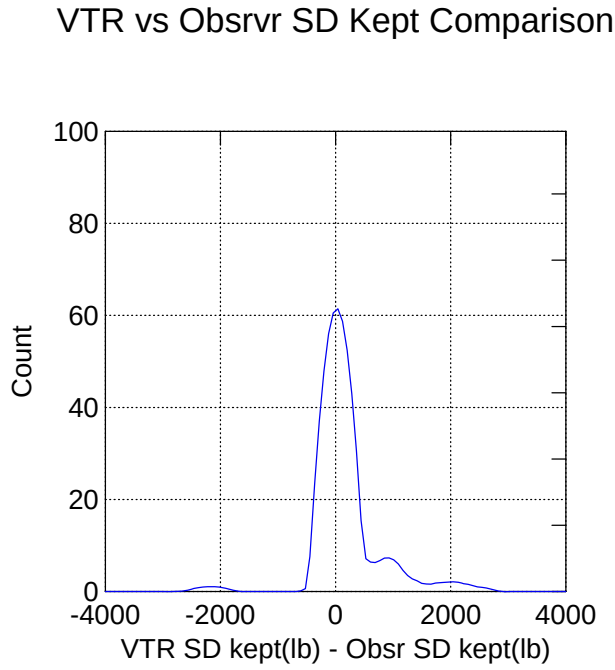
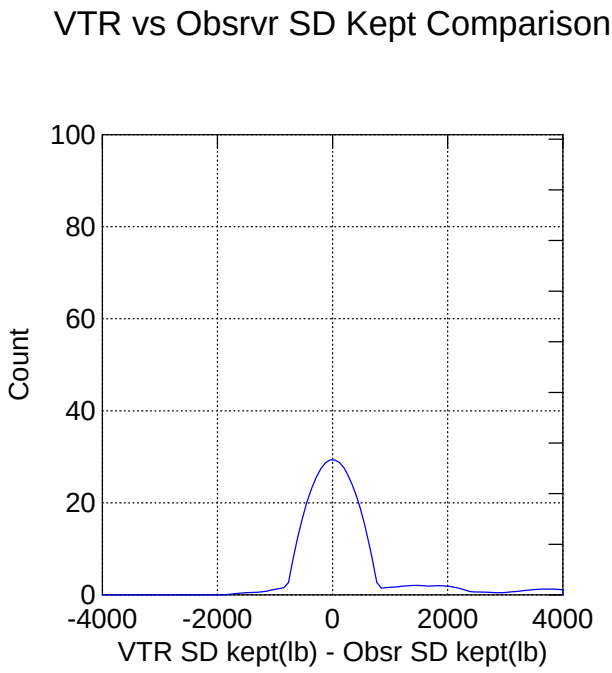
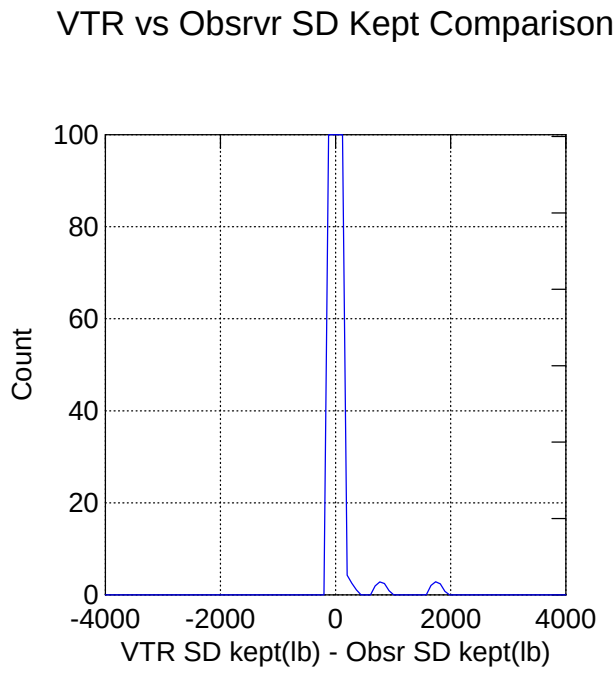


Figure B-9 continued. The distribution of difference between the standard deviation of average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

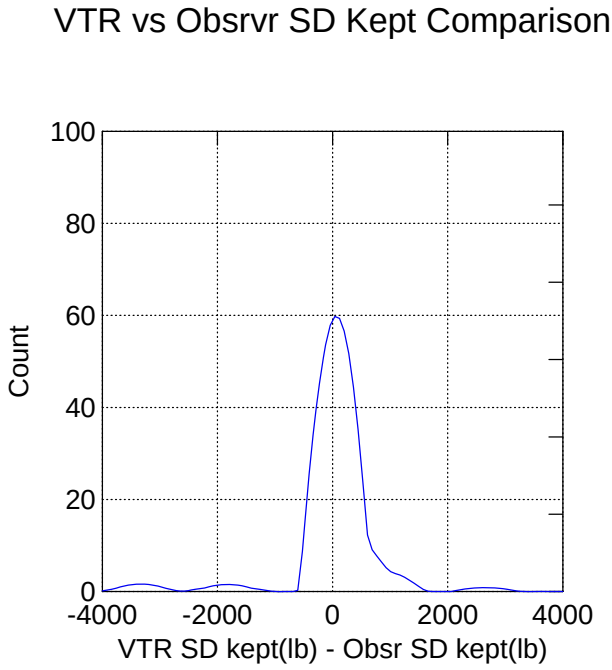
Scallop



Tilefish



Skate Complex



All Species

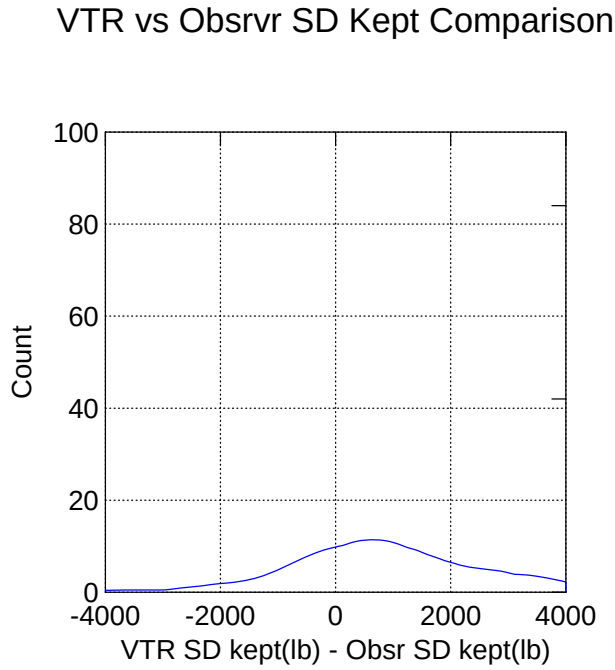


Figure B-9 continued. The distribution of difference between the standard deviation of average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

ALL TRIPS

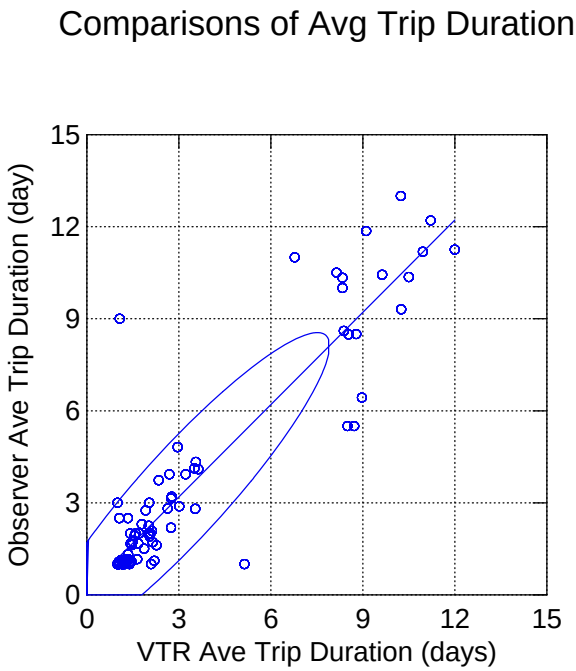
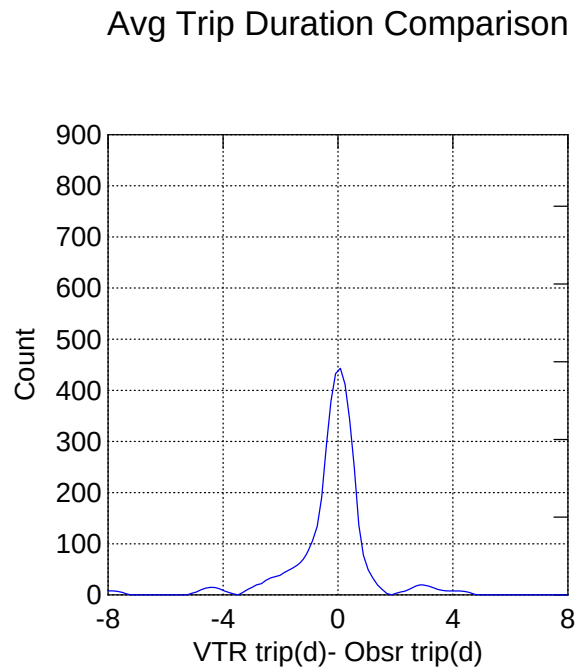


Figure B-10. Comparison of average trip duration (days) for all trips in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

ALL TRIPS



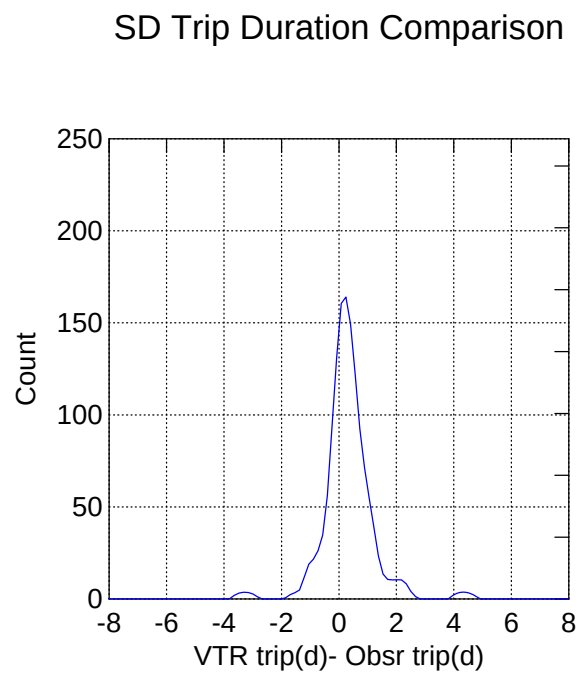


Figure B-11. The distribution of differences between the average trip duration (top), and standard deviation of average trip duration (bottom), for trips in the Northeast Fisheries Observer Program and the FVTR data for 2004

Table B-1. Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*
Longline	all	all	MA	all											
Otter Trawl	all	all	NE	small	0.508	0.437	*	0.428	0.710	**0.227**	0.634	0.320	0.309	0.366	0.405
Otter Trawl	all	all	NE	large	2.474	1.313	*	**0.280**	0.350	0.572	0.520	1.097	0.610	0.756	**0.088**
Otter Trawl	all	all	MA	small	0.903	0.784	*	1.394	0.574	0.561	1.044	0.635	0.735	0.571	0.354
Otter Trawl	all	all	MA	large	1.906	0.775	*	*	0.444	0.390	0.489	0.710	0.456	0.502	**0.295**
Scallop Trawl	open	limited	MA	all	*	*	*	*	**0.000**	**0.000**	*	*	**0.000**	*	**0.000**
Scallop Trawl	open	general	MA	all	1.141	*	*	0.640	**0.224**	0.354	*	0.343	**0.252**	0.976	**0.194**
Shrimp Trawl	all	all	NE	all	*	0.479	*	*	0.965	0.981	*	*	*	0.981	**0.235**
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	**0.000**	**0.000**	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	**0.220**	**0.229**	*	0.625	0.969	0.841	0.876	1.067	*	1.520	**0.210**
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	**0.181**	0.378	*	0.998	0.421	0.498	0.500	*	*	0.906	**0.174**
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	**0.000**	*	*	*	**0.000**	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	1.216	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	0.304	*	*	*	0.587	*	*	*	*	*	**0.273**
Scallop Dredge	open	limited	NE	all	*	*	*	0.842	**0.159**	0.689	*	0.490	1.112	1.662	0.319
Scallop Dredge	open	limited	MA	all	*	*	*	1.304	**0.200**	0.305	1.304	0.514	0.383	0.620	**0.174**
Scallop Dredge	open	general	NE	all	*	*	*	*	**0.094**	1.274	*	1.274	*	*	0.560
Scallop Dredge	open	general	MA	all	*	*	*	*	0.359	0.865	*	*	0.865	*	**0.202**
Scallop Dredge	closed	limited	NE	all	1.077	**0.168**	*	0.482	**0.135**	0.421	**0.167**	**0.255**	0.468	**0.158**	**0.222**
Scallop Dredge	closed	limited	MA	all	1.208	0.660	*	0.357	**0.198**	0.310	0.648	0.338	0.638	0.303	**0.280**
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	*	*	*	*	**0.000**	*	*	*	*	*	**0.000**
Mid-water paired & single Trawl	all	all	NE	all	0.770	0.770	*	*	1.464	0.429	0.430	0.872	1.457	1.387	0.724
Mid-water paired & single Trawl	all	all	MA	all	0.539	0.982	*	*	*	0.545	0.539	0.546	0.539	0.539	1.048
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	0.408
Purse Seine	all	all	NE	all	*	0.981	*	*	*	0.935	*	0.935	*	*	*
Purse Seine	all	all	MA	all											
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all											
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all											
Lobster Pots	all	all	MA	all											

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (LARGE-MESH)	Cod	Haddock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Windowpane	Halibut	Ocean pout
Longline	all	all	NE	all	0.335	0.401	0.389	*	*	*	*	1.191	*	*	*	*	0.569
Longline	all	all	MA	all													
Otter Trawl	all	all	NE	small	**0.233**	0.658	0.696	0.409	0.304	0.332	0.430	0.546	0.593	0.459	**0.291**	0.753	0.321
Otter Trawl	all	all	NE	large	**0.101**	**0.176**	**0.265**	**0.222**	**0.254**	**0.145**	0.429	0.640	**0.248**	**0.235**	**0.206**	0.424	**0.161**
Otter Trawl	all	all	MA	small	0.326	*	*	1.081	1.476	0.489	0.561	*	0.905	0.989	0.399	*	1.506
Otter Trawl	all	all	MA	large	**0.251**	3.122	*	0.669	*	**0.292**	0.413	3.122	0.974	3.133	0.312	*	0.477
Scallop Trawl	open	limited	MA	all	**0.000**	*	*	*	*	*	*	*	*	*	**0.000**	*	*
Scallop Trawl	open	general	MA	all	**0.170**	*	*	1.036	*	0.471	0.464	*	*	0.640	**0.237**	*	*
Shrimp Trawl	all	all	NE	all	**0.224**	0.352	0.659	0.552	0.305	0.928	**0.269**	0.473	0.374	**0.232**	**0.207**	*	0.960
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	**0.092**	**0.121**	**0.186**	**0.198**	**0.281**	0.406	**0.288**	**0.182**	**0.261**	**0.231**	0.432	0.449	0.437
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	**0.159**	**0.175**	**0.246**	0.361	0.337	1.018	0.557	0.317	0.364	0.372	0.815	0.436	0.421
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	0.868	*	*	*	*	*	*	*	*	*	0.868	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	limited	NE	all	0.480	0.850	0.848	0.637	0.848	0.485	1.022	0.848	*	0.525	0.454	*	0.656
Scallop Dredge	open	limited	MA	all	**0.242**	*	*	0.705	0.809	0.496	0.581	*	*	0.521	0.323	*	1.091
Scallop Dredge	open	general	NE	all	0.358	1.226	*	0.494	0.908	0.902	**0.213**	*	*	*	0.438	*	1.287
Scallop Dredge	open	general	MA	all	0.311	*	*	0.865	0.857	0.650	0.421	*	*	0.653	0.333	*	*
Scallop Dredge	closed	limited	NE	all	**0.159**	0.510	0.423	**0.211**	0.829	**0.188**	**0.200**	*	*	0.478	0.355	**0.179**	0.427
Scallop Dredge	closed	limited	MA	all	0.712	*	*	1.256	0.320	0.350	1.269	*	*	0.602	0.886	*	1.239
Scallop Dredge	closed	general	NE	all													
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	0.669	1.198	0.951	*	1.155	1.203	1.298	0.967	0.996	1.604	*	*	*
Mid-water paired & single Trawl	all	all	MA	all	0.708	*	*	*	*	1.146	*	*	*	0.541	*	*	*
Fish Pots/ Traps	all	all	NE	all													
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	NE	all	0.973	*	*	*	*	*	*	*	0.973	*	*	*	*
Purse Seine	all	all	MA	all													
Hand Line	all	all	NE	all	4.030	4.030	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all													
Scottish Seine	all	all	NE	all	**0.289**	**0.279**	**0.279**	*	**0.279**	*	0.543	*	*	**0.279**	0.354	*	*
Clam Quahog Dredge	all	all	NE	all													
Clam Quahog Dredge	all	all	MA	all													
Crab Pots	all	all	NE	all													
Crab Pots	all	all	MA	all													
Lobster Pots	all	all	NE	all													
Lobster Pots	all	all	MA	all													

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (SMALL-MESH)	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	Fluke	Scup	Black sea bass	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	0.910	*	*	0.910	0.614	0.654	*	*	*	*	*	*
Longline	all	all	MA	all												
Otter Trawl	all	all	NE	small	**0.235**	**0.219**	1.511	0.406	0.691	0.322	0.309	**0.276**	0.551	0.708	1.028	0.304
Otter Trawl	all	all	NE	large	**0.182**	**0.227**	0.322	0.353	**0.175**	**0.245**	0.319	0.328	0.918	0.833	1.512	0.529
Otter Trawl	all	all	MA	small	0.508	0.625	0.683	0.587	**0.222**	0.367	0.386	**0.278**	0.560	0.502	0.464	1.155
Otter Trawl	all	all	MA	large	0.827	0.451	*	1.811	**0.209**	0.557	**0.246**	**0.266**	0.354	0.652	0.609	*
Scallop Trawl	open	limited	MA	all	*	*	*	*	**0.000**	*	**0.000**	**0.000**	*	**0.000**	*	*
Scallop Trawl	open	general	MA	all	0.496	0.508	*	1.141	0.347	0.675	0.505	0.608	0.731	0.638	*	*
Shrimp Trawl	all	all	NE	all	0.557	0.567	*	0.537	0.799	0.960	*	*	*	*	*	*
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	**0.000**	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	**0.183**	**0.238**	*	**0.219**	**0.228**	**0.106**	0.845	0.898	*	1.602	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	0.624	**0.207**	*	0.864	**0.117**	**0.162**	**0.233**	**0.233**	0.904	*	*	**0.256**
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	**0.000**	**0.000**	**0.000**	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	*	*	*	*	1.118	1.083	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	*	*	*	*	**0.115**	**0.129**	0.303	0.303	*	*	*	*
Scallop Dredge	open	limited	NE	all	0.414	0.764	1.173	0.352	**0.236**	0.515	0.458	0.474	0.322	0.622	0.391	*
Scallop Dredge	open	limited	MA	all	0.758	0.856	0.738	0.402	**0.126**	**0.230**	**0.259**	**0.272**	0.704	0.558	0.771	*
Scallop Dredge	open	general	NE	all	**0.104**	1.300	*	**0.103**	**0.177**	0.318	**0.092**	**0.092**	*	*	1.287	*
Scallop Dredge	open	general	MA	all	0.482	0.467	*	0.857	**0.202**	0.550	0.461	0.461	*	*	0.830	*
Scallop Dredge	closed	limited	NE	all	0.396	0.403	0.489	0.448	**0.126**	0.326	**0.291**	**0.293**	**0.218**	**0.161**	**0.198**	*
Scallop Dredge	closed	limited	MA	all	**0.268**	0.323	*	**0.282**	**0.142**	0.425	0.383	0.385	1.011	0.333	0.321	*
Scallop Dredge	closed	general	NE	all												
Scallop Dredge	closed	general	MA	all	*	*	*	*	**0.000**	*	**0.000**	**0.000**	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	0.994	1.000	*	0.748	1.177	0.418	0.628	*	0.671	1.626	*	*
Mid-water paired & single Trawl	all	all	MA	all	0.539	0.539	*	0.539	*	**0.246**	1.165	1.142	*	1.176	*	*
Fish Pots/ Traps	all	all	NE	all												
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	**0.161**	*	**0.163**	**0.161**	*	*
Purse Seine	all	all	NE	all	*	*	*	*	*	0.972	*	*	*	*	*	*
Purse Seine	all	all	MA	all												
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all												
Scottish Seine	all	all	NE	all	**0.279**	**0.279**	*	**0.279**	0.319	*	**0.253**	**0.259**	0.808	0.808	*	*
Clam Quahog Dredge	all	all	NE	all												
Clam Quahog Dredge	all	all	MA	all												
Crab Pots	all	all	NE	all												
Crab Pots	all	all	MA	all												
Lobster Pots	all	all	NE	all												
Lobster Pots	all	all	MA	all												

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	**TURTLES**	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	**SEALS**	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK	**WHALES**
Longline	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Otter Trawl	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	*	*	0.931
Otter Trawl	all	all	NE	large	*	*	*	*	*	*	*	*	*	*	*	*	1.089
Otter Trawl	all	all	MA	small	0.573	*	*	0.573	*	*	*	*	*	*	*	*	*
Otter Trawl	all	all	MA	large	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Trawl	open	limited	MA	all	0.381	*	*	0.381	*	*	*	*	*	*	*	*	*
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	*	*	*	*	*	*	**0.206**	**0.293**	*	**0.273**	0.520	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	*	*	*	*	*	*	**0.215**	0.435	0.751	0.320	**0.273**	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	small	0.626	*	0.787	*	*	1.013	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	1.052	1.479	*	1.478	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	0.495	*	0.730	0.656	*	*	0.692	*	*	1.023	0.924	*	*
Scallop Dredge	open	limited	NE	all	0.551	*	*	0.551	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	limited	MA	all	0.770	*	*	0.770	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	limited	NE	all	**0.165**	*	*	**0.165**	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	general	NE	all													
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	1.114
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Fish Pots/ Traps	all	all	NE	all													
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Clam Quahog Dredge	all	all	NE	all													
Clam Quahog Dredge	all	all	MA	all													
Crab Pots	all	all	NE	all													
Crab Pots	all	all	MA	all													
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Lobster Pots	all	all	MA	all													

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHINS/- PORPOISE	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN- BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/ DOLPHIN, NK	SEA BIRDS (ALL)	ALL SPECIES	PILOT coverage
Longline	all	all	NE	all	*	*	*	*	*	*	*	*	*	0.425	0.489	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*		pilot
Otter Trawl	all	all	NE	small	0.931	*	*	0.650	0.936	0.713	*	*	*	0.548	**0.193**	
Otter Trawl	all	all	NE	large	1.089	*	*	0.389	0.389	*	*	*	*	0.489	**0.124**	
Otter Trawl	all	all	MA	small	*	*	*	0.557	*	0.557	*	*	*	0.706	**0.247**	
Otter Trawl	all	all	MA	large	*	*	*	*	*	*	*	*	*	0.672	**0.185**	
Scallop Trawl	open	limited	MA	all	*	*	*	*	*	*	*	*	*	*	**0.000**	pilot
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	**0.243**	pilot
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	0.310	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	**0.052**	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	**0.000**	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	*	*	*	0.359	0.977	*	*	0.384	*	0.342	**0.092**	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	*	*	*	**0.288**	*	*	0.751	0.300	*	0.602	**0.085**	
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	*	*	*	*	0.582	**0.000**	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	*	*	*	*	*	*	*	*	*	0.618	1.078	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	*	*	*	0.924	*	*	*	0.924	*	0.693	**0.052**	pilot for fish
Scallop Dredge	open	limited	NE	all	*	*	*	*	*	*	*	*	*	0.896	**0.197**	
Scallop Dredge	open	limited	MA	all	*	*	*	*	*	*	*	*	*	*	**0.112**	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	0.325	pilot
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	**0.184**	
Scallop Dredge	closed	limited	NE	all	*	*	*	*	*	*	*	*	*	**0.163**	**0.119**	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	**0.119**	
Scallop Dredge	closed	general	NE	all												pilot
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	**0.000**	pilot
Mid-water paired & single Trawl	all	all	NE	all	1.114	*	*	0.786	0.786	*	*	*	*	0.554	0.317	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	0.408	
Fish Pots/ Traps	all	all	NE	all												pilot
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	**0.137**	pilot
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	0.715	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*		pilot
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	4.030	pilot
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*		pilot
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	0.423	pilot
Clam Quahog Dredge	all	all	NE	all												pilot
Clam Quahog Dredge	all	all	MA	all												pilot
Crab Pots	all	all	NE	all												pilot
Crab Pots	all	all	MA	all												pilot
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*		pilot
Lobster Pots	all	all	MA	all												pilot

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-2. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	8	8	*	8	8	8	8	8	8	8
Longline	all	all	MA	all										
Otter Trawl	all	all	NE	small	16	12	*	25	29	6	5	8	4	7
Otter Trawl	all	all	NE	large	22	23	*	12	20	29	27	31	30	3
Otter Trawl	all	all	MA	small	14	22	*	26	15	5	7	11	4	13
Otter Trawl	all	all	MA	large	16	24	*	26	6	21	20	12	15	8
Scallop Trawl	open	limited	MA	all	8	8	*	8	1	8	8	6	8	4
Scallop Trawl	open	general	MA	all	15	20	*	12	2	20	16	9	11	4
Shrimp Trawl	all	all	NE	all	20	1	*	20	17	20	20	20	19	14
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	*	3	3	2	3	3	3	3
Sink, Anchor, Drift Gillnet	all	all	NE	large	9	15	*	22	24	12	23	27	25	8
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	6	19	*	21	18	8	27	27	23	3
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	*	4	4	4	4	4	2	4
Sink, Anchor, Drift Gillnet	all	all	MA	large	2	5	*	5	5	5	5	5	5	5
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	4	7	*	7	6	7	7	7	7	3
Scallop Dredge	open	limited	NE	all	26	26	*	24	1	26	17	16	18	3
Scallop Dredge	open	limited	MA	all	24	24	*	22	1	23	14	12	18	3
Scallop Dredge	open	general	NE	all	17	17	*	17	3	17	14	17	17	1
Scallop Dredge	open	general	MA	all	16	16	*	16	2	16	16	13	16	3
Scallop Dredge	closed	limited	NE	all	19	28	*	25	1	27	20	13	24	3
Scallop Dredge	closed	limited	MA	all	20	19	*	24	1	15	14	12	23	3
Scallop Dredge	closed	general	NE	all										
Scallop Dredge	closed	general	MA	all	5	5	*	5	1	5	5	5	5	3
Mid-water paired & single Trawl	all	all	NE	all	9	3	*	23	21	1	10	15	7	12
Mid-water paired & single Trawl	all	all	MA	all	11	10	*	15	15	14	2	7	9	3
Fish Pots/ Traps	all	all	NE	all										
Fish Pots/ Traps	all	all	MA	all	4	4	*	4	4	4	4	4	4	3
Purse Seine	all	all	NE	all	5	2	*	5	5	5	4	5	5	5
Purse Seine	all	all	MA	all										
Hand Line	all	all	NE	all	2	2	*	2	2	2	2	2	2	2
Hand Line	all	all	MA	all										
Scottish Seine	all	all	NE	all	13	13	*	13	13	13	13	13	13	13
Clam Quahog Dredge	all	all	NE	all										
Clam Quahog Dredge	all	all	MA	all										
Crab Pots	all	all	NE	all										
Crab Pots	all	all	MA	all										
Lobster Pots	all	all	NE	all										
Lobster Pots	all	all	MA	all										

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Cod	Had-dock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Window-pane	Halibut	Ocean pout
Longline	all	all	NE	all	2	4	8	8	8	8	6	8	8	8	8	5
Longline	all	all	MA	all												
Otter Trawl	all	all	NE	small	18	13	22	20	14	15	28	24	17	26	30	21
Otter Trawl	all	all	NE	large	8	10	7	9	5	14	16	13	18	4	21	11
Otter Trawl	all	all	MA	small	28	28	24	25	17	16	28	21	23	12	28	19
Otter Trawl	all	all	MA	large	22	26	17	26	9	10	19	25	23	7	26	11
Scallop Trawl	open	limited	MA	all	8	8	8	8	8	8	8	8	8	3	8	8
Scallop Trawl	open	general	MA	all	20	20	18	20	17	8	20	20	13	5	20	20
Shrimp Trawl	all	all	NE	all	8	15	7	3	13	5	6	12	11	9	20	16
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	3	3	3	3	3	3	3	3	3	3
Sink, Anchor, Drift Gillnet	all	all	NE	large	2	10	5	13	21	7	4	11	6	20	18	17
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	13	10	20	26	15	7	22	9	25	17	12
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	4	4	4	4	4	4	4	4	4	4
Sink, Anchor, Drift Gillnet	all	all	MA	large	5	5	5	5	5	5	5	5	5	4	5	5
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	7	7	7	7	7	7	7	7	7	7	7
Scallop Dredge	open	limited	NE	all	19	22	11	23	7	6	25	26	20	10	26	15
Scallop Dredge	open	limited	MA	all	24	24	16	21	8	15	24	24	10	6	24	17
Scallop Dredge	open	general	NE	all	13	17	4	12	10	5	17	17	17	8	17	14
Scallop Dredge	open	general	MA	all	16	16	13	13	11	6	16	16	10	4	16	16
Scallop Dredge	closed	limited	NE	all	15	14	4	10	11	9	29	29	16	6	26	21
Scallop Dredge	closed	limited	MA	all	25	25	6	18	7	11	25	25	16	8	25	22
Scallop Dredge	closed	general	NE	all												
Scallop Dredge	closed	general	MA	all	5	5	5	5	5	5	5	5	5	5	5	5
Mid-water paired & single Trawl	all	all	NE	all	16	6	23	13	18	19	8	5	14	23	23	23
Mid-water paired & single Trawl	all	all	MA	all	15	15	15	15	13	15	15	15	12	15	15	15
Fish Pots/ Traps	all	all	NE	all												
Fish Pots/ Traps	all	all	MA	all	4	4	4	4	4	4	4	4	4	4	4	4
Purse Seine	all	all	NE	all	5	5	5	5	5	5	5	3	5	5	5	5
Purse Seine	all	all	MA	all												
Hand Line	all	all	NE	all	1	2	2	2	2	2	2	2	2	2	2	2
Hand Line	all	all	MA	all												
Scottish Seine	all	all	NE	all	7	11	13	8	13	9	13	13	11	2	13	13
Clam Quahog Dredge	all	all	NE	all												
Clam Quahog Dredge	all	all	MA	all												
Crab Pots	all	all	NE	all												
Crab Pots	all	all	MA	all												
Lobster Pots	all	all	NE	all												
Lobster Pots	all	all	MA	all												

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	Fluke	Scup	Black sea bass	SURF CLAM/- OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	8	8	7	3	1	8	8	8	8	8
Longline	all	all	MA	all										
Otter Trawl	all	all	NE	small	2	23	9	1	3	10	11	19	31	27
Otter Trawl	all	all	NE	large	15	26	19	1	2	6	17	24	28	25
Otter Trawl	all	all	MA	small	6	20	8	1	2	10	3	9	18	27
Otter Trawl	all	all	MA	large	14	26	18	1	2	3	4	5	13	26
Scallop Trawl	open	limited	MA	all	8	8	8	2	8	5	8	7	8	8
Scallop Trawl	open	general	MA	all	7	20	14	1	3	6	10	19	20	20
Shrimp Trawl	all	all	NE	all	2	20	10	4	18	20	20	20	20	20
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	3	3	1	3	3	3	3	3
Sink, Anchor, Drift Gillnet	all	all	NE	large	14	27	16	3	1	19	27	26	27	27
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	16	27	11	2	1	5	23	27	27	14
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	4	4	1	3	4	4	4	4
Sink, Anchor, Drift Gillnet	all	all	MA	large	5	5	5	3	1	5	5	5	5	5
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	7	7	2	1	5	7	7	7	7
Scallop Dredge	open	limited	NE	all	13	14	8	2	9	4	21	12	5	26
Scallop Dredge	open	limited	MA	all	9	20	13	2	5	4	19	11	7	24
Scallop Dredge	open	general	NE	all	16	17	9	2	6	7	17	17	11	17
Scallop Dredge	open	general	MA	all	9	16	12	1	8	5	16	16	7	16
Scallop Dredge	closed	limited	NE	all	12	22	7	2	8	5	23	17	18	29
Scallop Dredge	closed	limited	MA	all	10	25	13	2	5	4	17	9	21	25
Scallop Dredge	closed	general	NE	all										
Scallop Dredge	closed	general	MA	all	5	5	5	2	5	4	5	5	5	5
Mid-water paired & single Trawl	all	all	NE	all	4	23	17	11	2	23	20	22	23	23
Mid-water paired & single Trawl	all	all	MA	all	6	15	5	15	1	8	15	4	15	15
Fish Pots/ Traps	all	all	NE	all										
Fish Pots/ Traps	all	all	MA	all	4	4	4	4	4	4	2	1	4	4
Purse Seine	all	all	NE	all	5	5	5	5	1	5	5	5	5	5
Purse Seine	all	all	MA	all										
Hand Line	all	all	NE	all	2	2	2	2	2	2	2	2	2	2
Hand Line	all	all	MA	all										
Scottish Seine	all	all	NE	all	5	13	3	4	13	1	10	6	13	13
Clam Quahog Dredge	all	all	NE	all										
Clam Quahog Dredge	all	all	MA	all										
Crab Pots	all	all	NE	all										
Crab Pots	all	all	MA	all										
Lobster Pots	all	all	NE	all										
Lobster Pots	all	all	MA	all										

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK
Longline	all	all	NE	all	2	2	2	*	2	2	2	2	2	*
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Otter Trawl	all	all	NE	small	5	5	5	*	5	5	5	5	5	*
Otter Trawl	all	all	NE	large	4	4	4	*	4	4	4	4	4	*
Otter Trawl	all	all	MA	small	4	4	2	*	4	4	4	4	4	*
Otter Trawl	all	all	MA	large	2	2	2	*	2	2	2	2	2	*
Scallop Trawl	open	limited	MA	all	2	2	1	*	2	2	2	2	2	*
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	7	7	*	7	2	7	3	4	*
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	8	8	8	*	8	4	6	1	3	*
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	2	4	*	3	4	4	4	4	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	2	4	2	*	4	4	4	4	4	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	4	1	*	7	7	7	6	5	*
Scallop Dredge	open	limited	NE	all	3	3	1	*	3	3	3	3	3	*
Scallop Dredge	open	limited	MA	all	2	2	1	*	2	2	2	2	2	*
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	limited	NE	all	3	3	2	*	3	3	3	3	3	*
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	general	NE	all										
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	4	4	4	*	4	4	4	4	4	*
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Fish Pots/ Traps	all	all	NE	all										
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*
Clam Quahog Dredge	all	all	NE	all										
Clam Quahog Dredge	all	all	MA	all										
Crab Pots	all	all	NE	all										
Crab Pots	all	all	MA	all										
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*
Lobster Pots	all	all	MA	all										

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN-BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/DOLP HIN, NK	SEA BIRDS (ALL)	PILOT coverage
Longline	all	all	NE	all	2	*	*	2	2	2	2	*	1	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Otter Trawl	all	all	NE	small	3	*	*	3	1	5	5	*	2	
Otter Trawl	all	all	NE	large	3	*	*	1	4	4	4	*	2	
Otter Trawl	all	all	MA	small	4	*	*	4	1	4	4	*	3	
Otter Trawl	all	all	MA	large	2	*	*	2	2	2	2	*	1	
Scallop Trawl	open	limited	MA	all	2	*	*	2	2	2	2	*	2	pilot
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	*	*	6	7	7	5	*	1	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	8	*	*	8	8	6	2	*	5	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	*	*	4	4	4	4	*	1	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	*	*	4	4	4	4	*	1	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	*	*	7	7	7	1	*	3	pilot for fish
Scallop Dredge	open	limited	NE	all	3	*	*	3	3	3	3	*	2	
Scallop Dredge	open	limited	MA	all	2	*	*	2	2	2	2	*	2	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	pilot
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	3	*	*	3	3	3	3	*	1	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all										pilot
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Mid-water paired & single Trawl	all	all	NE	all	3	*	*	2	4	4	4	*	1	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all										pilot
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Clam Quahog Dredge	all	all	NE	all										pilot
Clam Quahog Dredge	all	all	MA	all										pilot
Crab Pots	all	all	NE	all										pilot
Crab Pots	all	all	MA	all										pilot
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Lobster Pots	all	all	MA	all										pilot

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	Mackerel	Illex	Loligo	Butterfish	MONKFISH	
Longline	all	all	NE	all	14	13	*	11	19	13	15	14	16	21	
Longline	all	all	MA	all											
Otter Trawl	all	all	NE	small	2	2	*	2	13	2	1	1	1	4	
Otter Trawl	all	all	NE	large	4	5	*	1	11	7	4	8	7	3	
Otter Trawl	all	all	MA	small	3	7	*	6	10	3	2	2	2	11	
Otter Trawl	all	all	MA	large	8	9	*	11	7	8	8	3	5	10	
Scallop Trawl	open	limited	MA	all	14	13	*	11	3	13	15	6	16	13	
Scallop Trawl	open	general	MA	all	11	13	*	3	8	13	13	9	8	14	
Shrimp Trawl	all	all	NE	all	14	3	*	11	16	13	15	14	12	19	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	14	13	*	11	19	6	15	14	16	21	
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	6	*	4	17	5	10	14	11	15	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	5	8	*	5	15	4	15	14	13	5	
Sink, Anchor, Drift Gillnet	all	all	MA	small	14	13	*	11	19	13	15	14	3	21	
Sink, Anchor, Drift Gillnet	all	all	MA	large	1	13	*	11	19	13	15	14	16	21	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	6	13	*	11	14	13	15	14	16	12	
Scallop Dredge	open	limited	NE	all	14	13	*	7	2	13	5	5	6	1	
Scallop Dredge	open	limited	MA	all	14	13	*	8	1	10	7	4	9	2	
Scallop Dredge	open	general	NE	all	14	13	*	11	9	13	12	14	16	6	
Scallop Dredge	open	general	MA	all	14	13	*	11	6	13	15	13	16	9	
Scallop Dredge	closed	limited	NE	all	10	12	*	9	4	12	14	7	14	7	
Scallop Dredge	closed	limited	MA	all	13	11	*	10	5	9	11	11	15	8	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	14	13	*	11	12	13	15	14	16	16	
Mid-water paired & single Trawl	all	all	NE	all	9	1	*	11	18	1	6	10	4	17	
Mid-water paired & single Trawl	all	all	MA	all	12	10	*	11	19	11	3	12	10	18	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	14	13	*	11	19	13	15	14	16	20	
Purse Seine	all	all	NE	all	14	4	*	11	19	13	9	14	16	21	
Purse Seine	all	all	MA	all											
Hand Line	all	all	NE	all	14	13	*	11	19	13	15	14	16	21	
Hand Line	all	all	MA	all											
Scottish Seine	all	all	NE	all	14	13	*	11	19	13	15	14	16	21	
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all											
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Cod	Had-dock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Window-pane	Halibut	Ocean pout
Longline	all	all	NE	all	3	3	15	15	17	17	8	10	17	18	6	5
Longline	all	all	MA	all												
Otter Trawl	all	all	NE	small	5	1	3	2	2	1	4	2	1	10	3	2
Otter Trawl	all	all	NE	large	1	2	1	1	1	2	1	1	2	1	1	1
Otter Trawl	all	all	MA	small	14	11	12	10	6	4	10	5	7	4	6	6
Otter Trawl	all	all	MA	large	10	11	9	15	4	5	7	9	13	3	6	3
Scallop Trawl	open	limited	MA	all	14	11	15	15	17	17	10	10	17	2	6	14
Scallop Trawl	open	general	MA	all	14	11	14	15	14	13	10	10	12	11	6	14
Shrimp Trawl	all	all	NE	all	7	8	7	3	10	7	5	6	6	14	6	10
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	14	11	15	15	17	17	10	10	17	18	6	14
Sink, Anchor, Drift Gillnet	all	all	NE	large	2	5	4	5	12	10	2	4	4	16	4	8
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	6	8	8	16	12	3	8	5	17	2	7
Sink, Anchor, Drift Gillnet	all	all	MA	small	14	11	15	15	17	17	10	10	17	18	6	14
Sink, Anchor, Drift Gillnet	all	all	MA	large	14	11	15	15	17	17	10	10	17	6	6	14
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	14	11	15	15	17	17	10	10	17	18	6	14
Scallop Dredge	open	limited	NE	all	8	9	5	13	3	3	9	10	9	9	6	4
Scallop Dredge	open	limited	MA	all	14	11	11	12	5	11	10	10	3	5	6	9
Scallop Dredge	open	general	NE	all	13	11	6	7	9	8	10	10	17	12	6	11
Scallop Dredge	open	general	MA	all	14	11	13	11	11	9	10	10	10	8	6	14
Scallop Dredge	closed	limited	NE	all	9	7	2	4	7	6	10	10	11	7	5	12
Scallop Dredge	closed	limited	MA	all	14	11	10	14	8	14	10	10	14	15	6	13
Scallop Dredge	closed	general	NE	all												
Scallop Dredge	closed	general	MA	all	14	11	15	15	17	17	10	10	17	18	6	14
Mid-water paired & single Trawl	all	all	NE	all	11	4	15	6	13	16	6	3	8	18	6	14
Mid-water paired & single Trawl	all	all	MA	all	14	11	15	15	15	17	10	10	15	18	6	14
Fish Pots/ Traps	all	all	NE	all												
Fish Pots/ Traps	all	all	MA	all	14	11	15	15	17	17	10	10	17	18	6	14
Purse Seine	all	all	NE	all	14	11	15	15	17	17	10	7	17	18	6	14
Purse Seine	all	all	MA	all												
Hand Line	all	all	NE	all	6	11	15	15	17	17	10	10	17	18	6	14
Hand Line	all	all	MA	all												
Scottish Seine	all	all	NE	all	12	10	15	9	17	15	10	10	16	13	6	14
Clam Quahog Dredge	all	all	NE	all												
Clam Quahog Dredge	all	all	MA	all												
Crab Pots	all	all	NE	all												
Crab Pots	all	all	MA	all												
Lobster Pots	all	all	NE	all												
Lobster Pots	all	all	MA	all												

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	Fluke	Scup	Black sea bass	SURF CLAM/- OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	18	7	13	17	10	20	14	16	11	5
Longline	all	all	MA	all										
Otter Trawl	all	all	NE	small	1	1	1	3	4	1	2	4	8	1
Otter Trawl	all	all	NE	large	3	3	3	1	3	2	4	7	6	2
Otter Trawl	all	all	MA	small	2	4	2	6	7	6	1	2	5	4
Otter Trawl	all	all	MA	large	8	7	8	5	5	3	3	3	3	5
Scallop Trawl	open	limited	MA	all	18	7	19	8	23	11	14	10	11	5
Scallop Trawl	open	general	MA	all	11	7	16	10	13	16	5	14	11	5
Shrimp Trawl	all	all	NE	all	4	7	10	18	22	20	14	16	11	5
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	18	7	19	22	20	20	14	16	11	5
Sink, Anchor, Drift Gillnet	all	all	NE	large	9	7	11	15	2	17	14	13	11	5
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	13	7	9	11	8	9	13	16	11	3
Sink, Anchor, Drift Gillnet	all	all	MA	small	18	7	19	22	6	13	14	16	11	5
Sink, Anchor, Drift Gillnet	all	all	MA	large	18	7	19	16	1	20	14	16	11	5
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	18	7	19	14	12	15	14	16	11	5
Scallop Dredge	open	limited	NE	all	7	2	4	2	16	4	7	5	1	5
Scallop Dredge	open	limited	MA	all	6	5	6	4	14	5	8	6	2	5
Scallop Dredge	open	general	NE	all	17	7	7	13	19	14	14	16	7	5
Scallop Dredge	open	general	MA	all	12	7	15	7	21	10	14	16	4	5
Scallop Dredge	closed	limited	NE	all	10	6	5	9	17	7	12	12	9	5
Scallop Dredge	closed	limited	MA	all	15	7	18	12	18	8	11	8	10	5
Scallop Dredge	closed	general	NE	all										
Scallop Dredge	closed	general	MA	all	18	7	19	19	23	18	14	16	11	5
Mid-water paired & single Trawl	all	all	NE	all	5	7	14	20	9	20	10	15	11	5
Mid-water paired & single Trawl	all	all	MA	all	16	7	17	22	15	19	14	11	11	5
Fish Pots/ Traps	all	all	NE	all										
Fish Pots/ Traps	all	all	MA	all	18	7	19	22	23	20	6	1	11	5
Purse Seine	all	all	NE	all	18	7	19	22	11	20	14	16	11	5
Purse Seine	all	all	MA	all										
Hand Line	all	all	NE	all	18	7	19	22	23	20	14	16	11	5
Hand Line	all	all	MA	all										
Scottish Seine	all	all	NE	all	14	7	12	21	23	12	9	9	11	5
Clam Quahog Dredge	all	all	NE	all										
Clam Quahog Dredge	all	all	MA	all										
Crab Pots	all	all	NE	all										
Crab Pots	all	all	MA	all										
Lobster Pots	all	all	NE	all										
Lobster Pots	all	all	MA	all										

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK	
Longline	all	all	NE	all	2	3	8	*	2	3	2	4	4	*	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Otter Trawl	all	all	NE	small	2	3	8	*	2	3	2	4	4	*	
Otter Trawl	all	all	NE	large	2	3	8	*	2	3	2	4	4	*	
Otter Trawl	all	all	MA	small	2	3	4	*	2	3	2	4	4	*	
Otter Trawl	all	all	MA	large	2	3	8	*	2	3	2	4	4	*	
Scallop Trawl	open	limited	MA	all	2	3	1	*	2	3	2	4	4	*	
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	large	2	3	8	*	2	1	2	2	2	*	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	2	3	8	*	2	2	1	1	1	*	
Sink, Anchor, Drift Gillnet	all	all	MA	small	2	2	8	*	1	3	2	4	4	*	
Sink, Anchor, Drift Gillnet	all	all	MA	large	1	3	6	*	2	3	2	4	4	*	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	2	1	5	*	2	3	2	3	3	*	
Scallop Dredge	open	limited	NE	all	2	3	2	*	2	3	2	4	4	*	
Scallop Dredge	open	limited	MA	all	2	3	3	*	2	3	2	4	4	*	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	2	3	7	*	2	3	2	4	4	*	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Mid-water paired & single Trawl	all	all	NE	all	2	3	8	*	2	3	2	4	4	*	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Clam Quahog Dredge	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN-BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/DOLPHIN, NK	SEA BIRDS (ALL)	PILOT coverage
Longline	all	all	NE	all	4	*	*	5	3	2	4	*	12	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Otter Trawl	all	all	NE	small	1	*	*	3	1	2	4	*	6	
Otter Trawl	all	all	NE	large	2	*	*	1	3	2	4	*	5	
Otter Trawl	all	all	MA	small	4	*	*	5	2	2	4	*	11	
Otter Trawl	all	all	MA	large	4	*	*	5	3	2	4	*	3	
Scallop Trawl	open	limited	MA	all	4	*	*	5	3	2	4	*	14	pilot
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	4	*	*	4	3	2	2	*	1	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	*	*	5	3	1	1	*	9	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	*	*	5	3	2	4	*	8	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	*	*	5	3	2	4	*	7	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	4	*	*	5	3	2	3	*	10	pilot for fish
Scallop Dredge	open	limited	NE	all	4	*	*	5	3	2	4	*	4	
Scallop Dredge	open	limited	MA	all	4	*	*	5	3	2	4	*	14	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	pilot
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	4	*	*	5	3	2	4	*	13	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all										pilot
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Mid-water paired & single Trawl	all	all	NE	all	3	*	*	2	3	2	4	*	2	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all										pilot
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Clam Quahog Dredge	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Clam Quahog Dredge	all	all	MA	all										pilot
Crab Pots	all	all	NE	all										pilot
Crab Pots	all	all	MA	all										pilot
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Lobster Pots	all	all	MA	all										pilot

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-4. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	35	35	35	35	35	35	35	35	35	35	35
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	1103	882	211	848	1998	249	1748	487	454	633	757
Otter Trawl	all	all	NE	large	26644	12864	730	798	1233	3159	2582	9820	3561	5259	81
Otter Trawl	all	all	MA	small	2231	1869	196	5417	1162	1125	2841	1362	1697	1160	497
Otter Trawl	all	all	MA	large	3625	883	342	342	311	242	374	753	327	394	140
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	155	51	51	399	119	181	51	277	200	270	115
Shrimp Trawl	all	all	NE	all	42	92	42	42	353	364	42	42	42	364	22
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	443	486	141	2592	4357	3758	3929	5405	141	6119	408
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	267	1004	144	3266	1255	1701	1708	144	144	4216	238
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	105	29	29	29	29	29	29	29	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	131	68	68	68	301	68	68	68	68	68	104
Scallop Dredge	open	limited	NE	all	269	269	269	1596	80	1380	269	709	3260	6097	320
Scallop Dredge	open	limited	MA	all	329	329	329	8713	280	641	8713	1662	986	2528	213
Scallop Dredge	open	general	NE	all	92	92	92	92	204	176	92	176	92	92	117
Scallop Dredge	open	general	MA	all	96	96	96	96	54	293	96	96	293	96	17
Scallop Dredge	closed	limited	NE	all	3861	344	139	1473	167	1301	327	564	1531	273	429
Scallop Dredge	closed	limited	MA	all	1777	772	108	341	157	337	764	370	989	324	283
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	699	747	56	56	1793	346	347	829	1786	1712	718
Mid-water paired & single Trawl	all	all	MA	all	182	453	35	35	35	167	181	165	182	182	492
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	103
Purse Seine	all	all	NE	all	19	219	19	19	19	206	19	206	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					43,547	23,025	4,573	27,698	15,384	17,200	25,658	24,643	17,279	31,311	6,541
Total Sea Days excluding shaded cells					35,867	19,828	0	5,547	6,049	15,522	24,114	17,398	15,185	19,567	5,528

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (LARGE-MESH)	Cod	Haddock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Windowpane	Halibut	Ocean pout
Longline	all	all	NE	all	27	39	36	35	35	35	35	310	35	35	35	35	76
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	266	1861	1892	774	442	523	852	1351	1507	969	405	2129	490
Otter Trawl	all	all	NE	large	107	321	719	505	663	219	1837	3732	630	568	440	1793	268
Otter Trawl	all	all	MA	small	429	196	196	2763	3849	904	1172	196	2272	2580	633	196	3911
Otter Trawl	all	all	MA	large	101	5866	342	677	342	137	272	5866	1315	5882	156	342	358
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	85	51	51	505	51	255	423	51	51	399	170	51	51
Shrimp Trawl	all	all	NE	all	20	50	171	121	38	328	29	89	56	22	17	42	349
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	83	142	320	360	693	1325	724	315	607	488	1500	1532	1504
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	206	249	473	963	833	3315	1829	750	948	979	2892	1281	1245
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	19	29	29	29	29	29	29	29	29	29	19	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	68	68	68	68	68	68	68	68	68	68	68	68	68
Scallop Dredge	open	limited	NE	all	708	1855	1611	1077	1611	728	2851	1611	269	848	633	269	1298
Scallop Dredge	open	limited	MA	all	411	329	329	2708	3159	1660	2108	329	329	1687	715	329	6549
Scallop Dredge	open	general	NE	all	82	120	92	85	110	146	92	92	92	92	90	92	190
Scallop Dredge	open	general	MA	all	40	96	96	293	288	171	73	96	96	173	46	96	96
Scallop Dredge	closed	limited	NE	all	227	1735	1311	390	3105	315	355	139	139	1576	988	439	1332
Scallop Dredge	closed	limited	MA	all	1136	108	108	1819	333	404	1829	108	108	800	1409	108	1803
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	688	1451	855	56	1437	1037	1616	1217	1219	1128	56	56	56
Mid-water paired & single Trawl	all	all	MA	all	281	35	35	35	35	547	35	35	35	176	35	35	35
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	40	40	40
Purse Seine	all	all	NE	all	217	19	19	19	19	19	19	19	217	19	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	137	137	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	14	12	12	12	12	12	18	12	12	12	15	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					6,712	16,129	10,194	14,724	18,580	13,608	17,695	17,846	11,464	19,958	11,769	10,382	21,169
Total Sea Days excluding shaded cells					6,450	15,330	5,143	13,481	9,033	9,941	16,768	7,934	5,380	15,652	10,603	7,758	20,321

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (SMALL-MESH)	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	FLUKE/-SCUP/- BLK SEA BASS	Fluke	Scup	Black sea bass	SURF CLAM/- OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	185	35	35	185	89	99	35	35	35	35	35	35
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	269	233	5131	762	2024	492	455	365	1344	2115	3822	441
Otter Trawl	all	all	NE	large	341	530	1053	1255	316	614	1034	1091	7275	6224	15593	2692
Otter Trawl	all	all	MA	small	944	1324	1690	1198	202	532	584	314	1120	952	836	3057
Otter Trawl	all	all	MA	large	998	321	342	3401	70	481	98	114	201	643	584	342
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	292	297	51	155	80	443	408	75	102	396	51	51
Shrimp Trawl	all	all	NE	all	123	128	42	115	247	349	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	313	514	141	439	482	109	3767	4020	141	6294	141	141
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	2059	345	144	2902	109	214	417	418	4204	144	144	502
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	29	29	29	29	99	96	29	29	29	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	68	68	68	68	55	58	120	120	68	68	68	68
Scallop Dredge	open	limited	NE	all	534	1706	3605	390	177	807	649	693	325	1172	478	269
Scallop Dredge	open	limited	MA	all	3080	3657	3443	1081	114	371	465	512	2642	2077	2958	329
Scallop Dredge	open	general	NE	all	135	204	92	148	120	120	92	92	92	92	190	92
Scallop Dredge	open	general	MA	all	96	90	96	288	17	124	88	88	96	96	271	96
Scallop Dredge	closed	limited	NE	all	1180	1214	1618	1434	145	857	703	712	452	252	375	139
Scallop Dredge	closed	limited	MA	all	287	339	108	298	88	567	481	485	1568	378	334	108
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	1218	1226	56	826	1034	316	697	56	797	1134	56	56
Mid-water paired & single Trawl	all	all	MA	all	182	182	35	182	35	43	557	544	35	563	35	35
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	73	40	40	40
Purse Seine	all	all	NE	all	19	19	19	19	19	217	19	19	19	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	30	30	30	30	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					13,792	13,902	19,241	16,616	6,965	8,351	12,200	11,286	22,079	24,187	27,502	9,984
Total Sea Days excluding shaded cells					12,562	12,637	6,272	15,136	4,901	6,943	9,850	9,591	10,416	10,673	133	6,703

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLES	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEALS	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK
Longline	all	all	NE	all	35	35	35	35	35	35	35	35	35	35	35	35
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	211	211	211	211	211	211	211	211	211	211	211	211
Otter Trawl	all	all	NE	large	730	730	730	730	730	730	730	730	730	730	730	730
Otter Trawl	all	all	MA	small	1229	196	196	1229	196	196	196	196	196	196	196	196
Otter Trawl	all	all	MA	large	342	342	342	342	342	342	342	342	342	342	342	342
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	51	51	51	51	51	51	51	51	51	51	51	51
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	141	141	141	141	141	141	531	1007	141	889	2518	141
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	144	144	144	144	144	144	470	1694	3812	973	731	144
Sink, Anchor, Drift Gillnet	all	all	MA	small	1259	62	1841	62	62	1757	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	653	913	29	913	29	29	29	29	29	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	468	68	799	764	68	68	804	68	68	1175	1272	68
Scallop Dredge	open	limited	NE	all	1261	269	269	1261	269	269	269	269	269	269	269	269
Scallop Dredge	open	limited	MA	all	3956	329	329	3956	329	329	329	329	329	329	329	329
Scallop Dredge	open	general	NE	all	92	92	92	92	92	92	92	92	92	92	92	92
Scallop Dredge	open	general	MA	all	96	96	96	96	96	96	96	96	96	96	96	96
Scallop Dredge	closed	limited	NE	all	414	139	139	414	139	139	139	139	139	139	139	139
Scallop Dredge	closed	limited	MA	all	108	108	108	108	108	108	108	108	108	108	108	108
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	56	56	56	56	56	56	56	56	56	56	56	56
Mid-water paired & single Trawl	all	all	MA	all	35	35	35	35	35	35	35	35	35	35	35	35
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	40	40
Purse Seine	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					12,721	5,457	7,083	12,079	4,573	6,269	6,025	6,990	8,241	7,257	8,741	4,573
Total Sea Days excluding shaded cells					12,721	3,082	6,142	12,079	3,632	6,269	4,742	5,706	5,319	5,436	6,920	3,290

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALES	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHINS/- PORPOISE	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN- BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/ DOLPHIN, NK	SEA BIRDS (ALL)	ALL SPECIES
Longline	all	all	NE	all	35	35	35	35	35	35	35	35	35	35	267	57
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	3082	3082	211	211	2265	3099	2594	211	211	211	1870	183
Otter Trawl	all	all	NE	large	10526	10526	730	730	2111	2111	730	730	730	730	3237	159
Otter Trawl	all	all	MA	small	196	196	196	196	1164	196	1164	196	196	196	1880	250
Otter Trawl	all	all	MA	large	342	342	342	342	342	342	342	342	342	342	727	55
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	51	51	51	51	51	51	51	51	51	51	51	38
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	39
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	55
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	141	141	141	141	1398	3642	141	141	1557	141	1306	82
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	144	144	144	144	806	144	144	3816	871	144	2661	59
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	880	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	29	29	29	29	29	29	29	29	29	29	311	95
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	68	68	68	68	1272	68	68	68	1272	68	806	51
Scallop Dredge	open	limited	NE	all	269	269	269	269	269	269	269	269	269	269	3194	123
Scallop Dredge	open	limited	MA	all	329	329	329	329	329	329	329	329	329	329	329	89
Scallop Dredge	open	general	NE	all	92	92	92	92	92	92	92	92	92	92	92	88
Scallop Dredge	open	general	MA	all	96	96	96	96	96	96	96	96	96	96	96	14
Scallop Dredge	closed	limited	NE	all	139	139	139	139	139	139	139	139	139	139	407	130
Scallop Dredge	closed	limited	MA	all	108	108	108	108	108	108	108	108	108	108	108	61
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	1606	1606	56	56	1464	1464	56	56	56	56	808	193
Mid-water paired & single Trawl	all	all	MA	all	35	35	35	35	35	35	35	35	35	35	35	111
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	40	37
Purse Seine	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	143
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72	137
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	20
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					18,791	18,791	4,573	4,573	13,507	13,752	7,923	8,245	7,920	4,573	20,503	3,513
Total Sea Days excluding shaded cells					17,714	17,714	2,593	3,497	13,507	13,752	7,923	7,708	7,829	4,573	20,503	3,513

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	26	26	26	26	26	26	26	26	26	26	26
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	364	291	70	280	659	82	576	161	150	209	250
Otter Trawl	all	all	NE	large	11227	5420	304	336	520	1331	1088	4138	1501	2216	34
Otter Trawl	all	all	MA	small	1189	995	104	2885	619	599	1513	725	904	618	265
Otter Trawl	all	all	MA	large	1879	458	177	177	161	125	194	390	170	204	72
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	72	25	25	196	56	85	25	132	94	129	54
Shrimp Trawl	all	all	NE	all	42	91	42	42	350	361	42	42	42	361	22
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	327	359	104	1913	3216	2774	2900	3990	104	4517	301
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	175	657	94	2139	822	1114	1119	94	94	2760	156
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	100	27	27	27	27	27	27	27	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	94	51	51	51	211	51	51	51	51	51	76
Scallop Dredge	open	limited	NE	all	25	25	25	146	7	126	25	65	298	558	29
Scallop Dredge	open	limited	MA	all	36	36	36	966	31	71	966	184	109	280	24
Scallop Dredge	open	general	NE	all	71	71	71	71	149	130	71	130	71	71	89
Scallop Dredge	open	general	MA	all	69	69	69	69	39	210	69	69	210	69	12
Scallop Dredge	closed	limited	NE	all	449	40	15	171	19	151	38	66	178	32	50
Scallop Dredge	closed	limited	MA	all	194	84	12	37	17	37	83	40	108	35	31
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	266	285	21	21	683	132	132	316	681	652	274
Mid-water paired & single Trawl	all	all	MA	all	52	130	12	12	12	48	52	47	52	52	141
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	97
Purse Seine	all	all	NE	all	10	108	10	10	10	102	10	102	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75
Total Trips					17,678	10,260	2,306	10,588	8,647	8,594	10,019	11,808	5,891	13,889	3,015
Total Trips excluding shaded cells					15,925	9,034	0	1,539	2,468	7,333	8,922	6,413	4,300	5,539	2,219

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (LARGE-MESH)	Cod	Haddock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Windowpane	Halibut	Ocean pout
Longline	all	all	NE	all	21	30	28	26	26	26	26	242	26	26	26	26	59
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	88	614	624	255	146	173	281	446	497	319	133	702	161
Otter Trawl	all	all	NE	large	45	135	303	213	279	92	774	1572	266	239	185	755	113
Otter Trawl	all	all	MA	small	229	104	104	1472	2050	481	624	104	1210	1374	337	104	2083
Otter Trawl	all	all	MA	large	52	3040	177	351	177	71	141	3040	681	3048	81	177	185
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	41	25	25	244	25	125	207	25	25	196	81	25	25
Shrimp Trawl	all	all	NE	all	20	49	169	120	37	325	29	89	56	22	17	42	346
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	61	105	236	266	512	978	534	232	448	360	1107	1131	1110
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	135	163	310	631	545	2171	1197	491	621	641	1893	839	815
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	17	27	27	27	27	27	27	27	27	27	17	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	51	51	51	51	51	51	51	51	51	51	51	51	51
Scallop Dredge	open	limited	NE	all	65	170	147	99	147	67	261	147	25	78	58	25	119
Scallop Dredge	open	limited	MA	all	46	36	36	300	350	184	234	36	36	187	79	36	726
Scallop Dredge	open	general	NE	all	64	91	71	66	84	109	71	71	71	71	70	71	140
Scallop Dredge	open	general	MA	all	29	69	69	210	206	123	53	69	69	124	33	69	69
Scallop Dredge	closed	limited	NE	all	26	202	152	45	361	37	41	15	15	183	115	51	155
Scallop Dredge	closed	limited	MA	all	124	12	12	199	36	44	200	12	12	87	154	12	197
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	262	553	326	21	548	395	616	464	465	430	21	21	21
Mid-water paired & single Trawl	all	all	MA	all	81	12	12	12	12	157	12	12	12	50	12	12	12
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	37	37	37
Purse Seine	all	all	NE	all	107	10	10	10	10	10	10	10	107	10	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	129	129	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	14	12	12	12	12	12	18	12	12	12	15	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					2,641	6,572	3,902	5,630	6,641	6,657	6,407	8,167	5,730	8,536	5,495	5,198	7,437
Total Trips excluding shaded cells					2,464	6,143	2,403	4,676	2,717	5,239	5,685	3,669	2,618	7,001	4,602	3,710	6,881

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (SMALL-MESH)	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	FLUKE/-SCUP/- BLK SEA BASS	Fluke	Scup	Black sea bass	SURF CLAM/- OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	144	26	26	144	69	78	26	26	26	26	26	26
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	89	77	1692	251	668	162	150	120	443	698	1260	146
Otter Trawl	all	all	NE	large	143	223	444	529	133	259	436	460	3065	2623	6570	1134
Otter Trawl	all	all	MA	small	503	705	900	638	108	283	311	167	596	507	445	1628
Otter Trawl	all	all	MA	large	517	166	177	1762	36	249	51	59	104	333	303	177
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	142	144	25	72	39	216	200	36	48	195	25	25
Shrimp Trawl	all	all	NE	all	122	127	42	114	245	346	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	231	380	104	324	356	81	2780	2967	104	4646	104	104
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	1348	226	94	1900	71	140	273	273	2753	94	94	329
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	27	27	27	27	95	91	27	27	27	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	51	51	51	51	42	44	87	87	51	51	51	51
Scallop Dredge	open	limited	NE	all	49	156	330	36	16	74	59	63	30	107	44	25
Scallop Dredge	open	limited	MA	all	342	406	382	120	13	41	52	57	293	230	328	36
Scallop Dredge	open	general	NE	all	102	149	71	111	91	91	71	71	71	71	140	71
Scallop Dredge	open	general	MA	all	69	65	69	206	12	89	63	63	69	69	194	69
Scallop Dredge	closed	limited	NE	all	137	141	188	167	17	100	82	83	52	29	44	15
Scallop Dredge	closed	limited	MA	all	31	37	12	33	10	62	53	53	171	41	37	12
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	464	467	21	315	394	121	266	21	304	432	21	21
Mid-water paired & single Trawl	all	all	MA	all	52	52	12	52	12	12	160	156	12	161	12	12
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	69	37	37	37
Purse Seine	all	all	NE	all	10	10	10	10	10	107	10	10	10	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	30	30	30	30	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					5,584	4,647	5,688	7,873	3,447	3,658	6,227	5,872	9,332	11,423	10,788	4,971
Total Trips excluding shaded cells					4,637	3,673	2,211	6,842	2,243	2,511	4,981	4,874	4,476	4,543	139	3,180

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLES	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEALS	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK
Longline	all	all	NE	all	26	26	26	26	26	26	26	26	26	26	26	26
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	70	70	70	70	70	70	70	70	70	70	70	70
Otter Trawl	all	all	NE	large	304	304	304	304	304	304	304	304	304	304	304	304
Otter Trawl	all	all	MA	small	654	104	104	654	104	104	104	104	104	104	104	104
Otter Trawl	all	all	MA	large	177	177	177	177	177	177	177	177	177	177	177	177
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	25	25	25	25	25	25	25	25	25	25	25	25
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	104	104	104	104	104	104	392	743	104	656	1859	104
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	94	94	94	94	94	94	308	1109	2496	637	479	94
Sink, Anchor, Drift Gillnet	all	all	MA	small	1195	58	1747	58	58	1668	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	604	845	27	845	27	27	27	27	27	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	351	51	600	573	51	51	604	51	51	882	955	51
Scallop Dredge	open	limited	NE	all	115	25	25	115	25	25	25	25	25	25	25	25
Scallop Dredge	open	limited	MA	all	439	36	36	439	36	36	36	36	36	36	36	36
Scallop Dredge	open	general	NE	all	71	71	71	71	71	71	71	71	71	71	71	71
Scallop Dredge	open	general	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Scallop Dredge	closed	limited	NE	all	48	15	15	48	15	15	15	15	15	15	15	15
Scallop Dredge	closed	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	37	37
Purse Seine	all	all	NE	all	10	10	10	10	10	10	10	10	10	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					5,397	3,124	4,543	4,722	2,306	3,916	3,360	3,961	4,708	4,232	5,349	2,306
Total Trips excluding shaded cells					5,397	2,096	4,169	4,722	1,933	3,916	3,023	3,623	3,579	3,613	4,730	1,969

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALES	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHINS/- PORPOISE	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN- BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/ DOLPHIN, NK	SEA BIRDS (ALL)	ALL SPECIES
Longline	all	all	NE	all	26	26	26	26	26	26	26	26	26	26	208	44
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	1016	1016	70	70	747	1022	855	70	70	70	617	60
Otter Trawl	all	all	NE	large	4435	4435	304	304	890	890	304	304	304	304	1364	67
Otter Trawl	all	all	MA	small	104	104	104	104	620	104	620	104	104	104	1001	133
Otter Trawl	all	all	MA	large	177	177	177	177	177	177	177	177	177	177	377	29
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	25	25	25	25	25	25	25	25	25	25	25	18
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	38
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	9
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	104	104	104	104	1032	2688	104	104	1149	104	964	61
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	94	94	94	94	528	94	94	2499	570	94	1742	38
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	835	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	27	27	27	27	27	27	27	27	27	27	288	91
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	51	51	51	51	955	51	51	51	955	51	605	39
Scallop Dredge	open	limited	NE	all	25	25	25	25	25	25	25	25	25	25	292	11
Scallop Dredge	open	limited	MA	all	36	36	36	36	36	36	36	36	36	36	36	10
Scallop Dredge	open	general	NE	all	71	71	71	71	71	71	71	71	71	71	71	69
Scallop Dredge	open	general	MA	all	69	69	69	69	69	69	69	69	69	69	69	10
Scallop Dredge	closed	limited	NE	all	15	15	15	15	15	15	15	15	15	15	47	15
Scallop Dredge	closed	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	7
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	612	612	21	21	558	558	21	21	21	21	308	73
Mid-water paired & single Trawl	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	32
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	37	34
Purse Seine	all	all	NE	all	10	10	10	10	10	10	10	10	10	10	10	71
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68	129
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	20
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					7,975	7,975	2,306	2,306	6,887	6,965	3,607	4,711	4,731	2,306	9,877	1,992
Total Trips excluding shaded cells					7,720	7,720	1,550	2,051	6,887	6,965	3,607	4,429	4,698	2,306	9,877	1,992

Gray-shaded cells indicate unlikely combinations of species/gear.

Appendix C
Importance Filter Worksheets for All Fishing Modes

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Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Clam Dredge

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	3,466	0%	Fish
0	0	3,466	0%	Protected Species

Top Species:	scallop	monkfish	surfclam quahog									sea turtles
Projected observer days needed:	***50***	***50***	***50***									***50***
Average trip length (days):	0.70											
Estimated % coverage level required:	2%	2%	2%									2%
Realized CV for 2004:	N/A	N/A	N/A									N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A									N/A
Encounter rate:	N/A	N/A	N/A									N/A
Rank of total discards (out of 13):	N/A	N/A	N/A									N/A
Observed discards (lb):	N/A	N/A	N/A									N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A									N/A
2004 commercial landings (lb, all gears):	64,506,000	23,036,000	101,717,000									N/A
2004 recreational landings (lb, all gears):	0	0	0									N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A									N/A
Discards as % of comm landings:	N/A	N/A	N/A									N/A
Discards as % ot total landings:	N/A	N/A	N/A									N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Clam Dredge

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	3,461	0%	Fish
0	0	3,461	0%	Protected Species

Top Species:	scallop	monkfish	surfclam quahog									sea turtles
Projected observer days needed:	***84***	***84***	***84***									***84***
Average trip length (days):	1.20											
Estimated % coverage level required:	2%	2%	2%									2%
Realized CV for 2004:	N/A	N/A	N/A									N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A									N/A
Encounter rate:	N/A	N/A	N/A									N/A
Rank of total discards (out of 13):	N/A	N/A	N/A									N/A
Observed discards (lb):	N/A	N/A	N/A									N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A									N/A
2004 commercial landings (lb, all gears):	64,506,000	23,036,000	101,717,000									N/A
2004 recreational landings (lb, all gears):	0	0	0									N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A									N/A
Discards as % of comm landings:	N/A	N/A	N/A									N/A
Discards as % ot total landings:	N/A	N/A	N/A									N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Crab Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	103	0%	Fish
0	0	103	0%	Protected Species

Top Species:	red crab												sea turtles
Projected observer days needed:	***101***												***101***
Average trip length (days):	6.00												
Estimated % coverage level required:	16%												16%
Realized CV for 2004:	N/A												N/A
Percent of trips w/ zero discard:	N/A												N/A
Encounter rate:	N/A												N/A
Rank of total discards (out of 13):	N/A												N/A
Observed discards (lb):	N/A												N/A
Obs. discard percent of all obs. discards:	N/A												N/A
2004 commercial landings (lb, all gears):	3,952,000												N/A
2004 recreational landings (lb, all gears):	0												N/A
Obs. discards as % of comm landings:	N/A												N/A
Discards as % of comm landings:	N/A												N/A
Discards as % ot total landings:	N/A												N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Crab Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	1,133	0%	Fish
0	0	1,133	0%	Protected Species

Top Species:	red crab	sea turtles
Projected observer days needed:	***28***	***28***
Average trip length (days):	0.30	
Estimated % coverage level required:	8%	8%
Realized CV for 2004:	N/A	N/A
Percent of trips w/ zero discard:	N/A	N/A
Encounter rate:	N/A	N/A
Rank of total discards (out of 13):	N/A	N/A
Observed discards (lb):	N/A	N/A
Obs. discard percent of all obs. discards:	N/A	N/A
2004 commercial landings (lb, all gears):	3,952,000	N/A
2004 recreational landings (lb, all gears):	0	N/A
Obs. discards as % of comm landings:	N/A	N/A
Discards as % of comm landings:	N/A	N/A
Discards as % ot total landings:	N/A	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Fish Pots/Traps

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	973	0%	Fish
0	0	973	0%	Protected Species

Top Species:	herring	red crab	large-mesh mults	small-mesh mults	skates	SF/S/BSB	tilefish						sea turtles
Projected observer days needed:	***20***	***20***	***20***	***20***	***20***	***20***	***20***						***20***
Average trip length (days):	0.40												
Estimated % coverage level required:	5%	5%	5%	5%	5%	5%	5%						5%
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Encounter rate:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
2004 commercial landings (lb, all gears):	187,387,000	3,952,000	83,523,000	19,387,000	20,388,000	30,616,000	2,316,000						N/A
2004 recreational landings (lb, all gears):	27,000	0	5,383,000	35,000	0	17,982,000	0						N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Fish Pots/Traps

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
6	6	1,750	0%	Fish
9	8	1,750	0%	Protected Species

Top Species:	herring	red crab	large-mesh mults	small-mesh mults	skate	SF/S/BSB	tilefish						sea turtles
Projected observer days needed:	***40***	***40***	***40***	***40***	***40***	***40***	***40***						***40***
Average trip length (days):	0.60												
Estimated % coverage level required:	4%	4%	4%	4%	4%	4%	4%						4%
Realized CV for 2004:	*	*	*	*	*	16.1%	*						*
Percent of trips w/ zero discard:	100%	100%	100%	100%	100%	0%	100%						100%
Encounter rate:	0%	0%	0%	0%	0%	100%	0%						0%
Rank of total discards (out of 13):	3	3	3	3	3	1	3						N/A
Observed discards (lb):	0	0	0	0	0	7,031	0						0
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.00%	0.00%	0.00%	90.47%	0.00%						N/A
2004 commercial landings (lb, all gears):	187,387,000	3,952,000	83,523,000	19,387,000	20,388,000	30,616,000	2,316,000						N/A
2004 recreational landings (lb, all gears):	27,000	0	5,383,000	35,000	0	17,982,000	0						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%						N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	5.39%	0.00%						N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	3.40%	0.00%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Small-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
1	1	42	2%	Fish
1	1	42	2%	Protected Species

Top Species:	bluefish	herring	M/S/B	monkfish	large-mesh mults	small-mesh mults	skates	dogfish	SF/S/BSB				sea turtles
Projected observer days needed:	***12***	***12***	***12***	***12***	***12***	***12***	***12***	***12***	***12***				***12***
Average trip length (days):	0.80												
Estimated % coverage level required:	36%	36%	36%	36%	36%	36%	36%	36%	36%				36%
Realized CV for 2004:	*	*	0.0%	*	*	*	*	0.0%	*				*
Percent of trips w/ zero discard:	100%	100%	0%	100%	100%	100%	100%	0%	100%				100%
Encounter rate:	0%	0%	100%	0%	0%	0%	0%	100%	0%				0%
Rank of total discards (out of 13):	3	3	2	3	3	3	3	1	3				N/A
Observed discards (lb):	0	0	47	0	0	0	0	97	0				0
Obs. discard percent of all obs. discards:	0.00%	0.00%	27.73%	0.00%	0.00%	0.00%	0.00%	57.23%	0.00%				N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000				N/A
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	0	5,383,000	35,000	0	0	0				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%				N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%				N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
657	577	5,189	11%	Fish
876	772	5,189	15%	Protected Species

Top Species:	SF/S/BSB	S/M/B	herring	skates	bluefish	monkfish	small-mesh mults	dogfish	large-mesh mults				sea turtles
Projected observer days needed:	3,767	3,758	486	482	443	408	313	109	83				141
Average trip length (days):	0.90												
Estimated % coverage level required:	81%	80%	10%	10%	9%	9%	7%	2%	2%				3%
Realized CV for 2004:	84.5%	84.1%	22.9%	22.8%	22.0%	21.0%	18.3%	10.6%	9.2%				*
Percent of trips w/ zero discard:	98%	95%	93%	44%	93%	81%	81%	28%	22%				100%
Encounter rate:	2%	5%	7%	56%	7%	19%	19%	72%	78%				0%
Rank of total discards (out of 13):	9	7	8	3	5	4	6	1	2				N/A
Observed discards (lb):	3	346	208	11,989	849	878	495	460,442	41,669				0
Obs. discard percent of all obs. discards:	0.00%	0.06%	0.04%	2.16%	0.15%	0.16%	0.09%	82.83%	7.50%				N/A
2004 commercial landings (lb, all gears):	30,616,000	212,528,000	187,387,000	20,388,000	7,512,000	23,036,000	19,387,000	1,965,000	83,523,000				N/A
2004 recreational landings (lb, all gears):	17,982,000	1,134,000	27,000	0	15,146,000	0	35,000	0	5,383,000				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.06%	0.01%	0.00%	0.00%	23.43%	0.05%				N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.73%	0.14%	0.05%	0.03%	265.91%	0.63%				N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.73%	0.05%	0.05%	0.03%	265.91%	0.60%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Extra-Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
533	445	4,712	9%	Fish
701	569	4,712	12%	Protected Species

Top Species:	small-mesh mults	M/S/B	herring	SF/S/BSB	bluefish	dogfish	monkfish	large-mesh mults	skates				sea turtles
Projected observer days needed:	2,059	1,701	1,004	417	267	214	238	206	109				144
Average trip length (days):	0.40												
Estimated % coverage level required:	109%	90%	53%	22%	14%	11%	13%	11%	6%				8%
Realized CV for 2004:	62.4%	49.8%	37.8%	23.3%	18.1%	16.2%	17.4%	15.9%	11.7%				*
Percent of trips w/ zero discard:	88%	95%	96%	92%	85%	29%	57%	48%	30%				100%
Encounter rate:	12%	5%	4%	8%	15%	71%	43%	52%	70%				0%
Rank of total discards (out of 13):	8	7	11	5	6	1	3	4	2				N/A
Observed discards (lb):	373	0	46	0	1,935	100,388	29,933	16,705	36,016				0
Obs. discard percent of all obs. discards:	0.15%	0.00%	0.02%	0.00%	0.80%	41.55%	12.39%	6.91%	14.91%				N/A
2004 commercial landings (lb, all gears):	19,387,000	212,528,000	187,387,000	30,616,000	7,512,000	1,965,000	23,036,000	83,523,000	20,388,000				N/A
2004 recreational landings (lb, all gears):	35,000	1,134,000	27,000	17,982,000	15,146,000	0	0	5,383,000	0				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.03%	5.11%	0.13%	0.02%	0.18%				N/A
Discards as % of comm landings:	0.02%	0.00%	0.00%	0.24%	0.32%	64.66%	2.76%	0.27%	3.34%				N/A
Discards as % ot total landings:	0.02%	0.00%	0.00%	0.15%	0.10%	64.66%	2.76%	0.26%	3.34%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Small-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
3	3	2,924	0%	Fish
375	358	2,924	12%	Protected Species

Top Species:	bluefish	herring	M/S/B	monkfish	large-mesh mults	skates	dogfish	SF/S/BSB					sea turtles
Projected observer days needed:	***62***	***62***	***62***	***62***	***62***	***62***	***62***	***62***					1,259
Average trip length (days):	1.10												
Estimated % coverage level required:	2%	2%	2%	2%	2%	2%	2%	2%					39%
Realized CV for 2004:	*	*	0.0%	*	*	*	0.0%	0.0%					62.6%
Percent of trips w/ zero discard:	100%	100%	67%	100%	100%	100%	33%	67%					99%
Encounter rate:	0%	0%	33%	0%	0%	0%	67%	33%					1%
Rank of total discards (out of 13):	4	4	2	4	4	4	1	3					N/A
Observed discards (lb):	0	0	1	0	0	0	64	0					Yes
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%	31.25%	0.15%					N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	23,036,000	83,523,000	20,388,000	1,965,000	30,616,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	0	5,383,000	0	0	17,982,000					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%					N/A
Discards as % of comm landings:	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	99.70%	0.03%					N/A
Discards as % ot total landings:	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	99.70%	0.02%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
4	4	1,293	0%	Fish
85	81	1,293	6%	Protected Species

Top Species:	bluefish	skate	dogfish	herring	M/S/B	monkfish	SF/S/BSB	large-mesh mults					sea turtles
Projected observer days needed:	105	99	96	***29***	***29***	***29***	***29***	19					653
Average trip length (days):	0.40												
Estimated % coverage level required:	20%	19%	19%	6%	6%	6%	6%	4%					126%
Realized CV for 2004:	121.6%	111.8%	108.3%	*	*	*	*	86.8%					105.2%
Percent of trips w/ zero discard:	75%	50%	25%	100%	100%	100%	100%	75%					98%
Encounter rate:	25%	50%	75%	0%	0%	0%	0%	25%					3%
Rank of total discards (out of 13):	2	3	1	5	5	5	5	4					N/A
Observed discards (lb):	102	11	2,302	0	0	0	0	6					Yes
Obs. discard percent of all obs. discards:	4.02%	0.43%	90.65%	0.00%	0.00%	0.00%	0.00%	0.24%					N/A
2004 commercial landings (lb, all gears):	7,512,000	20,388,000	1,965,000	187,387,000	212,528,000	23,036,000	30,616,000	83,523,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	0	0	27,000	1,134,000	0	17,982,000	5,383,000					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%					N/A
Discards as % of comm landings:	8.93%	0.35%	770.42%	0.00%	0.00%	0.00%	0.00%	0.05%					N/A
Discards as % ot total landings:	2.96%	0.35%	770.42%	0.00%	0.00%	0.00%	0.00%	0.04%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Extra-Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
30	27	2,568	1%	Fish
152	142	2,568	6%	Protected Species

Top Species:	bluefish	SF/S/BSB	monkfish	herring	M/S/B	large-mesh mults	dogfish	skates					sea turtles
Projected observer days needed:	131	120	104	***68***	***68***	***68***	58	55					468
Average trip length (days):	0.60												
Estimated % coverage level required:	9%	8%	7%	4%	4%	4%	4%	4%					30%
Realized CV for 2004:	30.4%	30.3%	27.3%	*	*	*	12.9%	11.5%					49.5%
Percent of trips w/ zero discard:	56%	74%	37%	100%	100%	100%	11%	4%					97%
Encounter rate:	44%	26%	63%	0%	0%	0%	89%	96%					3%
Rank of total discards (out of 13):	4	5	3	7	7	7	1	2					N/A
Observed discards (lb):	328	113	1,712	0	0	0	3,620	2,500					Yes
Obs. discard percent of all obs. discards:	2.45%	0.84%	12.79%	0.00%	0.00%	0.00%	27.05%	18.68%					N/A
2004 commercial landings (lb, all gears):	7,512,000	30,616,000	23,036,000	187,387,000	212,528,000	83,523,000	1,965,000	20,388,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	17,982,000	0	27,000	1,134,000	5,383,000	0	0					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.18%	0.01%					N/A
Discards as % of comm landings:	0.26%	0.02%	0.45%	0.00%	0.00%	0.00%	11.19%	0.74%					N/A
Discards as % ot total landings:	0.09%	0.01%	0.45%	0.00%	0.00%	0.00%	11.19%	0.74%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Handline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
6	6	3,378	0%	Fish
18	9	3,378	0%	Protected Species

Top Species:	large-mesh mults	bluefish	dogfish	SF/S/BSB									sea turtles
Projected observer days needed:	137	***72***	***72***	***72***									***72***
Average trip length (days):	0.40												
Estimated % coverage level required:	10%	5%	5%	5%									5%
Realized CV for 2004:	403.0%	*	*	*									*
Percent of trips w/ zero discard:	67%	100%	100%	100%									100%
Encounter rate:	33%	0%	0%	0%									0%
Rank of total discards (out of 13):	1	2	2	2									N/A
Observed discards (lb):	8	0	0	0									0
Obs. discard percent of all obs. discards:	100.00%	0.00%	0.00%	0.00%									N/A
2004 commercial landings (lb, all gears):	83,523,000	7,512,000	1,965,000	30,616,000									N/A
2004 recreational landings (lb, all gears):	5,383,000	15,416,000	0	17,982,000									N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%									N/A
Discards as % of comm landings:	0.01%	0.00%	0.00%	0.00%									N/A
Discards as % ot total landings:	0.01%	0.00%	0.00%	0.00%									N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Handline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	6,283	0%	Fish
11	3	6,283	0%	Protected Species

Top Species:	large-mesh mults												sea turtles
Projected observer days needed:	***133***												133
Average trip length (days):	0.30												
Estimated % coverage level required:	7%												7%
Realized CV for 2004:	N/A												*
Percent of trips w/ zero discard:	N/A												100%
Encounter rate:	N/A												0%
Rank of total discards (out of 13):	N/A												N/A
Observed discards (lb):	N/A												0
Obs. discard percent of all obs. discards:	N/A												N/A
2004 commercial landings (lb, all gears):	83,523,000												N/A
2004 recreational landings (lb, all gears):	5,383,000												N/A
Obs. discards as % of comm landings:	N/A												N/A
Discards as % of comm landings:	N/A												N/A
Discards as % ot total landings:	N/A												N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Lobster Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	34,101	0%	Fish
3	3	34,101	0%	Protected Species

Top Species:	red crab	large-mesh mults											sea turtles
Projected observer days needed:	***439***	***439***											***439***
Average trip length (days):	0.60												
Estimated % coverage level required:	2%	2%											2%
Realized CV for 2004:	N/A	N/A											*
Percent of trips w/ zero discard:	N/A	N/A											100%
Encounter rate:	N/A	N/A											0%
Rank of total discards (out of 13):	N/A	N/A											N/A
Observed discards (lb):	N/A	N/A											0
Obs. discard percent of all obs. discards:	N/A	N/A											N/A
2004 commercial landings (lb, all gears):	3,952,000	83,523,000											N/A
2004 recreational landings (lb, all gears):	0	5,383,000											N/A
Obs. discards as % of comm landings:	N/A	N/A											N/A
Discards as % of comm landings:	0.00%	0.00%											N/A
Discards as % ot total landings:	0.00%	0.00%											N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Lobster Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	3,750	0%	Fish
0	0	3,750	0%	Protected Species

Top Species:	red crab	large-mesh mults											sea turtles
Projected observer days needed:	***89***	***89***											***89***
Average trip length (days):	0.60												
Estimated % coverage level required:	4%	4%											4%
Realized CV for 2004:	N/A	N/A											N/A
Percent of trips w/ zero discard:	N/A	N/A											N/A
Encounter rate:	N/A	N/A											N/A
Rank of total discards (out of 13):	N/A	N/A											N/A
Observed discards (lb):	N/A	N/A											0
Obs. discard percent of all obs. discards:	N/A	N/A											N/A
2004 commercial landings (lb, all gears):	3,952,000	83,523,000											N/A
2004 recreational landings (lb, all gears):	0	5,383,000											N/A
Obs. discards as % of comm landings:	N/A	N/A											N/A
Discards as % of comm landings:	N/A	N/A											N/A
Discards as % ot total landings:	N/A	N/A											N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Longline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
12	12	1,234	1%	Fish
133	119	1,234	10%	Protected Species

Top Species:	small-mesh mults	dogfish	skates	monkfish	tilefish	large-mesh mults							sea turtles
Projected observer days needed:	185	99	89	35	35	27							35
Average trip length (days):	0.80												
Estimated % coverage level required:	6%	10%	9%	4%	4%	7%							4%
Realized CV for 2004:	91.0%	65.4%	61.4%	*	*	33.5%							*
Percent of trips w/ zero discard:	92%	33%	25%	100%	100%	0%							100%
Encounter rate:	8%	67%	75%	0%	0%	100%							0%
Rank of total discards (out of 13):	4	1	3	5	5	2							N/A
Observed discards (lb):	7	8,270	0	0	0	1,667							0
Obs. discard percent of all obs. discards:	0.07%	77.04%	0.00%	0.00%	0.00%	15.53%							N/A
2004 commercial landings (lb, all gears):	19,387,000	1,965,000	20,388,000	23,036,000	2,316,000	83,523,000							N/A
2004 recreational landings (lb, all gears):	35,000	0	0	0	0	5,383,000							N/A
Obs. discards as % of comm landings:	0.00%	0.42%	0.00%	0.00%	0.00%	0.00%							N/A
Discards as % of comm landings:	0.00%	42.71%	0.35%	0.00%	0.00%	0.28%							N/A
Discards as % ot total landings:	0.00%	42.71%	0.35%	0.00%	0.00%	0.27%							N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Longline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	205	0%	Fish
11	2	205	1%	Protected Species

Top Species:	monkfish	large-mesh mults	skate	dogfish	tilefish								sea turtles
Projected observer days needed:	***76***	***76***	***76***	***76***	***76***								***76***
Average trip length (days):	5.40												
Estimated % coverage level required:	7%	7%	7%	7%	7%								7%
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A								*
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A								100%
Encounter rate:	N/A	N/A	N/A	N/A	N/A								0%
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A								N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A								0
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A								N/A
2004 commercial landings (lb, all gears):	23,036,000	83,523,000	20,388,000	1,965,000	2,316,000								N/A
2004 recreational landings (lb, all gears):	0	5,383,000	0	0	0								N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A								N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A								N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A								N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Mid-Water Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
165	66	1,061	6%	Fish
242	99	1,061	9%	Protected Species

Top Species:	small-mesh mults	herring	monkfish	bluefish	large-mesh mults	M/S/B	dogfish						sea turtles
Projected observer days needed:	1,218	747	718	699	688	346	316						56
Average trip length (days):	1.50												
Estimated % coverage level required:	77%	47%	45%	44%	43%	22%	20%						4%
Realized CV for 2004:	99.4%	77.0%	72.4%	77.0%	66.9%	42.9%	41.8%						*
Percent of trips w/ zero discard:	79%	86%	85%	89%	73%	62%	30%						100%
Encounter rate:	21%	14%	15%	11%	27%	38%	70%						0%
Rank of total discards (out of 11):	5	3	8	6	4	1	2						N/A
Observed discards (lb):	4,080	97,352	269	611	0	0	131,699						0
Obs. discard percent of all obs. discards:	1.01%	24.20%	0.07%	0.15%	0.00%	0.00%	32.74%						N/A
2004 commercial landings (lb, all gears):	19,387,000	187,387,000	23,036,000	7,512,000	83,523,000	212,528,000	1,965,000						0
2004 recreational landings (lb, all gears):	35,000	27,000	0	15,146,000	5,383,000	1,134,000	266,657						N/A
Obs. discards as % of comm landings:	0.02%	0.05%	0.00%	0.01%	0.00%	0.00%	6.70%						N/A
Discards as % of comm landings:	0.23%	0.37%	0.01%	0.05%	0.06%	2.43%	58.04%						N/A
Discards as % ot total landings:	0.23%	0.37%	0.01%	0.02%	0.06%	2.41%	51.10%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Mid-Water Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
39	13	121	11%	Fish
42	14	121	12%	Protected Species

Top Species:	monkfish	herring	large-mesh mults	bluefish	small-mesh mults	M/S/B	dogfish						sea turtles
Projected observer days needed:	492	453	281	182	182	167	43						35
Average trip length (days):	3												
Estimated % coverage level required:	116%	92%	116%	11%	14%	14%	16%						11%
Realized CV for 2004:	104.8%	98.2%	70.8%	53.9%	53.9%	54.5%	24.6%						*
Percent of trips w/ zero discard:	77%	92%	38%	92%	77%	69%	54%						100%
Encounter rate:	23%	8%	62%	8%	23%	31%	46%						0%
Rank of total discards (out of 13):	3	6	7	8	5	2	1						N/A
Observed discards (lb):	94	5	43	100	1,024	11,794	2,716						0
Obs. discard percent of all obs. discards:	0.50%	0.03%	0.23%	0.54%	5.49%	63.28%	14.57%						N/A
2004 commercial landings (lb, all gears):	23,036,000	187,387,000	83,523,000	7,512,000	19,387,000	212,528,000	1,965,000						N/A
2004 recreational landings (lb, all gears):	0	27,000	5,383,000	15,146,000	35,000	1,134,000	0						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.14%						N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.18%						N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.18%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Small-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
449	142	3,484	4%	Fish
577	200	3,484	6%	Protected Species

Top Species:	skates	scallop	bluefish	herring	red crab	monkfish	dogfish	SF/S/BSB	tilefish	small-mesh mults	large-mesh mults	M/S/B	sea turtles
Projected observer days needed:	2,024	1,998	1,103	882	848	757	492	455	441	269	266	249	211
Average trip length (days):	1.90												
Estimated % coverage level required:	31%	30%	17%	13%	13%	11%	7%	7%	7%	4%	4%	4%	3%
Realized CV for 2004:	69.1%	71.0%	50.8%	43.7%	42.8%	40.5%	32.2%	30.9%	30.4%	23.5%	23.3%	22.7%	*
Percent of trips w/ zero discard:	14%	89%	85%	74%	90%	36%	21%	41%	87%	34%	4%	35%	100%
Encounter rate:	86%	11%	15%	26%	10%	64%	79%	59%	13%	66%	96%	65%	0%
Rank of total discards (out of 13):	2	12	9	8	10	7	4	5	11	3	6	1	N/A
Observed discards (lb):	178,362	180	7,934	13,687	1,143	26,577	93,129	37,034	316	0	41,122	229,443	0
Obs. discard percent of all obs. discards:	16.10%	0.02%	0.72%	1.24%	0.10%	2.40%	8.40%	3.34%	0.03%	0.00%	3.71%	20.71%	N/A
2004 commercial landings (lb, all gears):	20,388,000	64,506,000	7,512,000	187,387,000	3,952,000	23,036,000	1,965,000	30,616,000	2,316,000	19,387,000	83,523,000	212,528,000	0
2004 recreational landings (lb, all gears):	35,405	0	15,146,000	27,000	0	0	266,657	17,982,000	0	35,000	5,383,000	1,134,000	N/A
Obs. discards as % of comm landings:	0.87%	0.00%	0.11%	0.01%	0.03%	0.12%	4.74%	0.12%	0.01%	0.00%	0.05%	0.11%	N/A
Discards as % of comm landings:	38.71%	0.01%	2.56%	0.28%	1.14%	4.93%	160.90%	5.54%	0.81%	26.55%	1.81%	4.28%	N/A
Discards as % ot total landings:	38.64%	0.01%	0.85%	0.28%	1.14%	4.93%	141.67%	3.49%	0.81%	26.50%	1.70%	4.25%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Small-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
471	194	5,222	4%	Fish
499	205	5,222	4%	Protected Species

Top Species:	tilefish	bluefish	herring	scallop	M/S/B	small-mesh mults	SF/S/BSB	dogfish	monkfish	large-mesh mults	skate		sea turtles
Projected observer days needed:	3,057	2,231	1,869	1,162	1,125	944	584	532	497	429	202		1,229
Average trip length (days):	0.90												
Estimated % coverage level required:	65%	47%	40%	25%	24%	20%	12%	11%	11%	9%	4%		26%
Realized CV for 2004:	115.5%	90.3%	78.4%	57.4%	56.1%	50.8%	38.6%	36.7%	35.4%	32.6%	22.2%		57.3%
Percent of trips w/ zero discard:	99%	90%	96%	90%	55%	73%	28%	37%	67%	44%	23%		99%
Encounter rate:	1%	10%	4%	10%	45%	27%	72%	63%	33%	56%	77%		2%
Rank of total discards (out of 13):	13	8	11	9	2	5	4	3	7	6	1		N/A
Observed discards (lb):	6	6,645	144	6,303	119,995	75,491	bsb	94,574	7,744	7,560	110,445		Yes
Obs. discard percent of all obs. discards:	0.00%	0.86%	0.02%	0.81%	15.45%	9.72%	#VALUE!	12.18%	1.00%	0.97%	14.22%		N/A
2004 commercial landings (lb, all gears):	2,316,000	7,512,000	187,387,000	64,506,000	212,528,000	19,387,000	30,616,000	1,965,000	23,036,000	83,523,000	20,388,000		N/A
2004 recreational landings (lb, all gears):	0	15,146,000	27,000	0	1,134,000	35,000	17,982,000	0	0	5,383,000	0		NA
Obs. discards as % of comm landings:	7.25%	7.82%	0.00%	7.56%	6.22%	7.48%	#VALUE!	6.20%	7.02%	3.98%	5.29%		N/A
Discards as % of comm landings:	0.00%	1.13%	0.00%	0.13%	0.91%	5.20%	4.56%	77.63%	0.48%	0.23%	10.24%		N/A
Discards as % ot total landings:	0.00%	0.38%	0.00%	0.13%	0.90%	5.19%	2.87%	77.63%	0.48%	0.21%	10.24%		N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Large-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
1,076	386	16,156	2%	Fish
1,947	539	16,156	3%	Protected Species

Top Species:	bluefish	herring	M/S/B	tilefish	scallop	SF/S/BSB	red crab	dogfish	small-mesh mults	skates	large-mesh mults	monkfish	sea turtles
Projected observer days needed:	26,644	12,864	3,159	2,692	1,233	1,034	798	614	341	316	107	81	730
Average trip length (days):	1.90												
Estimated % coverage level required:	87%	42%	10%	9%	4%	3%	3%	2%	1%	1%	0%	0%	2%
Realized CV for 2004:	247.4%	131.3%	57.2%	52.9%	35.0%	31.9%	28.0%	24.5%	18.2%	17.5%	10.1%	8.8%	*
Percent of trips w/ zero discard:	98%	90%	70%	99%	88%	72%	82%	28%	53%	6%	5%	49%	100%
Encounter rate:	2%	10%	30%	1%	12%	28%	18%	72%	47%	94%	95%	51%	0%
Rank of total discards (out of 13):	9	10	11	12	8	5	6	2	7	1	3	4	N/A
Observed discards (lb):	854	563	357	285	1,191	0	6,660	149,701	0	0	124,760	41,061	0
Obs. discard percent of all obs. discards:	0.06%	0.04%	0.02%	0.02%	0.08%	0.00%	0.43%	9.69%	0.00%	0.00%	8.07%	2.66%	N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	2,316,000	64,506,000	30,616,000	3,952,000	1,965,000	19,387,000	20,388,000	83,523,000	23,036,000	0
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	0	0	17,982,000	0	266,657	35,000	35,405	5,383,000	0	N/A
Obs. discards as % of comm landings:	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%	0.17%	7.62%	0.00%	0.00%	0.15%	0.18%	N/A
Discards as % of comm landings:	0.42%	0.01%	0.01%	0.38%	0.06%	2.35%	5.58%	244.01%	0.90%	167.01%	4.79%	5.70%	N/A
Discards as % ot total landings:	0.14%	0.01%	0.01%	0.38%	0.06%	1.48%	5.58%	214.85%	0.90%	166.72%	4.50%	5.70%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Large-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
183	75	8,850	1%	Fish
186	76	8,850	1%	Protected Species

Top Species:	bluefish	small-mesh mults	herring	dogfish	tilefish	scallop	M/S/B	monkfish	large-mesh mults	SF/S/BSB	skate		sea turtles
Projected observer days needed:	3,625	998	883	481	342	311	242	140	101	98	70		342
Average trip length (days):	0.90												
Estimated % coverage level required:	46%	13%	11%	6%	4%	4%	3%	2%	1%	1%	1%		4%
Realized CV for 2004:	190.6%	82.7%	77.5%	55.7%	*	44.4%	39.0%	29.5%	25.1%	24.6%	20.9%		*
Percent of trips w/ zero discard:	92%	77%	96%	31%	100%	80%	59%	44%	35%	20%	5%		100%
Encounter rate:	8%	23%	4%	69%	0%	20%	41%	56%	65%	80%	95%		0%
Rank of total discards (out of 13):	10	8	11	2	12	5	7	6	4	3	1		N/A
Observed discards (lb):	102	0	5	44,140	0	7,202	407	3,629	3,523	0	88,540		0
Obs. discard percent of all obs. discards:	0.05%	0.00%	0.00%	21.21%	0.00%	3.46%	0.20%	1.74%	1.69%	0.00%	42.54%		N/A
2004 commercial landings (lb, all gears):	7,512,000	19,387,000	187,387,000	1,965,000	2,316,000	64,506,000	212,528,000	23,036,000	83,523,000	30,616,000	20,388,000		N/A
2004 recreational landings (lb, all gears):	15,146,000	35,000	27,000	0	0	0	1,134,000	0	5,385,000	17,982,000	0		N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	2.25%	0.00%	0.01%	0.00%	0.02%	0.00%	0.00%	0.43%		N/A
Discards as % of comm landings:	0.06%	0.05%	0.00%	106.69%	0.00%	0.46%	0.01%	0.72%	0.37%	3.76%	29.24%		N/A
Discards as % ot total landings:	0.02%	0.05%	0.00%	106.69%	0.00%	0.46%	0.01%	0.72%	0.35%	2.37%	29.24%		N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Purse Seine

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
33	16	264	6%	Fish
53	26	264	10%	Protected Species

Top Species:	herring	dogfish	large-mesh mults	M/S/B	bluefish	small-mesh mults	skates						sea turtles
Projected observer days needed:	219	217	217	206	19	19	19						19
Average trip length (days):	0.80												
Estimated % coverage level required:	104%	103%	103%	98%	9%	9%	9%						9%
Realized CV for 2004:	98.1%	97.2%	97.3%	93.5%	*	*	*						*
Percent of trips w/ zero discard:	88%	44%	94%	88%	100%	100%	100%						100%
Encounter rate:	12%	56%	6%	12%	0%	0%	0%						0%
Rank of total discards (out of 13):	2	1	3	4	5	5	5						N/A
Observed discards (lb):	5,200	11,817	20	14	0	0	0						0
Obs. discard percent of all obs. discards:	29.55%	67.15%	0.11%	0.08%	0.00%	0.00%	0.00%						N/A
2004 commercial landings (lb, all gears):	187,387,000	1,965,000	83,523,000	212,528,000	7,512,000	35,000	20,388,000						N/A
2004 recreational landings (lb, all gears):	27,000	0	5,383,000	1,134,000	15,146,000	19,387,000	0						N/A
Obs. discards as % of comm landings:	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A
Discards as % of comm landings:	0.06%	13.86%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A
Discards as % ot total landings:	0.06%	13.86%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Purse Seine

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	76	0%	Fish
2	2	76	3%	Protected Species

Top Species:	bluefish	herring	M/S/B	large-mesh mults	small-mesh mults	skates	dogfish	SF/S/BSB					sea turtles
Projected observer days needed:	***9***	***9***	***9***	***9***	***9***	***9***	***9***	***9***					***9***
Average trip length (days):	0.40												
Estimated % coverage level required:	30%	30%	30%	30%	30%	30%	30%	30%					30%
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					*
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					100%
Encounter rate:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					0%
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					0
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	5,383,000	35,000	0	0	17,982,000					N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Open Access Area, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
344	26	1,229	2%	Fish
457	36	1,229	3%	Protected Species

Top Species:	red crab	M/S/B	dogfish	large-mesh mults	SF/S/BSB	small mesh mults	monkfish	skate	scallop				sea turtles
Projected observer days needed:	1,596	1,380	807	708	649	534	320	177	80				N/A
Average trip length (days):	10.90												
Estimated % coverage level required:	12%	10%	6%	5%	5%	4%	2%	1%	1%				N/A
Realized CV for 2004:	84.2%	68.9%	51.5%	48.0%	45.8%	41.4%	31.9%	23.6%	15.9%				55.1%
Percent of trips w/ zero discard:	96%	50%	46%	0%	35%	38%	8%	0%	19%				89%
Encounter rate:	4%	50%	54%	100%	65%	62%	92%	100%	81%				11%
Rank of total discards (out of 13):	10	9	8	5	4	7	3	2	1				N/A
Observed discards (lb):	3	0	871	0	0	817	37,877	28,515	270,249				Yes
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.11%	0.00%	0.00%	0.10%	4.69%	3.53%	33.50%				N/A
2004 commercial landings (lb, all gears):	3,952,000	212,528,000	1,965,000	83,823,000	30,616,000	19,387,000	23,036,000	20,388,000	64,506,000				N/A
2004 recreational landings (lb, all gears):	0	1,134,000	0	5,383,000	17,982,000	35,000	0	0	0				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.16%	0.14%	0.42%				N/A
Discards as % of comm landings:	0.00%	0.01%	1.66%	0.27%	1.57%	0.32%	12.58%	64.85%	28.58%				N/A
Discards as % ot total landings:	0.00%	0.01%	1.66%	0.25%	0.99%	0.32%	12.58%	64.85%	28.58%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Open Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
591	69	1,822	4%	Fish
675	78	1,822	4%	Protected Species

Top Species:	small-mesh mults	M/S/B	SF/S/BSB	large-mesh mults	dogfish	scallop	monkfish	skates					sea turtles
Projected observer days needed:	3,080	641	465	411	371	280	213	114					N/A
Average trip length (days):	9.00												
Estimated % coverage level required:	19%	4%	3%	3%	2%	2%	1%	1%					N/A
Realized CV for 2004:	75.8%	30.5%	25.9%	24.2%	23.0%	20.0%	17.4%	12.6%					77.0%
Percent of trips w/ zero discard:	57%	42%	33%	25%	62%	26%	1%	0%					97%
Encounter rate:	43%	58%	67%	75%	38%	74%	99%	100%					3%
Rank of total discards (out of 11):	8	9	4	5	2	1	3	2					N/A
Observed discards (lb):	869	0	0	0	2,037	367,166	45,211	156,844					Yes
Obs. discard percent of all obs. discards:	0.11%	0.00%	0.00%	0.00%	0.26%	46.65%	5.74%	19.93%					N/A
2004 commercial landings (lb, all gears):	19,387,000	212,528,000	30,616,000	83,523,000	1,965,000	64,506,000	23,036,000	20,388,000					0
2004 recreational landings (lb, all gears):	35,000	1,134,000	17,982,000	5,383,000	266,657	0	0	35,405					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.000%	0.10%	0.57%	0.20%	0.77%					N/A
Discards as % of comm landings:	0.15%	0.00%	1.42%	0.12%	4.68%	29.66%	8.80%	31.32%					N/A
Discards as % ot total landings:	0.15%	0.00%	0.90%	0.12%	4.12%	29.66%	8.80%	31.27%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Closed Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
805	86	292	29%	Fish
805	86	292	29%	Protected Species

Top Species:	red crab	M/S/B	small-mesh mults	dogfish	SF/S/BSB	monkfish	large-mesh mults	scallop	skates				sea turtles
Projected observer days needed:	1,473	1,301	1,180	857	703	429	227	167	145				N/A
Average trip length (days):	9.70												
Estimated % coverage level required:	52%	46%	42%	30%	25%	15%	8%	6%	5%				N/A
Realized CV for 2004:	48.2%	42.1%	39.6%	32.6%	29.1%	22.2%	15.9%	13.5%	12.6%				16.5%
Percent of trips w/ zero discard:	98%	43%	16%	51%	26%	5%	1%	20%	0%				99%
Encounter rate:	2%	57%	84%	49%	74%	95%	99%	80%	100%				1%
Rank of total discards (out of 13):	11	8	6	7	5	3	4	1	2				N/A
Observed discards (lb):	5	0	0	3,948	36,678	123,827	0	706,435	331,549				Yes
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.00%	0.27%	2.48%	8.38%	0.00%	47.81%	22.44%				N/A
2004 commercial landings (lb, all gears):	3,952,000	212,528,000	19,387,000	1,965,000	30,616,000	23,036,000	83,523,000	64,506,000	20,388,000				N/A
2004 recreational landings (lb, all gears):	0	1,134,000	35,000	266,657	17,982,000	0	5,383,000	0	35,405				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.20%	0.12%	0.54%	0.00%	1.10%	1.63%				N/A
Discards as % of comm landings:	0.00%	0.00%	0.12%	0.77%	0.33%	1.64%	0.26%	2.09%	6.16%				N/A
Discards as % ot total landings:	0.00%	0.00%	0.12%	0.68%	0.21%	1.64%	0.24%	2.09%	6.15%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Closed Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
373	35	78	45%	Fish
373	35	78	45%	Protected Species

Top Species:	large-mesh mults	dogfish	SF/S/BSB	M/S/B	small-mesh mults	monkfish	scallop	skates					sea turtles
Projected observer days needed:	1,136	567	481	337	287	283	157	88					N/A
Average trip length (days):	9.00												
Estimated % coverage level required:	162%	81%	69%	48%	41%	40%	22%	13%					N/A
Realized CV for 2004:	71.2%	42.5%	38.3%	31.0%	26.8%	28.0%	19.8%	14.2%					*
Percent of trips w/ zero discard:	9%	46%	29%	26%	23%	0%	17%	0%					100%
Encounter rate:	91%	54%	71%	74%	77%	100%	83%	100%					0%
Rank of total discards (out of 13):	6	5	4	8	7	3	1	2					N/A
Observed discards (lb):	1,213	2,019	0	164	317	67,163	631,764	159,899					0
Obs. discard percent of all obs. discards:	0.13%	0.21%	0.00%	0.02%	0.03%	6.99%	65.77%	16.65%					N/A
2004 commercial landings (lb, all gears):	83,523,000	1,965,000	30,616,000	212,528,000	19,387,000	23,036,000	64,506,000	20,388,000					N/A
2004 recreational landings (lb, all gears):	5,383,000	0	17,982,000	1,134,000	35,000	0	0	0					N/A
Obs. discards as % of comm landings:	0.00%	0.10%	0.00%	0.00%	0.00%	0.29%	0.98%	0.78%					N/A
Discards as % of comm landings:	0.01%	0.66%	0.24%	0.00%	0.00%	1.07%	1.88%	2.74%					N/A
Discards as % ot total landings:	0.01%	0.66%	0.15%	0.00%	0.00%	1.07%	1.88%	2.74%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Open Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
11	9	3,566	0%	Fish
24	20	3,566	1%	Protected Species

Top Species:	scallop	small-mesh mults	skate	dogfish	monkfish	red crab	SF/S/BSB	large-mesh mults					sea turtles
Projected observer days needed:	204	135	120	120	117	***92***	***92***	82					N/A
Average trip length (days):	1.30												
Estimated % coverage level required:	4%	3%	3%	3%	3%	2%	2%	2%					N/A
Realized CV for 2004:	9.4%	10.4%	17.7%	31.8%	56.0%	*	9.2%	35.8%					*
Percent of trips w/ zero discard:	67%	56%	11%	78%	33%	100%	89%	0%					100%
Encounter rate:	33%	44%	89%	22%	67%	0%	11%	100%					0%
Rank of total discards (out of 13):	3	7	2	5	1	10	6	4					N/A
Observed discards (lb):	114	6	1,123	33	3,330	0	4	225					0
Obs. discard percent of all obs. discards:	1.15%	0.06%	11.32%	0.33%	33.57%	0.00%	0.04%	2.27%					N/A
2004 commercial landings (lb, all gears):	64,506,000	19,387,000	20,388,000	1,965,000	23,036,000	3,952,000	30,616,000	83,523,000					N/A
2004 recreational landings (lb, all gears):	0	35,000	0	0	0	0	17,982,000	5,383,000					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.01%	0.00%	0.01%	0.00%	0.00%	0.00%					N/A
Discards as % of comm landings:	0.22%	0.02%	1.80%	0.50%	1.75%	0.00%	0.02%	0.04%					N/A
Discards as % ot total landings:	0.22%	0.02%	1.80%	0.50%	1.75%	0.00%	0.01%	0.04%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Open Access Area, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
33	22	3,433	1%	Fish
55	39	3,433	1%	Protected Species

Top Species:	dogfish	small-mesh mults	SF/S/BSB	scallop	large-mesh mults	skates	monkfish						sea turtles
Projected observer days needed:	124	96	88	54	40	17	17						N/A
Average trip length (days):	1.40												
Estimated % coverage level required:	3%	2%	2%	1%	1%	0%	0%						N/A
Realized CV for 2004:	55.0%	48.2%	46.1%	35.9%	31.1%	20.2%	20.2%						*
Percent of trips w/ zero discard:	86%	77%	73%	41%	41%	9%	18%						100%
Encounter rate:	14%	23%	27%	59%	59%	91%	82%						0%
Rank of total discards (out of 13):	7	8	5	2	4	1	3						N/A
Observed discards (lb):	18	0	0	6,039	0	2,284	1,307						0
Obs. discard percent of all obs. discards:	0.05%	0.00%	0.00%	18.08%	0.00%	6.84%	3.91%						N/A
2004 commercial landings (lb, all gears):	1,965,000	19,387,000	30,616,000	64,506,000	83,523,000	20,388,000	23,036,000						N/A
2004 recreational landings (lb, all gears):	0	35,000	17,982,000	0	5,383,000	0	0						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0.01%						N/A
Discards as % of comm landings:	0.12%	0.01%	0.08%	1.30%	0.05%	8.30%	0.91%						N/A
Discards as % ot total landings:	0.12%	0.01%	0.05%	1.30%	0.05%	8.30%	0.91%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Closed Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	50	0%	Fish
0	0	50	0%	Protected Species

Top Species:	red crab	scallop	monkfish	large-mesh mults	small-mesh mults	skate	dogfish	SF/S/BSB					sea turtles
Projected observer days needed:	***24***	***24***	***24***	***24***	***24***	***24***	***24***	***24***					N/A
Average trip length (days):	2.00												
Estimated % coverage level required:	24%	24%	24%	24%	24%	24%	24%	24%					N/A
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Encounter rate:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
2004 commercial landings (lb, all gears):	3,952,000	64,506,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000					N/A
2004 recreational landings (lb, all gears):	0	0	0	5,383,000	35,000	0	0	17,982,000					N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Closed Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
2	1	546	0%	Fish
2	1	546	0%	Protected Species

Top Species:	scallop	monkfish	large-mesh mults	small-mesh mults	skate	dogfish	SF/S/BSB						sea turtles
Projected observer days needed:	***21***	***21***	***21***	***21***	***21***	***21***	***21***						N/A
Average trip length (days):	1.30												
Estimated % coverage level required:	3%	3%	3%	3%	3%	3%	3%						N/A
Realized CV for 2004:	0.0%	0.0%	*	*	0.0%	*	0.0%						*
Percent of trips w/ zero discard:	0%	0%	100%	100%	0%	100%	0%						100%
Encounter rate:	100%	100%	0%	0%	100%	0%	100%						0%
Rank of total discards (out of 13):	1	3	5	5	2	5	4						N/A
Observed discards (lb):	70	11	0	0	21	0	1						0
Obs. discard percent of all obs. discards:	17.77%	2.79%	0.00%	0.00%	5.33%	0.00%	0.25%						N/A
2004 commercial landings (lb, all gears):	64,506,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000						N/A
2004 recreational landings (lb, all gears):	0	0	5,383,000	35,000	0	0	17,982,000						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A
Discards as % of comm landings:	0.06%	0.03%	0.00%	0.00%	0.06%	0.00%	0.00%						N/A
Discards as % ot total landings:	0.06%	0.03%	0.00%	0.00%	0.06%	0.00%	0.00%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Trawl, Open Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
11	1	198	1%	Fish
22	3	198	2%	Protected Species

Top Species:	bluefish	scallop	M/S/B	monkfish	large-mesh mults	small-mesh mults	skates	dogfish	SF/S/BSB				sea turtles
Projected observer days needed:	***95***	***95***	***95***	***95***	***95***	***95***	***95***	***95***	***95***				***95***
Average trip length (days):	7.90												
Estimated % coverage level required:	6%	6%	6%	6%	6%	6%	6%	6%	6%				6%
Realized CV for 2004:	*	0.0%	0.0%	0.0%	0.0%	*	0.0%	*	0.0%				38.1%
Percent of trips w/ zero discard:	100%	0%	0%	0%	0%	100%	0%	100%	0%				67%
Encounter rate:	0%	100%	100%	100%	100%	0%	100%	0%	100%				33%
Rank of total discards (out of 13):	7	1	6	4	3	7	2	7	5				N/A
Observed discards (lb):	0	7,280	9	275	979	0	5,790	0	82				Yes
Obs. discard percent of all obs. discards:	0.00%	45.45%	0.06%	1.72%	6.11%	0.00%	36.14%	0.00%	0.51%				N/A
2004 commercial landings (lb, all gears):	7,512,000	64,506,000	212,528,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000				N/A
2004 recreational landings (lb, all gears):	15,146,000	0	1,134,000	0	5,383,000	35,000	0	0	17,982,000				N/A
Obs. discards as % of comm landings:	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%				N/A
Discards as % of comm landings:	0.00%	3.12%	0.00%	0.33%	0.32%	0.00%	7.86%	0.00%	0.07%				N/A
Discards as % ot total landings:	0.00%	3.12%	0.00%	0.33%	0.30%	0.00%	7.86%	0.00%	0.05%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Trawl, Open Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
56	31	1,088	3%	Fish
71	39	1,088	4%	Protected Species

Top Species:	dogfish	SF/S/BSB	small-mesh mults	M/S/B	bluefish	scallop	monkfish	large-mesh mults	skates				sea turtles
Projected observer days needed:	443	408	292	181	155	119	115	85	80				51
Average trip length (days):	2.10												
Estimated % coverage level required:	19%	18%	13%	8%	7%	5%	5%	4%	4%				2%
Realized CV for 2004:	67.5%	50.5%	49.6%	35.4%	114.1%	22.4%	19.4%	17.0%	34.7%				*
Percent of trips w/ zero discard:	77%	74%	77%	58%	97%	35%	29%	32%	3%				100%
Encounter rate:	23%	26%	23%	42%	3%	65%	71%	68%	97%				0%
Rank of total discards (out of 13):	3	6	7	8	10	2	4	5	1				N/A
Observed discards (lb):	3,201	106	64	30	2	4,672	585	160	17,773				0
Obs. discard percent of all obs. discards:	8.45%	0.28%	0.17%	0.08%	0.01%	12.33%	1.54%	0.42%	46.90%				N/A
2004 commercial landings (lb, all gears):	1,965,000	30,616,000	19,387,000	212,528,000	7,512,000	64,506,000	23,036,000	83,523,000	20,388,000				N/A
2004 recreational landings (lb, all gears):	0	17,982,000	35,000	1,134,000	15,146,000	0	0	5,383,000	0				N/A
Obs. discards as % of comm landings:	0.16%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.09%				N/A
Discards as % of comm landings:	7.52%	0.02%	0.02%	0.00%	0.00%	0.35%	0.12%	0.01%	4.06%				N/A
Discards as % ot total landings:	7.52%	0.01%	0.02%	0.00%	0.00%	0.35%	0.12%	0.01%	4.06%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Scottish Seine

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
5	5	95	5%	Fish
8	8	95	8%	Protected Species

Top Species:	SF/S/BSB	large-mesh mults	bluefish	herring	scallop	M/S/B	monkfish	small-mesh mults	skates	dogfish			sea turtles
Projected observer days needed:	30	14	***12***	***12***	***12***	***12***	***12***	***12***	***12***	***12***			***12***
Average trip length (days):	0.30												
Estimated % coverage level required:	105%	49%	42%	42%	42%	42%	42%	42%	42%	42%			42%
Realized CV for 2004:	25.3%	28.9%	*	*	*	*	*	27.9%	31.9%	*			*
Percent of trips w/ zero discard:	60%	0%	100%	100%	100%	100%	100%	80%	40%	100%			100%
Encounter rate:	40%	100%	0%	0%	0%	0%	0%	20%	60%	0%			0%
Rank of total discards (out of 13):	1	2	5	5	5	5	5	3	4	5			N/A
Observed discards (lb):	269	218	0	0	0	0	0	130	32	0			0
Obs. discard percent of all obs. discards:	3.39%	2.74%	0.00%	0.00%	0.00%	0.00%	0.00%	1.64%	0.40%	0.00%			N/A
2004 commercial landings (lb, all gears):	30,616,000	83,523,000	7,512,000	187,387,000	64,506,000	212,528,000	23,036,000	19,387,000	20,388,000	1,965,000			N/A
2004 recreational landings (lb, all gears):	17,982,000	5,383,000	15,146,000	27,000	0	1,134,000	0	35,000	0	0			N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			N/A
Discards as % of comm landings:	0.04%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%			N/A
Discards as % ot total landings:	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%			N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Shrimp Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
12	12	1,968	1%	Fish
12	12	1,968	1%	Protected Species

Top Species:	M/S/B	skate	small-mesh mults	herring	monkfish	large-mesh mults							sea turtles
Projected observer days needed:	364	247	123	92	22	20							42
Average trip length (days):	1.00												
Estimated % coverage level required:	18%	13%	6%	5%	1%	1%							2%
Realized CV for 2004:	98.1%	79.9%	55.7%	47.9%	23.5%	22.4%							*
Percent of trips w/ zero discard:	92%	50%	50%	0%	17%	0%							100%
Encounter rate:	8%	50%	50%	100%	83%	100%							0%
Rank of total discards (out of 13):	8	4	3	1	5	2							N/A
Observed discards (lb):	0	84	285	1,072	2	299							0
Obs. discard percent of all obs. discards:	0.01%	3.85%	13.10%	49.28%	0.10%	13.73%							N/A
2004 commercial landings (lb, all gears):	212,528,000	20,388,000	19,387,000	187,387,000	23,036,000	83,523,000							N/A
2004 recreational landings (lb, all gears):	1,134,000	0	35,000	27,000	0	5,383,000							N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%							N/A
Discards as % of comm landings:	0.00%	0.08%	0.29%	0.11%	0.00%	0.07%							N/A
Discards as % ot total landings:	0.00%	0.08%	0.29%	0.11%	0.00%	0.07%							N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Shrimp Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
2	2	334	1%	Fish
2	2	334	1%	Protected Species

Top Species:	herring	M/S/B	monkfish	large-mesh mults	small-mesh mults	skates	SF/S/BSB						sea turtles
Projected observer days needed:	***76***	***76***	***76***	***76***	***76***	***76***	***76***						***76***
Average trip length (days):	5.80												
Estimated % coverage level required:	4%	4%	4%	4%	4%	4%	4%						4%
Realized CV for 2004:	*	*	*	*	*	*	*						*
Percent of trips w/ zero discard:	100%	100%	100%	100%	100%	100%	100%						100%
Encounter rate:	0%	0%	0%	0%	0%	0%	0%						0%
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Observed discards (lb):	0	0	0	0	0	0	0						N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
2004 commercial landings (lb, all gears):	187,387,000	212,528,000	23,036,000	83,523,000	19,387,000	20,388,000	30,616,000						N/A
2004 recreational landings (lb, all gears):	27,000	1,134,000	0	5,383,000	35,000	0	17,982,000						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Fishing Mode	Baseline Levels (No Filters)	Grey-Cell Filter	CV-Target Met Filter	Discard % of Discards Filter			Discard % of Catch Filter		
				0.5%	1.0%	3.0%	0.5%	1.0%	3.0%
NE Clam Dredge	50	50	50	50	50	50	50	50	50
MA Clam Dredge	84	84	84	84	84	84	84	84	84
NE Crab Pot	101	101	101	101	101	101	101	101	101
MA Crab Pot	28	28	28	28	28	28	28	28	28
NE Fish Pot	20	20	20	20	20	20	20	20	20
MA Fish Pot	103	40	40	40	40	40	40	40	40
NE Small-mesh Gillnet	12	12	12	12	12	12	12	12	12
MA Small-mesh Gillnet	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259
NE Large-mesh Gillnet	4,357	3,767	3,767	482	482	141	482	141	141
MA Large-mesh Gillnet	653	653	653	653	653	653	653	653	653
NE X-Large-mesh Gillnet	3,266	2,059	2,059	267	214	214	214	214	214
MA X-Large-mesh Gillnet	468	468	468	468	468	468	468	468	468
NE Handline	137	137	137	137	137	137	72	72	72
MA Handline	133	133	133	133	133	133	133	133	133
NE Lobster Pot	439	439	439	439	439	439	439	439	439
MA Lobster Pot	89	89	89	89	89	89	89	89	89
NE Longline	185	185	185	99	99	99	99	99	99
MA Longline	76	76	76	76	76	76	76	76	76
NE Mid-Water Trawl	1,793	1,218	1,218	1,218	1,218	747	346	346	346
MA Mid-Water Trawl	557	492	492	492	182	182	43	43	35
NE Small-mesh Trawl	3,822	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024
MA Small-mesh Trawl	5,417	3,057	3,057	2,231	1,229	1,229	1,229	1,229	1,229
NE Large-mesh Trawl	26,644	26,644	26,644	730	730	730	730	730	730
MA Large-mesh Trawl	3,625	3,625	3,625	481	481	481	481	481	481
NE Purse Seine	219	219	219	219	219	219	217	217	217
MA Purse Seine	9	9	9	9	9	9	9	9	9
NE Scallop Dredge OL	1,596	1,596	1,596	320	320	320	320	320	320
MA Scallop Dredge OL	8,713	3,080	3,080	280	280	280	280	280	280
NE Scallop Dredge CL	3,861	1,473	1,473	703	703	429	703	429	145
MA Scallop Dredge CL	1,777	1,136	1,136	283	283	283	283	283	88
NE Scallop Dredge OG	204	204	120	117	117	117	117	117	92
MA Scallop Dredge OG	293	124	124	54	54	54	54	54	17
NE Scallop Dredge CG	24	24	24	24	24	24	24	24	24
MA Scallop Dredge CG	21	21	21	21	21	21	21	21	21
MA Scallop Trawl OL	95	95	95	95	95	95	95	95	95
MA Scallop Trawl OG	443	443	443	443	443	443	443	443	443
NE Scottish Seine	30	30	12	12	12	12	12	12	12
NE Shrimp Trawl	364	364	364	247	247	247	42	42	42
MA Shrimp Trawl	76	76	76	76	76	76	76	76	76
Total Sea Days Needed:	**71,043**	**55,554**	**55,452**	**14,516**	**13,151**	**12,065**	**11,868**	**11,253**	**10,704**

Summary results (at-sea fisheries observer sea days needed) of applying the proposed importance filters (Option A) to the 39 fishing modes subject to the Northeast Region SBRM.

Fishing Mode	Baseline Levels (No Filters)	Grey-Cell Filter	Discard % of Discards Filter			Discard % of Mortality Filter		
			99.0%	95.0%	90.0%	99.0%	95.0%	90.0%
NE Clam Dredge	50	50	50	50	50	50	50	50
MA Clam Dredge	84	84	84	84	84	84	84	84
NE Crab Pot	101	101	101	101	101	101	101	101
MA Crab Pot	28	28	28	28	28	28	28	28
NE Fish Pot	20	20	20	20	20	20	20	20
MA Fish Pot	103	40	40	40	40	40	40	40
NE Small-mesh Gillnet	12	12	12	12	12	12	12	12
MA Small-mesh Gillnet	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259
NE Large-mesh Gillnet	4,357	3,767	443	141	141	141	141	141
MA Large-mesh Gillnet	653	653	653	653	653	653	653	653
NE X-Large-mesh Gillnet	3,266	2,059	417	267	238	214	214	144
MA X-Large-mesh Gillnet	468	468	468	468	468	468	468	468
NE Handline	137	137	72	72	72	72	72	72
MA Handline	133	133	133	133	133	133	133	133
NE Lobster Pot	439	439	439	439	439	439	439	439
MA Lobster Pot	89	89	89	89	89	89	89	89
NE Longline	185	185	99	35	35	99	35	35
MA Longline	76	76	76	76	76	76	76	76
NE Mid-Water Trawl	1,793	1,218	1,218	747	747	316	316	56
MA Mid-Water Trawl	557	492	35	35	35	35	35	35
NE Small-mesh Trawl	3,822	2,024	2,024	2,024	2,024	2,024	2,024	2,024
MA Small-mesh Trawl	5,417	3,057	2,231	2,231	2,231	1,229	1,229	1,229
NE Large-mesh Trawl	26,644	26,644	26,644	26,644	2,692	798	730	730
MA Large-mesh Trawl	3,625	3,625	481	481	481	481	481	481
NE Purse Seine	219	219	219	219	19	217	19	19
MA Purse Seine	9	9	9	9	9	9	9	9
NE Scallop Dredge OL	1,596	1,596	708	708	708	320	177	177
MA Scallop Dredge OL	8,713	3,080	3,080	465	280	280	114	114
NE Scallop Dredge CL	3,861	1,473	703	429	429	145	139	139
MA Scallop Dredge CL	1,777	1,136	481	283	108	108	108	108
NE Scallop Dredge OG	204	204	120	117	117	92	92	92
MA Scallop Dredge OG	293	124	88	17	17	17	17	17
NE Scallop Dredge CG	24	24	24	24	24	24	24	24
MA Scallop Dredge CG	21	21	21	21	21	21	21	21
MA Scallop Trawl OL	95	95	95	95	95	95	95	95
MA Scallop Trawl OG	443	443	119	51	51	80	51	51
NE Scottish Seine	30	30	12	12	12	12	12	12
NE Shrimp Trawl	364	364	123	92	92	42	42	42
MA Shrimp Trawl	76	76	76	76	76	76	76	76
Total Sea Days Needed:	**71,043**	**55,554**	**42,995**	**38,749**	**14,208**	**10,400**	**9,726**	**9,395**

Summary results (at-sea fisheries observer sea days needed) of applying the proposed importance filters (Option B) to the 39 fishing modes subject to the Northeast Region SBRM. Note that in this option, there is no "CV-met filter."

Fishing Mode	Baseline Levels (No Filters)	Grey-Cell Filter	95% of Discards & 98% of Mortality	95% of Discards & 99% of Mortality	98% of Discards & 99% of Mortality
NE Clam Dredge	50	50	50	50	50
MA Clam Dredge	84	84	84	84	84
NE Crab Pot	101	101	101	101	101
MA Crab Pot	28	28	28	28	28
NE Fish Pot	20	20	20	20	20
MA Fish Pot	103	40	40	40	40
NE Small-mesh Gillnet	12	12	12	12	12
MA Small-mesh Gillnet	1,259	1,259	1,259	1,259	1,259
NE Large-mesh Gillnet	4,357	3,767	141	141	141
MA Large-mesh Gillnet	653	653	653	653	653
NE X-Large-mesh Gillnet	3,266	2,059	214	214	214
MA X-Large-mesh Gillnet	468	468	468	468	468
NE Handline	137	137	72	72	72
MA Handline	133	133	133	133	133
NE Lobster Pot	439	439	439	439	439
MA Lobster Pot	89	89	89	89	89
NE Longline	185	185	35	35	99
MA Longline	76	76	76	76	76
NE Mid-Water Trawl	1,793	1,218	316	316	316
MA Mid-Water Trawl	557	492	35	35	35
NE Small-mesh Trawl	3,822	2,024	2,024	2,024	2,024
MA Small-mesh Trawl	5,417	3,057	1,229	1,229	1,229
NE Large-mesh Trawl	26,644	26,644	730	798	798
MA Large-mesh Trawl	3,625	3,625	481	481	481
NE Purse Seine	219	219	19	19	217
MA Purse Seine	9	9	9	9	9
NE Scallop Dredge OL	1,596	1,596	320	320	320
MA Scallop Dredge OL	8,713	3,080	114	280	280
NE Scallop Dredge CL	3,861	1,473	145	145	145
MA Scallop Dredge CL	1,777	1,136	108	108	108
NE Scallop Dredge OG	204	204	92	92	92
MA Scallop Dredge OG	293	124	17	17	17
NE Scallop Dredge CG	24	24	24	24	24
MA Scallop Dredge CG	21	21	21	21	21
MA Scallop Trawl OL	95	95	95	95	95
MA Scallop Trawl OG	443	443	51	51	80
NE Scottish Seine	30	30	12	12	12
NE Shrimp Trawl	364	364	42	42	42
MA Shrimp Trawl	76	76	76	76	76
Total Sea Days Needed:	**71,043**	**55,554**	**9,874**	**10,108**	**10,400**

Summary results (at-sea fisheries observer sea days needed) of applying the proposed importance filters to the 39 fishing modes subject to the Northeast Region SBRM (continued). This table indicates the specific combinations of filter thresholds considered, after refining the broader threshold levels identified on the previous table. The recommendation of the SBRM FMAT is to set the filters at 95% of discards and 98% of mortality.

Appendix D
Northeast Fisheries Observer Program
Data Flow Process

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Summary of Northeast Fisheries Observer Program DATA FLOW

The Northeast Fisheries Observer Program collects, maintains, and distributes data to be used for scientific and management purposes. Since 1989, the Northeast Fisheries Observer Program has deployed observers on commercial fishing vessels in various fisheries. Trips have ranged from 1-15 days at sea. The observed sea days have ranged from 2,000 – 12,000 annually, completed by 20-120 certified observers. The trips consist of data logs containing a variety of information including but not limited to:

- Trip information (target species, dates/times, gears fished, primary species landed, etc.)
- Economic information (trip level costs such as vessel/gear repair, fuel, etc.)
- Haul information (dates/times, weather, water depth, location, etc.)
- Species information (species, disposition, weights, etc.)
- Sampling information (lengths, weights, # of age structures collected, etc.)
- Incidental Take information (species, samples collected, lengths, etc.)
- Safety information (EPIRB on board, Coast Guard Documentation sticker, etc.)

Depending on the fishery observed and the associated reporting requirements, the flow of data can be very complex as it migrates from various sources before it is loaded to the main Oracle database. The outline below describes what happens to these data once an observer returns to port from an observed trip.

1. COMPLETION OF PAPER LOGS – The observer verifies that their paper logs are filled out completely and accurately.

2. ELECTRONIC DATA SUBMISSION – The observer enters a subset of their paper log data electronically and uploads the data to Oracle tables. For certain fisheries, this subset of data is used for preliminary analysis.

3. DATA REVIEW – All data are fully reviewed for completeness and accuracy, including any media and biological samples submitted. Observers are debriefed as needed to verify data or clarify inconsistencies.

4. DATA ENTRY AND AUDITING – Paper log data are fully entered and a thorough audit is completed. The audit continues until all errors and warnings have been addressed. Data are loaded to the main Oracle database.

   *****At this point the data have been loaded in the main Oracle database and are accessible to end users*****

5. DATA ERROR REPORTS – If errors are found after data has been loaded to the main Oracle database, error reports are generated and the appropriate changes are made directly to the main Oracle database.

6. DATA ARCHIVING – All data collected from the Northeast Fisheries Program are scanned in order to alleviate space and enable observer data to be viewed on a secure website. Original paper logs are archived at a secure facility.

Note: ***This is not a complete description of the data flow process used by the Northeast Fisheries Observer Program, but is instead a summary intended to provide an overview of how the data are reviewed, edited, and processed.***

Appendix E
Comments on the Draft Amendment

This appendix contains comments received on the draft 2007 SBRM Omnibus Amendment, as well as comments received on the current SBRM Omnibus Amendment. The public comment period for the draft 2007 SBRM Omnibus Amendment was October 31 through December 29, 2006. The public comment period on the draft of the current SBRM Omnibus Amendment was September 27, 2013, through October 27, 2013. The comment period was then reopened from November 19, 2013, through December 19, 2013.

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Summary of Comments Received on the Draft Amendment

Comment Period: October 31-December 29, 2006

NOAA's National Marine Fisheries Service (NMFS), on behalf of the Mid-Atlantic and New England Fishery Management Councils, published a Federal Register notice on October 31, 2006, to announce the availability of the draft SBRM Amendment and associated environmental assessment (EA) for review and to solicit comments on the document. The Federal Register notice announced two public hearings held on November 14, 2006, in Gloucester, MA, and on December 13, 2006, in New York, NY. Written comments were accepted through December 29, 2006.

A total of 48 individuals attended the public hearings, and 9 individuals offered public testimony on the amendment. In addition to those speaking at the public hearings, NMFS received seven comment letters. Several of these letters restated opinions voiced at the public hearings. One letter was submitted on behalf of six fishing industry organizations, with a second letter endorsing the first. Three of the letters were from conservation organizations, two of which endorsed the more detailed comments of the third. The two remaining letters were submitted by private citizens.

Several comment letters recognized the considerable effort expended to date on the development of the amendment and applauded the progress that has been made. However, with the exception of two letters, one focused entirely on the cost estimates for electronic monitoring and one on the state of fisheries in general and recommending improved enforcement, the comment letters indicated dissatisfaction with a variety of elements of the draft amendment and several expressed doubt that the amendment would satisfy the Court orders stemming from the Amendment 10 and Amendment 13 lawsuits. The following summarizes all comments provided during testimony at the public hearings and in the written letters; however, in cases where the same individual or organization provided the same comment more than once (e.g., during a public hearing and also in a follow-up letter), the comment is summarized once.

General Comments on the Amendment

Comment 1. One commenter expressed concern that the SBRM Amendment does not strike an adequate balance between specificity and generality. The commenter suggested that it is overly specific when it stratifies the bycatch reporting regime into "tens of hundreds" of strata, and it is too general in that it prescribes a uniform precision target across all fisheries.

> Response: The commenter's claim of "tens of hundreds" of strata is incorrect. The SBRM Amendment stratifies fishing activities into 39 fishing modes that represent

the appropriate gear type and area-based divisions to best serve as the basis for assigning observer coverage. Against these 39 strata, the implications of observer coverage are assessed for each species and species group managed under the Councils 13 FMPs, plus sea turtles, encountered by each fishing mode. While this creates a matrix composed of 585 cells, the Councils consider this to be an appropriate framework for the analysis conducted in support of the SBRM and with the appropriate level of specificity. The Councils do not consider the CV-based performance standard to be too general in its application across all fisheries. The CV-based methodology establishes the process by which observer coverage levels are determined and allocated across the wide variety of fisheries managed under the Northeast Region FMPs. Using a global standard (a CV of 30 percent) across all fisheries does not mean that all fisheries would be allocated the same level of observer coverage (as would occur under a process by which all fisheries were required to achieve, for example, 20 percent coverage), but recognizes inherently that some fisheries—those that have more highly variable catches—require higher levels of observer coverage than those with more consistent (less variable) catches. In this way, the differences among fisheries that would affect observer coverage levels are accounted for while ensuring that the data collected by observers on discards in all fisheries achieve a consistent and standard level of precision.

Given that the expectations for the discard data obtained by at-sea fisheries observers should be consistent across all fisheries for which the data are used in similar ways (e.g., to obtain reasonably precise and accurate estimates of discards for use in stock assessments and to determine the stock-level implications of discarding), it stands to reason that a generally-derived performance standard is appropriate, particularly given the overlaps and inter-relationships among fisheries and species caught (see chapter 3). When the discard data are used for different purposes in certain specific fisheries (e.g., for real-time area-based quota monitoring), the generally-derived performance standard may need to be supplemented to more appropriately reflect the needs of the specific application. This amendment would not preclude either Council from modifying the SBRM process established through this amendment to accomplish such a change on an FMP-by-FMP basis as management needs dictate. In fact, the SBRM Amendment has been designed to ensure such flexibility remains available to the Councils (see section 6.5). The ability of the Councils to develop changes to the SBRM through the framework adjustment and/or annual specifications process preserves the flexibility suggested by the commenter.

Comment 2. The same commenter further stated that the SBRM Amendment does not comport with NMFS's nationwide bycatch reporting technical guidance because it establishes blanket standards of precision across all fishing modes, rather than considering the needs and requirements of each fishery.

Response: The Councils intend to establish a rigorous methodology with which to ensure that the discard data obtained by at-sea observers is of the highest quality possible, with high levels of precision and accuracy to meet the needs of the scientists and managers that utilize the data. Establishing a uniform, global CV level is warranted to ensure a consistent and standard minimum level of precision in the data

collected by at-sea fisheries observers under the SBRM. As noted in the response to comment 1, using a global standard (a CV of 30 percent) across all fisheries does not mean that all fisheries would be allocated the same level of observer coverage (as would occur under a process by which all fisheries were required to achieve, for example, 20 percent coverage), but recognizes inherently that some fisheries—those that have more highly variable catches—require higher levels of observer coverage than those with more consistent (less variable) catches. Also, the use of the importance filters (section 6.2.3) provides a mechanism to accommodate differences in discard levels among the subject fishing modes and to account for the overall mortality to a stock associated with discards in the various fishing modes. In this way, the differences among fisheries that would affect observer coverage levels are accounted for while ensuring that the data collected by observers on discards in all fisheries achieve a consistent and standard level of precision.

The option of evaluating and setting the CV-based performance standard on a cell-by-cell basis was considered during the development of the SBRM Amendment, but ultimately rejected as an unnecessary and impracticable approach to address the need for establishing a minimum level of precision (see section 6.8.4). The process proposed in this amendment does not preclude adjusting the fishery-specific CV levels as conditions in any fisheries warrant (this ability is created in the proposed framework adjustment provisions, see section 6.5). In effect, this amendment establishes a baseline CV level that applies to all fisheries to serve as an initial minimum level of precision, and provides a mechanism to adjust the standard as appropriate.

Comment 3. The same commenter stated that the SBRM Amendment should provide the Councils and NMFS with a process only and some ground rules that can be used to develop and implement fisheries-specific monitoring systems in fishery management plan (FMP) specific contexts. The SBRM Amendment, he wrote, should establish a broad program structure with the details left to development by plan development teams (PDTs) (or some other knowledgeable working group) in the context of the individual FMPs and with full consideration of specific FMP needs.

Response: The Councils disagree with the suggestion that the SBRM Amendment should implement a process only and not actually establish the SBRM to be implemented in the fisheries. The Court order clearly remanded to the agency the responsibility to establish the actual SBRM, not simply create a framework or guidelines for establishing an SBRM at some later date. The Councils considered addressing the Court order on an FMP-by-FMP basis, but ultimately decided it would be more effective and efficient to handle this requirement in an omnibus amendment to all Northeast Region FMPs.

Comment 4. A commenter expressed dissatisfaction with the process used by the Fishery Management Action Team (FMAT), with concern that it disengaged interested parties from the development of the amendment except for periodic updates to the Councils.

Response: NMFS and the Councils disagree that the use of the FMAT disengaged interested parties from the development of the amendment. The FMAT served as a technical working group of NMFS and Council staff to develop the technical elements of the SBRM Amendment and provide input to the Joint SBRM Oversight Committee and the Councils for their consideration. Public input from interested parties was encouraged and accepted at seven meetings of the Joint SBRM Oversight Committee, six meetings of the Mid-Atlantic Council, seven meetings of the New England Council, two public hearings on the draft amendment, and a meeting of members of the two Councils' Science and Statistical Committees (SSC). This represents a total of 23 meetings at which members of the public were welcome to engage the Councils on issues related to the development of the amendment. By contrast, there were nine meetings of the FMAT. For a complete list of all public meetings at which the SBRM Amendment was discussed, see chapter 9.

Comment 5. One commenter was critical of the objectives identified for the amendment, citing that the public hearing document did not define the objectives for the SBRM program. This commenter stated that it was insufficient to prescribe a blanket CV requirement and term this an objective.

Response: Section 1.4 has been clarified to identify the purpose of both the SBRM Amendment and the resulting SBRM itself. The SBRM is intended to ensure that the biologic sampling programs used to obtain discard data minimize bias and maximize precision to the extent practicable. The CV of 30 percent is not, in itself, an objective of the SBRM, but is rather an objective criterion to be used to gauge the level of success in achieving the objectives of the SBRM.

Comment 6. A commenter stated that NMFS should ensure the amendment document undergoes external peer review by a party such as the Center for Independent Experts. The peer review panel, he wrote, should be given the opportunity to comment on the technical issues and issues related to management and integration of the SBRM into stock assessments.

Response: The Councils agree that this amendment is an important document warranting external peer-review. On August 22, 2006, four members of the Mid-Atlantic and New England Councils' SSCs (two members from each SSC) met to conduct a review of the technical components of the SBRM Amendment. In a report prepared by the SSC reviewers, they concluded that the document does "a commendable job of formulating a comprehensive approach to the problem of assessing bycatch rates in multiple fisheries." The overall consensus of the reviewers is that the document "provides a rigorous objective framework for addressing the problem of bycatch monitoring."

Regarding the proposed CV of 30 percent, the reviewers concluded that this was "a reasonable objective from a statistical perspective" but they did caution the Councils that "it may not be possible to achieve this objective for all species and fleet sectors simply by reallocating the present number of trip days observed" and that "additional observations may be needed." The focus of the report was on several technical

changes in the formulas used to estimate discards and calculate the CV that the reviewers suggested be made, as well as the suggestion that an "importance filter" be developed to prioritize coverage levels and account for situations where the magnitude of the discards are inconsequential relative to the level of observer coverage that would be necessary to achieve the performance standard.

All technical changes suggested by the SSC reviewers have now been made to the analyses described in the SBRM Amendment, and the amendment now includes provisions implementing the suggested "importance filter" process (see chapters 5 and 6 of the amendment for more discussion on these items).

Comment 7. Several commenters concluded that the amendment fails to meet the legal requirements of the Magnuson-Stevens Act, the National Environmental Policy Act (NEPA), and relevant Court orders. One commenter called for the SBRM Amendment to be withdrawn and for the Secretary of Commerce to implement emergency regulations to establish adequate levels of observer coverage until a "legally-compliant SBRM" is developed.

Response: The Councils disagree with the assertion that the amendment fails to meet the legal requirements of the Magnuson-Stevens Act, NEPA, and the relevant Court orders. The Councils were advised of the legal obligations under the applicable laws at each step in the development of this amendment. The Councils assert that this amendment fully complies with all applicable legal standards under the Magnuson-Stevens Act, NEPA, and other applicable laws (see chapter 8), and that the amendment fully complies with the relevant Court orders stemming from the Amendment 10 and Amendment 13 lawsuits.

There are no grounds on which to withdraw this amendment from development, nor any need or legal authority to promulgate emergency regulations regarding observer coverage levels at this time.

Comment 8. A commenter described the draft amendment as fatally flawed because it fails to incorporate the necessary requirements relating to "how" the bycatch data are to be collected; i.e., whether by observers and if so, the nature of the observer coverage. The SBRM should also specify, the commenter continued, how the data are to be analyzed and reported in support of management decisions.

Response: As a result of this comment, the amendment has been clarified to stipulate that, under the preferred alternatives, discard data are to be collected by at-sea fishery observers operating under the aegis of the NEFOP. For a detailed explanation of how the appropriate data are obtained by at-sea observers, refer to the Fisheries Observer Program Manual (NEFOP 2006a) and the Biological Sampling Manual (NEFOP 2006b). Chapter 5 and Appendix A explain, in detail, how the data are analyzed, and chapter 6 describes the SBRM reporting procedures proposed in this amendment.

Comment 9. Several commenters stated that NMFS will be fiscally unable to fulfill the requirements for observer coverage specified in the SBRM Amendment. The

commenters expressed concern that failure to fulfill the precision or observer level targets may result in litigation affecting the agency's ability to manage fisheries and perhaps bearing on the conduct of the fisheries.

Response: Based on the results of the analysis supporting this amendment, it is expected that observer coverage levels will need to increase in some fisheries from recent levels. It may be possible to decrease observer coverage in other fisheries, and this decrease may offset some of the increase needed, but not necessarily all. The Councils do not feel that the SBRM established by this amendment should be constrained to current or past levels of observer coverage, and acknowledge that observer coverage levels may need to increase overall to meet the SBRM performance standard. The purpose of this SBRM, as required by the Magnuson-Stevens Act and the Court orders, is to establish a methodology for assessing bycatch that is independent of the means available to fund the process. The SBRM Amendment recognizes that the agency's budget available to fund observer coverage is subject to change according to the appropriations authorized by Congress and the President, but it would not be appropriate to modify the SBRM based on expected funding levels that cannot be predicted. There may be years in which the available budget is insufficient to fully fund the observer coverage levels that result from the SBRM. The SBRM Amendment outlines a process for prioritizing available funding (see section 6.6).

Comment 10. A commenter noted that forms used for the reporting of bycatch should be standardized.

Response: The forms used by at-sea fisheries observers to report discards are standardized and are described in the Fisheries Observer Program Manual (NEFOP 2006a) and Biological Sampling Manual (NEFOP 2006b).

Comment 11. Several commenters were concerned about how the SBRM can be adapted to support the bycatch information needs of each FMP and how the SBRM will be updated to respond to (or in anticipation of) changes in the fishery. These commenters suggested the SBRM should contemplate the changing dynamics of each fishery by gear type and species and be integrated into each FMP.

Response: By definition, this omnibus amendment fully and adequately integrates the resulting SBRM into each FMP amended by this action. The Councils shared the concern raised by the commenter, so the SBRM Amendment includes provisions to allow changes to be made to elements of the SBRM through framework adjustments and/or specifications (see section 6.5). This is intended to preserve the ability of the Councils to make changes to the SBRM as needed to adapt to changes in the management programs of the various FMPs.

Comment 12. Commenters said that to ensure the SBRM can provide adequate information to support existing and future management needs, the amendment document should include a discussion of each fishery, its gear types, management scheme, and bycatch species.

Response: Chapter 2 of the SBRM Amendment provides a description of each FMP subject to the amendment that includes identifying the primary gear types used, the management scheme in place, the history and context for the FMP, the value of the fishery, and the primary ports of landing. Chapter 3 provides an overview of each fishing mode affected by one or more of the subject FMPs, including the major species caught, primary ports, and primary areas fished. The tables provided in Appendix C of the amendment identify the primary discard species for each fishing mode in 2004. These sections of the amendment address all items suggested in the comment.

Comment 13. The same commenters also suggested there should be a mechanism in place to update the allocation analysis annually or more frequently, in order to address changes in each fishery; i.e., gear innovations, changes in the total allowable catch, and other management changes.

Response: The Councils agree that the allocation analysis should be updated annually. The process established by this amendment includes an annual update to the analysis used to generate observer coverage levels and allocations. As a result of this amendment, the Councils would have the ability to change, through the framework adjustment process, certain aspects of the SBRM in order to address changes in each fishery.

Comment 14. One commenter suggested that the SBRM Amendment provide for future FMP-specific changes to be made by annual specifications, framework adjustment, regulatory action alone, or FMP amendment.

Response: The Councils agree and changes to the SBRM Amendment have been made to incorporate this flexibility (see section 6.5).

Comment 15. A commenter suggested that each FMP include a set of diagnostics, perhaps simply the coefficient of variation (CV) for bycatch estimate by mode, to gauge whether the FMP-specific SBRM is providing sufficiently precise information for management purposes.

Response: One of the primary outcomes of the SBRM Amendment is to establish a performance standard (a CV of no more than 30 percent) to function both as a mechanism to determine the level of observer coverage required in each fishing mode and as a diagnostic tool after the fact to evaluate whether the observer coverage provided data of the desired precision. This is described in detail in chapters 5 and 6 of the amendment, including a detailed discussion of the proposed SBRM reporting process intended to provide a periodic evaluation of the effectiveness of the SBRM at achieving its objectives. This evaluation would include determining the degree to which the observer coverage levels have been adequate to provide data of sufficient precision to achieve the CV-based performance standard (see section 6.4.2).

Comment 16. Several commenters stated that, despite observer allocation measures identified in the SBRM, the actual allocation of observers in any year will ultimately

depend on available funding. They noted that while the amendment document acknowledges the potential for funding shortfalls, it does not explain how the funding-delimited allocation will occur and what standards will be used to set minimum levels of observer coverage. One commenter suggested the SBRM Amendment include a set of non-discretionary priorities for allocation of observer resources and that whatever approach was used, it take into account the available resources.

Response: The commenters are correct that in any given year, the costs to fully implement the observer coverage levels calculated through the SBRM proposed in this amendment may exceed available funding provided by Congress. However, the amendment proposes to address this contingency through a prioritization process to be set by the Councils (see section 6.6). It would be premature to establish non-discretionary priorities in this amendment, as management and scientific needs can and do change with time. There already exist, through some of the FMPs addressed by this amendment, prescribed observer coverage levels for certain programs (e.g., Northeast multispecies fishery SAPs and the B-Regular DAS program). Nothing in this amendment alters any current prescribed levels of observer coverage.

Comments on the Amendment and the Court Order

Comment 17. Several commenters expressed the opinion that the SBRM would not satisfy the remand orders. The Court ruling, they said, requires NMFS to specify the level and allocation of observer coverage in each fishery, and the actual level of observer coverage may not be left to the agency's discretion. Commenters opined that the SBRM establishes only a target performance standard (observer sea days sufficient to achieve a CV ≤ 30 percent for bycatch estimates), leaving the actual level of observer coverage as a matter of agency discretion, and therefore, the SBRM Amendment does not satisfy the Court's order.

Response: With respect to establishing an SBRM, the Court's orders only require that NMFS establish an SBRM that is non-discretionary, which the proposed SBRM does. The Councils disagree that the SBRM leaves the allocation of observer coverage to the discretion of the agency. The methodology established by and described in the SBRM Amendment dictates the level of observer coverage necessary in each fishing mode to meet the performance standard. Once established, the analyses that comprise the SBRM remove discretion from the process to determine observer coverage levels and allocations across fishing modes. In cases where there are insufficient resources (i.e., the agency budget cannot support) to fully allocate the levels of observer coverage required, the agency and the Councils will determine the appropriate prioritization of available observer coverage given the most pressing scientific and management needs (see section 6.6). The performance standard is not proposed to serve as a mere target, but is an objective measure of the level of observer coverage necessary to achieve the level of precision specified in the amendment. Moreover, the Court's order in *Oceana* v. *Evans* (II) explicitly rejected the need for specific percentage levels of coverage in footnote 38 of its opinion:

> Contrary to plaintiff's interpretation (*see, e.g.*, Mot. at 29), *Oceana I* did *not* require that an FMP mandate a specific level of observer coverage. Rather, the Court held that an FMP may not delegate the development of a standardized bycatch reporting methodology to the Regional Administrator.

Comment 18. Another of the commenters, noting the Court's reference to the bycatch monitoring plan in the Pacific Highly Migratory Species FMP as an example of a legally compliant SBRM, suggested that a similarly compliant SBRM will have to contemplate the dynamics of each fishery and be integrated into each FMP. The writer noted that the SBRM Amendment, as written, will not anticipate and adapt to future fishery conditions and management needs.

Response: This amendment already contemplates the dynamics of each fishery and will be integrated into each FMP. Chapters 2 and 3 provide information specific to each FMP and fishing mode subject to the SBRM. Chapter 4 contemplates discard reporting mechanisms (both those currently used and potential additional methods) and in the context of the various fisheries in the Northeast Region. By developing an omnibus amendment, the Councils and NMFS are integrating this SBRM into all 13 Northeast Region FMPs. The provisions in the SBRM Amendment that make changes to certain elements of the SBRM through annual specifications or framework adjustments to the individual FMPs provide a mechanism to allow the Councils to adapt the SBRM on an FMP-by-FMP basis, as needed, to future fishery conditions and management needs in a relatively time-effective manner without the need to go through the full amendment process.

Comment 19. A commenter asserted that the draft SBRM Amendment exceeds the requirements laid out by the Court and is far more comprehensive than the example bycatch monitoring plans cited by the Court. The writer agreed that the rulings require the SBRM's implementation to be non-discretionary, but the commenter argued for flexibility in the new program, asserting that the Court did not mandate any particular approach or set of performance requirements.

Response: The Councils agree that the SBRM Amendment is more extensive and comprehensive than would be necessary to minimally satisfy the Court's concerns, but this is hardly a flaw and is certainly legal and appropriate under the Magnuson-Stevens Act and the Court opinions. While the Court did not mandate any particular approach or set of performance requirements, the approach and performance requirements proposed in the amendment are entirely consistent with the Court opinions and fulfill the requirements under the Magnuson-Stevens Act. By establishing the performance requirements described in this amendment, the resulting SBRM would be more robust than if the performance requirements did not exist.

Comment 20. The same commenter noted that by establishing a target CV for bycatch estimates in hundreds of various mode-species combinations, the SBRM Amendment would require specific application of a generally-derived standard. The writer urged NMFS to recast the omnibus amendment as a broader set of standards and methods, perhaps adopting a CV target for more broadly aggregated bycatch estimates, under

which PDTs would establish fishery specific observer coverage requirements and, thus, removing from the agency the discretion for establishing observer coverage levels. The commenter asserted that such flexibility would be consistent with both Court decisions.

Response: The CV-based methodology establishes the process by which observer coverage levels are determined and allocated across the wide variety of fisheries managed under the Northeast Region FMPs. Using a global standard (a CV of 30 percent) across all fisheries does not mean that all fisheries would be allocated the same level of observer coverage (as would occur under a process by which all fisheries were required to achieve, for example, 20 percent coverage), but recognizes inherently that some fisheries—those that have more highly variable catches—require higher levels of observer coverage than those with more consistent catches. In this way, the differences among fisheries that would affect observer coverage levels are accounted for while ensuring that the data collected by observers on discards in all fisheries achieve a consistent and standard level of precision.

Given that the expectations for the discard data obtained by at-sea fisheries observers should be consistent across all fisheries for which the data are used in similar ways (e.g., to obtain reasonably precise and accurate estimates of discards for use in stock assessments and to determine the stock-level implications of discarding), it stands to reason that a generally-derived performance standard is appropriate, particularly given the overlap and inter-relationships among fisheries and species caught (see chapter 3). When the discard data are used for different purposes in certain specific fisheries (e.g., for real-time area-based quota monitoring), it may be that the generally-derived performance standard may need to be supplemented to more appropriately reflect the needs of the specific application. Nothing in this amendment precludes either Council from modifying the SBRM process established through this amendment to accomplish such a change on an FMP-by-FMP basis as management needs dictate. In fact, the SBRM Amendment has been designed to ensure such flexibility remains with the Councils (see section 6.5). The ability of the Councils to develop changes to the SBRM through the framework adjustment and/or annual specifications process preserves the flexibility suggested by the commenter.

Comment 21. Several commenters stated that the Court decision requires the SBRM to clearly establish that an observer program will be developed and made mandatory in each fishery.

Response: The Councils disagree that the Court decision requires that an observer program be *developed*; the Northeast Fisheries Observer Program is well established and has proven to be a successful observer program for over 15 years. Observer coverage is currently mandatory in all Northeast Region FMPs subject to this amendment (i.e., vessels with Federal permits are required to carry an observer any time they are requested to do so). This amendment will formalize the SBRM in place in the Northeast Region and reinforce the importance and necessity of at-sea fisheries observers for collecting data on discards.

Comments on the Amendment and NEPA

Comment 22. Several commenters stated that the Omnibus SBRM Amendment should be subjected to the scoping and development process of an Environmental Impact Statement (EIS). They argued that the environmental impacts of the SBRM Amendment are likely to be significant, since the SBRM ultimately would affect widespread marine life, as data collected under the SBRM would influence fisheries management decisions throughout the region for years to come.

Response: The Councils disagree that an EIS is necessary for this action. Section 7.2 of the amendment analyzes the direct, indirect, and cumulative impacts expected to result from the implementation of this amendment and section 8.9.2 supports the conclusion that no significant impacts to the human environment are expected. While data collected under the SBRM may influence fisheries management decisions throughout the region for years to come, each of those future management decisions would be the subject of its own environmental review under NEPA. This separate environmental review would be based on the specific management measures under consideration for the specific stock(s) and fishery(ies) for which the action has been deemed necessary.

The purpose of this action is not to directly or even indirectly alter fishing practices or levels of fishing effort. This action is specifically designed to establish the methodology to be used to obtain, analyze, and report information regarding discards occurring in Northeast Region fisheries. It does not directly or indirectly affect the physical environment and, therefore, an EIS is not necessary. Nevertheless, the process for developing this amendment involves extensive public input and involvement by the two Councils.

Comment 23. The same commenters stated that the SBRM Amendment document contemplates too few and too narrow a range of alternatives to satisfy NEPA. They suggested that additional alternatives should have been considered with respect to the importance filters, bycatch reporting and monitoring mechanisms, the performance standard, and bycatch program review and reporting.

Response: The Councils disagree that the SBRM Amendment contemplates too few and too narrow a range of alternatives to satisfy NEPA. NEPA does not require a minimum number of alternatives be analyzed, other than the proposed action relative to taking no action, and the breadth of what is considered a reasonable range is dependent on the nature of the action. This amendment provides a range of possible outcomes as alternative courses of action, but is organized for the sake of clarity such that for each of seven relatively independent decision points the status quo is compared to between one and three additional alternatives (some alternatives include an additional one to three options). Given the structure of the SBRM Amendment in categorizing the actions under consideration, there are actually 1,464 distinct outcomes possible for the SBRM to be adopted by the Councils, ignoring sub-options within some of the alternatives. Accounting for the sub-options, the number of different possible outcomes climbs to 2,160.

Comment 24. One commenter indicated that the lack of an EIS limited the opportunities for public participation and stymied involvement by the Councils in the development of the amendment.

Response: The Councils disagree that the preparation of an EA has in any way limited the opportunities for the public to participate in the process to develop the SBRM Amendment. NMFS and the Councils have endeavored to provide the public with numerous opportunities to participate in the process to develop this amendment, through a variety of fora and media. In addition to 13 Council meetings, 7 oversight committee meetings, and 1 meeting of members of the Councils' SSCs at which the SBRM Amendment was discussed in a public forum with opportunities for members of the public to provide input into the process, there were two formal public hearings held on the draft amendment for which the sole purpose was to solicit and obtain input from the public on the SBRM Amendment. The public hearings were held during a 59-day comment period that followed publication in the *Federal Register* of a notice soliciting input from the public on the draft amendment. Copies of the draft amendment, and a companion summary document, were distributed at Council meetings and the public hearings, were available by mail to anyone requesting a copy, and were posted on the Internet with instructions for how to provide comments.

In addition to these opportunities, upon submission by the Councils to the Secretary of Commerce for review, a notice of availability will be published in the *Federal Register* with a comment period prior to any decision by the agency to approve or disapprove the amendment. Publication of a proposed rule will provide yet another opportunity for the public to review and comment on the proposed regulations designed to implement the SBRM Amendment. These public meetings and review/comment periods meet or exceed the requirements of all applicable laws, including the Magnuson-Stevens Act, NEPA, and the Administrative Procedure Act.

Comment 25. Several commenters insisted that alternative threshold levels for the importance filter mechanism should be identified and analyzed in the NEPA document, as should a range of alternative CV levels, as the performance standard for the SBRM.

Response: The SBRM Amendment, at section 6.3.2, identifies ranges of alternative threshold levels considered to apply to the proposed importance filters. Although considered during the early development of the amendment, a range of alternative CV levels was not formally proposed (see section 6.8.4) due to the lack of a scientific basis for any CV other than the 20-30 percent encouraged in NMFS (2004). The Councils contend that the decision to adopt a performance standard of 30 percent is explained adequately in section 6.3.2. The only potential outcome of selecting a different threshold level for the importance filter (higher or lower) or selecting a different CV level for the performance standard (higher or lower) would be to change the resulting observer coverage levels necessary to comply with the SBRM (more or fewer days observed), which would, as explained in section 7.2.3, have no direct, indirect, or cumulative effect on the environment.

Comment 26. One commenter suggested that the purpose, need, and scope of the document are too vague. This commenter also suggested that the entire document, particularly the analytical sections, needs to be easily accessible to the public, stakeholders, and decision makers.

Response: As stated in section 1.4 of the amendment, the purpose and need of the document are to ensure that all Northeast Region FMPs comply with the SBRM requirements of the Magnuson-Stevens Act and to address the concerns raised by the Court in the *Oceana* v. *Evans I* and *II* decisions. The scope of the amendment is similarly explained in section 1.4 and Table 1, which identifies the 13 FMPs and 39 fishery species to which this amendment applies.

The Councils and NMFS intend for this document be easily accessible to the public, stakeholders, and decision makers. As noted in the response to comment 24, the document has been widely available in different media and through different means in order to ensure that all those interested in the SBRM Amendment would have access to it. The document is written in plain language (to the extent that issues of such a technical nature allow) so as to be understood by non-experts.

Comment 27. The same commenter argued that the environmental assessment (EA) ignores the indirect and cumulative environmental effects of the SBRM Amendment, and that attention should be paid to the relationship of precision of bycatch estimates to the risks to the environment.

Response: The Councils disagree that the EA "ignores" the indirect and cumulative environmental effects of the SBRM Amendment. Sections 7.2 and 7.3 of the amendment specifically analyze the potential direct, indirect, and cumulative effects of the action on the environment, as required under NEPA. Section 8.9.2 concludes that no significant direct, indirect, or cumulative impacts to the environment are expected to occur, as required for an EA under NEPA.

Comment 28. Also, the commenter suggested that through an EIS, NMFS should discuss the effect of the SBRM Amendment on the drafting and issuance of Incidental Take Statements and Biological Opinions under the Endangered Species Act.

Response: It is not necessary under NEPA to include a discussion of the effect of the amendment on the drafting and issuance of Incidental Take Statements and Biological Opinions under the ESA. An SBRM is a requirement of the Magnuson-Stevens Act, not the ESA, and an approved SBRM is not a prerequisite of preparing or implementing Incidental Take Statements or Biological Opinions.

Comments on the Species Addressed by the Amendment

Comment 29. Several commenters addressed the range of species that would be considered under the SBRM, asserting that without a method to assess and report bycatch of all species, the SBRM is incomplete. Commenters claimed the Magnuson-Stevens

Act's definition of bycatch includes more species than those contemplated in the amendment, and includes non-commercial and unregulated fish species (especially those considered at risk, such as wolfish, cusk, and corals), as well as highly migratory species and fish managed by the Atlantic States Marine Fisheries Commission.

Response: The Councils agree that without a method to assess and report bycatch of all species encountered by a fishing vessel, the SBRM would be incomplete. However, as explained in section 4.5 and section 6.8.1, the NEFOP currently recognizes and accounts for all species encountered by a fishing vessel, whether or not the species is managed under a Council FMP. The intent of the amendment is to establish an SBRM that accounts for *all species* encountered by a fishing vessel, by requiring that data on all species are obtained and recorded by at-sea observers and other data collections tools utilized under the SBRM, while ensuring that the data utilized by stock assessment biologists and the Councils to develop FMPs under the Magnuson-Stevens Act are of sufficient precision and accuracy.

Comment 30. The same commenters argued endangered species and marine mammals should also be addressed, and there should be a discussion of the bycatch of corals and sponges as indicators of impacts on marine habitat, particularly in those areas designated as essential fish habitat.

Response: Data on all species brought onto the deck of a fishing vessel are reported by at-sea fisheries observers, as explained in section 4.5 and section 6.8.1 of this amendment and in the Observer Program Manual (NEFOP 2006a) and Biological Sampling Manual (NEFOP 2006b). These include endangered species, marine mammals, sponges, and corals. However, marine mammals are not considered bycatch under the Magnuson-Stevens Act and are, therefore, not directly relevant to the design of the SBRM, as required by the Magnuson-Stevens Act. Also, although data on discards of sponges and corals are collected by observers and are available for use by scientists, managers, and others, assessing the implications of corals and sponges as indicators of impacts on marine habitat is outside the scope of this amendment.

Comment 31. One of the letters expressed concern for the "chronic imprecision and inaccuracy" of estimates of bycatch of sea turtles and other protected species.

Response: The Councils disagree with the contention that there exists "chronic imprecision and inaccuracy" of bycatch estimates for sea turtles and other protected species. The commenter provided no evidence to support their contention. The analysis conducted in support of the amendment indicates that the precision of the discard data collected by at-sea observers varied, but overall was relatively strong (of the non-gray cells in Table 44 for which there was observer coverage in 2004, 54 cells had no bycatch, 82 cells had CVs of 30 percent or less, 40 had CVs between 30 percent and 50 percent, and 56 had CVs in excess of 50 percent). While there is certainly room for improvement in many fisheries, the evidence appears to contradict the commenter's assertion of "chronic" imprecision. As to the accuracy, section 5.6.2 of the amendment summarizes the accuracy analyses performed to date, and these

conclude that there is no evidence of systematic or significant bias in the observer program.

Comments on the Observer Coverage Levels

Comment 32. One commenter stated their opinion that the amendment does not establish an allocation of observer coverage and does not explain how one would be established. This commenter also expressed concern over whether there was an automatic mechanism to update the allocation analysis every year.

Response: The Councils disagree with the contention that the amendment does not establish an allocation of observer coverage. The primary purpose of the amendment is to establish just such a methodology by which observer coverage allocations are made. Chapter 5 describes, in detail, the methodology by which discard data are obtained and analyzed to, in turn, determine the necessary observer coverage allocations in each fishery. Chapter 6 describes, in detail, the proposed actions of the Councils to adopt this methodology as the basis to allocate observer coverage for all the FMPs. The intent of this methodology is to provide the mechanism to determine the observer coverage allocations on an annual basis, each year using the most recent complete year of observer data as an input into the process. The SBRM Amendment, in setting up a methodology for determining observer coverage allocations, rather than absolute coverage levels, used data from 2004 as an example dataset input into the proposed methodology.

Comments on the Level of Precision of Bycatch Estimates

Comment 33. One commenter asked to what units or level of aggregation would the CV target be applied; that is, would the 30 percent CV be an overall bycatch estimate for all species aggregated, or would it apply by fishing mode, species, or species group?

Response: The stratification used in the proposed methodology would be applied at the level of species or species group for each fishing mode (a gear- and area-based delineation of fisheries at the appropriate level for assigning observer coverage). This is described and explained in detail in chapter 5.

Comment 34. Another commenter stated that the performance standard must be mandatory, rather than a target, and that the SBRM must clearly establish how the standard is going to be applied for fishery, gear type/sector, and/or species.

Response: The Councils agree that the performance standard should be mandatory, and the SBRM Amendment proposes a mandatory performance standard (achieving a CV of 30 percent or less). However, while the performance standard is used to determine the level of observer coverage *expected* to achieve the standard, whether this standard is actually met can only be determined after fishing is concluded for the

year. The CV is a measure of the variability in the data obtained in the sampling program. There are many factors that affect the variability of the discard data obtained by at-sea observers (e.g., changes in stock distribution) and many of these factors remain outside the control of NMFS or the Councils. Thus, meeting the appropriate observer coverage levels is not a guarantee that the CV will be 30 percent or less. As noted in the preceding comment, the stratification used in the proposed methodology to apply the performance standard is described and explained in detail in chapter 5.

Comment 35. Several commenters stated that the target CV does too little to limit the Agency's discretion in determining whether and how to allocate observers. They argued that the SBRM Amendment should require specific levels of observers in each fishery.

Response: The Councils disagree that the use of the CV-based performance standard leaves to the agency the discretion to decide whether and how to allocate observers. The CV level is the minimum standard necessary to estimate bycatch with the desired level of precision, and as long as the minimum level is attained, the SBRM meets the Magnuson-Stevens Act requirements. Any discretion used by NMFS to attain lower CVs only enhances the results derived from the SBRM, which is entirely consistent with the Magnuson-Stevens Act. The purpose of the CV-based performance standard and the methodology proposed in this amendment is to stipulate the specific analytical process by which the observer coverage levels required in each fishery would be determined. Nothing in this methodology would substitute agency discretion for achieving the minimum CV level as described in chapters 5 and 6. As noted, there may be years in which the budget available to the agency with which to fund at-sea observers is insufficient to meet the resulting observer coverage levels; however, the amendment includes a process by which the agency would consult with the Councils in order to develop priorities for how to apply the available funding.

Comment 36. Another commenter argued that the application of the same precision standard (CV ≤ 30 percent) to all mode-species combinations is impracticable and ignores the issues and objectives of each individual FMP. The commenter also stated that it runs counter to NMFS's own technical guidance calling for more general application of the CV standard across all bycatch species.

Response: While the proposed application of the performance standard at the species or species complex level for each fishing mode may exceed the minimum standard suggested in the NMFS technical guidance on this issue (NMFS 2004), the Councils assert there is nothing wrong with exceeding this minimum level for application of the performance standard. The rationale for proposing a CV of 30 percent is described in section 6.3 and section 6.9.3. It is the intent of this amendment to establish a rigorous methodology to ensure that the discard data obtained by at-sea observers are of the highest possible quality, with high levels of precision and accuracy to meet the needs of the scientists and managers that utilize the data.

The Councils disagree that application of the same performance standard to all mode-species combinations is impracticable. The analysis presented in the SBRM

Amendment utilizes this performance standard in its application of the proposed methodology. The proposed methodology successfully determined observer coverage levels that would be expected to achieve this level of precision, confirming that this approach is reasonable and practicable.

The Councils also disagree with the commenter's contention that this approach ignores the issues and objectives of each FMP. One of the reasons the CV-based performance standard is the preferred basis for determining observer coverage levels is that it implicitly accounts for the variability associated with each fishery by requiring higher levels of coverage in fisheries for which there is relatively higher bycatch variability and lower levels of coverage in fisheries with less variability. In contrast, the non-preferred alternative would require a specific *level* of observer coverage (e.g., 20 percent of all trips) in all fisheries. The non-preferred approach would not account for the inherent differences among fisheries and would likely result in over-sampling some fisheries while under-sampling others. By establishing a global CV-standard, the proposed methodology accepts that there is a certain objective minimum level of precision that is desirable across all fisheries, but that the actual level of observer coverage necessary to achieve that standard will vary according to the unique parameters of each fishery. In addition, this amendment would enable the Councils to modify certain aspects of the SBRM on a fishery-by-fishery basis though the use of framework adjustments to the FMPs. In this way, should a Council determine that a higher level of precision is needed in certain circumstances (for example, for adequate real-time monitoring of a quota in some fisheries), the performance standard could be changed to accommodate these situations with relative ease (see section 6.5).

Comment 37. The same commenter suggested that days-at-sea estimates to meet the target CV for all mode-species combinations would be likely to exceed current levels of observer coverage, and worried that the SBRM may oblige the agency to observer days-at-sea levels that cannot be met, perhaps resulting in litigation.

Response: Based on the results of the analysis supporting this amendment, it is expected that observer coverage levels will need to increase in some fisheries. It may be possible to decrease observer coverage in other fisheries, and this decrease may offset some of the increase needed, but not necessarily all. The Councils do not intend for the SBRM established by this amendment to be constrained to current or past levels of observer coverage, and acknowledge that observer coverage levels may need to increase overall to meet the SBRM performance standard. The SBRM Amendment merely establishes the methodology for assessing bycatch but does not establish funding or operational mandates for meeting SBRM objectives. Neither the Magnuson-Stevens Act nor the Court orders require that the SBRM resolve all potential funding and/or operational problems (e.g., an insufficient number of certified observers) that may arise in implementing the SBRM. If problems arise in implementing the SBRM due to funding or operational issues, the prioritization process described in section 6.6 would be utilized.

Comment 38. One commenter, in calling for the Secretary of Commerce to establish observer requirements through an emergency rule, stated that NMFS should establish observers on at least 20 percent of all days fished, except in cases wherein analysis of the best available science indicates otherwise.

Response: The Court order in *Oceana* v. *Evans* II explicitly rejected the need for specific percentage levels of observer coverage (see response to comment 17). Nevertheless, this approach was considered in the SBRM Amendment, but is not preferred for the reasons explained in section 6.9.2. Also, the Councils disagree with the assertion that regulations establishing an SBRM should be implemented through an emergency rule. As noted above in response to other comments, there is no basis to assume the Secretary would or should disapprove this amendment, which fully complies with all SBRM-provisions of the Magnuson-Stevens Act and, therefore, there is no need or justification for emergency regulations.

Comments on the Importance Filters

Comment 39. In general, commenters supported the use of importance filters as a means of removing from consideration, for determining target observer sea day allocations, those mode-species combinations that are unlikely to occur or likely to be of minimal consequence, but urged caution in their refinement and use. One commenter characterized the use of importance filters for observer resource allocation as reasoned, practicable, and consistent with the law.

Response: The Councils agree with the comment and continue to propose the use of importance filters as part of the process to determine observer coverage levels.

Comment 40. One commenter stated that the filtering mechanisms need to be clarified and expanded to ensure all of the criteria used as filters are fully identified.

Response: The Councils agree and the final version of the SBRM Amendment clarifies and expands the discussion of the importance filters, including specifying the criteria to be used in implementing the filters (see sections 6.2 and 6.9.2).

Comment 41. Three commenters expressed concern that the importance filters rely on poor existing observer data as the foundation for calculation of the allocations. They suggested that a baseline level of observer coverage be established for a period of years to support future appropriate use of statistical filters.

Response: The Councils disagree with the commenters' assertion that the importance filters rely on "poor" data as the foundation for calculating the observer coverage allocations. The commenters provide no evidence to support this claim. The measure of the CV, as described in chapter 5, is an unbiased indicator of the precision of the data. As noted above in response to comment 31, less than 25 percent of the non-gray cells for which there was observer coverage in 2004 had CVs in excess of 50 percent. The majority (58 percent) of cells had either no discards or CVs of 30 percent or less.

By definition, those cells that had either no discards or CVs less than 30 percent were of sufficient quality to meet the performance standard proposed to be implemented through this amendment. The remainder of cells (18 percent) had CVs between 30 percent and 50 percent. The Councils and NMFS agree, in principle, with the suggestion to establish a "baseline" level of observer coverage for a period of years in order to provide data for more comprehensive analysis. Section 5.3.3.2 of the amendment describes the concept of "pilot" coverage that would address this suggestion for cells for which there was no observer coverage available.

Comment 42. Commenters generally supported the first tier gray-box filter, but several insisted that each decision to gray out a mode-species combination be explained in the amendment document. Also, the same commenters said that the gray-box filter should not be applied to any mode-species combination, wherein the species is a "protected species," or a species considered "at risk." They suggested that only after a robust observer program is in place can it be determined that an interaction between a mode and protected species is unlikely to occur.

Response: The Councils support the use of the gray-cell filter approach as a reasonable way to focus on particular combinations of fishing modes and species that occur in nature with sufficient frequency as to warrant inclusion in the SBRM. The need for this filter is particularly evident due to the approach, taken for ease and consistency of presenting the data, to use a matrix (species across the top; fishing modes along the side) as the basic model for the SBRM. This approach results in all species appearing as cells for all fishing modes, even if the species is never encountered in the fishing mode. The gray-cell filter is a recognition that many species are either never encountered by a fishing mode, or are encountered so rarely as to be *de minimus*. The process used to determine which cells should be included is explained in section 5.3.3.1. This section addresses both fish species and protected species.

The Councils reject the commenters' characterization that the current NEFOP is not "robust." The NEFOP is a well-established at-sea fishery observer program that has been in place for over 15 years. While the level of observer coverage has varied during this time in response to changing Federal budgets, and the program's objectives have evolved, the program itself has grown and developed in response to the needs of management and the scientists. The NEFOP observer program manual, biological sampling manual, training manuals, data handling procedures, and formal training facility and training program serve as a model for other observer programs around the country and around the world.

Comment 43. Several commenters claimed that the third level filter could be used to mask the real effects of bycatch in high volume fishery modes; i.e., when the discard rate for a species is small relative to a high volume fishery, but still of significant environmental consequence. The commenters asked for the third level filter to be removed from the amendment.

Response: Upon further consideration, the Councils have revised the third level filter to eliminate the potential that it could inadvertently mask the real effects of bycatch in high volume fishing modes. Section 6.2.3.2 of the amendment explains what changes were made to the filter and how these changes address this concern.

Comment 44. The same commenters expressed concern that the third and fourth level filters rely on threshold values (ratios) which are not specifically identified and analyzed in the amendment document. They stated that the SBRM Amendment must develop and address the specific fixed threshold alternatives through an EIS process before the public can properly assess the usefulness of the SBRM.

Response: The draft amendment included a range of potential threshold values from 0.5 percent to 3 percent, and the analysis in the document demonstrated the effects of these potential thresholds on observer coverage levels across the fishing modes. However, based on comments, the Councils have revised the importance filters to address concerns such as this comment. Section 6.2.3.2 explains the revisions made to the importance filters, and how the proposed threshold values were determined. Regarding the need for an EIS, see responses to earlier comments on this issue. The Councils are not preparing an EIS, but the revised EA that incorporates the changes made to the importance filters will be made available to the public for review prior to implementation.

Comment 45. A commenter suggested that the Councils consider adding an importance filter for any mode of fishing whose overall contribution to total landings falls below some threshold and, accordingly, for which the contribution to total discards can be considered *de minimus*. The commenter also suggested that the SBRM Amendment provide a means for the reduction of target observer sea days when gear improvements have reduced or eliminated the potential for bycatch.

Response: Regarding the first part of the comment, this is, in effect, the intent of the fourth level filter, which functions by comparing the total estimated discards of a species within a fishing mode with the total fishing mortality (commercial and recreational landings, plus discards) of that species among all fishing modes. In this way, species for which the total discards in a fishing mode is a *de minimus* amount of the total mortality of that species would not be used to determine the appropriate level of observer coverage needed in that fishing mode.

Regarding the second part of the comment, there are three ways in which changes in bycatch rates due to gear improvements could be accounted for under the proposed SBRM. First, the CV-based performance standard implicitly accounts for the variability associated with each fishery, by requiring higher coverage levels in fisheries for which there is relatively higher bycatch variability and lower coverage levels in fisheries with less variability. Thus, as conditions in a fishery change, whether as a result of gear improvements or not, and the variability of bycatch is reduced, the level of observer coverage necessary to achieve the performance standard would automatically decrease. However, the magnitude and the variability of bycatch are not necessarily directly related, as the magnitude relates to the overall

amount of bycatch occurring in a fishery, and the variability tracks the relative amounts of bycatch on trips within a fishery. It is possible that as the overall magnitude of bycatch decreases as a result of a gear modification or other change in the fishery, the variability among trips could actually increase. This could be particularly true as the magnitude approaches zero, where even relatively small amounts of bycatch could appear as substantially different than zero. This concern could be addressed by the fourth-level filter, which is intended to control for *de minimus* amounts of bycatch, as explained above.

The third way in which the proposed SBRM could address this issue is in the gray-cell filter process. As explained in section 5.3.3, this filter accounts for infrequent or infeasible interactions (combinations of species and gear types), by filtering these cells. The initial allocation to the gray-cell filter was based on a technical review of 16 years worth of NEFOP data, but the intention is that the gray-cell filter would be updated as new information becomes available that may change the initial distribution. A rationale for expanding the gray-cell filter would include such things as changes in regulations that effectively reduce potential bycatch interactions to the level of being highly infrequent or infeasible.

Comments on the Analysis of Accuracy and Precision

Comment 46. One commenter stated that the amendment document sufficiently addresses the issue of accuracy, and its inclusion of the Rago et al. analysis of observer program accuracy rectifies previous Court-identified deficiencies.

Response: The Councils agree with the comment.

Comment 47. Another commenter stated that the treatment of accuracy in the document is limited to a dismissal of current science and suggested that the amendment document consider methods to retrospectively assess the accuracy of bycatch in periodic bycatch reports.

Response: The Councils disagree with the commenter's assertion that the treatment of accuracy in the document is limited to a dismissal of current science. A discussion of accuracy as it relates to precision is provided in section 5.2, and a summary of the analyses of accuracy conducted in support of the amendment is provided in section 5.6.2 and in Appendix A. The Court order in *Oceana* v. *Evans* I stipulated that the agency consider the information presented in Babcock et al. (2003), and this paper is discussed in Appendix A and in section 6.9.2. The commenter also suggests consideration of methods to periodically retrospectively assess the accuracy (bias) associated with the bycatch data collection program. This is an appropriate element of the proposed periodic SBRM Report, and the proposed contents of this report have been updated to include updating the accuracy analyses conducted in support of this amendment to evaluate the sources and magnitude of bias in the observer program data (see section 6.4.2).

Comment 48. A commenter, arguing for FMP-specific bycatch monitoring programs developed under a more general omnibus SBRM structure, suggested the amendment mandate that sampling designs minimize bias to the greatest extent practicable.

Response: The Councils agree that the development and implementation of sampling designs to minimize bias to the extent practicable is a valid objective for the SBRM, and the document has been clarified to identify this as an objective of the SBRM implemented under this amendment (see section 1.4).

Comment 49. The same commenter warned that the SBRM should not result in an undue fiscal burden on the public or the industry, and that precision and accuracy are matters of policy that should be left for the Councils to determine on an FMP basis. The commenter stated that the document should consider not only a scientific perspective on precision and accuracy, but should also include a discussion of the benefits and costs associated with varying levels of precision and accuracy.

Response: The Councils disagree with the commenter's assertion that precision and accuracy are matters of policy to be determined on an FMP-by-FMP basis. As discussed in the responses to comment 20 and comment 36, the proposed methodology is based on the premise that there is a certain objective minimum level of precision that is desirable across all fisheries, but that the actual level of observer coverage necessary to achieve that standard will vary according to the unique parameters of each fishery. As noted in chapter 5, accuracy is a measure of the bias associated with the sampling design. Improving the sampling design to minimize bias is not a policy issue but is a matter of science and is critical to the development of a reliable statistically-based biological sampling program. Likewise, while there are real costs associated with increased levels of precision, the precision associated with bycatch data has implications for the science conducted in support of fishery management decisions. The lower the precision of the data used, the less reliable are the results of stock assessments and the greater the risk to the resource (and the fishing industry) that results from management decisions. While uncertainty and risk are unavoidable in fisheries science and management, it is the position of the Councils that these can be minimized and balanced by improving the precision and accuracy of the data used in the process.

The costs and benefits associated with varying levels of precision are an important consideration, and can best be illustrated through an examination of the relationship of expected CVs over a range of observer coverage levels. Figure E-1 is excerpted from the Rago et al. (2004) paper as an example of this analysis. It demonstrates that at low levels of coverage, there is most often a substantial benefit (as indicated by decreasing CVs) from a small increase in observer coverage. However, as observer coverage levels increase, the returns (improvements in precision) diminish rapidly. Thus, in Figure E-1, there is an initial rapid improvement in precision up to approximately 100 observed trips, then the improvements taper off to the point that quadrupling the observer coverage up to 400 trips only improves the precision by 10 percent. Understanding this relationship and the diminishing returns that are expected as coverage levels increase are important considerations in evaluating the costs and

benefits associated with varying levels of precision. There is not similar relationship in regards to varying levels of accuracy, as the accuracy of the data is a direct result of the amount of bias in the sampling program (see sections 5.2 and 5.6 for a complete discussion of accuracy, bias, and precision).

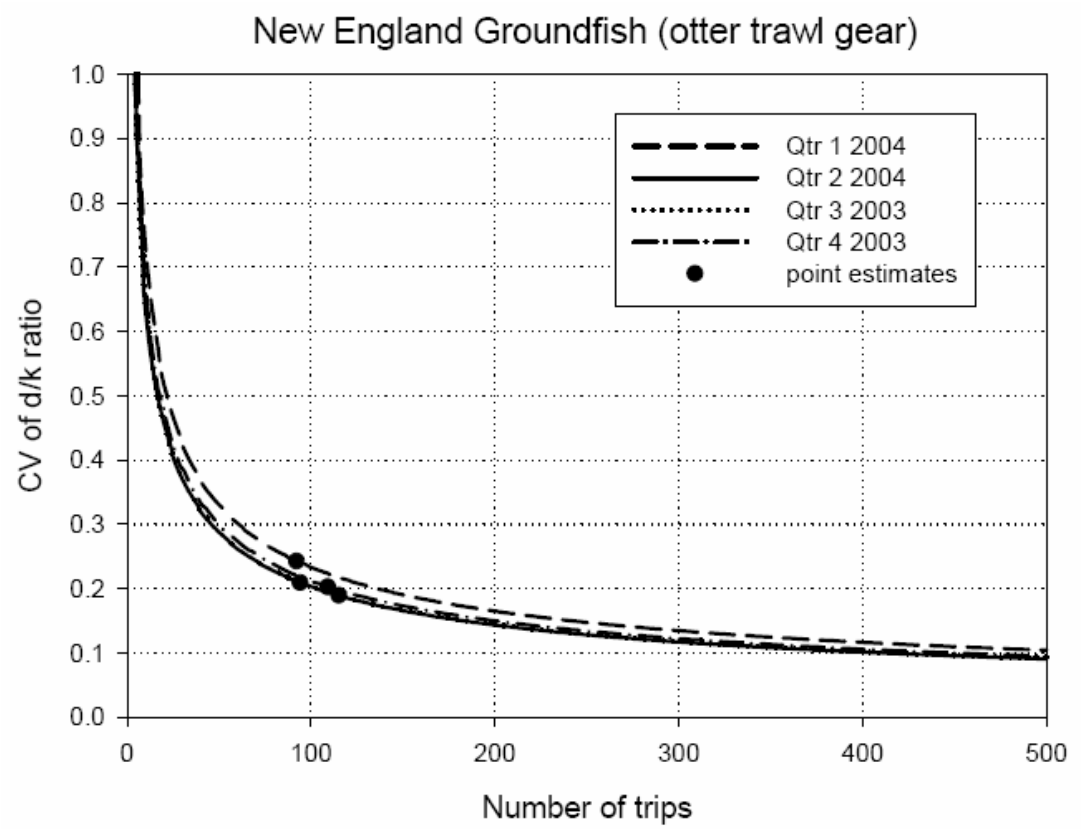

Figure E-1. The 2003/2004 point estimates of the coefficient of variation (CV) of the discard to kept (d/k) ratio for New England groundfish caught with otter trawl gear, and the expected coefficient of variation of the discard to kept ratio over a range of sample sizes (number of trips) (from Rago et al. 2004).

The commenter appears to suggest that observer coverage levels should be derived from target precision levels that are set by the Councils as an outcome of policy choices regarding the costs associated. The Councils disagree with this approach, but consider the SBRM to be a process that determines the observer coverage levels necessary to achieve the minimum precision level performance standard in order to provide the most robust discard data possible, without regard to the annual budgets available to fund such levels of observer coverage. The SBRM Amendment merely establishes the methodology for assessing bycatch but does not establish funding or operational mandates for meeting SBRM objectives (see response to comment 37). Once the available budgets are known, additional consideration of management priorities may be necessary by the Councils if the budget is insufficient to provide the full level of coverage desired.

Comment 50. A commenter stated that NMFS's bycatch mortality estimates are perceived by industry as inequitable from mode to mode and the document should better explain how discard mortality estimates are determined.

Response: The SBRM Amendment does not address discard mortality estimates. These estimates are derived on a stock-by-stock basis and utilized in stock assessments to determine total fishing-related mortality. The discard mortality estimates used in stock assessments are often based on a variety of sources, and are subject to the stock assessment peer-review process prior to being accepted as the basis for making determinations about fishing-related mortality. These estimates change over time as new information is utilized in the stock assessment process and as new assessment models are developed and refined. It would not be appropriate or practicable for the SBRM Amendment to address the issue of discard mortality estimates.

Comment 51. One commenter, providing a technical review on behalf of several fishing industry organizations, suggested that a typical assumption in the calculation of CVs based on observer coverage is that every tow is independent, but the truth is that sequential tows are clearly correlated and should not treated as statistically independent.

Response: While it is correct that sequential tows could be correlated and should not be treated as statistically independent, the proposed methodology is structured in recognition that the information content of tows is reduced by the inter-correlation; therefore, the tow was not used as the sampling unit. Instead, the SBRM analysis uses the fishing trip as the sampling unit. For a more detailed explanation, see chapter 5 and Appendix A.

Comment 52. This same commenter indicated that the "observer effect," the degree to which vessel operators behave differently when an observer is aboard, needs to be accounted for in the calculation of the CV.

Response: An analysis of the "observer effect" was conducted to explicitly evaluate the effect of bias, including the spatial patterns of fishing locations, the average trip length, and the average landings (kept pounds) of observed and unobserved fishing trips. These analyses indicated that the effect of observer bias is expected to be small and, therefore, the "observer effect" is not expected to contribute to the variance in the observer data. For a more detailed explanation, see chapter 5 and Appendix A.

Comment 53. This commenter also suggested that the CV calculation should account for observer downtime, those periods of fishing operations when the embarked observer is off duty.

Response: The bycatch ratio is based on the sum of the discarded pounds divided by the sum of the kept pounds of observed hauls and is, therefore, not influenced by the unobserved hauls. The bycatch ratio based on discarded pounds divided by days absent accounts for all hauls (observed and unobserved) by expanding the discarded

pounds by the ratio of the number of total hauls to the number of observed hauls. For more information on this issue, see chapter 5.

Comment 54. This same commenter suggested that the method of calculating the CV is, to some extent, fishery/stratum dependent. For example, different methods should be applied to day boat fisheries versus longer trip oriented fisheries.

Response: A finer-scale stratification could improve the estimation; however, trade-offs have been made throughout the stratification scheme to accommodate the diversity of fleets and species groups. The heterogeneity in the relationship between the discard pounds to kept pounds may be evidence of this. Post-stratification is possible and a finer-scale division between day trips and multi-day trips is, in fact, made for observer deployment within otter trawl fleets.

Comments on Electronic Monitoring

Comment 55. A commenter who works in the field of video monitoring agreed with the amendment document's rather high estimates of the costs associated with fishery video monitoring program. He attributed the high costs to the market dominance of a single contractor and he suggested that costs would likely come down should video monitoring requirements become more widespread and more contractors enter the field.

Response: The Councils agree with the commenter that the costs associated with electronic video monitoring would be expected to decrease as more contractors enter the marketplace. The costs provided in the document are based on the most widely available cost data. While this cost information may not be reflective of the costs that would be expected in a market environment in which there are many participants competing for customers, it is considered a valid indicator of the likely initial costs to the industry in the Northeast under current market conditions.

Comment 56. Another commenter agreed with the document's discussion of analytical difficulties that would be involved in video monitoring, and expressed support for the finding that use of such systems be deferred, pending further development.

Response: The Councils agree with the comment.

Comments on the SBRM Reporting Process

Comment 57. Two commenters stated that the maximum report period should be annual, and the report should present the bycatch data by fishery, gear type, sector, area fished, species, and any other variable, as determined by the Councils.

Response: The Councils agree with the commenter that the frequency, format, and content of the SBRM Review Reports should be determined by the Councils for their

FMPs. Both Councils considered requiring SBRM Review Reports on an annual basis, every 3 years, every 5 years, or in conjunction with other required reports (such as SAFE reports or monitoring committee reports), but ultimately directed the SBRM Review Reports to be provided every 3 years (see section 6.4.2).

Comment 58. One commenter argued that various reporting content, format, and frequency alternatives should be described and analyzed in an EIS. Also, the commenter expressed disappointment at the examples provided in the appendices, suggesting that the Councils require "estimates of overall bycatch and bycatch mortality by species/stock within a fishery and/or fishery mode or gear sector in a particular area."

Response: Although the Councils are not preparing an EIS for this action, the SBRM Amendment complies with the commenter's request that options for the content, format, and frequency of the SBRM Review Reports be described and analyzed in the document. The example SBRM Review Report provided in Appendix F is an *example* of the type of information that would be available to the Councils in an SBRM Review Report for a specific FMP. It is not intended to represent the only possible format or content for the SBRM Review Report. As explained in section 6.4.2, the Councils are free to determine the type of information, format, and content they require. However, the example report does provide much of the information suggested by the commenter, such as the observed monkfish discards in each fishing mode, the ratio of monkfish discards to total discards of all species, estimates of total monkfish discards in each fishing mode, the percent of total monkfish discards associated with each fishing mode, and the CVs of the estimates of total discards in each fishing mode.

Comment 59. This commenter also expressed concern that the amendment did not require reporting on the SBRM, but provided only for the Councils to request a query of the appropriate databases.

Response: The Councils disagree with the commenter's assertion that the SBRM Amendment does not require reporting on the SBRM. The Councils developed and considered several alternatives regarding a formal SBRM Review Report, all of the which but the no action alternative would require a periodic SBRM Review Report to be prepared by NMFS. The document does, however, stipulate that regardless of the decisions of the Councils regarding the specific content, format, and frequency of the SBRM Review Report, they are always free to request any additional queries of NMFS' databases that they consider appropriate and necessary.

Miscellaneous

Comment 60. A commenter insisted the SBRM must address how data will be collected on sea turtle impacts in the scallop dredge fishery, noting that turtle-chains prevent sea turtles from being captured and hauled on deck in the dredge, and there is no mechanism for observing sea turtle interactions with the gear underwater.

Response: The Councils disagree with the comment. There is an important distinction between what is defined as a "take" under the Endangered Species Act (ESA) and what is defined as "bycatch" under the Magnuson-Stevens Act. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. 1532(19)). This is a much broader definition than that of bycatch in the Magnuson-Stevens Act, which is defined as "fish which are *harvested* in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards [emphasis added]." The distinction hinges upon the term "harvested," which, while it is not defined in the Magnuson-Stevens Act, is accepted to mean an animal that is brought on board the vessel or otherwise removed from the ocean in the act of fishing. The activity described by the commenter regarding potential interactions between sea turtles and scallop dredge gear underwater that does *not* result in the turtles being captured and hauled on deck in the dredge could be considered a take under the ESA, but does not qualify as bycatch under the Magnuson-Stevens Act. Because the SBRM required to be established under the Magnuson-Stevens Act only pertains to the monitoring of *bycatch*, non-bycatch takes of sea turtles are outside the scope and purview of the SBRM. However, NMFS is obligated to monitor and address takes if required by the ESA or any applicable biological opinions associated with the FMPs amended by this omnibus amendment. Thus, while NMFS takes seriously the need to monitor interactions of fishing activity with sea turtles, such interactions that do not result in bycatch, as defined by the Magnuson-Stevens Act, are not explicitly addressed by the SBRM proposed in this amendment.

Comment 61. A commenter, arguing for greater FMP orientation of the SBRM, suggested that the amendment authorize and encourage a variety of cooperative research aimed at reducing bycatch and improving bycatch data quality.

Response: Including provisions to authorize and encourage cooperative research is outside the scope and purpose of the SBRM and this amendment. Nevertheless, the Councils support a wide variety of cooperative research programs, including many projects aimed at reducing bycatch. Bycatch reduction is frequently a priority research area of the Northeast Consortium, Cooperative Research Partners Program, and the various research set-aside programs. The Councils intend to continue to provide support for such projects, as resources allow.

Comment 62. A commenter stated that NMFS needs, as practical matter, to ensure the observer program is affordable and effective and enjoys stable funding and workforce.

Response: The NEFOP strives to maintain an effective and cost-efficient at-sea fishery observer program, including a stable, well-trained workforce. Funding levels vary and are dependent upon the annual Federal budget developed by the U.S. Congress and signed by the President.

Comment 63. A commenter suggested that NMFS should make use of industry and government resource surveys to estimate bycatch. The commenter noted that prior to

opening an area to scallop fishing, the area is surveyed by observed commercial vessels and that the pre-opening surveys may support sufficient discard estimates and provide for reduced observer coverage in the fishery.

Response: All available information is considered and used, as appropriate, in stock assessments and management decisions. While the focus of this amendment is development of a standardized methodology for obtaining and utilizing discard data in a programmatic way across all Northeast Region fisheries, nothing in this amendment would preclude the use of additional data as they become available.

Comment 64. The same commenter expressed concern that the SBRM's reliance on gear and area fished to identify modes may result in an unmanageable number of separate modes for scallop vessels under the SBRM.

Response: A detailed explanation of the purpose and procedures for stratifying the fisheries according to gear type, port, and fishery program is provided in section 5.3. While the number of strata may change as conditions in the management system change, the stratification is an important component of the SBRM used to differentiate fishing modes so that the variability inherent in most fisheries can be minimized to the extent practicable, thus reducing potential sources of bias and improving the precision of the resulting data collected in the fishing mode.

Comment 65. A commenter stated that the amendment document does too little to standardize how observers conduct themselves and their data collection aboard fishing vessels.

Response: While this comment addresses two very important aspects of any successful at-sea fishery observer program, these issues are well addressed by the NEFOP in the Observer Program Manual (NMFS 2006a), the Biological Sampling Manual (NMFS 2006b), and the Observer Training Program, and are beyond the scope and purpose of this amendment.

Comment 66. Another commenter wondered if NMFS had the resources to support the analysis obligations made by the SBRM Amendment.

Response: The Councils expect that NMFS will complete all analyses required under the SBRM proposed in this amendment, to the extent that resources will allow.

Comment 67. One commenter suggested that law enforcement be increased "to 10 percent, not less than 1 percent."

Response: Enforcement of fishing regulations is not within the scope or purview of this amendment. The Councils expect that the commenter may have misunderstood the discussion of at-sea observer coverage levels to relate to fisheries enforcement. At-sea fisheries enforcement is conducted by the U.S. Coast Guard, as one of several important missions. The ability of the Coast Guard to provide an on-the-water presence and to engage in fisheries enforcement is dependent upon annual budgets

and competing priorities such as drug interdiction, search and rescue, and homeland security.

Public Hearing Summary

Gloucester, MA
November 14, 2006

Chair: Dana Rice
Council Staff: Chris Kellogg
NMFS Staff: Michael Pentony
Council Members: Phil Ruhle
Attendance: 32 (8 signed in)

Introduction:

Mr. Rice welcomed those in attendance and introduced the purpose and structure of the SBRM Amendment public hearing. Mr. Pentony provided a short presentation on the purpose of the hearing, a summary of the SBRM Amendment and the Councils' preferred alternatives, and a review of the process to comment on the draft amendment, which are accepted at the hearing, or at the second of two public hearings on December 13, 2006, in New York, NY. Mr. Pentony announced that written comments would be accepted through December 29, 2006, via mail, fax, or email.

Five individuals provided comments on the draft amendment. The following represents a summary of the testimony of each commenter and is not intended to be a complete transcript.

Comments:

1. Gib Brogan, Oceana: Mr. Brogan relayed Oceana's concerns regarding the draft SBRM Amendment. Mr. Brogan asserted that the SBRM Amendment, as proposed, does not satisfy the Court's remand order regarding Amendment 13 to the Northeast Multispecies Fishery Management Plan (FMP). During his testimony, Mr. Brogan identified the following concerns with the document:

- The proposed SBRM continues to leave the level of observer coverage at the discretion of the Regional Administrator (RA). The SBRM Amendment should require a minimum level of observer coverage for each fishery and, therefore, does not meet the court order.
- The Purpose and Need in the first section of the document is not sufficiently clear. It should better state what is in the document and what it sets out to do; that is, how it will move the SBRM issue forward.
- An omnibus FMP amendment effects changes to all the region's FMPs. The document does not, but should, discuss how the amendment will affect each individual FMP.

- The possibility of future management implications is not spelled out in the document.
- The document should also clarify the annual process to update the observer allocations.
- An SBRM needs to establish an allocation of observer days and this document does not do that.
- The range of alternatives considered in the document is inadequate to comply with the National Environmental Policy Act (NEPA), and more viable alternatives should be considered. The performance standard of a CV equal to or less than 30% is accepted in the document as a gold standard without consideration of other CV levels.
- The document should specify what is to be included in the SBRM Report. The alternatives for requiring reports on the SBRM should be expanded.
- The idea of *accuracy* is not explored in the amendment document.
- The SBRM Amendment is very complex and technical and relies on NMFS science. The amendment should be peer reviewed to ensure the science and reasoning are robust.
- The concept of *importance filters* is too vague in the document. Sample threshold levels (used in several of the filters) and the effects of their range (0.5% - 3.0%) on the outcomes of data quality are not discussed. It appears that the threshold level can be manipulated. Threshold values should be fixed and established in the SBRM Amendment document. The importance filters should not be a mechanism merely for justifying status quo observer levels.
- Oceana has issues with specific fisheries. For sea scallop trawls, NMFS and the Councils should consider the use of underwater video monitoring to capture interactions of the fishing gear with marine life. There is no discussion of underwater video monitoring in the amendment document.
- Appendix E is an example of what a required SBRM Report might look like. The information provided in Appendix E is insufficient and does not satisfy the requests of the NEFMC regarding SBRM reporting. The example does not include any time/area data or analyses of bycatch patterns. Mr. Brogan expressed concern that if such information is not specified as required, it will not be collected.
- The SBRM Amendment has come a long way since the review of the Rago et al (2005) paper in September 2005, but more needs to be done to move the region's bycatch monitoring into modern management. Oceana will submit written comments.

2. David Frulla, Fisheries Survival Fund: Commenting on behalf of the Fisheries Survival Fund, Mr. Frulla expressed concern that some of the approaches proposed in the SBRM Amendment are too open to litigation. Mr. Frulla stated that the Fisheries Survival Fund will be submitting written comments and, perhaps, technical papers on specific issues. During his testimony, Mr. Frulla identified the following issues:

- Levels of precision and accuracy are matters of policy that should be left to the Councils. Whatever monitoring methods are decided upon, they should not unduly burden the public or bankrupt the industry.
- The document should explain the costs and benefits of achieving varying levels precision and accuracy.
- Mr. Frulla expressed support for the concept of importance filters and notes that under the example threshold levels the required number of observer days still more than doubles the highest levels ever achieved.
- Mr. Frulla concurs with the document's finding that video monitoring of discards is still a ways off. The method is not robust, as the boat deck is not a production line that is easily videotaped. Also, vis a vis underwater video monitoring, sea turtles that are deflected by a scallop dredge's turtle chains are not *bycatch*. A white paper by the Fisheries Survival Fund will address this issue.
- Mr. Frulla expressed support for the "gray cell" importance filter that removes from consideration (for observer day allocation) improbable bycatch gear/species combinations. Bycatch problems that have been addressed, such as sea turtles scallop dredges, might also be considered as gray cells in the importance filters.
- Add consideration of reducing needed observer coverage levels for fisheries that have implemented successful bycatch reduction devices.
- The detailed discussion of accuracy in the SBRM Amendment document and Rago et al (2005) should satisfy the Court's remand order. NMFS has done a good job addressing accuracy and bias in a principled way.
- The SBRM Amendment would set a performance standard of a CV less than or equal to 30% for each mode/species combination. Case law has provided more room for flexibility in this matter. The level of detail – down to mode/species combinations – is one reason the tally of observer days is so high. Mr. Frulla expressed concern that this approach may lead to a court order that requires observer coverage to meet a CV target of 30% for each mode/species combination.
- There's more flexibility in the court orders than Oceana suggests. Methodology has not been specified by the courts. The Pacific groundfish SBRM has been held up by the court as an acceptable example, but even it does not go into the level of detail of the Northeast SBRM Amendment.

3. Cindy Smith, Maine Department of Marine Resources (DMR): Speaking on behalf of the Maine DMR, Ms. Smith identified an issue related to the estimated discard mortalities. NMFS's mortality estimates by mode, derived from observed discards, are perceived by constituents in Maine as inequitable from mode to mode. The SBRM Oversight Committee should explain the discard estimates in the document. She explained that Maine DMR will be submitting written comments.

4. Jeff Kaelin, Ocean Spray Partnership/Ocean Frost Seafood: During his testimony, Mr. Kaelin identified the following issues:

- Mr. Kaelin supports the Council's decision not to adopt an electronic monitoring alternative. Electronic monitoring methods are not yet practical.

- Mr. Kaelin expressed concern regarding the Council's decision not to set minimum percentages of observer coverage.
- Mr. Kaelin also expressed concern regarding how a CV standard may leave NMFS open to litigation and that setting such a standard would handcuff the SBRM to artificial and unrealistic expectations. NMFS should not be in the position of getting sued due to lack of resources to meet CV and observer coverage targets. Can other parties at the table pitch in funds to support additional observer coverage?
- The use of importance filters in the determination of observer day determinations makes good sense. Mr. Kaelin expressed concern about the extrapolation of observed discards to derive total discard estimates. He will be submitting written comments.

5. Ron Smolowitz, Fisheries Survival Fund: During his testimony, Mr. Smolowitz identified the following issues:

- One component of monitoring that could be expanded is the use of industry and NMFS surveys to estimate bycatch. Prior to opening an area to fishing, the area gets surveyed by commercial vessels. The pre-opening surveys and the bycatch rates from VMS reporting could be expanded. Mr. Smolowitz believes that pre-opening surveys in which bycatch rates are determined may support discard estimates, even with a lower level of observer coverage in the fishery.
- The SBRM Amendment document should include a retrospective analysis of the Georges Bank sea scallop opening to determine whether the target CV was met using the pre- and post-opening surveys.
- Sea turtle interactions with scallop dredges are not bycatch. Turtle chains prevent the turtles from being caught. The interactions are "takes" (under the Endangered Species Act) and should be addressed elsewhere. This distinction should be clarified in the document.
- In areas without a TAC-driven closure, the Council and NMFS should consider requiring an exploratory level of observer coverage and develop methodology for such pilot coverage.
- The reliance in the SBRM Amendment on fishing gear/area modes is a concern for the scallop industry. Each new access area in the fishery is likely to result in a separate mode under the SBRM. This concern may be alleviated if pre-opening surveys are used to reduce the observer burden on the industry.

Conclusion:

No one else requested to speak, and the hearing was adjourned at 6:30 p.m.

Public Hearing Summary

New York, NY
December 13, 2006

Chair:	Laurie Nolan
Council Staff:	Jim Armstrong
NMFS Staff:	Michael Pentony
Council Members:	Pat Augustine, Paul Scarlett, Ed Goldman, Fran Puskas, Gene Kray, and Jeff Deem
Attendance:	16 (10 signed in)

Introduction:

Ms. Nolan welcomed those in attendance and introduced the purpose and structure of the SBRM Amendment public hearing. Mr. Pentony provided a short presentation on the purpose of the hearing, a summary of the SBRM Amendment and the Councils' preferred alternatives, and a review of the process to comment on the draft amendment. Mr. Pentony announced that written comments would be accepted through December 29, 2006, via mail, fax, or email.

After a short question-and-answer period to clarify several specific points about the amendment, four members of the public provided comments on the draft amendment. The following represents a summary of the testimony of each commenter and is not intended to be a complete transcript.

Comments:

1. Shaun Gehan, Fisheries Survival Fund: Speaking on behalf of the Fisheries Survival Fund, Mr. Gehan reiterated many of the comments made at the first hearing. In particular, Mr. Gehan identified the following issues:

    - The draft SBRM Amendment does a good job of addressing the issue of accuracy that was identified by the Court as an area of concern.
    - Overall, the importance filters are a good thing. In particular, they help focus limited resources where they would be the most meaningful.
    - Some concern that the plan far exceeds the National guidance for bycatch monitoring, which suggests achieving a CV of 20-30 percent across fisheries, not at the species-by-species level as the SBRM Amendment proposes.
    - Concerned over the potential for litigation if the amendment creates high expectations which are then not met. In order to remedy this, Mr. Gehan suggested expanding the importance filters and focusing them to further refine the resulting observer coverage levels.

- Concerned that the document does not go far enough in *requiring* an observer program; the Court said this was not optional. At a minimum, the document should stipulate that the use of observers is mandatory.

2. Greg DiDomenico, Garden State Seafood Association: Mr. DiDomenico expressed mixed emotions regarding this type of action, but stressed he hopes NMFS can get good information on bycatch occurring in the fisheries. He expressed concern that if the Agency cannot meet the requirements for fisheries observer coverage, then the amendment could serve as a tool for litigation. His primary concerns are that, if litigation occurs, either a fishery would be shut down due to incomplete observer coverage or the industry would be forced to pay for the observers.

3. Sima Freierman, Montauk Inlet Seafood: Ms. Freierman expressed concern that the SBRM Amendment does not address problems with the fisheries observer program, such as faulty data, anomalous tows, and putting observers on smaller vessels. She reported being particularly concerned about standardizing observer practices. Ms. Freierman would like the amendment to shift away from focusing on how the data are collected and to look at what goes on on the fishing vessels.

4. Peter Moore, American Pelagics Association: Mr. Moore indicated he would be submitting written comments, but expressed particular concern over the potential for unintended consequences of the amendment if the Agency cannot achieve the observer coverage levels stipulated in the amendment. He is concerned that fisheries may be shut down if there is insufficient funding to meet the expectations.

Conclusion:

There was some discussion among the attending Council members and staff, but no other members of the public requested to speak, and the hearing was adjourned at 8:15 p.m.

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Subject: PUBLIC COMMENT ON FEDERAL REGISTER OF 11/16/06 VOL 71 PG 66748
Date: Thu, 16 Nov 2006 07:33:23 -0800 (PST)
From: jean public <jeanpublic@yahoo.com>
To: SBRMcomment@noaa.gov, COMMENTS@WHITEHOUSE.GOV, VICEPRESIDENT@WHITEHOUSE.GOV

FED REG DOC E6 19398 ID 102006a
HEARING IN NYC - 50 CFR 648
MEETING ON DECEMBER 13 AT 7 PM

OF COURSE THERE SHOULD BE STANDARDIZED FORMS WHICH ARE USED ALL OVER THE U.S. BY THESE COUNCILS.

HOWEVER, THE FORMS USED ISNT THE ISSUE, THE LIES TOLD BY COMMERCIAL FISH PROFITEERS WHO OVERCATCH IS THE ISSUE. LAW ENFORCEMENT NEEDS TO BE STEPPED UP TO TEN PERCENT, NOT LESS THAN ONE PERCENT.

WE NEED TO JAIL THESE OVER QUOTA COMMERCIAL FISH PROFITEERS, FINE THEM WITH FINES STARTING AT ONE MILLION DOLLARS AND GOING UP AND SEIZE THEIR VESSELS.

IT IS CLEAR THERE IS FAR TOO MUCH OVERFISHING GOING ON AND SPECIES AFTER SPECIES AFTER SPECIES ARE VANISHING FROM THIS EARTH. OUR CHILDREN'S HERITAGE IS BEING LOST BY NOAA AND ITS FAILURE TO PROTECT ALL AMERICANS FROM RAPACIOUS SMALL PROFITEERING CLIQUES.
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December 22, 2006

Patricia Kurkul
Northeast Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

Via email to: SBRMcomment@noaa.gov

Re: Comments of Oceana Concerning the Omnibus Standardized Bycatch Reporting Methodology Fishery Management Plan Amendment for the New England and Mid-Atlantic Regions

Dear Ms. Kurkul:

We would like to take this opportunity to comment on the development and approval of the Standardized Bycatch Reporting Methodology (SBRM). Catch data is the fundamental basis of any fishery management system. Without an adequate bycatch reporting system, the sustainable management of New England and Mid-Atlantic fisheries will be impossible. Developing a robust program to collect, analyze, and report bycatch data – that is available and useful for fisheries managers, stakeholders, and the public -- is a critical step in improving the sustainability of these fisheries and the efficacy of the many rebuilding programs that are under way in these regions.

Oceana would like to commend the staff of the Fisheries Service for their work in developing a draft SBRM document that provides meaningful guidance for the Council and the Agency. The draft SBRM makes important conclusions about the need for increased use of at-sea observers to collect information about bycatch, including the findings of the National Working Group on Bycatch. This information and analysis will undoubtedly improve the way the regions' fisheries are managed.

However, the SBRM draft is the product of a remand order, and it must satisfy the requirements of the law and of the Court's order. As it stands now, the draft document fails to meet those requirements. This SBRM amendment will be a precedent-setting management action that will influence how fisheries are monitored and managed across the country. Oceana understands that it may require additional time and effort to fully address the requirements of the Court's order and controlling statutes, but emphasizes again that the document must be legal and complete. We are happy to work with the agency as the process moves forward, but intend on using every option to ensure that this document fulfills its requirements.

In order to meet the legal requirements of the Magnuson-Stevens Act, National Environmental Policy Act ("NEPA") and the Court order, the SBRM must incorporate significant changes, including:

- **The SBRM must mandate how data is collected by mandating the level and allocation of observer coverage**
- **The SBRM must mandate how data is reported**
- **The agency must take a hard look at the environmental impacts of the SBRM in an Environmental Impact Statement ("EIS").**

Below is more detail on these required changes.

DETAILED COMMENTS

I. THE SBRM MUST MANDATE HOW DATA IS COLLECTED BY MANDATING THE LEVEL AND ALLOCATION OF OBSERVER COVERAGE

As you know, Oceana brought lawsuits against the Fisheries Service concerning both Groundfish Amendment 13 and Atlantic Sea Scallop Amendment 10, because neither amendment contained an adequate SBRM. In these cases, the Court ruled that the amendments violated the SBRM requirement of the Magnuson-Stevens Act.

Most importantly, the Court held that Amendment 13 failed to "establish" an SBRM, because, while it set forth an intention to achieve 5% observer coverage, it left the actual level of observer coverage completely in the discretion of the agency. *Oceana v. Evans,* No. 04-0811, 2005 WL 555146 at *42 (D.D.C. Mar. 9, 2005) (hereinafter "*Oceana I* "). The Court found Scallop Amendment 10 to be unlawful, because it too failed to "establish" an SBRM, instead leaving the actual allocation of observers up to the Regional Administrator. *Oceana v. Evans*, 384 F. Supp.2d 203, 232 (D.D.C. 2005) (hereinafter "*Oceana II")*.

The draft SBRM appears to have exactly the same flaw as Groundfish Amendment 13 and Scallop Amendment 10; it appears to establish performance targets while leaving the actual level and allocation of observer coverage entirely up to the agency.

What is more, the SBRM draft does not establish an allocation of observer coverage and does not explain how one would be established. The analysis in the document appears to be based upon a certain level of days-at-sea, but it is not clear whether there is an automatic mechanism to update the allocation analysis every year, which would be needed as fishing effort changes as the result of changes in total allowable catch levels ("TACs") and other measures controlling fishing effort. The draft also makes clear, at p. 184, that the actual allocation of observers would be further reduced based on funding, but the SBRM neither

gives a minimum number of observers nor any way to determine how observer allocation would be reduced.

The hard work of the SBRM team should not be in vain. The Council and the agency must take the final step required by the law and establish the SBRM with binding requirements for observer allocation in affected fisheries.

II. THE SBRM MUST MANDATE HOW DATA ARE REPORTED

As an omnibus amendment to individual fishery management plans, the SBRM amendment must develop a standardized bycatch reporting methodology that addresses the management and data needs of each fishery. The reporting methodology should be an integral part of each plan and effectively contribute to improving fishery management. The current document does not consider current or future management needs or discuss how the information provided by the SBRM could improve or change the management of a given fishery. The final document should include a discussion of the management scheme for each affected fishery and the possible bycatch data needs of the current and future management of these fisheries. The amendment should take affirmative steps to address these needs.

For example, the SBRM as drafted merely states that the Council can request information and it will be provided through a 'query' of the bycatch database and related analyses. This non-binding and vague promise does not establish a reporting methodology – it leaves reporting solely at the discretion of the agency. Instead, the SBRM should specify data to be collected, reporting formats, and reporting frequencies to address the needs of specific fisheries.

III. THE SBRM MUST CONSIDER BYCATCH OF SPECIES THAT ARE NOT TARGETED UNDER FISHERY MANAGEMENT PLANS

The Magnuson-Stevens Act definition of bycatch and fish encompasses a much broader range of bycatch species than the SBRM document considers in its analyses. Species that are not targeted under fisheries managed by the New England or Mid-Atlantic Councils, such as those managed by the Atlantic States Marine Fisheries Commission (i.e. striped bass, shad, etc) or the National Marine Fisheries Service directly (Highly Migratory Species), must be considered in the Standardized Bycatch Reporting Methodology. Without a method to assess and report bycatch of *all* species, the SBRM is incomplete. Additionally, the SBRM must consider the management needs of the Councils in its analysis and include a discussion of bycatch of corals and sponges as possible indicators of impacts on marine habitat, especially essential fish habitat ("EFH").

IV. THE SBRM DRAFT DOES NOT SATISFY NEPA

A. An Environmental Assessment ("EA") Is Insufficient for This Action

The information and analysis in the SBRM document will have a significant impact on thirteen fisheries from the Canadian border to North Carolina. The information, analysis, and technical guidance contained in a complete SBRM will affect how these fisheries are managed, their stock assessments, and ultimately the management approaches used to reach management goals. Therefore, the Omnibus SBRM amendment is a major federal action significantly affecting the quality of the human environment. Accordingly, the agency must take a hard look at the environmental impacts of the preferred alternative as well as other alternatives, in a full Environmental Impact Statement.

With a wide range of stakeholders that could be affected by the findings of this process, the agency must engage in a complete scoping process to educate and engage the public about the issue and seek concerns and ideas to be investigated and developed as part of the document. Instead of an open public process, the agency chose to develop this document using the internal Fishery Management Action Team ("FMAT") process which removed interested parties from the development process with the exception of periodic updates to the Councils.

B. The SBRM Document Must Discuss the Purpose, Need, and Scope of the Amendment

In it current form, the SBRM document is vague and fails to clearly state the goals or issues to be addressed. The SBRM EIS must be presented in a format that is accessible to the public, affected stakeholders, and decision makers. The SBRM development process suffered because of a lack of public participation and the failure to engage the New England and Mid-Atlantic Councils apart from cursory presentations at council meetings. Putting the analysis in a more accessible format will yield a more complete and functional document.

C. The EIS Must Consider a Range of Feasible Alternatives

Instead of examining real alternatives for each decision point, the EA only presents the options of status quo, preferred alternative and impossible straw man. This is blatantly in violation of NEPA and quite similar to the EAs that were thrown out in the original EFH case. *See AOC v. Daley*, 183 F. Supp.2d 1, 19 (D.D.C. 2000) (EAs overturned where most considered only status quo and preferred alternative).

For the important choices the EIS must consider *real* alternatives. For example:

1. Performance standard

The document fails to define to which units of measurement the performance standard will be applied. For example, would the bycatch estimate that would have a 30% CV be an

overall bycatch estimate for all species aggregated; an estimate for all species aggregated, but broken out by time and area; an estimate by "fishing mode;" an estimate for each individual species; or an estimates for various species groups?

For the SBRM to be effective, it needs to include a performance standard. This standard needs to be a requirement, not a target. Oceana believes that the SBRM can and should mandate compliance with relevant performance standards to ensure high quality bycatch data is used in fisheries management.

2. Reporting

The EIS should consider different reporting formats and frequencies and the option of a mandatory periodic report on bycatch in respective fisheries. The draft EA considers different frequencies of the SBRM review process, but does not discuss what should be in the report, or whether different reports should be required under the SBRM.

3. Accuracy

Precision and accuracy are equally important metrics by which the quality of data can be assessed. The treatment of accuracy in the SBRM is limited to a dismissal of current science (Babcock, et al). Although accuracy may be considerably more difficult to proactively plan for in sampling design, the EIS should consider alternative methods to retrospectively assess the accuracy of bycatch data in periodic bycatch reports.

D. The EIS Must Consider Cumulative Environmental Impacts

The EA erroneously ignores the indirect and cumulative effects of the SBRM on the environment. As a broad reaching amendment to 13 management plans, the SBRM will indirectly affect the level of fishing and the level of mortality of targeted, bycatch, and protected species in the many fisheries and will directly affect the quality of the data used to complete stock assessments and set mortality limits. Particularly salient is that the less frequent the reporting and the less precise the methodology, the greater the risk to the environment. The EIS must fully discuss these issues and the importance of a robust SBRM or risk marginalizing the document and its important work.

E. The EIS Must Address Protected Resources

Bycatch of protected species is a recently documented problem in some of the fisheries affected by this SBRM document. More attention must be given to the problem of protected resources and the chronic imprecision and inaccuracy of, e.g., sea turtle bycatch, estimates in these fisheries. Furthermore, the SBRM must address how data will be collected on sea turtle impacts in the scallop dredge fishery, which currently has no adequate monitoring mechanism since turtle chains render it impossible for at-sea observers to monitor interactions. Additionally, the EIS must fully discuss the impacts of the SBRM on the drafting and issuance of Incidental Take Statements and Biological Opinions for these fisheries.

F. The EIS Must Address Importance Filters

The various alternatives for filters must be laid out in an EIS that explains the implications of the filters and proposes levels at which the filters could be set. *See section VI below for additional information.*

V. Peer Review

The Omnibus SBRM Amendment is a significant action that will affect a wide range of fisheries. The National Marine Fisheries Service should ensure that the document receives a full external peer review by a body such as the Center for Independent Experts (CIE). Although the SBRM received a short review by a limited number of members of the joint Council Scientific and Statistical Committee, the review was limited to very technical issues, and was done while the SBRM was still very incomplete. Experts from the CIE should be given the opportunity to comment on the technical issues but also issues related to management and the integration of the SBRM into stock assessments.

VI. IMPORTANCE FILTER

A. Development of Filters

The preferred alternative would reduce the initial observer allocation by means of applying a series of "importance filters" to remove fishery mode/species combinations from the list of observer needs based on different criteria including the current database of fishery mode/species interactions. This approach is fundamentally flawed because it uses the scant observer data from past years as the foundation for the calculation of interaction percentages. Instead, the SBRM should mandate a baseline level of observer coverage and use the information from this coverage as the foundation for the future application of statistical filters.

Oceana also has serious concerns about the development and use of filters 3 and 4. These filters create a loophole through which the agency can support any level of observer coverage by manipulating the threshold values for these filters. If the SBRM does not specify the thresholds, the public has no way of knowing how useful the SBRM will be. Because the threshold values will constitute a significant part of the SBRM if the importance filter is adopted, the amendment must go out for further public comment on specific alternatives for the threshold values, including a proposed preferred alternative.

The draft document states that: "The third-level filter would eliminate species when the discards of that species in a mode are less than a certain minimum percentage of the total discards for that mode." Thus, the filter can be used to mask the real effects of a bycatch problem. For example, an unselective gear that catches a high volume of fish, like trawl gear, might catch a significant percentage of a particular species, but the percentage of that species in the total catch of the gear might not be high. Thus the third-level filter might fail to properly address bycatch of species like cod or haddock in gear like herring trawls.

Oceana recommends that filter 3 be removed from the SBRM and that the options for the percentage level for filter 4 be developed through an EIS.

B. Protected Species

Oceana agrees that applying the first level 'graying out' filter is appropriate for those species which are geographically limited or physically unable to be taken with a given fishery mode but recommends that criteria or discussion be provided for all combinations removed through 'graying out'. This importance filter, however, is inappropriate for removing any fishery mode/protected species combination. Interactions with protected species are rarer than interactions with fish species. Interaction combinations should not be excluded based on frequency of the interactions until a robust observer program is in place which indicates that an interaction is unlikely.

VII. COMMENTS ON DRAFT REPORT OF BYCATCH

Throughout the SBRM development process, FMAT members assured those involved at Committee and Council discussions that data would be available from the SBRM which would provide estimates of bycatch broken down by ***time, area, gear, and species/stock***.

Instead of real examples of the usable data that the SBRM could produce, the Council and the public were provided with disappointing reproductions of past uses of bycatch data in fisheries management.

The New England Council is moving forward with a new management action to meet the mortality and rebuilding goals of the Multispecies Fishery. The Council should require that the following information should be included in any report from a 'query':

Estimates of overall bycatch and bycatch mortality by species/stock within a fishery and/or fishery mode or gear sector in a particular area (e.g. Bycatch of George's Bank Cod in the small vessel gillnet fishery)

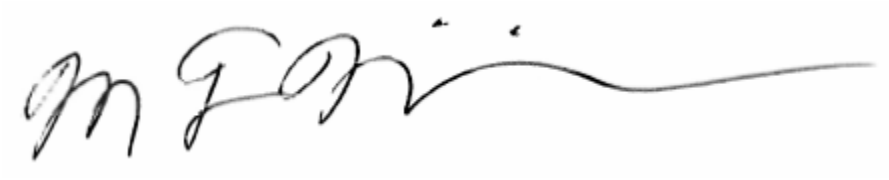
Without evidence of the capability to assess bycatch in this kind of detail, the Council should require the FMAT to resume development of the document until such time as this level of detail is available.

CONCLUSION

Oceana appreciates the work that has gone into the development of the SBRM document and its analyses. The work will advance the management of the region's fisheries and will bring the region closer to real fisheries accountability. Oceana is concerned that the process has gone most of the way toward completing its obligations but fails to take the final step to finish the job. We hope that the issues raised above can be amended before the SBRM is approved and implemented.

Thank you for your consideration.

Sincerely,



Michael F. Hirshfield, Ph.D.
Senior Vice President and Chief Scientist

cc: Members
New England Fishery Management Council

Paul J. Howard
Executive Director
New England Fishery Management Council

William Hogarth
Assistant Administrator
National Marine Fisheries Service

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service

Gene Martin
Regional Counsel
National Marine Fisheries Service

Subject: Comments on Section 7.2.1.3.2. Alternative 1.2 - Implement Electronic Monitoring
Date: Wed, 27 Dec 2006 08:02:29 -0900
From: Mark K. Buckley <mkbuckley@alaska.com>
To: SBRMcomment@noaa.gov

My comments are related to the concluding paragraph of the above-referenced section of the SBRM:

> "Comparatively, the costs associated with the electronic monitoring alternative appear much greater than the status quo alternative that is proposed as the preferred alternative at this time. Future consideration of electronic monitoring programs would need to weigh the benefits of such a program against the substantial costs to both the fishing industry and the Federal government, although as technologies improve, costs may decrease."

The facts in support of this statement are found in the previous paragraphs of that section. They reflect the cost structure associated with one contractor, who has has thus far been involved with the vast majority of video monitoring deployments in the commercial fisheries of North America. This contractor provides excellent service, and my comments are in no way meant to disparage the quality or thoroughness of its products. Nonetheless the contractor enjoys a virtual monopoly in the video monitoring field on this continent. This market dominance and scarcity of competition, I believe, have led to higher prices for video monitoring services.

A case in point is a video monitoring RFP issued in 2006 by the Alaska Fisheries Science Center. In this example there was a competitive field, with my Alaska-based company bidding against the market leader. My company's bid was $101,000 and the market leader's bid was $151,000.

This 33% cost difference, I believe, was due to my company's lower overhead and its local-hire business model. I am confident that if there were more competition to provide electronic observer services in places such as the New England Region, the prices would come down considerably.

Mark Buckley
Kodiak, Alaska

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December 29, 2006

Patricia A. Kurkul
Regional Administrator
Northeast Regional Office
National Marine Fisheries Service
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Re: Comments on Draft SBRM Amendment

Dear Ms. Kurkul:

On behalf of the Natural Resources Defense Council (NRDC), I submit the following comments regarding the National Marine Fisheries Service (NMFS)' Northeast Region Standardized Bycatch Reporting Methodology, an Omnibus Amendment to the Fishery Management Plans of the Mid-Atlantic and New England Regional Fishery Management Councils ("Draft Bycatch Amendment" or "Draft Amendment").

NRDC's primary concern with the Draft Bycatch Amendment -- and it is a fundamental one -- is that the Draft Amendment fails to incorporate the necessary requirements relating to *how* the bycatch data is collected. Section 303 of the Magnuson-Stevens Act requires that each Fishery Management Plan ("FMP") and FMP amendment (hereinafter collectively "FMP") "shall … establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery …." *See* 16 U.S.C. § 1853(a)(11). It seems self-evident that, to "establish" such a standardized bycatch reporting methodology ("SBRM"), a FMP must "establish" both the manner in which the bycatch data is collected, *e.g.*, whether by observers and if so the nature of the observer coverage, as well as "establish" how this data is then processed so as to provide an adequate basis for management decisions. Adequate data collection is obviously a necessary predicate to adequate analysis.

In three different decisions, one in 2001 and two in 2005, the federal district court for the District of Columbia recognized that the requirement to establish a SBRM includes a requirement to establish the bycatch data collection system itself. *See Oceana v. Evans*, No. 04-0811, 2005 WL 555146 (D.D.C. Mar. 9, 2005) (hereinafter "*Oceana I")*; *Oceana v. Evans*, 384 F. Supp. 2d 203 (D.D.C. 2005); *CLF v. Evans*, 209 F. Supp. 2d 1 (D.D.C. 2001). The federal court specifically concluded that a SBRM that only indicates an "intent" to implement,

rather than a mandate to implement, an adequate observer program fails to satisfy Section 303. *See, e.g. Oceana I,* 2005 WL at *34.

The Draft Bycatch Amendment does not satisfy the requirements of Section 303. In the portions of the Draft Amendment addressing data-gathering, NMFS simply states that its "preferred" approach is to continue to utilize the "status quo" data sources, most significantly the at-sea observer program. *The Draft Amendment is fatally flawed because it does not propose to set any requirements relating to these data gathering programs, or to otherwise "establish" them.* Most critically, the Draft Amendment does not set any requirements for level or allocation of observer coverage, or, for that matter, for any observers at all. The Amendment does propose the use of a 30% "Coefficient of Variation" ("C.V.") "standard" applied to "all applicable fishing modes for each species group." As an initial matter, we note that, because of the relatively general level at which NMFS proposes to apply the 30% C.V. "standard," it may not provide adequate precision. More significantly, like the 5% observer coverage level at issue in *Oceana I,* the 30% C.V. "standard" appears to still be simply a target, not a requirement. While such a performance measure may well provide an enhanced understanding of the precision of various bycatch estimates, as well as facilitate the most cost-effective use of observers, the 30% C.V. performance target proposal still falls short of what the law requires. As was already determined by the district court in *Oceana I:* it "merely suggests a hoped-for result, as opposed to 'establish[ing]' a particular standardized methodology, [and thus] does not measure up to the statute's requirements." *See id.*

In its comments dated December 22, 2006, Oceana addressed a number of other concerns with the Draft Amendment. NRDC shares these concerns and adopts Oceana's comments herein in their entirety. We want to draw the agency's attention in particular to the following concerns:

- The Draft Bycatch Amendment proposes the use of "importance filters" for the purpose of reducing observer coverage to only what it considers to be significant fishery mode/species interactions. As set out in the Draft Amendment, however, the "importance filters" threaten to ensnare the agency in a self-perpetuating data-poor bycatch reporting methodology and to mask the shortcomings of this methodology from the public. First, it is critical – given that up-to-date data of adequate specificity, *i.e.*, to the time/area/species/fishing mode level, is frequently lacking – that NMFS explain the limits of the existing data for each specific gear/species combination proposed to be "filtered out." Second, NMFS must identify, and allow the public to comment on, the "specific minimum percentage" thresholds that it intends to apply in the case of importance filters 3 and 4.

- The Draft Bycatch Amendment needs significantly more detail concerning how the bycatch information needs of each specific FMP will be addressed on an ongoing basis. For example, it is not at all clear that the proposed bycatch reporting methodology will be able to generate analyses, reports, and other forms of information that adequately address specific bycatch problems in specific fisheries, i.e.,

provide adequate information to make a management response possible. It is also important that managers be able to propose changes in the SBRM and supplemental monitoring in order to focus on a particular bycatch problem and enable development of a management response.

- For reasons set forth by Oceana, the Draft Bycatch Amendment requires an EIS. In this regard, we want to note that the Draft Amendment is, as NMFS almost certainly recognizes, a very important regulatory proposal. It addresses a significant fisheries management problem and proposes to do so by amending thirteen different FMPs, which cover dozens of managed stocks and affect a much larger number of marine species. The Draft Amendment is also of course a response to a judicial remand in two separate federal court actions.

In closing, NRDC does recognize that the Draft Bycatch Amendment is the product of considerable work and represents a step forward in certain respects, such as by recognizing the importance of observers and the need to increase observer coverage. However, as already noted, the Draft Amendment still falls substantially short of what the statute requires. We strongly urge NMFS to address the concerns we have highlighted above, as well as those identified by Oceana. Thank you for consideration of our comments.

Respectfully yours,

Brad Sewell
Senior Attorney
Natural Resources Defense Council

KELLEY DRYE
COLLIER SHANNON

December 29, 2006

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VIA ELECTRONIC MAIL

Ms. Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

RE: FISHERIES SURVIVAL FUND COMMENTS ON SBRM AMENDMENT

Dear Ms. Kurkul:

We represent the Fisheries Survival Fund, an association whose participants include the bulk of the Atlantic scallop full-time limited access permit holders. We submit this letter on behalf of the FSF, as well as North Carolina Fisheries Association, the Garden State Seafood Association, Montauk Inlet Seafood, Inc., the American Pelagic Association, and Associated Fisheries of Maine, and we expect other groups may associate themselves with these comments. Collectively, these organizations represent thousands, of participants in nearly every, if not every, fishery managed by the New England and Mid-Atlantic Fishery Management Councils. We appreciate this opportunity to provide comments, including technical comments prepared by a respected fisheries scientist, Mr. Paul Starr, who has years of experience in designing and implementing bycatch estimation programs,[1] on the proposed omnibus Standardized Bycatch Reporting Methodology ("SBRM") Amendment, under consideration by both these councils.

INTRODUCTION

Development of an omnibus SBRM amendment represents an ambitious project, albeit one that has not garnered attention and scrutiny commensurate with its significance. The Public Hearing Document is technical, but if it is implemented in the preferred form, it will have major practical ramifications for New England and Mid-Atlantic fisheries. It appears, moreover, that neither the fishing communities nor the New England and Mid-Atlantic Fishery Management Council members yet understand these ramifications. In contrast, and judging by the attendance at the two public hearings on the SBRM Amendment, environmental organizations, including those whose lawsuits in the groundfish and scallop cases resulted in the court decisions to which the SBRM Amendment responds, are paying close attention to this process. If the past is prologue, these groups will not hesitate either to renew such challenges if they perceive any weakness in the amendment or bring suit to enforce any mandate seen as resulting from the action the Councils take on this amendment.

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[1] These comments are included, along with Mr. Starr's *curriculum vitae*, as Attachments 1 and 2 to this letter.

Indeed, whatever standardized bycatch reporting methodology the Councils decide to implement, they should recognize that they are creating standards for a program that might be able to be enforced in court. In discussing a case involving invalidation of the Pacific Groundfish FMP for lacking an adequate SBRM, the federal court that invalidated the Scallop Amendment 10 SBRM, explained:

> The failing in PMCC was that NMFS had determined that a live observer program was necessary for accurate reporting, but it had nonetheless neglected to establish any type of observer program.

Oceana v. Evans, 384 F. Supp. 2d 203, 234 n.38 (D.D.C. 2005) ("*Oceana II*"), *citing Pacific Marine Conservation Council, Inc. v. Evans*, 200 F. Supp. 2d 1194, 1200 (N.D. Cal 2002).

In summary, the SBRM Amendment is currently not on a feasible or productive track. While considerable rigorous work has gone into this draft omnibus amendment, it does not strike an adequate balance between specificity and generality. It is overly specific when it stratifies the bycatch reporting regime into tens of hundreds of strata and then prescribes a uniform coefficient of variation ("CV") for each. Such fine gradations of the units of analysis are not necessary to meet the requirements for an SBRM requested by the court in the scallop and groundfish cases. (The undersigned participated on the government's side in the challenges to the SBRM in these cases and have a detailed understanding of these decisions.) Even more fundamentally, as explained herein, such an approach is not consistent with nationwide NMFS technical guidance.

Such a uniform CV approach across these many strata is likewise too general. Bycatch reporting objectives will and should vary with the particular management needs and problems specific to each fishery. NMFS explained in its nationwide technical guidance for establishing such monitoring systems that, "The development of a sampling strategy for the estimation of bycatch based on an at-sea observer program entails first clearly defining the objectives of the sampling program and selecting a sampling strategy designed to meet these objectives. . . . An explicit statement of the objectives is a critical step in devising effective sampling procedures."[2]

In contrast to this considered nationwide guidance, the omnibus amendment puts the metaphorical cart before the horse (as the court found in the prior cases) by establishing blanket standards of precision across a myriad of fisheries "modes" sub-divided by bycatch species, rather than considering the needs and requirements of individual fisheries. In this regard, the amendment appears to share the failures that the court found to exist in the scallop and groundfish amendments.

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[2] National Marine Fisheries Service, *Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs*, NOAA Technical Memorandum NMFS-S/SPO-66, at 48 (Oct. 2004) (hereafter "*Evaluating Bycatch*"); *see also* Comments of Mr. Paul Starr, at 1-2 (attached) ("Starr Comments").

This omnibus amendment would be more constructive if it provided the Councils and NMFS with a process and some ground rules they could employ to develop and implement fisheries-specific monitoring systems in plan-specific contexts. Such an approach could provide information that is actually useful to management. The amendment could also establish general rules for NMFS to use in administering observer programs. As we explain, we would expect, and the omnibus amendment could prescribe, that observer programs represent a core component of fishery-specific programs.

Finally, and perhaps equally importantly, such an approach could take into account available resources. As explained above, the Public Hearing Draft would prescribe that managers seek to achieve a 30% CV for tens of hundreds of different strata. While it is not clear whether the Public Hearing Document plans to treat this 30% CV goal as mandatory for each stratum, it is quite possible (and perhaps even likely) that a court would find this requirement to be enforceable, particularly if attainment of 30% CV represents the centerpiece requirement of the amendment. As the Councils can well understand, the resources do not and will not exist to achieve such a mammoth undertaking. However, failure to achieve these CVs could result in chronic and disabling litigation, each time a target CV is not met.

Fortunately, it is not necessary to begin the process from square one. With the adjustments suggested herein, which are based on the *Evaluating Bycatch* report, applicable law, consultation with experts in sampling design, and the decisions in the groundfish and scallop cases, the Omnibus SBRM Amendment can fully meet legal requirements and assist the Councils in their statutory responsibilities to evaluate and minimize bycatch. The following proposal provides a more practical – and practicable – way forward to create a workable program that not only actually can be implemented, but is also more consistent with legal requirements and the Councils' management needs. After setting forth our proposal, we will conclude by discussing the general legal framework applicable to this action and the specific issues raised in the SBRM Public Hearing Document.

RECOMMENDED DIRECTION FOR THE SBRM AMENDMENT

The key task identified by NMFS in its *Evaluating Bycatch* report is to define the objectives of any SBRM program. (Typically, an SBRM program would not be designed for an entire NMFS Region's worth of fisheries at once, but the principle remains the same.) As we explain below, the draft Public Hearing Document has not been able to define the objectives for the SBRM program, either as a whole or for each specific fishery. It is simply not sufficient to prescribe a blanket CV requirement and term this an objective.

Properly conceived bycatch and reporting methodology objectives will vary by fishery, depending on such factors as whether protected species issues are involved, the gear types employed, and the baseline amount of information on the types and amount of bycatch. As noted in *Evaluating Bycatch*, different fisheries have differing needs in terms of sampling design and other elements of an SBRM. The report explains:

> [A]n at-sea observer program designed with the objective of estimating fishery discards may be quite different from one designed to assess incidental takes of protected species, particularly if the latter represents rare events. When there are multiple objectives for an observer program, the program design often will need to address competing objectives and the optimal design cannot be determined unless weights have been assigned to the various objectives. Basically, when there are multiple objectives, it becomes much more difficult to clearly define the objective (including the weights to be used), to identify the appropriate sample design, and to identify the desired level of precision for each estimate.

Evaluating Bycatch, at 48-49; *see also* Starr Comments, at 1 ("There is no substitute for dealing with each fishery unit (or grouping) individually and tailoring the monitoring to fit the situation.").

Accordingly, the omnibus should instead focus on the development of a broad program – and methodology for developing fishery specific bycatch reporting regimes – with the details left to development in the context of individual fishery management plans. Such an approach represents a constructive enterprise. There is a value in and of itself for the Northeast Region to have a consistent set of standards for developing fishery-specific bycatch reporting programs.

Furthermore, the applicable case law does not require NMFS to develop fishery-specific programs to have a legally adequate and useful omnibus amendment. *Oceana II* explained that:

> A methodology need not necessarily be detailed, but it must at the very least provide decision makers and the public with a program of what actually will be *done* to improve bycatch reporting, and why these measures will be sufficient based on the best available science.

384 F. Supp. 2d at 234. Realistically, given the nature of this omnibus amendment process, the elements of this amendment must be somewhat general.

Whether general or specific, the key element for an appropriate SBRM is that it sets requirements for NMFS to follow in deploying observer coverage and undertaking other fishery monitoring programs. *Oceana II* explained:

> The Court concluded that the Secretary's mere "intention" to maintain a five-percent observer coverage level, while delegating the actual level of observer coverage and methodology to the Regional Administrator, did not constitute establishment of a "bycatch reporting methodology."

Oceana II, 384 F. Supp. 2d at 232 (*citing Oceana I*, 2005 U.S. Dist. Lexis 3959, 2005 WL 555416, at *40). Our proposal's strength is that it would allow the Councils to develop these requirements, based on the recommendations of those with fishery-specific expertise.

Accordingly, this SBRM omnibus amendment would meet all legal requirements so long as it: (1) establishes a process and broad programmatic outline that will guide the development of FMP-specific programs; and (2) directs the agency to focus resources according to certain criteria based on urgency for coverage determined from an examination of existing bycatch information, including reliable anecdotal information.

Regarding process, the omnibus amendment should authorize the Councils to develop and implement more detailed methodologies, specific to each fishery, through framework adjustments, regulatory amendments, or full plan amendments, as they see fit. To allow for initiation of such a subsequent FMP-specific process, the omnibus amendment should amend each fishery management plan to allow for the adoption of a bycatch estimation program by abbreviated rulemaking processes, such as through a framework action.[3] Individual plan development teams, perhaps supplemented by working groups (as explained by Mr. Starr at page 3), would have the specific knowledge of the fishery in question to develop practical and practicable approaches. Moreover, the process should allow managers to adjust these fishery specific requirements, perhaps through annual or biannual specification setting processes, as conservation and management requirements for the fishery change over time. This approach would allow each Council to tailor bycatch monitoring and reporting to the specific needs of each fishery as they evolve.

Regarding more substantive requirements, the amendment will most likely have to mandate a live observer program in each fishery, in conjunction with other data collection systems. *Evaluating Bycatch* and other studies have found observers to be important to achieve precise and accurate estimates. Courts have also recognized the importance of live observers.[4]

Additional substantive requirements can be more general in nature. To that end, we would suggest that the SBRM:

- Mandate that each fishery management plan establish observer coverage levels in that fishery based on considerations specific to that fishery. Such levels can be particular to an individual species or a species grouping, as well as to each specific gear type, and can be changed through framework adjustment or specification

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[3] As an omnibus amendment, the SBRM Amendment can provide overarching analyses that can be incorporated into streamlined rulemaking documents under each FMP. This is perfectly consistent with legal requirements under the National Environmental Policy Act.

[4] *See, e.g., Oceana II*, 384 F. Supp. 2d at 233-34 ("'Because the observer program is optional under Amendment 13, NMFS in theory could decide not to implement an observer program for the ground fishery, and nothing in Amendment 13 would prohibit the agency from making that decision.'") (quoting *Pac. Marine Conservation Council, Inc. v. Evans*, 200 F. Supp. 2d 1194, 1200 (N.D. Cal. 2002)).

setting processes, as conservation and management needs changes in the fishery and across fisheries[5];

- Provide that each FMP should establish a set of diagnostics, perhaps using a target CV or CVs for each fishery or fishery mode, to gauge whether the program is providing sufficiently precise information for management purposes. This is consistent with NMFS' guidance,[6] and far more realistic than attempting to achieve such a level for several hundred fishery modes sub-divided by bycatch species;
- Create a general set of priorities for deployment of limited observer resources that is non-discretionary for NMFS. For example, that resources be dedicated first to fisheries or sectors within a fishery that have taken protected species or that have material bycatches of overfished species;
- Mandate that sampling designs developed for each fishery minimize bias (thus promoting accuracy in assessments) to the greatest extent practicable;
- Authorize and encourage cooperative research to undertake such activities as, for example, development of gear that minimizes bycatch, identification of times/areas/gear with unusually high or levels of bycatch, testing of sampling designs, and getting basic information for fisheries for which the extent of bycatch information is not well understood. *See Evaluating Bycatch*, at 35 (also suggesting cooperative research projects focus on discard mortality and identifying means of minimizing the so-called "observer effect");
- Explain, expand upon, and authorize the use of "importance filters" by Councils as they develop fishery-specific observer plans, in order to insure that resources are focused on the highest priority areas.

These suggestions are not exclusive, but provide some flavor of the type of guidance the Omnibus SBRM Amendment should provide, and most of these elements are already contained in the document. A combination of mandatory elements, such as the observer program, priorities, and general guidance will together provide the necessary structure and guidance for the operation of fishery-specific monitoring programs that do not leave all the discretion with NMFS. As explained above, this is a key element of the court decision in the groundfish and scallop cases. *See Oceana II,* 384 F. Supp. 2d at 234 n.41 ("[T]he Court is not suggesting that the FMP should mandate the precise areas where observers must be concentrated for years to come; it only requires that the FMP establish some method for determining observer concentration instead of leaving all decisions to the Regional Administrator's discretion.").

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5 In developing these fishery-specific programs, existing observer commitments (such as for higher levels of coverage in the Atlantic sea scallop area access and groundfish "B" day programs) will need to be considered as well.

6 *See Evaluating Bycatch*, at 57-58.

As noted, our proposal does not represent a major change from the direction that the current SBRM Amendment has taken. The Public Hearing Document contains many useful elements, such as its discussion of the various reporting methodologies, tools (such as logbooks, VMS, electronic monitoring systems, etc.). However, in its ambition, it far exceeds both legal requirements and what is feasible given current constraints, not to mention the national guidance from NMFS. As such, there is a very real danger that, if passed essentially as is, it could be found by courts to set a new standard that is neither feasible nor necessary.[7]

GENERAL LEGAL ISSUES

Before turning to the specifics of the Public Hearing Document, there are general legal issues to consider. The Executive Summary of the Public Hearing Document explains:

> Generally, an SBRM can be viewed as the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Several specific analyses are conducted to calculate a measure of the variance associated with the data that have been collected by fisheries observers and to determine the most appropriate fisheries observer coverage levels and the optimal allocation of observer effort across the fisheries in order to minimize the variance to the degree practicable. Given the target level of data precision desired by fisheries scientists and managers, fisheries observer coverage levels can be calculated that would be expected to provide data of the desired precision [and accuracy].

Public Hearing Document, at iv.

The appropriate levels of precision and accuracy to be achieved from the SBRM contain a policy component under the Magnuson-Stevens Fishery Conservation and Management Act. The Public Hearing Document explains that the Magnuson-Stevens Act "addresses both the requirement to establish an SBRM for each FMP and the requirement to include conservation measures to minimize bycatch and bycatch mortality to the extent practicable . . . ." Public Hearing Document, at 6 (citing 16 U.S.C. § 1853(a)(11) (requiring these bycatch related measures in each FMP)). Notably, the Public Hearing Document proceeds to explain that it will deal with only the former element, and not address bycatch reduction as a conservation matter. *Id.* However, it does note that the goal is "to minimize the variance to the extent practicable." *Id.* at iv.

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[7] Parenthetically, the supervening changes in the Magnuson-Stevens Act, signed into law on December 27, 2006, and their applicability to amendments such as this now under consideration, mean that a slightly new course can be charted without any delay beyond that which will necessarily occur as guidance is developed and the SBRM Amendment reviewed for consistency with the newly-amended law.

Accordingly, the Magnuson-Stevens Act's practicability standard applies to this exercise. In this instance, practicability entails two considerations: (1) the monitoring standards/observer requirements should not unduly burden the public fisc or bankrupt the fishing industry to implement; and (2) there needs to be a discussion of the benefits and costs of various levels of precision and accuracy, not just a purely scientific conclusion that a certain level is required. The court in the *Oceana* cases essentially made this point, and we are litigating it in another context.

A corollary to the first point, also, is that the SBRM should not be established as a set of aspirational goals that are not expected to be attained on a regular basis, given the expected resource constraints from a budgetary and observer manpower perspective. If the system is either aspirational, or so ambitious that it can only be expected to be aspirational, it will just become fodder for litigation from year to year when the standards are not met, with the threat of a court injunction on the fishery as a remedy for non-compliance.

As to the point regarding practicability, it must be noted that the requirement to establish an SBRM is an adjunct to the duty of the Council to minimize bycatch more generally. Indeed, the SBRM must be designed "to assess the amount and type of bycatch occurring in the fishery," and that bycatch must then be minimized to the extent practicable. 16 U.S.C. § 1853(11). In instances where a particular bycatch species is rarely encountered, and thus has been minimized, it is fully consonant with the legal requirement not to expend significant scarce resources in an attempt to develop extremely precise estimates. That is the essence of the practicability limitation, which applies with as much force to the SBRM as to the bycatch minimization objective itself.

In this regard, the FSF applauds the decision to include "importance filters" as a means of insuring that limited resources are directed to where they will be most effective. The Public Hearing Document, *see e.g.*, *id.* at 167-71, does an admirable job of providing a reasoned explanation and justification for their use, and does so in legally relevant terms. For instance, it notes that achieving the essentially arbitrary target level of precision for estimates of red crab bycatch would cost more than three times the value of the entire red crab fishery. *Id.* at 170. Employment of these filters as a means of identifying the truly important bycatch species and fishing modes in which to focus limited observer resources represents a reasoned, practicable policy judgment that meets the requirements of the law.

Finally, it is worth noting that the SBRM well addresses one of the key issues in the court decisions in the Amendments 10 and 13 cases, specifically, the issue of accuracy. The failure in those amendments to address the findings in the Babcock, *et al.*, study with respect to levels of observer coverage necessary to achieve precise and accurate estimates was one of the key omissions identified by the court. This shortcoming, however, has been rectified with the Rago, *et al.*, study referenced in, and included with the amendment.

ELEMENTS OF SBRM AMENDMENT

Turning to the elements of the Public Hearing Document, it prescribes four choice points for the councils: (1) bycatch reporting and monitoring mechanisms; (2) analytical techniques and allocation of observers; (3) SBRM standard; and (4) SBRM review process. This memorandum will set forth the Councils' preferred alternative and some initial thoughts below.

The problem, however, is that the uncertainties of agency budgets and observer availability make it very difficult for NMFS to ensure implementation of a mandatory, highly ambitious level of observer coverage. Perhaps the most fundamental flaw in the Public Hearing Document is that it provides for an incredibly, in fact unduly, ambitious set of standards for observed trips, without any discussion or understanding of whether and how that level of observer coverage can be provided or paid for, or whether the agency can even make use of all the data it would collect under such a program (which has been a problem even in very targeted observer programs). *See* Starr Comments, at 2.

Oceana II makes clear that an SBRM standard may not be based, or back-calculated from, how much observer coverage can be funded. "While the logistics of paying for observers is a fair consideration in establishing a particular bycatch reporting methodology," the agency cannot put "the cart before the horse, predicting sampling frequency, observer distribution, and precision rates based on potentially available funding rather than establishing a methodology." *Oceana II*, 384 F. Supp.2d at 236.

Monitoring Mechanisms: Regarding element one, monitoring mechanisms: The Public Hearing Document essentially contains two options. The first involves using the sources of information that are currently available: fishery independent surveys, fishing vessel trip reports, dealer purchase reports, at-sea observers, commercial port sampling, recreational fishery sampling (MRFSS), and industry-based surveys. The document then addresses the strengths and limitations of each source of data from the perspective of identifying bycatch:

> Observer-gathered discard information is generally considered the most accurate and objective in recording bycatch and discard information. Observer programs often collect detailed biological information on both catch and discards for all aspects of commercial catch . . . .
>
> Observer data are preferred over other data sources including FVTR data for a few reasons. Unlike fishermen, who may be performing or managing many fishing related tasks at once . . . observers are focused solely on data collection while deployed at sea. . . .
>
> [However,] [m]anaging an observer program requires dealing with numerous practical and fiscal constraints. Observers must be carefully trained, work under sometimes hazardous conditions, and deal with a variety of circumstances that can arise while at sea on a fishing vessel. Logistical issues, such as having an adequate number of observers available to cover a wide geographic area,

> numerous ports, and a variety of fisheries; and getting the observers aboard vessels within relatively short windows of time before they intend to sail further add to the complexity and costs of observer programs.

Public Hearing Document, at 89. The document identifies only video sampling as an alternative to the current array of monitoring options, and explains that video does not currently provide the same types of detail as on-board observers. *Id.* at 98-101. The document correctly recognizes the analytical difficulties involved in transitioning to video monitoring and thus sensibly defers use of these systems, pending further development. *Id.* at 113.

Of course, this is not the end of the story. If the status quo is chosen, NMFS needs, as a practical matter, to get to an affordable and effective observer system, with a stable workforce and budgets. This is lacking right now for most Northeast Region fishing fleets.

Analytical Techniques and Allocation of Observers: In general, we support the preferred alternative, which would apply an "importance filter" to "aid in establishing target observer sea day allocations." *Id.* at 117. Recommended by the Scientific and Statistical Committee, the importance filter "is specifically designed to 'weed out' particular combinations of fishing gear and bycatch species where the infrequency and variable amounts of discards would result in very high observer sea day coverage levels, in spite of the fact that the actual magnitude and frequency of discards is very low and likely of no consequence to the discarded species." *Id.* "The importance filter focuses on the encounter rate (the proportion of trips in which the species was encountered and discarded), the relative proportion of discards of that particular species when compared to the discards of other species within the fishing mode, the magnitude of the observed discards, and the proportion of the discards of the species within the fishing mode to the total landings of the species among all fisheries." *Id.*

The importance filtering mechanisms need to be clarified and perhaps expanded to ensure that they have sufficiently identified the criteria to be used as filters. For instance, while an importance filter includes an encounter rate component, the Amendment should state that observer sea days can be reduced when gear improvements have reduced, if not eliminated, the potential for bycatch, viz. turtle chains ought to preclude intensive scallop fishery turtle monitoring. The Councils should also consider a filter for any mode of fishing whose overall contribution to total landings falls below some threshold or is so rarely used that it can be assumed that the contribution to total discards are likely *de minimus*. This would help to reduce the administrative complexity of the plan, as well as to preserve limited observer assets for areas of real concern.

SBRM Standard: The question presented in the Public Hearing Document is whether the SBRM Amendment would "specify a target CV as a performance measure or standard against which to judge the adequacy of the bycatch monitoring program described in the amendment." *Id.* at 121. The options are the *ad hoc* approach that exists now, or application of a uniform 30% CV, subject to importance filtering. <u>As explained above, we submit these decisions should be made in a more structured way than they currently are, but in FMP-specific contexts</u>.

The Public Hearing Document explains that the preferred alternative (uniform 30% CV) would comprise the following:

> In addition to a set of bycatch reporting and monitoring mechanisms used to collect information on discards in a fishery, and a set of analytical techniques and procedures used to estimate discards, allocate at-sea fishery observer effort, and perform stock assessments, the preferred alternative would also establish a performance measure to ensure that the bycatch-related data collected under the SBRM and utilized in stock assessments and management is adequate for those tasks. In order to ensure that the SBRM is performing to the expected level, this preferred alternative would establish a process to periodically review the adequacy of the SBRM, with consideration of how and when changes to the SBRM should be made.

Id. at 121.

We submit that it will be important for the Amendment to establish some standards, to ensure fidelity to the *Oceana* decisions, but that: (1) there will need to be some flexibility in these standards; and (2) the Amendment should not be light years more ambitious than NMFS guidance in seeking to apply these standards. Our recommendations that seek to address these concerns are set forth above.

In terms of flexibility, such performance measures should represent diagnostic tools, and must not be read or be able to be characterized as immutable standards, such that failure to achieve them in any given year becomes an event for litigation. In this regard, as discussed below in regards to the second point, the ambitions of the SBRM as proposed in the Public Hearing Document may far exceed the ability of the agency to meet on a sustained basis, making it very important that the Councils utilize the importance filters, make clear that the CVs are aspirational, and state that program overall is sufficient to precisely characterize and assess bycatch across fisheries (as opposed to any particular mode).

Such flexibility is consistent with the decisions in the *Oceana* cases. The primary deficiency of Amendments 10 and 13 was the Council's failure to develop an reporting methodology coupled with what the judge saw as a grant of unfettered discretion to the Regional Administrator to determine when, where, and how much observer coverage to deploy. "[A]n FMP that merely suggests a hoped-for result, as opposed to 'establishing' a particular standardized methodology, does not measure up to the statute's requirements." *Oceana v. Evans* ("*Oceana I*"), 2005 U.S. Dist. LEXIS 3959, at *136 (D.D.C., March 9, 2005) (citation omitted). "Instead of analyzing what type of program – whether a mandated level of coverage or *some other mechanism* – would succeed in producing the statistically reliable estimates of bycatch needed to better manage the fishery, the FMP essentially assigns this task to the Regional Administrator." *Oceana II*, 384 F. Supp. 2d at 233-34 (emphasis added).

In the current instance, the methodology specified more than meets, and even exceeds, the requirements laid out by the court.[8] In fact, the proposed amendment is far more comprehensive than what has been laid out in FMPs for other fisheries, such as the Pacific Groundfish and the Pacific Highly Migratory Species fisheries, the latter of which was cited by the environmental plaintiffs as a model and the former which was promulgated in response to a similarly successful SBRM challenge.

What the *Oceana* cases did not do, however, was to mandate any particular approach or set of performance requirements in order to meet the SBRM requirement. For instance, the judge explicitly noted that "*Oceana I* did *not* require that an FMP mandate a specific level of observer coverage. Rather, the Court held that an FMP may not delegate the development of a standardized bycatch reporting methodology to the Regional Administrator." *Oceana II* at 384 F. Supp. 2d at 234 n.38. The court also noted that it "is not suggesting that the FMP should mandate the precise areas where observers must be concentrated for years to come; it only requires that the FMP establish some method for determining observer concentration instead of leaving all decisions to the Regional Administrator's discretion." *Id.* n.41. What the court did require, and this amendment actually overachieves relative to NMFS's guidelines, as noted below, is that mechanisms be developed that "would succeed in producing the statistically reliable estimates of bycatch needed to better manage the fishery." *Id.* In these terms, the task is to best utilize the government's resources to gain a precise estimate of the amount and composition of bycatch in the managed fisheries rather than designing a theoretically ideal system.

Even in instances where the importance filtering still requires some coverage, there may be a need for reduced levels of coverage designed to identify whether there is any bycatch issue when the data is too sparse to determine what level of observer coverage would be needed to achieve a pre-determined level of precision/accuracy. This may also need some statistical support as a basis for application either of an importance filter or some tolerance for a reduced level of precision/accuracy. These considerations are best addressed in context, as both *Evaluating Bycatch* and Mr. Starr explain. *See Evaluating Bycatch*, at 58-59; Starr Comments, at 1-2.

What would appear to be required, however, is a mandate that the agency create an observer program to implement the SBRM. *See, e.g., Oceana II*, at 135 ("'Because the observer program is optional under Amendment 13, NMFS in theory could decide not to implement an observer program for the ground fishery, and nothing in Amendment 13 would prohibit the agency from making that decision.'") (quoting *Pac. Marine Conservation Council, Inc.*, 200 F. Supp. 2d at 1200). This is not the same as setting minimum levels of observer coverage, which,

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[8] *See id.* ("A methodology need not necessarily be detailed, but it must at the very least provide decision makers and the public with a program of what actually will be *done* to improve bycatch reporting, and why these measures will be sufficient based on the best available science.") (citation omitted)).

it should be stressed, is not required under the law.[9] Rather, it is a matter of including language similar to that in Pacific Groundfish Plan: "The Regional Administrator will implement an observer program through a Council-approved Federal regulatory framework." PFMC, Pacific Coast Groundfish FMP, at 71 (Sept. 2006). Such is necessary to avoid the same deficiency the court found in the *Oceana* cases.

The second, and significant, issue is that the Public Hearing Document goes far beyond NMFS guidance by recommending to apply this level of statistical precision to fishery modes, as opposed to the fishery for a species as a whole. It would also apply such a level of precision to each bycatch species rather than to bycatch in a fishery as a whole:

> In total, the proposed SBRM would separately track and report the precision associated with the discard estimates of 36 individual fishery resources or species groups and 23 individual protected species or species groups across 39 separate fishing gear modes. In sum, this means that rather than trying to achieve a precision of 20-30 percent for a single estimate of total discards in each of the 16 major fisheries (16 separate estimates), under the proposed SBRM, the Councils and NOAA Fisheries Service will strive to achieve a precision of no more than 30 percent in up to 2,301 unique fishing gear mode and species combinations [less certain importance-filtered combinations].

Id. at 123. The *Oceana* decisions do not require this level of detail, as the quotes from the decisions above indicate.

Significantly, the Public Hearing Document's disaggregated approach countervails nationwide NMFS guidance. The SBRM Amendment explains:

> Although the proposed 30-percent CV target is based on the recommendation [for CVs of 20-30% for SBRM programs] in NMFS (2004), the proposed application

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[9] While the court found fault with the fact that Amendments 10 and 13 did not set a mandatory level of observer coverage, those decisions were made in the context of two plans that contained "recommended" levels of observer coverage that could be changed or not implemented at all at the agency's sole discretion. *See, e.g., Oceana I* at 133 ("[T]he Secretary stated that he merely 'intends' to maintain a 5% coverage level. While he did state that a 5% level 'will resume in FY 05 and beyond,' in the context of the Secretary's overall response to criticisms of Amendment 13's bycatch reporting, it is clear that this figure is not mandatory and may be subject to change if the Secretary deems it proper.") (citations omitted). In other words, minimum levels of observer coverage were the primary means for collecting bycatch information under those two plans, and as such, the Court found that they must be mandatory and shown to be sufficient to collect precise and accurate data. By contrast, Councils could select a different mechanism, to wit, a methodology focused on gear types, sectors, and fisheries.

> of this standard differs in several important ways. First, the precision goal is recommended to apply to a "fishery," but in the proposed SBRM, the target CV would apply at the level of the fishing mode. [The Amendment then explains that this would require the six separate modes of the monkfish fishery to be examined separately.]
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> ***
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> Another way in which the proposed application of the SBRM differs from the NMFS (2004) guidance is that while the guidance document indicates that the precision goal of 20-30 percent should apply to total discards "aggregated over *all* species [emphasis added], this proposed alternative proposes disaggregating all species to the level of individual species or groups of related species. Continuing the example of the monkfish fishery, among the gear types that catch monkfish, there are more than 29 other species caught in those gears (along with many other non-FMP species). The guidance in NMFS (2004), therefore, recommends that the precision of the estimate of total discards of all 30+ species across all applicable fishing gears would be sufficient if the single estimate had a CV between 20 and 30 percent. The SBRM proposed under the preferred alternative would separately track the precision of the discard estimates for each individual species, except for a few limited cases where a species complex is more appropriate, managed under a Northeast Region FMP.

Id. at 122.

This is not an academic exercise. In practical effect, adopting the preferred alternative might require, based on estimates provided at the SSC, about 58,000 observer sea-days across the Northeast Region, compared to the 8,000 or so deployed, for example, in 2004. As explained above, the *Oceana* decisions suggest that if the Amendment appears to set certain standards for observer coverage, Councils will likely be held to those standards. It is, furthermore, unlikely that even with such coverage levels this standard could be attained for many of the various modes.

In this regard, Mr. Starr explains:

> It is very unlikely that a single CV "performance standard" can be applied successfully to such a broad and diverse range of fisheries. While the application of such a standard may improve the existing situation, given that relatively little monitoring presently exists, I believe that it will also result in a large number of data collection programmes which will be poorly designed, badly applied and subsequently not properly analysed. Thus I believe that the overall goal of better monitoring and management of these fisheries will not be achieved, particularly in the short term.

Starr Comments, at 1. It is also Mr. Starr's conclusion, which coincides with the advice in the NMFS nationwide technical document, that "[t]here is no substitute for dealing with each fishery

unit (or grouping) individually and tailoring the monitoring to fit the situation." *Starr Comments, at 1.*

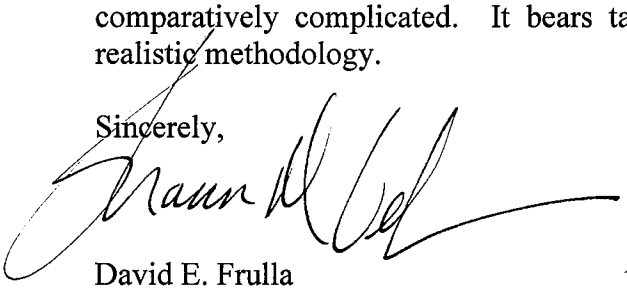
The divergence from NMFS guidance that would seek to prescribe a uniform level of precision of estimates for each bycatch species appears to present the biggest obstacle in practical implementation.[10] Tellingly, Mr. Starr further explains that, in his experience, calculation of CVs for each cell is a detailed, individualized process. Starr Comments, at 2-4. It is hard to conceive how NMFS could administer this program, with the resource constraints it faces and its essential inflexibility as an institution. There is a reasonable concern that litigation could ensue again if NMFS were not able to achieve the stated degree of precision (plus accuracy) in each of these 2,000 or so individual situations, even if this approach is not consistent with NMFS guidance.

Figuring out how to address this issue will be very important for the fishing fleets in the Northeast Region. It may be that observer and management decisions could be based on an aggregated estimate, consistent with the NMFS nationwide guidance, and that the species by species information could be assembled as a diagnostic and evaluative tool. In either event, importance filtering will have an important role.

CONCLUSION

The suggestions offered represent a workable and legally sufficient approach, that better meshes with available resources. It will also provide the Councils with the fishery-specific bycatch information they need in order to meet the conservation and management of the Magnuson-Stevens Act, especially as amended. This is an important issue, albeit one which is comparatively complicated. It bears taking the time necessary to produce a workable and realistic methodology.

Sincerely,



David E. Frulla
Shaun M. Gehan

Counsel for Fisheries Survival Fund

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[10] There may be good reason, to seek to ensure consistent levels of coverage among fishing sectors, but there needs to be flexibility in terms of the levels of precision that are sought. *See Evaluating Bycatch*, at 59 ("Flexibility is needed when setting CV targets for specific fisheries and bycatch species.").

ATTACHMENT 1

Paul Starr, Fisheries Stock Assessment Scientist
61A Rhine Street, Island Bay, Wellington, New Zealand

29 December 2006

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

RE: Submission on SBRM Amendment

Dear Ms. Kurkul:

Introduction and qualifications

I have been asked by the Fisheries Survival Fund (FSF) to prepare an independent submission as an outside expert familiar with many of the issues being debated over the adoption of the Standardised Bycatch Reporting Methodology (SBRM) Amendment. I have had considerable experience over the thirty years that I have been a fisheries scientist in designing, implementing and analysing data generated from various programmes intended to measure quantities of interest in a fishery. These programmes range from observer programmes such as those being discussed in relation to the SBRM to logbook programmes which are designed to be completed by the fisherman.

I am not completely familiar with the details of how fisheries are managed on the eastern seaboard of the United States nor am I fully cognisant of all the sensitivities which exist between the various sectors and stakeholders who participate in these fisheries. However, I feel that I am able to make some general comments on the nature of the "preferred alternatives" identified in the SBRM Public Hearing Document because such programmes tend to have strong similarities regardless of where they are implemented. I have experienced this universality myself, having worked extensively in western Canada as a salmon and groundfish scientist and also having worked in the New Zealand groundfish and shellfish fisheries.

Summary

The following is a summary of the main points of this submission:

- It is very unlikely that a single CV "performance standard" can be applied successfully to such a broad and diverse range of fisheries. While the application of such a standard may improve the existing situation, given that relatively little monitoring presently exists, I believe that it will also result in a large number of data collection programmes which will be poorly designed, badly applied and subsequently not properly analysed. Thus I believe that the overall goal of better monitoring and management of these fisheries will not be achieved, particularly in the short term.
- There is no substitute for dealing with each fishery unit (or grouping) individually and tailoring the monitoring to fit the situation. Therefore, a more productive approach

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would be to establish a process through which all stakeholders can participate in the establishment of the monitoring programme, including agreement on the overall management goals.

- Finally, my experience has shown that successful fishery monitoring programmes need the co-operation of the stakeholders being monitored. It is easy to mandate compulsory programmes, but they tend to be less successful (and more costly) than programmes that have been developed co-operatively.

General comments

The most relevant comment that I feel I can make is that collecting information from any fishery without clear objectives which are tightly integrated into the management of that fishery is not a sensible course of action. This seems to me to be the most fundamental flaw in the SBRM Public Hearing Document where the "preferred alternative" is to specify a single region-wide performance standard, specifically the "30% CV" for mean catch estimates, without reference to the management objectives the coefficient of variation (CV) standard is to serve, including conservation issues applying to these fisheries. That is because specifying a CV without knowing how the data will be used in the management or the science is like putting the "cart before the horse". The precision required for an estimate should always be tied to the purpose to which the estimate is put. To do otherwise is poor science and not good management practise.

I recognise that there is a lack of information to manage some aspects of these fisheries and the SBRM is an attempt to rectify important missing components needed for management. However, simply specifying a minimum level of observer coverage and/or specifying a target performance standard is probably not the best way to go about establishing the collection of data that can be used to manage these fisheries. My understanding is that the SBRM will apply to about 1,500 strata (where a stratum would be a species, fishery, time period cell) for which data would be collected. It is almost inconceivable that any agency would have the resources to go through a process of designing, implementing and finally analysing the data for such a large number of strata. Even 100 such strata would tax the capacity of any agency with which I am familiar. It is important to note that an observer on a vessel collecting information over a number of species will not achieve the 30% CV performance standard for each species collected. Instead, the 30% CV performance standard will require a separate sampling protocol for every species because each species is captured at different rates, even on the same vessel.

A frequent lapse in many observer programmes is the failure to adequately analyse the resulting data. Captain Ron Smolowitz, an independent gear technologist and consultant to the FSF, described to me the existence of observer bycatch information for a scallop dredge fishery in the Georges Bank Scallop Access Areas which takes yellowtail flounder as a bycatch. High levels of observer coverage are used to manage this fishery and there exist at least four years of good quality data. However, I understand that these data have not yet been analysed to see whether they have achieved a target CV performance standard nor has the design of this observer programme been adjusted based on the data collected. Given that resource constraints apply to all natural resource management regimes with which I am familiar, this example shows how difficult it is to achieve an adequate level of design, implementation and analysis for a single programme, let alone 1,500 cells.

Therefore, I believe that mandating a fixed CV performance standard on 1,500 strata and expecting that this will supply useful information that can be used in managing these fisheries is a recipe for failure. It is inconceivable to me that there would be sufficient resources, either in terms of personnel or of money, that could successfully undertake the design of such a large programme, let alone implement and evaluate the outcome of each and every stratum. The SBRM, as I think it will progress over time, will most likely result in a pattern of putting

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observers on vessels without a great deal of thought, collecting a large amount of data, some of which may be relatively useless and then allowing the data to moulder in a computer without being properly analysed.

An alternative approach

My experience has shown that this problem should be approached differently to achieve success. For instance, in New Zealand, the Ministry of Fisheries uses "Working Groups" (which are organised around specific fisheries or species groupings) to help it to perform the following tasks: a) setting priorities for which fisheries are to be monitored (usually on the basis of perceived problems), b) arranging for the scientific design of an observer programme to address the problems, c) critiquing and evaluating the design before implementation, d) overseeing the implementation of the design and e) arranging for an evaluation of the final product.

In New Zealand, Working Groups are comprised of knowledgeable and interested people who represent all components of fishery "stakeholders": government and industry scientists, managers, representatives from NGOs, recreational fishery groups and aboriginal groups. The Working Groups tend to work on a consensus basis, primarily putting forward material on which there is agreement. Occasionally there is dissension and a minority report will also be filed. But there is usually strong agreement on issues which involve fishery observer coverage because these issues tend to be straightforward and usually do not cause much difference in opinion.

It appears to me that what is missing in the SBRM Public Hearing Document is the establishment of a <u>process</u> – the development of fishery-specific methodologies – that will achieve the collection of useful information which can be used to manage bycatch in these fisheries without specifically mandating a fixed 30% CV for large number of separate strata. Such a process needs to be measured, thoughtful and directed towards where it will do the most good and will address the problems which require immediate attention. Resources are always limiting in natural resource management situations and they need to focussed on those problems which are perceived to be the most acute. This can be best done (in my experience) in a group setting where consensus can be reached. A motivated and well run Working Group will achieve a much better result than single individuals working in isolation, regardless of which agency or interest group they represent.

Additional issues concerning the design of observer programmes

I have a few additional points to add to this submission, which are technical but which have implications for the SBRM decision:

1. Observer coverage CVs often are calculated as if every tow is independent. This is not true because observer coverage takes place in the context of a fishing trip, a series of tows conducted by the same skipper. Experience has shown that sequential tows by the same skipper are correlated, which means they are not statistically independent. This means that more tows need to be observed to achieve the statistical performance standard of a 30% CV than would be required if all tows could be randomly selected. While this issue is not strictly relevant to the specification of the 30% CV performance standard, it is frequently overlooked and means that achieving the mandated performance standard is often much more difficult than envisioned.
2. There are also auxiliary issues associated with observer coverage. One of these is the "observer effect". That is, vessels perform differently when an observer is present. This effect is obviously most important when observer coverage is low, because there will be the greatest leverage. However, this effect may affect the calculation of the CVs and should be considered in the design of the programme.

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3. Another issue is how to handle downtime while the observer is on board. NGO commentary often suggests that commercial vessels use this opportunity to subvert the coverage afforded by an independent observer, although this effect may be less pronounced in fishery systems that are managed by a trip limit or by the number of days fished. More importantly, observer downtime will affect the estimate of the CV and should be included in the estimation of this quantity. Again, this is frequently an aspect of observer coverage which tends to be overlooked with the more usual response being to assume that every tow on a vessel with an observer is actually observed.

4. The method of calculating the CV will also be, to some extent, fishery (or stratum) dependent. For instance, fisheries that consist mainly of day trips will have different issues for calculating the CV compared to fisheries that go out for a week or more. This dichotomy shows the weakness of relying on a universal standard to ensure adequate coverage for all fishery strata and indicates that specifying a single target CV performance standard will not address all the relevant issues.

I bring up these points not because they are directly relevant to the decision of whether to implement the SBRM, but because they affect the design of the programme which is needed to achieve the mandated 30% CV and illustrate why specifying a single CV target is not adequate in itself. The calculation of the CV itself will be incorrect unless all factors which affect the CV are incorporated, and these will vary across fisheries or even within the same fishery, as they will differ by species. With these factors contributing complications in calculating the CV estimates, there is a danger that the focus of the SBRM programme will move to determining whether the performance standard was achieved, rather than ascertaining whether the data needed to manage the fishery were obtained.

Conclusion

My instinctive reaction to the SRBM proposal is that a single performance standard that applies to a range of objectives across a large number of fisheries is doomed to failure. Fisheries don't fit the "one size fits all" model. It is not sensible to expect that a single over-arching performance standard, such as specifying a 30% CV, will automatically result in satisfactory outcomes across a number of differing situations. Fisheries are complex and managing them requires careful consideration of the components of each situation individually. To do otherwise is a recipe for failure.

One final point: my experience has shown that observer programmes are much more successful when the participants support the project. Observers always are "extra" in that they interfere with the smooth operation of the vessel and potentially may affect the livelihoods of everyone on board. Therefore, it makes a lot of sense to design the programme in such a way that the co-operation of those most affected is secured. Mandating unrealistic solutions that are probably not achievable is not the best way to proceed. Instead, if a process where fishermen are allowed to have a real and significant input at the design level of the programme is developed, then the overall goals of the programme are much more likely to be achieved.

Sincerely yours,

Paul Starr

ATTACHMENT 2

CURRICULUM VITAE

Full Name: Paul J. Starr

Present Position: Consulting Fisheries Stock Assessment Scientist

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Academic Qualifications:

1973 Master of Science
University of British Columbia
Thesis title: Population dynamics and colonisation of *Sida crystallina* in Marion Lake, British Columbia.

1968 Bachelor of Science
Yale University
Thesis topic: Distribution of aquatic invertebrate fauna in cave ecosystems

Professional Positions Held:

2000 – present Consulting Fisheries Stock Assessment Scientist
Major clients:
- Canadian Groundfish Research and Conservation Society
- New Zealand Rock Lobster Industry Council
- New Zealand Seafood Industry Council

1997 – 2000 Chief Scientist
NZ Seafood Industry Council

1991 – 1997 Fisheries Stock Assessment Scientist
NZ Seafood Industry Council
(previously *New Zealand Fishing Industry Board*)

1982 – 1991 Senior Stock Assessment Biologist (chinook salmon)
Canadian Department of Fisheries and Oceans (DFO)
Biological Sciences Branch

1981 - 1982	Program Planner Canadian Department of Fisheries and Oceans Program Planning Branch
1980 - 1981	Management Biologist, Canadian Department of Fisheries and Oceans Fraser River Division Fisheries Branch
1976 - 1980	Biological Technician Canadian Department of Fisheries and Oceans Fraser River Division Fisheries Branch
1975 -1976	Fisheries Biologist Province of British Columbia Fish and Wildlife Branch
1973 - 1975:	Research Assistant University of British Columbia Institute of Animal Resource Ecology

Present Research/Professional Speciality:

- Experience in stock assessment of a variety of marine species, including deepwater demersal species (orange roughy, oreo, hoki and other species), inshore demersal species (snapper), shellfish (including lobster) and salmon (chinook, coho, sockeye, chum and pink).
- Experience in designing marine fisheries research programmes, including biomass tagging surveys, sampling of commercial and recreational catches, and research trawl surveys.
- Specialisation includes designing self-monitoring programmes for the collection of scientifically useable information in commercial potting, long line and trawl fisheries.
- Experience in the presentation and interpretation of fisheries data for the purposes of fishery management, including extensive participation in peer review working groups in Canada, New Zealand and the United States.
- Experience in providing advice to the fishing industry, to government policy makers, and to government negotiators in international fishing treaties.
- Experience in the New Zealand ITQ system, particularly in its implementation of research planning for fisheries assessment research, the evaluation of the research output and its integration into eventual management decisions.
- Specialisation in the interpretation and presentation of scientific information to all parts of the NZ Fishing Industry to allow informed decision making on scientific issues.
- Supervision and training of graduate students in a practical fisheries assessment and management environment.

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Associations:

American Pelagic Association

Garden State Seafood Association

December 29, 2006

VIA ELECTRONIC MAIL

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

RE: FISHERIES SURVIVAL FUND COMMENTS ON SBRM AMENDMENT

On behalf of the companies and vessels listed in our masthead, we are writing in support of the comments submitted to you today by Kelley Drye Collier Shannon (Shaun Gehan and David Frulla, on behalf of Fisheries Survival Fund) relative to the Standardized Bycatch Reporting Methodology Omnibus Amendment.

Their comments and suggestions reflect our needs, and will make the Omnibus Amendment workable for the Agency, the Councils and the affected industry.

As an industry, we advocate for sound fishery science and management. We believe the Omnibus Amendment, as currently written, could be very detrimental to your Agency's ability to manage the fisheries properly given the likelihood for litigation if and when the Agency is unable to fulfill the specific requirements of the Amendment as currently proposed.

Thank you,

/s/
Brady Schofield and Jeff Reichle

Conservation Law Foundation

December 29, 2006

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

Via electronic mail to: SBRMcomment@noaa.gov

Re: Comments on SBRM Amendment

Dear Ms. Kurkul,

The Conservation Law Foundation (CLF) submits the following comments on the omnibus Standardized Bycatch Reporting Methodology Amendment (Omnibus SBRM). We again acknowledge and thank the New England Fishery Management Council (NEFMC) and the National Marine Fishery Service (NMFS) for responding to our request in the fall of 2005 to decouple the draft SBRM, advanced by NMFS at that time from Groundfish Framework 42. The draft Omnibus SBRM amendment that will apply to all fisheries in New England is clearly a superior effort that has benefited from additional work. Developing and implementing a comprehensive SBRM based on the best available science is an important step toward achieving full compliance with the Magnuson-Stevens Act's bycatch requirements and addressing one of the most serious conservation and management issues facing fisheries management in New England.

While the proposed Omnibus SBRM demonstrates considerable effort by NMFS to develop a draft SBRM that would be a significant improvement over the existing patchwork of bycatch reporting measures, it simply continues to fail to meet the legal requirements of the Magnuson-Stevens Act (MSA), the National Environmental Policy Act (NEPA), and relevant court orders. CLF urged that these shortcomings be addressed throughout development of the Omnibus SBRM, thus it is unfortunate that at this time we must urge you to again withdraw the draft Omnibus SBRM in order to develop and analyze an appropriate range of alternatives addressing the legal shortcoming discussed below through a full Environmental Impact Statement (EIS). While we continue to seek expeditious implementation of SBRMs throughout New England's fisheries, the fact is that this SBRM will establish precedent for future SBRM's across the nation. Thus, while we are disappointed that more time will be required to complete the amendment, it is more important that it be done right and that further litigation on this matter is avoided if at all possible.

I. Bycatch Information is Critically Important to Effective Fisheries Management

The Northwest Atlantic ecosystem, the fish populations it supports, and fishing communities throughout New England continue to suffer due to depleted fish populations resulting from the failure of the existing groundfish management system to achieve its conservation and rebuilding goals. A

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significant contributing factor to the poor condition of N.E. stocks is the failure of New England fisheries managers to adequately implement measure to avoid and minimize bycatch.

As clearly set out in the Magnuson-Stevens Act, development of a SBRM to assess the amount and types of bycatch occurring in fisheries is a critical aspect of the Council's responsibility when writing fishery management plans, and it is the first step to fulfilling the Act's mandates to minimize bycatch and bycatch mortality. Without an accurate and precise assessment of bycatch, the Council and NMFS are simply hamstrung in their ability to develop management measures to account for the ecological and economic waste that is occurring in our fisheries. Without appropriate bycatch assessment and reporting, effective management is impossible.

II. The Omnibus SBRM Fails to Meet the Requirements of the Court Order Regarding the Development of a Standardized Bycatch Reporting Methodology

As you are aware, the Conservation Law Foundation brought two separate federal court cases resulting in decisions holding that the bycatch measures developed by the Council and NMFS for inclusion in the Groundfish FMP failed to meet the legal requirements of the Magnuson-Stevens Act (MSA).[1] While the proposed Omnibus SBRM Amendment is greatly improved over initial efforts, it is still inadequate and fails to meet the applicable legal requirements as set forth in the March 9, 2005 Order by the United States District Court for the District of Columbia. Specifically, the Federal Court ordered NMFS and the NEFMC to evaluate its bycatch reporting and assessment program, establish a standardized reporting methodology, specify observer coverage levels in their fishery management plans, and address other demonstrated shortcomings in their observer program.[2] In reaching this conclusion, the Court emphasized the following points:

1. NMFS violated the MSA when it failed to require any observers in the New England groundfish fishery.[3]

2. NMFS violated the MSA and ignored the best available science when it failed to take account of the report on bycatch and observers submitted by Oceana to NMFS as part of the Amendment 13 administrative record.[4]

3. NMFS violated the MSA when it failed to assess the bycatch problem by sector, gear type, and species.[5]

4. NMFS violated the MSA when it relied upon discredited methodologies for monitoring and reductions in bycatch in the New England groundfish fishery.[6]

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[1] *Conservation Law Foundation v. Evans*, 209 F. Supp. 2d (D.D.C. 2001); *Conservation Law Foundation v. Evans*, D.D.C. No. 04-811 ESH (March 9, 2005)(*consolidated as Oceana v. Evans).* In the 2001ruling, the Court explicitly criticized NMFS for relying upon bycatch reporting methods that were demonstrably inaccurate and inadequate. In the March 9, 2005 ruling, the Court referenced these earlier findings. *Oceana v. Evans,*. at 85.
[2] *Oceana v. Evans*, D.D.C. No. 04-811 at 85.
[3] *Id.* at 79-82.
[4] *Id.* at 83-84.
[5] *Id.* at 84-85.
[6] *Id.* at 85.

Upon entering these findings, the Court remanded the bycatch portion of Amendment 13 to NMFS with instructions to comply with the MSA.[7]

Given that NMFS has already delayed its compliance with the bycatch requirements of the MSA by over ten years, and now for more than five years following the ruling by Judge Kessler in December of 2001, we again request prompt compliance with the MSA and the March 9, 2005 Order. In order to do so, the following changes to the draft SBRM must be made.

1. Specify levels of Observer Coverage in the FMPs

The Court found that the groundfish FMP failed to specify a level of observer coverage in the fishery. Further, the Court rejected the argument by NFMS that is had met its SBRM obligations by stating an intention to achieve a certain level of observer coverage while retaining complete discretion for setting the actual level of observer coverage.[8] The draft Omnibus SBRM appears to take the same approach rejected by the Court by establishing mere performance targets in the SBRM while leaving the actual level of observer coverage entirely up to NMFS's discretion.

Further, insofar as the SBRM appears to undertake an allocation analysis for observer coverage based upon a certain level of days fished, it is not clear whether there is a mechanism in place to update the allocation analysis annually (or more often) in order to address changes in the fishery. The draft also indicates that the actual allocation of observers would be reduced based on funding, but there is no way to determine how this will occur and no standards are set for minimum levels of coverage. The Omnibus SBRM must set the stage for the Council and NMFS to specify the levels of observer coverage in all fisheries by gear type, sector, and/or other appropriate criteria.

2. Adequately Assess the Bycatch Problem by Fishery, Gear Type, and Species.

In reaching its conclusion that the SBRM needed to address bycatch by sector, gear type, and species, the Court considered the bycatch plan utilized in the Pacific Highly Migratory Fisheries (FMP) as a reference point for what a legally compliant SBRM in New England would look like.[9] As is evident by the Court's decision and a review of the Pacific FMP, to be useful in improving fisheries management the SBRM must specifically contemplate the changing dynamics of each fishery by gear type and species, and be integrated into each FMP. The draft Omnibus SBRM does not do this in a meaningful way, and therefore it is likely to fall well short of anticipating and adapting to future fishery conditions and management needs. As a starting point for addressing these shortfalls and making the SBRM a truly useful document, it should include a discussion of each fishery, gear type, and associated species interactions along with the fisheries management scheme. It should then consider and seek to anticipate the potential bycatch data needs in order to make appropriate recommendations for levels of observer coverage and other means for collecting bycatch data.

Further, the MSA's bycatch provisions contemplate that a broader range of species will be addressed than is covered by the Omnibus SBRM. Species not commercially targeted under fisheries managed by the New England or Mid-Atlantic Councils should be included. These

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[7] *Id.* at 85-86.
[8] *Id.* at 79-82.
[9] The Court noted specifically that the FMP evaluates various kinds of reporting for different types of fishing gear and vessels. (See CLF Mot. Ex. 2 (HMS FMP, August 2003) at Ch. 5, pp. 34-36 (previously provided as part of this record).

species should include those managed by the Atlantic States Marine Fisheries Commission, Highly Migratory Species, protected species (e.g., sea turtles), and species known to be at risk (e.g., wolfish, cusk, corals). Absent these species, the SBRM is incomplete and will fail to meet the MSA's intended goals.

3. Best Available Science Must be Applied in Establishing the SBRM

Performance standard

To be effective, the Omnibus SBRM must set a mandatory performance standard; it cannot be a mere target standard. The standard must clearly indicate how it is to be applied, and it needs to be set for each fishery, gear type and/or sector, and species.

Reporting

There should be, at a minimum, an annual report on bycatch for each fishery broken down by gear type, sector (as appropriate), area fished, species and other means as determined by the Council. All reports must be public.

Filters

The Omnibus SBRM proposes to reduce the initial observer allocations by applying a series of "importance filters." These filters would remove fishery mode/species combinations from the list of observer needs based on different criteria including the current database of fishery mode/species interactions. This approach is fundamentally flawed because it uses the existing poor observer data as the foundation for the calculation of the allocation. A better approach would be to establish a baseline level of observer coverage for a period of years and to then use this observer data to establish the appropriate use of future of statistical filters. Further, until there is a robust data set providing a high degree of confidence in the use of filers, no protected species or species at risk should be eliminated as a result of data shoing a low frequency of interaction because, by definition, a low frequency is likely in many instances due to the low abundance of protected species.

CLF is also concerned that filter 3 could result in the inappropriate removal of a fishery mode/species because the species could show up as a low volume in a very high volume fishery, yet the environmental impact could be significant. Recent evidence of bycatch of haddock in the herring mid-water trawl fishery is one example though, because of the severely depleted status of cod, a cod/herring trawl interaction could be even more serious. Filter 3 should be eliminated from the SBRM. Filter 4 is also of concern because it fails to establish a threshold value, a matter that should be analyzed through an appropriate EIS alternatives analysis.

III. Failure to Complete an Environmental Impact Statement or Meet Other Fundamental National Environmental Policy Act Requirements

1. The SBRM Will Have Significant Environmental Impacts Triggering the Need for an EIS

Contributing significantly to the shortfalls in the Omnibus SBRM is the failure to develop the Amendment through an EIS. Lack of an EIS limited the opportunities for public participation and stymied New England and Mid-Atlantic Council involvement, which in turn has significantly limited the range of alternatives considered and the substantive analysis of the issues.

As noted above, the first step to fulfilling the Act's mandates to minimize bycatch and bycatch mortality is the SBRM; if the SBRM fails to include an accurate and precise assessment of bycatch it is

impossible for the Council and NMFS to develop the management measures necessary to reduce the ecological and economic waste that is occurring in our fisheries. The decisions made as a result of the SBRM analysis will affect fisheries and other ocean life throughout the New England and Mid-Atlantic regions and will help form the basis for nearly all fundamental fisheries management tools including stock assessments and management measures to control fishing mortality and bycatch, itself. A poorly designed SBRM could result in significant environmental harm as bycatch issues are missed or their seriousness is not accurately assessed resulting in the severe depletion of a species.

It is difficult to imagine an action to be taken by NMFS with a greater potential to significantly affect the quality of the human environment, thus the agency must take a hard look at the environmental impacts of the Omnibus SBRM in a full EIS.

2. The SBRM Fails to Consider a Range of Alternatives

Fundamentally, the draft Omnibus SBRM only contains two alternatives for each decision point, one of which is the status quo, and fails to consider other reasonable alternatives. In some cases the identified alternative is so overly simplistic the result is in effect to have no alternative at all (e.g., whether to specify an SBRM review process). Development of a SBRM, like other major federal actions, requires consideration of an appropriate range of alternatives to comply with NEPA and the MSA. Additional alternatives should have been considered in many areas of the Omnibus SBRM, including for importance filters, bycatch reporting and monitoring mechanisms, performance standards, and bycatch review and reporting. The failure to consider a reasonable range of alternatives here at least partly stems from the decision early on not to undertake an EIS, thereby limiting public participation and the opportunity to develop additional alternatives.

IV. NMFS Should Specify Observer Coverage via Emergency Rule

Because the fishery management plans for New England continue to unlawfully fail to require any level of observer coverage, NMFS must take action immediately by emergency rule to establish an adequate level of coverage during the period of time it takes to develop a legally compliant SBRM through an EIS. The observer coverage established through emergency rule must be based on the best available science. In instances where draft SBRM or other information does not represent the best available science for setting the level observer coverage necessary to assure accurate and precise estimates of bycatch for a given gear type or sector, NMFS should establish observers on at least 20 percent of all days fished (trips) consistent with the Oceana report on bycatch discussed in the March 9, 2005 federal court ruling (e.g., 20 percent).[10]

Thank you for considering these comments. The Conservation Law Foundation looks forward to working with NMFS, the NEFMC and other interested parties to address the concerns raised in these comments. Should you have questions regarding these comments or wish to discuss any of the issues further, please contact me at rfleming@clf.org or by telephone at 207.729.7733.

Sincerely yours,

/S/_____
Roger Fleming
Senior Attorney

[10] *Oceana v. Evans*, D.D.C. No. 04-811 at 84-85.

cc: New England Fishery Management Council

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October 27, 2013

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Dover, DE 19901

Submitted via email to: nmfs.ner.draftSBRM@noaa.gov.

Re: Comments on Draft Standardized Bycatch Reporting Methodology Omnibus Amendment

Dear Chairman Stockwell and Chairman Robins:

Oceana thanks you for the opportunity to submit these comments on the Northeast Region Omnibus Standardized Bycatch Reporting Amendment Draft document.[1]

For more than a decade Oceana has advocated and litigated to improve the quality of information available to support Northeast Region fisheries management under the guidance of the New England and the Mid-Atlantic Fishery Management Councils. Modern fisheries management is becoming more data-dependent every year, so access to high-quality, accurate, and precise catch data is essential. As the SBRM document itself explains, "(t)*he primary purpose of bycatch reporting and monitoring is to collect information that can be used reliably as the basis for making sound fisheries management decisions.*"[2]

Oceana's longstanding goal for the SBRM is to establish a program across the Northeast region that collects accurate and precise information about bycatch in all fisheries and then timely reports this information in a useful form to Councils, fisheries scientists, the fishing industry, and other stakeholders. A robust data collection and reporting system will help identify bycatch interactions that need management attention, improve stock assessments, and support efforts to manage the region's fisheries.

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[1] Standardized Bycatch Reporting Methodology Draft Document downloaded from http://www.nero.noaa.gov/mediacenter/2013/09/2013nersbrmdraftamendment.pdf , September 27, 2013. Oceana submits these comment based on the documents available on 9/27/2013 and notes that the document was incomplete at that time with the notable omission of appendices and supporting materials.

[2] *Id* at 3 (Section 1.3)

There is great potential for the Councils and the National Marine Fisheries Service (NMFS) to support these multiple functions. However, the Agency-led SBRM development process has not done the job. Moreover the Agency's revision of the SBRM irrationally ignores how the fisheries work, by using a data-set that is almost 10-years old, when the fishery had vastly different characteristics, and by failing to consider the management changes brought on by important events such as the introduction of Annual Catch Limit (ACLs) and Accountability Measures (AMs) in the fishery management plan amendments that implemented the 2006 reauthorization of the Magnuson Act (MSA) and the establishment of a catch shares fishery for New England groundfish.

Oceana repeats many of the comments that we raised in a May, 2013 letter to the Fishery Management Action Team (FMAT) chair highlighting deficiencies in the document at that time.[3] Despite assurances to the Councils that revisions and modifications would be made prior to public comments[4], it appears that the majority of the promised changes have not been made the document continues to suffer from deficiencies we identified 5 months ago. Oceana encourages the Councils to ensure that the document is complete before proceeding with approval and submission to the Agency.

For these reasons, despite the need to establish the SBRM as quickly as possible, we urge you to delay Council approval of the SBRM document. It is incomplete and inadequate to satisfy the goals and objectives of the amendment or satisfy the various mandates that guide this action. The SBRM simply does not provide the information needed to identify, recognize, describe, and respond to bycatch in the region or assess the effects of this action on the fisheries of the region. Approving a fundamentally flawed document in the name of speed is unacceptable. Oceana looks to you as chairs of your respective Councils to lead your Councils and disapprove the current SBRM document to allow further development and specific action to address the important shortcomings in the document which can then be approved at a later date.

Oceana encourages the Councils to convene an open *Council-led* process in the near future to publicly develop and refine the amendment to meet the needs of the fisheries of the region and provide the information that fisheries managers, scientists and stakeholders need to manage New England and Mid-Atlantic fisheries.

In the interim, Agency can move forward with an observer allocation process for 2014 regardless of Council action on the draft amendment. An interim plan of action that continues the status quo approach is not ideal but will serve the fisheries of the region until a new SBRM amendment can be completed: a short term solution that Oceana reluctantly accepts.

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[3] *See* Oceana letter to Doug Potts, FMAT Chair May 17, 2013.
[4] *See* Testimony and Answers to questions by Doug Potts, NEFMC meeting April, 2013 and June, 2013.

The SBRM is an incomplete response to the Court Order in *Oceana v. Locke*

The SBRM includes measures that specifically respond to the court opinion in *Oceana v. Locke*.[5] As the SBRM document explains, the court found that the 2007 SBRM provided the Agency with undue discretion to determine whether there was insufficient funding and also provided the Agency undue discretion to address insufficient funding to support the goals of the SBRM.

The treatment of funding triggers in the draft document is wholly inadequate. The draft contains only one alternative to the status quo, and does not coherently explain what that alternative is or how it differs from the status quo. The Councils need to take a fresh look at this issue, considering what it really means to have insufficient resources within the context of how fisheries and budgets are actually managed.

The reallocation alternatives presented in the current document are fundamentally incomplete, because they address reallocation observer coverage without addressing reallocating buffers for uncertainty and otherwise modifying management measures to account for the reallocated observer coverage. The Amendment must address this fundamental aspect of the SBRM in order to be consistent with the conservation goals and objectives of the Magunuson Act.

Funding Triggers

While Oceana supports developing a formulaic approach to determine when available funds are insufficient to support the needs of the SBRM observer allocation in order to remove Council and Agency discretion from this portion of the allocation process, the draft document fails to contain such an approach. The draft document purports to consider only one alternative to the status quo, but a review of the text intended to describe that alternative reveals that there is no substance to this approach.

The document starts out by claiming that the Amendment "would identify specific funding sources to be used to fund observer coverage under the SBRM each year."[6] But the document never actually describes an alternative that would do that. The most specific it gets is the claim that "total available funds allocated to the Northeast Region from the Congressional appropriate funding lines listed in Table 66 would be used to support SBRM consistent with historic practice."[7] But the draft document fails to explain why only these funding lines and not others would be considered, fails to explain the relevant aspects of the appropriations and Agency budgeting process, fails to explain whether other discretionary sources of money exist, fails to explain how new or different funding lines that might be applicable would be handled, and fails to explain exactly how much leeway the Agency gives itself in the phrase "consistent

[5] *Oceana, Inc. v. Locke*, 670 F.3d 1238 (D.C. Cir. 2011)
[6] Standardized Bycatch Reporting Methodology Draft Document page 238.
[7] *Id.*

with historic practice." It appears to all intents and purposes that this alternative is the same as the status quo expressed in different words.

So the Councils must develop alternatives that really do confine Agency and Council discretion. In developing these alternatives, the Councils must consider all the relevant factors, not just federal funding from certain named funding lines. Among these factors to be considered would be other potentially applicable funding lines, discretionary money, existing industry-funding opportunities in the Northeast Region, and the possibility of developing industry-funding alternatives within the SBRM amendment.

Prioritization Alternatives

Prioritizing Buffers for Uncertainty in Conjunction with Changing Observer Levels

The SBRM Amendment's discussion of the prioritization process should start from the realization that the prioritization is related to the performance standard which is related to the management needs. These three elements can be balanced in more than one way. A reduction in observer coverage increases scientific and management uncertainty which then causes uncertainty in permissible catch levels. The Agency and Council have already begun to explore these tradeoffs between catch levels and uncertainty. In the 2004 SBRM guidance, the Agency described this basic situation:

> 'as the CV of the estimate increases, the limit on bycatch for the marine mammal species of interest decreases in a predictable manner. Therefore, managers can determine the costs and benefits associated with various levels of the CVs on both the abundance estimate and the bycatch estimate and allocate funding appropriately to improve either or both estimates.[8]'

The Agency then further discussed the effects of increased uncertainty:

> 'if bycatch mortality is not monitored adequately, it increases the uncertainty concerning total fishing-related mortality, which in turn makes it more difficult to assess the status of stocks of fish and other bycatch species, to set the appropriate optimum yields and overfishing levels for fish stocks, to determine acceptable levels of bycatch for other bycatch species, and to ensure that the optimum yields are attained, that overfishing does not occur and that the acceptable levels of bycatch for other species are not exceeded.[9]'

[8] National Marine Fisheries Service. 2004. Evaluating bycatch: a national approach to standardized bycatch monitoring programs. at 59
[9] *Id* at 85

More recently, the Council analyzed this type of reduction of quota to account for uncertainty in the discussion of monitoring in the Multispecies sector fishery.[10] This work summarized the effect of various CV levels on different catch scenarios and suggested requiring catch reductions to account for scientific uncertainty and keep catch below set levels. This approach is a fundamental requirement of management under ACLs and AMs as advised by the National Standard One Guidance[11]

Any observer prioritization process must consider and rationally include the appropriate trade offs between uncertainty and buffers in catch limits to allow for scientific and management uncertainty. If uncertainty is increased as a result of the prioritization, there must be changes to account for this increased uncertainty. The Omnibus SBRM amendment is the appropriate place to develop and consider these necessary changes in every Fishery Management Plan. Without a full consideration of the effect of monitoring prioritization on catch management, the SBRM is incomplete.

What does this mean in terms of alternatives? The SBRM reallocation alternatives section must develop and consider alternatives for *achieving the conservation goals and objectives* of the Magnuson Act prior to considering alternatives for doing the best the Agency can if it *cannot achieve those goals*. Thus, the reallocation alternatives should result not in a simple reallocation of observers but also in a process for rebalancing buffers for uncertainty in the catch limits and management measures that will not receive full funding for their observer needs. It is irrational to completely ignore this vitally important component of the prioritization process.

Reallocation Methodologies

To the extent that one component of reallocation will be reallocation of observers, Oceana offers comments on the incomplete alternatives put forward in the draft. Oceana sees merit in both the Proportional and Penultimate Approaches to prioritizing monitoring resources if funding does not match the needs described by the SBRM analysis. Both approaches are rational and methodical means to reallocate observer coverage – which is only a portion of what a reallocation alternative must do.

Oceana also notes that these prioritization approaches are untested. Without practical application of these tools, there may be unforeseen significant effects on the ability of the SBRM to accomplish its primary purpose to collect information to support management. Oceana suggests that the Councils revise the proportional and penultimate prioritization measures to guard against these shortcomings and improve the transparent oversight of catch

[10] Northeast Multispecies Framework Adjustment 48, page 413-420: http://www.nefmc.org/nemulti/frame/fw%2048/130307_FW48_Figures_Repaired.pdf
[11] National Marine Fisheries Service National Standard One Final Rule (74 Fed. Reg 3178, January 16, 2009)

monitoring in the region. The product of any prioritization must be subject to public review and comment.

The Draft SBRM Does Not Provide Information Needed to Support Management of the Region's Fisheries

Since 1996, the MSA has required every FMP to 'establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery.'[12] Importantly, the Act also defines a *fishery* as '(A)(O)ne or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics; and (B) any fishing for such stocks.[13]

When developing an SBRM, the document advises that "(t)he development of an SBRM must consider how, where, and when it is most appropriate to collect information on and monitor bycatch occurring in a fishery, and the most effective SBRM will be designed at the *appropriate operational level*[14]. " It then clarifies that an 'FMP is the operational unit used for managing a fishery (or collection of fisheries) that targets the species specifically addressed in the FMP. FMP is the operational unit for MSA compliance. [15]'

For these reasons, it is logical that the Councils would want an SBRM that collects and reports bycatch using the 'operational unit' for management of the region's fisheries: the FMP. All management actions are at the FMP level. MSA-mandated accountability is at the FMP level.[16] If bycatch issues are taking place or arise, the response at the Council level will be through an FMP action.

However, instead of allowing the Councils to consider and select the appropriate *operational level* for the fisheries of the region relative the management needs of the fisheries, the Agency has forced the Councils to adopt a new concept, known as the 'fishery mode' as the operational unit of the SBRM with emphatic clarity: "While the FMP works very well as the operational unit for devising and implementing fishing regulations, it is not the most efficient or appropriate operational unit for devising and implementing an SBRM[17]" Unlike most other policy decisions, the Councils have not been given the opportunity to consider the effects of the mode approach on the administration of the fisheries of the region or the merits and tradeoffs of this approach. Since the beginning of the previous SBRM, the fishery mode has not been discussed.

[12] Magnuson-Stevens Act Section 303 (a) (11)
[13] Magnuson Stevens Act, Section 104
[14] Standardized Bycatch Reporting Methodology Draft Document, at 9
[15] Id at 47
[16] Magnuson Stevens Act, Section 303 (a)(15)
[17] Standardized Bycatch Reporting Methodology Draft Document, at 47

Instead the Agency simply opines that, "the fishing mode is a more appropriate operational unit than the FMP…"[18]

Oceana has commented in the past that the fishery mode is an ineffective approach to bycatch reporting that provides bycatch data that is of little use to be the 'basis for making sound fisheries management decisions.[19]' Oceana continues to oppose the use of the fishery mode because this approach 1) does not report bycatch relative to FMPs, 2) does not collect or report bycatch in a spatially useful manner and 3) does not consider the data needed to manage the same species in different stock areas. These weaknesses present problems for the Councils as they try to manage fisheries and can be remedied by rejecting the fishery mode in favor of a Fishery Management Plan-level operational unit.

First the aggregation of FMPs or parts of FMPs under a single mode improperly aggregates catch and shields this bycatch from appropriate management scrutiny. Allowing the Agency to continue to aggregate bycatch by the mode stratification will continue to hamper the efforts of the Councils to identify bycatch problems, manage catch and meet the management objectives of each FMP.

Second continuing to collect and report bycatch information by species (e.g. cod) rather than species and stock area (e.g Georges Bank cod) does not provide useful information for assessment or management. The document even notes that "(s)tock areas will not be considered in the analyses, although retrospective data on observed discards would be available at this scale.[20]"

To illustrate the inefficiency of the fishery mode, a recent report from the Agency estimated that across the fisheries of the region, over 71,000 mt (156,500,000 pounds) of discards of the 14 species groups occurred during the July 2010 through June 2011 period[21]. Although the data was reported by species such as yellowtail flounder, the report was unable to parse bycatch by FMP or stock and instead reported it by the more general fishery mode. This lack of clarity does not indicate which stock was caught or which fishery should be held accountable. This lack of clarity leaves all stakeholders and managers unable to respond to this vast volume of discards. If this data were reported by stock and FMP level, the Councils could then consider appropriate management actions in response to ensure accountability.

The Councils' struggle to manage the catch of specific stocks in varying levels of abundance across the region. The Councils should take clear action to include options to define the

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[18] I*d.*
[19] *Id* at 3)
[20] Standardized Bycatch Reporting Methodology Draft Document, at 146
[21] 2012 Discard Estimation, Precision, and Sample Size Analyses for14 Federally Managed Species Groups in the Northeast Region. NEFSC CRD 12-17.

operational unit for the SBRM to be the FMP level with stock area stratification to provide useful information support management.

The Councils must take this action before moving forward with approval of the SBRM.

The SBRM Does Not Meet the Data Needs of Annual Catch Limits and Accountability Measures

Since the advent of Annual Catch Limits (ACLs) and Accountability Measures (AMs) in 2006, the need for robust catch information has become more critical to ensure that all catch, both landings and discards, are accounted for in the effort to end overfishing. Accurate, precise and timely catch information is essential for the Councils to ensure that ACLs are not exceeded. In the absence of robust data, managers are left to use assumptions about catch without any assurances about the quality of these important descriptors of the fisheries.

In the 2007 SBRM, the Agency declined to assess the bycatch reporting that ACLs and AMs would necessitate. Instead the Agency chose to ignore the mandate for ACLs and AMs, treating it as a future change that could be considered at a later date[22]. This responsibility cannot be avoided any longer. Managing the FMPs of the region under ACLs and AMs is now the *status quo* for every FMP. The Councils and Agency must ensure that the data collected and reported match the data needs of the respective FMPs to 'be used reliably as the basis for making sound fisheries management decisions'[23] including in-season closures, overage deductions and the 'off the top' Annual Catch Target (ACT) setting process that is used throughout the Mid-Atlantic. Remarkably this process is described in just two sentences in the document without any discussion of the role of data in the process: "The Council then sets corresponding annual catch targets (ACT) for each fishing sector. The commercial quota and recreational harvest limit are the amount of landings remaining after deducting discards from the respective ACTs.[24]"

The SBRM must include an explicit discussion of the data needed to administer each fishery and its ACLs and AMs. Without this fishery-by-fishery discussion, the SBRM will not support the specification or administration of ACLs and AMs used in the region and cannot be shown to meet the mandates of the MSA.

The Standardized Bycatch Reporting Methodology Must Consider Alternatives to Respond to Management and Scientific Uncertainty Created by the 30% CV Performance Standard

[22] *See* Agency response to Oceana comments in 2008 Standardized Bycatch Reporting Methodology Final Rule *(73* Fed. Reg. 4741, January 28, 2008)
[23] Standardized Bycatch Reporting Methodology Draft Document, section 1.3 at 3
[24] Id at 39

Uncertainty and assumptions are common and expected in fisheries management. However it is incumbent upon the Agency as part of both NEPA and MSA analysis to fully explore, discuss and account for the effects of this uncertainty on management and science. The document itself recognizes the effects of uncertainty as well, concluding that "(u)ncertainty related to the amount and mortality of discards increases the uncertainty associated with stock assessments, diminishing managers' ability to accurately set and achieve optimum yield from a fishery.[25]"

It is troubling then to see that the SBRM does not discuss the effect of CV-associated uncertainty on both management uncertainty[26] and scientific uncertainty[27] or the need to consider these factors when setting and administering ACLs and AMs. In fact, the SBRM offers just one reference to the stock assessment process as a footnote[28] and generalizes the discussion of ACL specification in each fishery.

Oceana has submitted independent analysis of the effects of a 30% CV on bycatch estimates that show this uncertainty to be as much as +/- 100% of the true value[29]. This is a considerable amount of uncertainty that cannot be ignored. Uncertainty must be discussed in the context of each FMP, an approach that was suggested by the Agency in its 2004 guidance on developing SBRMs: "The appropriate precision standards for the estimates of bycatch depend on the management objectives, the management uses of the estimates, the precision of other information used with the bycatch estimates to make management decisions, and the cost of increasing the precision of the bycatch estimates. [30]"

For these reasons, the SBRM should be rejected by your Councils to allow a full discussion and consideration of the effects of uncertainty associated with the 30% CV Performance Standard and the ability of this information to support current management of each fishery. Further, as discussed above, if the CV standard cannot be met, the effects of this increased uncertainty must be discussed and accounted for in the SBRM.

The Draft SBRM Does Not Use the Best Available Science in its Consideration of Bias and Precision

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[25] Id at 2-3

[26] Management uncertainty occurs because of the lack of sufficient information about catch (*e.g.*, late reporting, underreporting and misreporting of landings or bycatch). National Marine Fisheries Service National Standard One Final Rule (74 Fed. Reg, 3178, January 16, 2009)

[27] Stock assessment models have various sources of scientific uncertainty associated with them and many assessments have shown a repeating pattern that the previous assessment overestimated near-future biomass, and underestimated near future fishing mortality rates (i.e., called retrospective patterns).
National Marine Fisheries Service National Standard One Final Rule (74 Fed. Reg. 3181, January 16, 2009)

[28] Standardized Bycatch Reporting Methodology Draft Document Footnote 36, at 207

[29] McAllister, M. K., 2007. Review of the Northeast Regional Standardized Bycatch Reporting Methodology. Lenfest Ocean Program.

[30] National Marine Fisheries Service. 2004. Evaluating bycatch: a national approach to standardized bycatch monitoring programs. at 58

Catch data that is collected and reported to support assessment and management must be both precise and accurate. Accuracy and precision will ensure that bycatch data is representative of the catch of the fishery as a whole and provide useful information to meet the goals and purpose of the respective FMPs and the SBRM. The Agency has advised that bias may present more significant problems for management than precision: '(i)n some instances decreasing bias (including that caused by the observer effect) will be more important than increasing precision.[31] This necessity for accuracy as well as precision is aptly noted in the objectives of the SBRM: 'to establish, maintain, and utilize biological sampling programs designed to *minimize bias* to the extent practicable, thus *promoting accuracy* while maintaining sufficiently high levels of precision[32].'

The current SBRM however continues the trend started by the 2007 SBRM by inappropriately focusing its design on achieving goals of precision and largely discounts bias. Bias in data is a serious issue that must be accounted for at the risk, in the words of one NEFMC member of being 'precisely wrong.[33]'

The SBRM does a poor job examining and exploring the issue of bias while attempting to justify a conclusion that "there are no bias issues evident[34]" in the monitoring of the region's fisheries. This conclusion advanced to justify the findings of the SBRM is not supported by the analysis and discussion in the document. Furthermore, the publication of external reports demonstrating bias in the region's fisheries questions this conclusion.

The discussion of bias in the document relies on an analysis of 2004 observer data to characterize the accuracy of observer data relative to Fishing Vessel Trip Report (FVTR) data. This analysis concludes that an examination of kept pounds 'compares favorably' and 'indicates no evidence of systematic bias."[35] However, an exploration of other metrics indicates that bias may be present in this data. Trip length was 'different' between the observer and VTR data set with a consistently longer trips with observers[36]. Further when viewed spatially, the document advises that '(t)he null hypothesis of observer proportions equal to FVTR proportions was rejected ($P<0.05$) in 38 of the 86 comparisons, which suggests that there are some spatial differences in the observed data compared with the FVTR data.[37]' Put a different way, bias exists in the spatial data in 44 percent of comparisons. This additional analysis suggests that a difference exists between observed and unobserved trips and observer data is not representative of the fishery.

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[31] *Id* at vi
[32] Standardized Bycatch Reporting Methodology Draft Document, at iii
[33] Comments of David Goethel on FW48. New England Fishery Management Council Meeting November, 2012.
[34] Standardized Bycatch Reporting Methodology Draft Document Page 177
[35] Id at176
[36] Id at 176
[37] Id at 177

This weakness in the SBRM analysis of bias is further demonstrated with the analysis performed by Chad Demarest in 2012 to examine bias in the NE Multispecies sector fishery[38]. Demarest used a more comprehensive examination of eight metrics of fishing behavior[39] and used a peer reviewed technique to examine for observer bias[40]. Demarest found that 'analyses point towards a highly variable but relatively consistent pattern of different fishing behaviors when an observer is on board and when one is not' and further concluded that 'fishing behavior across the eight metrics was variable, but that statistically significant differences in reporting were observed across all eight metrics and that the strength of the statistical signal varied depending on how the data were parsed.[41]'

The omission of the Demarest analysis comes after Oceana's specific comments describing its findings to the FMAT in May 2012.[42] This omission raises questions of the intent of the Agency to reach predetermined conclusions relative to bias and whether the conclusions are arbitrary, capricious and an abuse of discretion.

It should also be noted that the Standardized Bycatch Reporting Methodology has improperly inserted '*to the extent practicable'* language into the goals for accuracy where it is not warranted. The SBRM is required of all FMPs[43], not where practicable. Conservation and management measures shall be based upon the best scientific information available[44], not where practicable. And ACLs and AMs must be included in each Fishery Management Plan to prevent overfishing[45], not where practicable. Accuracy is therefore necessary for each of these requirements and must be ensured.

The SBRM must be updated with a complete discussion of bias and include measures to assess and account for bias in bycatch monitoring.

The Standardized Bycatch Reporting Methodology Omnibus Amendment Requires an Environmental Impact Statement

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[38] Summary of Analyses Conducted to Determine At-Sea Monitoring Requirements for Multispecies SectorsFY2013 Page 8-9 (http://www.nero.noaa.gov/ro/fso/reports/Sectors/ASM/FY2013_Multispecies_Sector_ASM_Requirements_Summary.pdf).

[39] total landed pounds; total roundfish pounds; total groundfish pounds; total non-groundfish pounds; total cod pounds; total groundfish value; total non-groundfish value; trip duration

[40] Benoit and Allard (2009)

[41] Summary of Analyses Conducted to Determine At-Sea Monitoring Requirements for Multispecies Sectors FY2013 at 8-9 (http://www.nero.noaa.gov/ro/fso/reports/Sectors/ASM/FY2013_Multispecies_Sector_ASM_Requirements_Summary.pdf).

[42] *See* Oceana letter to Doug Potts, FMAT Chair May 17, 2013.

[43] *See* Magnuson Stevens Act Section 303 a(11)

[44] *See* Magnuson Stevens Act National Standard Two, Section 301 a(2)

[45] *See* Magnuson Stevens Acts Section 303 a(15)

In this comment letter, Oceana identifies a number of specific ways in which the SBRM Environmental Assessment (EA) does not satisfy NEPA, the MSA and the Administrative Procedure Act (APA) These flaws are symptoms of a systematic problem: a measure of such major significance and widespread impact requires that the Agency take a hard look at a full spectrum of alternatives through an Environmental Impact Statement (EIS).

As Oceana has explained in prior comment letters on this process and the previous SBRM iterations[46], the information and analysis in the SBRM document will have a significant impact on thirteen fisheries from the Canadian border to North Carolina. The information, analysis, and technical guidance contained in a complete SBRM will affect how these fisheries are managed, their stock assessments, and ultimately the efficacy of the management approaches used to reach the goals of the FMPs through ACLs, AMs and other measures. The Omnibus SBRM amendment is a major federal action significantly affecting the quality of the human environment and cannot satisfy the requirements for a Finding of No Significant Impact, or FONSI.

In bringing the environmental analysis into compliance with NEPA, the Council and the Agency must also give proper consideration to the alternatives preemptively and irrationally rejected for consideration in the draft document *before the Councils have even had the opportunity to rationally consider them*. These alternatives include the important alternative of extending the *bycatch* reporting methodology to *bycatch species* rather than only to target species managed under a plan and alternatives to develop and employ alternative monitoring techniques where observer coverage would not be completely accurate. The scoping process that comes with an EIS should prove invaluable in this regard.

Accordingly, the Agency must disapprove the SBRM Amendment as inconsistent with NEPA and swiftly act to develop an EIS and a revised SBRM Amendment that will comply with the Court's order, NEPA, and the Magnuson-Stevens Act. With a wide range of stakeholders affected by the findings of this process, the Agency should engage in a complete scoping process to educate and engage the public about the issue and seek concerns and ideas to be investigated and developed as part of the document. This scoping should include the narrow range of issues that were vacated by the Court, the new challenges posed by the *status quo* ACLs and AMs requirements for the affected fisheries as well as other issues highlighted by stakeholders.

Conclusion and Recommendations-

In conclusion, while it is disappointing that the Agency has not seized the opportunity to improve catch monitoring and reporting in the NE region with the current SBRM , it is not surprising. Since the beginning of the development of the previous SBRM, it has been clear that the intent of the Agency has been to elaborately codify the Agency's outdated approach to

[46] *See* Oceana comments related to 2007 Standardized Bycatch Reporting Methodology Amendment and Implementing Regulations, submitted September 24, 2007.

monitoring without ever answering the critically important question of *how much observer coverage do the region's fisheries need to be effectively managed under the current management regime?*

Oceana suggests that the Councils take the following actions when it reviews the Standardized Bycatch Reporting Methodology at their upcoming meetings:

1. Disapprove the Standardized Bycatch Reporting Methodology document. The document is not complete and many of the promises made to the Councils have not been fulfilled.
2. Initiate an Environmental Impact Statement process to identify and address issues related to the primary purpose of the SBRM, to *collect information that can be used reliably as the basis for making sound fisheries management decisions.*
3. Convene a joint ad hoc Council committee to explore the data needs of each fishery and how the SBRM can be structured provide the necessary information to support current management.
4. Task the FMAT with developing options in the SBRM that account for uncertainty associated with the CV30 performance standard in ACL specification processes. Additionally management options should be developed to respond when the CV standard cannot be met.
5. Include alternatives and analysis to ensure accuracy of bycatch data.
6. Require the Agency to publish the observer coverage needs that are associated with the assertion that 'NMFS requests funding for the Fisheries Observer Program that it has *determined necessary to meet the needs of the fishery and to comply with statutory mandates*[47]'

Oceana remains committed to ensuring that the fisheries of the NE region are managed with statistically robust data that is accurate, precise and timely to support sound fisheries management decisions.

We agree with the purpose of the SBRM and look forward to working with the Councils as you continue to develop an SBRM that meets these purposes.

Thank you for considering these comments,

Sincerely,

Gib Brogan
Oceana
Wayland, MA

[47] Standardized Bycatch Reporting Methodology Draft Document at 119

Mr. John K. Bullard, Regional Administrator

NMFS, NERO

55 Great Republic Drive

Gloucester, MA 01930

December 18, 2013

Dear Mr. Bullard,

Please accept these comments on the draft SBRM. I work part time for Wallace and Associates, who represent numerous surfclam and ocean quahog fishing vessels and processors. Prior to joining Wallace and Associates I was the Senior Ecologist for the Mid-Atlantic Fishery Management Council (MAFMC) where I worked for 30 years. I was the senior clam staffer from the late 1980s until 2012. I wish to comment on the draft omnibus amendment to all the fishery management plans of the New England and Mid-Atlantic Councils that was noticed in the *Federal Register* on November 19, 2013.

The surfclam and ocean quahog fisheries are extremely clean, as evidenced by the NEFSC clam survey species listing in Table 34 of the MAFMC Amendment 13. Surfclams and ocean quahogs comprise well over 80% of the total catch from the survey with no fish caught by the survey dredge. Only sea scallops, representing other commercially desirable invertebrates were caught at around one-half of one percent by the survey dredge. Commercial clam operations are certainly even cleaner than the scientific surveys (which have liners in the dredges) as all animate and inanimate objects except for surfclams and ocean quahogs are discarded quickly before the clam resource in place in the cages. Processors want only clams and reduce their payments to the boats if "things" other than surfclams or ocean quahogs are in the cages.

Clam Amendment 13 also addressed interactions with marine mammals and sea turtles. Since the start of my interaction with the clam fishery in the early 1980s, I have never heard of an interaction between commercial clam operations and marine mammals or turtles. While marine mammals may occur near surfclam and ocean quahog beds, it is highly unlikely any significant conflict would exist. Commercial clam dredging vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. Additionally, surfclam and ocean quahogs are benthic organisms, while marine mammals and marine turtles are pelagic and spend nearly all of their time up in the water column or near the

surface. The realized reduction in the number of fishing vessels resulting from the implementation of the ITQ program reduced the potential for the interaction with endangered species from a minimal to a very minimal level.

This draft omnibus amendment is designed to prioritize the allocation of sampling effort. Only a small fraction (about 105 days based on 2012 sea days needed) of effort appears devoted to the clam fisheries. However, I wonder if with the projected very large shortfall in the number of days available, if it might warrant the exclusion of these two fisheries in order to develop more statistically valid data for other fisheries where bycatch and marine mammals and turtle interactions do occur.

Thank you for your consideration of these comments. Should there be any questions, I can readily be reached through this email address or by phone (215-536-3543).

Sincerely,

Thomas B. Hoff Ph.D.

David T. Goethel
23 Ridgeview Terrace
Hampton, NH 03842

December 10, 2013, 2013

Mr. John Bullard
Regional Administrator NMFS
Northeast Regional Office
55 Great Republic Drive
Gloucester, MA

Comments on the Draft Amendment to "The Standardized Bycatch Reporting Methodology (SBRM) Amendment"

Dear Mr. Bullard,
Notwithstanding the provisions of 303(a)(11) to include provisions to assess the amount and type of bycatch, I believe this amendment should be withdrawn and reworked for the following reasons:

1. There is nothing standardized about bycatch reporting across fisheries.
2. The standard of precision chosen (30% cv) is the wrong standard. Accuracy is more important than precision.
3. The issue of cost is not sufficiently addressed.

In addition to the SBRM document I wish to have the National Marine Fisheries Service review and comment on SBRM in light of:

1. "Design, Implementation and Performance of an Observer Pre-Trip Notification System (PTNS) for the Northeast United States Groundfish Fishery," Michael C. Palmer,et.al., Northeast Fishery Science Center Reference Doc 13-21.
2. "Analysis of Landings/Discards-Proportional Allocation Scheme of the At-Sea Monitoring Program in New England", Jenny Sun, Gulf of Maine Research Institute.
(See documents attached to the electronic submission)

These papers address many of the issues and short comings surrounding the current system which are detailed below.

First, about the issue of standardization, bycatch is unique to each fishery and should be scored on a fishery by fishery basis to form a prioritization matrix. This is how the Atlantic States Marine Fishery Commission handles the problem. Those fisheries receiving the highest scores get proportionally more of the limited funding available for bycatch observers. Using a standard measure of precision only insures that far more coverage of fisheries with limited bycatch is required than is actually necessary. This prioritization process should be done by a joint effort between the NMFS and the NEFMC.

Precision is the wrong metric for bycatch. Consider this example; two archers each fire six arrows at a target. One archer places all six arrows in a very tight grouping but completely outside the target circles. He is very precise but not accurate. The second archer places two arrows in the bull's-eye with the other four scattered across the concentric circles. He is accurate but not very precise. As a manager and a scientist, I am more interested in accuracy. The current system that is precision oriented causes under coverage of boats catching large amounts of fish and over covers small boats making numerous trips for small amount of fish. Furthermore it is rigid and inflexible and does not allow for placing coverage where large amounts of discards may occur. The alternative way, described in the Sun paper, would produce more accurate bycatch data and be more cost effective and yield more accurate

data for stock assessment. For example, the vast majority of fish caught in two New England fisheries are caught by a relatively small amount of vessels. In the herring fishery over ninety percent of the fish are caught by about twenty vessels, the remaining ten percent are caught by literally hundreds of vessel catching small amounts of fish. Similarly, in groundfish, approximately ten percent of the boats catch ninety percent of the fish. Accuracy would be greatly improved by high levels of coverage on these vessels in both groundfish and herring. The remaining vessels could be covered at the NEFOPS level of coverage of about five to seven percent to determine a baseline and detect any major changes in bycatch over time. Placing high levels of coverage on the boats that actually catch the majority of the fish would be both cost effective and greatly improve accuracy.

Finally, the issue of cost is not addressed sufficiently. I believe the cost of collecting bycatch data is a function of government and should be explicitly stated in the document. As such, it will always be subject to budget constraints and hence the need for prioritization mentioned above. I also believe the document should explicitly state that a census of bycatch is not necessary, useful or cost effective with a rationale. A section should be added to the document stating why a census is cost prohibitive and of little scientific value. I believe that the gains in precision and accuracy become negligible. This should be done specifically to avoid legal challenges by Environmental Non-Governmental Organizations trying to require 100% observer coverage.

Last, I would hope that all comments in this letter are fully addressed in detail in the Federal Register by NMFS, with sufficient rationale to ensure they have been seriously considered, analyzed and will hold up in a court of law.

Respectfully submitted,

David T. Goethel

David T. Goethel

Attachment 1

Northeast Fisheries Science Center Reference Document 13-21

The Design, Implementation and Performance of an Observer Pre-trip Notification System (PTNS) for the Northeast United States Groundfish Fishery

by Michael C. Palmer, Patty Hersey, Heidi Marotta,
Gina Reppucci Shield, and Sarah B. Cierpich

July 2013

Northeast Fisheries Science Center Reference Document 13-21

The Design, Implementation and Performance of an Observer Pre-trip Notification System (PTNS) for the Northeast United States Groundfish Fishery

by Michael C. Palmer*, Patty Hersey, Heidi Marotta,
Gina Reppucci Shield, and Sarah B. Cierpich

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

July 2013

Northeast Fisheries Science Center Reference Documents

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LIST OF ACRONYMNS AND ABBREVIATIONS

ASM: At-Sea Monitor

CV: Coefficient of variation

DAS: Days-at-sea

FSB: Fisheries Sampling Branch

GUI: Graphical user interface

NEFOP: Northeast Fisheries Observer Program

NEFSC: Northeast Fisheries Science Center

NMFS: National Marine Fisheries Service

NOAA: National Oceanic and Atmospheric Administration

ODDS: Observer Declare and Deploy System

PHP: hypertext preprocessor

PIN: Personal identification number

PLSQL: **Procedural Language/Structured Query Language**

PTNS: Pre-Trip Notification System

SBRM: Standardized Bycatch Reporting Methodology

SMP: Special Management Program

U.S.: United States

VMS: Vessel Monitoring System

ABSTRACT

Historically, a dock intercept process was used to deploy observers in the northeast United States multispecies (groundfish) fishery. In this process, fishing trips for observer coverage were manually selected using pre-defined specifications established by the National Marine Fisheries Service's Northeast Fisheries Science Center. Amendment 16 to the Northeast Multispecies Fisheries Management Plan implemented major changes in the groundfish fishery, which affected the magnitude and complexity of observer deployment. These changes included: (a) creation of an additional 15 active groundfish sectors; (b) an approximate four-fold increase in the level of observer coverage; (c) introduction of a new class of trained observers; (d) potential for industry-funded observer coverage to supplement government-funded coverage; and (e) the need for the observer deployment process to directly support in-season monitoring of fishery discards. The dock intercept process was insufficient to adequately address these new provisions, and an automated observer pre-trip notification system (PTNS) was implemented in the northeast groundfish fishery on 1 May 2010. The PTNS uses a self-adjusting probability-based, tiered selection process to randomly assign observer coverage across the groundfish fleet on a proportional basis for the purpose of monitoring discards. The PTNS also addresses other objectives, such as monitoring of special management programs and protected species bycatch. In this paper, we discuss the design, implementation, and performance of the PTNS over the past three years.

INTRODUCTION

Historically, at-sea observers have been deployed in the large-mesh groundfish fishery occurring off the northeast United States using a dock intercept process. Observer service providers would manually select fishing trips for coverage using pre-defined specifications established by the National Marine Fisheries Service's (NMFS) Northeast Fisheries Science Center (NEFSC). The pre-defined specifications were in the form of a prioritized sea day schedule established through the annual Standardized Bycatch Reporting Methodology (SBRM) process (Wigley et al. 2007). Sea day schedules support stratified random sampling designs by providing a list of observed sea days needed for coverage within a particular stratum. Observer service providers used the sea day schedules along with a randomized list of vessels likely to be active in the fishery to manually select trips for observer coverage based on knowledge of local fleet activity. There were exceptions to the dock intercept process; for example, observer deployment in some special management programs (SMPs, e.g., participation in the United States/Canada Resource Sharing Area on Georges Bank) was accomplished using a pre-trip call-in system. However, for the majority of observer coverage, particularly in the groundfish fishery, observer deployment was accomplished using a manual dock intercept process.

Amendment 16 to the Northeast Multispecies Fisheries Management Plan (NEFMC 2010) brought about major changes to the northeast groundfish fishery, including some which affected the degree and complexity of observer coverage. Most notably, Amendment 16 implemented a new management regime in the northeast groundfish fishery colloquially referred to as 'sector management.' One of the more significant requirements under sector management was the need to estimate total sector catches in-season. To meet these requirements the breadth and complexity of the groundfish monitoring effort had to be expanded while at the same time continuing to meet the demands of existing monitoring programs. It was widely recognized that a dock-intercept process would be insufficient to meet the increased demands. A more sophisticated and integrated observer deployment system would be needed prior to the start of sector management, which began at the start of the 2010 groundfish fishing year on May 1, 2010[1].

Amendment 16 and sector management

Increased observer coverage

Prior to sector management, observer coverage rates in the groundfish fishery averaged less than 8% between 2000 and 2009 (Figure 1). Coverage rates were primarily controlled by the available funding; however, since 2008 the SBRM Omnibus Amendment (MAFMC/NEFMC 2007) required that coverage rates be sufficient to achieve a 30% coefficient of variation (CV) on estimates of fishery discards. Within the SBRM framework the 30% CV criteria was applied at

[1] The Northeast Multispecies fishing year runs annually from May 1 to April 30.

the fleet and species group level. SBRM species groupings were consistent with the scope of existing fishery management plans (e.g., large-mesh groundfish). SBRM fleets were broadly defined by their regional (New England, Mid-Atlantic) and gear (e.g., large mesh otter trawl) characteristics. Using the broad SBRM stratification scheme, the existing observer coverage levels were generally sufficient to achieve discard estimates with CVs below the 30% threshold for the groundfish complex (Wigley et al. 2011). Additionally, for most individual groundfish species, the 30% CV criteria were met when estimating discards at the level of stock management units (NEFSC 2008, 2012).

Amendment 16 specified that "*minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology. The required levels of coverage will be set by NMFS…and may consider factors other than the SBRM CV standard when determining appropriate levels*" (NEFMC 2010). While Amendment 16 did not explicitly define the stratification levels to which the 30% CV would apply, it was generally interpreted that it would be applied at stratification levels identical to those used for the estimation of in-season groundfish discards which were stratified by sector, gear, and stock. There were expected to be 18 active sectors (including the common pool, which includes those vessels that did not join organized sectors), six gear types, and 16 stocks (including sub-stocks like the eastern Georges Bank cod, *Gadus morhua*, and haddock, *Melanogrammus aeglefinus*). The maximum number of possible discard strata combinations exceeded 1,700. It was known that observer coverage levels much higher than the approximate 8% that had been historically achieved would be needed to meet SBRM precision requirements under sector management (Northeast Fisheries Science Center Discard Peer Review, http://nefsc.noaa.gov/groundfish/discard/). In addition to the precision concerns, there were also practical considerations, such as funding availability and achieving a coverage level that would deter observer bias (e.g., Benoît and Allard 2009). Ultimately, NMFS determined that there would need to be approximately 22-30% observer coverage of the groundfish fishery in addition to the approximate 8% coverage provided by existing monitoring efforts.

Sector vessels would be subject to the increased groundfish observer coverage levels whenever the vessel was sailing on a fishing trip designated as a 'groundfish' trip. A groundfish trip is defined as any trip where the vessel will be fishing under a Northeast Multispecies day-at-sea (DAS). While sector vessels were exempt from DAS requirements, the usage of DAS would continue to be monitored and used to determine the directed nature of the fishing trip. Based on these rules, in addition to trips targeting groundfish, groundfish trips may also include trips targeting monkfish (*Lophius americanus*), spiny dogfish (*Squalus acanthias*), and skates (Rajidae). Under Amendment 16, vessels intending to sail on a groundfish trip would be required to submit notification to NMFS of their intent to fish at least 48 hours in advance of sailing, in order to facilitate the deployment of fisheries observers.

A new class of observer

Amendment 16 originally specified that, beginning with fishing year 2012 (May 2012), all sectors must fund NMFS-approved at-sea monitoring programs. In the interim (i.e., fishing years 2010 and 2011), NMFS agreed to fund observer coverage levels in excess of existing federally funded monitoring to meet the increased coverage demands. Observers certified through the Northeast Fisheries Observer Program (NEFOP) to provide baseline fishery coverage collect a suite of information on fishery operations that extends beyond the core information needed to support in-season monitoring of groundfish sectors. Anticipating a future shift from NMFS-funded to industry-funded observers, a lower-cost alternative to NEFOP observers was created that were termed 'at-sea monitors,' or ASMs. The data collection protocols for ASMs are restricted to collecting haul-by-haul catch estimates and length frequency information. ASMs do not perform any of the additional biological sampling or data collection required of the NEFOP observers, though they do collect minimal protected species bycatch information. In contrast to the single service provider contract awarded to provide NEFOP coverage, multiple service providers were contracted to provide ASM coverage. Additionally, sectors could contract with individual service providers to fund ASM coverage beyond the NMFS-funded levels (i.e., industry-funded ASM); to date, however, no sector has done so. All coverage types, regardless of funding source and program objective, would be used in support of groundfish discard estimation for both stock assessments and in-season quota monitoring.

Complexity of proportional deployments

In a given fishing year, not all of the 1,700 possible discard strata would be expected to be active. For example, some sectors' operations were likely to fish only certain gear types, in addition to being geographically restricted to one or two regions (Figure 2), which would preclude the harvesting of certain groundfish stocks. However, it was not known *a priori* which strata would be active. Given the large scale changes to the fishery as a result of sector management, the behavior of the groundfish fleet in prior years would likely be a poor predictor of expected behavior from May 1, 2010 and beyond. The efficient and effective support of fine-scale discard stratification would require the capacity to dynamically identify active strata and deploy observer coverage in these strata in a statistically unbiased manner. This was a marked departure from the sea day schedule approach, in which the stratification scheme was static and the behavior of the fleet was assumed to be similar from one year to the next. An additional aspect of the in-season discard estimation methods was that sectors would be subject to an assumed discard rate early in the fishing year, when there were insufficient in-season observations in strata from which a reliable estimate could be derived. Given this, it was desirable to achieve some level of 'front-loading' to get in-season information early in the fishing year in a way that would not introduce a temporal bias into the resulting discard estimates.

Maintenance of existing coverage objectives

While Amendment 16 and sector management brought about many changes to the groundfish monitoring program, it did not reduce the obligation to continue ongoing monitoring efforts in support of other programmatic objectives. These included coverage of vessels participating in certain SMPs, such as the Georges Bank United States/Canada Resource Sharing Area and closed area access programs. In addition, NMFS is mandated to provide seasonal coverage of certain groundfish gear types to monitor the bycatch of protected species like marine mammals. Monitoring of protected species is also covered under the SBRM Omnibus Amendment. The sampling protocols employed on gillnet trips is limited with respect to fish sampling, and as such these trips are not applied against groundfish trip coverage requirements and excluded from the discard estimation process.

Summary of needs

Amendment 16 and sector management introduced considerable complexity into the manner in which observers would need to be deployed in the groundfish fishery. To meet these demands, a sophisticated and integrated observer deployment system would be needed that was capable of automatically, and efficiently, allocating observer coverage across the range of monitoring programs. The highest priority of such a system would be to support the stratified random deployment of observers within the groundfish fishery in an unbiased manner. Given the range of possible observer programs (e.g., NEFOP, NMFS-funded ASM, industry-funded ASM) across the groundfish fishery, such a system would need to support multiple selection protocols as well as observer coverage rates. Coverage rates could vary from program-to-program, and potentially from sector-to-sector. Because some observer programs would utilize multiple service providers, there needed to be an efficient and equitable method for assigning trips to individual providers proportional to the relative capacity of each service provider (i.e., number of employed observers). Since multiple ASM service providers would exist, it was desirable to select multiple providers; this would improve the likelihood of a trip being covered in the event that the first provider selected did not have an observer available for deployment. Lastly, from the perspective of the fishing industry, the system would need to be simple and easy to use, and would allow for the trip and provider selection processes to be accomplished through a single action.

With these requirements in mind, the NMFS Northeast Fisheries Science Center (NEFSC) set out to design an observer pre-trip notification system (PTNS) beginning in late winter of 2010. While other similar systems have been developed and deployed in North America since 2010 (e.g., NMFS - Alaska Region developed and deployed their Observer Declare and Deploy System; USOFR 2012), to our knowledge the PTNS was a first-of-its-kind automated observer deployment system. Much of the design work could not begin until the details of Amendment 16 were finalized, which left only a few months to design, test, develop, and deploy a sophisticated next-generation observer deployment system. Given the short development time frames and new fishery management regime, it was inevitable that improvements in the initial design would be required. During the first year of deployment PTNS was incrementally improved, resulting in the

current system, which has been meeting a range of observer deployment requirements since May 1, 2011. In this paper we discuss the design, implementation, and performance of the PTNS over its three-year implementation in the groundfish fishery. Additionally, we identify areas of possible improvements that would benefit not only the PTNS, but the design of similar systems around the world.

SYSTEM DESIGN

During the preliminary PTNS design phase, several critical system features were identified. We have attempted to describe the need and basic design of the PTNS with respect to these features, but it is not intended to be an exhaustive list of all of system features. The following descriptions capture the major PTNS features that are central to its successful operation.

Hierarchal tiers

The most important design feature identified was the need to establish a hierarchy in the selection process. Because of the multiple coverage objectives that the PTNS would need to address, it was critical that the relative priorities of each of the objectives were established such that coverage was assigned in order of relative importance. Within the hierarchal structure, individual monitoring programs were assigned to priority levels, or tiers. Each tier had an associated type of observer coverage (e.g., NEFOP observer for NEFOP-level coverage) for which there may or may not have been multiple providers. The hierarchal design features of the PTNS are described below:

> *Sampling unit* – The object that is being sampled from the population, or sampling frame. Within the PTNS, the fishing trip was identified as the sampling unit. The PTNS selection process would be trip-based, such that the target coverage rates would be evaluated with respect to the ratio of observed trips relative to total trips occurring within a defined stratum. While other sampling frames were considered, such as total fishing effort (e.g., days absent) and total groundfish landings, the difficulty in defining a sampling unit in these terms at the point of notification (i.e., prior to a trip sailing) precluded their use in the PTNS. Fundamentally, if the coverage deployment was unbiased, the proportionality of trip-based coverage would be equal to those of other metrics.
>
> *Selection tiers* - Discrete hierarchal levels within the observer selection process. Many of the selection tiers would correspond to explicit monitoring programs such as NEFOP, protected species (limited fish sampling), and ASM monitoring (limited biological sampling). In general, the placement of the tiers within the hierarchy would be dictated by overall importance relative to resource monitoring. The more important tiers would be placed at the top of the selection process, and trips would move down through the selection process until the trip was selected at a given tier. Once a trip was selected at one selection tier, it would exit the selection process and could not re-enter. The selection of a

trip at a selection tier would not guarantee that an observer would be assigned to cover the trip, since the trip would still have to enter the provider assignment process post-selection. There would be four different types of tiers: 'conditional,' 'list,' 'probability-based,' and 'sea day schedule'. *Conditional tiers* refer to those tiers where trips are issued waivers if they met certain defined conditions. *List tiers* refer to those tiers where a vessel was either on the 'list' or not on the 'list'. List tiers exist in two forms: automatic waiver and automatic selection. *Probability-based tiers* rely on a stratified random selection process to determine whether a trip is selected for coverage. *Sea day schedule tiers* rely on fixed sea day schedules; if a trip declared into a stratum for which there is still a positive balance on the sea day schedule, it would be selected for coverage. A full list of selection tiers and a general description of each are provided in Table 1.

Observer coverage types - The type of observer coverage deployed on a fishing trip. Each selection tier would have only a single coverage type. The possible coverage types would be: NEFOP coverage, NEFOP-limited (protected species), NMFS-funded ASM, and industry-funded ASM. The relationship between selection tiers and coverage types is shown in Table 1.

Observer providers - A company contracted to provide fishery observers. Each provider may be contracted to cover multiple selection tiers, and or, multiple coverage types. For coverage types where multiple providers exist, a weighted probability selection would be used to identify two service providers (provider 1, provider 2) for each trip. The probability of provider selection would be proportional to the number of certified observers each provider has at the time of the notification. Provider 1 would receive the right of first refusal, and if provider 1 declined the trip or failed to accept the trip in a specified amount of time, the trip would be offered to provider 2. The details of this selection are described later in this paper.

The relationship between selection tiers and observer coverage types is shown in Table 1. Figure 3 provides a schematic of the progression of a fishing trip as it moves through the PTNS groundfish selection process. All of the selection tiers that would preclude a trip from being selected are placed at the beginning of the selection process to ensure that only those trips eligible for coverage reach the lower selection tiers where positive selection of a trip is possible. The ordering of the four initial list tiers (manual waiver, set-only gillnet, do not deploy - safety, do not deploy - coverage) is irrelevant, as trips must pass through all four in order to reach tiers capable of a positive selection.

Trips could be issued manual waivers by PTNS staff on a case-by-case basis. Manual waivers are most commonly issued when a vessel operator wants to sail less than 48 hours from the trip notification to avoid impending weather. In these situations a PTNS staff member would occasionally grant the vessel a temporary waiver of coverage if the vessel has a good record of compliance. Gillnet vessels may take what are referred to as 'set-only' trips, which are trips in

which gillnet gear is set, but not hauled. There is no harvesting of fish on these trips, so the deployment of an observer is unnecessary. These trips would be monitored for compliance external to the PTNS to ensure that they are truly set-only trips. The ‘do not deploy’ list tiers have two purposes. The first tier of this type is to protect the safety of observers. If a vessel has been identified as unsafe or constituting a hostile work environment for an observer, vessels will be temporarily placed on this list until the issues can be resolved. Many of these situations represent compliance problems and often require the intervention of NMFS Office of Law Enforcement. Once the issue has been addressed, the vessel is removed from the list. The second ‘do not deploy’ tier type is used to allow a temporary reprieve to vessels that have experienced unusually high coverage until their coverage rates are reduced below a specified level. Because the PTNS works to achieve coverage targets at the stratum level, not the individual vessel level, occasionally there can be a wide disparity of individual vessel coverage within a stratum, particularly when a stratum contains several non-compliant vessels or vessels attempting to avoid observer coverage. To achieve target coverage rates for a stratum, low coverage on a small number of vessels must be compensated by other vessels within the stratum receiving above-average coverage. The PTNS tracks individual vessel coverage rates and automatically monitors for high- and low-coverage vessels. The details of this system monitoring will be described in a subsequent section. Vessels identified as high-coverage are placed in the ‘do not deploy - coverage’ and vessels identified as low-coverage are placed in the ‘keep active’ tier, which will be described below.

The next selection tiers are the NEFOP-level coverage, SMP, and protected species tiers (Tiers 5 through 7; Table 1). These constitute the core monitoring programs in the region, independent of additional coverage needed to meet groundfish sector coverage demands. These were identified as the top monitoring priority for the groundfish fishery. The NEFOP and SMP are probability-based tiers; however, the protected species coverage is assigned using a sea day schedule. The difference in design was reflective of the desire of the end-user group that assigns protected species coverage to continue to use their existing sea day schedule method for observer selection. The sea day schedule selection specifies a set number of sea days of observer coverage by month, port, and gear-type. Any trip that reaches this tier will be evaluated to determine if it meets the criteria for which there is a positive balance on the sea day schedule. The sea day schedule is filled on a first-come, first-filled basis. If the trip does meet the criteria it will be selected for coverage. Trips not selected at the NEFOP, SMP, and protected species tiers will drop through to the ASM selection tiers. In the initial design discussions it was not known when, and if, there would ultimately be an industry-funded component to the system. For this reason, the NMFS-funded tier was placed higher in the selection process than the industry-funded component. The last tier is the ‘keep active’ tier. This tier is used to ensure coverage of vessels that have experienced below-average observer coverage despite automated system efforts to randomly deploy observers. Observer coverage for trips selected in the ‘keep active’ tier are assigned using the observer coverage associated with the next highest selection tier (e.g., if

NMFS-funded ASM coverage is the next highest tier turned on within the PTNS, 'keep active' trips will be assigned NMFS-funded ASMs).

Within each of the probability-based tiers (NEFOP, SMP, NMFS-funded ASM, and industry-funded ASM), a 'must deploy' sub-tier exists. These sub-tiers are used to address vessel compliance issues, specifically observer avoidance behavior. Before a vessel enters into the probability based selection for any of these tiers, the vessel is checked against a list to determine if it has been previously identified as 'non-compliant' based on prior PTNS usage patterns. The compliance aspect of the system will be described in depth in a subsequent section. Trips that enter the probability-based sub-tiers will be assigned coverage based on a stratified random selection algorithm. The details of the selection algorithm are covered in the next section.

Methods to establish observer deployment probabilities

The primary objective of the PTNS is the stratified random deployment of observers within the groundfish fishery in support of in-season discard estimation. Specifically, the PTNS needs to be able to deploy observers in an unbiased manner within each stratum, contingent on a target coverage rate. The level of stratification applied within the PTNS was designed to be consistent with the in-season discard estimation methods which were based on sector, gear and mesh size (i.e., gear category), and fish stock. Since the specific species/fish stocks that would be caught on a particular trip were not known *a priori*, the PTNS used the intended fishing area as a proxy for fish stocks. The fishing areas were divided into three regions (Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic; Figure 2) which generally corresponded with the management units used for the various groundfish stocks.

The target coverage rates are determined external to the PTNS based on considerations that include the desired precision of discard estimates, compliance monitoring needs (i.e., reduction of observer effects; Benoît and Allard 2009), and funding availability. Target coverage rates would likely require manual adjustment throughout the fishing year to compensate for changes in trip length, amount of fishing effort (number of trips), estimated effort remaining in the fishing year, number of observers available, and overall compliance with PTNS notification requirements.

With the exceptions noted above (e.g., do not deploy, set-only gillnet, must-deploy, protective species sea day, and keep-active tiers), the selection method for the majority of trips entering the PTNS should incorporate a probability-based sampling scheme utilizing random selection of fishing trips. There are numerous manners by which the trip selection probability could be determined ranging from the simple to the complex. From an initial design review, several desirable features of the selection method were identified:

1. Ability to achieve a target coverage rate.
2. Some level of 'front-loading' to get in-season information early in the fishing year to limit the influence of assumed discard rates in the calculation of discard estimates. While

the ‘front-loading’ aspect was desirable, it had to be accomplished in such a way as to limit the amount of temporal bias in the level of observer coverage.

3. Ideally, the selection criteria should have a self-adjusting capacity so that it can make fine-scale adjustments to the target coverage rates based on the actual realized coverage rates for the stratum, in the event that coverage rates are perturbed from the desired target rate.

With these criteria in mind, three different selection methods were considered and evaluated through simulation. The methods do not constitute an exhaustive list of possible methods; rather, they were selected because of their simplicity and ability to achieve a target level of observer coverage over time. Under all three methods, each trip is assigned a random number from 0.000 to 1.000 (r_{tier}). The trip is selected if $r_{tier} \leq$ a tier’s selection probability (p_{tier}). The selection probability (p_{tier}) is some function of either the target coverage rate (t_{tier}) or stratum trip counts with the independent control variable, varying by method.

The three candidate methods were investigated and evaluated using simple, single-tier simulations. The simulations were programmed using SAS software, Version 9 (SAS Institute Inc., Cary, NC, USA). Simulations assumed that all trips entered into the system occurred (no cancellations), and that trips selected for coverage received coverage (providers could not decline trips). Trips were entered into the simulation one at a time, and each iteration was carried out to 100 trips. Each simulation was run for 500 iterations, and the performance of the method was evaluated based on the mean coverage rate and precision. While the simplistic nature of these simulations may not capture the nuances of a production system and the limited iterations may not characterize the true precision, the simulations were sufficient to evaluate the general characteristics of each the methods and offer an objective means with which to identify an optimal method. The three candidate methods are described below.

Fixed method

The fixed method represented the simplest of the three methods explored, and addressed only the criteria to achieve a specified coverage rate. In the fixed method, every trip had a fixed probability of being selected for observer deployment that is equal to the target observer coverage (Equation 1, Figure 4).

[Equation 1] $p = c_t$

Where:

p is the probability of trip being observed
c_t is the target coverage level

Incremental method

The incremental method attempted to address the probability of zero coverage early in the fishing year by applying some front-loading capacity. The incremental method starts with a

specified high fixed coverage rate (e.g., 1.0), with the coverage rate decreasing in fixed increments as each successive trip entered the stratum (Equation 2), until it reaches a defined target coverage rate (Equation 3, Figure 5). The method operates independent of the realized observer coverage rate; the probability of a trip being selected for observer coverage is dependent only on its order of occurrence in the stratum, not whether previous trips were selected for observer deployment. In this respect, the incremental method did not contain a self-adjusting mechanism.

[Equation 2] $p = 1 - t(i)$ unless $c_t > 1 - t(i)$ then $p = c_t$

The number of trips that must exist in a stratum before the target observer coverage is reached is:

[Equation 3] $t = \left[\frac{1-t}{i}\right] + 1$ $(integer)$

Where:

p is the probability of trip being observed
c_t is the target coverage level
t is the number of trips in a stratum when the pre-notification for a trip occurs
i is the increment value

Linear method

In addition to the ability to achieve a target coverage rate and front-loading capacity, the linear method also employed a self-adjusting capacity. The self-adjusting feature allowed the system to adjust the selection probabilities based on the realized coverage rates, thereby providing a correction mechanism if realized coverage rates deviated from the target coverage rates. In the linear method, a linear regression was fit between two control points: a specified maximum selection probability, and a target coverage rate (Equation 4, Figure 6). The control points represented the fixed behavior of any assignment of observer coverage levels; when no trips were observed within a stratum, observer coverage was assigned at the specified maximum selection probability (e.g., 1.0), and when the observer coverage within a stratum was equal to the target coverage level, any additional trips were assigned coverage at a probability equal to the target observer coverage rate. The probability of a trip being selected for coverage at all other points was determined using a simple linear regression. The trip selection probability could not drop below the specified minimum. A minimum level may be desirable for compliance reasons such that even when realized observer coverage levels are high, a vessel operator could expect that there is some probability that the trip will be observed.

[Equation 4] $p = \left[\frac{c_t - 1}{c_t}\right] c_r + c_{max}$ unless $c_{min} > \left[\frac{c_t - 1}{c_t}\right] c_r + c_{max}$, then $p = c_{min}$

Where:

p is the probability of trip being observed
c_t is the target observer coverage level
c_r is the realized (actual) coverage level when the pre-notification for a trip occurs
c_{max} is the maximum selection probability
c_{min} is the minimum selection probability

The compensatory nature of the linear method attempted to stabilize the realized coverage rate at the target coverage rate as quickly as possible. By setting the minimum coverage rate higher, it limited the ability of the method to compensate for high realized coverage rates.

Method comparisons and preferred alternative

Both the linear and fixed methods have the tendency to reach the target coverage rate in fewer trips relative to the incremental method (Figure 7). The duration it takes for the linear method to reach the target coverage rate is positively related to the specified minimum coverage rate. The fixed method is susceptible to a large amount of variability when there are few trips within the stratum, but does tend to approach the target coverage rate over time. One drawback to the fixed method is the high probability of having no observer coverage for a stratum when trip counts are low (Figure 8). The lower the target observer coverage rate, the higher the probability of having zero observed trips. This quality may not be desirable, given the likelihood of small stratum sizes (< 10 trips) expected under sector management and the desire to move away from the assumed discard rate into an in-season discard rate. Both the fixed and incremental methods achieve approximately normal distribution of stratum coverage (Figures 9 and 10). The self-adjusting nature of the linear method works to reduce the overall variance in the stratum coverage, thereby achieving non-normal distributions.

Unlike the fixed method, both the incremental and linear method have zero theoretical probability of having no observer coverage. However, in practice, all methods have some probability of having no observer coverage. This can occur if the selected observer service provider(s) are unable to deploy an observer on the first trip in a stratum. One benefit of the linear approach is that the probability of selection is based on realized observer coverage, not the total number of trips taken in the stratum. In the event that the first trip within a stratum is not observed, the linear method will assign a probability of 1.0 to the next trip occurring within the stratum. The impacts of provider cancelation were not evaluated in this simulation.

Because of the front-loading aspect of the incremental method and its inability to set trip selection probabilities below the target coverage rate, the realized coverage tends to be biased high relative to the target rate. The effects of the incremental method's front-loading can never be mitigated. These impacts are greatest when there are a low number of trips within the stratum and increase with smaller increment values.

The linear selection method addressed the concerns identified with both the fixed and incremental methods; specifically, the probability of having zero trips within a stratum early on

in the fishing year and a prolonged coverage bias introduced from the front-loading. The lower the minimum coverage rate, the faster the front-loading biases were addressed. Additionally, the self-correcting aspect of the linear method worked to reduce the overall variance in the coverage rates relative to both the fixed and incremental methods. Based on these simple simulations, the linear selection method performed optimally and had all of the desirable properties outlined in the design phase.

'Combined' versus 'separate' tier relationships

Whenever a trip enters a PTNS selection tier it receives a random value, r_{tier}, ranging from 0 to 1.0. A tier selection probability, p_{tier}, is then estimated using the linear method, and when $r_{tier} \leq p_{tier}$, the trip is selected for coverage. When a selection system has more than a single tier, there are two ways that tier selection probabilities can be designed: 'separate' or 'combined'. In a 'combined' system, each trip receives a single r value and the individual tier selection probabilities are cumulative. For example, in a system with three tiers where the target coverage rates of the first, second, and third tiers are 0.08, 0.30, and 0.12 respectively, the target values (p) used within the PTNS are cumulative, such that the first tier is assigned a 0.08 target probability, the second tier is assigned a 0.38 target (0.08 + 0.30), and the third tier is assigned a 0.50 target (0.08 + 0.30 + 0.12). The realized coverage rates necessary to estimate the p value in the linear method are estimated by combining the coverage from all tiers, such that the PTNS only needs to track a single coverage rate for each stratum. The primary advantage of the 'combined' method is that it is relatively simple to implement, since the PTNS only needs to track realized coverage at the stratum level and not for each strata-tier combination. The major disadvantage of the 'combined' method is that in order for it to achieve the target coverage rates for each individual tier, the minimum coverage level specified within the linear method must be set equal to the target coverage rate for all but the last tier (Figure 11), thereby diminishing the compensatory nature of the linear method.

A 'separate' system treats the selection of each tier independently from the rest such that each trip receives an r value for each tier it enters. The target coverage rates are set equal to the desired target and work independent of the coverage in all other tiers. To implement this design, the PTNS must track coverage rates for each strata-tier combination. In this sense, a 'separate' system is more complicated to implement; however, the major advantage of the 'separate' system is that the minimum coverage level can be set to any desired value to maximize the compensatory nature of the linear method (Figure 11).

The performance of the two system designs was evaluated using simple multi-tier simulations. These simulations were built on the initial single-tier simulation code. Simulations were done using both two- and three- tier systems, with the tier coverage rates for tiers one, two, and three set at 0.08, 0.30, and 0.12 respectively. The coverage rates were chosen based on anticipated target coverage rates for the NEFOP and NMFS-funded ASM in fishing year 2010, and an arbitrary value was chosen for industry-funded ASM coverage. Example runs from the

simulations are shown in Figure 12. In the ‘combined’ system, there is a notable high bias that persists in the lowest tier (tier 1) for several trips. This effect is similar to what was observed in the incremental selection method. Since the minimum coverage level must be set to the target coverage level, the ‘combined’ system is very much like the incremental method in the sense that it has no mechanism to compensate for the initial high coverage induced by the front-loading. The high bias in the lowest tier is offset by below-target coverage in tiers two and three. Additionally, because of the diminished ability of the ‘combined’ system to self-correct coverage in excess of the target coverage rate, the system is slow to respond to perturbations as occurred in tier 2 of the three-tier example. This perturbation negatively impacted the ability of the system to meet the coverage requirements of tier 3. Conversely, the ‘separate’ system equilibrates to the target coverage rates for all tiers relatively quickly, and perturbations from the target are minimal. A ‘separate’ system allows the PTNS to take full advantage of the compensatory nature of the linear selection logic, and also ensures that perturbations affecting one tier are isolated and do not affect the other tiers.

When the PTNS was first implemented on May 1, 2010, it was based on the ‘combined’ design. The choice in design was purely pragmatic, based on the short amount of time available to design, build, and implement the initial system. It was recognized from the beginning that a ‘separate’ system would be optimal, but it was believed that there was insufficient time to implement a system with that complexity in the initial design. During the first year, work began to revise the PTNS to incorporate the ‘separate’ design, with the revised system implemented at the start of the 2011fishing year.

Observer avoidance and coverage equitability

When the PTNS was first implemented on May 1, 2010, it contained no mechanism to address the intentional avoidance of observer coverage by vessels. Shortly after implementation it became clear that some vessels were avoiding observer coverage by canceling trips scheduled for observer coverage at proportions higher than trips not scheduled for observer coverage. In August 2010, the PTNS was redesigned to fix this loophole. The redesign forced vessels that cancelled trips scheduled for observer coverage to be automatically selected for observer coverage on all subsequent trips until a trip had been covered by an observer. The design was intended to reduce the incentive to cancel trips scheduled for observer coverage and ensure more equitable coverage across all vessels. This solution created a new sub-tier within each of the probability based tiers which was termed ‘must deploy.’ This was a list tier such that anytime a vessel canceled a trip scheduled for coverage, it would be placed on the ‘must deploy’ list corresponding to the type of coverage that was canceled. For example, if a trip selected for NEFOP coverage was canceled, the vessel would be added to the NEFOP ‘must deploy’ sub-tier. The next time a trip from the vessel entered the NEFOP selection tier, it would be checked against the list prior to undergoing random selection. If the vessel was listed, the trip would automatically be selected for NEFOP coverage. Once a vessel successfully carried an observer following placement on the ‘must deploy’ list, it would be removed from the ‘must deploy’ list at

all levels. If a vessel canceled trips at multiple tiers prior to carrying an observer, it could be placed on the 'must deploy' list for multiple tiers. The PTNS would recognize a vessel as having carried an observer once a provider had indicated within the PTNS that an observer had been deployed on a vessel.

The redesign was effective at forcing vessels that were attempting to avoid coverage to carry observers. Unfortunately, the redesign negatively impacted compliant vessels that were not intentionally avoiding observer coverage, but rather legitimately attempting to fish around weather windows, crew availability, etc. These impacts were exacerbated during the winter fishing months, when 'day-boat' vessels (i.e., small vessels which typically take trips ≤ 48 hours) were forced to cancel a higher proportion of declared trips due to inclement weather. As a result, active, compliant 'day-boat' vessels ended up experiencing observer coverage well in excess of the target coverage rates in fishing year 2010. A more effective means of addressing observer avoidance that did not penalize compliant vessels was needed.

Prior to the start of the 2011 fishing year, work began to develop improved methods of dealing with observer avoidance without negatively impacting compliant vessels. The need to delay notifying the vessel of the PTNS trip selection until 48 hours prior to the sail date was identified. Frequently, 'day-boat' vessel operators would make trip declarations in weekly batches and notify their intent to fish every day in the coming week, not knowing which days would offer favorable sea conditions and/or an available crew. Once the operator had a better understanding of sea conditions and crew availability, they would cancel notifications for trips on which they did not intend to sail, a process that was often done in advance of the 48-hour notification requirement. In the initial PTNS design, vessel operators were informed immediately after declaration which trips were scheduled for coverage. This allowed the vessel operators to consider an additional piece of information when deciding which trips to take or cancel; this was particularly true of those vessels looking to avoid observer coverage. To address this, the PTNS was modified so that vessel operators were not informed of the selection status of a given trip until 48 hours prior to the trip sail date (the PTNS still made the selection at the time of entry, but notification was delayed). Any cancelations made prior to the 48-hour period would be done without knowledge of the coverage status; therefore, trips canceled outside of the 48-hour window would not be subjected to subsequent 'must deploy' targeting.

For those vessels that canceled trips within the 48-hour window, the goal was to identify only vessels that were intentionally avoiding observer coverage; however, identifying these vessels proved difficult. Since PTNS operates at the stratum level and not at the individual vessel level, any vessel that has received below-target coverage must be offset by one or more vessels with above-target coverage within the same stratum. From a system operation perspective, it is irrelevant whether the low coverage was due to random chance or intentional avoidance of observer coverage through selective cancelation; both causes affect all other vessels within their stratum identically. Rather than attempting to identify vessels intentionally avoiding observer coverage, the solution envisioned would simply target all low-coverage vessels that cancelled

trips scheduled for observer coverage. This would require significant changes within the PTNS to enable it to track individual vessel coverage levels, and then be able to utilize this information to determine whether a vessel would be subject to 'must deploy' assignment following cancelation of a trip scheduled for observer coverage.

In an effort determine appropriate '*low coverage*' threshold values, a modeled version of the PTNS was created to simulate its performance under varying levels of low-coverage thresholds. The modeled PTNS was more sophisticated than earlier PTNS simulation models, in that it accounted for provider cancelations and allowed for differential vessel cancelation rates. Additionally, it categorized vessels into two groups: 'compliant' and 'non-compliant.' Compliant vessels were those that canceled trips scheduled for observer coverage at the same rate they canceled trips receiving a waiver. Non-compliant vessels were identified as those with higher cancelation rates on trips scheduled to carry an observer compared to trips receiving a waiver. While both compliant and non-compliant vessels would be targeted for canceling observer coverage when their overall coverage rate was below the threshold value, the identification of the two groups assisted with understanding how the PTNS modifications would affect each group. The modeled PTNS lacked one important component compared to the actual PTNS: trips were entered individually and not in weekly blocks as is common among 'day-boat' vessels. Therefore, the graduated notification aspect of the proposed redesign was not considered in these simulations.

Simulation runs were performed using actual PTNS notifications from the 2010 groundfish fishing year. The simulated population was created from a real stratum (sector, gear, fishing region) containing several active 'day-boat' vessels. Only the first 1000 trips from the selected stratum were included in the simulations. Because the simulated set was constructed of actual PTNS notifications, the individual vessel behavior (cancelation rates, compliant vs. non-compliant, total trips declared, etc.) was self-determined from the data. Three separate simulations were performed using three different '*low-coverage*' threshold values. In all simulations the provider decline rate was fixed at 10% (i.e., the selected provider decline 10% of the trips initially offered). The simulated PTNS included a single tier with a target coverage rate of 30% and a minimum selection rate of 1%. Each simulation was run through 250 iterations. The selected low-threshold coverage levels were 0%, 30% (equal to the target), and 100%. The 0% low-coverage threshold provides a simulation of the initial May 1, 2010 PTNS design, where vessels were not targeted following the cancellation of a trip scheduled for an observer. The 100% low-coverage threshold provides a simulation of the PTNS post August 2010, when vessels were targeted following the cancelation of a trip scheduled for observer coverage regardless of their current coverage rates or coverage status. Setting the low-coverage threshold equal to the target coverage (30%) represents a compromise between the two systems.

The results from the simulations indicate that setting the low-coverage threshold equal to the target coverage (30%) produced the least biased overall stratum coverage with respect to the interquartile range (Figure 13). Comparatively, the 0% threshold and 100% threshold tended to

produce biased low and high coverage, respectively. Under all three simulations, the distribution of stratum coverage tended to be above target until 10 to 25 trips had occurred in the stratum. These results are consistent with single-tier simulations of the linear method (Figure 7), reflecting the residual effects of front-loaded coverage. The stratum coverage rates stabilized around 75 trips under all three simulation scenarios.

Setting the low-coverage threshold equal to the target coverage produced the most equitable distributions of vessel-level observer coverage relative to the 0% and 100% thresholds (Figure 14). The 0% threshold does nothing to affect the non-compliant vessels, which subsequently experience coverage rates much lower than the target 30%. The compliant vessels tend to have above-target coverage, which is needed to meet overall stratum targets given the low coverage of non-compliant vessels. The 100% low-coverage threshold results in above-target coverage for all vessels, regardless of status, since all vessels are penalized for cancelation of trips scheduled for observer coverage, regardless of their realized coverage rate. When the low-coverage threshold was set equal to the target, the median coverage of non-compliant vessels was below-target; however, the interquartile range of most of the non-compliant vessels extended above the target level. Median coverage of non-compliant vessels tended to approach the target with increasing activity. For compliant vessels, the opposite was true, with slightly elevated coverage for low-activity vessels and near-target coverage for higher activity vessels. Overall, the variability in coverage declined with increasing vessel activity. A general conclusion from this is that there is some degree of system acclimation required before the compliance aspect of the PTNS has an effect; e.g., with a limited number of trips, low-activity compliant vessels tend to experience above-target coverage and non-compliant vessels tend to experience below-target coverage. The acclimation period is most likely attributable to providers declining trips that were selected by the PTNS for coverage, thus reflecting actual conditions under which the PTNS operates. Since not all trips selected for coverage will receive coverage, some amount of time is required for any coverage adjustments to be effective, whether the adjustments are due to the compensating nature of the linear method or are an attempt to address low-coverage through coverage thresholds.

Given the general lack of bias and reduced variability properties of the 30% low-coverage threshold, a second simulation exercise was performed examining how a system would perform with a minimum trip criterion. Under this simulation, the coverage thresholds were not applied until a vessel had taken more than 10 trips. This minimum trip criterion was based on the knowledge that there is a high degree of random variability among the coverage of vessels that have only taken a few trips. This compares to the first simulation exercise which focused on achieving equitable vessel-level coverage regardless of a vessel's activity level. The results of this second simulation suggest that a minimum trip criteria of 0 results in median unbiased stratum coverage, whereas the median coverage tended to be below-target under the 10-trip minimum scenario (Figure 15). The explanation for these results can be seen in the coverage distributions of the individual vessels (Figure 16). Since most of the non-compliant vessels in

this simulation were low-activity vessels, there was little opportunity for the PTNS to positively affect their coverage. Consequently, the median coverage of compliant vessels tended to be slightly higher under the 10-trip minimum scenario.

Based on the collective simulation results, the PTNS was modified to use a low-coverage threshold equal to the target threshold with no minimum trip requirement. Setting the low-coverage threshold equal to the target coverage rate was expected to reduce the likelihood that vessels not intentionally attempting to avoid observer coverage would experience excessively high observer coverage, without negatively impacting the overall stratum coverage rates. Additionally, treating all low-coverage vessels equally, regardless of the number of trips a vessel had taken, would ensure more equitable vessel-level coverages and a higher probability that the realized strata coverage rates would be equal to the specified targets.

Provider selection

Unlike NEFOP coverage, where the service provider contract is issued to a single provider, the ASM contracts (either NMFS or industry-funded) could potentially be issued to multiple providers. For tiers where multiple providers could exist, a systematic method was needed to offer trips to individual providers in an objective manner. Additionally, there was a desire to offer individual ASM trips to multiple providers on a given trip to increase the likelihood that an observer would be assigned to each trip selected for ASM coverage.

The agreed-upon solution for assigned coverage types where multiple providers existed was to apply a weighted probability selection to identify two service providers for each trip (provider 1 and provider 2). The probability of provider selection would be proportional to the number of certified observers each provider had in service at the time of the notification. This is a variant of probability-proportional-to-size (PPS) sampling, with the selection performed sequentially without replacement (select provider 1, remove it from the provider list, select provider 2 based on recalculated proportions). Under this selection process, provider 1 would receive the right of first refusal, and if provider 1 declined the trip or failed to accept the trip in a specified amount of time, the trip would then be offered to provider 2.

The provider selection process is performed based on the following six steps (*ASM coverage has been used as an example for any coverage selection where multiple providers exist*):

1. Assign each trip selected for ASM coverage a random number, $r_{provider}$, between 0 and 1.
2. Calculate the proportion of observers each provider has relative to the total number. **Note that provider observer counts are updated within the system on a regular basis (e.g., monthly).*
3. Order the providers based on the proportion of monitors and calculate the cumulative proportions.
4. Select the provider where $r_{provider1} \leq$ the provider's cumulative proportion, but greater than the provider with the next lowest cumulative proportion. This provider becomes

provider 1 (see example in Table 2: if $r_{provider}$ = 0.294 then provider 2 would be selected as ASM provider D).

5. Remove the selected ASM provider 1 and recalculate the cumulative proportions (repeat steps 2 and 3).
6. Select the provider where $r_{provider} \leq$ the provider's cumulative proportion, but greater than the provider with the next lowest cumulative proportion. (see example in Table 2: if $r_{provider}$ = 0.294 then provider A would be selected as ASM provider 2).

SYSTEM IMPLEMENTATION AND PERFORMANCE

The PTNS was initially implemented on May 1, 2010. Between the start of the 2010 fishing year and end of the 2012 fishing year, the PTNS has undergone eight revisions, three of which represent major modifications (Table 3). The current system has been in place since May 2, 2011. The section below describes the major components of the PTNS.

System components

There are five major components to the PTNS production system (Figure 17). The most visible aspect of the PTNS is the web-based graphical user interface, or GUI (Figure 18). The web-based GUI is written with the following scripting languages: Perl, PHP (hypertext preprocessor), JavaScript, and jQuery. The application runs on an Apache web server located outside the NEFSC firewall with a Linux CentOS operating system. The purpose of the user interface is multi-faceted; it is used by vessel representatives (e.g., owners, operators, sector managers), observer service providers, and PTNS staff. The primary function of the PTNS user interface is to allow vessel representatives to make initial trip declarations as well as to view and edit pending trips; however, not all vessel operators use the web-based application directly. A fraction of the groundfish fleet submits their trip information to on-duty PTNS staff either through a toll-free telephone number or via email. A PTNS staff member then enters the trip information on behalf of the vessel representative. Regardless of the submission method, all trips are ultimately entered through the web-based application either by a vessel representative or PTNS staff. The web interface is also used by observer service providers to manage offered trips and report vessel assignments. All trip entries and changes made through the GUI write directly to an Oracle database.

Vessels that intend to fish in the groundfish (multispecies) fishery, and hold either a multispecies category D (hook gear), F (large mesh individual DAS), E (combination), K (open access), or A (individual DAS) permit, are required to notify their intent to take a groundfish trip through the PTNS at least 48 hours in advance of sailing. When making an initial trip declaration, the vessels must login with the vessel permit number and a personal identification number (PIN). This allows the system to identify the vessel as well as the groundfish sector to which it belongs, since there is a unique relationship at any given time between a vessel and groundfish sector. The vessel must provide the PTNS with the following information: anticipated sail date and time, estimated trip duration, port of departure, the type of gear that will be used on the trip, and the

general fishing region (regions shown in Figure 2). Additionally, the vessel must indicate if it intends to fish in an SMP, since some SMPs have separate observer coverage levels that must be achieved in addition to the baseline coverage required for the groundfish fishery.

The PTNS utilizes two separate Oracle databases (PTNS components two and three; Figure 17). The first Oracle database resides outside the NEFSC firewall and serves as the principal production database for the PTNS GUI. The second database is located inside the NEFSC firewall and serves as the master PTNS database where all the core support tables originate. The master database has established database links to other core fisheries-dependent data collection programs to ensure the consistency of data content and coding schemes across systems. If, for example, changes are made to a vessel's permit status through the Permit System, it would automatically be reflected in the PTNS master database. The master database also serves as an archive of the data collected and managed in the production system; **Procedural Language/Structured Query Language (**PLSQL) procedures execute hourly to backup the core data entry tables from the production system. Nightly, PLSQL procedures push support table updates from the master to the production database.

The fourth component of the PTNS is a set of Perl cron jobs, which run every 15 minutes on the Apache web server (Figure 17). The cron jobs are responsible for making database edits to vessel and provider status selections as well as the sending of automated email notifications whenever any of the system time thresholds have been crossed (Figure 19). Fishing trips can be declared up to nine days prior to the date of sailing, but must be declared at least 48 hours prior the scheduled sail date. The vessel is not informed of a trip's preliminary selection status at the time of notification; 48 hours prior to the trip sail date, the cron job changes the trip status from 'pending' to either 'waived' or 'selected for observer coverage,' based on the results of the selection process that occurred when the trip was entered. An email is then automatically sent to the vessel notifying it of its selection status. If the trip was selected for coverage, an email is also sent to the selected observer provider. In the case of trips scheduled for NEFOP coverage, the provider will have 24 hours to make a determination as to whether or not it will deploy an observer on that trip. In the event the provider does not make a determination within the 24-hour window, the cron job will automatically decline the trip for the provider, issue the vessel a waiver, and notify the vessel via email. In the case of trips scheduled for NMFS-funded ASM coverage, the first provider has 12 hours to make a determination as to whether or not it will deploy an ASM for the trip (from 48 hours prior until 36 hours prior to the trip sail date). If provider 1 either declines the trip or fails to act within the 12-hour window, the trip is offered to provider 2. Provider 2 then has until 24 hours prior to the trip sail date to make a selection determination. If provider 2 fails to act, at the end of the 24-hour window the vessel will be issued a waiver and notified via email.

The fifth component of the PTNS is a web-based reporting and monitoring utility. The chief function of this utility is to provide a PTNS system administrator with a near real-time understanding of system performance and industry usage (i.e., a system dashboard). In addition

to providing general information on system performance, it also tracks several areas of vessel compliance. The web-based reporting and monitoring utility was developed using SAS (Cary, NC) and runs daily. Several minor database maintenance procedures are controlled automatically through the SAS code, including the maintenance of the 'keep active' and 'do not deploy-coverage' list tiers.

System performance over time

There are two primary objectives of the PTNS: 1) optimize the sea days allocated to the fishery in a given contract year; and, 2) distribute the available sea days in a manner that provides unbiased observer coverage of the fishery (i.e., proportional to fishing activity). Annually, the PTNS is budgeted a fixed number of NEFOP and NMFS-funded ASM sea days for coverage of the groundfish fishery (e.g., NEFSC/NERO 2012). These allocated sea days represent the total number of sea days the PTNS has available for each contract year. Provider contract years run from April 1 to March 31 and therefore do not entirely overlap with the fishing year. From this allocation of sea days, an estimate is made to establish interim coverage rates for use in the PTNS at the start of each contract year. These estimates are based on the budgeted sea days and an expectation of the coming year's fishing activity. The interim target rates are usually adjusted soon after the start of the year based on a close monitoring of the sea day burn rate (i.e., rate at which sea days are being utilized) by a system administrator. Using the PTNS web-based reporting and monitoring utility, the system administrator evaluates the sea day burn rates of both NEFOP and NMFS-funded ASM sea days relative to two factors:

> *Constant burn trajectory:* This provides a general overview of the sea day burn rate and indicates whether sea days are being burned too fast (the sea day budget will be exceeded before the end of the year) or too slow (a surplus of sea days will remain at the end of the year). If fishing activity were constant throughout the year, then the PTNS target rates would only have to be adjusted to maintain a constant sea day burn; however, there are temporal variations in fleet activity throughout the year and it is critical that sea day burns are controlled to ensure that observer coverage is temporally unbiased.
>
> *Comparison of the current year's fishing activity to that of the previous year:* This provides the administrator with an indication of the expected seasonal trends in the fishery based on previous fishing years, as well a gauge of whether the current year's fishing activity is higher or lower relative to previous years (Figure 20). Both are taken into consideration and used to make adjustments to the PTNS target coverage rates which control the sea day burn rates.

The target coverage rates used in PTNS often have little bearing on the realized coverage rates. They can be considered unitless accelerator/decelerator knobs. For example the PTNS NEFOP target coverage rate may have to be adjusted to 0.15 (15%) to achieve a specific burn rate, which may result in a realized observer coverage of 6%. A number of factors affect the relationship between the target coverage rates, burn rates, and realized observer coverage, although one of the

most common factors is the number of observers/monitors currently available for the groundfish fishery and the subsequent provider decline rates. For example, if 100% of available observers are being assigned to trips and yet the sea days are still being under-burned, subsequent increases to the target coverage rates will not increase the sea day burn rates or realized coverage rates. Given the complexities of running the PTNS, one should avoid preconceived notions about expected coverage rates that were established at the start of the fishing year based on the total allocated sea days. The realized coverage rates at the end of the year will be contingent on the number of sea days initially allocated, the activity of the groundfish fishery, and the availability of observers/monitors.

The following sections will describe the performance of the PTNS in years 2010 through 2012 relative to meeting its two primary objectives: utilization of the allocated sea days and unbiased observer coverage of the fishery.

Sea day burn rates, target coverage rates and trip selection probabilities

In contract years 2010 through 2012, over 90% of the allocated NMFS-funded ASM sea days were utilized annually, with the sea day burn exceeding the allocated sea days in 2011 (1% overage; Table 4, Figure 21). In contract years 2010 through 2012, 80-99% of the NEFOP sea days were utilized. The magnitude of the NEFOP sea day under-utilization in 2010 (85% utilization) and 2011 (80% utilization) is undesirable, though the reasons for the under-utilization vary by year. PTNS target coverage rates were adjusted over time in an effort to optimize the sea day utilization (Figure 22). Modifications to the PTNS target coverage rates impact the relationship between trip selection probabilities and realized stratum coverage, consistent with the linear selection design of the PTNS (Figure 23). Changes to PTNS target coverage rates affect the slope of the relationship between the trip selection probability and the realized stratum coverage; as PTNS target coverage rates are increased, the trip selection probability for a given realized stratum coverage increases. Consistent with the self-adjusting design of the PTNS, at a fixed PTNS target coverage rate the trip selection probabilities vary linearly, depending on the current realized coverage for each stratum. It is important to note that from May 2010 to April 2011, the trip selection probabilities for the NEFOP tier were capped at the target due to the combined tier design.

In 2010, the realized coverage rates for the NEFOP tier were generally in excess of the PTNS target coverage rates (Figure 24). Typically, when realized coverage rates exceeded the targets, the system would compensate by lowering the trip selection probability. However, due to the combined tier design of the 2010 PTNS, the minimum coverage rate of the NEFOP tier had to be held equal to the target coverage rate, which negatively impacted the compensatory capabilities of the PTNS. Because the realized coverage rates were in excess of the PTNS NEFOP targets, it is highly likely that the system could have achieved higher coverage rates had the target rates been increased. This would have improved the utilization of NEFOP sea days in 2010. Target coverage rates were not increased for the NEFOP tier until around November 1 (Figure 22), and

only from 0.08 to 0.10. The target coverage rates for the NEFOP tier in 2010 should have been increased earlier in the year to better utilize the allocated NEFOP sea days.

In 2011, the NEFOP sea day burn slowed about the same time as in 2010 (approximately June 1). The similarities in timing may be coincidental, or they may relate to the deployment of NEFOP observers in other fisheries. The service provider for NEFOP observers is instructed to offer preference to certain non-groundfish fisheries when demand for observers is high. Increased activity in other fisheries, such as herring, which tends to increase in early summer, may compete with the groundfish fishery when the number of observers is limited. Unlike 2010, the 2011 NEFOP target coverage rates were continually increased beginning in early July (Figure 22), in an effort to counteract the slow burn. The increased target coverage rates had little impact on the sea day burns (Figure 21). During this period, the PTNS was exhibiting signs of system stress: realized coverage rates dropped below target coverage rates and the trip selection probabilities spiked in excess of 0.30 (Figure 24). Despite the increased probability of trip selection, the PTNS was unsuccessful in increasing the sea day burn to a level that would fully utilize the allocated NEFOP sea days. The unresponsiveness of the sea day burn to increases in target coverage rates is symptomatic of there being too few observers to fully utilize the allocated NEFOP sea days (i.e., observer saturation). A comparison of the percentage of PTNS trips selected at the NEFOP tier in 2011 (40.0%) to the percentage observed (7.3%) further illustrates the impacts of observer saturation (Table 5); i.e., in an effort to increase the burn of NEFOP sea days, the PTNS was assigning trips for NEFOP-level coverage at a rate 5.5 times that which could actually be achieved by the available NEFOP observers.

Interestingly, the PTNS also exhibited signs of stress in 2011 with respect to the coverage of the NMFS-funded ASM tier: realized coverage rates were generally below target coverage rates, and there were large increases in the trip selection probabilities (Figure 24). However, unlike the NEFOP tier, the allocated sea days for the NMFS-funded ASM tier were fully utilized (Figure 21). Similar to what was done for the NEFOP tier, target coverage rates were increased early in the fishing year in response to an under-burn of sea days. Unlike the NEFOP tier, the system was responsive to the increase in target coverage rates and the sea day burns increased to a level consistent with full utilization (Figure 21). It is notable that the NMFS-funded ASM target coverage rates remained at 0.45 for the majority of fishing year 2011, yet the 0.45 target only achieved a realized coverage of 0.195 (Table 6). The discrepancy between PTNS target coverage rates and realized coverage rates can be partially explained by provider declines of offered trips. Not all trips offered to providers are accepted, so there is not a 1:1 relationship of PTNS trip selection probabilities and realized coverage. This highlights a point made previously: the PTNS target coverage rates have little bearing on the realized coverage rates and should be considered in terms of unitless accelerator/decelerator knobs and not as indicators of the realized coverage rates.

Observer coverage rates

A primary objective of the PTNS is to distribute the available sea days in a manner that provides unbiased observer coverage of the fishery such that it is proportional to fishing activity. Evaluating the coverage achievements of the PTNS can be done either using data internal to the PTNS or from external sources (Vessel Monitoring System, or VMS, activity declarations, observer data, etc.). The optimal performance of the PTNS is contingent on the accuracy of the self-reported information contained within it; most importantly, the PTNS estimates of the realized strata coverage rates. This requires that the PTNS data accurately reflect how many total groundfish trips are taken and how many are observed. Unfortunately, there is no unique trip identifier to link PTNS trip declarations to the other fisheries-dependent data sources used to monitor the groundfish fishery. Absent a trip identifier, the PTNS cannot communicate directly with the other fisheries-dependent data collection systems to verify the accuracy of its information.

While there is no direct communication between the PTNS and other fisheries-dependent systems, the information contained in other data collection systems can be used to verify externally the accuracy of PTNS data and evaluate system performance. External verification methods such as matching on the vessel permit number and sail date are often useful; however, the match between the PTNS-declared sail date and actual sail date is inexact and often off by as much as 48 hours. Due to the inability to directly match trips, validation is limited to an examination of the total number of trips taken and observed. An additional issue in externally verifying PTNS information is the difficulty in identifying strata in the VMS activity declaration. Vessel operators must submit a groundfish activity declaration via VMS to NMFS prior to sailing on every groundfish trip. The activity declaration offers the only definitive way to classify groundfish versus non-groundfish trips from a regulatory perspective. Vessel identity, and by extension sector affiliation, can be determined from the activity declaration; however, determining the other criteria of the strata definition – gear category and fishing region – is difficult and imprecise. For this reason, attempts to validate the PTNS-realized strata coverage are inexact and not altogether useful. However, because vessel- and sector-level coverage can be verified using observer data and VMS activity declarations, a gross examination of the PTNS information can be conducted at these levels. These will be discussed in subsequent sections.

Impacts of trip cancelations on PTNS trip counts

It is critically important that the PTNS maintains an accurate accounting of the true number of groundfish trips taken. This also applies to an accurate accounting of the number of trips *not* taken. Given the need to fish around weather windows, crew availability, and equipment malfunctions, it is often difficult for vessel operators to determine 48 hours in advance whether they will fish on a particular day. Vessels operators will often declare trips in weekly batches while only actually sailing on a fraction of the declared days, to maintain flexibility given the 48-hour pre-trip notification requirement. While this practice is allowed, it is required that the vessel cancel all PTNS notifications for trips not taken. The non-cancelation of trips negatively impacts

PTNS performance by inflating the total trip count, effectively lowering the PTNS-estimated realized coverage.

Trip cancelations are particularly common among the 'day-boat' fleet, which generally comprises smaller vessels that are more sensitive to inclement weather. The cancelation rates for day trips were consistently four to six times higher than that of multi-day trips (trip duration >48 hours; Figure 25). There is a seasonal cycle to the cancelation rates of day trips, with cancelation rates lowest during the summer months and highest in the winter months, consistent with the need to fish around weather windows. Interestingly, there are no consistent seasonal cycles for multi-day trip cancelations. The September 2, 2010 release of the PTNS (Table 3) required a major change in the underlying database such that trip-type (i.e., day, multi-day) cannot be reliably tracked prior to that release. Despite the partial information for 2010, there is a notable increase in the cancelation rates of day trips from 2010 to 2011. This does not reflect a true increase in the fraction of declared trips that did not sail; rather, it reflects efforts taken by the NEFSC Fisheries Sampling Branch (FSB) staff to improve communication and outreach with the fishing industry on the need to cancel trips not taken, as well as improved monitoring of non-canceled trips. This pattern can also be seen in a comparison of PTNS-declared trips to VMS-declared trips that will be discussed in the next section.

Comparison of external and internal vessel-level coverage

Comparison of the internal PTNS estimates of total trip counts, observed trips and coverage rates to those from external sources is critical to evaluating the performance of the PTNS. Overall, the PTNS estimates of number of observed trips compare closely with the true number of observed trips on a vessel-by-vessel basis (Figure 26). Because the determination of whether a trip was observed is based on information provided by the service providers, who are contractually obligated to enter the information, these data within the PTNS generally tend to be of a higher quality than the data input by the fishing industry. There are slight differences between the PTNS and external observer data, though these are small, with most vessels falling close to the 1:1 identity line. There is greater variability between the PTNS estimates of groundfish trips and those estimates from VMS data, though the variability has generally decreased with each successive fishing year. The large numbers of vessels above the 1:1 identity line in 2010 indicate those vessels having a high incidence of not canceling PTNS notifications for trips that did not sail. Vessels falling below the 1:1 identity line represent vessels failing to notify all groundfish trips through the PTNS. Interestingly, the number of vessels where VMS declared groundfish trips exceeded the number of PTNS notifications has increased over time (137 vessels in 2010, 187 vessels in 2011, and 197 vessels in 2012). While this could indicate declines in general PTNS compliance, the trends could be obscured by improvements in PTNS trip cancelations; for example, non-cancelation of PTNS trips could be offsetting non-notifications.

Overall the PTNS estimates of vessel coverage rates relative to the observer/VMS-based realized coverage rates have generally improved over time. In addition, the level of variability in the coverage rates among vessels decreased considerably from 2011 to 2012. The decrease in the

variability in vessel-level coverage will be explored in depth in a subsequent section. While improvements have been made over time in the level of agreement between PTNS- and externally-estimated vessel coverage, there are several vessels in fishing year 2012 that exhibit much higher internal PTNS coverage rates relative to the observer/VMS-realized coverage. The most likely explanation for these discrepancies is failure to declare all groundfish trips through the PTNS. As will be shown in the next section, these vessels are not spread homogenously throughout the fishery, but rather have a tendency to belong to certain groundfish sectors. These types of patterns can be improved in the future through targeted outreach and enforcement.

Comparison of external and internal sector-level coverage

A comparison of the PTNS estimates of sector-level coverage to those obtained externally from observer and VMS activity declarations show similar patterns to the vessel-level comparisons. In fishing year 2010, there was a tendency for PTNS coverage estimates to be lower than the observer/VMS-based estimates for all but four sectors (Figure 27). As with the vessel-level coverage, the most likely reason for the lower coverage rates estimated internally within the PTNS is the non-cancelation of trips that were declared but never sailed. In both 2011 and 2012 fishing years, there was greater consistency between the PTNS estimates of sector coverage and those obtained from observer data and VMS activity declarations. This can be directly attributed to improved compliance and monitoring of non-canceled trips. The variability in coverage rates between sectors was considerably reduced from 2011 to 2012. This is consistent with the patterns observed in the internal individual vessel coverage rates. The decrease in variability reflects directed efforts to ensure equitable observer coverage across all vessels. Examination of the distribution of vessel coverage within individual sectors highlights this point (Figure 28); the size of the interquartile ranges has decreased over time, and there is less spread in the mean and median sector-level coverage rates around the overall mean.

In all years, there are one to three sectors where the PTNS has estimated much larger observer coverage rates relative to the realized observer/VMS-based coverage (Figure 27). The cause of these discrepancies is failure to declare groundfish trips through the PTNS (i.e., non-compliance with the PTNS notification requirement). One sector – the common pool – is responsible for a moderately large number of trips in each of the fishing years and represents the most egregious offender. While efforts have been made to reach out this component of the fishery, without directed enforcement of PTNS notification requirements there is little that can be done to improve compliance.

Interestingly, there are seasonal trends in the degree of compliance with the PTNS notification requirement. Overall, there is lower PTNS compliance in April and May and peak compliance July through September (Figure 29). The seasonal trends are related to fishery activity, with the compliance trends being negatively correlated with the level of targeted monkfish activity (Figure 30). Monkfish-targeted behavior (i.e., fishing on a monkfish DAS) can be determined from the VMS activity declaration. Groundfish vessels fishing on a multispecies DAS but targeting monkfish are still subject to all groundfish reporting requirements, including the filing

of a PTNS notification. Based on the relationship between vessel compliance and monkfish-targeted activity, it appears that the industry is not entirely cognizant of their groundfish reporting requirements when fishing simultaneously on both monkfish and groundfish DAS. One aspect to the low PTNS compliance among the common pool vessels is that, proportionally, a much larger fraction of common pool trips are targeting monkfish compared to sector vessels. Between 2010 and 2012, greater than 56% of common pool trips were fishing on monkfish DAS, compared to less than 11% of sector trips (Table 7). Common pool compliance with the PTNS notification requirement ranged from 69-76% when not fishing on a monkfish DAS (targeted groundfish trip), but less than 15% when fishing on a monkfish DAS. Comparatively, the compliance rate among sector vessels was greater than 79% when fishing on a monkfish DAS and greater than 89% when not fishing on a monkfish DAS.

PTNS internal strata-level coverage

While it is nearly impossible to accurately verify internal PTNS strata-level coverage using external sources, given the limitations of the NMFS's Northeast Region's fisheries-dependent data collection systems, the sector- and vessel-level comparisons have shown that, overall, the data contained in the PTNS provides an accurate representation of the realized coverage rates for the majority of groundfish vessels. This provides confidence in the internal PTNS data and allows inferences to be made about the strata-based coverage using only internal PTNS data. The distribution of strata-level coverage for the NEFOP and NMFS-funded ASM tiers is consistent with the expected system performance, based on the simulation results shown in Figure 7. There is high variability for strata with limited numbers of trips, but the variability decreases with an increasing number of trips, with strata-level coverage converging on the mean tier coverage as the number of trips increases (Figure 31). Annual estimates of tier-level coverage are provided in Table 6. Overall, at the strata-level the PTNS has performed consistent with the system design.

Despite the front-loading nature of the PTNS, there are a large number of strata with no observer coverage (Figure 32). While there may be a large number of strata, it is important to consider that they are not all highly active. In 2010 through 2012, there were 429, 316, and 195 trips, respectively, among strata that received no observer coverage. Relative to the total number of trips that occur in the groundfish fishery (Table 6), these represent less than 3.5% of the total annual trips.

Examination of alternate coverage metrics

The sampling unit of the PTNS is a fishing trip, and the target coverage rates are evaluated with respect to the ratio of observed trips relative to total trips occurring within a defined stratum. Other sampling frames/coverage metrics, such as days absent or total groundfish landings, while useful to evaluate, are difficult to define at the point of trip notification and therefore impractical for use in PTNS coverage selection. However, if the trip-based coverage is accomplished in an unbiased manner, coverage should be similar regardless of the metric used to evaluate it. As part of the PTNS web-based monitoring utility, coverage of both days absent and groundfish landings are regularly monitored.

The distribution of sector-level days absent-, groundfish landings-, and trip-based coverage were compared to the aggregate annual (fishing year total) trip-based coverage to determine the uniformity of observer coverage across alternate coverage metrics and evaluate whether there was evidence of temporal bias. Aggregate annual coverage levels are provided in Table 6. Between 2010 and 2012, the aggregate annual trip-based coverage levels were within +/- 1 standard deviation of the weekly mean (mean across sectors) of all three coverage metrics (Figure 33). The degree of variability in weekly coverage rates over time is consistent with the expectation from the simulation experiments. As time progresses and more trips enter the PTNS, the variability in the realized coverage generally decreases. Overall, there is little evidence of large-scale temporal biases in the rates. There was little fluctuation of the coverage rates after stabilizing around week 8 of the fishing year, with weekly mean rates similar to the overall annual trip-based coverage. Coverage based on days absent was slightly higher than the annual trip-based coverage in 2010 and 2011. This suggests that observed trips tended to be slightly longer than unobserved trips in these fishing years, though the cause of this pattern is unclear.

External evaluation of vessel-level coverage

PTNS is designed to provide equitable coverage across strata (sector, region and gear category) with sampling within individual stratum being random. This means that the linear selection method of the PTNS does not explicitly attempt to deploy coverage equitably among vessels. However, because coverage at the vessel level should be random, the vessel-level coverage at any particular activity level (number of trips) should be uniformly distributed, with the coverage converging on the stratum mean as activity increases (i.e., variability should decrease with increased activity). A Runs Test (Bradley 1968) was performed on the r_{trip} values generated by the PTNS to demonstrate the randomness of trip coverage assignments. Runs Tests were performed on r_{trip} values from fishing years 2011 and 2012 with the NEFOP- and NMFS-funded ASM evaluated separately. Due to the major change to the system design at the end of the 2010 fishing year, tier-level r_{trip} values are not available for fishing year 2010. The p-values from the Runs Tests were in excess of 0.3 for all fishing year, tier combinations indicating that the null hypothesis of randomness could not be rejected (Table 8). This finding is not surprising, given that the PTNS produces the r_{trip} values using a random number generator. These results demonstrate the random selection on a trip-by-trip basis and, by extension, on a vessel-by-vessel basis.

While, the selection of vessels for observer coverage by the PTNS is random, there are several non-random external factors that can influence whether a vessel actually ends up carrying an observer. Shortly after implementation of the PTNS in May 2010, it became clear that there was active vessel avoidance of observer coverage. Additionally, there were concerns raised by the fishing industry, particularly from fishing vessel operators who were experiencing high levels of observer coverage, that vessel-level coverage was non-random. These two concerns were directly related: the number of vessels experiencing no coverage negatively impacted the equitability of the coverage across all vessels. Since the PTNS is attempting to maintain strata-

level coverage, low coverage on some fraction of vessels within a stratum must be compensated for by raising coverage on other vessels. Over time, directed efforts were made to mitigate vessel coverage inequities in a variety of ways. The first steps were taken in the August 16, 2010 PTNS update (Table 3) in an attempt to address the observer avoidance issue. As discussed in the design section, this fix effectively addressed those vessels exhibiting observer avoidance behavior, but has the unintended consequence of increasing observer coverage on vessels legitimately canceling trips (fishing around weather windows, etc.). The May 2, 2011 PTNS update (Table 3) addressed this issue by implementing low-coverage thresholds for placement on 'must deploy' tiers. In addition, changes were made to the web-based monitoring utility to scan for vessels that either fall below or exceed specified coverage levels. The web monitoring utility temporarily adds these vessels to the 'keep active' or 'do not deploy - coverage' selection tiers. Once a vessel falls back within the tolerance range, it is removed from these list tiers and returned to the normal random selection protocols. Usage of both tiers increased over time, though generally the use of these tiers is minimal relative to the random selection tiers (Table 5).

Evaluation of vessel-level coverage using observer data and VMS activity declarations shows that, overall, vessel coverage was random and uniformly distributed at a given activity level, and, with increasing vessel activity, the coverage converges on the overall mean (Figure 34). Comparison of vessel-level coverage across fishing years shows the influence of the various system modifications on vessel-level coverage. Overall, the level of variability of vessel-level coverage has declined in each successive fishing year. Because of the expected high variability when the number of trips is low, vessels were separated into two categories: those having taken fewer than ten trips and those having taken ten trips or greater (Figure 35). The reductions in vessel coverage variability from 2010 to 2011 were primarily due to the implementation of the low-coverage monitoring modifications to the PTNS released on May 2, 2011 (Table 3). A subsequent reduction in the coverage variability occurred from 2011 to 2012. While there were no system modifications from fishing year 2011 to 2012 that would have affected the coverage variability, there were several monitoring efforts taken to ensure more equitable coverage across fishing vessels. First, as noted above, there was more active management of the 'keep active' and 'do not deploy - coverage' tiers to increase the coverage on low-coverage vessels while reducing coverage on high-coverage vessels. Secondly, beginning during the 2011 fishing year, there was a concerted outreach initiative to observer service providers to ensure equitable coverage across vessels.

Outside of observer availability, there are at least two factors that affect the decision of a provider to select a particular trip for coverage: the vessel identity and trip characteristics. Providers are informed which vessels are taking the trips they have been offered, which can potentially result in the preferential coverage of certain vessels or avoidance of others. Both actions would contribute to non-equitable coverage across vessels. In 2010, there was considerable variability in vessel-level coverage including a large percentage (20%) of vessels that had received 100% coverage and those that had received no coverage at all (10%; Figure

36). By 2012 there were reductions in both extremes and an overall decline in the variability of coverage levels among vessels. There was still an undesirably high number of vessels at the two extremes, but these were largely restricted to vessels that have taken fewer than 50 trips.

One trip characteristic that may affect a provider's ability to accept a fishing trip is the port of sailing. Vessels sailing out of ports outside the region of core activity may experience lower observer coverage due to the difficulty in deploying observers to these areas, and to high travel costs in the event observers are not regularly stationed in the regions. In fishing year 2010, there was considerable disparity in coverage among states with the Mid-Atlantic states (New York, New Jersey, and Virginia) receiving lower coverage relative to the New England states (Figure 37). The lower coverage in the Mid-Atlantic states was not due to differential selection by the PTNS, but rather higher provider decline rates for these states. ASM observers are not regularly stationed in the Mid-Atlantic states. Incremental improvements were seen in the state-level coverage in both 2011 and 2012. By fishing year 2012, provider decline rates were similar across states. Some of this may have been due to improvements within the provider operations, but there was also a notable decrease in the overall number of trips sailing from Mid-Atlantic ports from 2010 through 2012.

Trip duration (e.g., day vs. multi-day) is also a trip characteristic that has the potential to affect a provider's willingness to accept a trip that has been selected by the PTNS. Logistically, multi-day trips are easier to coordinate, given the lower likelihood of a trip being canceled and greater reward in the form of more sea days per coordination efforts. In the past, providers have complained about the inequitable offering of multi-day trips to each provider. While the complaints were investigated and found to be unfounded, it is evidence of the high value of multi-day trips to providers. To evaluate the decline rate by trip type, an odds ratio test was conducted. The odds ratios indicated that day trips were between 2.9 and 7.7 times more likely to be declined than multi-day trips in 2010 and 2011 (Table 9). Correspondingly, the observer coverage rates were higher for multi-day trips. Interestingly, in 2012, multi-day trips were 2.3 times more likely to be declined than day trips, resulting in higher observer coverage of day trips. It is unknown exactly why there was a reversal in the patterns from 2011 to 2012. While it can't be quantified, it is known that in 2010 and 2011 some providers would initially accept more day trips than could be covered to increase their flexibility, given that 'day-boat' trips would experience a higher vessel cancelation rate. This practice was discontinued in 2012. There was also a change in the NEFOP service provider in 2012, which could have impacted both NEFOP and ASM coverage in unexpected ways.

Meeting the needs of other monitoring programs

In addition to deploying observer coverage to meet the base coverage requirements of the groundfish catch monitoring, the PTNS is also responsible for meeting other coverage requirements within the groundfish fishery. These include providing coverage of the four groundfish SMP and protect species bycatch monitoring.

In fishing years 2010 to 2012, use of the SMP tiers within the PTNS were seldom utilized (Table 5). The primary reason for this is that the SMP coverage requirements were always less than the base groundfish fishery coverage requirements. For example, mandated SMP coverage ranges from 10 to 20%, depending on the SMP, yet the base coverage exceeded 20% in all years (Table 6). Because of the compensatory nature of the linear selection, the probability of selection at the SMP tiers was low. In the future, if the base coverage declines below the mandated SMP coverage requirements, then use of these selection tiers would be expected to increase.

Observer deployment for the monitoring of protected species bycatch in the groundfish fishery is accommodated in the PTNS using a sea day schedule (Figure 3). The NEFSC Protected Species Branch generates a sea day schedule annually based on an expectation of fleet activity on a port, month, and gear type basis. Frequently, fleet activity within individual sea day strata are not sufficient to meet the specified sea day coverage and the unused sea days must be manually 'rolled' over to the next month. Typically, the port and gear stratification is held identical to the previous month, but occasionally the sea days are reallocated to different ports where fishing activity is more likely. The need to continually 'rollover' unused sea days highlights the difficulty and lack of efficiency of a sea day schedule deployment scheme. From the perspective of sampling design, the sea day schedule approach assumes that fishing activity during the deployment period will be identical to fishing activity from the reference period. As has been demonstrated through three years of deployment of protected species coverage using a sea day schedule, this is often not the case. Similar to how groundfish bycatch monitoring is deployed, an adaptive deployment approach where observer deployment was distributed proportional to fishing effort would offer improvements over the sea day schedule.

DISCUSSION

Overall, the PTNS has worked consistent with the system design and was successful in meeting the diverse objectives of a complex observer deployment system. The PTNS utilized over 93% of the nearly twenty-five thousand sea days allocated to it from 2010 to 2012. Equally important, the sea day utilization was accomplished in a manner that spread observer coverage proportional to fishing effort, resulting in consistent coverage over time and across multiple coverage metrics, including days absent and groundfish landings. This provides some indication that, at least at a gross level, there is no strong evidence of observer bias, though there are some indications of observed trips being slightly longer in 2010 and 2011. The issue of observer bias requires additional research and is outside the scope of this paper. The deployments of both NEFOP- and NMFS-funded ASM observers was done in such a way as to make the resulting discard rates from these two programs statistically indistinguishable across a broad range of groundfish species and gear types (Wigley et al. 2012).

The self-adjusting nature of the PTNS linear selection method was effective at reducing coverage variability and, in turn, increasing coverage equitability as additional trips entered the PTNS. Additionally, the self-adjusting nature mitigated many of the coverage rate perturbations induced

by external factors, such as vessel avoidance and observer saturation. These are expected characteristics of the PTNS and reflect the importance of simulation work during the design of complex monitoring systems. Some of the real-world complexities of running such a system were not considered in the initial simulations, and required system modifications over time to address. These highlight the need to regularly evaluate system performance and identify areas of improvement.

Need for continued improvements

It is one thing to design a system that performs optimally in simple theoretical simulations, but extremely difficult to design a system robust to the realities of a production deployment. The PTNS encountered its share of these realities over time, some of which were addressed through system enhancements and others through external low-coverage monitoring and outreach to observer service providers. The net results of these efforts were sequential improvements in system performance between 2010 and 2012. Many of the remaining issues can be addressed through minor system improvements in concert with continued improvements in coverage monitoring and outreach activities. While system improvements may lead to marginal gains in performance, the biggest challenge for the PTNS is compensating for external human factors such as vessel compliance, observer availability, and objective provider selection of vessels and trips.

Perhaps the largest external factor affecting optimal performance of the PTNS relates to vessel compliance, both with respect to declaring all groundfish trips and canceling all trips that were declared but never sailed. The optimal performance of the PTNS requires the accuracy of the internal trip count information. While the analyses show that the current system has reasonable accuracy, there continue to be small differences in both the counts of observed trips and total groundfish trips. Compliance among vessels targeting monkfish continues to be the most problematic area with respect to trip counts, particularly for common pool vessels. Targeted outreach and education to this portion of the fleet could lead to large improvements in PTNS notification compliance. The cancelation of declared trips that did not sail was a large problem in fishing year 2010 but has decreased over time, primarily as the result of monitoring and outreach by the NEFSC Fisheries Sampling Branch staff. In fishing year 2012, the non-cancelation of fishing trips had minimal impact on PTNS performance. Both of these issues highlight the need for the PTNS to directly communicate with the other fisheries-dependent data collection systems, like VMS activity declarations and observer data.

A means of direct communication between data collection systems would greatly improve compliance monitoring and enforcement efforts. Equally important, a means for the PTNS to directly communicate with other data collection systems would allow the PTNS to incorporate a feedback loop to auto-correct the declaration information and maintain accurate accounting of the number of groundfish trips taken. The most obvious solution to this problem is to create a unique trip identifier that can be used to link trips across all of the regional fisheries-dependent

data collection systems. The unique trip identifier should be generated by the first system that a vessel must report to for a given fishing trip; for the groundfish fishery, that system is the PTNS (i.e., 48 hours in advance of sailing). The unique trip identifier would then propagate through to the other data collection systems. As more of the region's data collection systems migrate towards electronic collection (e.g., electronic vessel trip reports), the ease of propagating a unique trip identifier from system to system should improve. Uniquely linking trips across data collection systems would also lead to improved efficiencies by reducing the amount of duplicative information currently being collected from the fishing industry.

The ability to utilize all of the sea days allocated to the PTNS is contingent upon having a sufficient number of observers available for deployment. As seen with NEFOP coverage in 2011, an insufficient number of observers can lead to sub-optimal utilization of the allocated sea days. The availability of observers is affected by many factors, including the total number of certified observers in the region, the number of allocated sea days, and the competing coverage demands of other fisheries. For service providers, balancing these demands is a difficult task requiring planning and coordination. Having too few observers is problematic from the perspective of coverage deployment, but too many observers can be detrimental to the retention of qualified observers. Maintaining sufficient observers requires a balancing of seasonal coverage demands, employee losses, and training sessions for new observers. Continued experience with balancing these demands should improve observer availability in future fishing years.

There remains a need to continue to work with observer providers to further improve the equitability of provider selection, with respect to both vessels and trips. Ensuring that providers are not preferentially selecting or declining trips based on the identity of the vessel is critical. A modification to the PTNS to hide the vessel identity from the provider until after the trip selection has been made may be one possible solution to the provider selection issue. Unfortunately, unlike the vessel identity, the trip characteristic information (port of sailing, trip duration) is critical for provider planning purposes and cannot be hidden from the provider. These areas can be addressed through real-time monitoring of provider decline rates across a range of metrics, including port of sailing and trip duration, and then working with providers to ensure unbiased selection.

While external factors pose the biggest challenges to PTNS performance, there are several areas of the PTNS where improvements could be made. The PTNS has required manual interventions to adjust target coverage rates in response to fleet behavior and provider capacity. While this is anticipated, more automated methods need to be explored to adjust target coverage rates in response to sea day burn trajectories and realized observer coverage. Not only will this reduce the extent of manual intervention on the part of the system administrator, it will also help prevent the types of sea day under-utilization similar to what occurred with the NEFOP sea days in 2010. This under-burn had less to do with observer saturation and more to do with a lack of responsiveness to the under-burn.

Automation of the 'keep active' and 'do not deploy - coverage' list tier maintenance is also needed. The process is currently managed through a semi-automated procedure run through the PTNS web-based monitoring and reporting utility; however, it requires some manual intervention on the part of a system administrator to adjust the coverage tolerance ranges that control when vessels are added and removed from these lists. The maintenance of these list tiers should be moved to the database level and linked directly back to mean vessel coverage rates such that the tolerances are established dynamically based on some plus/minus percentage of the mean vessel coverage rate at any given time.

Meeting system requirements, providing flexibility, and minimizing the burden to industry was, and continues to be, a challenge. The trip-based nature of the PTNS works well from the perspective of system design but it has proven to be burdensome for 'day-boat' operators and observer service providers. As discussed previously, many 'day-boat' vessel operators will submit a notification for every day of the week in order to maintain the flexibility to fish around weather and/or crew availability; trips on which they don't sail are then canceled both before and after the provider assignment. With the service provider potentially varying from trip to trip this translates numerous phone calls, emails, and communication with a variety of contacts in a given week and is a source of frustration. Industry has expressed a desire to be selected for an entire week's worth of trips, such that any time the vessel sails during that week, an observer must be on board and communication would only occur with a single provider. The weekly notification strategy is currently employed in the herring fleet; however, there are large differences in size and complexity between the two fisheries. Additionally, observer coverage in the herring fishery is deployed using a manual call-in system, not an automated statistical design. Weekly notifications would require significant restructuring of the PTNS but has been considered for future upgrades.

Criticisms of the PTNS

A recent report criticized several aspects of the PTNS (NEI 2011); however, these criticisms were levied without a full understanding of how the PTNS functions. One aspect of the report criticized the PTNS for not achieving normally distributed coverage. As was illustrated in the theoretical simulations (Figures 9 and 10) and documented in practice, it is not expected that the distribution of PTNS selections will be normally distributed. The linear selection method of the PTNS actively works to reduce variance, resulting in under-dispersion. The authors of the NEI (2011) report did accurately capture some of the vessel coverage equitability issues that had plagued the PTNS design in fishing year 2010; however, by the time the report was published in September 2011, these issues had largely been resolved.

The NEI (2011) authors incorrectly assumed that the inequities across sector level coverage (e.g., Figure 27 and 28) were due to varying target coverage rates across strata in response to meeting specified CV requirements. "*It is reasonably clear that combined coverage levels of NEFO[P]s and ASMs across sectors were unequal in FY 2010 from a statistical perspective…We believe*

that one plausible reason for this is that NEFSC-FSB goals in setting coverage levels were based on meeting "coefficient of variation" requirements for specific gears fished in specific areas (Gear/Area Stratum) as outlined in the 2010 SBRM process (NEFSC-FSB, 2010b). These requirements are likely to be at odds with a goal to have fair and equitable coverage levels across sectors, particularly if SBRM coverage levels vary across strata and if sectors have varying levels of participation in different strata." Their assumption is not correct. In 2010, all strata within a tier were assigned identical target coverage rates, with the exception of the NMFS-funded ASM target coverage rate for the common pool. The inequities across strata in 2010 were the result of differential vessel compliance with PTNS requirements and provider selections.

The NEI (2011) report also took issue with the fact that the coverage of the groundfish fishery was not achieving fishing year 2010 coverage goals of 38% that were being referenced publicly. Ultimately, the groundfish fishery was covered at approximately 29.3% in 2010 (Table 6). The discrepancy between publicly referenced targets and realized coverage raises important issues about the realities of developing sea day budgets and running a PTNS-type system. If the PTNS could operate off of a limitless budget, it could be tuned to realized target coverage rates. However, that is not the reality of how most observer deployment programs are operated. The sea days allocated prior to the start of the fishing years are contingent on many factors, one of which is the desired coverage levels. Once the fishing year begins, sea day allocations seldom change, and the realized target coverage rates are primarily a function of allocated sea days, fleet activity, and observer availability.

Expansion to other Northeast U.S. fisheries

Automated observer deployment systems will likely become more commonplace as fishery regulations become more complex in response to industry demands for greater flexibility and need for improved accuracy and precision in monitoring fishery catches. While the PTNS was a first-of-its-kind automated deployment system, since the deployment of the PTNS in May 2010, at least one other system has been developed and deployed in North America. The National Marine Fisheries Service's Alaska Region developed and deployed their Observer Declare and Deploy System (ODDS) for the groundfish and Pacific halibut, *Hippoglossus stenolepis*, fisheries on January 1, 2013 (USOFR 2012). The system has objectives similar to the PTNS in that it attempts to deploy observers in a statistically unbiased manner among a subset of the fleet chosen for trip-based selection.

Though not described in this paper, based on the initial success of the PTNS in the groundfish fishery, the PTNS was expanded to the targeted long finned squid (*Doryteuthis pealeii)* fishery in January 2011 (Table 3). There are other fisheries in the northeast U.S. with existing observer notification requirements, such as the Atlantic sea scallop (*Placopecten magellanicus*) and Atlantic herring (*Clupea harengus*) fisheries, which could be incorporated into the PTNS. For vessels participating in multiple fisheries, a single observer notification system could streamline

vessel reporting requirements. Additionally, it may offer efficiencies with respect to system administration and support. While broadening the scope of the PTNS can offer many efficiencies, past experiences with large-scale improvements and application to multiple fisheries has shown that large changes to a system of this complexity are not simple and require extensive planning and development time to properly implement.

ACKNOWLEDGEMENTS

We would like to thank Chris Legault and Susan Wigley for informative discussions leading to the final design of the PTNS. The NEFSC Data Management Systems staff provide support of the networks and databases on which this system resides. A debt of gratitude is also owed to members of the NEFSC Fisheries Sampling Branch who provide the administrative and operational support for the PTNS without which the system would not function.

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TABLES

Table 1. List of the selection tiers within the groundfish Pre-Trip Notification System (PTNS).

Tier order	Selection tier	Tier description	Tier Type	Coverage type
1	Manual waiver	Allows for a system administrator to waive coverage of a trip.	Conditional	Waiver
2	Set-only (gillnet only)	Used to waive observer coverage on gillnet trips that are sailing only for the explicit purpose of setting gear. This is used only when there is no intention of hauling gear and subsequently no harvest of fish.	Conditional	Waiver
3	Do not deploy - safety	Used to waive observer coverage on a short-term basis when a vessel has been previously identified to be a safety concern for deployed observers.	List	Waiver
4	Do not deploy - coverage	Used to waive observer coverage on a short-term basis for individual vessels documented to have experienced excessively high coverage.	List	Waiver
5	Northeast Fisheries Observer Program (NEFOP) baseline coverage	Provides the baseline coverage of the groundfish fishery using NEFOP trained observers	Probability-based	NEFOP
6	Special Management Program (SMP) coverage	Provides coverage of SMPs in the event that the base NEFOP and ASM coverage is insufficient to meet the coverage demands of indicidual SMPs.	Probability-based	NEFOP
7	Protected species coverage	Provides coverage for the monitoring of protected species bycatch.	Sea day schedule	NEFOP-limited
8	NMFS funded At-Sea Monitoring (ASM)	Provides ASM coverage of the groundfish fishery beyond NEFOP coverage needed to meet sector monitoring demands. Trips selected at this tier are funded by NMFS.	Probability-based	ASM
9	Industry funded At-Sea Monitoring (ASM) - *optional*	Provides ASM coverage of the groundfish fishery beyond NEFOP coverage needed to meet sector monitoring demands. Trips selected at this tier are funded by industry.	Probability-based	ASM
10	Keep active	Provides coverage to meet a range of short-term compliance needs where coverage is required for certain vessels.	List	ASM

Table 2. Example of the provider selection process when multiple providers exist for a Pre-Trip Notification selection tier. In this example the random selection variable, $r_{provider}$ = 0.294. The lists are sorted in ascending order based on the number of certified observers each provider has in service at the time of the trip notification. Selection is performed based on a comparison of the random selection variable to the cumulative proportion of each provider. The selected provider of At-Sea Monitor (ASM) coverage for each step is highlighted in grey.

Provider selection step	ASM provider	Certified observers	Total observers in region	Proportion of observers in region	Cumulative proportions
1	Provider C	4	39	0.103	0.103
	Provider A	5	39	0.128	0.231
	Provider D	10	39	0.256	0.487
	Provider B	20	39	0.513	1.000
2	Provider C	4	29	0.138	0.138
	Provider A	5	29	0.172	0.310
	Provider B	20	29	0.690	1.000

Table 3. List of Pre-Trip Notification System (PTNS) modifications over time.

Version number	Date	Scope of modification	System modification
1.0.1	May 1, 2010	Major	Initial release
1.0.2	May 18, 2010	Minor	Miscellaneous bug fixes
1.0.3	June 16, 2010	Minor	Improved functionality and usability
1.1.1	August 16, 2010	Major	Handling of set-only gillnet trips and first attempt to address observer avoidance issues
1.1.2	September 2, 2010	Moderate	Addition of the protected species coverage tier, collection of trip duration information
1.1.3	November 3, 2010	Minor	Miscellaneous system work to improve functionality and prepare the system to accommodate other non-groundfish fisheries
1.2.1	December 30, 2010	Major	Incorporation of the directed long-finned squid fishery (non-groundfish)
1.2.2	January 4, 2011	Minor	Upgrade to the PTNS web-server
1.3.1	May 2, 2011	Major	Implementation of 'separate' tier selection and compliance thresholds

Table 4. Summary of the Northeast Fisheries Observer Program (NEFOP) and At-Sea Monitor (ASM) sea days allocation and utilization by fishing year.

Coverage type	Year	Allocated sea days	Utilized sea days	Percent sea days utilized (%)
NEFOP	2010	2,208	1,863	84.4%
	2011	3,386	2,694	79.6%
	2012	1,338	1,320	98.7%
ASM	2010	5,991	5,761	96.2%
	2011	6,814	6,909	101.4%
	2012	5,225	4,887	93.5%

Table 5. Summary of Pre-Trip Notification System (PTNS) trip selections by fishing year and selection tier. Trips indicated as observed within the PTNS are also summarized. *Note that trip and observed trip counts reflect internal PTNS counts and may not match the external estimates contained in Tables 6-8. Acronyms: At-Sea Monitoring (ASM), National Marine Fisheries Service (NMFS), Northeast Fisheries Observer Program (NEFOP), Special Management Program (SMP).*

Fishing year	Total annual declared trips	Tier order	Selection tier	Trips selected	Percentage of total trips (%)	Trips observed	Percentage of total trips (%)
2010	15,851	1	Manual waiver	559	3.5		0.0
		2	Set-only	108	0.7		0.0
		3	Do not deploy - safety	83	0.5		0.0
		4	Do not deploy - coverage	213	1.3		0.0
		5	NEFOP	3,354	21.2	882	5.6
		6	SMP	38	0.2	14	0.1
		7	Protected species limited coverage	203	1.3	51	0.3
		8	NMFS-funded ASM	5,489	34.6	3,044	19.2
		10	Keep active	12	0.1	4	0.0
		11	Not selected	5,792	36.5		0.0
2011	14,062	1	Manual waiver	333	2.4		0.0
		2	Set-only	172	1.2		0.0
		3	Do not deploy - safety	160	1.1		0.0
		4	Do not deploy - coverage	303	2.2		0.0
		5	NEFOP	5,618	40.0	1,029	7.3
		6	SMP	8	0.1	6	0.0
		7	Protected species limited coverage	133	0.9	111	0.8
		8	NMFS-funded ASM	4,669	33.2	3,022	21.5
		10	Keep active	228	1.6	110	0.8
		11	Not selected	2,438	17.3		0.0
2012	12,745	1	Manual waiver	213	1.7		0.0
		2	Set-only	89	0.7		0.0
		3	Do not deploy - safety	61	0.5		0.0
		4	Do not deploy - coverage	842	6.6		0.0
		5	NEFOP	2,395	18.8	806	6.3
		6	SMP	8	0.1	1	0.0
		7	Protected species limited coverage	50	0.4	45	0.4
		8	NMFS-funded ASM	2,372	18.6	1,701	13.3
		10	Keep active	709	5.6	590	4.6
		11	Not selected	6,006	47.1		0.0

Table 6. Estimates of observer coverage rates in the groundfish fishery for fishing years 2010-2012 by coverage type. *Acronyms: At-Sea Monitoring (ASM), National Marine Fisheries Service (NMFS), Northeast Fisheries Observer Program (NEFOP), Vessel Monitoring System (VMS).*

Fishing Year	Tier Name	Observed trips	Total VMS trips	Tier coverage	Fraction of annual trips receiving observer coverage
2010	NEFOP	898	13,313	0.067	0.293
	NMFS-funded ASM	2,998		0.225	
2011	NEFOP	1,005	15,614	0.064	0.260
	NMFS-funded ASM	3,047		0.195	
2012	NEFOP	784	14,315	0.055	0.208
	NMFS-funded ASM	2,193		0.153	

Table 7. Summary of Pre-Trip Notification System (PTNS) compliance by fishing year, sector type (common pool or sector) and Vessel Monitoring System (VMS) activity declaration (groundfish, monkfish). PTNS compliance refers the fraction of groundfish trip declared through a VMS activity declaration with a positive PTNS notification. *Note that the PTNS trip counts only include PTNS notifications that could be matched to a VMS-declared trip within a 48 hour tolerance window.*

Sector type	Fishing year	Trip type	Total groundfish trips	Fraction of groundfish trips fishing on monkfish DAS	Trips declared into PTNS	Fraction of trips declared into PTNS
Common pool	2010	Groundfish	776	0.569	586	0.755
		Monkfish	1,026		124	0.121
	2011	Groundfish	316	0.795	228	0.722
		Monkfish	1,228		175	0.143
	2012	Groundfish	213	0.794	146	0.685
		Monkfish	819		60	0.073
Sector	2010	Groundfish	10,281	0.107	9,238	0.899
		Monkfish	1,230		979	0.796
	2011	Groundfish	12,690	0.098	11,728	0.924
		Monkfish	1,380		1,168	0.846
	2012	Groundfish	12,153	0.085	10,843	0.892
		Monkfish	1,130		908	0.804

Table 8. Results of a Runs Test for randomness on the Pre-Trip Notification System (PTNS) r_{tier} values. The Z statistics are presented by fishing year and PTNS selection tier for with the associated p-values shown in parentheses. Tier-level r_{tier} were not available prior to fishing year 2011.

Tier	2011	2012
NEFOP	0.985 (*0.325*)	0.587 (*0.557*)
NMFS-funded ASM	-0.735 (*0.462*)	0.843 (*0.399*)

Table 9. Provider decline rates by trip type (day and multi-day). Odds ratio are expressed in terms of decline rates between trip types (odds ratios are multi-day/day). *Note that 2010 is a partial year since trip type could not be tracked prior to September 2, 2010. Additionally, trip counts and associated observer coverage rates will differ from those in Table 4 due to differences in the information source (internal Pre-trip Notification System data vs. external sources).*

Fishing year	**Trip type**	**Total trips taken**	**Trips offered to provider**	**Trips accept by provider**	**Trips declined by provider**	**Observer coverage level**	**Probability of provider declining the trip**	**Odds of provider decline**	**Odds ratio (95% CI)**	***P*-value**
2010	Day	7,771	4,485	1,859	2,626	0.24	0.59	1.41	0.12 (0.10-0.16)	<.0001
	Multi-day	1,670	576	491	85	0.29	0.15	0.17		
2011	Day	11,586	9,187	3,373	5,814	0.29	0.63	1.72	0.35 (0.31-0.39)	<.0001
	Multi-day	2,476	1,446	905	541	0.37	0.37	0.60		
2012	Day	10,390	4,316	2,654	1,662	0.26	0.39	0.63	2.30 (2.02-2.62)	<.0001
	Multi-day	2,355	1,199	491	708	0.21	0.59	1.44		

FIGURES

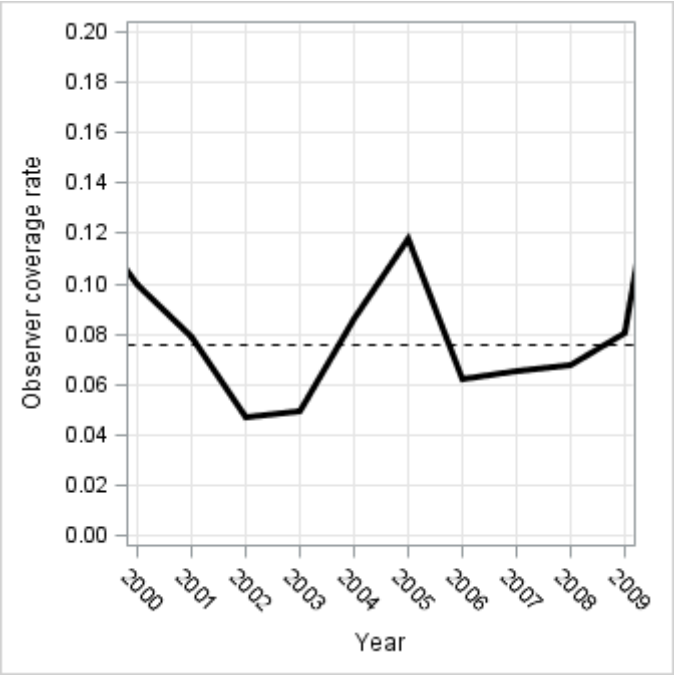

Figure 1. Observer coverage rate estimates for the northeast United States groundfish fishery between 2000 and 2009. The dashed line indicated the mean coverage rate over the time period. Note that groundfish coverage rate estimates are sensitive to many analytical assumptions and are illustrative rather than definitive.

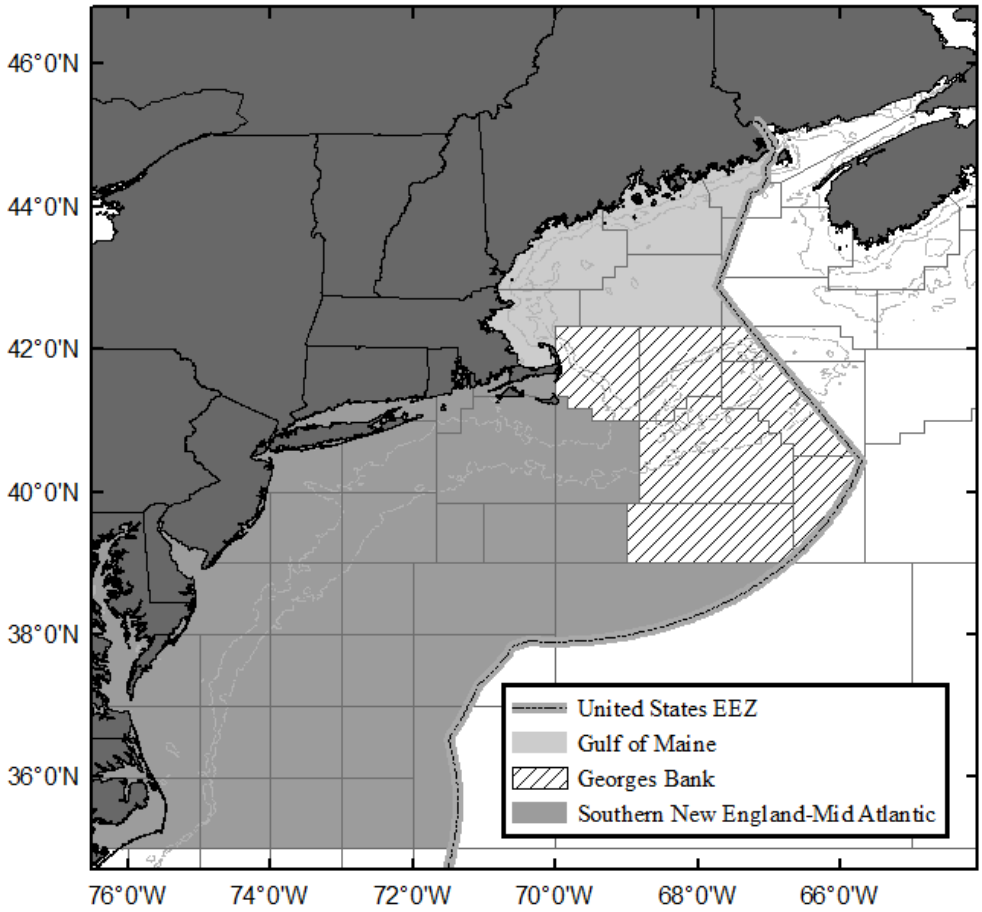

Figure 2. Map of the offshore waters of the northeast United States showing the three fishing regions as defined by the Pre-Trip Notification System within the U.S. Exclusive Economic Zone (EEZ). The gridded area delineates North Atlantic Fisheries Organization (NAFO) statistical areas. The 50 m and 100 m bathymetry lines are indicated by thin grey lines.

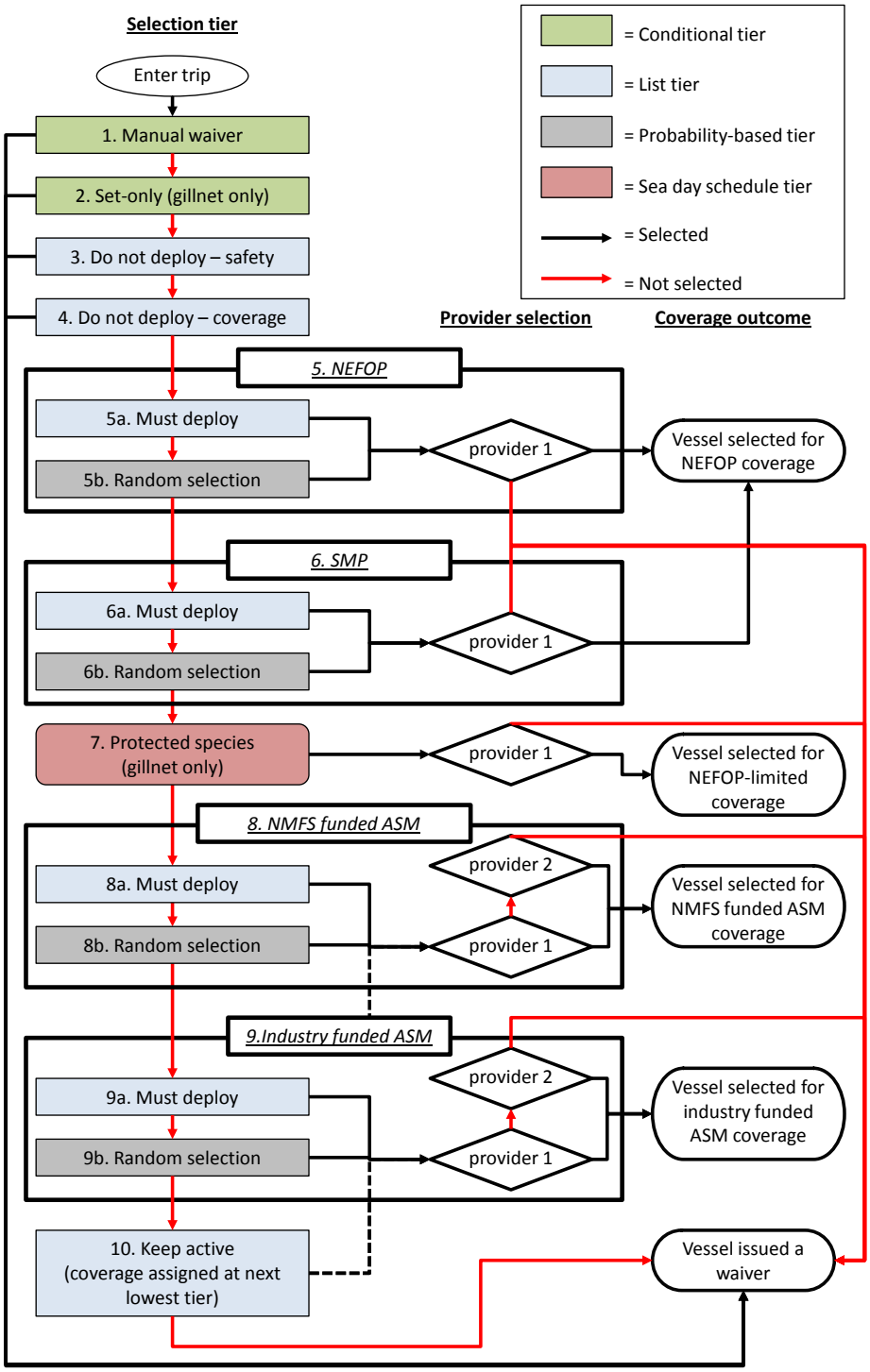

Figure 3. Schematic diagram illustrating the hierarchal tier selection of the groundfish Pre-Trip Notification System. *Acronyms: At-Sea Monitoring (ASM), National Marine Fisheries Service (NMFS), Northeast Fisheries Observer Program (NEFOP), Special Management Program (SMP).*

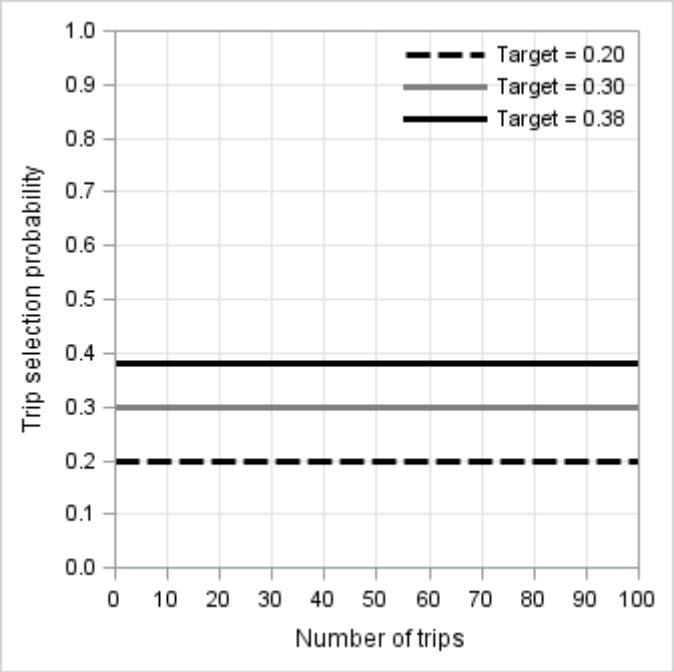

Figure 4. Schematic illustrating the ‘fixed’ method for determining trip selection probabilities. The application of the fixed method at three different target coverage rates (0.20, 0.30, 0.38) is shown.

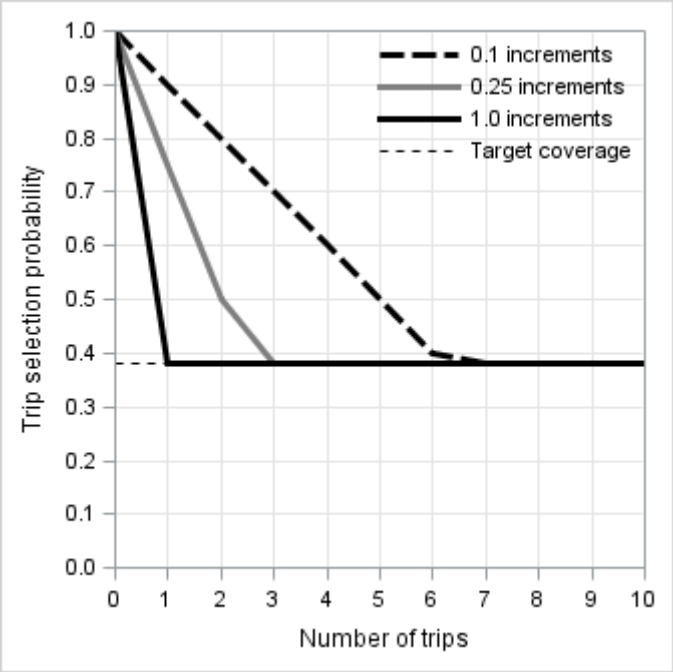

Figure 5. Schematic illustrating the ‘incremental’ method for determining trip selection probabilities. The selection probability is a function of the total number of trips existing within the stratum combined with a sequential decrementing of the selection probability based on a pre-determined increment amount (0.1, 0.25, 1.0). In all examples the target coverage rate is set at 0.38.

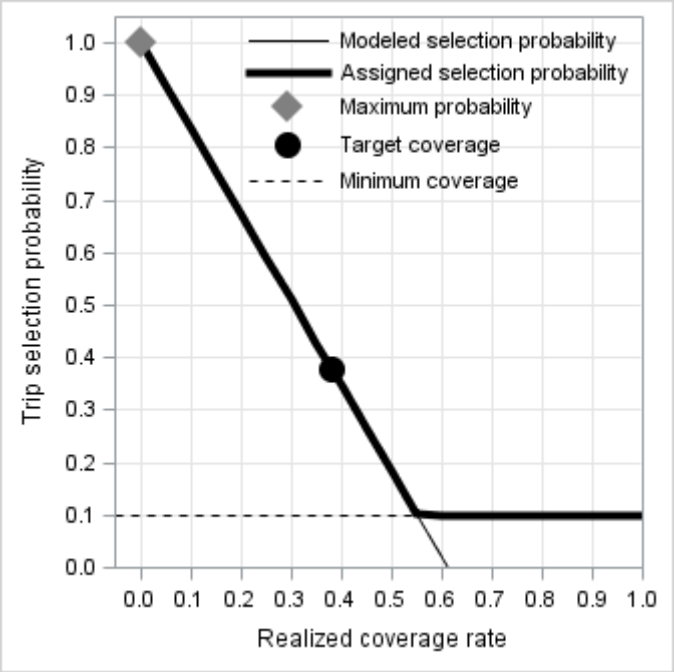

Figure 6. Schematic illustrating the ‘linear’ method for determining trip selection probabilities. In the ‘linear’ method, selection probabilities are determined based on the realized observer coverage rates for each stratum at the time at which the trip is entered into the selection process. The ‘linear’ method requires specification of three parameters: a maximum probability (probability of selection when realized coverage is equal to zero), a target probability (i.e., target coverage rate), and a minimum coverage rate.

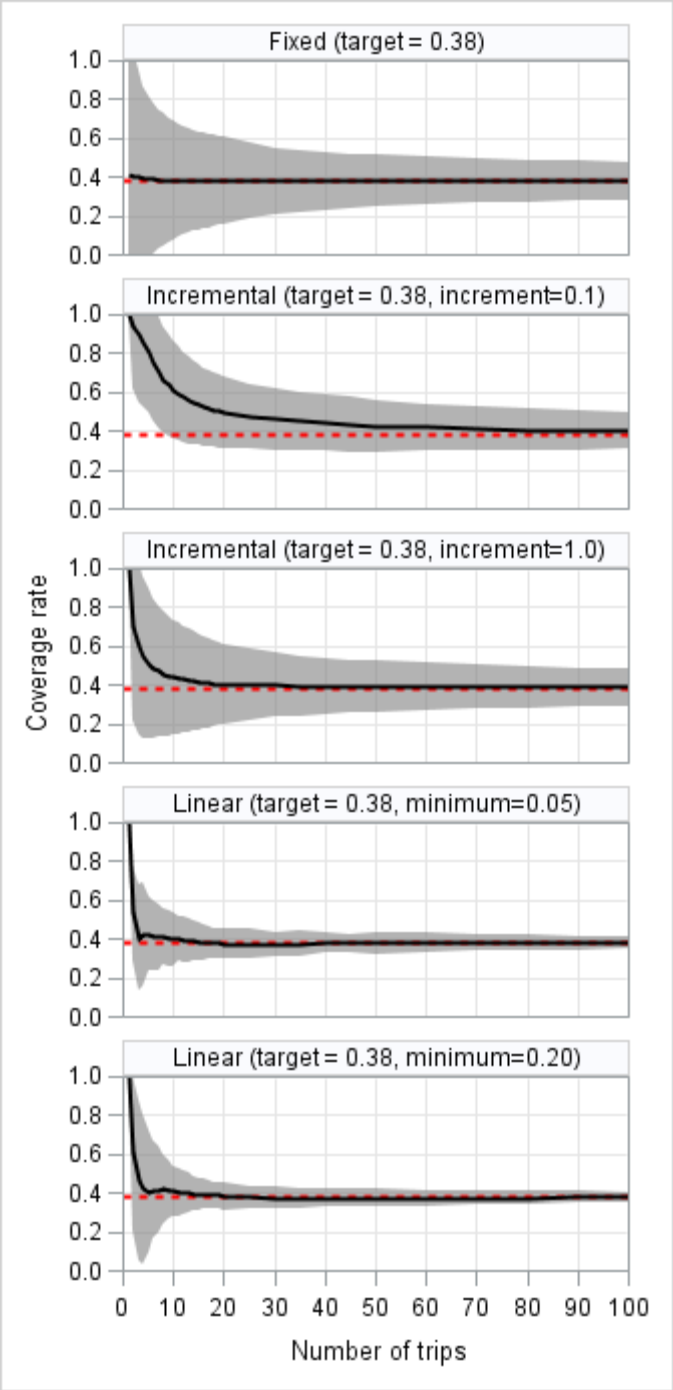

Figure 7. Comparative performance of the 'fixed', 'incremental', and 'linear' selection methods with respect to meeting a target coverage rate. Results are based on 500 iterations of a simple single-tier simulation with a specified target coverage rate of 0.38 (dashed red line). The mean coverage (solid black line) and 95% confidence intervals (grey band) from all simulation runs is shown.

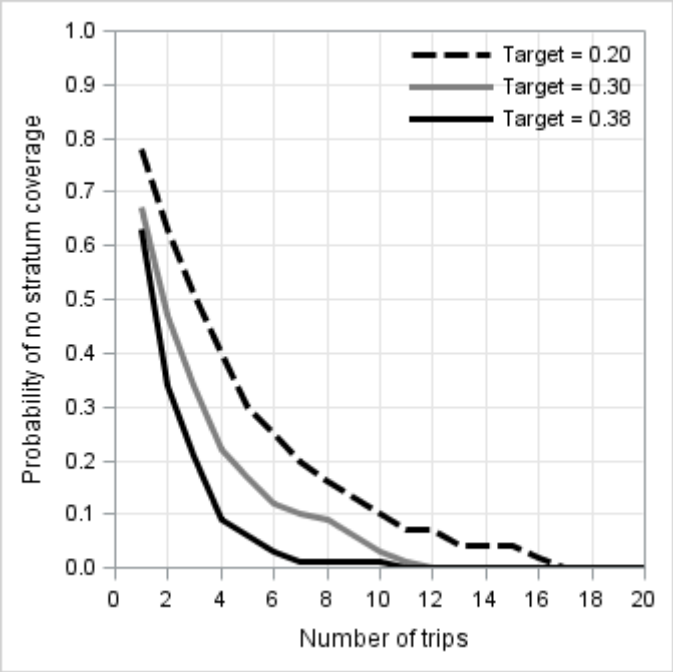

Figure 8. Mean probability of having no observer coverage within a stratum as a function of total stratum trips when using the 'fixed' method to assign observer coverage at three target coverage levels (0.20, 0.30, 0.38). Results shown are based on 100 iterations of a simple, single-tier simulation.

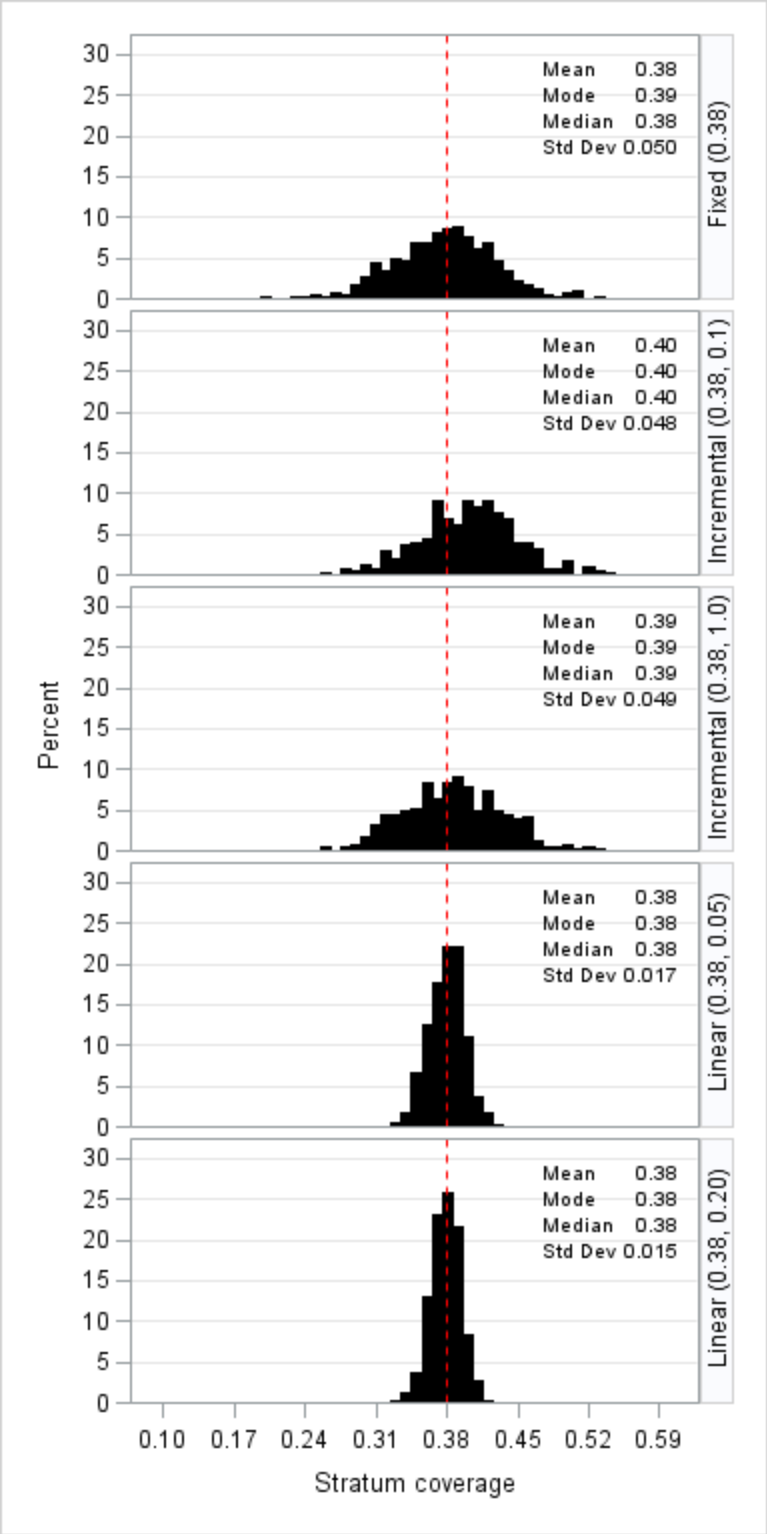

Figure 9. Histogram of coverage distributions from ‘fixed’, ‘incremental’, and ‘linear’ selection methods. Results are from 500 iterations of a simple single-tier simulation with a specified target coverage rate of 0.38 (dashed red line).

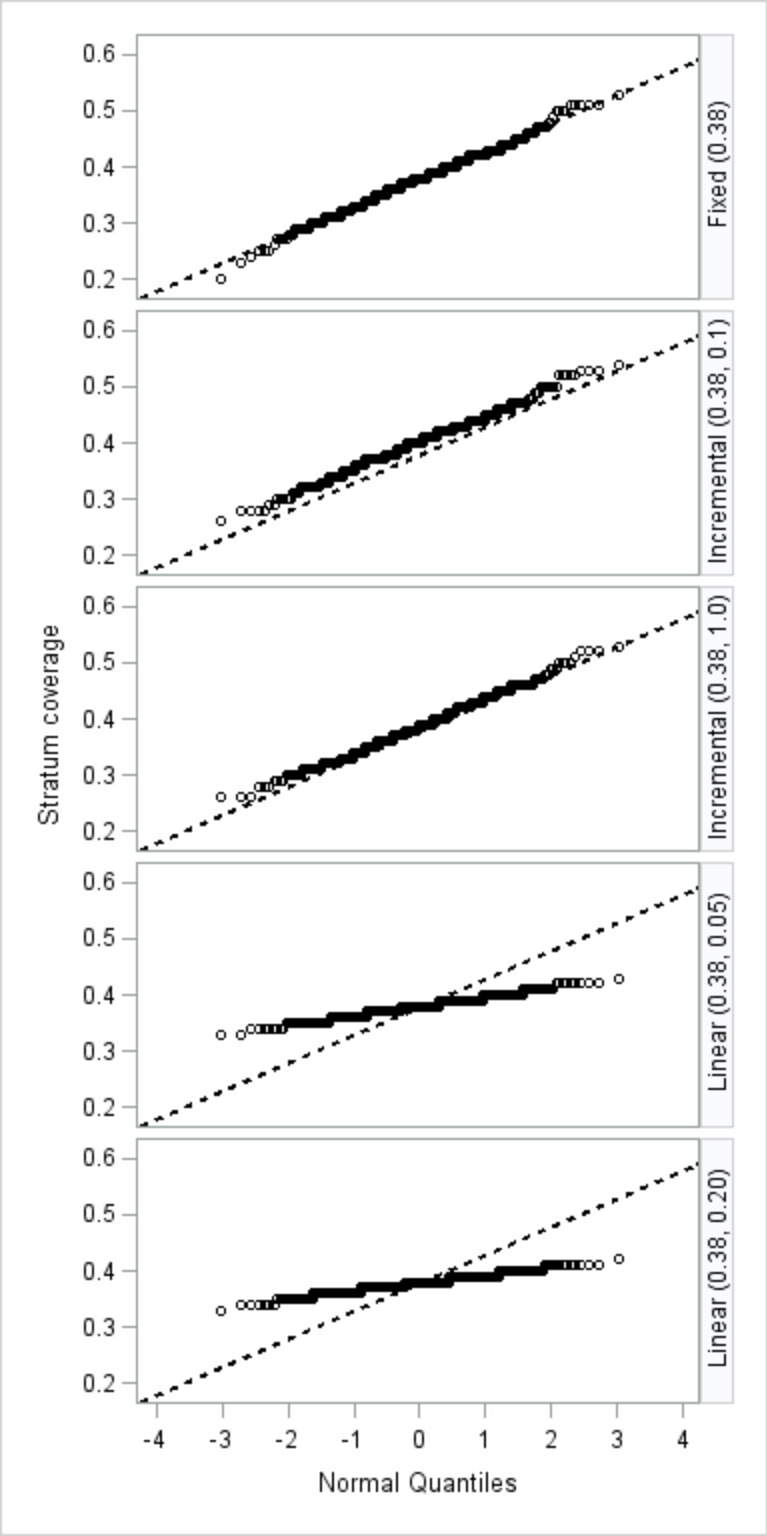

Figure 10. Quantile-quantile plots (Q-Q plots) from ‘fixed’, ‘incremental’, and ‘linear’ selection methods. Results are from 500 iterations of a simple single-tier simulation.

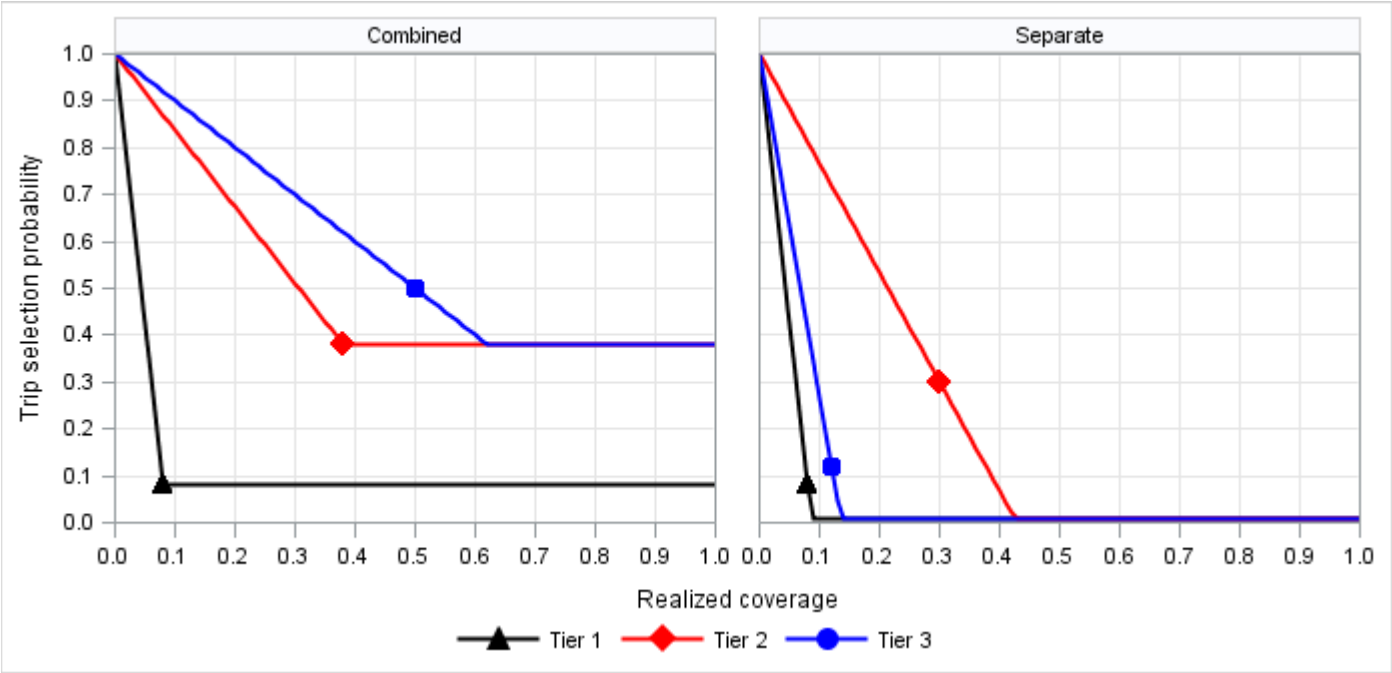

Figure 11. Examples of a 'separate' and 'combined' selection design under a three-tiered system. In both examples the target coverage rates for the selection tiers are as follows: Tier 1 = 0.08, Tier 2 = 0.30, Tier 3 = 0.12. The tier-level target coverage rates are identified by the markers in each of the plots. In a 'combined' system, each trip is assigned a single random value and the tier selection probabilities are cumulative; e.g., Tier 1 is assigned a 0.08 target probability, Tier 2 is assigned a 0.38 target (0.08 + 0.30) and Tier 3 is assigned a 0.50 target (0.08 + 0.30 + 0.12). In a 'separate' system, with the exception of the last tier, the minimum coverage rates must be set equal to the target coverage. In a 'combined' system, each trip is assigned a separate random value for each selection tier and the selection probabilities are independent of other tiers. In a 'separate' system the minimum coverage rates can be set to any desired value at or below the target coverage rate.

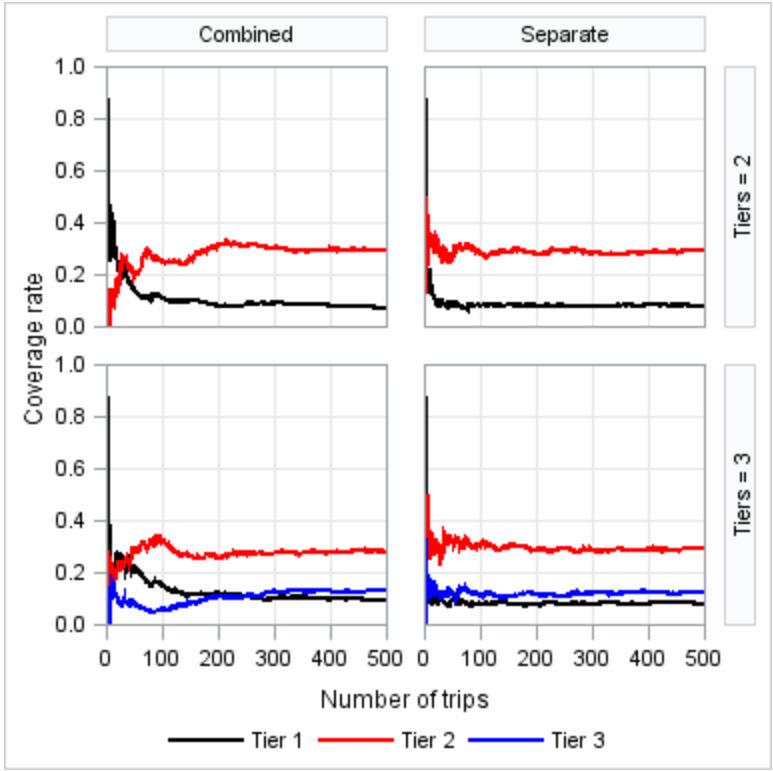

Figure 12. An example of the performance of the ‘separate’ and ‘combined’ selection designs in both a two- and three-tier system. For each scenario, 500 trips were entered into a single-stratum simulation; the results shown reflect one realization of the simulation. The target coverage rates for the tiers in each simulation are: Tier 1 = 0.08, Tier 2 = 0.30, Tier 3 = 0.12.

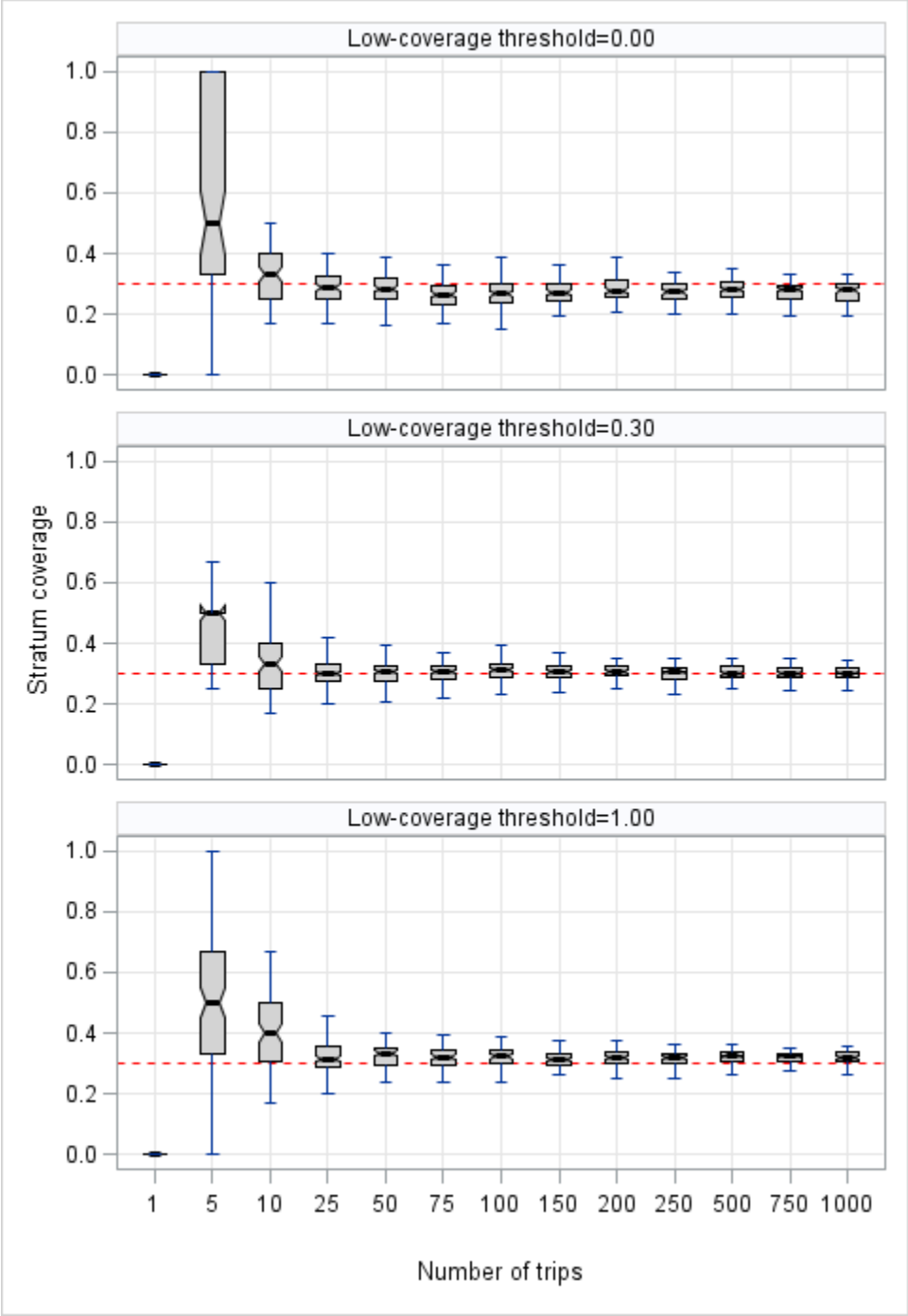

Figure 13. Distribution of 100 simulated PTNS stratum coverage rates as function of the number or trips declared using three different low-coverage thresholds: 0%, 30% (target), and 100%. In all simulations the target coverage rate was set at 30% with a 1% minimum and the provider decline rate was held constant at 10%. Boxes show the 25th, 50th and 75th percentiles; whiskers reflect the 10th and 90th percentiles.

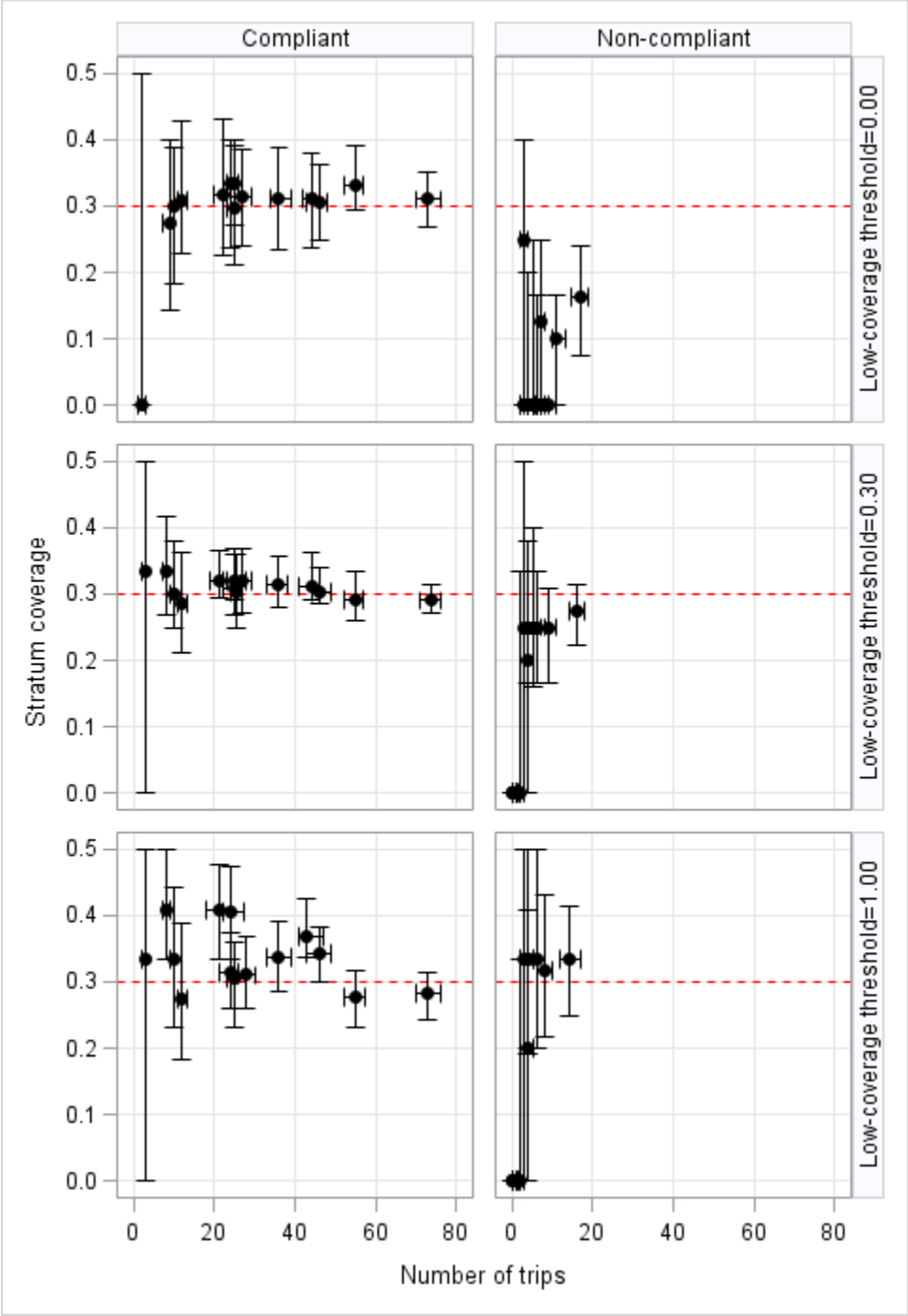

Figure 14. The median and 25th and 75th percentile of individual vessel trip counts and coverage rates from 100 PTNS simulations run under three different low-coverage thresholds: 0%, 30% (target), and 100%. In all simulations the target coverage rate was set at 30% with a 1% minimum and the provider decline rate was held constant at 10%.

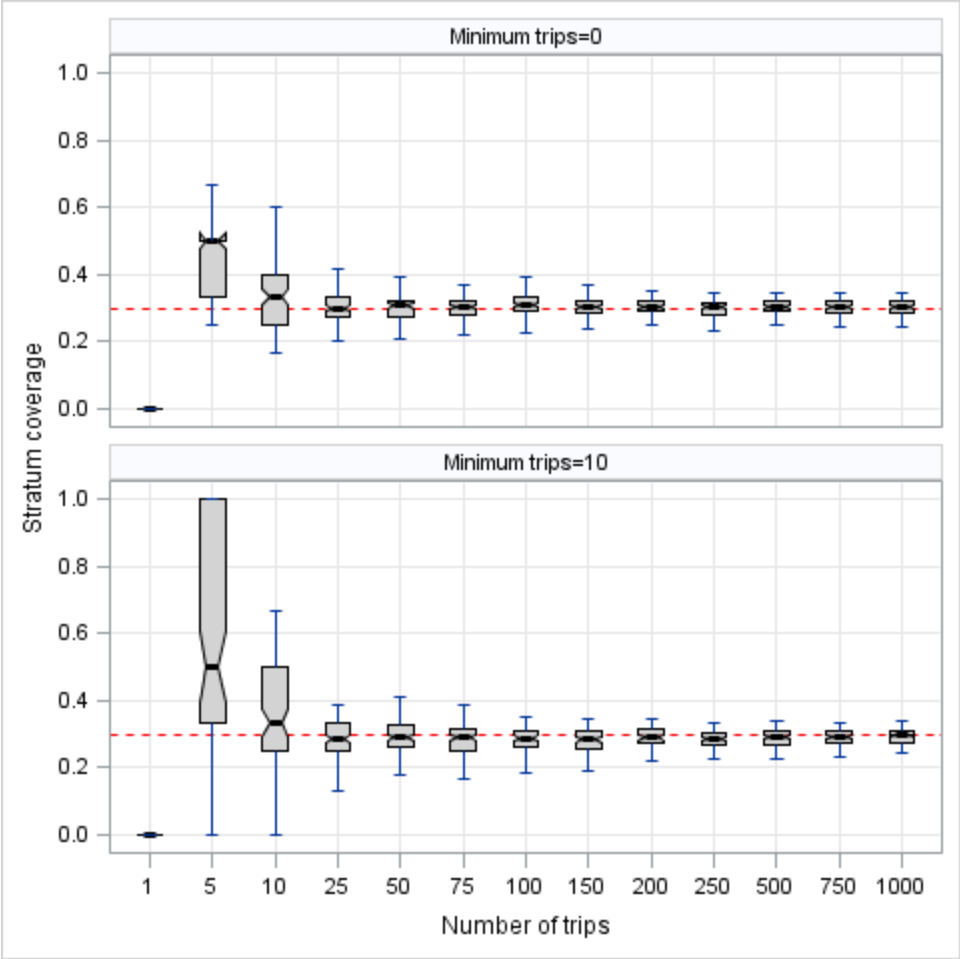

Figure 15. Distribution of 250 simulated PTNS stratum coverage rates as function of the number or trips declared using two different minimum trip thresholds: 10 trips and 0 trips. In both simulations the target coverage rate was set at 30% with a 5% minimum, the provider decline rate was held constant at 10% and the low-coverage threshold was set at 30%. Boxes show the 25th, 50th and 75th percentiles; whiskers reflect the 10th and 90th percentiles and the dots reflect the 5th and 95th percentiles. The bold red line represents the mean.

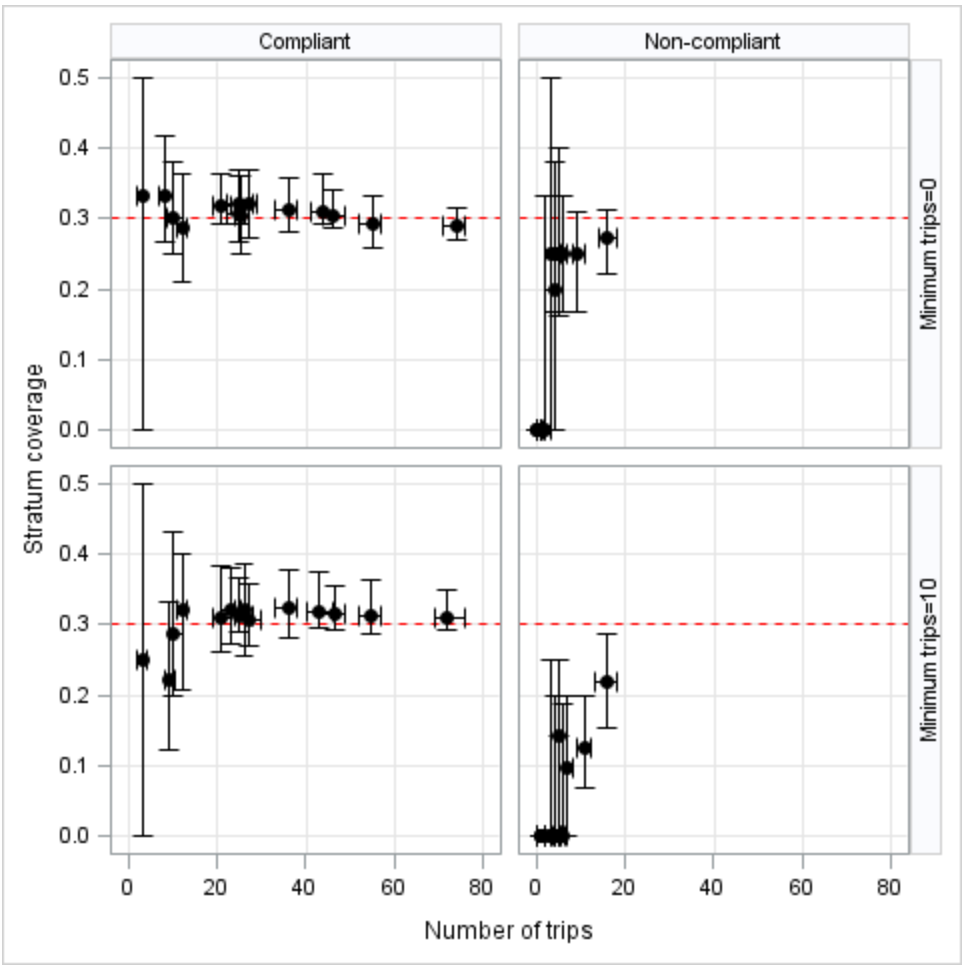

Figure 16. The mean and standard deviation of individual vessel trip counts and coverage rates from 250 PTNS simulations run under two different minimum trip thresholds: 10 trips and 0 trips. In both simulations the target coverage rate was set at 30% with a 5% minimum, the provider decline rate was held constant at 10% and the low-coverage threshold was set at 30%.

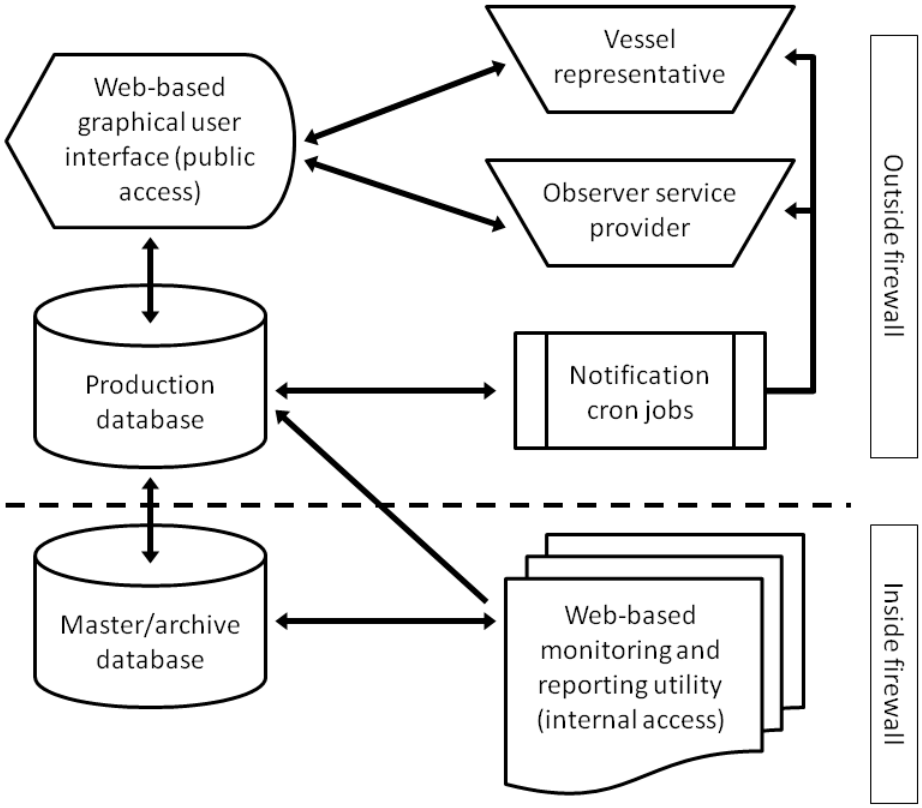

Figure 17. Data flow processes and major information technology components of the Pre-Trip Notification System (PTNS).

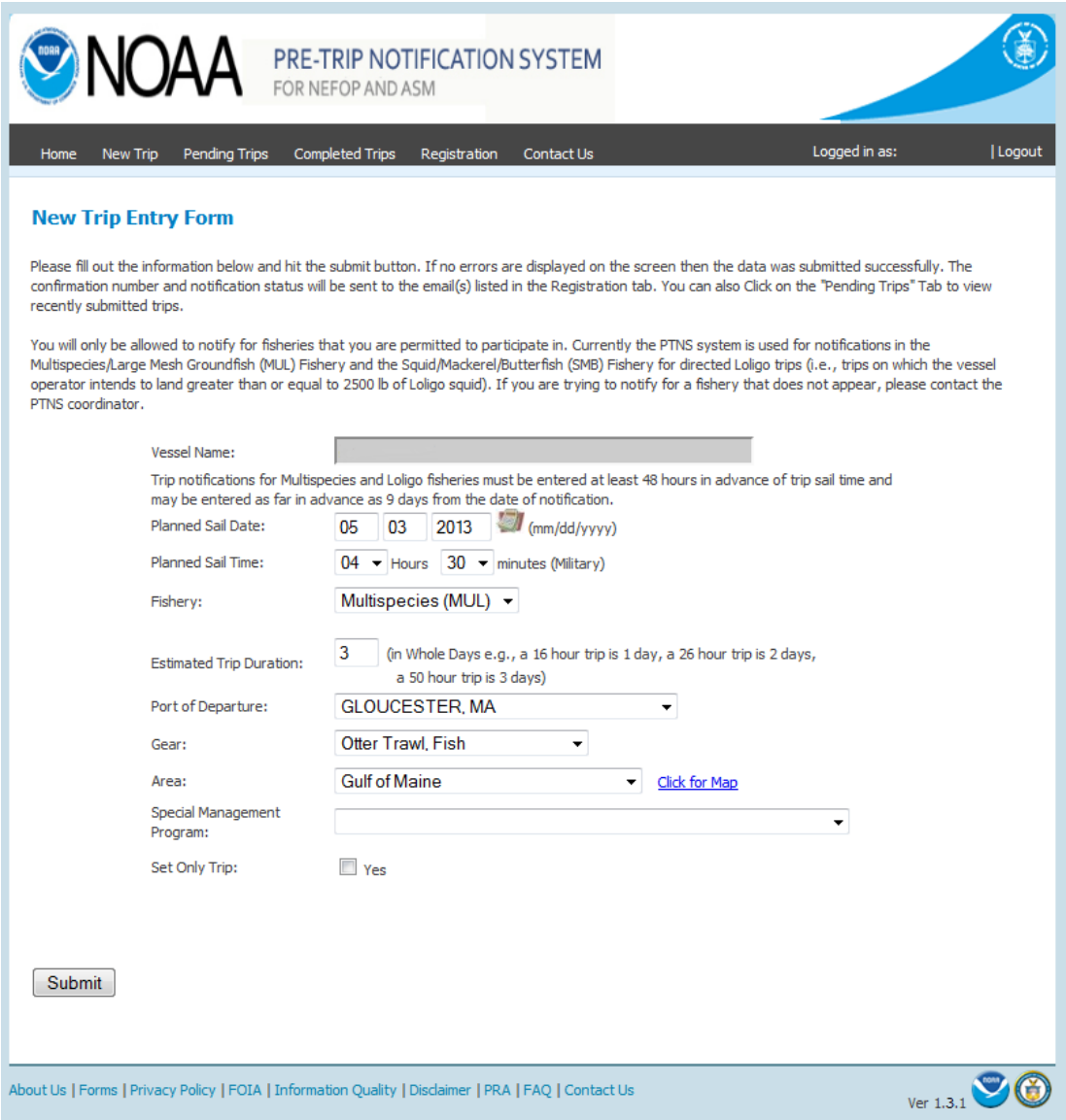

Figure 18. Screenshot of the trip declaration screen from the web-based Pre-Trip Notification System (https://fish.nefsc.noaa.gov/cgi-bin/PTNS/login.pl).

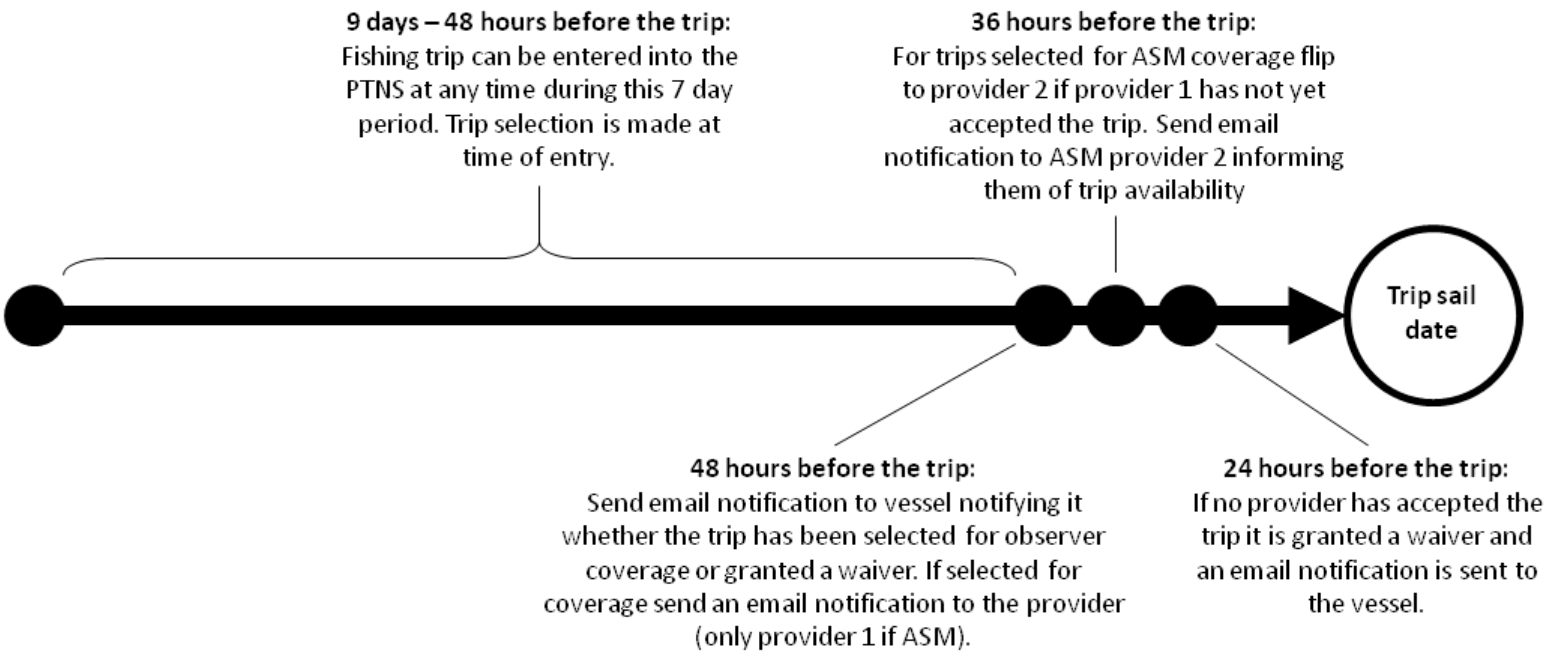

Figure 19. Timeline of observer Pre-Trip Notification System (PTNS). After initial trip entry the system events are controlled by Unix cron jobs. Once a provider has accepted a trip the PTNS will send an automatic notification to the email informing them of the selection and identifying the provider.

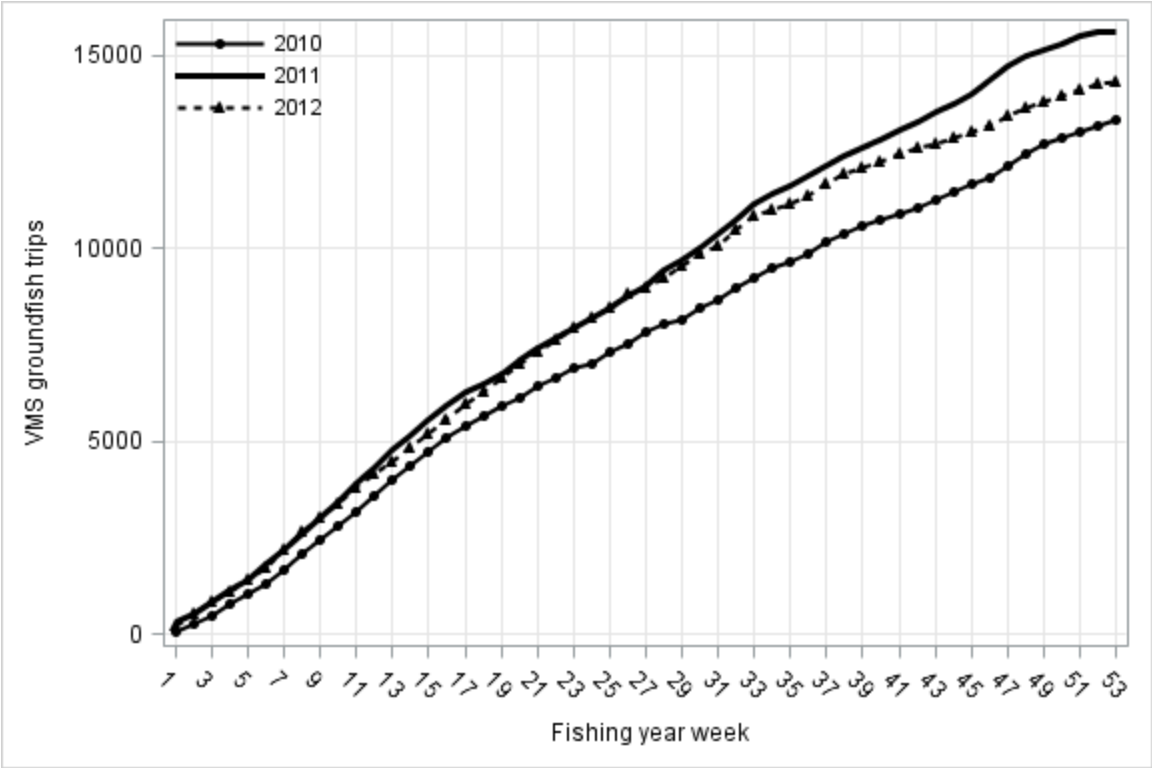

Figure 20. Groundfish trips over time by fishing year as estimated from VMS activity declarations.

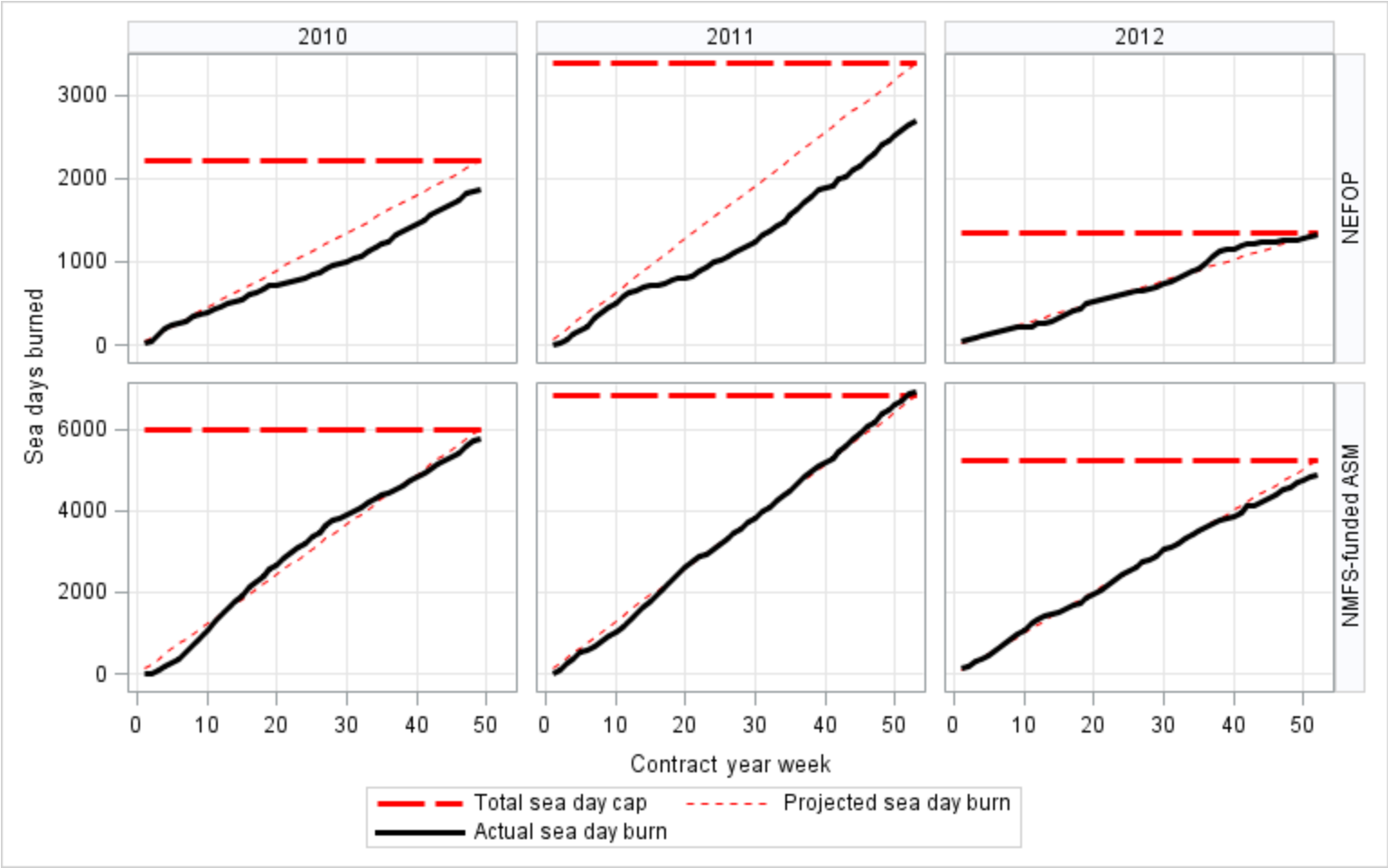

Figure 21. Sea day utilization over time (solid black line) relative to the annual allocated sea days (cap, thick dashed red line) and a constant burn trajectory (projected, dashed red line) for both Northeast Fisheries Observer Program (NEFOP) and National Marine Fisheries Service funded At-Sea Monitors (NMFS-funded ASM) for the years 2010 to 2012. *Note that the years reflect sea day contract years which run from April 1 to March 30. In 2010, the contract year did not start until the start of the groundfish fishing year on May 1, 2010.*

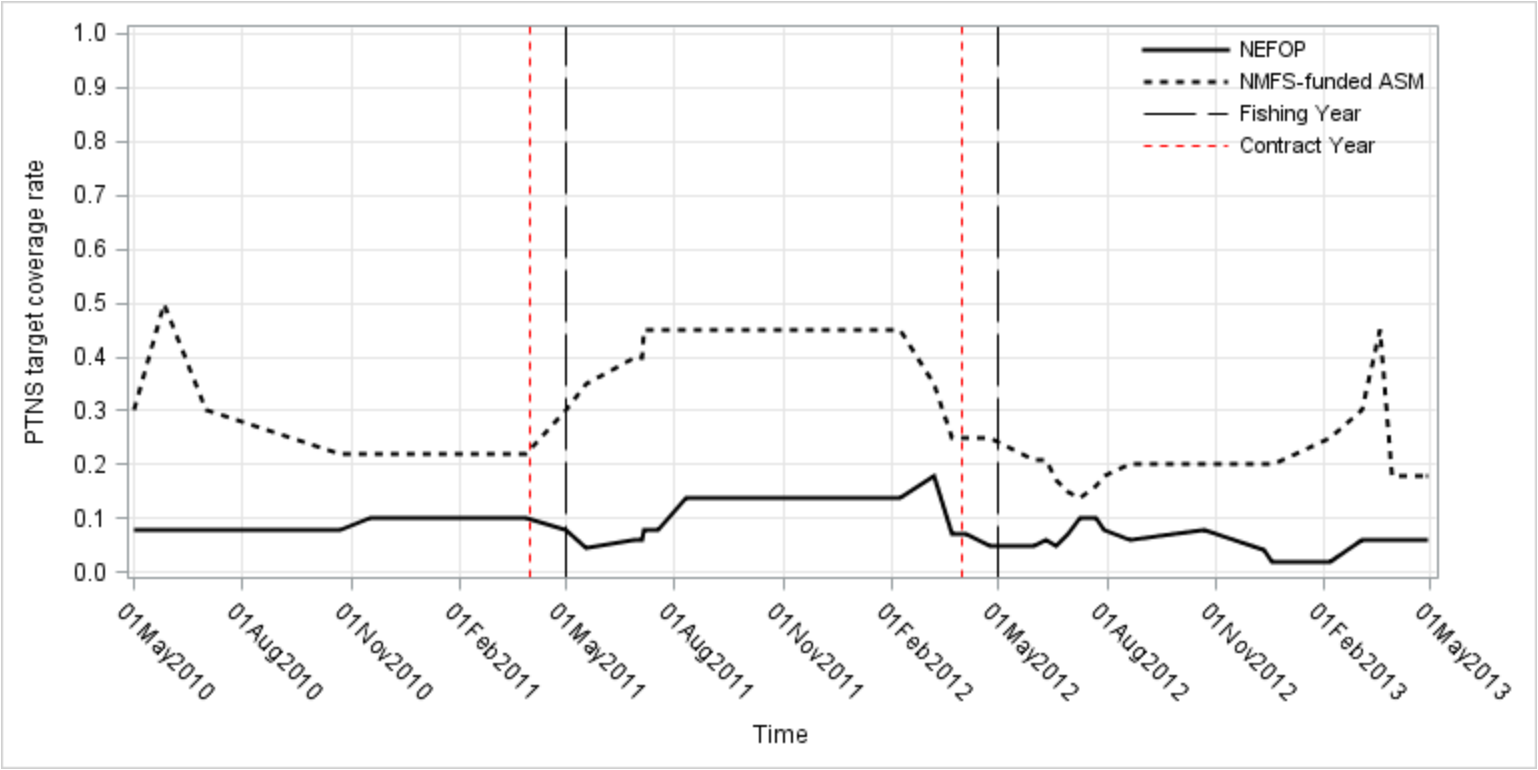

Figure 22. Target coverage rate settings of the Pre-Trip Notification System (PTNS) from May 1, 2010 to April 30, 2013 for both the Northeast Fisheries Observer Program (NEFOP) and National Marine Fisheries Service funded At-Sea Monitors (NMFS-funded ASM) tiers. The dashed red lines denote the start of the provider contract years on April 1 and the black vertical lines denote the start of individual fishing years on May 1.

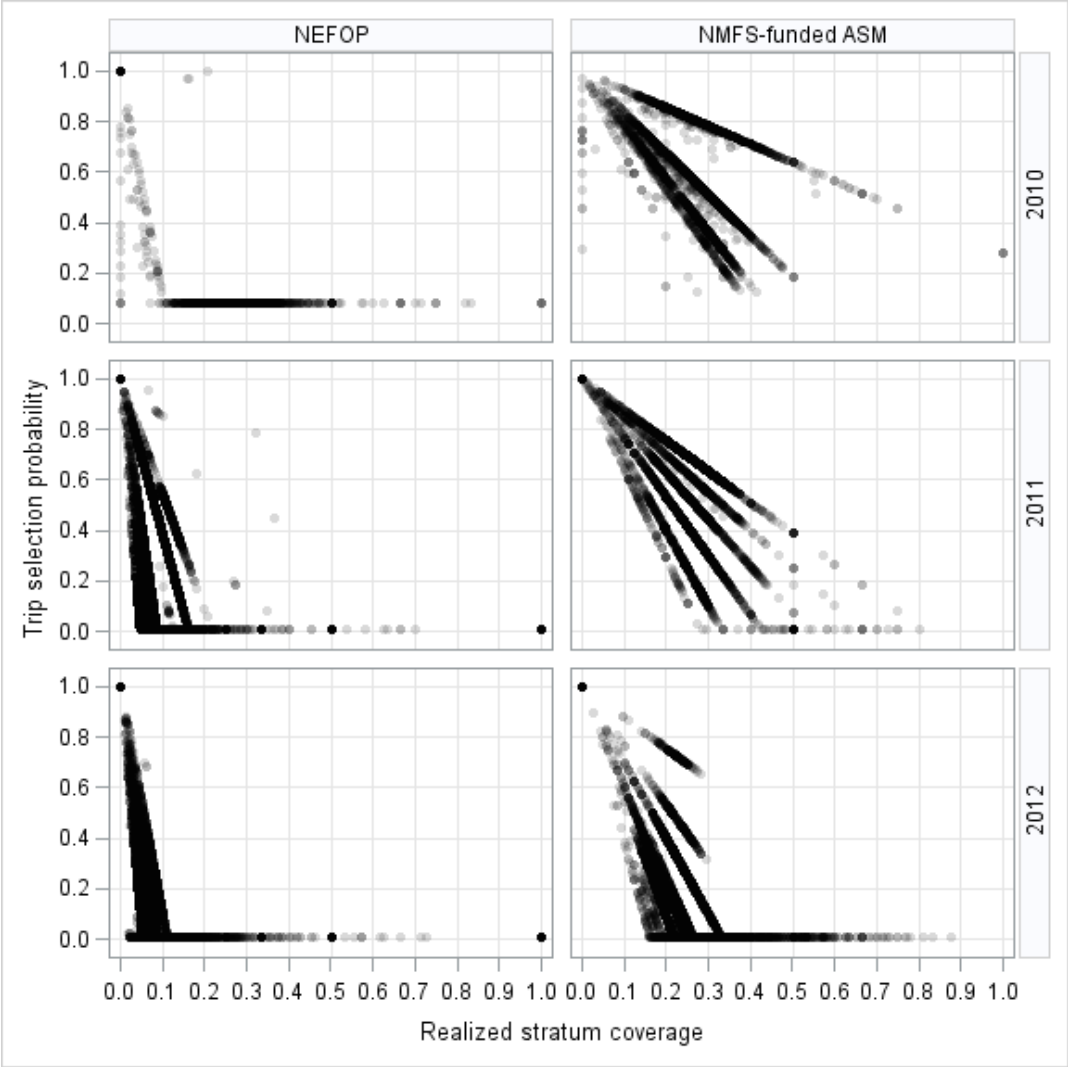

Figure 23. Relationship between the trip selection probability (*p*) and the realized stratum coverage by tier and fishing year. *Acronyms: At-Sea Monitoring (ASM), National Marine Fisheries Service (NMFS), Northeast Fisheries Observer Program (NEFOP). Note that 2010 values were recreated from the PTNS data that existed immediately prior to migration to the 2011 system; 2010 realized stratum coverages are approximated. Trips where realized stratum coverage is zero and the trip selection probability is less than 1.0 are products of this approximation. In actuality the realized stratum coverages were greater than zero at the time the trip declaration occurred.*

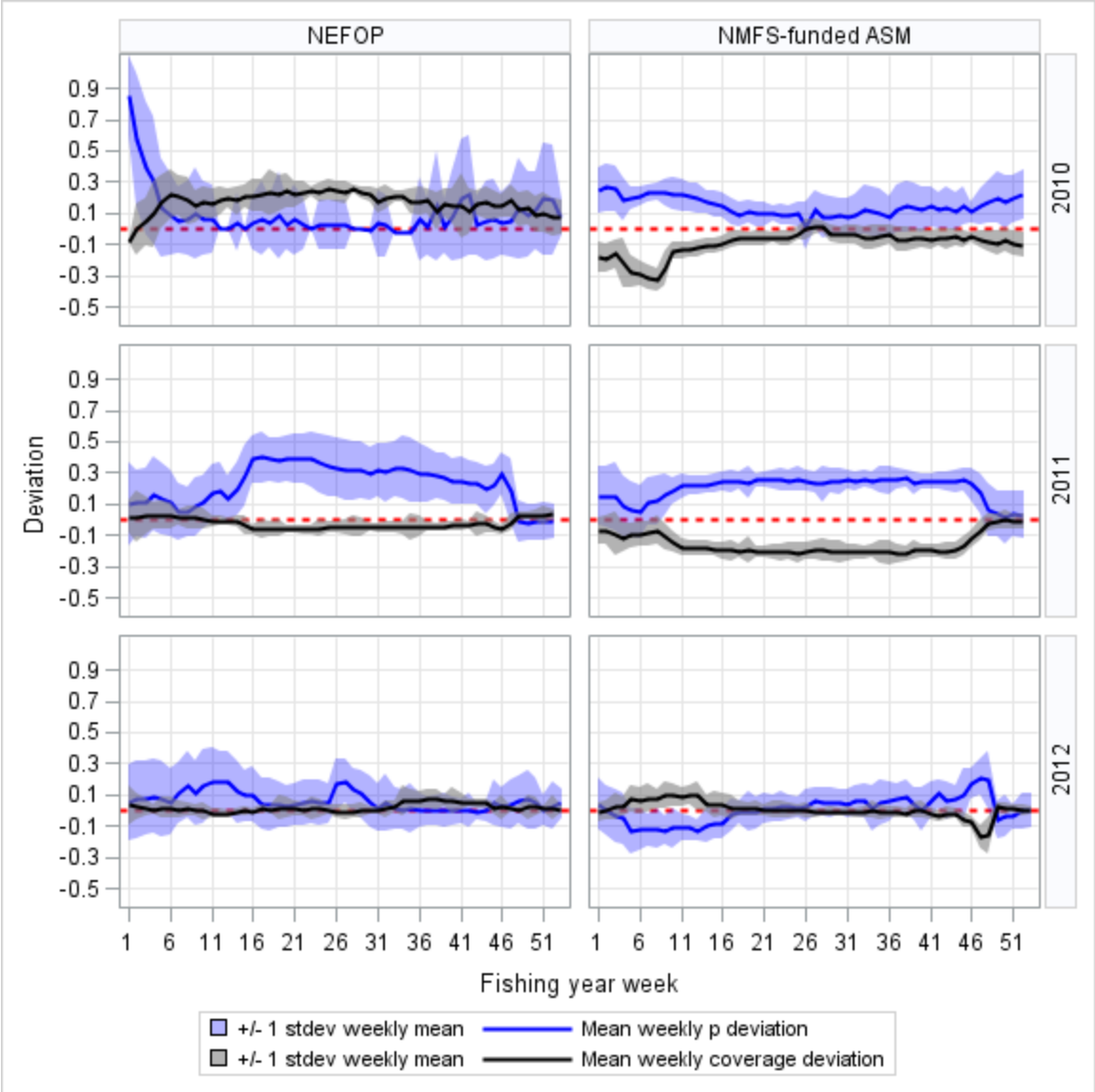

Figure 24. Deviations of the trip selection probability (*p*) and realized coverage from the target coverage rate by tier and fishing year. Results are summarized by fishing year week.

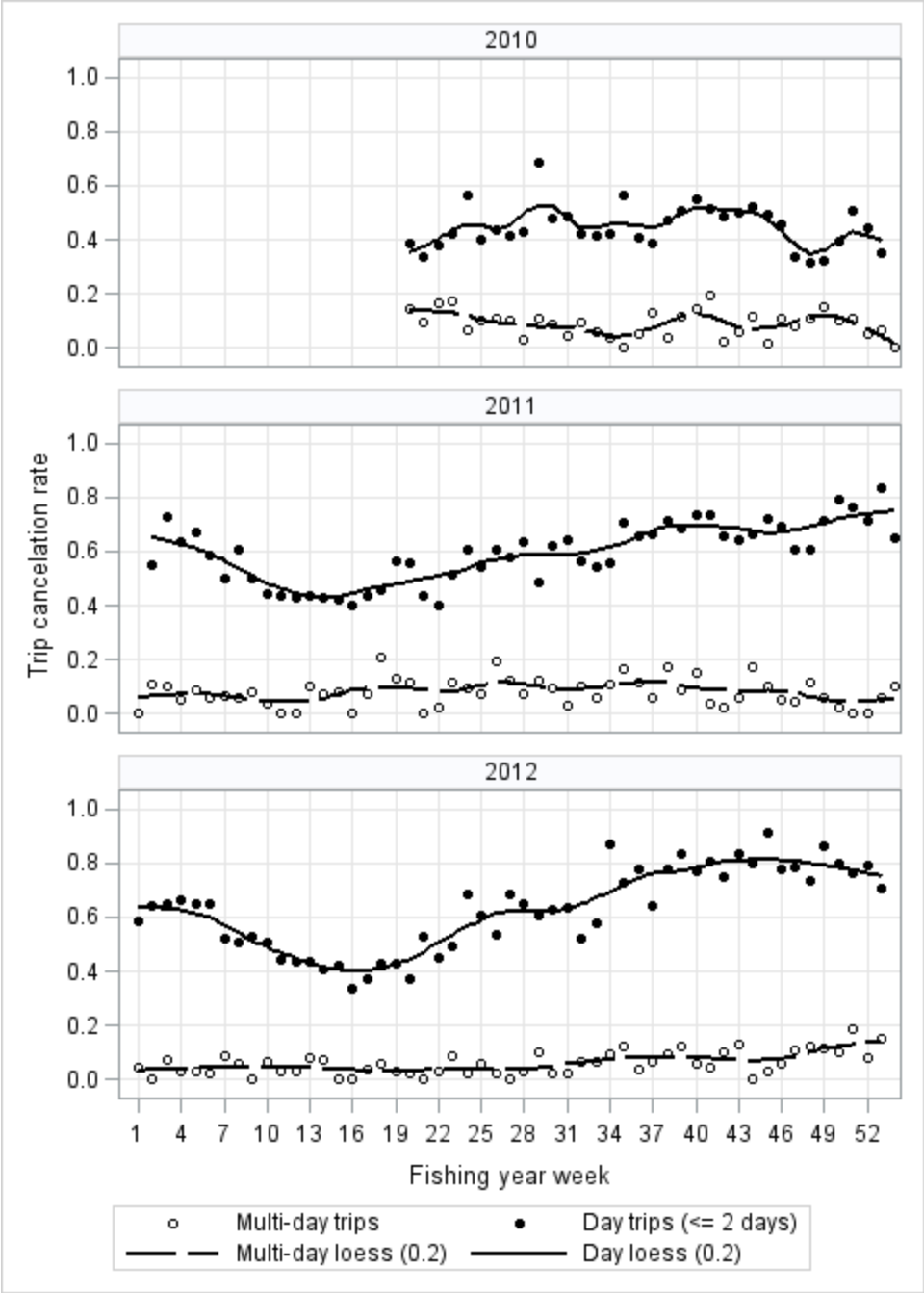

Figure 25. Trip cancellation rates by trip type (day or multi-day) and fishing year. Day trips are defined as any trip anticipated to be less than or equal to two days in duration. Multi-day trips are those trips anticipated to be longer than two days in duration.

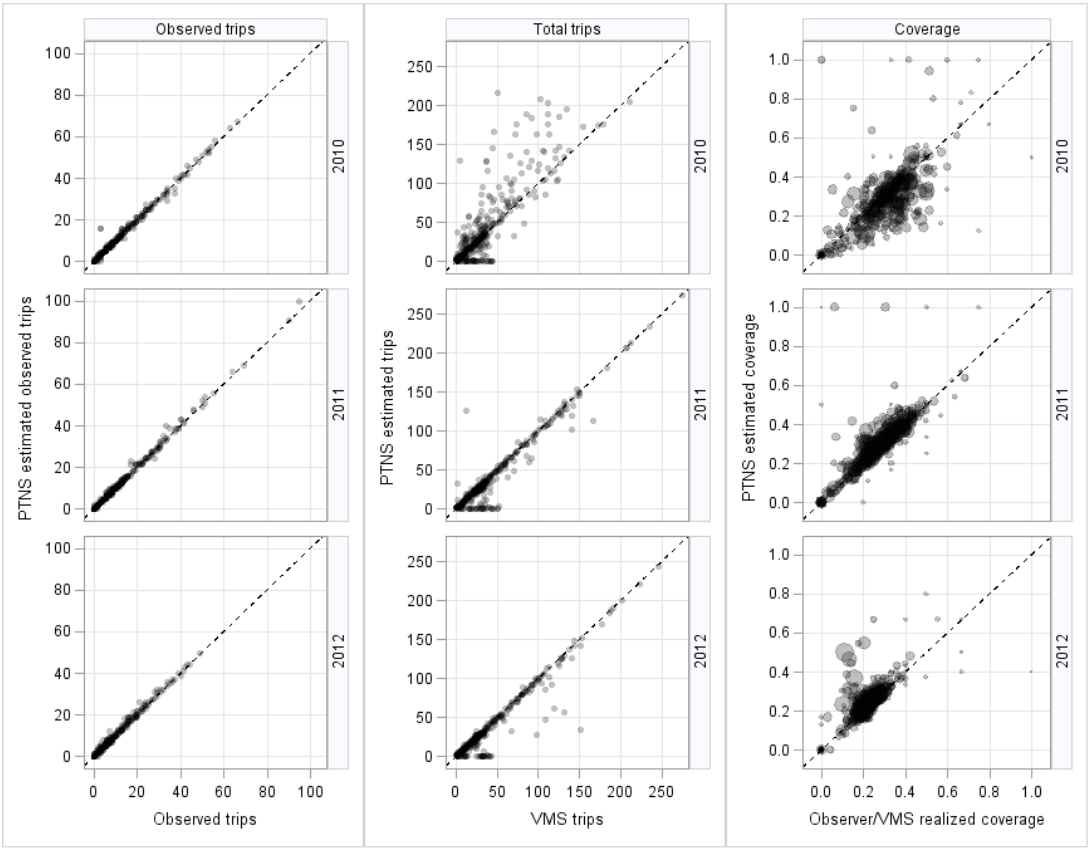

Figure 26. Comparison of the Pre-Trip Notification System (PTNS) estimate of observed, total trips and coverage rates for an individual vessel to the realized coverage estimated from observer and Vessel Monitoring System (VMS) data. Comparison plots are shown by fishing year. The dashed line indicates the 1:1 identity line.

Figure 27. Comparison of the Pre-Trip Notification System (PTNS) estimated coverage for an individual sector to the realized coverage estimated from observer and Vessel Monitoring System (VMS) data. Comparison plots are shown by fishing year. The dashed line indicates the 1:1 identity line. The common pool is colored red.

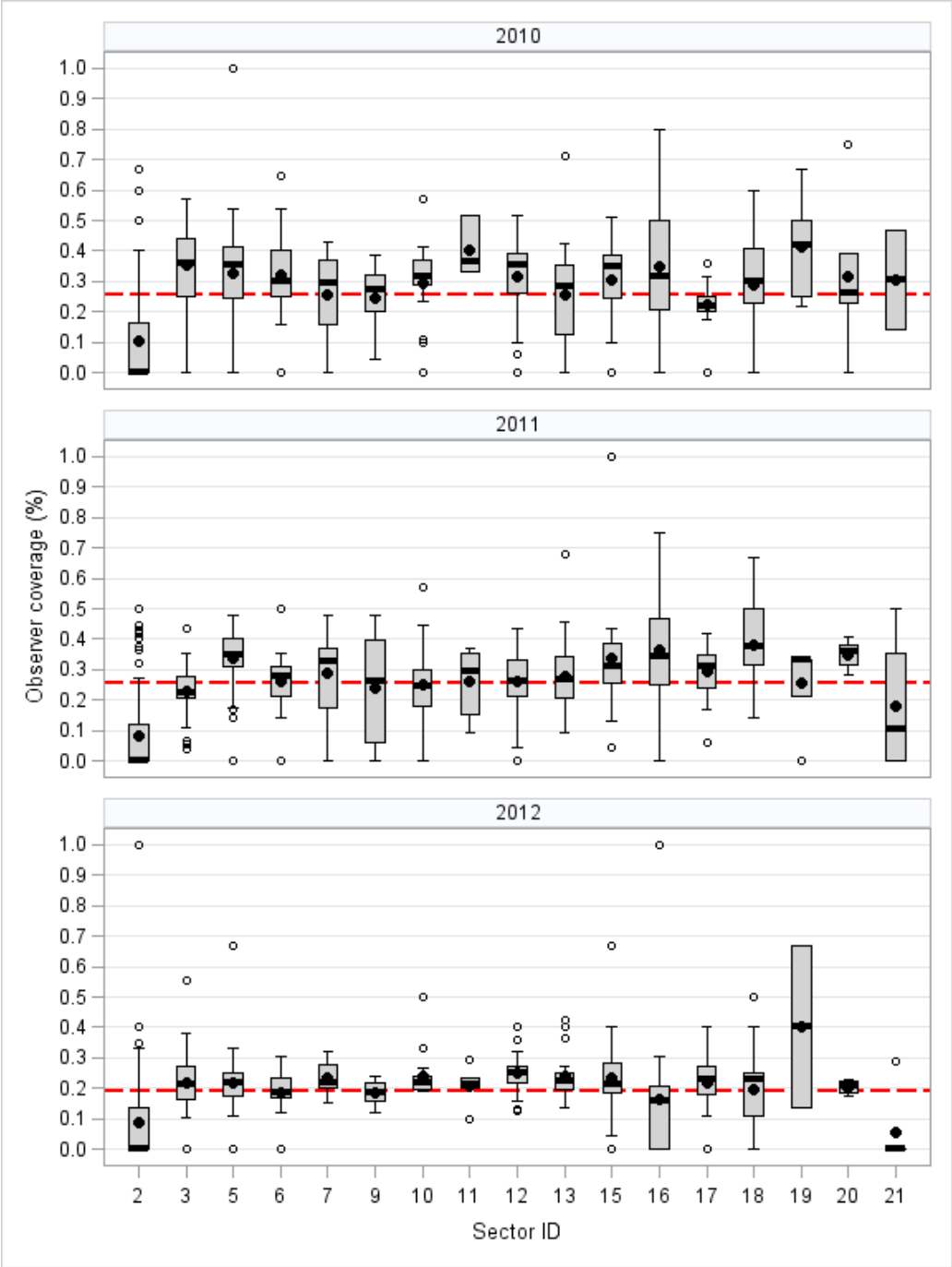

Figure 28. Box-plot distribution of vessel-level coverage within individual sectors for fishing years 2010 to 2012. The dashed red line indicates the annual mean across all vessels. The solid black line indicates the median, the black circle is the mean, the grey box represents the interquartile range (Q1 – Q3) and the whiskers indicate observations within 1.5(IQR).

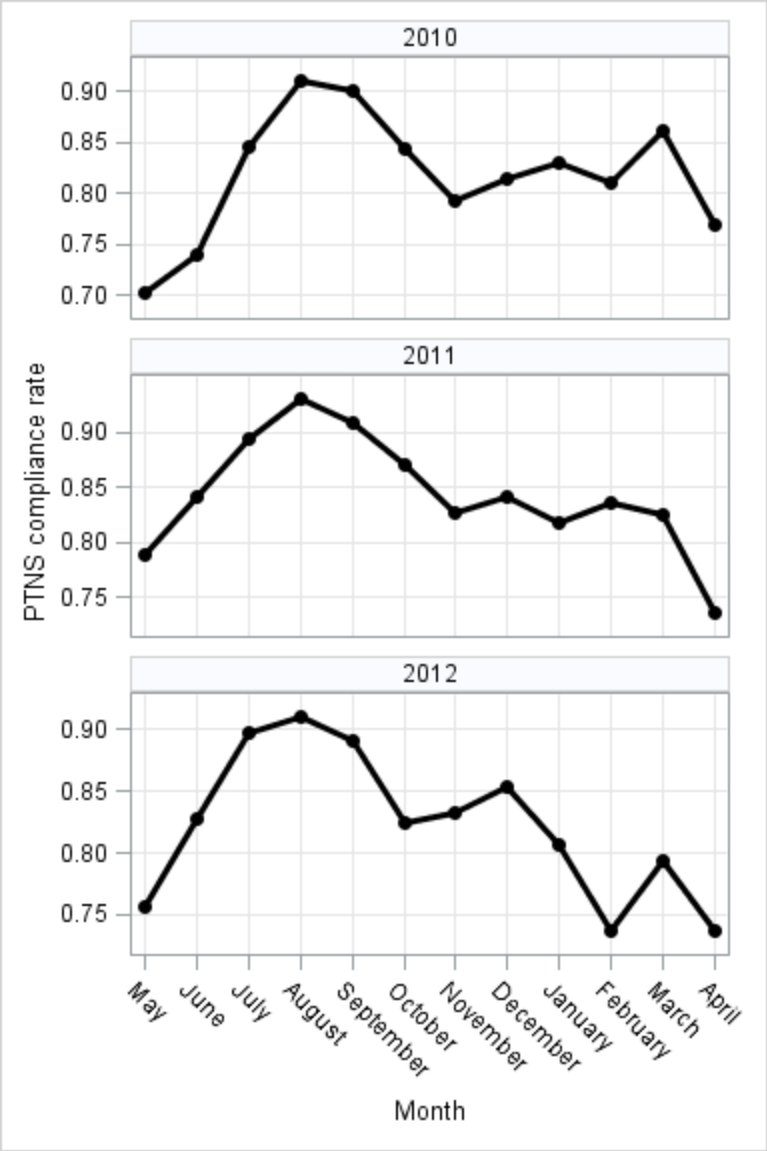

Figure 29. Monthly PTNS compliance by fishing year. PTNS compliance refers the fraction of groundfish trip declared through a VMS activity declaration with a positive PTNS notification.

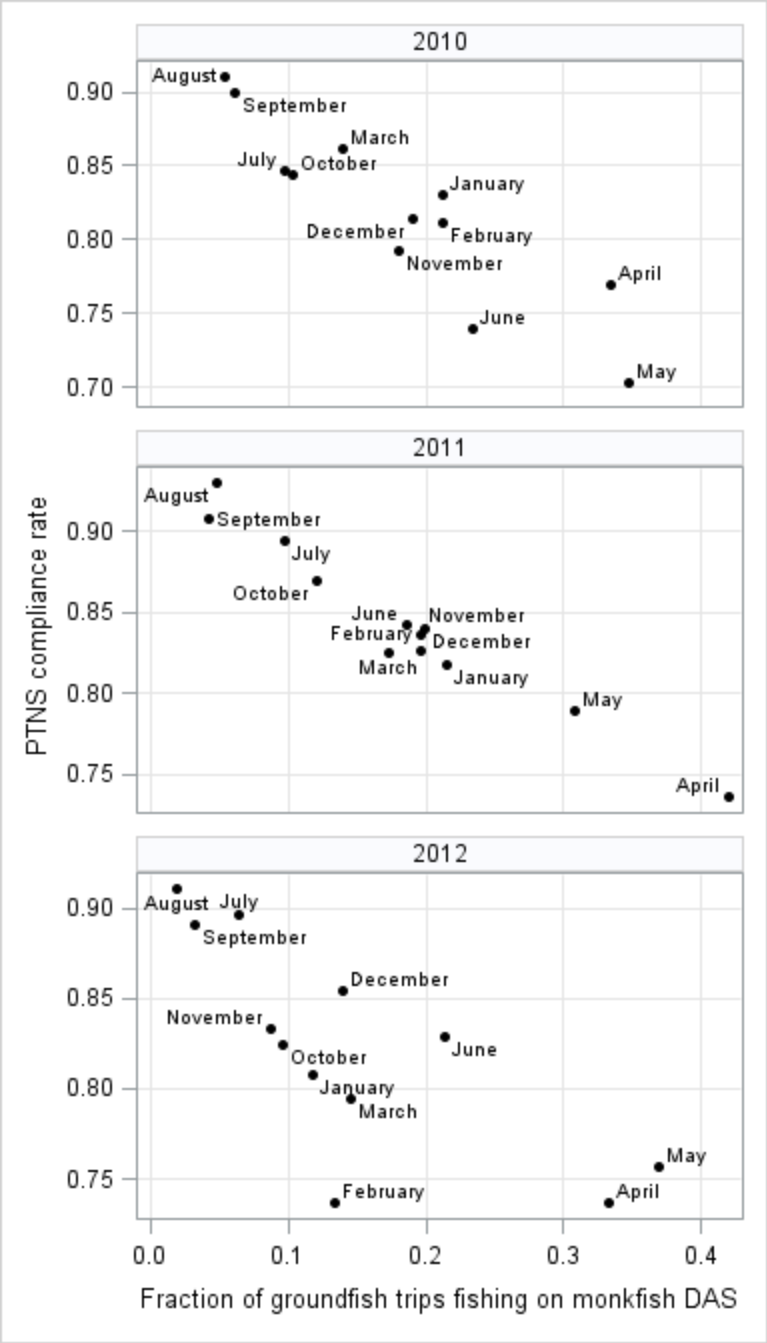

Figure 30. Relationship of monthly PTNS compliance rates as a function of the fraction of groundfish trips fishing on a monkfish day-at-sea (DAS). PTNS compliance refers the fraction of groundfish trip declared through a VMS activity declaration with a positive PTNS notification.

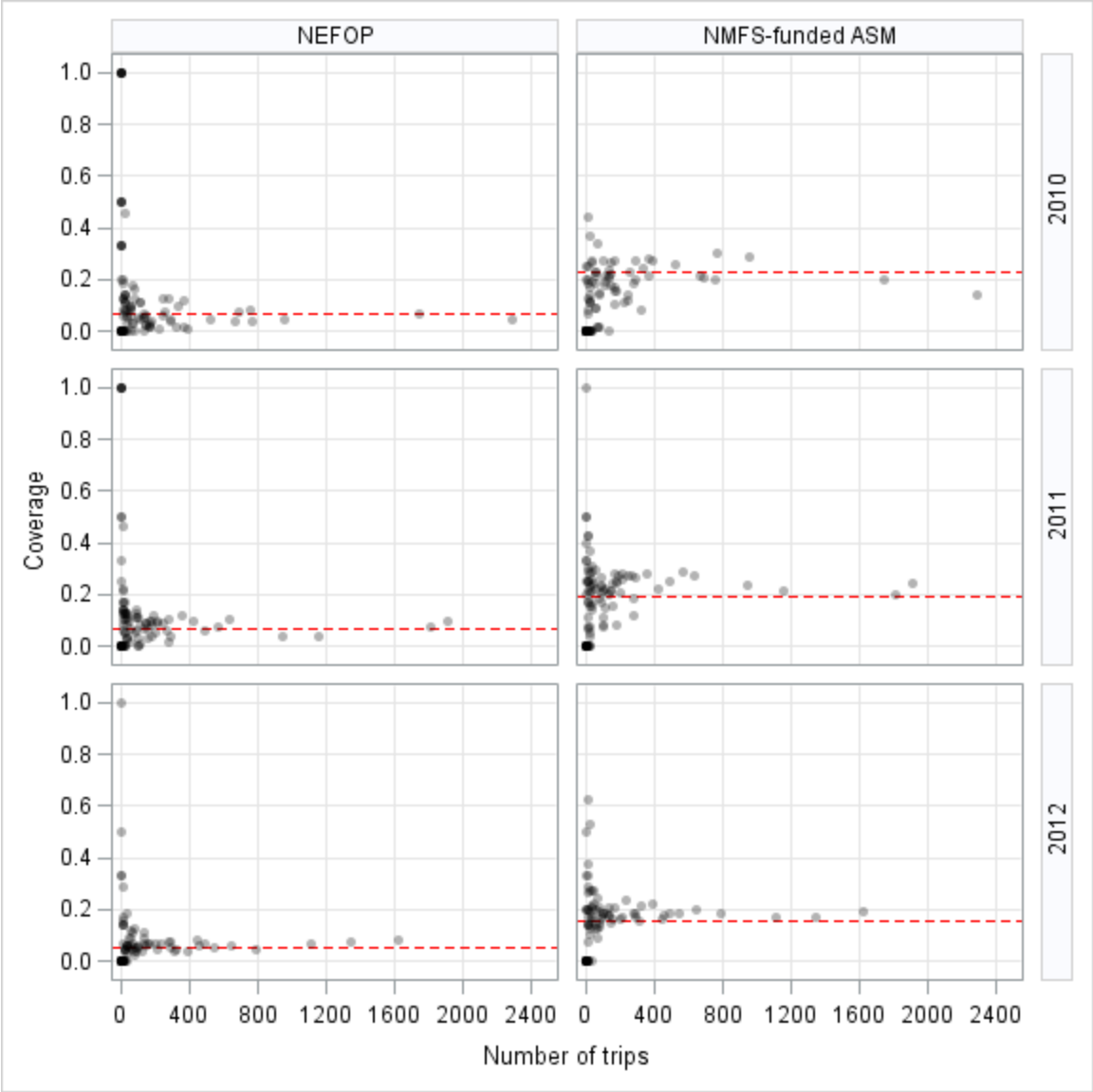

Figure 31. Comparison of individual strata coverage rates to the total number of trips taken within each stratum summarized by tier type and fishing year. The dashed red line indicates the aggregate annual trip based coverage based on total observed trips/total Vessel Monitoring System trips. *Acronyms: At-Sea Monitoring (ASM), National Marine Fisheries Service (NMFS), Northeast Fisheries Observer Program (NEFOP).*

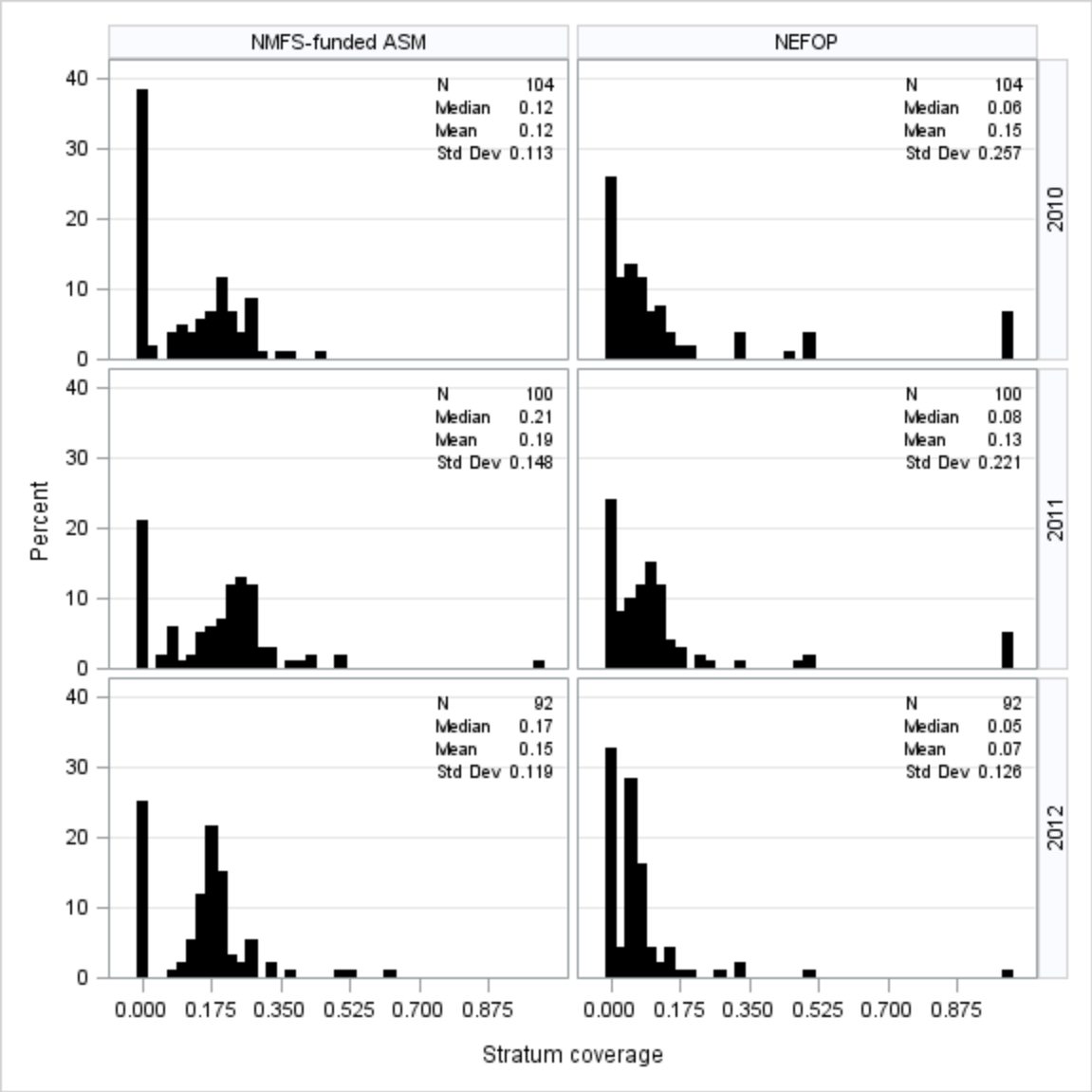

Figure 32. Histogram of strata coverage rates by tier type and fishing year. *Acronyms: At-Sea Monitoring (ASM), National Marine Fisheries Service (NMFS), Northeast Fisheries Observer Program (NEFOP).*

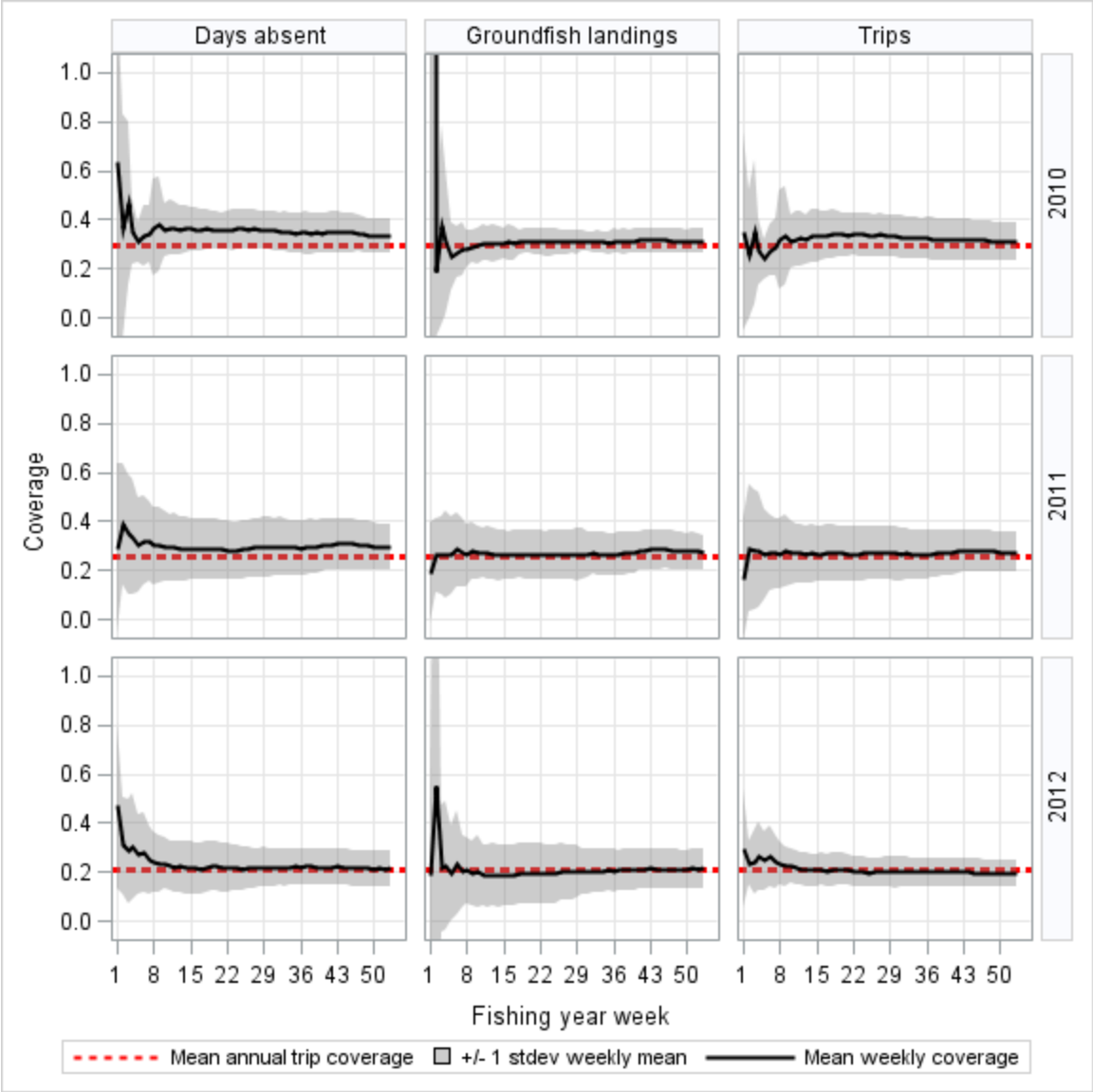

Figure 33. Mean weekly sector coverage rates over time calculated using three different metrics: days absent, groundfish landings and trips. The dashed red line indicates the aggregate annual trip based coverage (across all groundfish trips) based on total observed trips/total VMS trips.

Figure 34. Comparison of individual vessel coverage rates and the total number of trips taken by an individual vessel. The dashed red line indicates the aggregate annual trip based coverage based on total observed trips/total VMS trips.

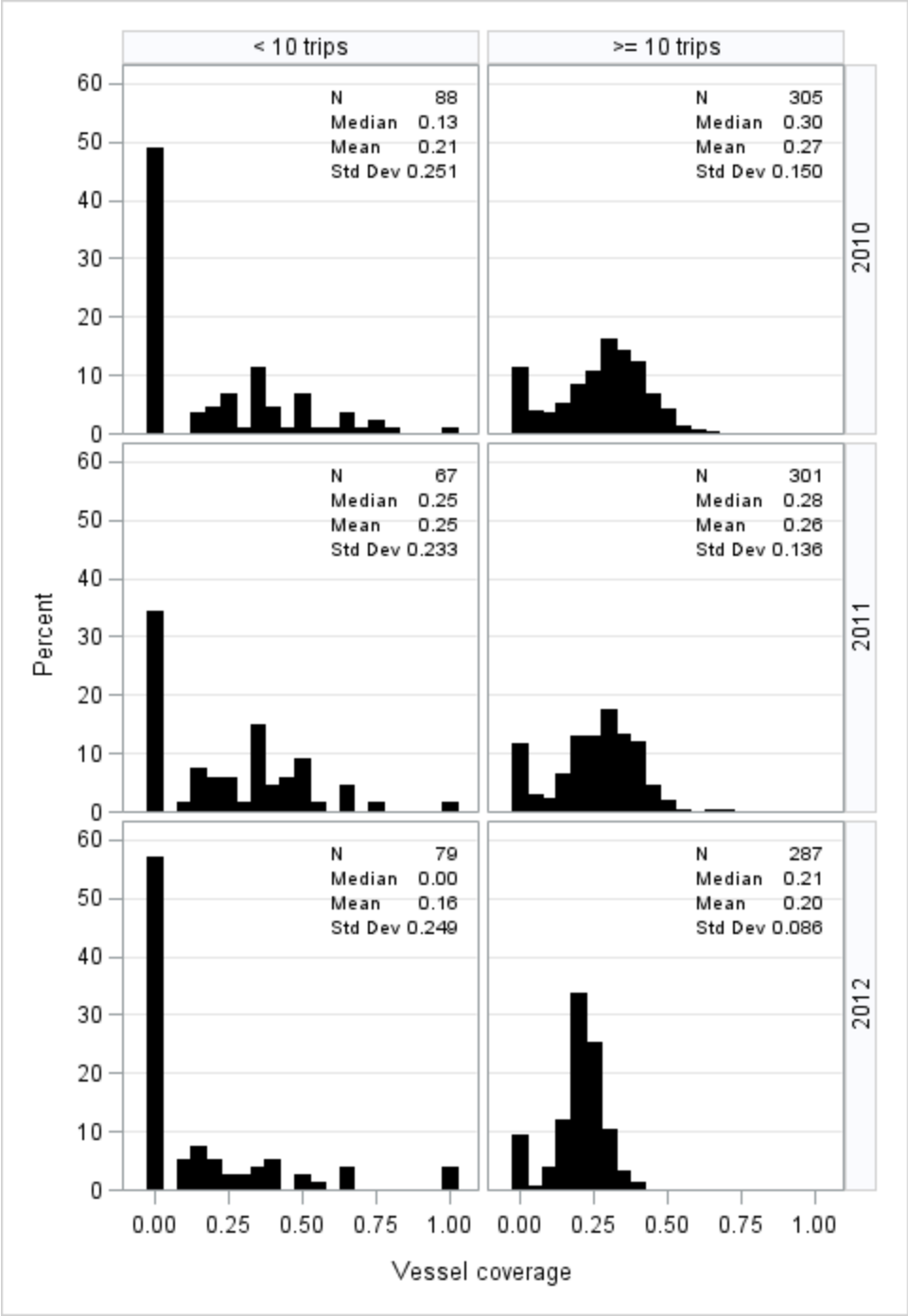

Figure 35. Histogram of individual vessel coverage rates by fishing year. Vessels are grouped into two categories: those taken fewer than 10 trips and those with 10 or more fishing trips.

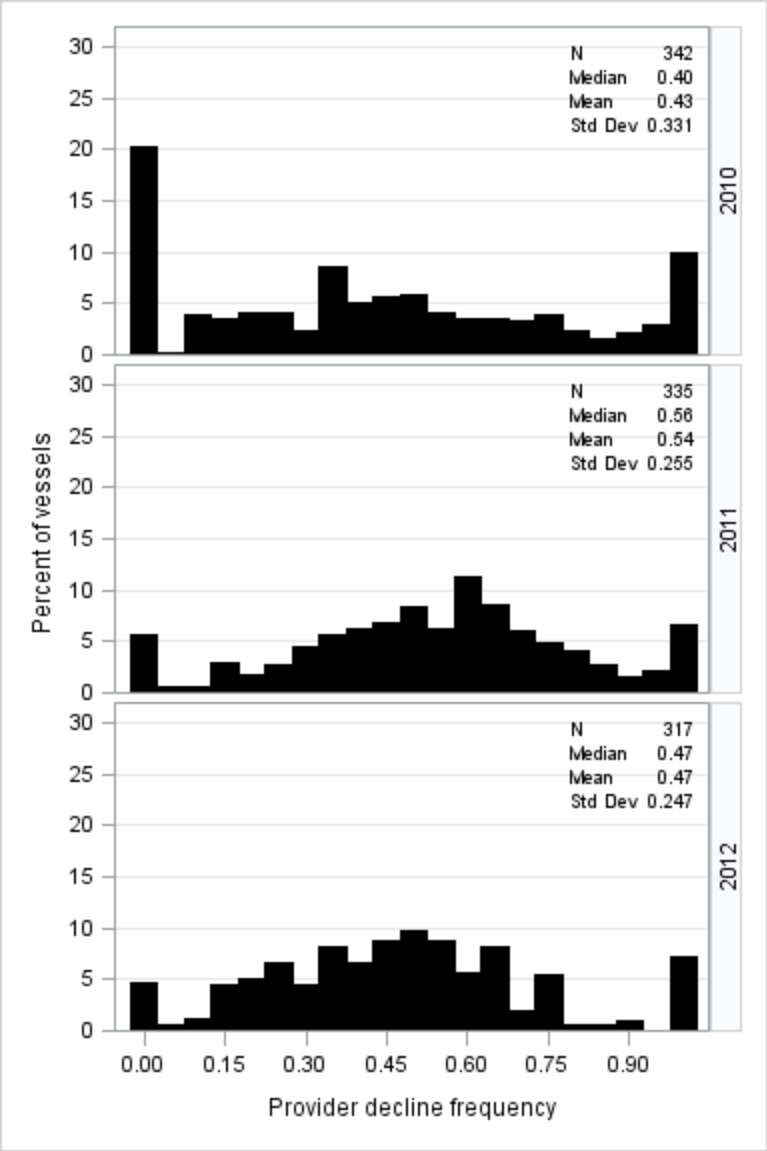

Figure 36. Histogram of provider decline rates for individual vessels by fishing year. Vessels are grouped into two categories: those taken fewer than 10 trips and those with 10 or more fishing trips.

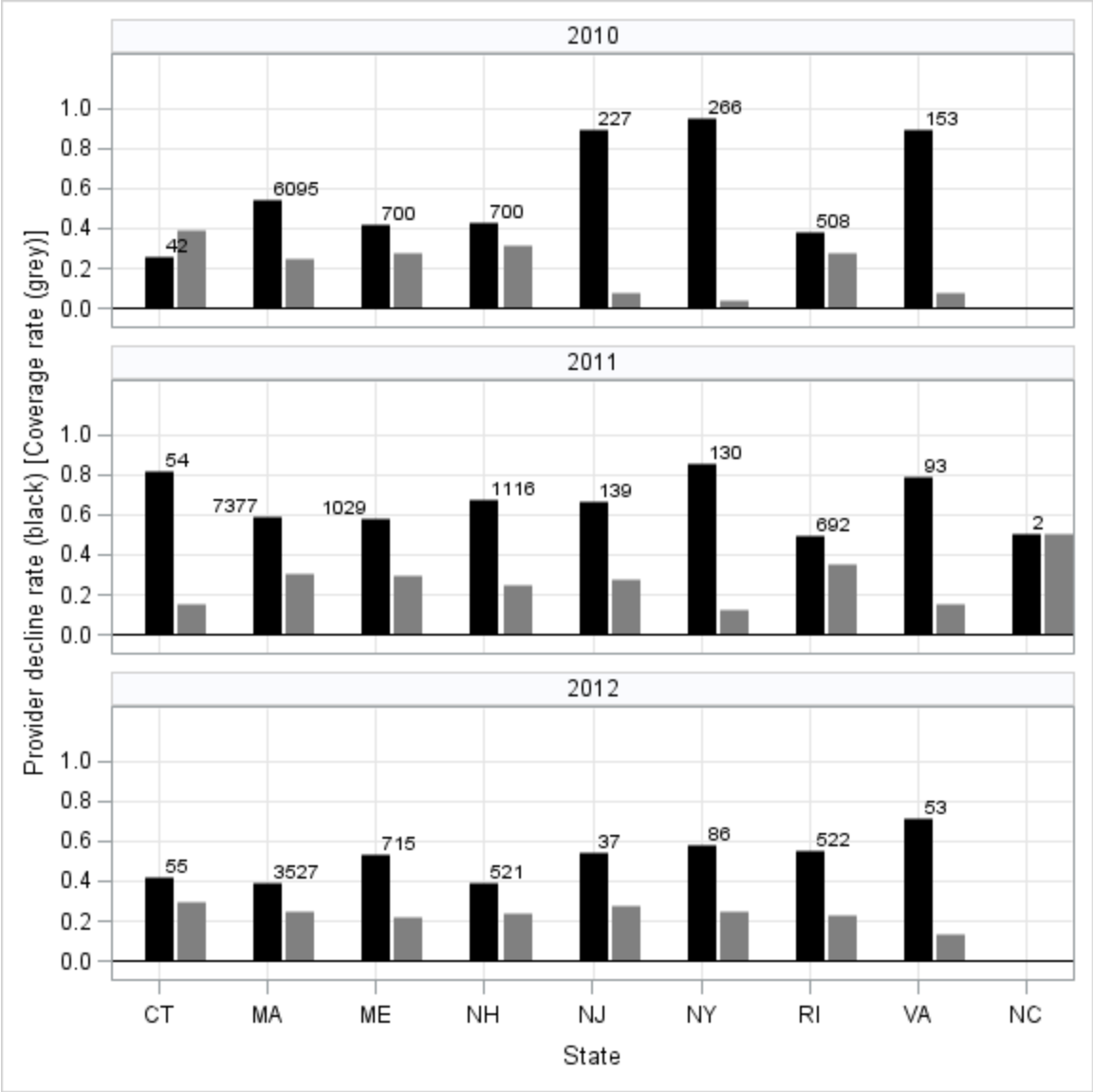

Figure 37. Provider decline rates (black) and coverage rates (grey) by fishing year state. The total number of trips offered to each provider is displayed above the decline rates.

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Attachment 2

Analysis of Landings/Discards-Proportional Allocation Scheme for the At-Sea Monitoring Program of the Groundfish Fishery in New England

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The report has been uploaded to the GMRI Monitoring Working Group website at www.gmri.org/monitoringworkinggroup. The author thanks comments from Jessica Joyce and Jonathan Labaree in the Community Team at GMRI and help from William Bowman as a GMRI intern sponsored by the Forest Foundation internship program. Any remaining errors are the author's responsibility.

Abstract

The New England groundfish At-Sea Monitoring (ASM) observer program's 30% coefficient of variation (CV) standard deploys observers at an almost equal rate across various groundfish vessel sizes, gear types, and in terms of broad stock area. This results in too many observers being allocated to trips with low landings and discards, lowering the degree of accuracy for overall catch estimates. Continued use of the 30% CV fixed target as a measure of relative standard deviation precision will result in similar coverage levels across vessel categories (size and gear).

Given that funding is limited to support the billable seadays taken by observers in all trips, the purpose of this analysis is to identify whether the groundfish sector ASM observer seadays were equitably assigned across all appropriate strata in fishing year (FY) 2010 and in FY2011. Furthermore, this study focuses on how many billable seadays were taken by observers by trip type and vessel size. The appropriateness of these additional strata as predictors of discards for each stock is examined using a Seemingly Unrelated Regression model. The results of the model are then used to present an alternate monitoring approach for FY2014 and beyond.

Based on the Data Matching and Imputation System (DMIS) dataset for FY2010 and FY2011, more seadays were observed per pound of groundfish catch on smaller vessels, especially gillnetters, than on larger vessels, especially those fishing with otter trawl gear. That is to say, more ASM resources were expended to observe less catch in the former category. Allocation of the observer seadays based on discard volume is proposed as a cost-effective method to ensure an accurate accounting of landings and discards for each sector.

1. Background and Motivation

The current, stated objective for the At-Sea Monitoring (ASM) program in Amendment 16 to the Northeast Multispecies Fishery Management Plan is to "verify area fished, catch, and discards by species, by gear type." The calculated discards by stock assigned to each sector are assumed to be proportional to landings by fishing area and gear type. However, the current monitoring coverage rate is calculated based on the number of trips in each strata and is not distinguished by the magnitude of landings or discards in each strata, operating vessel size, or the number of billable seadays per trip.

The New England Fishery Management Council (NEFMC) revised certain elements of the groundfish monitoring program through Framework Adjustment 48 (FW 48) to the Northeast Multispecies Fishery Management Plan. These measures were voted on during their December 2012 meeting, and were implemented by the National Marine Fisheries Service (NMFS) for FY2013. Through their vote, NEFMC revised the goals and objectives for the ASM program; clarified the coefficient of variation (CV) standard; removed the requirement for industry-funded ASM in FY2013 (i.e., fund ASM for sectors at the level NMFS can afford); limited the responsibility of the industry to pay for the salary of an at-sea monitor; lowered coverage rates for sector trips on a monkfish day-at-sea (DAS) in the Southern New England Broad Stock Area using extra-large mesh gillnet gear; and eliminated the dockside monitoring program. While the Groundfish Oversight Committee requested that the Plan Development Team (PDT) develop monitoring standards that address both accuracy and precision, ultimately these revisions did not address accuracy or give the industry much flexibility in using various tools to meet the monitoring goals and standards. Further, while FW 48 deferred industry funding of ASM in FY2013, there is no guarantee the NMFS budget will be able to cover this level of monitoring in FY2014, yet the fishery will still be required to meet Amendment 16 standards for monitoring (i.e, 30% CV as determined by the Standardized Bycatch Reporting Methodology [SBRM]).

This analysis attempts to identify the distribution of monitoring effort by estimating the average historical landings and discards that were observed in each seaday among different vessel sizes and fishing gear configurations, in order to see if these categories should serve as appropriate strata to adjust coverage levels. This approach could still include sector/area-fished

strata as ASM vendors have broad stock area information, vessel size and gear type prior to embarkation to help them determine the appropriate coverage rate under each category.

During the early developmental stages of FW 48, the Gulf of Maine Research Institute (GMRI) convened a Monitoring Working Group (MWG) with members from industry, NMFS, NEFMC staff, and other non-profit organizations.[1] The purpose of the MWG was to increase industry participation in the development of the revised monitoring standards, and to develop multiple monitoring alternatives for sectors to propose in their operations plans, which were required to meet the new monitoring goals and objectives in FW 48. A MWG meeting on April 19, 2012 identified the need for analysis of alternative monitoring allocations in order to give sectors the necessary time to thoughtfully adapt their monitoring programs to the new goals and standards and negotiate contracts with monitoring providers prior to FY 2013.[2]

As part of this process, the MWG developed several alternatives that each sector could review with their manager and board of directors to determine the ideal option for their operations. Throughout summer and fall of 2012, the PDT vetted setting the coverage rate proportional to discards, although the analysis was not completed in time for further consideration in FW48, primarily due to the lack of available data for the 2011 fishing year. Therefore, having missed the September deadline for sectors to propose any of these alternatives for FY2013, this analysis is now aimed toward FY2014 and beyond, although implementation of this approach may require regulatory changes outside of those included in sector operations plans.

Literature Review

ASM coverage distribution within a fleet is not a topic that is abundant in literature. Most studies were found to focus mainly on the total observer coverage rate, rather than across vessel sizes and gear types. Zollett et al. (2011) gives an extensive overview of effective monitoring programs. In terms of setting the level of observer coverage, guiding principles included a formal threat assessment and/or a cost-benefit analysis, and consideration for the needs of industry. In

[1] For more information about the MWG, visit: www.gmri.org/monitoringworkinggroup
[2] Ultimately NMFS announced funding 100% of the ASM program in FY 2013, and as such, the ASM program continued to be operated by NMFS, and sectors did not propose alternate ASM programs.

terms of program costs, guiding principles included shifting the burden of responsibility to the industry and an aim to implement a program that can fund its own resource. Moving observer program costs to industry is intended to incentivize vessel operators to fish “cleaner”.

Furlong and Patrick (2001) focus on the optimal level of observer coverage in a fishery through which maximum net benefits are realized. The benefits come in the form of reduced illegal and underreported fishing and are measured against the costs of observer coverage. While this paper does not employ a cost-benefit analysis framework to find the optimal overall rate of coverage, multiple scenarios are presented so as to present several possibilities. The tradeoffs here include discards observed (more equals more reliable data) vs. observer costs.

Rossman (2007) highlights the importance of looking at observer coverage and relative bycatch rates for each stratum with respect to marine mammals in the Northeast and Mid-Atlantic bottom trawl and gillnet fisheries. Those vessels responsible for higher marine mammal mortality were deemed a priority in receiving observer coverage. Similarly, those vessels responsible for mortalities of mammal populations in particularly poor shape were also given priority observer coverage.

This analysis expands on these previous studies in showing that while there may be an optimal level of observer coverage within a fishery, there is also an optimal way to disperse those observers among fleet members. Put another way, a certain level of ASM coverage is required to effectively enforce quota controls but that ASM coverage can come in different forms.

Currently, the 30% CV standard applied to GF trips will result in about 30% of trips observed and around 30% of landings and discards observed. However, by targeting those vessels that land and discard the most, fewer trips can carry an observer while observing the same volume of landings and discards. If the goal were to observe the most landings of highly utilized GF species, then using a weighted GF stock utilization rate would be necessary. This model is similar to what Rossman (2007) proposed for protecting marine mammals in the Northeast and Mid Atlantic bottom trawl and gillnet fisheries.

Overview of Groundfish Activity by Trip Type, Vessel Size, and Fishing Gear

The data in this analysis was compiled from the individual trip level DMIS dataset, which was acquired by GMRI through a data access agreement for a project evaluating the viability of sectors as businesses. The sector viability project is funded in part by the Social Sciences Branch of the Northeast Fisheries Science Center, which restricts access of these confidential data to the GMRI staff directly working on the project, except in aggregated form. Since ASM costs are closely associated with sector viability, GMRI was given permission to use the DMIS dataset for this monitoring analysis; however, no funding from the sector viability project was used for this study.

Table 1 shows relevant data for FY2010 and FY2011, including number of trips, number of seadays, landings volume, and discards volume for all groundfish (GF). We considered GF trips to be any trip identified in the DMIS dataset performing groundfish fishing activities. The trips were then categorized by vessel size and gear type. This method yielded a total of 13,982 GF trips in 2010 and 16,609 GF trips in FY2011. These figures are slightly higher than those indicated in Table 1, as trips taken on vessels less than 30 feet in length are not included in the table. Both figures are also slightly higher than those reported in the 2011 NMFS groundfish fishery performance report (Murphy et al., 2012). This discrepancy is due to double counting for a small number of trips in which more than one type of fishing gear was used.[3]

For vessel size, four classes were chosen: class 1 vessels, less than 30 feet in length; class 2 vessels, measuring 30 to 50 feet; class 3 vessels, measuring 50 to 75 feet; and class 4 vessels, those longer than 75 feet. The DMIS dataset indicates that only two trips made on class 1 vessels (landing less than 1% of total GF landings in FY2011) had ASM coverage in for FY2011;[4] thus they are not indicated individually in the tables, but are included in the totals. Those vessels that made less than 30 trips in hand line, longline or Ruhle trawl categories are also not indicated individually in the tables but are included in the totals. In both the 2010 and 2011 fishing years, the majority of trips on class 2 vessels used gillnets, and the majority of trips on larger, class 3 and 4 vessels fished with otter trawl gear. Overall, the majority of GF trips were made by class 2

[3] No deletion was made, but could count only the gear type that landed the most fish if needed.
[4] We understand that smaller vessels, many of which are handgear A or category C vessels, are subject to the default NEFOP rate of 8%, but are not required to call into PTNS and therefore may not be subject to additional ASM coverage.

vessels using gillnets, however the majority of seadays were made by class 3 and class 4 boats using otter trawl gear, as shown in Columns A and B in Table 1.

The number of seadays was calculated in accordance with the definition provided in a request for northeast observer contractors (NMFS, 2011). That is, the first calendar day the vessel leaves port is counted as one seaday regardless of when the vessel leaves or returns, the day the vessel lands is prorated from the beginning of the day to the time landed (unless the vessel lands on the same day it sails), and any interim days are counted as one seaday.[5] The number of observed trips and observed seadays were summed in each sub-category, with all observer data coming from the Northeast Fisheries Observer Program (NEFOP) or the ASM program.

The current ASM observer program defines the coverage rate based on number of trips without considering how the scale of landings and discards vary substantially based on the size of the vessel and the length of the trip. Since the majority of GF seadays were made by class 3 and 4 multiday-trip boats with otter trawls, and their average seadays per trip is about 3 to 7 days, their landings and discards per trip are expected to be much higher than that of the class 2 day-trip boats. This study proposes to evaluate the distribution of observed seadays, GF landings, and GF discards, such as shown in the following section, in order to find a fair and equitable way to allocate the observer on various types of trips.

Estimates of Observer Coverage Rates and Distribution of Seadays, Landings, and Discards

Observer coverage rates in the jth category of trips (based on vessel size and gear type) were calculated as follows: a dummy variable was assigned to each trip, where i indexes the GF trips in the jth sub-category.

$$Observer_{ij} = \begin{cases} 1, & \text{when trip } i \text{ was observed} \\ 0, & \text{otherwise} \end{cases}$$

To find the coverage rate by trip, we simply used the mean of the $Observer_{ij}$ dummy. Note that this is equivalent to dividing the number of observed trips by the total number of trips.

[5] Starting in FY12, NMFS' contracts with ASM providers are transitioning to a new billing structure of quarter-day (i.e., 6-hr) seadays; however this does not affect our historical analysis of FY 2010 and FY 2011 (http://www.nefsc.noaa.gov/fsb/asm/ASM%202012%20Contract%20Information/AIS.Signed.Redacted.Contract-TOs-2.2012.pdf).

The estimated coverage rate weighted by GF landings was then calculated, with the variable L_{ij} being the round weight of all GF landed on the ith trip of the jth sub-category.

$$P_j^L = \frac{\sum_{i=1}^{N} Observer_{ij} \cdot L_{ij}}{\sum_{i=1}^{N} L_{ij}}$$

The coverage rate by trips and by seadays, so as weighted by GF landings and discards, were calculated in a similar manner and defined in Table 2 for each category of vessel size and fishing gear in Columns A-D of Table 2 for FY2010 and FY2011 as the percentage of trips that carried an observer on board (A); the percentage of seadays fished with an observer on board (B); the percentage of total GF landings that were observed (C); and the percentage of total GF discards that were observed (D).

The percentage of trips that carry observers (coverage rate by trip) is the category that the current monitoring system is most concerned with. The result of this method of ASM is similar values for the percentage of trips observed vs. the percentage of total landings or discards observed. However, this does not necessarily indicate equitable distribution of monitoring resources. In 2010, class 3 and 4 otter trawl trips accounted for a total of 73.2% (27.3% and 45.9%, respectively, in Table 2 Column F) of total GF landings and 74.8% (31.3% and 43.5%, respectively, in Table 2 Column G) of total GF discards, but only 55.4% (25.1% and 30.3%, respectively, in Table 2 Column E) of total observed seadays were used to monitor them.

A disparity between monitoring effort and GF landings and discards is generally present for all gear types under various vessel sizes, though it is most pronounced for the large vessels fishing with otter trawl gear and the small vessels using gillnets. These two vessel categories made the majority of GF trips, shown in Table 1 Column A, though their total landings and discards differed greatly.

Table 2 shows the GF landings by class 4 vessels using otter trawls were 3.9 times (45.9% vs. 11.7% in Column F) the GF landings by class 2 vessels using gillnets with large mesh. Large otter trawls also discarded 4.5 times (43.5% vs. 9.6% in Column G) more than the small gillnetters, in FY2010. This is a large discrepancy considering the ASM observed seadays were only 1.5 (30.3% vs. 20.6%) times higher for large otter trawlers than small gillnetters in FY2011, as shown in Column E. A similar disparity between catch/discards and monitoring effort appeared for these vessel categories for FY2011 indicated in Table 2.

Large vessels fishing with otter trawls produce more discards per trip than most of the other fishing activity categories. In addition, by comparing the discards by seadays (shown in Table 3 Column G), what was discarded by an average class 4 otter trawler in one seaday in 2010 would take a class 2 extra-large mesh gillnet vessel an average of 13.03 seadays to discard an equivalent amount of fish (Table 3 Column H). Clearly this is a large discrepancy that is not being accounted for when evaluating the tradeoffs of assigning one observer seaday in various vessel size classes in order to observe the majority of the discards.

This mismatch is caused by the 30% CV precision standard by trip, which is a normalized formal equality measure of dispersion required for all ASM of groundfish sector trips. The 30% CV criteria is a precision measurement by using the ratio of the sample standard deviation(s) to the sample mean ($\bar{x}$). As shown in the coverage rate on seadays indicated in Table 2 Column B, the coverage rate by trip, seaday, landings, and discards for small gillnett and larger otter trawl are all around 30%. Neither the magnitude of the average landings and discards per seaday nor the distribution of total discards across vessel size and gear type category is taken into account in deciding how high of the CV is needed for various fishing activities.

This mismatch suggests two avenues for improvement: first, allocate coverage effectively (and its associated costs) to better reflect the magnitude of GF landings and discards by vessel categories, and increase the amount of both landings and discards that can be monitored; second, achieve the same industry-wide observed magnitude of GF landings and discards with less monitoring effort and at a reduced cost. The first avenue could be approached by adding vessel size as strata under the current ASM program when deciding coverage rates, the second by making coverage rates proportional to the landings or discards produced per seaday within the industry-wide stratified categories. If observing most of the discards is preferable, the higher the discard the higher the coverage rate that would be assigned, i.e. discard-proportional monitoring approach.

CVs measure precision of discard rates in the trip base, which is to say how much they vary around an average of the trip no matter the trip length. However, while the discard rates may be precise in fulfilling the 30% CV requirement, they likely are not accurate across all trip lengths and vessel size categories. In addition, how precise a discard rate is needed depends on how meaningful it is for monitoring Annual Catch Entitlement (ACE). By comparing the relative

costs for paying each observer seaday with the outcomes (discards observed), it is not as cost-effective to assign observers on trips that experience so little landings and discards per seaday than those trips discarding at a higher rate.

From a limited monitoring funding point of view, there is a need to reallocate the observers in a more cost-effective way to observe most of the discards and to monitor the majority of the ACE under the quota management objective. Allard and Chouinard (2011), show the importance of a cost-efficient strategy in enforcing regulations against discarding. Therefore, the approach proposed in this paper primarily addresses how to identify whether observed trips are distributed efficiently and equitably and how should the relative magnitude of the landings and discards across vessel size and gear be considered in the monitoring program. There is a compelling and time-sensitive need to have a comprehensive evaluation of the requirement to set the strata to assigning observers with the transition to an industry-funded ASM program on the horizon. If the majority of observers are assigned to observe the majority of the landings and discards, then it would more accurately ensure that a sector does not exceed their ACE.

Utilization Rate of Groundfish Stocks

The PDT report from July 25, 2012 suggests that there may be differences in monitoring coverage levels by various vessel size, fishing gear, and broad stock area for three stocks (GOM cod, GB haddock, and pollock). In order to be comprehensive, all 22 GF stocks are considered in this paper to explore a system multivariate regression model to identify if adding trip type and vessel size as an additional strata to sector, fishing gear, and broad stock area as a significant factor in determining the discard level by stock.

The collective members' landings and discards are counted against a sector's ACE for each GF stock. To maximize the value of catch, sector members wish to catch or utilize a large percentage of the ACE for various species. Table 4 shows that there is great variability in the utilization rate of GF stocks. Stocks such as Georges Bank haddock and redfish were not heavily utilized in FY2011, while others, such as white hake and Georges Bank yellowtail flounder, had almost their entire ACE utilized. To combat this variability, a weighting scheme was introduced for the discards in this analysis in order to put more weight to allocate more observer seadays to observe those stocks that are highly utilized. By using pollock as the equivalent-based stock in

standardizing the discard rates for all stocks relative to their utilization rate, GB cod East and GB cod West were assigned with 2.838 and 1.634 times the discards for each pound of discards than the discards of pollock, as shown in Table 4. A weighted discard model will also be specified in the discard system equation model in addition to the discard level by stock.

Correlations of Landings and Discards vs. Trip Length and Vessel Size

As discards are calculated based on the amount of landings for each trip, it is reasonable to believe that landings and discards should have a strong, positive correlation with trip length and vessel size. Indeed, such a correlation appears in FY2011, as shown in Figure 1. A positive correlation also exists between trip duration and discards, shown in Figure 2. Note that for trips shorter than 5 days, discards per trip are strongly concentrated below 1,000 pounds, while trips 5 days or longer do not follow this trend. The relationships between landings, trip duration, and discards are not surprising, nor are they especially useful from a management perspective, as landings and trip duration cannot be known prior to a given trip.

There are, however, variables that can be determined prior to a fishing trip that are strongly correlated with landings and trip duration. Larger vessels have a greater hold capacity, and it is logical to believe that these vessels will have higher landings per trip. Figure 3 shows that in FY2011 there was in fact a strong, positive correlation between vessel length and discards. Also, while the exact length of a multiday trip generally depends on several factors that occur during the trip, it is generally known in advance when a vessel intends to return on the same day it leaves. So while trip duration may be unknown prior to departure, it is reasonable to categorize trips as day trips or multiday trips before they leave port. Therefore, vessel length and trip type (day vs. multiday) serve as proxies for landings and trip duration, which are expected to be strong predictors of discards.

There is also considerable variability in the distribution of landings and discards by vessel size and gear type among different GF stocks. Therefore, allocating ASM observer coverage based on the overall total discards by various vessels and gear types may result in better monitoring coverage for some stocks over others. Figures 4 and 5, which show the distribution of GF landings and discards by stock among different gear types in FY2010 and FY2011, illustrate this variability. By utilizing the preceding simulation model, the overall discard coverage will be

improved for stocks having a discard distribution similar to the combined stock distribution in Figure 1 (the rightmost value on the horizontal axis). However, this same model may result in lesser coverage for those stocks with distributions that differ greatly from the total discard distribution. Most notably, GOM cod, GOM pollock, and GBE haddock have lower discard percentages by class 3 otter trawlers compared to other fishing gears and vessel sizes for FY2010.

2. Specification Discard Regression Model

Regression analysis is utilized to show the explanatory power of vessel size and trip length variables in relation to discards, with the best fit being a double-log Seemingly Unrelated Regression (SUR) model. This method accounts for the high correlation of the error terms in the species models resulting from the species being landed together in a multispecies fishery. The SUR model utilizes an aggregate regression to estimate discards for all groundfish stocks combined, and also runs separate regressions for each stock. The data used in this model was compiled from the individual trip level DMIS dataset for FY2011 and contains 14,946 observations. Discards in this dataset have been inputted using the weighted average of the discard rate assigned to each vessel by NOAA using gear type, broad stock area, and sector strata.

The regression dependent variable is discards per trip measured in pounds. The key explanatory variables for this analysis are trip type and vessel size. Vessel size is divided into four classes. Class 1 vessels are dropped because they do not carry observers, and class 2 is used as the base size. The regression therefore indicates how the larger vessels compare to the class 2 category. A positive value on the class 3 or class 4 coefficient would indicate that larger vessels are associated with higher discards. For trip length, a binary variable, *dday*, is used, which takes a value of 1 if the trip is shorter than 24 hours and a value of 0 if the trip is longer than 24 hours. A negative value for this variable would indicate that day trips are associated with lower discards. Dummy variables are also included for the strata currently used by the ASM program: sector, gear type, and broad stock area. All sectors are specified that take the value 0 or 1 as dummy variables to sort data into mutually exclusive categories to indicate the absence or presence of the sector effect that may be expected to shift the discards, which represents

differential intercept coefficients in the discard model. For gear type, the base of comparison is the otter trawl, and the broad stock area base group is Southern New England (SNE). The explanatory variables and their definitions appear in Table 5.

The regression results are based on all groundfish trips in FY2011 and are summarized in Table 5. A total of 3,625,779 pounds of groundfish were discarded in FY2011, an average of 226.6 pounds per trip. The average trip duration was 1.4 days. For the dummy variables, the mean value can be interpreted as the percent of trips that belong to that category. For example the variable *dFixedgear* has a mean of 0.18, meaning that 18% of groundfish trips in FY2011 were taken by vessels in the Fixed Gear Sector. Similarly the mean of *dGillnetExtraLargeMesh* is 0.38 indicating that extra-large mesh gillnets were used on 38% of the trips in FY2011. The sum of the mean from various gear type dummy variables shows 61.32% trips were taken by all of the gear type indicated in Table 5 and indicates the rest of the 38.68% trips are taken by otter trawls as the base category.

Regression Results

The log dependent variable SUR results for all stocks combined are displayed in Table 6 and the regression results for all 22 individual stocks is also available upon request from the author. The binary variable *dday* is negative (-1.872) and statistically significant. For specifications with a logged dependent variable and dummy independent variables, the following formula is used to estimate the percentage change associated with the dummy variable category over the base group with exponential of coefficient minus one.

Therefore, the interpretation of the *dday* coefficient is that trips lasting fewer than 24 hours are associated with an 85% ($e^{-1.875}$-1) decrease in discards compared to multiday trips. The coefficients for the vessel size class variables were both positive, but only the coefficient for *dclass4* was statistically significant. The value for *dclass4* can be interpreted as follows: a trip on a vessel greater than 75 feet long is associated with discards 106% higher than trips on vessels shorter than 50 feet.

The R^2 value for the aggregated stock model was 0.401; the model explained about 40% of the variation in discards. However, once the information from the individual stock models was incorporated using the SUR method, the system R^2 value increased to 0.834.

A joint test for significance was conducted on all of the vessel class and trip type variables in the model. The test returned an F statistic value of 66.79 with 69 degrees of freedom in the numerator and 343,114 degrees of freedom in the denominator. The null hypothesis was therefore rejected and we conclude that vessel class and trip type are highly statistically significant in explaining discards.

3. Allocation Proportional to Relative Volume of Discards across Vessel/Gear Categories

The following simulation is based on the premise that the optimal allocation of observed seaday resources should be proportional to the amount of discards recorded in each category for the GF fishery. For reference, Table 2 Column G shows the actual distribution of GF discards for these various categories of GF trips in FY2010 and FY2011. As observed seadays determine most of the cost of the monitoring program, it is identified as the basic unit of observing effort in this simulation.

Two scenarios of the simulated ideal allocation of observed seadays for groundfish trips in FY2010 and FY2011 are shown in Table 7. Scenario 1 re-allocates the actual 7,726 observed seadays in FY2010, shown in Table 1 Column D. Without increasing the monitoring effort, the percentage of weighted discards observed increases to 36% (Column D in Table 7) from the actual average observed GF discard of 29% (Column D in Table 2) in FY2010.

Scenario 2 shows how to achieve the same volume of discards observed in FY2010 (869,044 in Table 1 Column H) while reducing the total observed seadays. The results of this simulation are shown in Columns E through I in Table 7. The overall observed seadays are thereby reduced by 1,477 seadays from 7,726 to 6,249, shown in Column E. The reduction is achieved by increasing monitoring for trawl class 3 vessels by 31 seadays and class 4 vessels by 377 seadays, and reducing the seadays of all other gears by 1,885.

For FY2011 the percentage of GF discards observed could be increased from 30% to 37% while using the same number of observed seadays in Column A under scenario 1, or observer effort could be reduced by 1,616 seadays under scenario 2, shown in Column I, and the same total volume of discards could be observed as the status quo shown in Table 1 Column H under 2011.

Allocation Based on Weighted Volume of Discards across Vessel/Gear Categories

As with the allocation scheme based on total discards, the weighted discard simulation is presented in Table 8 with scenarios 3 and 4 as the corresponding scenarios to scenarios 1 and 2 in Tables 7, respectively, relative to the status quo. Scenario 1 re-allocates the actual 7,726 observed seadays in FY2010, shown in Table 1 Column D. Without increasing the monitoring effort, in scenario 3 the percentage of weighted discards observed increases to 57% in FY2010 (Column D in Table 8) from the average weighted observed GF discard of 29% in FY2010. Such an increase would be of great assistance to fishery managers and scientists in evaluating the impact of discards on GF stocks and fisheries.

Scenario 4 shows how to achieve the same percentage of weighted discards observed in FY2010 (29%) while reducing the total observed seadays. The results of this simulation are shown in Columns E through H in Table 8. The overall observed seadays is thereby reduced by 1,530 seadays from 7,726 to 6,196, shown in Column E. The reduction is achieved by increasing monitoring for trawl (Otter and Ruhle) class 3 vessels by 45 seadays and class 4 vessels by 333 seadays, so the seadays of all other gears could be reduced by 1,908.

For FY2011 the percentage of weighted GF discards observed could be increased from 30% to 47% while using the same number of observed seadays in Table 1 Column D, or observer effort could be reduced by 1,691 seadays and the same volume of weighted discards could be observed as the status quo, shown in Column G.

Costs of Monitoring

While similar to the sector ASM program, the existing NEFOP, which currently provides 8% coverage, will not be replaced by the industry-funded ASM program. Based on FY2010, the

overall cost[6] of an ASM seaday is $917.95. The cost for an at-sea monitor can be separated into two components: at-sea and infrastructure. In this case, the industry (or NOAA) could have saved $1,355,812 ($917.95*1,477) in FY2010 and $1,483,407 ($917.95*1,616) in FY2011 by allocating ASM based on the volume of discards across vessel categories (size and gear), as shown in Table 7 under scenario 2.

If ASM were allocated proportional to weighted discard volume of various sizes of vessels, at a cost of $917.95 per ASM seaday, $1,483,407 ($917.95*1,530 seadays) could be saved by allocating ASM more efficiently under scenario 3 in 2010 and $1,552,253 ($917.95*1,691 seadays) could have been saved in FY2011, as shown in Table 8 under scenario 4. Once again, shifting observer seadays away from small gillnetters to class 4 otter trawlers is where most of the savings occur.

If the goal was to reach the FY2011 level of observed discards using the least amount of coverage possible, significant monetary resources could be saved by allocating ASM based on volume of discards by vessel size and trip length.

One potential method to distribute the monitoring burden equitably in scenarios where vessels with higher discards are covered at higher rates could be for individual sectors to develop a transfer scheme. Vessels with lower coverage rates could help compensate the vessels that have higher coverage rates so they could collectively reduce the number of observed seadays but would still be able to effectively monitor the ACE. For example, as shown by the ratio in Column H of Table 3 in FY2010, a sector could increase observed seadays for otter trawl class 4 vessels (accounting for 43.5% of all GF discards), by 1 seaday in order to reduce coverage assigned to class 2 extra-large mesh gillnet vessels (accounting for 1.6% of all GF discards), by 13 seadays.

This compensation scheme would be possible since the overall observed seadays are less than the current status quo for most of the vessels. Nearly all vessels, except class 4 otter trawlers, would be saving substantially with less coverage than the status quo. This savings would be more than enough to compensate the cost to the large otter trawlers. How a sector

[6] An average seaday in FY2010 cost $630.44 + $32.28 in travel + $37.46 in training for a subtotal of $700.19. In addition, there were $217.76 in NEFOP infrastructure and overhead costs for administration of the program, for a combined total of $917.95 (Van Atten, 2001a *as cited in* Northern Economics, Inc. A Review of Observer and Monitoring Programs in the Northeast, the West Coast, and Alaska, prepared for Environmental Defense Fund, September 2011).

would establish their compensation scheme would be at their discretion, and this is merely one possible scenario of many that a sector could develop. Importantly, when all types of vessels and gears are combined in a sector, the percentage of discards observed would not be less than the actual FY2011 percentage.

Monitoring costs will be one of the major factors affecting groundfish sector viability moving forward, especially with decreased federal assistance. Based on "Developing Effective Monitoring for the Northeast Multispecies Fishery: Methods and Considerations," draft white paper for NEFMC on April 12, 2012, sectors are required to monitor their members to ensure compliance with self-regulating measures designed to prevent a sector allocation overage. Currently all sectors employ a sector manager, who typically oversees reporting requirements and implements an ASM program, amongst other duties.

Currently, coverage rates must meet a minimum requirement to get at the precision goal, unless NEFMC removes the 30% CV language following NMFS' 3-year review of the discard rate methodology, or the language is otherwise modified in Amendment 16. Therefore, this approach may need to be used as one component of a monitoring program, and allow precision to be covered by NEFOP or another approach unless these regulations are revised.

However, how to interpret what's fair and equitable at the sector level, and not the vessel level, might also need to be further investigated. CVs measure precision of discard rates, which is to say how much they vary around an average. However, as indicated by a PDT member, while the discard rates may be precise, they do not vary a lot around their central value, and therefore they may not be accurate - their central value may be far from the true discard rate.

Therefore, the approach proposed in this paper primarily addresses the accuracy of the monitoring program (*which was not addressed in FW 48 and will not be addressed in FW 51 either*), and not the precision. In addition, the current flat CV of 30% applies no matter what the distribution of ACE or discards is geographically, temporally, or by vessel size and gear type. This is not the most cost effective method, and doesn't help identify whether observed trips are distributed efficiently and equitably. There is a compelling need to have a comprehensive evaluation of the requirement to set the strata to assigning observers. If more observers were assigned to observe trips with high rates of landings and discards, then the monitoring program

could more effectively ensure that a sector does not exceed their ACE, and more accurate data could be integrated into stock assessments and other analyses that utilize catch and discards.

4. Conclusion and Discussion

According to the "Sector Operations Plan, Contract, and Environmental Assessment Requirements for FY 2013," the regulations stated in 50 CFR 648.87(b)(1)(v)(B)(*3*), contain the following objectives for an ASM program:

- Objective 1: It must provide coverage that is fair and equitable.
- Objective 2: It must be distributed in a statistically random manner among all trips.
- Objective 3: Coverage must be representative of fishing activities and operations by all vessels within the sector throughout the entire FY.

The stated goal of ASM is: "To verify area fished and catch (landings and discards), by species and gear type, for the purposes of monitoring sector ACE utilization."

We offer two methods of allocating observer coverage that will be an improvement over the status quo. The first is to assign coverage to vessels based on discard volume; the second is to assign coverage based on discards per seaday. Both distribute costs to those who produce the most discards, and result in collection of data that is more reflective of actual fishing activity. These proposed options are tiered allocation schemes, so observers could still be assigned randomly within each tier. These approaches also incentivize vessels to reduce discards and meet other proposed goals for a monitoring program. While the precision standard is not specifically addressed, it may either be used in conjunction with the current 30% CV, or an alternate precision standard could be developed and implemented to meet the overarching goals of monitoring.[7]

Assigning ASM coverage proportionally to discards meets the FW 48 (78 FR 53363; August 29, 2013) monitoring Goal 1, *improve documentation of catch*, because it increases accuracy (*i.e., the true discard estimates instead of a relative ratio without taking into account*

[7] While the NEFMC clarified how the 30% CV standard is applied in FW48, we understand that this does not represent a change to current practices, and only clarifies the intent in the regulations.

the scale for various GF fishing activity per seaday) over the existing program. The proposed allocation methods therefore meet the objective to determine total catch and effort of target species. The objective to achieve coverage levels sufficient to minimize effects of potential observer bias was analyzed by the PDT, which ultimately concluded that they could not determine how observer bias related to discards on unobserved trips.

The proposed ASM schemes fully meets monitoring Goal 2, *reduce the cost of monitoring*, in that the monitoring costs and coverage levels do not conform to the one-size-fits all approach, which equates to similar costs whether you are landing higher volumes (and getting more of a return per trip) with a large vessel or smaller volumes with a smaller boat. This alternative distributes the costs of monitoring commensurate to the pounds caught, and avoids high coverage rates on small boats that have lower than proportional volume landings/discards than large boats on a daily basis. The proposed ASM schemes support monitoring Goal 3, *incentivize reducing discards*, as vessels that have a lower relative volume of discards (or volume per seaday) would be assigned lower coverage levels. Coverage levels will be assigned to specified vessel categories within a sector, and the status quo, which does not reward individual vessels with low discards, will be improved upon.

The proposed ASM schemes would not provide additional data streams for stock assessments (Goal 4), beyond the data already collected under the existing program. While there could be alterations to accommodate this goal, they could directly contradict Goal 2, unless the government could fund these data streams. The proposed schemes do, however, provide more accurate data streams for stock assessments.

Vessel size would serve as an appropriate strata and would help to determine more suitable coverage rates that would cut costs for the industry and incentivize reducing discards while achieving monitoring goals and providing accounting of ACE for the fishery.

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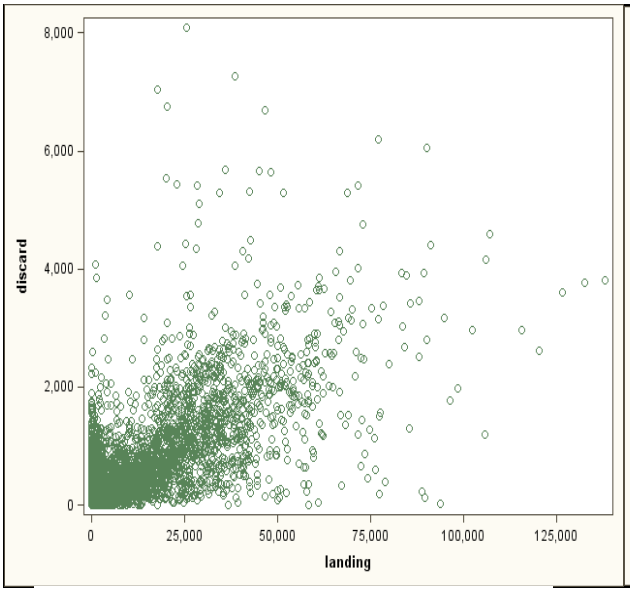

Figure 1 Landings vs. Discards per Trip in FY2011

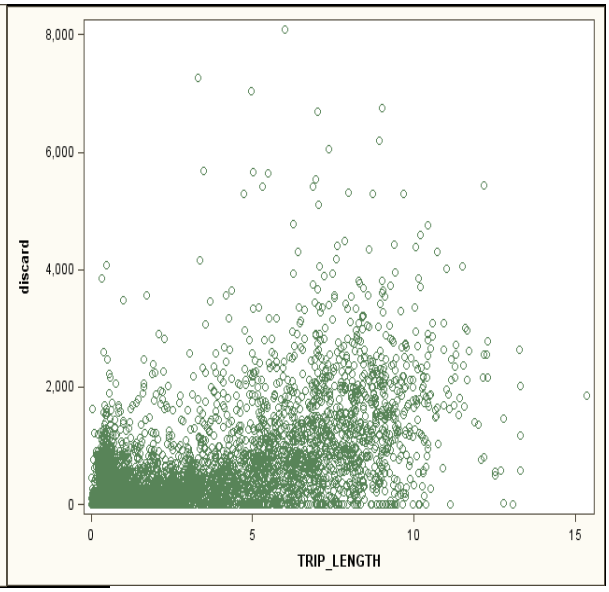

Figure 2 Trip Length (Seadays) vs. Discards per Trip in FY2011

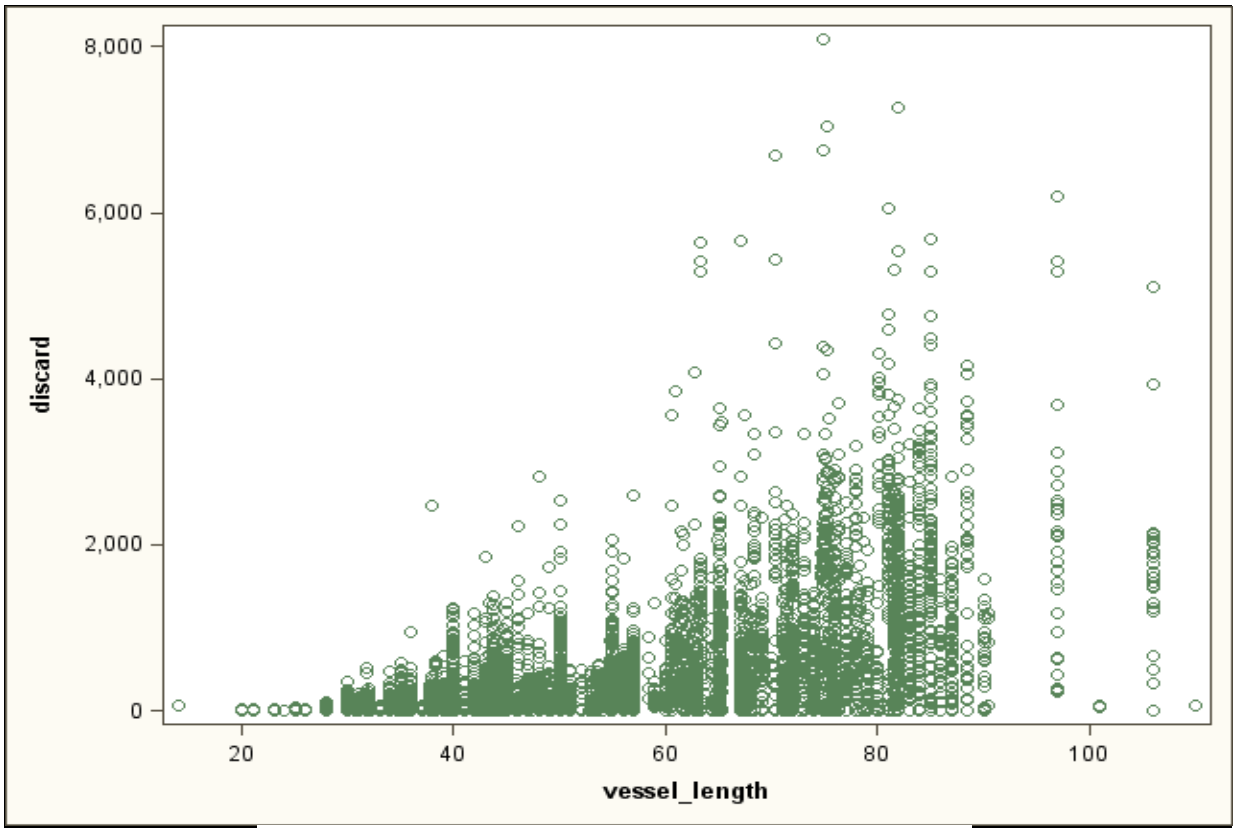

Figure 3 Vessel Length vs. Discards per Trip in FY2011

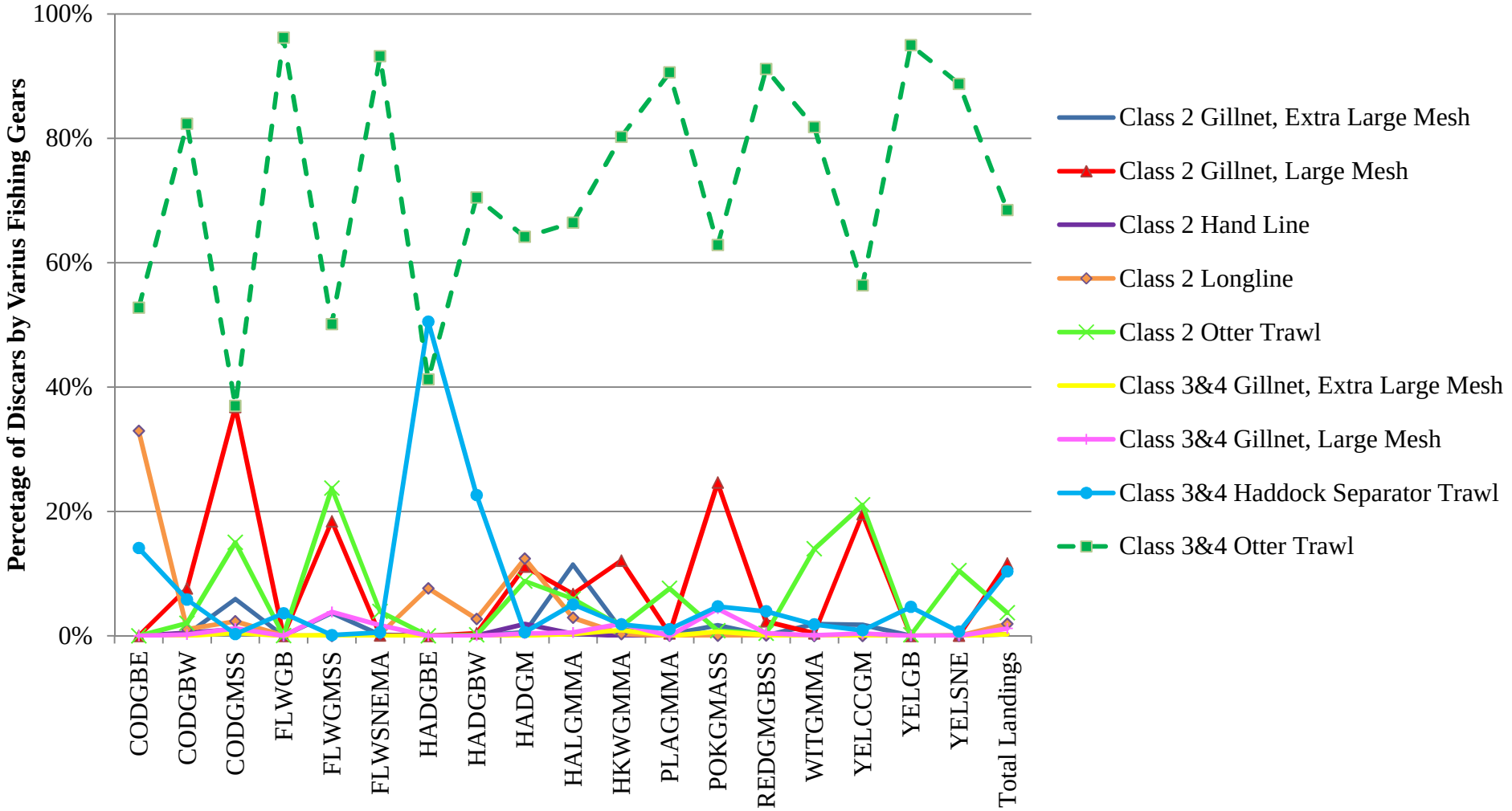

Figure 4(a) Distribution of GF Landings (Live lbs) by Various Gears for Each GF Stock under GF Trips in FY 2010

Note: Abbreviation of Groundfish stock are defined as follows and those stocks with an "*" indicated are zero possession prohibited species under landing/possession limits.

CODGBE: GB Cod East;	FLWGB*: GB Winter Flounder;	HADGM: GOM Haddock;	POKGMASS: Pollock;	YELCCGM: CC/GOM Yellowtail Flounder;
CODGBW: GB Cod West;	FLWGMSS: GOM Winter Flounder;	HALGMMA: Halibut;	REDGMGBSS: Redfish;	YELGB: GB Yellowtail Flounder;
CODGMSS: GOM Cod;	FLWSNEMA*: SNE Winter Flounder;	HKWGMMA: White Hake;	WITGMMA: Witch Flounder;	YELSNE: SNE Yellowtail Flounder.
FLDSNEMA*: Southern Windowpane;	HADGBE: GB Haddock East;	OPTGMMA*: Ocean Pout;	WOLGMMA*:Wolffish;	
FLGMGBSS*: Northern Windowpane;	HADGBW: GB Haddock West;	PLAGMMA: American Plaice;		

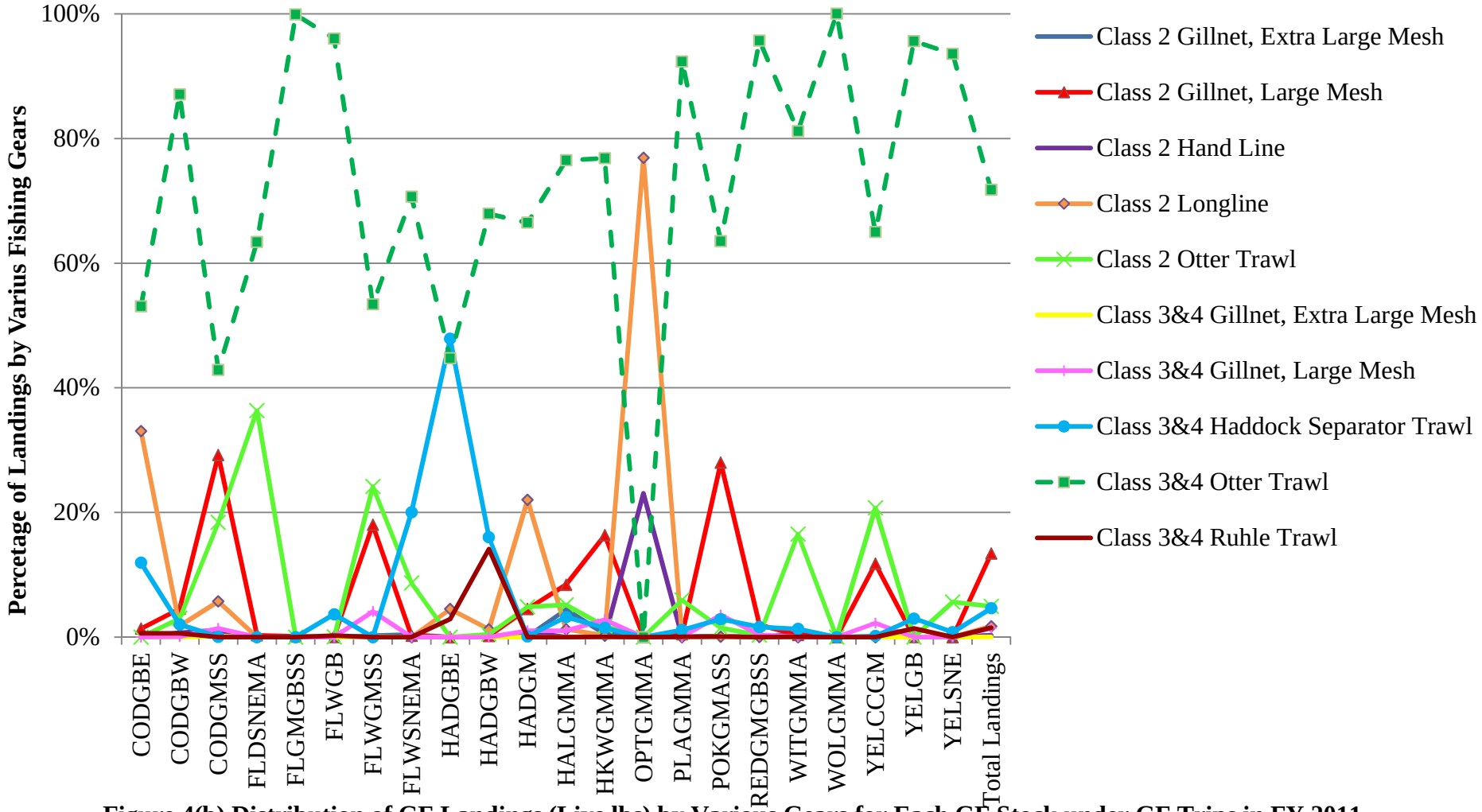

Figure 4(b) Distribution of GF Landings (Live lbs) by Various Gears for Each GF Stock under GF Trips in FY 2011

Note: Abbreviation of Groundfish stock are defined as follows and those stocks with an "*" indicated are zero possession prohibited species under landing/possession limits.

CODGBE: GB Cod East;	FLWGB*: GB Winter Flounder;	HADGM: GOM Haddock;	POKGMASS: Pollock;	YELCCGM: CC/GOM Yellowtail Flounder;
CODGBW: GB Cod West;	FLWGMSS: GOM Winter Flounder;	HALGMMA: Halibut;	REDGMGBSS: Redfish;	YELGB: GB Yellowtail Flounder;
CODGMSS: GOM Cod;	FLWSNEMA*: SNE Winter Flounder;	HKWGMMA: White Hake;	WITGMMA: Witch Flounder;	YELSNE: SNE Yellowtail Flounder.
FLDSNEMA*: Southern Windowpane;	HADGBE: GB Haddock East;	OPTGMMA*: Ocean Pout;	WOLGMMA*:Wolffish;	
FLGMGBSS*: Northern Windowpane;	HADGBW: GB Haddock West;	PLAGMMA: American Plaice;		

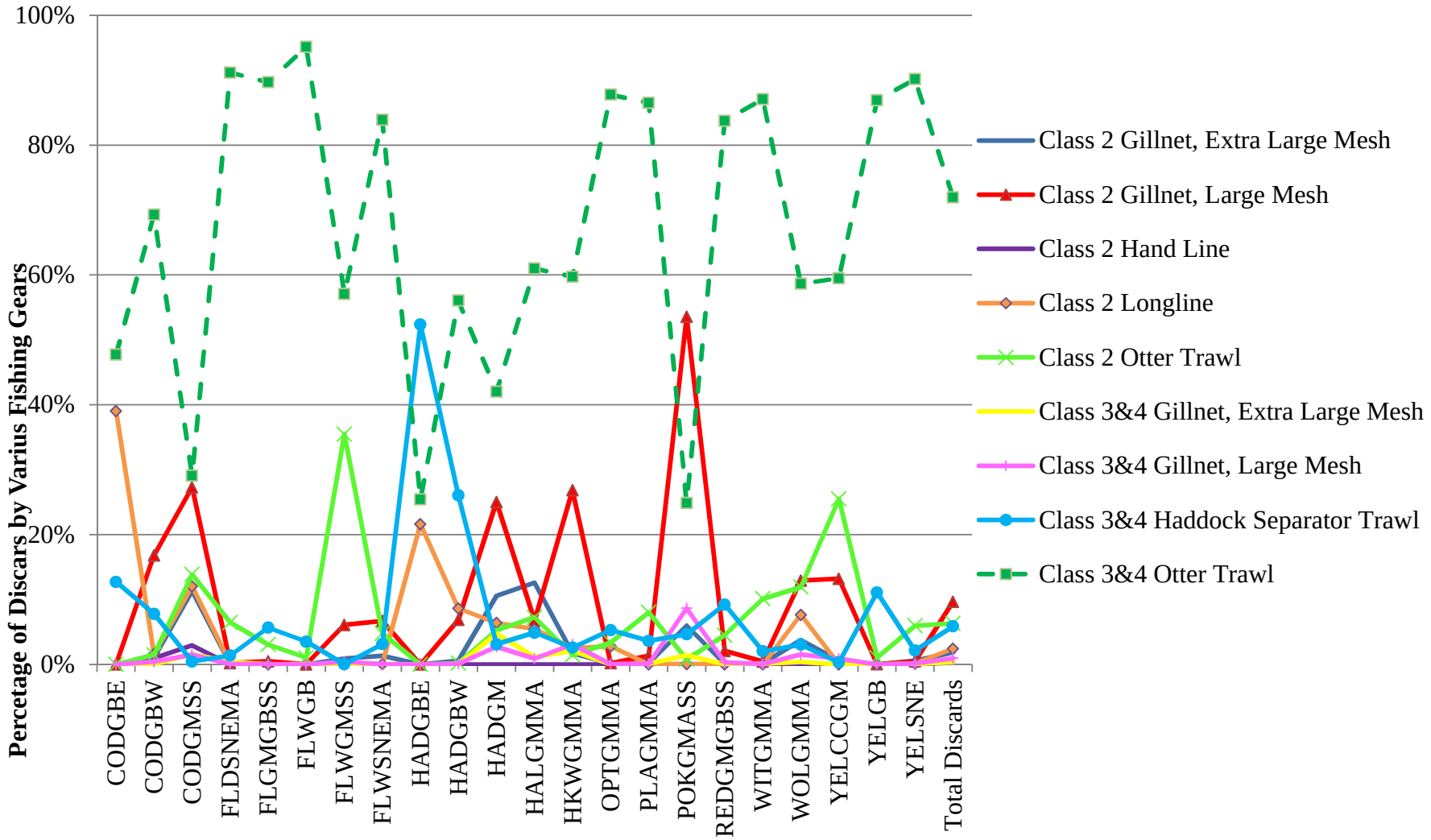

Figure 5(a) Distribution of GF Discards (Live lbs) by Various Gears for Each GF Stock under GF Trips in FY 2010

Note: Abbreviation of Groundfish stock are defined as follows and those stocks with an "*" indicated are zero possession prohibited species under landing/possession limits.

CODGBE: GB Cod East;
CODGBW: GB Cod West;
CODGMSS: GOM Cod;
FLDSNEMA*: Southern Windowpane;
FLGMGBSS*: Northern Windowpane;
FLWGB*: GB Winter Flounder;
FLWGMSS: GOM Winter Flounder;
FLWSNEMA*: SNE Winter Flounder;
HADGBE: GB Haddock East;
HADGBW: GB Haddock West;
HADGM: GOM Haddock;
HALGMMA: Halibut;
HKWGMMA: White Hake;
OPTGMMA*: Ocean Pout;
PLAGMMA: American Plaice;
POKGMASS: Pollock;
REDGMGBSS: Redfish;
WITGMMA: Witch Flounder;
WOLGMMA*:Wolffish;
YELCCGM: CC/GOM Yellowtail Flounder;
YELGB: GB Yellowtail Flounder;
YELSNE: SNE Yellowtail Flounder.

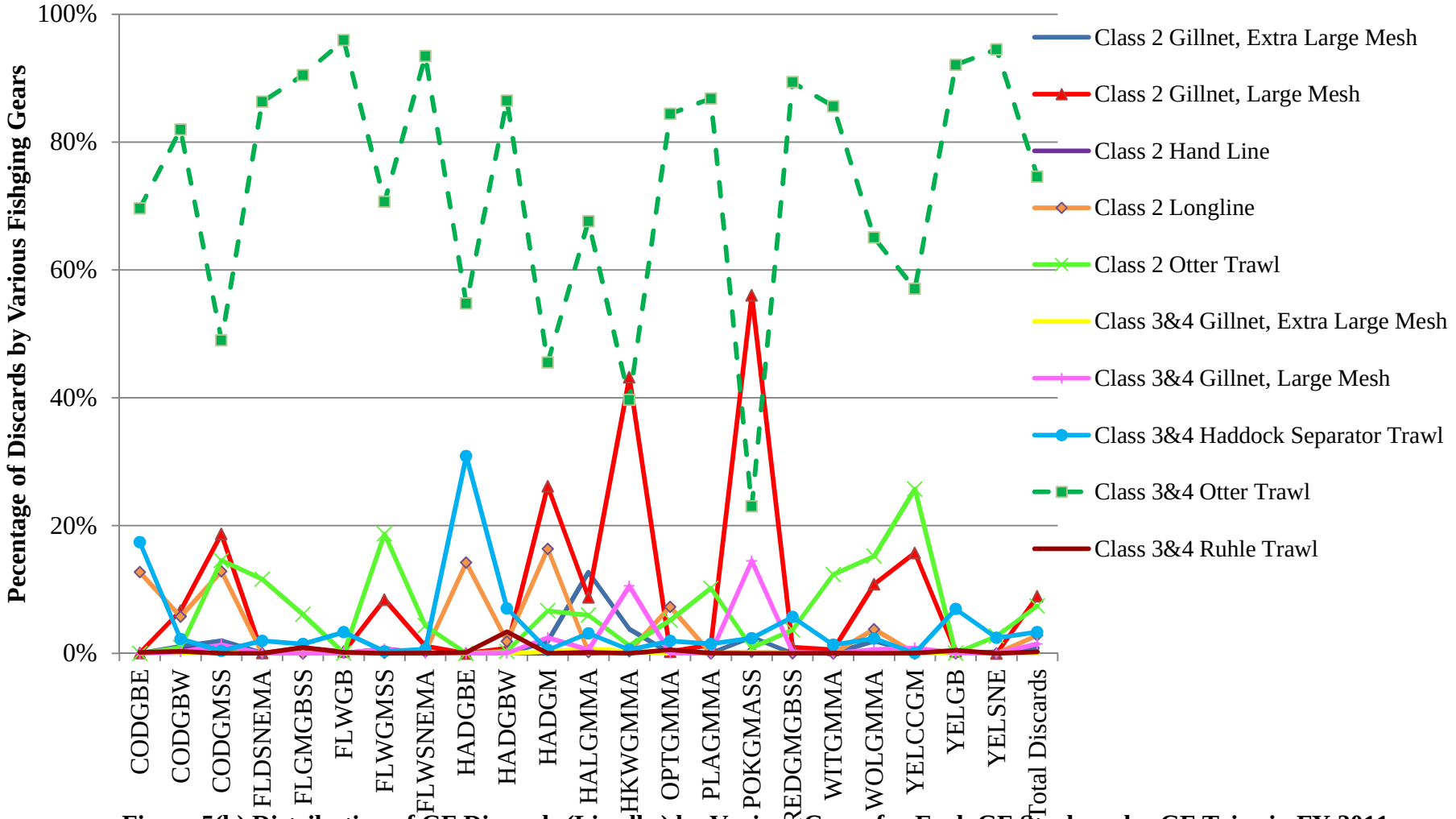

Figure 5(b) Distribution of GF Discards (Live lbs) by Various Gears for Each GF Stock under GF Trips in FY 2011

Note: Abbreviation of Groundfish stock are defined as follows and those stocks with an "*" indicated are zero possession prohibited species under landing/possession limits.

CODGBE: GB Cod East;
CODGBW: GB Cod West;
CODGMSS: GOM Cod;
FLDSNEMA*: Southern Windowpane;
FLGMGBSS*: Northern Windowpane;
FLWGB*: GB Winter Flounder;
FLWGMSS: GOM Winter Flounder;
FLWSNEMA*: SNE Winter Flounder;
HADGBE: GB Haddock East;
HADGBW: GB Haddock West;
HADGM: GOM Haddock;
HALGMMA: Halibut;
HKWGMMA: White Hake;
OPTGMMA*: Ocean Pout;
PLAGMMA: American Plaice;
POKGMASS: Pollock;
REDGMGBSS: Redfish;
WITGMMA: Witch Flounder;
WOLGMMA*:Wolffish;
YELCCGM: CC/GOM Yellowtail Flounder;
YELGB: GB Yellowtail Flounder;
YELSNE: SNE Yellowtail Flounder.

Table 1 Number of Trips, Seadays, Landings, and Discards for GF Trips in FY 2010

Size Class	Gear Type	Trips (A)	Seadays (B)	Observed Trips (C)	Observed Seadays (D)	GF Landings (E)	Non-GF Landings (F)	GF Discards (G)	Observed GF Discards (H)
				FY 2010					
2 (0'-50')	Gillnet, XL Mesh	2,955	3,585	564	656	814,477	12,451,412	47,020	9,209
	Gillnet, L Mesh	4,524	5,185	1,367	1,594	7,609,899	5,259,914	286,156	89,358
	Hand Line	271	297	40	43	99,625	158,660	12,556	3844
	Longline	547	745	185	242	1,249,132	386,952	72,371	18,827
	Otter Trawl	1,328	1,643	399	488	2,328,292	687,035	195,397	67,399
3 (50'-75')	Gillnet, XL Mesh	271	502	38	79	170,105	1,018,179	9,605	2130
	Gillnet, L Mesh	172	413	58	120	768,548	291,740	27,978	10,915
	Haddock Sep. Trawl	15	46	4	11	187,285	10,359	5,135	1,157
	Otter Trawl	2,438	6,657	745	1,936	17,783,821	9,350,367	930,740	269,042
	Ruhle Trawl	8	50	0	0	115,547	44,944	5,822	0
4 (75'+)	Haddock Separator Trawl	81	547	24	182	3,318,470	121,026	77,768	25,558
	Otter Trawl	1,214	7,571	361	2,339	29,900,139	6,441,003	1,293,505	369,709
	Ruhle Trawl	17	117	6	36	727,338	26,576	11,461	1,896
	Total*	13,845	27,362	3,791	7,726	65,073,596	36,249,551	2,975,574	869,044
				FY 2011					
2 (30'-50')	Gillnet, XL Mesh	2,854	3,573	379	486	174,417	14,466,542	23,316	4,177
	Gillnet, L Mesh	5,485	6,511	1,520	1,745	9,209,041	7,534,108	324,231	90,349
	Hand Line	444	459	29	29	157,499	109,995	7,982	826
	Longline	745	865	137	154	1,201,593	466,010	105,039	16,974
	Otter Trawl	2,022	2,349	503	601	3,326,165	1,030,607	273,134	76,775
3 (50'-75')	Gillnet, XL Mesh	291	472	29	49	28,114	1,440,591	2,302	639
	Gillnet, L Mesh	269	595	107	240	987,089	457,267	52,890	18,594
	Haddock Sep. Trawl	18	26	4	4	16,289	3,751	6,870	1,653
	Longline	1	1	1	1	13	3,010	0	0
	Otter Trawl	2,903	7,983	794	2,424	20,032,274	11,697,859	1,301,553	424,915
	Ruhle Trawl	4	30	0	0	56,882	14,972	1,679	0
4 (75'+)	Haddock Sep. Trawl	37	263	17	115	1,247,060	79,098	29,178	13,286
	Hand Line	5	7	0	0	739	5,168	279	0
	Otter Trawl	1,196	8,225	400	2,845	30,666,386	9,062,349	1,468,505	427,654
	Ruhle Trawl	49	368	19	139	1,390,287	172,761	28,729	13,500
	Total*	16,326	31,732	3,939	8,831	68,500,349	46,545,612	3,625,779	1,089,342

Table 2 Observer Coverage Rates and Proportion of Observed Seadays, Landings, and Discards during GF Trips in FY 2010

Size Class	Gear Type	Observer Coverage rate (%) by Category				Distribution % across Category		
		Trips (A)	Seadays (B)	GF Landings (C)	GF Discards (D)	Observed Seadays (E)	GF Landings (F)	GF Discards (G)
FY 2010								
2 (30’-50’)	Gillnet, XL Mesh	19.1%	18.3%	24.2%	19.6%	8.5%	1.3%	1.6%
	Gillnet, L Mesh	30.2%	30.7%	35.1%	31.2%	20.6%	11.7%	9.6%
	Hand Line	14.8%	14.5%	34.1%	30.6%	0.6%	0.2%	0.4%
	Longline	33.8%	32.5%	28.8%	26.0%	3.1%	1.9%	2.4%
	Otter Trawl	30.0%	29.7%	30.1%	34.5%	6.3%	3.6%	6.6%
3 (50'-70'))	Gillnet, XL Mesh	14.0%	15.7%	28.8%	22.2%	1.0%	0.3%	0.3%
	Gillnet, L Mesh	33.7%	29.1%	28.7%	39.0%	1.6%	1.2%	0.9%
	Haddock Separator Trawl	26.7%	23.9%	34.6%	22.5%	0.1%	0.3%	0.2%
	Otter Trawl	30.6%	29.1%	30.2%	28.9%	25.1%	27.3%	31.3%
	Ruhle Trawl	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%
4 (75'+)	Haddock Separator Trawl	29.6%	33.3%	39.6%	32.9%	2.4%	5.1%	2.6%
	Otter Trawl	29.7%	30.9%	30.5%	28.6%	30.3%	45.9%	43.5%
	Ruhle Trawl (Class 3&4)	35.3%	30.8%	27.2%	16.5%	0.5%	1.1%	0.4%
Average/Total*		27.4%	28.2%	31.1%	29.2%	100.0%	100.0%	100.0%
FY 2011								
2 (30’-50’)	Gillnet, XL Mesh	13.3%	13.6%	21.0%	17.9%	5.5%	0.3%	0.6%
	Gillnet, L Mesh	27.7%	26.8%	26.1%	27.9%	19.8%	13.4%	8.9%
	Hand Line	6.5%	6.3%	7.4%	10.3%	0.3%	0.2%	0.2%
	Longline	18.4%	17.8%	13.2%	16.2%	1.7%	1.8%	2.9%
	Otter Trawl	24.9%	25.6%	26.1%	28.1%	6.8%	4.9%	7.5%
3 (50'-75')	Gillnet, XL Mesh	10.0%	10.4%	47.6%	27.8%	0.6%	0.0%	0.1%
	Gillnet, L Mesh	39.8%	40.3%	41.2%	35.2%	2.7%	1.4%	1.5%
	Haddock Sep. Trawl	22.2%	15.4%	20.8%	24.1%	0.0%	0.0%	0.2%
	Longline	100.0%	100.0%	100.0%	-	0.0%	0.0%	0.0%
	Otter Trawl	27.4%	30.4%	31.7%	32.6%	27.4%	29.2%	35.9%
	Ruhle Trawl	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
4 (75'+)	Haddock Separator Trawl	45.9%	43.7%	60.8%	45.5%	1.3%	1.8%	0.8%
	Hand Line	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Otter Trawl	33.4%	34.6%	33.7%	29.1%	32.2%	44.8%	40.5%
	Ruhle Trawl	38.8%	37.8%	34.2%	47.0%	1.6%	2.0%	0.8%
Total*		24.1%	27.8%	31.8%	30.0%	100.0%	100.0%	100.0%

Table 3 Landings and Discards per Trip and per Seaday for GF Trips in FY 2010

Size Class	Gear Type	GF Landings per Trip (A)	Non-GF Landings per Trip (B)	GF as % of Total Landings (C)	GF Discards per Trip (D)	GF Landings per seaday (E)	Non-GF Landings per seaday (F)	GF Discards per seaday (G)	Relative Seaday Ratio** (H)= [Max(G) /(G)]
				FY 2010					
2 (30'-50')	Gillnet, XL Mesh	276	4,214	6.14%	16	227	3,473	13	13.03
	Gillnet, L Mesh	1,682	1,163	59.13%	63	1,468	1,014	55	3.10
	Hand Line	368	585	38.57%	46	335	534	42	4.04
	Longline	2,284	707	76.35%	132	1,677	519	97	1.76
	Otter Trawl	1,753	517	77.22%	147	1,417	418	119	1.44
3 (50'-75')	Gillnet, XL Mesh	628	3,757	14.32%	35	339	2,028	19	8.93
	Gillnet, L Mesh	4,468	1,696	72.48%	163	1,861	706	68	2.52
	Haddock Sep. Trawl	12,486	691	94.76%	342	4,071	225	112	1.53
	Otter Trawl	7,294	3,835	65.54%	382	2,671	1,405	140	1.22
	Ruhle Trawl	14,443	5,618	72.00%	728	2,311	899	116	1.47
4 (75'+)	Haddock Sep. Trawl	40,969	1,494	96.48%	960	6,067	221	142	1.20
	Otter Trawl	24,629	5,306	82.28%	1065	3,949	851	171	1.00
	Ruhle Trawl	42,785	1,563	96.47%	674	6,217	227	98	1.74
	Total*	4,700	2,618	64.22%	215	2,378	1,325	109	1.57
				FY 2011					
2 (30'-50')	Gillnet, XL Mesh	61	5,069	1.19%	8	49	4,049	7	40.49
	Gillnet, L Mesh	1,679	1,374	55.00%	59	1,414	1,157	50	5.31
	Hand Line	355	248	58.88%	18	343	240	17	15.19
	Longline	1,613	626	72.06%	141	1,389	539	121	2.18
	Otter Trawl	1,645	510	76.34%	135	1,416	439	116	2.27
	Ruhle Trawl	6,466	930	87.43%	62	2,155	310	21	12.79
3 (50'-75')	Gillnet, XL Mesh	97	4,950	1.91%	8	60	3,052	5	54.18
	Gillnet, L Mesh	3,669	1,700	68.34%	197	1,659	769	89	2.97
	Haddock Sep. Trawl	905	208	81.28%	382	627	144	264	1.00
	Longline	13	3,010	0.43%	0	13	3,010	0	-
	Otter Trawl	6,901	4,030	63.13%	448	2,509	1,465	163	1.62
	Ruhle Trawl	14,221	3,743	79.16%	420	1,896	499	56	4.72
4 (75'+)	Haddock Sep. Trawl	33,704	2,138	94.04%	789	4,742	301	111	2.38
	Hand Line	148	1,034	12.51%	56	106	738	40	6.63
	Otter Trawl	25,641	7,577	77.19%	1,228	3,728	1,102	179	1.48
	Ruhle Trawl	28,373	3,526	88.95%	586	3,778	469	78	3.38
	Total*	4,196	2,851	59.54%	222	2,159	1,467	114	2.31

Table 4 Annual Catch Entitlement of Groundfish to Groundfish Sector, Catches, and the Utilization Rate by Species/Stocks

Groundfish Species/stocks	2010 ACE (lb) (A)	2010 Catch (Landings + Discards) (lb) (B)	2011 ACE (lb) (C)	2011 Catch (Landings + Discards)(lb) (D)	Predicted Utilization Rate for 2011 (E=B/C)	Actual Utilization Rate for 2011 (F=D/C)	Standardized Ratio based on Pollock (G)
CC/GOM Yel. Fl.	1,608,084	1,234,074	2,169,519	1,752,995	56.88%	80.80%	1.614
GB Cod East	717,441	558,835	431,357	357,959	100.00%	83.00%	2.838
GB Cod West	6,563,099	5,494,540	9,544,297	6,730,519	57.57%	70.50%	1.634
GB Haddock East	26,262,695	4,019,295	21,122,576	2,337,362	19.03%	11.10%	0.540
GB Haddock West	62,331,182	14,164,402	54,741,830	6,103,776	25.87%	11.20%	0.734
GB Winter Fl.	4,018,496	3,047,725	4,796,109	4,242,164	63.55%	88.50%	1.803
GB Yellowtail Fl.	1,770,451	1,629,253	2,474,662	2,178,073	65.84%	88.00%	1.868
GOM Cod	9,540,389	7,974,284	11,357,677	9,629,834	70.21%	84.80%	1.992
GOM Haddock	1,761,206	816,869	1,871,943	1,066,284	43.64%	57.00%	1.238
GOM Winter Fl.	293,736	177,934	716,989	348,756	24.82%	48.60%	0.704
Plaice	6,058,149	3,315,063	7,302,377	3,597,139	45.40%	49.30%	1.288
Pollock	35,666,741	12,014,768	34,096,310	16,629,760	35.24%	48.80%	1.000
Redfish	14,894,618	4,725,257	18,034,606	5,959,501	26.20%	33.00%	0.744
SNE/MA Yel. Fl.	517,372	336,125	941,762	802,444	35.69%	85.20%	1.013
White Hake	5,522,677	4,884,630	7,038,744	6,645,585	69.40%	94.40%	1.969
Witch Fl.	1,824,125	1,533,027	2,847,251	2,189,017	53.84%	76.90%	1.528
Grand Total	**179,350,461**	**65,926,081**	**179,488,008**	**70,762,673**	**36.73%**	**39.40%**	**-**

Table 5 Variable definitions and descriptive statistics

Variable	Definition	Mean	Std. Dev.
Discards	Discards per trip (Lbs)	226.62	529.25
Landings	Landingss per trip (Lbs)	4,482.43	10,561.93
trip_length	Length of the trip by number of seadays	1.39	2.25
Dday	=1 if trip less than 24 hours, and =0 otherwise	0.76	0.43
• ***Size class* (omitted if vessel size is less than 30')**			
class2 (base)	= 0 if vessel size is 30' to <50'		
dclass3	=1 if vessel size is 50' to <75'	0.21	0.41
dclass4	=1 if vessel size is >75'	0.09	0.29
• ***Sectors* (NEFS4 and the common pool are omitted)**			
dFixedgear	=1 if vessel belongs to that sector, and = 0 if otherwise	0.18	0.38
dSHS	=1 if vessel belongs to that sector, and = 0 if otherwise	0.08	0.26
dPortclyde	=1 if vessel belongs to that sector, and = 0 if otherwise	0.05	0.22
dNEFS7	=1 if vessel belongs to that sector, and = 0 if otherwise	0.02	0.15
dNEFS8	=1 if vessel belongs to that sector, and = 0 if otherwise	0.01	0.09
dNEFS11	=1 if vessel belongs to that sector, and = 0 if otherwise	0.11	0.32
dNEFS12	=1 if vessel belongs to that sector, and = 0 if otherwise	0.02	0.13
dNEFS2	=1 if vessel belongs to that sector, and = 0 if otherwise	0.14	0.35
dNEFS3	=1 if vessel belongs to that sector, and = 0 if otherwise	0.20	0.40
dNEFS10	=1 if vessel belongs to that sector, and = 0 if otherwise	0.07	0.26
dNEFS13	=1 if vessel belongs to that sector, and = 0 if otherwise	0.03	0.17
dNEFS9	=1 if vessel belongs to that sector, and = 0 if otherwise	0.03	0.17
dNEFS5	=1 if vessel belongs to that sector, and = 0 if otherwise	0.04	0.20
dTristate	=1 if vessel belongs to that sector, and = 0 if otherwise	0.00	0.06
dNEFS6	=1 if vessel belongs to that sector, and = 0 if otherwise	0.01	0.09
dNCCS	=1 if vessel belongs to that sector, and = 0 if otherwise	0.00	0.06
• ***Gear***			
dLongline	= 1 if Longline gear was used to land catch	0.05	0.21
dHandline	= 1 if Hand Line gear was used to land catch	0.01	0.10
dGillnetLargeMesh	= 1 if Large Mesh Gillnet was used to land catch	0.38	0.48
dGillnetExtraLargeMesh	= 1 if Extra Large Gillnet was used to land catch	0.16	0.37
dRuhleTrawl	= 1 if Ruhle Trawl was used to land catch	0.00	0.06
dHaddockSeparatorTrawl	= 1 if Haddock Separator Trawl was used to land catch	0.01	0.10
• ***Broad Stock Areas***			
dGOM	=1 if landings occurred in the Gulf of Maine (515)	0.61	0.49
dGBW	=1 if landings occurred in the George's Bank West (521)	0.20	0.40
dGBE	=1 if landings occurred in the George's Bank East (525)	0.00	0.07

Table 6 Double Log SUR Regression Results

Models / Variables	Unweighted Discards Model		Weighted Discards Model	
	Parameter Estimate	**t statistic**	**Parameter Estimate**	**t statistic**
dday	-1.872	-15.820	-1.658	-17.190
dclass3	0.072	0.560	0.104	0.990
dclass4	0.723	3.620	0.720	4.430
dFixedgear	3.827	15.740	4.543	22.940
dSHS	4.844	22.910	5.298	30.770
dPortclyde	4.978	19.530	5.506	26.520
dNEFS7	4.746	17.290	5.318	23.800
dNEFS8	4.160	10.020	5.051	14.940
dNEFS11	5.290	22.060	5.652	28.940
dNEFS12	3.814	12.450	4.619	18.520
dNEFS2	4.867	23.580	5.361	31.890
dNEFS3	5.117	21.440	5.657	29.100
dNEFS10	4.783	19.430	5.442	27.140
dNEFS13	5.580	21.240	6.135	28.670
dNEFS9	1.675	6.480	2.977	14.150
dNEFS5	6.242	26.870	6.789	35.890
dTristate	4.979	8.450	5.702	11.890
dNEFS6	4.834	11.840	5.377	16.170
dNCCS	5.060	7.400	5.791	10.400
dLongline	0.007	0.030	0.126	0.680
dHandline	-3.315	-8.810	-2.947	-9.610
dGillnetLargeMesh	-1.726	-11.420	-1.605	-13.040
dGillnetExtraLargeMesh	-3.708	-20.850	-3.308	-22.850
dRuhleTrawl	-2.134	-3.550	-2.169	-4.430
dHaddockSeparatorTrawl	-0.804	-2.300	-0.831	-2.920
dGOM	0.928	5.730	0.729	5.530
dGBW	0.726	4.810	0.587	4.780
dGBE	1.872	3.650	1.578	3.780
Number of Observation	14,946		14,946	
Discard model R-squared	0.401		0.571	
System weighted R-squared	0.834		0.842	

Table 7 Simulation of Possible Allocation of Observed Seadays for GF Trips in FY 2010 and FY2011

Size Class	Gear Type	Scenario 1: Reallocation of Observed Seadays				Scenario 2: Reduce Observed Seadays by 19%				
		Observed Seadays (A)	**Observed Seadays % (B)**	**Observed Discards (C)**	**Observed Discards % (D)**	**Observed Seadays (E)**	**Observed Seadays % (F)**	**Observed Discards (G)**	**Observed Discards % (H)**	**Change in Observed Seadays (I)**
					FY 2010					
2 (30' - 50')	Gillnet, XL Mesh	122	3%	1,601	3%	99	3%	1,295	3%	-557
	Gillnet, L Mesh	743	14%	41,005	14%	601	12%	33,164	12%	-993
	Haddock S.Trawl	0	8%	5	8%	0	7%	4	7%	-
	Hand Line	33	11%	1,378	11%	26	9%	1,115	9%	-17
	Longline	188	25%	18,254	25%	152	20%	14,764	20%	-90
	Otter Trawl	507	31%	60,337	31%	410	25%	48,799	25%	-78
3 (50' - 75')	Gillnet, XL Mesh	25	5%	477	5%	20	4%	386	4%	-59
	Gillnet, L Mesh	73	18%	4,921	18%	59	14%	3,980	14%	-61
	Haddock S. Trawl	13	29%	1,488	29%	11	23%	1,203	23%	0
	Otter Trawl	2,417	36%	337,880	36%	1,955	29%	273,267	29%	19
	Ruhle Trawl	15	30%	1,760	30%	12	24%	1,424	24%	12
4 (75' +)	Haddock S. Trawl	202	37%	28,708	37%	163	30%	23,218	30%	-19
	Otter Trawl	3,359	44%	573,808	44%	2,716	36%	464,080	36%	377
	Ruhle Trawl	30	25%	2,915	25%	24	21%	2,358	21%	-12
	Total*	7,726	28%	1,074,523	36%	6,249	23%	869,044	29%	-1,477
					FY 2011					
2 (30' - 50')	Gillnet, XL Mesh	57	2%	371	2%	46	1%	303	1%	-440
	Gillnet, L Mesh	790	12%	39,325	12%	645	10%	32,129	10%	-1,100
	Hand Line	19	4%	338	4%	16	3%	276	3%	-13
	Longline	256	30%	31,067	30%	209	24%	25,382	24%	55
	Otter Trawl	665	28%	77,353	28%	544	23%	63,199	23%	-57
	Ruhle Trawl	0	5%	3	5%	0	4%	2	4%	0
3 (50' - 75')	Gillnet, XL Mesh	6	1%	27	1%	5	1%	22	1%	-44
	Gillnet, L Mesh	129	22%	11,451	22%	105	18%	9,356	18%	-135
	Haddock S.Trawl	17	64%	4,421	64%	14	53%	3,612	53%	10
	Longline	0	0%	0	-	0	0%	0	-	-1
	Otter Trawl	3,170	40%	516,852	40%	2,590	32%	422,275	32%	166
	Ruhle Trawl	4	14%	229	14%	3	11%	187	11%	3
4 (75' +)	Haddock S.Trawl	71	27%	7,884	27%	58	22%	6,441	22%	-57
	Otter Trawl	3,577	43%	638,592	43%	2,922	36%	521,738	36%	77
	Ruhle Trawl	70	19%	5,463	19%	57	16%	4,463	16%	-82
	Total*	8,831	28%	1,333,321	37%	7,215	23%	1,089,341	30%	-1,616

Table 8 Weighted Discard Simulation of Observed Seadays for GF Trips in FY 2010

Size Class	Gear Type	Scenario 3: Reallocation of Observed Seadays				Scenario 4: Reduce Observed Seadays by 20%				
		Observed Seadays (A)	**Observed Seadays % (B)**	**Observed Weighted Discards (C)**	**Observed Discards % (D)**	**Observed Seadays (E)**	**Observed Seadays % (F)**	**Observed Weighted Discards (G)**	**Observed Discards % (G)**	**Change in Observed Seadays (I)**
					2010					
2 (30'-50')	Gillnet, XL Mesh	135	4%	3,054	6%	108	3%	2,449	5%	-548
	Gillnet, L Mesh	708	14%	58,448	20%	568	11%	46,871	16%	-1,026
	Haddock S. Trawl	0	10%	11	18%	0	8%	9	14%	0
	Hand Line	39	13%	3,036	24%	31	10%	2,435	19%	-12
	Longline	224	30%	40,835	56%	180	24%	32,747	45%	-62
	Otter Trawl	518	32%	98,829	51%	416	25%	79,255	41%	-72
3 (50'-75')	Gillnet, XL Mesh	26	5%	817	9%	21	4%	655	7%	-58
	Gillnet, L Mesh	61	15%	5,428	19%	49	12%	4,353	16%	-71
	Haddock S. Trawl	12	25%	1,788	35%	9	20%	1,434	28%	-2
	Otter Trawl	2,453	37%	546,256	59%	1,967	30%	438,065	47%	31
	Ruhle Trawl	18	36%	3,931	68%	14	29%	3,152	54%	14
4 (75'+)	Haddock S. Trawl	167	31%	30,941	40%	134	25%	24,813	32%	-48
	Otter Trawl	3,332	44%	886,101	69%	2,672	35%	710,600	55%	333
	Ruhle Trawl	32	27%	5,248	46%	26	22%	4,208	37%	-10
	Total*	7,726	28%	1,684,723	57%	6,196	23%	1,351,047	45%	-1,530
					2011					
2 (30'-50')	Gillnet, XL Mesh	63	2%	715	3%	51	1%	578	2%	-435
	Gillnet, L Mesh	740	11%	54,093	17%	598	9%	43,734	13%	-1,147
	Hand Line	22	5%	682	9%	18	4%	551	7%	-11
	Longline	292	34%	63,584	61%	236	27%	51,408	49%	82
	Otter Trawl	717	31%	140,734	52%	580	25%	113,783	42%	-21
	Ruhle Trawl	0	6%	8	13%	0	5%	6	10%	0
3 (50'-75')	Gillnet, XL Mesh	6	1%	50	2%	5	1%	41	2%	-44
	Gillnet, L Mesh	105	18%	11,895	22%	85	14%	9,617	18%	-155
	Haddock S. Trawl	20	76%	9,514	138%	16	61%	7,692	112%	12
	Longline	0	0%	0	-	0	0%	0	-	-1
	Otter Trawl	3,281	41%	866,945	67%	2,653	33%	700,925	54%	229
	Ruhle Trawl	5	16%	470	28%	4	13%	380	23%	4
4 (75'+)	Haddock S. Trawl	62	23%	9,305	32%	50	19%	7,523	26%	-65
	Hand Line	1	10%	44	16%	1	8%	36	13%	1
	Otter Trawl	3,442	42%	926,051	63%	2,783	34%	748,712	51%	-62
	Ruhle Trawl	76	21%	9,963	35%	61	17%	8,055	28%	-78
	Total*	8,831	28%	2,094,054	58%	7,140	23%	1,693,043	47%	-1,691

Appendix F
Example SBRM Report and Data Queries

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Northeast Region SBRM Review Report

[*Note: This is an example report to illustrate one possible structure for presenting information relevant for reviewing and evaluating the Northeast Region SBRM. An alternative example could be the SBRM 3-yr Review Report 2011, published in two Center Reference Documents (CRD11-09[1] and CRD12-27[2]). This information should be considered preliminary and is not intended for Council action. If the Councils select options for both a SBRM review report and a discard report, the SBRM review report may provide a review of previous discard estimations without repeating previously estimated discards.*]

Monkfish

Background

Amendment 3 to the Monkfish Fishery Management Plan (FMP), part of the Omnibus Standardized Bycatch Reporting Methodology (SBRM) Amendment to the Northeast Region FMPs, implemented several requirements regarding the reporting of bycatch information for the monkfish fishery. This amendment was developed under the authority of section 303(11)(a) of the Magnuson-Stevens Act, which requires that all FMPs establish an SBRM. The SBRM Amendment addressed four elements: (1) The bycatch reporting and monitoring mechanisms used to obtain information on discards in Northeast fisheries; (2) the analytical techniques used to estimate discards and to allocate at-sea observer effort; (3) establishing a precision-based performance standard for the SBRM; and (4) requiring a periodic review and reporting process as part of the SBRM.

This document complies with the fourth element of the SBRM implemented under Amendment 3: The periodic SBRM Report. This report is intended to provide information with which the New England and Mid-Atlantic Fishery Management Councils (Councils) and NOAA Fisheries Service would consider the effectiveness of the SBRM and, if necessary, take appropriate steps to improve the SBRM. As described in Amendment 3, the SBRM Report would provide the following information: (1) A review of the recent levels of observer coverage in each applicable fishery; (2) a review of recent observed encounters with each species in each fishery, 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) an estimate of the total amount of discards associated with each fishery (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 specified target for each fishery; (6) a description of the methods used to calculate the reported CVs and to determine target observer coverage levels, if the methods used are different from those

[1] www.nefsc.noaa.gov/publications/crd/crd1109/
[2] www.nefsc.noaa.gov/publications/crd/crd1227/

described and evaluated in the SBRM Amendment; and (7) an evaluation of the implications for management of the discard information collected under the SBRM.

The information to be provided in the report for the purpose of determining the effectiveness of the SBRM in meeting the CV standards should not be confused with the level of information a Council may want or need to address specific management issues. More detailed discard-related information, structured in a way and at a scale meaningful for the particular management issue, can always be provided at the Councils' request.

Analytical Overview

This report focuses on the monkfish fishery, as managed under the Monkfish FMP, but addresses the discards of all species in the monkfish fishery as well as the discards of monkfish in other fisheries. There are three primary fishing gear modes that comprise the monkfish fishery: New England large-mesh otter trawl; New England extra-large-mesh gillnet; and Mid-Atlantic extra-large-mesh gillnet. This analysis will examine the discards of all species that occur in these three fishing modes.

In addition to the three primary monkfish fishing modes identified above, there are another 17 fishing modes for which at least some amount of monkfish was discarded in 2004. Of these, there are nine that contributed at least 1 percent of the total estimated monkfish discards in 2004: New England and Mid-Atlantic open area, limited access scallop dredge; New England and Mid-Atlantic small-mesh otter trawl; New England and Mid-Atlantic open area, general category scallop dredge; New England and Mid-Atlantic closed area, limited access scallop dredge; and Mid-Atlantic large-mesh otter trawl. This analysis will examine monkfish discards in these fishing modes.

Review of Recent Levels of Observer Coverage

Table 1 identifies the observer coverage in 2004 for the primary monkfish fishery and monkfish discard fishing modes. This table also identifies the number of FVTR reports submitted for each fishing mode, in order to calculate an observer coverage rate for 2004.

Fishing Mode	Observed Trips	Observed Sea Days	FVTR Trips	Coverage Rate
NE large-mesh otter trawl	386 (153)	1,076 (871)	16,156	2% (3%)
NE x-large-mesh gillnet	445 (124)	533 (168)	4,712	9% (12%)
MA x-large-mesh gillnet	27 (115)	30 (122)	2,568	1% (6%)
NE OL scallop dredge	26 (10)	344 (113)	1,229	2% (3%)
MA OL scallop dredge	69 (9)	591 (84)	1,822	4% (4%)
NE small-mesh otter trawl	142 (58)	449 (128)	3,484	4% (6%)
NE OG scallop dredge	9 (11)	11 (13)	3,566	0.25% (1%)
NE CL scallop dredge	86	805	292	29%
MA CL scallop dredge	35	373	78	45%
MA OG scallop dredge	22 (17)	33 (22)	3,433	1% (1%)
MA large-mesh otter trawl	75 (1)	183 (3)	8,850	1% (1%)
MA small-mesh otter trawl	194 (11)	471 (18)	5,222	4% (4%)

Table 1. 2004 observer coverage rates for the primary fishing modes associated with either the monkfish fishery (landings) or monkfish discards. Numbers in parentheses represent additional

observer coverage included in the protected resources dataset (either training trips or "limited protocol" trips). For modes with no number in parentheses, there were no additional trips in the protected resources dataset.

Recent Observed and Estimated Discards

Discards in the Monkfish Fishery

As noted above, there are three primary fishing modes that comprise the monkfish fishery: New England large-mesh otter trawl; New England extra-large-mesh gillnet; and Mid-Atlantic extra-large-mesh gillnet. Together, three fishing modes accounted for over 92 percent of monkfish landings in 2004 (see Table 2). Although there were 142 species observed to be discarded in 2004 by these three fishing modes, the top 10 discard species accounted for 83 percent, by weight, of the total observed discards (see Table 3). Winter and little skates were the primary discard species, together comprising over 41 percent of observed discards. All skates combined represented 58 percent of all observed discards in these three fishing modes. Spiny dogfish accounted for another 14 percent of observed discards; monkfish, 4 percent; Jonah crab, 3.2 percent; American lobster, 2.9 percent; and thorny skate, 2.8 percent. All other discard species represented 1 percent or less of the total observed discards for these three fishing modes. Attachments 1, 2, and 3, identify all observed discards, by weight, for the three primary monkfish fishing modes.

Fishing Mode	2004 Monkfish Landings (lb) (FVTR)	Percent of Total 2004 Monkfish Landings	Cumulative Percentage of Landings
NE Large-mesh Trawl	14,955,163	47.6%	47.6%
NE X-Large-mesh Gillnet	9,836,119	31.3%	78.9%
MA X-Large-mesh Gillnet	4,301,618	13.7%	92.6%
NE Scallop Dredge	878,931	2.8%	95.4%
NE Large-mesh Gillnet	615,585	2.0%	97.3%
MA Scallop Dredge	348,132	1.1%	98.4%
MA Large-mesh Trawl	346,457	1.1%	99.5%
NE Small-mesh Trawl	49,150	0.2%	99.7%
MA Small-mesh Trawl	36,600	0.1%	99.8%
MA Scallop Trawl	32,555	0.1%	99.9%

Table 2. 2004 monkfish landings, by weight, by fishing mode (FVTR).

Discard Species	Total 2004 Observed Discards (lb)	Percent of Total Observed Discards	Cumulative Percent of Observed Discards
Winter skate	386,292	21.5%	21.5%
Little skate	353,072	19.6%	41.1%
Spiny dogfish	253,710	14.1%	55.2%
Skate, NK	219,095	12.2%	67.3%
Monkfish	72,706	4.0%	71.4%
Jonah crab	57,026	3.2%	74.5%
American lobster	51,748	2.9%	77.4%
Thorny skate	50,240	2.8%	80.2%
Atlantic cod	27,633	1.5%	81.7%
Windowpane flounder	23,448	1.3%	83.0%

Table 3. Top ten discard species, by weight, and percent of total 2004 observed discards in the New England large-mesh otter trawl, and New England and Mid-Atlantic extra-large-mesh gillnet fishing modes, combined.

Discards of Monkfish in Other Fisheries

As noted above, there are 20 fishing modes, including the three primary modes in the monkfish fishery, for which at least some amount of monkfish was discarded in 2004. Table 4 identifies the discards of monkfish in 2004, based on observed fishing trips in these 20 fishing modes. The table identifies both the observed discards, the ratio of observed monkfish discards to total observed discards (which indicates the degree to which monkfish is a component of the total discards in the fishing mode), an estimate of the total discards of monkfish in these fishing modes (based on the techniques described in the SBRM Amendment), and the percent (and cumulative percent) of the estimated total monkfish discards in these fishing modes.

Fishing Mode	Observed Monkfish Discards (lb)	Observed Discards, All Species (lb)	Ratio of Monkfish to Total Discards	Estimate of Total Monkfish Discards (lb)	Percent of Total Monkfish Discards	Cumulative Percent of Discards
NE Scallop Dredge OL	37,877	806,792	4.7%	2,896,875	29.71%	29.71%
MA Scallop Dredge OL	45,211	787,116	5.7%	2,027,711	20.79%	50.50%
NE Large-mesh Otter Trawl	41,061	1,545,623	2.7%	1,313,457	13.47%	63.97%
NE Small-mesh Otter Trawl	26,577	1,108,074	2.4%	1,136,577	11.66%	75.63%
NE X-Large-mesh Gillnet	29,933	241,610	12.4%	635,797	6.52%	82.15%
NE Scallop Dredge OG	3,330	9,918	33.6%	402,741	4.13%	86.28%
NE Scallop Dredge CL	123,828	1,477,622	8.4%	377,988	3.88%	90.15%
MA Scallop Dredge CL	67,163	960,608	7.0%	245,389	2.52%	92.67%
MA Scallop Dredge OG	1,307	33,400	3.9%	209,696	2.15%	94.82%
MA Large-mesh Otter Trawl	3,629	208,137	1.7%	166,051	1.70%	96.52%
MA Small-mesh Otter Trawl	7,744	776,602	1.0%	110,351	1.13%	97.65%
MA X-Large-mesh Gillnet	1,712	13,386	12.8%	103,961	1.07%	98.72%
MA Scallop Trawl OL	275	16,019	1.7%	76,078	0.78%	99.50%
MA Scallop Trawl OG	585	37,893	1.5%	28,377	0.29%	99.79%
NE Large-mesh Gillnet	878	555,903	0.2%	11,021	0.11%	99.90%
MA Scallop Dredge CG	11	394	2.8%	6,106	0.06%	99.97%
NE Midwater Trawl	269	402,297	0.1%	2,241	0.02%	99.99%
MA Midwater Trawl	94	18,637	0.5%	461	0.00%	99.99%
NE Shrimp Trawl	2	2,175	0.1%	428	0.00%	100.00%
MA Fish Pot	1	7,771	0.0%	234	0.00%	100.00%

Table 4. 2004 discards of monkfish, both observed and estimated total discards, by weight, for the 20 Northeast Region fishing modes with at least 1 lb of observed discards. The ratio of monkfish to total discards indicates, based on observer data, the relative proportion of the total observed discards that are accounted for by discards of monkfish. For example, the data collected by at-sea observers in 2004 suggest that monkfish comprise one-third of all discards in the New England open area, general category scallop dredge fishing mode.

Precision of Discard Estimates

Based on the information presented in the SBRM Amendment, a CV is a measure of the precision of the data used in developing discard estimates. Table 5 and Table 6 provide the CVs associated with the discard estimates for the fishing modes most relevant to this report. Table 5 identifies the CVs for all relevant species and species groups for the New England large-mesh otter trawl, and the Mid-Atlantic and New England extra-large-mesh

gillnet fishing modes (the primary three fishing modes associated with the monkfish fishery). Table 6 identifies the CVs for monkfish discards for the 12 fishing modes for which the discards of monkfish accounted for at least 1 percent of the total monkfish discards in 2004.

Discard Species/Species Group	NE large-mesh otter trawl	NE extra-large-mesh gillnet	MA extra-large-mesh gillnet
Bluefish	247%	**18%**	**30%**
Atlantic herring	131%	38%	*
Deep-sea red crab	**28%**	N/A	N/A
Sea scallop	35%	N/A	N/A
Mackerel, squid, butterfish	57%	50%	*
Monkfish	**9%**	**17%**	**27%**
Large-mesh multispecies	**10%**	**16%**	*
Small-mesh multispecies	**18%**	62%	N/A
Skates	**17%**	**12%**	**11%**
Spiny dogfish	**24%**	**16%**	**13%**
Summer flounder, scup, black sea bass	32%	**23%**	**30%**
Surfclam, ocean quahog	N/A	N/A	N/A
Tilefish	53%	N/A	N/A
Sea turtles	*	*	49%

Table 5. The CV of total discards, by fleet and species group, derived from the 2004 Northeast Region Fisheries Observer Program, for the primary three fishing modes associated with the monkfish fishery. "*" indicates that there were zero discards in 2004. "N/A" indicates that the particular combination of species and fishing mode is excluded from the review.

Fishing Mode	Monkfish Discards
NE Scallop Dredge OL	32%
MA Scallop Dredge OL	**17%**
NE Large-mesh Otter Trawl	**9%**
NE Small-mesh Otter Trawl	40%
NE X-Large-mesh Gillnet	**17%**
NE Scallop Dredge OG	56%
NE Scallop Dredge CL	**25%**
MA Scallop Dredge CL	**26%**
MA Scallop Dredge OG	**20%**
MA Large-mesh Otter Trawl	**29%**
MA Small-mesh Otter Trawl	35%
MA X-Large-mesh Gillnet	**27%**

Table 6. The CV of total monkfish discards, by fleet, derived from the 2004 Northeast Region Fisheries Observer Program, for the 12 fishing modes for which each mode's monkfish discards account for at least 1 percent of total monkfish discards.

Evaluation of Effectiveness of Meeting the SBRM Standard

The SBRM Amendment [*proposes to*] implement a performance standard of a CV of no more than 30 percent for each relevant combination of fishing mode and species/species group in the Northeast Region. The intent of this standard is to ensure that the data obtained through the Northeast Region SBRM is sufficiently precise to enable scientists and managers to confidently use the resulting data for conducting stock assessments and making management decisions.

Based on the information presented in Table 5 and Table 6, we can evaluate whether the SBRM has met the performance standard for the fishing modes relevant to the subject of this report, monkfish. For the three primary monkfish fishing modes, there are five species groups for which a CV could not be calculated because there were no (zero) discards observed in these fishing modes. There were also 10 species groups which are not included due to the "gray-cell" filter process (see SBRM Amendment for explanation of the gray-cell process). Of the remaining 27 combinations of fishing modes and species groups, 17 have CVs of 30 percent or less. Many of these have CVs considerably better than the SBRM standard (e.g., monkfish in New England large-mesh otter trawl, 9 percent; spiny dogfish in Mid-Atlantic extra-large-mesh gillnet, 13 percent). The remaining 10 combinations have CVs that exceeded the standard, and ranged from 32 percent to 247 percent.

For the 12 fishing modes with monkfish discards included in Table 6, 8 have CVs of 30 percent or less. The other four fishing modes have CVs that range from 32 to 56 percent. Overall, of the 41 unique fishing mode and species group combinations subject to the SBRM standard and related to monkfish, 14 (one-third) have CVs that exceed the standard. The remaining 27 combinations either meet the CV standard or have zero discards.

Implications for Management

In addition to determining whether or not the SBRM standard was met for each applicable combination of fishing mode and species group, it is also important to examine the potential management implications of not meeting the standard. The reasons for not meeting the standard can vary and include: Insufficient sampling; highly variable discard events; rare discard events; etc. Taking stock of the discard information driving the high CVs can be informative for both understanding the implications of not meeting the standard as well as setting priorities for redressing the issues. Table 7 displays, for each of the three primary monkfish fishing modes, the species groups for which the 2004 CV exceeds the SBRM standard and the observed discards, the estimated total discards, and the percent of total catch represented by the estimated total discards. Table 8 shows similar information for monkfish discards by the primary discard fishing modes for which the 2004 exceeds the SBRM standard.

	Discard Species/Species Group	2004 CV	Observed Discards (lb)	Estimated Total Discards (lb)	Discards as Percent of Total Landings
NE Large-mesh Otter Trawl	Atlantic bluefish	247%	854	31,518	0.14%
	Atlantic herring	131%	563	18,710	0.01%
	Sea scallop	35%	1,191	39,996	0.06%
	Mackerel, squid, butterfish	57%	357	12,498	0.01%
	Summer flounder, scup, black sea bass	32%	21,854	720,531	1.48%
	Tilefish	53%	285	8,798	0.38%
NE X-Large-mesh Gillnet	Atlantic herring	38%	46	531	0.00%
	Mackerel, squid, butterfish	50%	393	9,736	0.00%
	Small-mesh multispecies	62%	373	4,414	0.02%
MA X-Large-mesh Gillnet	Sea turtles	49%	Yes	N/A	N/A

Table 7. Summary information regarding the potential impact of discards for species/species groups for which the 2004 CV exceeded the SBRM standard.

Fishing Mode	2004 CV (Monkfish)	Observed Discards (lb)	Estimated Total Discards (lb)	Discards as Percent of Total Landings
NE Scallop Dredge OL	32%	37,877	2,896,875	12.58%
NE Small-mesh Otter Trawl	40%	26,577	1,136,577	4.93%
NE Scallop Dredge OG	56%	3,330	402,741	1.75%
MA Small-mesh Otter Trawl	35%	7.744	166,051	0.48%

Table 8. Summary information regarding the potential impact of monkfish discards for fishing modes for which the 2004 CV exceeded the SBRM standard.

Examining the information presented above provides insight into the potential implications for management of the relatively high CVs associated with the discard information collected in 2004 for the primary monkfish fishery fishing modes. With the possible exception of summer flounder, scup, and black sea bass discards in the New England large-mesh otter trawl mode, and sea turtle encounters in the Mid-Atlantic extra-large-mesh gillnet mode, the impacts of the discards associated with relatively high CVs are very likely to be trivial. Except as noted, estimated total discards do not exceed 40,000 lb for any species/species group, and for most cases, the estimated total discards represent less than 1/10 of 1 percent of the total (recreational and commercial) landings. Within the fishing modes that discard monkfish, although New England open area, limited access scallop dredge contributes the most monkfish discards, the CV (32 percent) is very close to the SBRM standard. Mid-Atlantic small-mesh otter trawl also has a CV (35 percent) relatively close to the SBRM standard, and the estimated total discards represent less than ½ of 1 percent of the total monkfish landings for 2004.

Further examination of the summer flounder, scup, and black sea bass discards in the New England large-mesh otter trawl fishing mode indicates that over 90 percent of the observed discards for this species group are summer flounder (19,723 lb out of 21,854 lb). Table 9 provides additional information on these three species for this fishing mode. In this case, the highest CVs are associated with scup and black sea bass, but estimated total discards for these two species are relatively low (0.45 percent and 0.15 percent, respectively, of total (commercial and recreational) 2004 landings). Most of the discards within this species group are summer flounder, but even though the CV is greater than the SBRM standard, it remains relatively close (33 percent rather than 30 percent).

Individual Species	2004 CV	Observed Discards (lb)	Estimated Total Discards (lb)	Discards as Percent of Total Landings
Summer flounder	33%	19,723	650,271	2.23%
Scup	92%	1,879	61,951	0.45%
Black sea bass	83%	253	8,341	0.15%

Table 9. Additional summary information regarding the potential impact of discards for species for which the 2004 CV exceeded the SBRM standard.

The implications of CVs exceeding the SBRM target, based on this information, are likely to be most important for the discards of monkfish in the New England small-mesh otter trawl and New England open area, general category scallop dredge fishing modes.

Trends in Discards

There is no information to be presented at this time on recent or developing trends in discards for the subject fishing modes.

Notes on the Example

This information should be considered to be preliminary. It is not presented for Council action, but rather is intended solely as an example of the potential structure and content that could be used in preparing future SBRM Reports.

The information presented in this example report was collected prior to the development and implementation of the Northeast Region SBRM. Future evaluations of the SBRM data should be conducted based on information collected after the SBRM is implemented.

Were this an actual SBRM report, additional information could be utilized and incorporated into the report, such as trend information on discards over time. Also, additional information could be presented depending on the specific needs of the Councils, Plan Development Teams, Fishery Management Action Teams, or Monitoring Committees.

Attachment 1: ***Observed Discards in the NE Large-mesh Otter Trawl Fishing Mode***

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
1	SKATE, WINTER (BIG)	366,380	1,545,623	23.70%	23.70%
2	SKATE, LITTLE	347,835	1,545,623	22.50%	46.21%
3	SKATE, NK	217,238	1,545,623	14.06%	60.26%
4	DOGFISH, SPINY	149,701	1,545,623	9.69%	69.95%
5	CRAB, JONAH	49,502	1,545,623	3.20%	73.15%
6	SKATE, THORNY	47,074	1,545,623	3.05%	76.20%
7	MONKFISH (ANGLER, GOOSEFISH)	41,061	1,545,623	2.66%	78.85%
8	LOBSTER, AMERICAN	29,328	1,545,623	1.90%	80.75%
9	FLOUNDER, SAND DAB (WINDOWPANE)	23,446	1,545,623	1.52%	82.27%
10	FLOUNDER, WITCH (GREY SOLE)	22,266	1,545,623	1.44%	83.71%
11	FLOUNDER, SUMMER (FLUKE)	19,723	1,545,623	1.28%	84.99%
12	SKATE, SMOOTH	18,832	1,545,623	1.22%	86.20%
13	FLOUNDER, YELLOWTAIL	17,016	1,545,623	1.10%	87.30%
14	RAVEN, SEA	15,844	1,545,623	1.03%	88.33%
15	SPONGE, NK	15,118	1,545,623	0.98%	89.31%
16	COD, ATLANTIC	13,711	1,545,623	0.89%	90.19%
17	FLOUNDER, AMERICAN PLAICE	12,086	1,545,623	0.78%	90.98%
18	SCULPIN, LONGHORN	9,979	1,545,623	0.65%	91.62%
19	HADDOCK	9,724	1,545,623	0.63%	92.25%
20	OCEAN POUT	9,242	1,545,623	0.60%	92.85%
21	BASS, STRIPED	9,217	1,545,623	0.60%	93.45%
22	CRAB, TRUE, NK	8,419	1,545,623	0.54%	93.99%
23	SKATE, BARNDOOR	7,846	1,545,623	0.51%	94.50%
24	STARFISH, SEASTAR,NK	7,529	1,545,623	0.49%	94.99%
25	REDFISH, NK (OCEAN PERCH)	7,220	1,545,623	0.47%	95.45%
26	CRAB, DEEPSEA, RED	6,660	1,545,623	0.43%	95.88%
27	CRAB, SPIDER, NK	4,945	1,545,623	0.32%	96.20%
28	FISH, NK	4,499	1,545,623	0.29%	96.49%
29	FLOUNDER, FOURSPOT	4,474	1,545,623	0.29%	96.78%
30	FLOUNDER, WINTER (BLACKBACK)	3,871	1,545,623	0.25%	97.03%
31	HAKE, SILVER (WHITING)	3,648	1,545,623	0.24%	97.27%
32	POLLOCK	3,570	1,545,623	0.23%	97.50%
33	LUMPFISH	3,481	1,545,623	0.23%	97.73%
34	SKATE, CLEARNOSE	2,997	1,545,623	0.19%	97.92%
35	CRAB, ROCK	2,961	1,545,623	0.19%	98.11%
36	ANEMONE, NK	2,364	1,545,623	0.15%	98.26%
37	RAY, TORPEDO	2,358	1,545,623	0.15%	98.42%
38	SHARK, BASKING	2,000	1,545,623	0.13%	98.55%
39	DOGFISH, SMOOTH	1,999	1,545,623	0.13%	98.68%
40	SCUP	1,879	1,545,623	0.12%	98.80%
41	SCULPIN, NK	1,742	1,545,623	0.11%	98.91%
42	HAKE, WHITE	1,674	1,545,623	0.11%	99.02%
43	HAKE, RED (LING)	1,280	1,545,623	0.08%	99.10%
44	CRAB, NORTHERN STONE	1,253	1,545,623	0.08%	99.18%
45	SEA ROBIN, STRIPED	1,197	1,545,623	0.08%	99.26%
46	SCALLOP, SEA	1,191	1,545,623	0.08%	99.34%
47	HALIBUT, ATLANTIC	942	1,545,623	0.06%	99.40%
48	FLOUNDER, NK	875	1,545,623	0.06%	99.45%
49	BLUEFISH	854	1,545,623	0.06%	99.51%
50	CRAB, HORSESHOE	716	1,545,623	0.05%	99.56%
51	CRAB, SNOW	590	1,545,623	0.04%	99.59%
52	HERRING, ATLANTIC	563	1,545,623	0.04%	99.63%
53	CRAB, HERMIT, NK	468	1,545,623	0.03%	99.66%

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
54	CUSK	435	1,545,623	0.03%	99.69%
55	CRAB, CANCER, NK	288	1,545,623	0.02%	99.71%
56	TILEFISH, GOLDEN	285	1,545,623	0.02%	99.73%
57	SEA ROBIN, NK	267	1,545,623	0.02%	99.74%
58	SEA ROBIN, NORTHERN	260	1,545,623	0.02%	99.76%
59	SEA BASS, BLACK	253	1,545,623	0.02%	99.78%
60	WOLFFISH, ATLANTIC	251	1,545,623	0.02%	99.79%
61	SNAIL, MOONSHELL, NK	241	1,545,623	0.02%	99.81%
62	SKATE, ROSETTTE	236	1,545,623	0.02%	99.82%
63	WHITING, BLACK (HAKE, OFFSHORE)	214	1,545,623	0.01%	99.84%
64	SEA CUCUMBER, NK	179	1,545,623	0.01%	99.85%
65	SHARK, PORBEAGLE (MACKEREL SHARK)	175	1,545,623	0.01%	99.86%
66	RAY, NK	164	1,545,623	0.01%	99.87%
67	SQUID, SHORT-FIN	154	1,545,623	0.01%	99.88%
68	SNAIL, NK	140	1,545,623	0.01%	99.89%
69	MUSSEL, NK	126	1,545,623	0.01%	99.90%
70	HERRING, BLUEBACK	111	1,545,623	0.01%	99.91%
71	WRYMOUTH	108	1,545,623	0.01%	99.91%
72	LUMPSUCKER, ATL SPNY	100	1,545,623	0.01%	99.92%
73	CLAM, NK	100	1,545,623	0.01%	99.93%
74	QUAHOG, OCEAN (BLACK CLAM)	86	1,545,623	0.01%	99.93%
75	SQUID, NK	82	1,545,623	0.01%	99.94%
76	TAUTOG (BLACKFISH)	77	1,545,623	0.00%	99.94%
77	SHAD, AMERICAN	69	1,545,623	0.00%	99.95%
78	HAKE, NK	67	1,545,623	0.00%	99.95%
79	ROSEFISH,BLACK BELLY	66	1,545,623	0.00%	99.95%
80	MACKEREL, ATLANTIC	62	1,545,623	0.00%	99.96%
81	SEA URCHIN, NK	43	1,545,623	0.00%	99.96%
82	WHELK, CHANNELED (SMOOTH)	43	1,545,623	0.00%	99.96%
83	STURGEON, NK	40	1,545,623	0.00%	99.97%
84	SQUIRRELFISH, NK	35	1,545,623	0.00%	99.97%
85	SHRIMP, NK	34	1,545,623	0.00%	99.97%
86	ALEWIFE	33	1,545,623	0.00%	99.97%
87	HAKE, SPOTTED	30	1,545,623	0.00%	99.97%
88	SQUID, ATL LONG-FIN	30	1,545,623	0.00%	99.98%
89	BUTTERFISH	29	1,545,623	0.00%	99.98%
90	HAKE, RED/WHITE MIX	29	1,545,623	0.00%	99.98%
91	CLAM, SURF	26	1,545,623	0.00%	99.98%
92	WHELK, NK, CONCH	25	1,545,623	0.00%	99.98%
93	CUNNER (YELLOW PERCH)	21	1,545,623	0.00%	99.99%
94	SHARK, ATL SHARPNOSE	21	1,545,623	0.00%	99.99%
95	SEA SQUIRT, NK	17	1,545,623	0.00%	99.99%
96	DOGFISH, NK	17	1,545,623	0.00%	99.99%
97	CUSK-EEL, NK	16	1,545,623	0.00%	99.99%
98	HERRING, NK (SHAD)	15	1,545,623	0.00%	99.99%
99	SHARK, SANDBAR (BROWN SHARK)	15	1,545,623	0.00%	99.99%
100	HAGFISH, ATLANTIC	13	1,545,623	0.00%	99.99%
101	CRAB, SPIDER, PORTLY	13	1,545,623	0.00%	99.99%
102	OCTOPUS, NK	12	1,545,623	0.00%	99.99%
103	EEL, NK	11	1,545,623	0.00%	99.99%
104	EELPOUT, NK	11	1,545,623	0.00%	100.00%
105	CRAB, LADY	11	1,545,623	0.00%	100.00%
106	DORY, BUCKLER (JOHN)	10	1,545,623	0.00%	100.00%
107	SHAD, HICKORY	7	1,545,623	0.00%	100.00%
108	CRAB, BLUE	5	1,545,623	0.00%	100.00%

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
109	MENHADEN, ATLANTIC	5	1,545,623	0.00%	100.00%
110	JELLYFISH, NK	5	1,545,623	0.00%	100.00%
111	FLOUNDER, LEFTEYE, NK	5	1,545,623	0.00%	100.00%
112	WHELK, KNOBBED	4	1,545,623	0.00%	100.00%
113	INVERTEBRATE, NK	4	1,545,623	0.00%	100.00%
114	TRIGGERFISH, NK (LEATHERJACKET)	3	1,545,623	0.00%	100.00%
115	WEAKFISH (SQUETEAGUE SEA TROUT)	2	1,545,623	0.00%	100.00%
116	ROCKLING, FOURBEARD	2	1,545,623	0.00%	100.00%
117	MACKEREL, NK	1	1,545,623	0.00%	100.00%
118	SHRIMP, MANTIS	1	1,545,623	0.00%	100.00%
119	SHRIMP, PANDALID, NK (NORTHERN)	1	1,545,623	0.00%	100.00%
120	TOADFISH, OYSTER	1	1,545,623	0.00%	100.00%
121	STARGAZER, NK	1	1,545,623	0.00%	100.00%
122	GRENADIER, COMMON (MARLINSPIKE)	1	1,545,623	0.00%	100.00%
123	SEA ROBIN, ARMORED	1	1,545,623	0.00%	100.00%
124	SCALLOP, BAY	1	1,545,623	0.00%	100.00%

Attachment 2: ***Observed Discards in the NE Extra-Large-Mesh Gillnet***

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
1	DOGFISH, SPINY	100,388	241,610	41.55%	41.55%
2	MONKFISH (ANGLER, GOOSEFISH)	29,933	241,610	12.39%	53.94%
3	LOBSTER, AMERICAN	22,402	241,610	9.27%	63.21%
4	SKATE, WINTER (BIG)	19,309	241,610	7.99%	71.20%
5	COD, ATLANTIC	13,922	241,610	5.76%	76.96%
6	SKATE, BARNDOOR	7,871	241,610	3.26%	80.22%
7	CRAB, JONAH	7,444	241,610	3.08%	83.30%
8	CRAB, ROCK	4,831	241,610	2.00%	85.30%
9	RAVEN, SEA	4,266	241,610	1.77%	87.07%
10	SKATE, LITTLE	3,768	241,610	1.56%	88.63%
11	SKATE, THORNY	3,167	241,610	1.31%	89.94%
12	TUNA, BLUEFIN	2,875	241,610	1.19%	91.13%
13	FLOUNDER, SUMMER (FLUKE)	2,416	241,610	1.00%	92.13%
14	FISH, NK	2,286	241,610	0.95%	93.07%
15	BLUEFISH	1,935	241,610	0.80%	93.88%
16	CRAB, TRUE, NK	1,577	241,610	0.65%	94.53%
17	SKATE, NK	1,535	241,610	0.64%	95.16%
18	POLLOCK	1,526	241,610	0.63%	95.79%
19	BASS, STRIPED	1,219	241,610	0.50%	96.30%
20	STARFISH, SEASTAR,NK	1,169	241,610	0.48%	96.78%
21	SHARK, PORBEAGLE (MACKEREL SHARK)	721	241,610	0.30%	97.08%
22	SPONGE, NK	631	241,610	0.26%	97.34%
23	LUMPFISH	515	241,610	0.21%	97.56%
24	HAKE, WHITE	437	241,610	0.18%	97.74%
25	SHARK, THRESHER	400	241,610	0.17%	97.90%
26	MACKEREL, ATLANTIC	392	241,610	0.16%	98.06%
27	SHARK, MAKO, NK	300	241,610	0.12%	98.19%
28	CRAB, NORTHERN STONE	294	241,610	0.12%	98.31%
29	MUSSEL, NK	289	241,610	0.12%	98.43%
30	RAY, TORPEDO	282	241,610	0.12%	98.55%
31	HAKE, RED (LING)	277	241,610	0.11%	98.66%
32	SKATE, SMOOTH	258	241,610	0.11%	98.77%
33	FLOUNDER, YELLOWTAIL	200	241,610	0.08%	98.85%
34	OCEAN POUT	176	241,610	0.07%	98.92%
35	HADDOCK	176	241,610	0.07%	98.99%
36	FLOUNDER, WINTER (BLACKBACK)	153	241,610	0.06%	99.06%
37	CRAB, SPIDER, NK	126	241,610	0.05%	99.11%
38	SHARK, MAKO, SHORTFIN	120	241,610	0.05%	99.16%
39	CRAB, HORSESHOE	116	241,610	0.05%	99.21%
40	SCULPIN, LONGHORN	115	241,610	0.05%	99.26%
41	STURGEON, ATLANTIC	113	241,610	0.05%	99.30%
42	SKATE, CLEARNOSE	107	241,610	0.04%	99.35%
43	STURGEON, SHORT-NOSE	100	241,610	0.04%	99.39%
44	DOGFISH, SMOOTH	99	241,610	0.04%	99.43%
45	DORY, BUCKLER (JOHN)	97	241,610	0.04%	99.47%
46	HAKE, SILVER (WHITING)	97	241,610	0.04%	99.51%
47	TUNA, NK	95	241,610	0.04%	99.55%
48	SEA ROBIN, NORTHERN	88	241,610	0.04%	99.58%
49	HALIBUT, ATLANTIC	82	241,610	0.03%	99.62%
50	TUNA, YELLOWFIN	71	241,610	0.03%	99.65%
51	TILEFISH, GOLDEN	71	241,610	0.03%	99.68%
52	DOGFISH, NK	69	241,610	0.03%	99.71%

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
53	SEA URCHIN, NK	69	241,610	0.03%	99.73%
54	FLOUNDER, NK	50	241,610	0.02%	99.75%
55	SCALLOP, SEA	49	241,610	0.02%	99.78%
56	SNAIL, NK	48	241,610	0.02%	99.80%
57	HERRING, ATLANTIC	46	241,610	0.02%	99.81%
58	FLOUNDER, FOURSPOT	43	241,610	0.02%	99.83%
59	CRAB, CANCER, NK	36	241,610	0.01%	99.85%
60	SCULPIN, NK	33	241,610	0.01%	99.86%
61	CLAM, NK	30	241,610	0.01%	99.87%
62	CRAB, DEEPSEA, RED	26	241,610	0.01%	99.88%
63	SEA BASS, NK	24	241,610	0.01%	99.89%
64	FLOUNDER, AMERICAN PLAICE	22	241,610	0.01%	99.90%
65	SHARK, NK	20	241,610	0.01%	99.91%
66	STURGEON, NK	20	241,610	0.01%	99.92%
67	CRAB, HERMIT, NK	19	241,610	0.01%	99.93%
68	WHELK, NK, CONCH	18	241,610	0.01%	99.93%
69	SEA CUCUMBER, NK	18	241,610	0.01%	99.94%
70	TAUTOG (BLACKFISH)	17	241,610	0.01%	99.95%
71	SHAD, AMERICAN	16	241,610	0.01%	99.96%
72	SEA ROBIN, STRIPED	13	241,610	0.01%	99.96%
73	FLOUNDER, LEFTEYE, NK	12	241,610	0.00%	99.97%
74	REDFISH, NK (OCEAN PERCH)	11	241,610	0.00%	99.97%
75	CUNNER (YELLOW PERCH)	9	241,610	0.00%	99.97%
76	ANEMONE, NK	9	241,610	0.00%	99.98%
77	SEA SQUIRT, NK	8	241,610	0.00%	99.98%
78	SNAIL, MOONSHELL, NK	8	241,610	0.00%	99.98%
79	WRYMOUTH	5	241,610	0.00%	99.99%
80	HERRING, BLUEBACK	4	241,610	0.00%	99.99%
81	HAKE, NK	4	241,610	0.00%	99.99%
82	JELLYFISH, NK	3	241,610	0.00%	99.99%
83	LAMPREY, NK	3	241,610	0.00%	99.99%
84	CUSK	2	241,610	0.00%	99.99%
85	FLOUNDER, SAND DAB (WINDOWPANE)	2	241,610	0.00%	99.99%
86	SEA ROBIN, NK	2	241,610	0.00%	99.99%
87	DOGFISH, CHAIN	2	241,610	0.00%	99.99%
88	CORAL, STONY, NK	2	241,610	0.00%	100.00%
89	STARFISH, BRITTLE,NK	2	241,610	0.00%	100.00%
90	SEA ROBIN, ARMORED	2	241,610	0.00%	100.00%
91	HAGFISH, ATLANTIC	1	241,610	0.00%	100.00%
92	INVERTEBRATE, NK	1	241,610	0.00%	100.00%
93	BUTTERFISH	1	241,610	0.00%	100.00%
94	FLOUNDER, WITCH (GREY SOLE)	1	241,610	0.00%	100.00%
95	SCUP	1	241,610	0.00%	100.00%
96	SKATE, ROSETTTE	1	241,610	0.00%	100.00%
97	WORM, NK	1	241,610	0.00%	100.00%

Attachment 3: ***Observed Discards in the MA Extra-Large-Mesh Gillnet***

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
1	DOGFISH, SPINY	3,620	13,386	27.05%	27.05%
2	CRAB, HORSESHOE	2,107	13,386	15.74%	42.79%
3	MONKFISH (ANGLER, GOOSEFISH)	1,712	13,386	12.79%	55.58%
4	SKATE, LITTLE	1,469	13,386	10.97%	66.55%
5	SKATE, WINTER (BIG)	603	13,386	4.50%	71.05%
6	STARFISH, SEASTAR,NK	600	13,386	4.48%	75.53%
7	STURGEON, ATLANTIC	547	13,386	4.09%	79.62%
8	BASS, STRIPED	453	13,386	3.38%	83.00%
9	FISH, NK	379	13,386	2.83%	85.83%
10	BLUEFISH	328	13,386	2.45%	88.28%
11	SKATE, NK	322	13,386	2.40%	90.68%
12	STURGEON, NK	235	13,386	1.76%	92.44%
13	SPONGE, NK	192	13,386	1.43%	93.87%
14	FLOUNDER, SUMMER (FLUKE)	113	13,386	0.84%	94.71%
15	STURGEON, SHORT-NOSE	110	13,386	0.82%	95.53%
16	SKATE, CLEARNOSE	107	13,386	0.80%	96.33%
17	DOGFISH, SMOOTH	89	13,386	0.66%	97.00%
18	CRAB, JONAH	80	13,386	0.60%	97.59%
19	CRAB, ROCK	60	13,386	0.45%	98.04%
20	SCALLOP, SEA	60	13,386	0.44%	98.49%
21	CRAB, TRUE, NK	27	13,386	0.20%	98.69%
22	MENHADEN, ATLANTIC	23	13,386	0.17%	98.86%
23	CRAB, SPIDER, NK	23	13,386	0.17%	99.03%
24	LOBSTER, AMERICAN	18	13,386	0.13%	99.17%
25	CROAKER, ATLANTIC	18	13,386	0.13%	99.30%
26	FLOUNDER, NK	15	13,386	0.11%	99.41%
27	DOGFISH, NK	15	13,386	0.11%	99.53%
28	STARGAZER, NK	14	13,386	0.10%	99.63%
29	RAY, TORPEDO	12	13,386	0.09%	99.72%
30	WHELK, NK, CONCH	8	13,386	0.06%	99.78%
31	CRAB, CANCER, NK	7	13,386	0.05%	99.83%
32	ANCHOVY, NK	5	13,386	0.04%	99.87%
33	STARFISH, BRITTLE,NK	5	13,386	0.04%	99.91%
34	WEAKFISH (SQUETEAGUE SEA TROUT)	4	13,386	0.03%	99.94%
35	CRAB, HERMIT, NK	2	13,386	0.01%	99.95%
36	MACKEREL, FRIGATE	1	13,386	0.01%	99.96%
37	HERRING, BLUEBACK	1	13,386	0.01%	99.97%
38	SEA ROBIN, STRIPED	1	13,386	0.01%	99.98%
39	CLAM, NK	1	13,386	0.01%	99.99%
40	MUSSEL, NK	1	13,386	0.01%	99.99%
41	SEA ROBIN, NORTHERN	1	13,386	0.00%	100.00%
42	SEA URCHIN, NK	1	13,386	0.00%	100.00%

Examples of how observer discard data can be queried and analyzed to support management decisions.

Example 1

The follow excerpts are from pages 137, 152, and 153 of Framework 40A to the Northeast Multispecies FMP. This example demonstrates the use of observer discard data to make predictions of possible biological impacts of management alternatives. The complete document is available at: http://www.nefmc.org/nemulti/index.html.

ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS
Proposed Action

CAII Haddock SAP

An experiment has not been conducted that estimates the incidental catch species that will be taken during the CAII haddock SAP. As a result, this analysis uses recent observer reports from the area and the results of several gear experiments to evaluate the impacts of this SAP on incidental catch species. First examined were observer reports for trawl trips in SA 561 and 562 from calendar years 2001 through 2003. A summary of observed tows by area and quarter is provided in Table 45. The analyses focus on 2002 and 2003 because of the higher level of observer coverage in SA 562. Note that for these tows, there was no requirement to use a haddock separator trawl. Catches of the top fifteen species are shown by statistical area for calendar years 2002 and 2003 in Table 57 and Table 58. Of the regulated groundfish species in this list, the stocks of concern that were caught most frequently in both years were cod, white hake, plaice, and witch flounder. Large quantities of skates were also caught and these catches will be discussed in a following section that analyzes bycatch.

The proposed SAP is allocated a portion of the GB cod incidental catch TAC. The observed trips were examined further to determine catch rates of cod and to estimate the number of days that may be fished before the cod TAC is caught. Cod catches on observed tows in 2002 averaged 109 lbs./tow for the entire area. The difference between the average cod/tow in SA 561 (166) and SA 562 (75) was statistically significant. Catch per tow on observed tows in 2003 was 245 lbs./tow. Once again, the catch per tow in SA 561 (365) was significantly higher than that in SA 562 (141). Catches for plaice, white hake, and witch flounder were less than 25 lbs./tow. 2003 tows were analyzed to determine the mean catch of cod on tows targeting haddock. For both areas, the average cod catch/tow was 235 lbs for tows targeting haddock. The cod catch/tow in SA 561 (457 lbs.) was significantly different than that in SA 562 (110 lbs.). According to the data, catches per tow of cod are higher in SA 561, while catches of haddock are higher in SA 562.

	Number of Observed Tows								
	2001			2002			2003		
Quarter	Both	561	562	Both	561	562	Both	561	562
1	68	63	5	29	20	9	192	108	84
2	54	52	2	135	41	94	576	321	255
3	9	9	0	208	58	150	240	67	173
4	30	29	1	72	49	23	189	55	134
Total	161	153	8	444	168	276	1197	551	646

Table 45 – Observed otter trawl tows, calendar years 2001 – 2003, statistical areas 561 and 562 (NMFS OBDBS database)

Species	SA 561		SA 562		Grand Total
	Discarded	Kept	Discarded	Kept	
ANGLER	955	17,246	479	4,008	22,688
COD	631	27,181	136	20,526	48,473
FLOUNDER, AM. PLAICE	150	5,486	3	13	5,652
FLOUNDER, SUMMER	66	192	4,633	2,399	7,289
FLOUNDER, WINTER	2	30,208	1,695	287,302	319,207
FLOUNDER, YELLOWTAIL	378	25,468	165	41,184	67,194
HADDOCK	292	15,966	758	18,163	35,179
HAKE, WHITE	77	4,823	9	34	4,943
LOBSTER	1,752	5,980	2,272	6,246	16,250
SCALLOP, SEA	261	8	6,514	3,490	10,273
SEA RAVEN	2,021	10	2,150	10	4,191
SKATE, LITTLE	14,428	1,352	111,140		126,920
SKATE, THORNY	2,779		1,883		4,662
SKATE, WINTER(BIG)	12,761	7,228	72,358	13,287	105,634
SKATES	5,980	70	35,401	2,303	43,754
Grand Total	42,532	141,218	239,594	398,962	822,307

Table 57 – Top fifteen species caught by otter trawls on observed tows in SAs 561 and 562, 2002 (pounds) (NMFS OBDBS)

Species	SA 561		SA 562		Grand Total
	Discarded	Kept	Discarded	Kept	
ANGLER	3,787	72,916	1,939	11,309	89,951
COD	11,210	190,872	1,412	89,895	293,388
FLOUNDER, AM. PLAICE	1,210	16,384	53	1,630	19,277
FLOUNDER, WINTER	1,554	85,278	432	354,303	441,566
FLOUNDER, WITCH	1,304	9,192	329	1,181	12,006
FLOUNDER, YELLOWTAIL	954	83,699	4,012	131,763	220,428
HADDOCK	3,313	39,560	6,656	199,215	248,743
HAKE, SILVER	759	243	212	17,111	18,325
LOBSTER	6,581	25,037	3,995	15,038	50,651
POLLOCK	24	19,115		445	19,584
SCALLOP, SEA	2,554	7,268	15,794	12,745	38,360
SEA RAVEN	5,027		7,412		12,439
SKATE, LITTLE	56,812		282,885		339,697
SKATE, WINTER(BIG)	66,581	46,318	330,624	56,742	500,264
SKATES	16,018	14,742	87,040	20,611	138,410
Grand Total	177,687	610,622	742,794	911,986	2,443,089

Table 58 – Top fifteen species caught by otter trawls on observed tows in SAs 561 and 562, 2003 (pounds round weight), 2003 (NMFS OBDBS)

Example 2

The following excerpt is from page 205 of Framework 42 to the Northeast Multispecies FMP. This is a good example of how observer discard data can be used to examine a specific program in a defined area and time period, in this case, the Yellowtail Flounder Special Access Program in Closed Area II. The complete document is available at: http://www.nefmc.org/nemulti/index.html.

6.5.2.4 Closed Area II Yellowtail Flounder Special Access Program

Yellowtail flounder discards in the SAP were reviewed to determine the cause. Thirty-one (out of 319, or 9.7 percent) trawl trips in the CAII Yellowtail Flounder SAP were observed. Yellowtail flounder (600,805 lbs.), haddock (156,378 lbs.), sea scallops (88,634 lbs.), monkfish (68,417 lbs.), and winter skates (47,517 lbs.) were the top five kept species on these observed trips. The top discarded species were skates (704,205 lbs., all species), sea scallops (32,610 lbs.), yellowtail flounder (30,290 lbs.), and haddock (22,178 lbs.). The primary reason for yellowtail flounder discards on observed trips was that the fish were smaller than the regulatory minimum size (21,289 lbs., or 70 percent of observed discards). Vessels that had filled their quota discarded another 3,409 lbs. on observed trips, while 4,081 lbs. were discarded due to market conditions.

Example 3

The following excerpts are from page 211-215 of Framework 42 to the Northeast Multispecies FMP. In this example, observer discard data are used to help evaluate the performance of the haddock separator trawl in commercial fishing operations. The complete document is available at: http://www.nefmc.org/nemulti/index.html.

6.5.2.8 Haddock Separator Trawl

This action proposes two measures that require use of the haddock separator trawl: an extension of the Eastern U.S./CA Haddock SAP, and a proposal to require the use of the separator trawl when participating in the Category B (regular) DAS Program (which may be renewed). There are a limited number of observed trips by vessels using the separator trawl which can be used to supplement experimental data on the performance of the trawl.

The observer (OBDBS) database was queried to identify trawl trips that used a separator panel (excluder device='3') in CY 2005. A total of 20 observed trips were identified in the database as of December 14, 2005. Additional observed trips may have occurred but may not yet be entered into the database. Fourteen trips were recorded as U.S./CA area trips while six trips were recorded as Category B (regular) DAS trips. This designation is made by the observer, and it is possible that they are not exclusive (e.g. a Category B (regular) program trip may occur in the U.S./CA area). Seven trips made tows both with and without the panel. Most trips used the separator panel in the Eastern U.S./Canada area (SAs 561 and 562).

Catches (kept and discarded) of the top twenty-five species on tows using a separator panel are shown in Table 74. Regulated groundfish accounted for sixty-five percent of the catch, with haddock, yellowtail flounder, cod, and winter flounder as the four largest regulated groundfish components. Combined catches of skates (207,136 lbs.) exceeded the haddock catch (199,634 lbs.). The overall ratio of haddock to yellowtail flounder was 2.6:1, the ratio

of haddock to cod was 4.2:1, and the ratio of haddock to winter flounder was 3.2:1. Monkfish, witch flounder, and plaice were also caught in substantial quantities.

The ratio of haddock to other species was compared for trips identified as occurring in the Category B (regular) DAS program and trips identified as taking place in the U.S./CA area. With only five observed trips using the separator trawl in the Category B (regular) DAS program these results should not be considered definitive. While the ratio of haddock to winter flounder in both programs was similar (3.1:1 in the U.S./CA area, 3.4:1 in the Category B(regular) DAS program), the ratio of haddock to yellowtail flounder was 4.1:1 in the U.S./CA program but 1.1:1 in the Category B (regular) DAS Pilot Program. The ratio of haddock to cod in the U.S./CA program was 3.8:1, while it was 7:1 in the Category B (regular) DAS program. The ratio of haddock to monkfish was similar in both programs.

Haddock discards accounted for six percent of the haddock catch (12,466 lbs.), with almost all discards due to the fish being smaller than the regulatory minimum. Cod discards accounted for fifty percent (21,504 lbs.) of the cod catch; sixty-seven percent of these discards were due to a filled vessel quota, twenty-three percent were due to high grading, and various other reasons were given for the remaining discards. Ninety-four percent of the skates caught were discarded, totaling 193,937 pounds. Winter skate (49,716 lbs.) and little skates (54,369 lbs.) were the largest components identified by species, but an additional 78,711 lbs. was identified as skates (NK). There were also 10,609 lbs. of barndoor skates caught, all discarded, and 532 lbs. of smooth skates.

Catch composition on tows using the separator trawl was examined by trip, focusing on regulated groundfish. All twenty trips caught haddock and cod while using a separator trawl, seventeen trips caught yellowtail, winter flounder, or monkfish, fifteen trips caught plaice, and thirteen trips caught grey sole (witch flounder). The ratio of haddock to cod for the twenty trips ranged from 0.2:1 to 22.4:1. For the seventeen observed trips that caught winter flounder, the ratio of haddock to winter flounder ranged from 0.1:1 to 186.8:1. For the trips that caught yellowtail flounder, the ratio of haddock to yellowtail flounder ranged from 0.1:1 to 5,230:1.

There were a total of 405 observed tows that used a separator trawl on these fifteen trips. Over these tows, haddock was caught on 370 tows (ninety-one percent), cod on 309 tows (seventy-six percent), yellowtail flounder on 266 tows (sixty-six percent), and winter flounder on 243 tows (sixty percent). The average catch of haddock per tow was 493 lbs., yellowtail flounder was 189 lbs., cod was 117 lbs., and winter flounder was 156 lbs. In comparison to the observed data, FW 40A estimated that the cod catch per tow would be between 47 and 92 lbs. and the haddock catch per tow would be 765 lbs. There was considerable variation in the catch of regulated groundfish between trips and tows. For example, four trips did not have any tows catching yellowtail flounder, four trips had occasional tows that caught small amounts, one trip had yellowtail catches decline as the trip passed, and six trips had frequent tows catching sizeable amounts of yellowtail flounder.

As reported earlier, seven trips made tows both with and without the separator trawl. These trips were examined to contrast the performance of tows using the separator trawl with tows that did not use the separator trawl by vessels that used both on the same trip. While this approach reduces the likelihood that any differences are due to differences between vessels, it does not resolve the issue that catches may be the result not just of the gear used,

but numerous other factors: location, depth fished, etc. Catch composition differed: haddock accounted for twelve percent of the catch on tows without the separator trawl, and thirty-three percent of the catch on tows with the trawl (Table 75). Overall, the ratio of haddock to cod for these trips, while not using the separator trawl, was 1.4:1, the ratio of haddock to yellowtail flounder was 0.7:1, the ratio of haddock to winter flounder was 11.8:1, and the ratio of haddock to monkfish was 1:1. While using a separator trawl, for these vessels the ratio of haddock to cod on the same trip was 2.5:1, the ratio of haddock to yellowtail flounder was 7.4:1, the ratio of haddock to winter flounder was 3.1:1, and the ratio of haddock to monkfish was 6.3:1. In an effort to reduce the influence of tows in different areas, five trips were examined that fished in SA 561 and 562. The results, while not detailed here, were similar.

Table 73 – Observed trips using a separator panel, CY 2005 (OBDBS data available as of December 14, 2005)

Program	Month	521	522	525	561	562	Total
US/CA	01	0	0	0	0	1	1
	03	1	0	0	4	3	5
	05	0	1	0	5	5	5
	06	0	0	1	0	2	2
	07	0	0	1	1	1	1
Sub-Total		1	1	1	10	10	14
CAT B (regular)	03	1	1	0	0	0	1
	05	0	0	1	0	2	2
	06	2	2	1	0	0	2
	07	0	1	0	0	0	1
Sub-Total		3	3	2	0	4	6
Grand Total		4	4	3	10	14	20

Table 74 – Catches (pounds, live weight, kept and discarded) by statistical area on observed tows using a haddock separator trawl, CY 2005

COMNAME	521	522	525	552	561	562	Grand Total
HADDOCK	8,445	31,152	142	18	47,946	140,234	227,937
SKATE, LITTLE	25	83,432	1,977	500	5,975	44,916	136,825
FLOUNDER, YELLOWTAIL	1	1,375	4,633	30	3,834	91,623	101,496
MONKFISH (ANGLER, GOOSEFISH)	9,368	43,446	341	0	23,475	14,187	90,817
SKATE, WINTER (BIG)	2,105	10,700	357	693	21,087	51,773	86,715
SKATE, NK	1,770	235	1,500	0	8,766	70,805	83,076
FLOUNDER, WINTER (BLACKBACK)	5	174	67	420	9,461	54,546	64,673
COD, ATLANTIC	12,712	1,591	41	339	32,955	16,339	63,977
FLOUNDER, AMERICAN PLAICE	876	2,681	54	0	24,635	1,898	30,144
FLOUNDER, WITCH (GREY SOLE)	14,813	1,415	105	0	9,583	3,331	29,247
LOBSTER, AMERICAN	1,785	2,130	34	0	13,902	3,776	21,627
SKATE, BARNDOOR	98	434	306	0	515	10,369	11,722
CRAB, JONAH	11	9,310	0	0	24	157	9,502
POLLOCK	873	1,344	0	0	6,226	238	8,681
HAKE, WHITE	191	930	0	0	4,400	9	5,530
FLOUNDER, SAND DAB (WINDOWPANE)	0	3	136	15	70	3,813	4,037
SCALLOP, SEA	0	112	1	0	303	3,289	3,705
RAVEN, SEA	114	114	217	10	711	2,515	3,681
DOGFISH, SPINY	185	186	0	0	2,895	201	3,467
FLOUNDER, FOURSPOT	0	42	210	0	51	2,238	2,541
HAKE, RED (LING)	8	7	138	0	1,393	218	1,764
HERRING, ATLANTIC	0	1,482	0	0	4	0	1,486
STARFISH, SEASTAR,NK	6	717	2	0	11	713	1,449
FLOUNDER, SUMMER (FLUKE)	0	89	80	10	24	955	1,158
OCEAN POUT	9	41	8	0	128	804	990
Grand Total	53,400	193,142	10,349	2,035	218,374	518,947	996,247

Table 75 – Catch composition (pounds, live weight) for seven trips that made tows with and without the separator panel, CY 2005 (Source: NMFS OBDBS as of December 12, 2005)

COMNAME	Without Separator	With Separator	Grand Total
HADDOCK	17,679	40,893	58,572
SKATE, WINTER (BIG)	21,960	14,207	36,167
FLOUNDER, YELLOWTAIL	23,750	5,560	29,310
COD, ATLANTIC	12,920	16,146	29,066
MONKFISH (ANGLER, GOOSEFISH)	17,117	6,489	23,606
SKATE, LITTLE	14,346	5,754	20,100
SKATE, NK	2,875	14,163	17,038
FLOUNDER, WINTER (BLACKBACK)	1,494	13,209	14,703
FLOUNDER, AMERICAN PLAICE	10,462	1,416	11,878
LOBSTER, AMERICAN	7,109	3,359	10,468
FLOUNDER, WITCH (GREY SOLE)	4,135	1,715	5,850
POLLOCK	4,300	623	4,923
HAKE, WHITE	3,490	469	3,959
SCALLOP, SEA	2,766	150	2,916
DOGFISH, SPINY	1,893	98	1,991
HAKE, RED (LING)	1,410	0	1,410
SKATE, BARNDOOR	1,083	24	1,107
RAVEN, SEA	365	394	759
FLOUNDER, FOURSPOT	618	1	619
FLOUNDER, SAND DAB (WINDOWPANE)	48	407	455
OCEAN POUT	213	101	314
LUMPFISH	276	12	288
HALIBUT, ATLANTIC	0	263	263
FLOUNDER, SUMMER (FLUKE)	50	63	113
WOLFFISH, ATLANTIC	25	33	58
Grand Total	150,384	125,549	275,933

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Appendix G
Example Discard Report

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Northeast Fisheries Science Center Reference Document 12-17

2012 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Northeast Region

by SE Wigley, J Blaylock, PJ Rago, and G Shield

Northeast Fisheries Science Center Reference Document 12-17

2012 Discard Estimation, Precision, and Sample Size Analyses for 4 Federally Managed Species Groups in the Northeast Region

by SE Wigley[1], J Blaylock[2], PJ Rago[1], and G Shield[1]

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Northeast Fisheries Science Center Reference Documents

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LIST OF ACRONYMS

CV = coefficient of variation
d/k = discard/kept
FMP = fishery management plan
MRIP = Marine Recreational Information Program
MRFSS = Marine Recreational Fisheries Statistical Survey
NEFOP = Northeast Fisheries Observer Program
NEFSC = Northeast Fisheries Science Center
NERO = Northeast Regional Office
NMFS = National Marine Fisheries Service
SBRM = Standardized Bycatch Reporting Methodology
VTR = Vessel Trip Report

EXECUTIVE SUMMARY

This report describes the analysis of the expected coverage needed by at-sea observers for Northeast fisheries for the April 2012 through March 2013 period using the Standardized Bycatch Reporting Methodology. Refinements to the procedure for filtering the needed sea days have been made based on analyses conducted for the 2011 3-year Review Report. The sea days needed to achieve the precision-based performance standard (30% coefficient of variation of the discard estimate) were updated using July 2010 through June 2011 data. To monitor 14 federally managed fish and invertebrate species groups across 55 fleets, a total of 18,822 sea days are needed. The discards reported in this document may not necessarily correspond directly with the discard estimates derived for individual stock assessments due to differences in stratification and data. Hence, the discard estimates are not definitive, but indicative of where discarding is occurring among commercial fleets and for which species groups. Based upon this analysis, the predominant species groups discarded are skates and dogfish. Across all species groups examined, “No Market” is the reason reported for the majority of discards.

BACKGROUND

The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment (NEFMC 2007; NMFS 2008) was vacated by the US District Court of the District of Columbia on September 15, 2011 and the regulations implementing the SBRM were removed by the National Marine Fisheries Service (NMFS) on December 29, 2011 (NMFS 2011). While an SBRM is not currently required, the need to allocate observer sea days to monitor fisheries prosecuted off the northeast coast of the US remains and thus an analysis to estimate the number of sea days needed by each fleet is needed.

The SBRM discard estimation methods described in Wigley et al. 2007 are still applicable. Refinements to the procedure for filtering the needed sea days have been made based on analyses conducted for the 2011 SBRM 3-year Review Report Part 2 (Wigley et al. forthcoming 2012).

This document presents the estimated discards and associated precision, and the number of sea days needed to obtain a 30% coefficient of variation (CV) on the discard estimates for the 14 species groups associated with federal fishery management plans (FMPs) in northeast fleets[1]. Additionally, discard reasons associated with the discarded species are summarized. This document differs from previous SBRM documents in that it does not include a sea day prioritization[2] and focuses on fish and invertebrate species groups; it does not include sea turtles.

METHODS

Data Sources

The data sets used include July 2010 through June 2011 data from the Northeast Fisheries Observer Program[3] (NEFOP) database, the Vessel Trip Report (VTR; including logbooks from the surfclam and ocean quahog fishery) database, the Northeast Fisheries Science Center (NEFSC) commercial landings database, and the NOAA Fisheries Marine Recreational Fisheries Statistics Survey[4] (MRFSS) database.

The NEFOP is a comprehensive, multi-purpose program that collects a broad range of data on all species that are encountered during a fishing trip as well as gear characteristics data, economic information, and biological samples (NEFOP, 2010). The NEFOP employs trained sea-going observers and monitors to collect these data that also include weight, by species and disposition (retained and discarded), of the entire catch. Fish and invertebrate species are recorded in weight. Conversion factors were applied to convert any dressed weight data to live weight equivalents.

For this analysis, only observed hauls from NEFOP trips with a "complete" sampling protocol were used. A "complete" sampling protocol includes obtaining species weights for both kept and discarded portions of all species in the catch. NEFOP training trips have been included

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[1] "fleet" is synonymous with "fishing mode."

[2] The Proposed 2012 Observer Sea Day Allocation (March 23, 2012) document is available on-line at: http://www.nefsc.noaa.gov/fsb/SBRM/2012/Proposed_2012_Observer_Sea_Day_Allocation_3-23-2012_v3.pdf

[3] A comparison of discard rates derived from observer and at-sea monitor data revealed there were generally no statistical differences in discard rates between the two data collection programs for the 14 fish species groups for four gear types (longline, large mesh otter trawl, large mesh gillnet and extra large mesh gillnet) where at-sea monitor data exist. See Northeast Fisheries Observer Program (2011) for more information on at-sea monitoring.

[4] Marine Recreational Fisheries Statistics Survey (MRFSS) was replaced with Marine Recreational Information Program (MRIP) in 2012.

in the analysis. Aborted trips, "set only" trips, and trips associated with a groundfish sentinel fishery (program code = 127) were excluded from this analysis. Additionally, hauls with no catch report and species hail weight with discard reason "039" ("previously discarded") were excluded.

The same broad stratification scheme used in SBRM analyses was employed in this analysis, where trips were partitioned into fleets using six classification variables: calendar quarter, geographic region, gear type, mesh, access area, and trip category. Calendar quarter was based on landed date and used to capture seasonal variations in fishing activity and discard rates. Two broad geographical regions were defined: New England (NE) and Mid-Atlantic (MA) based on port of departure[5]; ports from Maine to Rhode Island constituted the NE region, and ports in states from Connecticut southward constituted the MA region. Gear type was based on Northeast gear codes (*negear)*. Some gear codes were combined: sink, anchored, and drift gillnets, and single and paired mid-water trawls. Trips for which gear was unknown were excluded. Mesh size groups were formed for otter trawl and gillnet gear types. For otter trawls, two mesh groups were formed: small (mesh less than 5.5 inches) and large (5.5 inch mesh and greater). For gillnets, three mesh groups were formed: small (mesh less than 5.5 inches), large (mesh between 5.5 and 7.99 inches), and extra large (mesh 8 inches and greater). Two access area categories were formed: access area (AA) and open (OPEN). The sea scallop fishery was divided into General (GEN) and Limited (LIM) category trips. All other fisheries were combined into a category called "all."

Stratification abbreviations used are given below.

Abbreviation	**Definition**
MA	Mid-Atlantic ports (CT and southward)
NE	New England ports (RI and northward)
sm	Small mesh (less than 5.5 inches)
lg	Large mesh (5.5 to 7.99 inches)
xlg	Extra large mesh (8 inches and greater)
LIM	Limited access category
GEN	General category
OPEN	Non-access area
AA	Access area

The VTR data are used as a basis for defining the sampling frame, since all federally permitted vessels are required to file a VTR for each fishing trip (See NMFS-Northeast Regional Office http://www.nero.noaa.gov/ro/fso/vtr_inst.pdf). These self-reported data[6] constitute the basis of the fishing activity of the commercial fleets. Because Dealer data do not contain mesh size and area fished information, the Dealer data[7] could not be used to expand discard ratios by

[5] Wigley et al. (2007) found that the majority (over 93%) of 2004 observed trips both originated and fished in the same region and exhibited the same general pattern as in the VTR data. An updated analysis using data collected during July 2007 through June 2011 found similar results.
[6] See Wigley et al. 2007 for more details on self-reported VTR data.
[7] The trip-based allocation of Dealer (CFDETT/S*yyyy*AA) data are conducted annually and were not available when the annual discard estimation and sample size analyses were conducted.

fleet for the annual analyses. The VTR data were used as a surrogate for Dealer data and were used to expand the NEFOP discard ratios to total discards. For this analysis, the commercial VTR trips [excluding NY state (non-federal) vessels] were used. Conversion factors were applied to convert various units of measure to pounds and all weight to live weight. VTR trip data were collapsed into fleets as defined above. Trips participating in the US/Canada access area, B-day category programs and other special access programs could not be identified in the VTR data. These trips have been grouped by the other stratification variables and have not been partitioned separately.

The clam fishery has a separate logbook system from the VTR logbook. The commercial clam logbook data were used to augment the VTR data for the clam dredge fishery. The commercial and recreational landings (in live weight) for the federally managed species were used only in sample size analysis.

A list of the 14 federally managed fish and invertebrate species groups analyzed, and the individual species comprising each species group, is given in Table 1. This analysis does not include sea turtles. Summaries of the data used, in terms of number of trips and number of sea days, by fleet, calendar quarter, and data source (NEFOP and VTR), are given in Tables 2 and 3, respectively.

Discard Estimation

Total discards of each of the 14 federally managed species groups were estimated for the July 2010 through June 2011 time period using a combined discard/kept (d/k) ratio estimator (Cochran 1963), where d = discarded pounds of a given species group, and k = the kept pounds of all species. Total discards (in weight for fish) were derived by multiplying the estimated discard rate of each fleet by the corresponding fleet landings in the VTR database, and then summing over fleets.

Simple imputation methods were used to fill quarterly cells for which there were one or no observed trips. Data from adjoining strata were pooled to impute estimates for cells with zero or one trip. In this imputation only the temporal stratification, calendar quarter, was relaxed to half year (or annual) recognizing that seasonal variation can occur for some species. This simple imputation could not be applied to fleets where observer coverage was low or missing throughout the year (i.e., too few data to support the simple imputation approach). In these cases, imputed values were not used, and the fleet was designated as a fleet in need of pilot coverage. If some data were available, then discard estimates were derived, but these results were not used in sample size analyses.

The variances of the discard estimates were also derived. In this document, CV is defined as the ratio of the standard error of the total discards divided by the total discards. The appendix presents the equations used in the analysis.

For each species/species group and fleet, the landings from the VTR and clam logbook are presented to provide perspective for the discard estimates.

Discard Reasons

For each species group and fleet, the fish dispositions associated with discarding (as reported by the at-sea observer) have been grouped into the following six discard reason categories: no market, regulation (size), regulation (quota), regulation (other), poor quality, and

other. The discard reason categories and the associated fish dispositions are summarized in Appendix Table 1. The discard reasons "No Market" and "Poor Quality" would be considered economic discards and not regulatory discards.

The observed (non-extrapolated) discards associated with each of the six discard reason categories were summed for each species group/species 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/species and fleet. The discard reason category percentages were taken from 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 sample size analysis), the observed discard reason category percentages were then multiplied by the total estimated (extrapolated) discards for each species group/species and fleet to derive the estimated discards by discard reason category for each species group/species and fleet 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 comprise the fleet aggregation for each species group/species. The estimated 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 and fleet.

Sample Size Analysis

The sample size analysis (also referred to as sea day analysis) was conducted to estimate the number of baseline trips and sea days needed to monitor the 14 federally managed species groups in each fleet. As described in Wigley et al. 2007 (and given in the appendix), 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 precision standard for discard estimates (30% CV) were derived. The sample size analysis was performed 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. The percentage of trips was derived by dividing the number of trips needed by the number of VTR trips that occurred in the fleet.

When total discards could not be estimated due to little or no observer coverage (no data), or when total discards were zero (no variance), the sample size (number of trips) was determined 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). The 2% pilot coverage level[8] was the same as was used in SBRM analyses (Wigley et al. 2007; Wigley et al. 2011). 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. It is recognized that pilot coverage may result in too much coverage in cases where little or no observer coverage may actually be needed.

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.

[8] Pilot coverage is defined as a minimum level of observer coverage necessary to acquire bycatch information with which to calculate variance estimates that in turn can be used to further define the level of sampling needed (NMFS 2004).

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. To address this, a modification of the filtering approach developed for SBRM was employed. Similar to the SBRM analyses (Wigley et al. 2007), importance filters were 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 due to the discards. In the SBRM analyses, the importance filter was comprised of three filters (i.e., unlikely cell filter, fraction of discard filter, and fraction of total mortality due to discards filter) that were applied simultaneously. However, based on an evaluation of the use of the unlikely filter over a three-year period, it was found that no substantive changes in the determination of sea days would have resulted had the unlikely filter been removed from the importance filter (Wigley et al. forthcoming 2012). Thus, in this analysis, all cells in the unlikely filter were set to 1 (all cells are likely).

The 2012 baseline sea days were filtered using a 95% cut-point in the discard filter, and a 98% cut-point for the total mortality filter due to discards. 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 the "2012 sea days needed") and trips needed to achieve a 30% CV on the estimates of discards for each of the 14 species groups 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 ensures that all species groups 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 pilot coverage to maintain monitoring coverage for that fleet. If the fleet was designated as a pilot fleet, then pilot sea days were used. These fleets are indicated with a "P." The fleets with sufficient data to estimate sample size are referred to as non-pilot fleets.

RESULTS

There were 55 fleets identified during the July 2010 through June 2011 period (Tables 2 and 3). There were three new fleets compared to the 2011 sea day analysis (NEFSC 2011b, NEFSC and NERO 2011): MA large mesh Ruhle trawl (Row 13), NE small mesh Ruhle trawl (Row 14), and MA large mesh haddock separator trawl (Row 16). New fleets, those that have not been identified in previous analyses, have been identified with a plus (+).

Of the 55 fleets examined, 29 fleets had little or no observer data: 6 fleets had sparse observer data across all quarters, while 23 fleets were missing observer data in all quarterly cells. The fleets with no observer coverage were primarily pot and trap fisheries targeting particular species (e.g., lobster, crab, conch, shrimp, and hagfish). No discard estimation was performed for the 23 fleets with no observer coverage and they were designated as fleets in need of pilot coverage (Tables 2 and 3). The 6 fleets with sparse observer coverage were also designated as fleets in need of pilot coverage for the sample size analysis; however, discard estimation was performed using the sparse observer data. For the 26 remaining fleets (non-pilot fleets), estimates of discards and their associated variance were derived and used to determine the sample sizes needed for a 30% CV. Of the 26 fleets, there were 9 fleets (Rows 11, 15, 19, 22, 23, 24, 29, 31, and 35) where the simple imputation was applied.

Thus, for discard estimation and precision analysis, 23 fleets had no discard estimation and 32 fleets had discards estimated. For the sample size analysis, 26 fleets had sample sizes derived from the discard variances and 29 fleets had sample sizes based upon pilot coverage.

A total of 5,444 trips (14,174 days) was observed during July 2010 through July 2011. When these trips were stratified, some trips were partitioned between strata resulting in 5,558 trips (15,018 days; Tables 2 and 3) in the VTR. There appears to be minor misreporting of gear type associated with trips in the NE Ruhle trawl fleet (Row 15) and MA Mid-water trawl (Row 38; Tables 2 and 3; Quarter 3). For Ruhle trawl, the incidence of misreporting gear (bottom otter trawl versus Ruhle trawl) is less than in previous years.

The percentages of observed trips varied by fleet and calendar quarter. On an annual basis, the percentage of observed trips by fleet ranged between 0.1% (MA handline fleet, Row 3) to 72% (MA Mid-water trawl fleet, Row 38; Table 2). Over all fleets, the percentage of observed trips was 5.5%.

Annual VTR landings and estimated discards (live pounds) with associated precision are summarized for 53 fleets (Rows 1-19, 21-43, 45-55 and "Other fleets" with landings only) for each of the 14 species groups and the individual species that comprise those species groups (Tables 4A and 4B; Figures 1A and 1B). The landings associated with the "minor" fleets not uniquely identified in this analysis have been aggregated into a single fleet labeled "Other fleets." Due to confidentially rules, the landings associated with MA Floating Trap (Row 20) and MA Hagfish Pots and Traps (Row 44) have been combined with the landings of other minor fleets (labeled as "Other fleets") that have not been not uniquely identified within this analysis. As a consequence, the fleet row numbers within Tables 4A and 4B are sequential but there are gaps in the row numbers. The landings associated with the various minor fleets aggregated into "Other fleets" generally contribute less than 0.5% of the total landings across all fleets for each of the 14 species groups (Table 4A). As mentioned above, there are 23 fleets (Rows 10, 13, 14, 20, 21, 25, 28, 40-55) that have no discard estimation due to no NEFOP coverage (dark shaded fleets in Tables 4A and 4B, with Rows 20 and 44 included in "Other fleets"). In Table 4A, the CVs associated with the cells (species group and fleet) that were not used in the sample size analysis (i.e. cells filtered out via the importance filter) are indicated in light shading. Precision of discards of individual species (Table 4B) were not used in the sample size analysis.

Based upon this analysis, over 71,000 mt (live wt) of discards of the 14 species groups occurred during the July 2010 through June 2011 period. The majority (77%) of the discards were comprised of three species groups: skates (49%), scallops (16%), and dogfish (12%); the remaining species groups comprised less than or equal to 5% (Table 4A).

The percentage of discards to total catch varied among the 14 species groups (Table 4A; Figure 1A) and individual species (Table 4B; Figure 1B). There was one species group (SAL) with zero discards (this species group is not presented in Figure 1A); two species groups (HERR and SCOQ) where discards were less than 1% total catch; three species groups (SCAL, SBM, and TILE) where percentages of discards ranged between 1% and 10% of total catch; three species groups (BLUE, FSB, and GFL) where discards ranged between 11% and 25% of total catch; and five species groups (MONK, RCRAB, SKATE, GFS, and DOG) where discards were greater than 26% of total catch. The species groups with the highest percentage of total discards relative to total catch were: skates (75%), dogfish (62%), and red crab (62%; Figure 1A). For individual species, most notable are the high percentages of discards to total catch of wolffish (99%) and ocean pout (99%) due to the no possession regulations for these two species.

The reasons for discarding varied among the 14 species groups (Appendix Table 2A) and individual species (Appendix Table 2B). Overall, for the 14 species groups, the majority (74%) of discards occurred due to "No Market," "Regulation" (due to size, quota, and other), "Poor Quality," and "Other" contributed 21%, 3%, and 1%, respectively (Appendix Table 2A).

The percentages of discard to total catch were also summarized by fleet for 26 fleets (Figure 2). Discards of one or more of the 14 species groups that were filtered out via the importance filter have been aggregated into a species group labeled "Other FMP." Discards of non-federally managed species have been aggregated into a species group labeled "Non-FMP." The percentages of discard to total catch varied by fleet (Figure 2). There was one fleet (Row 29) where discards were less than 1% of the total catch in the fleet; four fleets (Rows 4, 23, 38, and 39) where the percentages of discards ranged between 1% and 10%; 13 fleets (Rows 2, 7, 15, 19, 22, 24, 26, 27, 32, 33, 35, 36, and 37) where the percentages of discards ranged between 11% and 25% of total catch; five fleets (Rows 5, 8, 17, 31, and 34) where the percentages of discards ranged between 26% and 50% of the total catch; and three fleets where discards were greater than 50% of the total catch (Row 6, 11, and 16).

The number of species groups discarded within a fleet also varied among fleets. The majority of fleets (17 of the 26 fleets) were comprised of two or three discarded species groups. Eight of these fleets (Rows 2, 4, 15, 16, 31, 33, 35, and 38) had the "Other FMP" species group comprised the majority of the discards. This indicates that the majority of discards were filtered out via the importance filter. There were another five fleets (Rows 22, 29, 32, 34, and 39) where the "Non-FMP" species group comprised the majority of the discards. There was one fleet (Row 23) where discards were evenly split between with "Other FMP" and "Non-FMP" species groups. There were three fleets where two of the three discarded species groups were "Other FMP" and "Non-FMP" and the other was the dominant species group of skate, small mesh groundfish, and dogfish (Rows 11, 19, and 26 respectively).

The remaining fleets (9 of the 26 fleets) had between four and nine discarded species groups. The skate species group dominated the discards in five of these fleets (Rows 6, 8, 17, 24, and 27) while "Non-FMP" species group dominated the discards in two fleets (Rows 36 and 37). Two fleets (Rows 5 and 7) had a mix of discarded species groups.

The dominant "Non-FMP" species in the scallop dredge fleets (Rows 32, 33, 34, 35, and 36) were: sand dollar, sponge, and starfish. Menhaden and jellyfish were the dominant "Non-FMP" species in the MA small mesh gillnet fleet (Row 22). "Fish, not known" was the dominant species in the NE purse seine fleet (Row 29).

The precision of the discard estimates varied by species group and fleet (Tables 4A and 4B). Of the 14 species groups, 11 species groups had an overall CV that was less than 30%, two species groups (BLUE and SCOQ) had an overall CV that was greater than 30% CV, and one species group (SAL) had zero discards and consequently no CV. The discards of four species groups (BLUE, HERR, SCOQ, and TILE) were filtered out in all fleets indicating the discards of these species groups were a minor component of the total catch of these species (Table 4A; Figure 1A).

The numbers of sea days needed for each species group and fleet, as well of the number of sea days needed for the fleet (referred to as "2012 Sea Days Needed"), are summarized in Table 5. A total of 18,822 days are needed for all fleets. As mentioned previously, 29 fleets had insufficient observer information to estimate discards and the sea days for these fleets have sea days based on pilot coverage. The number of sea days needed associated with fleets with the pilot coverage designation was 1,638 days (9% of 18,822; Table 5). There are 10 fleets where the

sea days for all species groups were filtered out via the importance filter and pilot days was used to maintain some coverage (Rows 2, 4, 15, 16, 22, 23, 29, 31, 35, and 38; Table 5). The sea days needed associated with these fleets was 377 days (2% of 18,822; Table 5). The sea days needed for the remaining 16 fleets (16,807 days representing 89% of the total sea days needed) were derived using the variance of the discard estimate (Tables 5). Of the 16,807 days, 12,661 days (75%) were associated with three fleets (Rows 5, 6, and 8).

The sample size (in terms of number of sea days, number of trips, and percentage of trips based upon the VTR trips in July 2010 through June 201) needed to achieve a 30% CV of the discard estimate in these 16 fleets is given in Table 6. The relationship between sample size and precision, over a range of sample sizes, is shown in Figure 3 for species groups and fleets. If the precision standard (30% CV) was relaxed for the red crab species group in three fleets (Rows 5, 6, and 8) and the penultimate (next largest) value was used in each of the three fleets, then the total number of sea days needed across all fleets would be 7,827 days (a 42% decrease from the 18,822 days). Using the penultimate value, the expected achieved precision of red crab discards in Rows 5, 6, and 8 would be 92% CV, 140% CV, and 72% CV respectively.

DISCUSSION

A broad stratification was used to support the deployment of observers on commercial fishing trips among various fleets using attributes known prior to the trip departure. As discussed in previous discard estimation analyses (Wigley et al. 2011), species-specific stock assessment discard estimation may differ from this report due to differences in stratification and data used [calendar year versus 12-month (July to June) time period; area fished versus region (port of departure); and VTR landings versus Dealer landings]. Region, based on port of departure, was used for the deployment of observers. It is recognized that area fished would provide a better stratification for discard estimation. It is expected, however, that estimates would be in the same order of magnitude. The discard estimates presented here are not definitive estimates, but rather are indicative of where discarding occurred among the commercial fleets for the 14 federally managed species groups.

We have assumed 100% discard mortality, i.e. 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 usefully to note that survival ratios are applied in stock assessments for spiny dogfish, summer flounder, southern New England and Gulf of Maine stocks of winter flounder, and southern New England yellowtail flounder.

These analyses have used VTR data. Dealer (*CFDERSyyyy*) data do not contain mesh or area fished information until the trip-based allocation is performed. The trip-based allocation of Dealer (*CFDETT/SyyyyAA*) data is conducted annually and was not available when this analysis was initiated. Given that the VTR landings estimates are usually less (VTR reports the good faith hails) than the dealer records for a given fleet, the corresponding estimates of discards will also be underestimated. The magnitude of the underestimation will vary by fleet and year.

New fleets were added in response to VTR activity in the time period examined. The Ruhle Trawl (*negear* code 054) and Haddock Separator Trawl (*negear* code 057) were used by vessels departing from the MA region. These gear types are required in the US/Canada resource sharing area and their use is expected in both access and non-access areas to reduce discards of New England groundfish under sector management. Due to the low number of VTR trips reported for these fleets in the July 2010 through June 2011 period, the number of sea days

needed is lower than what may be realized. Additional outreach and education via permit holder letters to industry members have emphasized the proper use of these two gear codes.

There are several fleets with high sea day requirements (> 3,000 sea days). The Northeast Fisheries Observer Program data associated with the trips within these fleets were reviewed to rule out any data "irregularities." The high coverage for New England and Mid-Atlantic otter trawl fleets (Rows 5, 6, and 8; Table 5) was due to high variability associated with red crab discards. In this analysis, as well as in the 2011 SBRM analysis (NEFSC 2011a; NEFSC 2011b; NEFSC and NERO 2011; Wigley et al. 2011), the high variability arises from observing some trips that are fishing in deep-water portions of statistical areas as well as observing other trips that are fishing in shallower portions of the same statistical areas. Red crabs were encountered during trips fishing in deep water. Although the discard reason reported for three fleets was "No Market" (Appendix Table 2A), these vessels do not generally have permits to land red crab, thus the red crabs must be discarded. Currently, the analysis does not stratify these fleets further to account for depth because statistical area is the finest spatial resolution that defines a subtrip within the Vessel Trip Report (a subtrip within the VTR is a unique gear, mesh, and statistical area). While depth is a data element in the VTR, depth is not always reported and there are few QA/QC checks on this data element.

Fish may be discarded for economic reasons (e.g., "No Market" or "Poor Quality") or for regulatory reasons (size, quota, or other). When considering mechanisms to reduce discards, it may be useful to know why discarding is occurring. It is important to note that large discard percentages 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. Observers classify the discards by fish disposition based upon the NEFOP protocol (NEFOP 2010; NEFOP 2011) 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 cautiously.

This analysis does 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 this analysis 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.

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Table 1. List of the 14 fish and invertebrate species groups (in bold), with species group abbreviations in parentheses, and the species comprising these groups, corresponding to the 13 federal fishery management plans in the Northeast region.

ATLANTIC SALMON (SAL)
BLUEFISH (BLUE)
FLUKE - SCUP - BLACK SEA BASS (FSB)
Black Sea Bass
Fluke
Scup
HERRING, ATLANTIC (HERR)
LARGE MESH GROUNDFISH (GFL)
American Plaice
Atlantic Cod
Atlantic Halibut
Atlantic Wolffish
Haddock
Ocean Pout
Pollock
Redfish
White Hake
Windowpane Flounder
Winter Flounder
Witch Flounder
Yellowtail Flounder
MONKFISH (MONK)
RED CRAB (RCRAB)
SEA SCALLOP (SCAL)
SKATE COMPLEX (SKATE)
Barndoor Skate
Clearnose Skate
Little Skate
Rosette Skate
Smooth Skate
Thorny Skate
Winter Skate
SMALL MESH GROUNDFISH (GFS)
Offshore Hake
Red Hake
Silver Hake
SPINY DOGFISH (DOG)
SQUID - BUTTERFISH - MACKEREL (SBM)
Atlantic Mackerel
Butterfish
Illex Squid
Loligo Squid
SURFCLAM - OCEAN QUAHOG (SCOQ)
Surfclam
Ocean Quahog
TILEFISH (TILE)

Table 2. Number of Northeast Fisheries Observer Program (NEFOP) and Vessel Trip Report (VTR) trips, by fleet and calendar quarter (Q) from July 2010 through June 2011. "P" indicates fleets with "pilot" designation.

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	NEFOP Q3	NEFOP Q4	NEFOP Q1	NEFOP Q2	NEFOP TOTAL	VTR Q3	VTR Q4	VTR Q1	VTR Q2	VTR TOTAL	Pilot
1	Longline	OPEN	all	MA	all	.	.	.	1	1	50	32	43	37	162	P
2	Longline	OPEN	all	NE	all	83	29	46	30	188	429	86	166	186	867	
3	Hand Line	OPEN	all	MA	all	.	1	.	1	2	1,885	786	123	963	3,757	P
4	Hand Line	OPEN	all	NE	all	46	10	24	7	87	1,763	241	57	491	2,552	
5	Otter Trawl	OPEN	all	MA	sm	56	48	53	57	214	1,156	799	582	831	3,368	
6	Otter Trawl	OPEN	all	MA	lg	63	24	41	28	156	1,799	1,335	1,234	1,901	6,269	
7	Otter Trawl	OPEN	all	NE	sm	86	72	40	60	258	1,208	825	544	1,063	3,640	
8	Otter Trawl	OPEN	all	NE	lg	341	319	402	376	1,438	2,217	1,560	1,559	1,962	7,298	
9	Scallop Trawl	AA	GEN	MA	all	6	1	.	1	8	53	.	2	13	68	P
10	Scallop Trawl	AA	LIM	MA	all	.	.	.	.	.	1	2	4	1	8	P
11	Scallop Trawl	OPEN	GEN	MA	all	10	3	2	.	15	94	32	35	213	374	
12	Scallop Trawl	OPEN	LIM	MA	all	.	.	1	.	1	4	6	11	2	23	P
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	.	.	.	.	.	.	2	1	4	7	P
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	.	.	.	.	.	.	1	.	3	4	P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	7	.	1	6	14	4	.	1	44	49	
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	.	.	3	3	6	.	.	4	6	10	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	31	26	14	50	121	61	77	35	84	257	
18	Shrimp Trawl	OPEN	all	MA	all	1	.	.	.	1	251	122	5	10	388	P
19	Shrimp Trawl	OPEN	all	NE	all	.	4	1	.	5	158	559	2,307	41	3,065	
20	Floating Trap	OPEN	all	MA	all	.	.	.	.	.	25	.	.	38	63	P
21	Floating Trap	OPEN	all	NE	all	.	.	.	.	.	40	.	.	35	75	P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	4	4	7	.	15	615	359	543	301	1,818	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	3	26	14	.	43	455	644	521	372	1,992	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	.	49	28	27	104	109	606	580	1,132	2,427	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	.	.	.	.	.	13	2	1	2	18	P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	655	384	250	269	1,558	2,579	1,075	706	1,293	5,653	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	372	206	52	145	775	1,113	718	275	1,119	3,225	
28	Purse Seine	OPEN	all	MA	all	.	.	.	.	.	160	5	1	82	248	P
29	Purse Seine	OPEN	all	NE	all	13	1	.	5	19	166	41	.	35	242	
30	Scallop Dredge	AA	GEN	MA	all	6	.	.	.	6	14	17	10	3	44	P
31	Scallop Dredge	AA	GEN	NE	all	18	7	1	.	26	62	13	2	.	77	
32	Scallop Dredge	AA	LIM	MA	all	20	7	12	18	57	116	43	60	44	263	
33	Scallop Dredge	AA	LIM	NE	all	34	13	8	8	63	86	27	23	25	161	
34	Scallop Dredge	OPEN	GEN	MA	all	12	5	11	15	43	945	657	732	1,094	3,428	
35	Scallop Dredge	OPEN	GEN	NE	all	6	4	.	18	28	617	520	1,026	994	3,157	
36	Scallop Dredge	OPEN	LIM	MA	all	17	11	6	27	61	357	208	259	468	1,292	
37	Scallop Dredge	OPEN	LIM	NE	all	18	14	8	40	80	495	245	201	394	1,335	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	1	.	4	.	5	.	.	7	.	7	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	65	42	27	26	160	96	122	51	59	328	
40	Pots and Traps, Fish	OPEN	all	MA	all	.	.	.	.	.	350	342	33	346	1,071	P
41	Pots and Traps, Fish	OPEN	all	NE	all	.	.	.	.	.	423	71	.	124	618	P
42	Pots and Traps, Conch	OPEN	all	MA	all	.	.	.	.	.	195	569	14	418	1,196	P
43	Pots and Traps, Conch	OPEN	all	NE	all	.	.	.	.	.	351	222	4	261	838	P
44	Pots and Traps, Hagfish	OPEN	all	MA	all	.	.	.	.	.	.	.	.	3	3	P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	.	.	.	.	.	43	6	8	18	75	P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	.	.	.	.	.	3	.	151	.	154	P
47	Pots and Traps, Lobster	OPEN	all	MA	all	.	.	.	.	.	1,196	539	196	569	2,500	P
48	Pots and Traps, Lobster	OPEN	all	NE	all	.	.	.	.	.	14,215	9,340	1,968	4,369	29,892	P
49	Pots and Traps, Crab	OPEN	all	MA	all	.	.	.	.	.	8	32	15	28	83	P
50	Pots and Traps, Crab	OPEN	all	NE	all	.	.	.	.	.	120	63	5	41	229	P
51	Beam Trawl	OPEN	all	MA	all	.	.	.	.	.	31	27	34	71	163	P
52	Beam Trawl	OPEN	all	NE	all	.	.	.	.	.	87	1	29	10	127	P
53	Dredge, Other	OPEN	all	MA	all	.	.	.	.	.	2	97	199	8	306	P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	.	.	.	.	.	785	641	258	213	1,897	P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	.	.	.	.	.	736	535	101	83	1,455	P
					Total	**1,974**	**1,310**	**1,056**	**1,218**	**5,558**	**37,741**	**24,252**	**14,726**	**21,907**	**98,626**	

P= pilot coverage; + = new fleet in 2012; see text for fleet abbreviations.

Table 3. Number of Northeast Fisheries Observer Program (NEFOP) and Vessel Trip Report (VTR) sea days, by fleet and calendar quarter (Q) from July 2010 through June 2011. "P" indicates fleets with "pilot" designation.

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	NEFOP Q3	NEFOP Q4	NEFOP Q1	NEFOP Q2	NEFOP TOTAL	VTR Q3	VTR Q4	VTR Q1	VTR Q2	VTR TOTAL	Pilot
1	Longline	OPEN	all	MA	all	.	.	.	1	1	235	198	208	244	885	P
2	Longline	OPEN	all	NE	all	105	60	56	46	267	497	143	202	271	1,113	
3	Hand Line	OPEN	all	MA	all	.	5	.	1	6	2,076	804	139	978	3,997	P
4	Hand Line	OPEN	all	NE	all	49	12	24	16	101	1,971	350	99	512	2,932	
5	Otter Trawl	OPEN	all	MA	sm	128	159	320	190	797	2,330	1,723	2,274	1,667	7,994	
6	Otter Trawl	OPEN	all	MA	lg	93	92	175	60	420	2,755	2,785	4,594	3,187	13,321	
7	Otter Trawl	OPEN	all	NE	sm	259	200	232	121	812	2,668	2,059	1,831	1,863	8,421	
8	Otter Trawl	OPEN	all	NE	lg	1,025	1,036	1,313	1,447	4,821	4,942	4,742	5,306	5,769	20,759	
9	Scallop Trawl	AA	GEN	MA	all	12	2	.	3	17	101	.	6	26	133	P
10	Scallop Trawl	AA	LIM	MA	all	.	.	.	.	.	7	18	35	8	68	P
11	Scallop Trawl	OPEN	GEN	MA	all	18	3	4	.	25	175	62	65	378	680	
12	Scallop Trawl	OPEN	LIM	MA	all	.	.	6	.	6	35	102	90	41	268	P
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	.	.	.	.	.	.	2	1	4	7	P
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	.	.	.	.	.	.	1	.	24	25	P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	54	.	5	51	110	26	.	5	358	389	
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	.	.	3	3	6	.	.	6	6	12	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	243	225	127	366	961	487	635	315	688	2,125	
18	Shrimp Trawl	OPEN	all	MA	all	5	.	.	.	5	1,333	836	87	105	2,361	P
19	Shrimp Trawl	OPEN	all	NE	all	.	4	1	.	5	160	574	2,332	52	3,118	
20	Floating Trap	OPEN	all	MA	all	.	.	.	.	.	25	.	.	38	63	P
21	Floating Trap	OPEN	all	NE	all	.	.	.	.	.	40	.	.	35	75	P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	4	4	7	.	15	685	373	548	374	1,980	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	3	27	14	.	44	492	678	566	430	2,166	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	.	59	47	37	143	114	781	822	1,287	3,004	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	.	.	.	.	.	13	2	10	3	28	P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	804	478	325	354	1,961	2,921	1,346	870	1,568	6,705	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	453	232	111	245	1,041	1,326	842	670	1,877	4,715	
28	Purse Seine	OPEN	all	MA	all	.	.	.	.	.	164	5	2	82	253	P
29	Purse Seine	OPEN	all	NE	all	31	2	.	15	48	395	101	.	85	581	
30	Scallop Dredge	AA	GEN	MA	all	11	.	.	.	11	32	42	27	9	110	P
31	Scallop Dredge	AA	GEN	NE	all	31	18	3	.	52	95	16	4	.	115	
32	Scallop Dredge	AA	LIM	MA	all	174	58	78	152	462	1,087	340	477	392	2,296	
33	Scallop Dredge	AA	LIM	NE	all	311	131	78	89	609	741	264	246	279	1,530	
34	Scallop Dredge	OPEN	GEN	MA	all	17	7	17	18	59	1,299	944	1,052	1,432	4,727	
35	Scallop Dredge	OPEN	GEN	NE	all	7	6	.	22	35	935	812	1,299	1,291	4,337	
36	Scallop Dredge	OPEN	LIM	MA	all	145	95	59	303	602	3,279	1,794	2,198	4,635	11,906	
37	Scallop Dredge	OPEN	LIM	NE	all	203	132	87	489	911	4,880	2,494	2,023	4,461	13,858	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	5	.	16	.	21	.	.	40	.	40	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	292	157	91	104	644	366	405	170	229	1,170	
40	Pots and Traps, Fish	OPEN	all	MA	all	.	.	.	.	.	362	356	39	363	1,120	P
41	Pots and Traps, Fish	OPEN	all	NE	all	.	.	.	.	.	423	71	.	125	619	P
42	Pots and Traps, Conch	OPEN	all	MA	all	.	.	.	.	.	196	570	15	419	1,200	P
43	Pots and Traps, Conch	OPEN	all	NE	all	.	.	.	.	.	351	230	12	261	854	P
44	Pots and Traps, Hagfish	OPEN	all	MA	all	.	.	.	.	.	.	.	.	3	3	P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	.	.	.	.	.	165	57	43	104	369	P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	.	.	.	.	.	3	.	151	.	154	P
47	Pots and Traps, Lobster	OPEN	all	MA	all	.	.	.	.	.	1,476	734	300	732	3,242	P
48	Pots and Traps, Lobster	OPEN	all	NE	all	.	.	.	.	.	16,554	11,350	3,508	6,044	37,456	P
49	Pots and Traps, Crab	OPEN	all	MA	all	.	.	.	.	.	8	32	15	28	83	P
50	Pots and Traps, Crab	OPEN	all	NE	all	.	.	.	.	.	212	190	68	160	630	P
51	Beam Trawl	OPEN	all	MA	all	.	.	.	.	.	82	84	97	128	391	P
52	Beam Trawl	OPEN	all	NE	all	.	.	.	.	.	94	1	29	21	145	P
53	Dredge, Other	OPEN	all	MA	all	.	.	.	.	.	19	115	199	14	347	P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	.	.	.	.	.	1,176	1,092	557	546	3,371	P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	.	.	.	.	.	776	642	166	132	1,717	P
					Total	**4,482**	**3,204**	**3,199**	**4,133**	**15,018**	**60,584**	**41,797**	**33,818**	**43,768**	**179,968**	

P= pilot coverage; + = new fleet in 2012; see text for fleet abbreviations.

Table 4A. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: ATLANTIC SALMON

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	0	0	0		
6	Otter Trawl	OPEN	all	MA	lg	0	0	0		
7	Otter Trawl	OPEN	all	NE	sm	0	0	0		
8	Otter Trawl	OPEN	all	NE	lg	0	0	0		
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	0	0	0		
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	0	0	0		
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	0	0	0		
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: ATLANTIC SALMON

33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0		
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0		
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	0	0	0		

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: BLUEFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	53	53	0		P
2	Longline	OPEN	all	NE	all	2,084	2,034	50	0.897	
3	Hand Line	OPEN	all	MA	all	89,237	89,237	0		P
4	Hand Line	OPEN	all	NE	all	80,664	76,855	3,809	0.454	
5	Otter Trawl	OPEN	all	MA	sm	228,440	202,337	26,103	0.556	
6	Otter Trawl	OPEN	all	MA	lg	135,441	126,463	8,978	0.471	
7	Otter Trawl	OPEN	all	NE	sm	262,663	160,908	101,755	1.228	
8	Otter Trawl	OPEN	all	NE	lg	97,532	62,771	34,761	0.622	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	500	500			P
11	Scallop Trawl	OPEN	GEN	MA	all	145	145	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	70	70	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	4,330	445	3,885	0.735	
18	Shrimp Trawl	OPEN	all	MA	all	162	162	0		P
19	Shrimp Trawl	OPEN	all	NE	all	640	640	0		
21	Floating Trap	OPEN	all	NE	all	3,421	3,421			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	748,869	714,437	34,432	0.603	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	1,320,752	1,201,723	119,029	0.682	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	22,892	15,593	7,299	0.306	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	525	525			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	132,813	128,424	4,389	0.145	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	51,800	21,596	30,204	0.232	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	4	0	4	0.939	
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	18	18	0		

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: BLUEFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	353	0	353	0.786	
37	Scallop Dredge	OPEN	LIM	NE	all	76	0	76	1.038	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	244	0	244	0.356	
40	Pots and Traps, Fish	OPEN	all	MA	all	1,470	1,470			P
41	Pots and Traps, Fish	OPEN	all	NE	all	44	44			P
42	Pots and Traps, Conch	OPEN	all	MA	all	42	42			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	17	17			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	72	72			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	9,633	9,633			P
52	Beam Trawl	OPEN	all	NE	all	39	39			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					26,585	26,585			
					TOTAL	3,221,630	2,846,259	375,371	0.408	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: FLUKE - SCUP - BLACK SEA BASS

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	9,586	9,586	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	274,188	274,188	0		P
4	Hand Line	OPEN	all	NE	all	40,891	40,891	0		
5	Otter Trawl	OPEN	all	MA	sm	4,870,770	3,781,875	1,088,895	0.302	
6	Otter Trawl	OPEN	all	MA	lg	14,143,686	13,102,065	1,041,621	0.216	
7	Otter Trawl	OPEN	all	NE	sm	3,292,244	2,460,146	832,098	0.270	
8	Otter Trawl	OPEN	all	NE	lg	4,084,969	3,459,194	625,775	0.122	
9	Scallop Trawl	AA	GEN	MA	all	2,165	1,000	1,165	0.338	P
10	Scallop Trawl	AA	LIM	MA	all	19,583	19,583			P
11	Scallop Trawl	OPEN	GEN	MA	all	78,058	54,333	23,725	0.522	
12	Scallop Trawl	OPEN	LIM	MA	all	47,525	46,221	1,304	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	1,865	1,865			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	1	1			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	669	318	351	0.470	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	445	429	16	0.537	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	17,572	730	16,842	0.302	
18	Shrimp Trawl	OPEN	all	MA	all	2,455	2,455	0		P
19	Shrimp Trawl	OPEN	all	NE	all	10,125	9,735	390	0.185	
21	Floating Trap	OPEN	all	NE	all	147,815	147,815			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	2,765	1,998	767	0.581	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	16,931	16,247	684	0.729	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	36,104	25,767	10,337	0.345	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	625	625			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	70,406	68,041	2,365	0.364	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	137,799	37,792	100,007	0.140	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	334	334	0		P
31	Scallop Dredge	AA	GEN	NE	all	69	0	69	0.396	
32	Scallop Dredge	AA	LIM	MA	all	104,493	8,667	95,826	0.226	
33	Scallop Dredge	AA	LIM	NE	all	93,086	0	93,086	0.158	
34	Scallop Dredge	OPEN	GEN	MA	all	124,425	30,294	94,131	0.748	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: FLUKE - SCUP - BLACK SEA BASS

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	14,303	0	14,303	0.635	
36	Scallop Dredge	OPEN	LIM	MA	all	531,347	29,161	502,186	0.193	
37	Scallop Dredge	OPEN	LIM	NE	all	838,985	185	838,800	0.255	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	7,478	0	7,478	1.103	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	16	0	16	0.461	
40	Pots and Traps, Fish	OPEN	all	MA	all	372,068	372,068			P
41	Pots and Traps, Fish	OPEN	all	NE	all	311,361	311,361			P
42	Pots and Traps, Conch	OPEN	all	MA	all	183	183			P
43	Pots and Traps, Conch	OPEN	all	NE	all	330	330			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	791	791			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	34,590	34,590			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	15,642	15,642			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	838	838			P
51	Beam Trawl	OPEN	all	MA	all	46,258	46,258			P
52	Beam Trawl	OPEN	all	NE	all	25,112	25,112			P
53	Dredge, Other	OPEN	all	MA	all	90	90			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	271	271			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					55,889	55,889			
					TOTAL	29,887,199	24,494,964	5,392,235	0.097	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: HERRING, ATLANTIC

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	28	28	0		
3	Hand Line	OPEN	all	MA	all	58	58	0		P
4	Hand Line	OPEN	all	NE	all	49	49	0		
5	Otter Trawl	OPEN	all	MA	sm	587,539	525,168	62,371	0.444	
6	Otter Trawl	OPEN	all	MA	lg	11,928	4,652	7,276	1.212	
7	Otter Trawl	OPEN	all	NE	sm	10,047,331	9,890,924	156,407	0.337	
8	Otter Trawl	OPEN	all	NE	lg	22,662	3,415	19,247	0.213	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	33	0	33	1.890	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	400	400			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	559	0	559	0.756	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	2	0	2	0.787	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	1,129	0	1,129	0.209	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	641,550	614,020	27,530	0.988	
21	Floating Trap	OPEN	all	NE	all	412	412			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	5,170	5,170	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	192	192	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	76	76	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	380	380			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	4,954	373	4,581	0.305	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	612	300	312	0.255	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	21,542,761	21,514,860	27,901	1.094	
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	8	8	0		

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: HERRING, ATLANTIC

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	99	0	99	0.742	
37	Scallop Dredge	OPEN	LIM	NE	all	35	0	35	0.780	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	2,004,114	2,004,000	114	0.574	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	117,086,289	117,006,373	79,916	0.513	
40	Pots and Traps, Fish	OPEN	all	MA	all	1,800	1,800			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	1,495,914	1,495,914			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	630	630			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					138	138			
					TOTAL	153,456,851	153,069,340	387,511	0.216	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: LARGE MESH GROUNDFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	208,634	11,623	197,011	0.000	P
2	Longline	OPEN	all	NE	all	1,013,974	946,295	67,679	0.132	
3	Hand Line	OPEN	all	MA	all	29,384	8,150	21,234	0.000	P
4	Hand Line	OPEN	all	NE	all	135,293	124,430	10,863	0.291	
5	Otter Trawl	OPEN	all	MA	sm	837,968	13,925	824,043	0.297	
6	Otter Trawl	OPEN	all	MA	lg	937,267	157,731	779,536	0.195	
7	Otter Trawl	OPEN	all	NE	sm	518,757	118,357	400,400	0.261	
8	Otter Trawl	OPEN	all	NE	lg	42,091,761	39,877,275	2,214,486	0.036	
9	Scallop Trawl	AA	GEN	MA	all	48	0	48	0.394	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	69,719	0	69,719	0.646	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	160	160			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	1,066,369	1,059,622	6,747	0.588	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	14,119	10,496	3,623	0.135	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	6,361,835	6,207,219	154,616	0.118	
18	Shrimp Trawl	OPEN	all	MA	all	795,226	268	794,958	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	207,183	295	206,888	0.470	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	3,373	1,445	1,928	1.969	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	822	367	455	0.490	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	4,473	3,953	520	0.326	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	2,931	2,931			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	7,684,208	7,376,489	307,719	0.072	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	655,801	605,427	50,374	0.181	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	61	0	61	0.247	P
31	Scallop Dredge	AA	GEN	NE	all	609	0	609	0.252	
32	Scallop Dredge	AA	LIM	MA	all	18,300	363	17,937	0.277	
33	Scallop Dredge	AA	LIM	NE	all	29,323	892	28,431	0.185	
34	Scallop Dredge	OPEN	GEN	MA	all	43,405	20	43,385	0.370	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: LARGE MESH GROUNDFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	71,354	23	71,331	0.539	
36	Scallop Dredge	OPEN	LIM	MA	all	216,570	852	215,718	0.198	
37	Scallop Dredge	OPEN	LIM	NE	all	847,387	5,401	841,986	0.104	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	1	0	1	0.857	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	61,217	55,987	5,230	0.227	
40	Pots and Traps, Fish	OPEN	all	MA	all	4,203	4,203			P
41	Pots and Traps, Fish	OPEN	all	NE	all	252	252			P
42	Pots and Traps, Conch	OPEN	all	MA	all	3,150	3,150			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	656	656			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	1,807	1,807			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	4,106	4,106			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					7,543	7,543			
					TOTAL	63,949,248	56,611,713	7,337,535	0.048	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: MONKFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	949	943	7	0.888	
3	Hand Line	OPEN	all	MA	all	3,463	3,463	0		P
4	Hand Line	OPEN	all	NE	all	25	25	0		
5	Otter Trawl	OPEN	all	MA	sm	262,396	96,970	165,426	0.281	
6	Otter Trawl	OPEN	all	MA	lg	447,227	246,200	201,027	0.210	
7	Otter Trawl	OPEN	all	NE	sm	145,738	108,535	37,203	0.287	
8	Otter Trawl	OPEN	all	NE	lg	5,345,394	4,711,328	634,066	0.101	
9	Scallop Trawl	AA	GEN	MA	all	1,285	157	1,128	0.250	P
10	Scallop Trawl	AA	LIM	MA	all	1,013	1,013			P
11	Scallop Trawl	OPEN	GEN	MA	all	4,589	676	3,914	0.413	
12	Scallop Trawl	OPEN	LIM	MA	all	506	506	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	27	27			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	25	25			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	652	469	183	0.266	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	66	66	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	46,196	41,879	4,317	0.168	
18	Shrimp Trawl	OPEN	all	MA	all	115,273	269	115,004	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	182	125	57	1.053	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	4,067	4,067	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	19,042	19,042	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	3,168,068	2,968,306	199,762	0.203	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	4,476	4,476			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	190,281	180,952	9,330	0.071	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	3,877,307	3,593,705	283,601	0.094	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	2,300	493	1,807	0.203	P
31	Scallop Dredge	AA	GEN	NE	all	1,017	0	1,017	0.219	
32	Scallop Dredge	AA	LIM	MA	all	209,599	21,401	188,197	0.216	
33	Scallop Dredge	AA	LIM	NE	all	196,868	18,319	178,549	0.144	
34	Scallop Dredge	OPEN	GEN	MA	all	90,424	47,983	42,442	0.348	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: MONKFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	29,471	8,186	21,285	0.544	
36	Scallop Dredge	OPEN	LIM	MA	all	1,865,862	168,313	1,697,549	0.221	
37	Scallop Dredge	OPEN	LIM	NE	all	1,919,990	312,774	1,607,216	0.155	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	272	0	272	0.282	
40	Pots and Traps, Fish	OPEN	all	MA	all	564	564			P
41	Pots and Traps, Fish	OPEN	all	NE	all	17	17			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	227	227			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	110	110			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	2,079	2,079			P
52	Beam Trawl	OPEN	all	NE	all	10	10			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	20,605	20,605			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	3,195	3,195			P
	Other fleets					330	330			
					TOTAL	17,981,186	12,587,830	5,393,356	0.086	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: RED CRAB

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	335,300	0	335,300	0.971	
6	Otter Trawl	OPEN	all	MA	lg	222,747	0	222,747	1.405	
7	Otter Trawl	OPEN	all	NE	sm	750	0	750	1.291	
8	Otter Trawl	OPEN	all	NE	lg	318,214	0	318,214	0.291	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	53	0	53	0.323	
18	Shrimp Trawl	OPEN	all	MA	all	2,584,938	0	2,584,938	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	370	0	370	0.202	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	81	0	81	0.298	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: RED CRAB

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0		
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0		
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	1,400	1,400			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	2,285	2,285			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	2,138,429	2,138,429			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	5,604,567	2,142,114	3,462,453	0.133	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SEA SCALLOP

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	463	0	463	0.792	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	636,337	103,750	532,587	0.512	
6	Otter Trawl	OPEN	all	MA	lg	2,644,970	2,352,490	292,480	0.626	
7	Otter Trawl	OPEN	all	NE	sm	38,121	13,336	24,785	0.583	
8	Otter Trawl	OPEN	all	NE	lg	89,331	44,516	44,816	0.185	
9	Scallop Trawl	AA	GEN	MA	all	234,372	228,875	5,497	0.397	P
10	Scallop Trawl	AA	LIM	MA	all	232,574	232,574			P
11	Scallop Trawl	OPEN	GEN	MA	all	1,143,528	986,233	157,295	0.416	
12	Scallop Trawl	OPEN	LIM	MA	all	81,226	30,946	50,280	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	25	25			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	20	0	20	0.916	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	7	0	7	0.512	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	5,078	392	4,686	0.280	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	106	0	106	0.674	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	489	8	480	0.638	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	149,940	149,940			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	1,732	0	1,732	0.754	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	1,235	0	1,235	0.700	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	476,763	466,205	10,558	0.260	P
31	Scallop Dredge	AA	GEN	NE	all	365,090	256,445	108,645	0.185	
32	Scallop Dredge	AA	LIM	MA	all	24,051,111	23,381,156	669,956	0.244	
33	Scallop Dredge	AA	LIM	NE	all	22,503,246	20,841,843	1,661,403	0.182	
34	Scallop Dredge	OPEN	GEN	MA	all	13,619,011	12,333,798	1,285,213	0.507	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SEA SCALLOP

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	9,997,595	9,592,338	405,257	0.289	
36	Scallop Dredge	OPEN	LIM	MA	all	167,812,239	164,954,002	2,858,237	0.225	
37	Scallop Dredge	OPEN	LIM	NE	all	249,854,484	232,526,675	17,327,809	0.231	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	8	8			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	48,037	48,037			P
52	Beam Trawl	OPEN	all	NE	all	15,785	15,785			P
53	Dredge, Other	OPEN	all	MA	all	360,689	360,689			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	1,034,378	1,034,378			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	538,518	538,518			P
	Other fleets					1,101,543	1,101,543			
					TOTAL	497,038,051	471,594,505	25,443,546	0.162	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SKATE COMPLEX

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	11,879	370	11,509	0.000	P
2	Longline	OPEN	all	NE	all	239,609	10,756	228,853	0.219	
3	Hand Line	OPEN	all	MA	all	8,580	8,580	0		P
4	Hand Line	OPEN	all	NE	all	249	174	75	0.870	
5	Otter Trawl	OPEN	all	MA	sm	4,596,262	229,350	4,366,912	0.263	
6	Otter Trawl	OPEN	all	MA	lg	13,112,884	2,065,203	11,047,681	0.170	
7	Otter Trawl	OPEN	all	NE	sm	1,855,210	269,428	1,585,782	0.282	
8	Otter Trawl	OPEN	all	NE	lg	39,215,287	10,675,996	28,539,292	0.069	
9	Scallop Trawl	AA	GEN	MA	all	2,852	0	2,852	0.330	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	1,209,464	18,955	1,190,509	0.366	
12	Scallop Trawl	OPEN	LIM	MA	all	208,815	0	208,815	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	2,817	2,817			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	166,986	9,678	157,308	0.887	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	34,936	4,230	30,705	0.258	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	2,487,743	114,393	2,373,349	0.121	
18	Shrimp Trawl	OPEN	all	MA	all	57,369	0	57,369	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	851	0	851	0.951	
21	Floating Trap	OPEN	all	NE	all	45	45			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	23,818	23,818	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	104,970	96,077	8,893	0.532	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	4,099,717	2,999,305	1,100,411	0.221	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	8,301	8,301			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	796,287	568,411	227,875	0.087	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	10,763,896	8,028,634	2,735,262	0.089	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	1,273	0	1,273	0.266	P
31	Scallop Dredge	AA	GEN	NE	all	5,563	0	5,563	0.118	
32	Scallop Dredge	AA	LIM	MA	all	780,526	0	780,526	0.181	
33	Scallop Dredge	AA	LIM	NE	all	691,550	0	691,550	0.131	
34	Scallop Dredge	OPEN	GEN	MA	all	871,979	13,814	858,165	0.276	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SKATE COMPLEX

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	837,889	15	837,874	0.312	
36	Scallop Dredge	OPEN	LIM	MA	all	7,701,133	0	7,701,133	0.159	
37	Scallop Dredge	OPEN	LIM	NE	all	11,746,489	0	11,746,489	0.130	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	766	0	766	0.239	
40	Pots and Traps, Fish	OPEN	all	MA	all	16	16			P
41	Pots and Traps, Fish	OPEN	all	NE	all	5,559	5,559			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	29,308	29,308			P
52	Beam Trawl	OPEN	all	NE	all	57	57			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	105	105			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					1,000	1,000			
					TOTAL	101,682,039	25,184,395	76,497,644	0.048	

See supporting text for abbreviations.

Table 4A continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SMALL MESH GROUNDFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	24	24	0		P
2	Longline	OPEN	all	NE	all	9,759	118	9,641	0.141	
3	Hand Line	OPEN	all	MA	all	2,490	2,490	0		P
4	Hand Line	OPEN	all	NE	all	65	65	0		
5	Otter Trawl	OPEN	all	MA	sm	7,744,537	5,828,237	1,916,300	0.311	
6	Otter Trawl	OPEN	all	MA	lg	467,565	252,777	214,788	1.050	
7	Otter Trawl	OPEN	all	NE	sm	13,833,698	10,680,062	3,153,636	0.258	
8	Otter Trawl	OPEN	all	NE	lg	515,781	288,349	227,432	0.071	
9	Scallop Trawl	AA	GEN	MA	all	19	0	19	0.679	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	15,244	4	15,240	0.738	
12	Scallop Trawl	OPEN	LIM	MA	all	186	0	186	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	300	300			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	976	230	746	0.505	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	1	0	1	0.430	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	9,886	2	9,884	0.167	
18	Shrimp Trawl	OPEN	all	MA	all	968,524	0	968,524	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	977,113	27,890	949,223	0.463	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	599	599	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	5	5	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	17	14	3	0.851	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	18,214	8,099	10,115	0.075	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	2,061	1,060	1,001	0.210	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	34	0	34	0.259	P
31	Scallop Dredge	AA	GEN	NE	all	35	0	35	0.352	
32	Scallop Dredge	AA	LIM	MA	all	17,796	0	17,796	0.614	
33	Scallop Dredge	AA	LIM	NE	all	8,312	0	8,312	0.256	
34	Scallop Dredge	OPEN	GEN	MA	all	13,992	3,000	10,992	0.707	

See supporting text for abbreviations.

Table 4A continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SMALL MESH GROUNDFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	4,482	0	4,482	1.460	
36	Scallop Dredge	OPEN	LIM	MA	all	46,981	0	46,981	0.188	
37	Scallop Dredge	OPEN	LIM	NE	all	105,094	0	105,094	0.257	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	10,560	10,373	187	0.383	
40	Pots and Traps, Fish	OPEN	all	MA	all	2,075	2,075			P
41	Pots and Traps, Fish	OPEN	all	NE	all	10,072	10,072			P
42	Pots and Traps, Conch	OPEN	all	MA	all	10	10			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	18,927	18,927			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	5,371	5,371			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					40	40			
					TOTAL	24,810,844	17,140,193	7,670,651	0.147	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SPINY DOGFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	3,343	3,343	0		P
2	Longline	OPEN	all	NE	all	1,247,949	1,087,614	160,335	0.177	
3	Hand Line	OPEN	all	MA	all	8,215	8,215	0		P
4	Hand Line	OPEN	all	NE	all	240,736	199,812	40,924	0.273	
5	Otter Trawl	OPEN	all	MA	sm	4,649,829	612,700	4,037,129	0.237	
6	Otter Trawl	OPEN	all	MA	lg	5,644,030	1,138,666	4,505,364	0.301	
7	Otter Trawl	OPEN	all	NE	sm	2,187,077	397,606	1,789,471	0.430	
8	Otter Trawl	OPEN	all	NE	lg	3,721,470	254,057	3,467,413	0.065	
9	Scallop Trawl	AA	GEN	MA	all	288	0	288	0.340	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	87,810	6,000	81,810	1.117	
12	Scallop Trawl	OPEN	LIM	MA	all	134,327	0	134,327	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	6,000	6,000			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	33,571	0	33,571	0.740	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	215,130	1,250	213,880	0.196	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	31,801	22,850	8,951	1.326	
21	Floating Trap	OPEN	all	NE	all	10	10			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	583,728	509,659	74,069	1.523	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	1,692,147	1,645,948	46,199	0.687	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	210,787	105,258	105,529	0.177	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	4,000	4,000			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	7,390,864	4,448,353	2,942,511	0.060	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	860,585	626,861	233,724	0.101	
28	Purse Seine	OPEN	all	MA	all	1,800	1,800			P
29	Purse Seine	OPEN	all	NE	all	3,445	0	3,445	1.198	
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	10	0	10	0.450	
32	Scallop Dredge	AA	LIM	MA	all	31,468	0	31,468	0.340	
33	Scallop Dredge	AA	LIM	NE	all	22,072	0	22,072	0.187	
34	Scallop Dredge	OPEN	GEN	MA	all	3,520	2,090	1,430	0.528	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SPINY DOGFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	468	0	468	1.538	
36	Scallop Dredge	OPEN	LIM	MA	all	137,627	0	137,627	0.317	
37	Scallop Dredge	OPEN	LIM	NE	all	211,272	0	211,272	0.232	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	2,511	0	2,511	0.190	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	219,300	7,326	211,974	0.300	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	3,045	3,045			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	28,000	28,000			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					54,704	54,704			
					TOTAL	29,672,939	11,175,167	18,497,772	0.101	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SQUID - BUTTERFISH - MACKEREL

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	1,726	1,726	0		P
4	Hand Line	OPEN	all	NE	all	2,761	2,761	0		
5	Otter Trawl	OPEN	all	MA	sm	37,113,836	34,753,341	2,360,495	0.252	
6	Otter Trawl	OPEN	all	MA	lg	673,616	606,919	66,697	1.107	
7	Otter Trawl	OPEN	all	NE	sm	29,464,630	26,060,728	3,403,902	0.246	
8	Otter Trawl	OPEN	all	NE	lg	597,629	548,610	49,019	0.107	
9	Scallop Trawl	AA	GEN	MA	all	10	0	10	0.796	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	2,047	523	1,524	0.552	
12	Scallop Trawl	OPEN	LIM	MA	all	358	358	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	207	207			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	168,500	168,500			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	771	0	771	0.673	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	4,234	2,600	1,634	0.149	
18	Shrimp Trawl	OPEN	all	MA	all	180,853	45,710	135,143	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	73,967	71,250	2,717	0.467	
21	Floating Trap	OPEN	all	NE	all	31,125	31,125			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	14,486	14,373	113	0.606	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	389	389	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	3,040	2,544	496	0.505	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	3,534	1,485	2,049	0.167	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	552	401	151	0.465	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	2	0	2	1.193	
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	7,713	7,208	505	0.245	
33	Scallop Dredge	AA	LIM	NE	all	609	0	609	0.274	
34	Scallop Dredge	OPEN	GEN	MA	all	2,251	2,002	249	0.691	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SQUID - BUTTERFISH - MACKEREL

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	831	0	831	0.929	
36	Scallop Dredge	OPEN	LIM	MA	all	27,450	21,152	6,298	0.277	
37	Scallop Dredge	OPEN	LIM	NE	all	2,118	0	2,118	0.452	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	47,147	47,132	15	1.086	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	412,600	402,323	10,277	0.615	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	457	457			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	79,500	79,500			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					4,512	4,512			
					TOTAL	68,923,460	62,877,836	6,045,624	0.170	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SURFCLAM - OCEAN QUAHOG

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	5,321	0	5,321	0.679	
6	Otter Trawl	OPEN	all	MA	lg	37,222	0	37,222	0.978	
7	Otter Trawl	OPEN	all	NE	sm	0	0	0		
8	Otter Trawl	OPEN	all	NE	lg	1,269	0	1,269	0.559	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	780	0	780	0.807	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	19	0	19	0.519	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	3	0	3	0.957	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	20	0	20	1.062	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	1,224	0	1,224	0.619	
33	Scallop Dredge	AA	LIM	NE	all	824	0	824	0.374	
34	Scallop Dredge	OPEN	GEN	MA	all	65,957	65,563	394	1.291	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: SURFCLAM - OCEAN QUAHOG

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	179,802	179,802	0		
36	Scallop Dredge	OPEN	LIM	MA	all	7,490	0	7,490	0.785	
37	Scallop Dredge	OPEN	LIM	NE	all	1,585	0	1,585	0.666	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	39,908	39,908			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	148,223,092	148,223,092			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	96,871,763	96,871,763			P
	Other fleets					0	0			
					TOTAL	245,436,279	245,380,128	56,151	0.661	

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: TILEFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	1,758,696	1,758,696	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	1,711	1,711	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	11,585	9,376	2,209	0.472	
6	Otter Trawl	OPEN	all	MA	lg	3,605	2,697	908	1.048	
7	Otter Trawl	OPEN	all	NE	sm	14,806	11,833	2,973	0.487	
8	Otter Trawl	OPEN	all	NE	lg	8,401	8,103	298	0.920	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	65	65			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	15	0	15	0.767	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	29	29	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	75	75	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	10	10	0		
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	8,440	4,439	4,001	0.247	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4A, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for 14 fish and invertebrate species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species Group: TILEFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0		
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0		
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	2	2			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	175	175			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	104	104			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					78	78			
					TOTAL	1,807,798	1,797,393	10,405	0.218	

See supporting text for abbreviations.

Table 4B. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.
Species: BLACK SEA BASS

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	191	191	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	61,809	61,809	0		P
4	Hand Line	OPEN	all	NE	all	5,648	5,648	0		
5	Otter Trawl	OPEN	all	MA	sm	380,791	235,020	145,771	0.339	
6	Otter Trawl	OPEN	all	MA	lg	505,296	323,019	182,277	0.851	
7	Otter Trawl	OPEN	all	NE	sm	118,824	48,673	70,151	0.612	
8	Otter Trawl	OPEN	all	NE	lg	40,329	33,310	7,019	0.255	
9	Scallop Trawl	AA	GEN	MA	all	941	0	941	0.340	P
10	Scallop Trawl	AA	LIM	MA	all	333	333			P
11	Scallop Trawl	OPEN	GEN	MA	all	781	17	764	1.191	
12	Scallop Trawl	OPEN	LIM	MA	all	1,750	1,750	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	5	5			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	13	0	13	0.576	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	640	640	0		
21	Floating Trap	OPEN	all	NE	all	815	815			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	26	26	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	813	813	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	661	661	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	140	140			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	5,001	4,990	11	0.502	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	853	850	3	0.798	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	859	0	859	0.391	
33	Scallop Dredge	AA	LIM	NE	all	1,052	0	1,052	0.294	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.
Species: BLACK SEA BASS

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
34	Scallop Dredge	OPEN	GEN	MA	all	1,418	123	1,295	0.585	
35	Scallop Dredge	OPEN	GEN	NE	all	142	0	142	0.693	
36	Scallop Dredge	OPEN	LIM	MA	all	8,249	53	8,196	0.337	
37	Scallop Dredge	OPEN	LIM	NE	all	12,752	15	12,737	0.346	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	572	0	572	1.103	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	6	0	6	0.543	
40	Pots and Traps, Fish	OPEN	all	MA	all	355,259	355,259			P
41	Pots and Traps, Fish	OPEN	all	NE	all	50,413	50,413			P
42	Pots and Traps, Conch	OPEN	all	MA	all	145	145			P
43	Pots and Traps, Conch	OPEN	all	NE	all	310	310			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	53	53			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	27,871	27,871			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	8,543	8,543			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	575	575			P
51	Beam Trawl	OPEN	all	MA	all	1,538	1,538			P
52	Beam Trawl	OPEN	all	NE	all	37	37			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					1,896	1,896			
					TOTAL	1,597,349	1,165,541	431,808	0.390	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: FLUKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	9,395	9,395	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	111,878	111,878	0		P
4	Hand Line	OPEN	all	NE	all	19,590	19,590	0		
5	Otter Trawl	OPEN	all	MA	sm	1,075,637	614,546	461,091	0.248	
6	Otter Trawl	OPEN	all	MA	lg	11,221,557	10,607,722	613,835	0.215	
7	Otter Trawl	OPEN	all	NE	sm	808,359	687,410	120,949	0.261	
8	Otter Trawl	OPEN	all	NE	lg	2,619,318	2,044,953	574,365	0.128	
9	Scallop Trawl	AA	GEN	MA	all	1,224	1,000	224	0.329	P
10	Scallop Trawl	AA	LIM	MA	all	19,150	19,150			P
11	Scallop Trawl	OPEN	GEN	MA	all	75,621	52,954	22,667	0.550	
12	Scallop Trawl	OPEN	LIM	MA	all	45,725	44,421	1,304	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	1,860	1,860			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	669	318	351	0.470	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	445	429	16	0.537	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	17,559	730	16,829	0.302	
18	Shrimp Trawl	OPEN	all	MA	all	2,455	2,455	0		P
19	Shrimp Trawl	OPEN	all	NE	all	1,000	1,000	0		
21	Floating Trap	OPEN	all	NE	all	1,566	1,566			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	1,048	281	767	0.581	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	14,992	14,308	684	0.729	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	35,252	24,940	10,312	0.346	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	31,469	29,119	2,350	0.365	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	134,367	34,364	100,003	0.140	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	334	334	0		P
31	Scallop Dredge	AA	GEN	NE	all	69	0	69	0.396	
32	Scallop Dredge	AA	LIM	MA	all	103,527	8,667	94,860	0.228	
33	Scallop Dredge	AA	LIM	NE	all	91,922	0	91,922	0.159	
34	Scallop Dredge	OPEN	GEN	MA	all	102,937	10,171	92,766	0.758	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: FLUKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	14,161	0	14,161	0.636	
36	Scallop Dredge	OPEN	LIM	MA	all	522,589	29,106	493,483	0.197	
37	Scallop Dredge	OPEN	LIM	NE	all	825,075	170	824,905	0.259	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	3	0	3	0.788	
40	Pots and Traps, Fish	OPEN	all	MA	all	410	410			P
41	Pots and Traps, Fish	OPEN	all	NE	all	1,680	1,680			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	41	41			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	87	87			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	44,035	44,035			P
52	Beam Trawl	OPEN	all	NE	all	21,254	21,254			P
53	Dredge, Other	OPEN	all	MA	all	90	90			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	271	271			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					5,658	5,658			
					TOTAL	17,984,280	14,446,363	3,537,917	0.088	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: SCUP

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	100,501	100,501	0		P
4	Hand Line	OPEN	all	NE	all	15,653	15,653	0		
5	Otter Trawl	OPEN	all	MA	sm	3,414,343	2,932,309	482,034	0.461	
6	Otter Trawl	OPEN	all	MA	lg	2,416,833	2,171,324	245,509	0.466	
7	Otter Trawl	OPEN	all	NE	sm	2,365,062	1,724,063	640,999	0.282	
8	Otter Trawl	OPEN	all	NE	lg	1,425,322	1,380,931	44,391	0.430	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0	0.340	P
10	Scallop Trawl	AA	LIM	MA	all	100	100			P
11	Scallop Trawl	OPEN	GEN	MA	all	1,655	1,362	293	1.091	
12	Scallop Trawl	OPEN	LIM	MA	all	50	50	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	1	1			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	0	0	0		
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	8,485	8,095	390	0.185	
21	Floating Trap	OPEN	all	NE	all	145,434	145,434			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	1,691	1,691	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	1,126	1,126	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	191	166	25	0.851	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	485	485			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	33,937	33,932	5	0.736	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	2,578	2,578	0		
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	107	0	107	0.710	
33	Scallop Dredge	AA	LIM	NE	all	112	0	112	0.681	
34	Scallop Dredge	OPEN	GEN	MA	all	20,070	20,000	70	0.593	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: SCUP

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	509	2	507	0.521	
37	Scallop Dredge	OPEN	LIM	NE	all	1,157	0	1,157	0.478	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	6,905	0	6,905	1.103	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	7	0	7	0.543	
40	Pots and Traps, Fish	OPEN	all	MA	all	16,399	16,399			P
41	Pots and Traps, Fish	OPEN	all	NE	all	259,268	259,268			P
42	Pots and Traps, Conch	OPEN	all	MA	all	38	38			P
43	Pots and Traps, Conch	OPEN	all	NE	all	20	20			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	738	738			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	6,678	6,678			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	7,012	7,012			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	263	263			P
51	Beam Trawl	OPEN	all	MA	all	685	685			P
52	Beam Trawl	OPEN	all	NE	all	3,821	3,821			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					48,335	48,335			
					TOTAL	10,305,570	8,883,060	1,422,510	0.217	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: AMERICAN PLAICE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	237	196	41	0.269	
3	Hand Line	OPEN	all	MA	all	54	54	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	759	0	759	0.946	
6	Otter Trawl	OPEN	all	MA	lg	1,903	1,865	38	0.928	
7	Otter Trawl	OPEN	all	NE	sm	77,687	1,797	75,890	0.499	
8	Otter Trawl	OPEN	all	NE	lg	3,117,034	2,759,681	357,353	0.053	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	2,938	2,650	288	0.977	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	35,623	28,122	7,501	0.163	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	139,623	25	139,598	0.601	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	28	28	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	200	200	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	5	5			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	19,787	12,879	6,908	0.080	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	3,347	2,964	383	0.241	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	4	0	4	0.616	
32	Scallop Dredge	AA	LIM	MA	all	66	0	66	0.597	
33	Scallop Dredge	AA	LIM	NE	all	12	0	12	0.569	
34	Scallop Dredge	OPEN	GEN	MA	all	32	0	32	0.793	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: AMERICAN PLAICE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	769	0	769	0.740	
36	Scallop Dredge	OPEN	LIM	MA	all	614	0	614	0.894	
37	Scallop Dredge	OPEN	LIM	NE	all	1,115	0	1,115	0.613	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	12	0	12	0.398	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	38	38			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	3,401,888	2,810,504	591,384	0.159	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC COD

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	196,737	11,574	185,163	0.000	P
2	Longline	OPEN	all	NE	all	437,927	391,663	46,264	0.165	
3	Hand Line	OPEN	all	MA	all	28,704	7,470	21,234	0.000	P
4	Hand Line	OPEN	all	NE	all	102,810	92,254	10,556	0.286	
5	Otter Trawl	OPEN	all	MA	sm	1,776	851	925	0.511	
6	Otter Trawl	OPEN	all	MA	lg	60,433	46,610	13,823	0.766	
7	Otter Trawl	OPEN	all	NE	sm	14,449	6,656	7,793	0.428	
8	Otter Trawl	OPEN	all	NE	lg	8,465,309	8,143,083	322,226	0.078	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	785	0	785	1.663	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	35	35			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	23,028	22,007	1,021	0.835	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	8,323	7,927	396	0.562	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	345,605	327,015	18,590	0.145	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	130	130	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	3,047	1,213	1,834	2.070	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	21	21	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	558	122	436	0.371	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	2,911	2,911			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	3,052,849	2,958,863	93,986	0.115	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	298,276	279,153	19,123	0.127	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	105	0	105	0.873	
33	Scallop Dredge	AA	LIM	NE	all	335	0	335	0.359	
34	Scallop Dredge	OPEN	GEN	MA	all	741	0	741	0.588	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC COD

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	444	25	419	0.924	
37	Scallop Dredge	OPEN	LIM	NE	all	6,771	70	6,701	0.197	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	2,788	651	2,137	0.339	
40	Pots and Traps, Fish	OPEN	all	MA	all	3,905	3,905			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	255	255			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	1,525	1,525			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	17	17			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					80	80			
					TOTAL	13,060,680	12,306,086	754,594	0.041	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC HALIBUT

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	1,872	808	1,064	0.521	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	488	488	0		
5	Otter Trawl	OPEN	all	MA	sm	0	0	0		
6	Otter Trawl	OPEN	all	MA	lg	30	30	0		
7	Otter Trawl	OPEN	all	NE	sm	100	0	100	0.793	
8	Otter Trawl	OPEN	all	NE	lg	37,614	7,103	30,511	0.073	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	109	0	109	0.640	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	2,395	659	1,736	0.194	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	57	0	57	1.053	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	97	97	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	5,263	982	4,281	0.152	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	15,488	1,106	14,382	0.568	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC HALIBUT

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	49	0	49	0.914	
37	Scallop Dredge	OPEN	LIM	NE	all	308	0	308	0.772	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	57	57			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	63,927	11,330	52,597	0.162	

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC WOLFFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	1,777	4	1,773	0.202	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	204	0	204	1.031	
5	Otter Trawl	OPEN	all	MA	sm	0	0	0		
6	Otter Trawl	OPEN	all	MA	lg	0	0	0		
7	Otter Trawl	OPEN	all	NE	sm	0	0	0		
8	Otter Trawl	OPEN	all	NE	lg	52,322	409	51,913	0.092	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	1,154	0	1,154	0.407	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	7,243	8	7,235	0.118	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	1,749	0	1,749	0.236	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC WOLFFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0		
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0		
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	64,449	421	64,028	0.077	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: HADDOCK

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	544,171	531,968	12,203	0.308	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	1,308	1,308	0		
5	Otter Trawl	OPEN	all	MA	sm	44,636	0	44,636	0.448	
6	Otter Trawl	OPEN	all	MA	lg	13	0	13	1.217	
7	Otter Trawl	OPEN	all	NE	sm	41,388	2,861	38,527	0.358	
8	Otter Trawl	OPEN	all	NE	lg	8,212,882	8,169,761	43,121	0.131	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	926,280	923,883	2,397	0.358	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	4,951,997	4,927,034	24,963	0.137	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	3,794	0	3,794	0.403	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	2,724	2,724	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	128,876	124,405	4,471	0.126	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	3,983	3,440	543	0.250	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	10	0	10	0.941	
33	Scallop Dredge	AA	LIM	NE	all	923	0	923	0.777	
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: HADDOCK

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	122	0	122	0.889	
37	Scallop Dredge	OPEN	LIM	NE	all	1,564	0	1,564	0.582	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	56,231	54,916	1,315	0.313	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	459	459			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					7,089	7,089			
					TOTAL	14,928,450	14,749,848	178,602	0.143	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: OCEAN POUT

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	11,848	0	11,848	0.000	P
2	Longline	OPEN	all	NE	all	3,735	10	3,725	0.264	
3	Hand Line	OPEN	all	MA	all	166	166	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	30,880	0	30,880	0.705	
6	Otter Trawl	OPEN	all	MA	lg	44,303	0	44,303	0.514	
7	Otter Trawl	OPEN	all	NE	sm	20,426	150	20,276	0.389	
8	Otter Trawl	OPEN	all	NE	lg	87,384	60	87,324	0.087	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	8,671	0	8,671	1.524	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	121	0	121	0.810	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	70	0	70	0.385	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	5,106	0	5,106	0.307	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	6	6	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	406	0	406	0.189	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	204	0	204	0.501	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	14	0	14	0.343	
32	Scallop Dredge	AA	LIM	MA	all	220	0	220	0.590	
33	Scallop Dredge	AA	LIM	NE	all	536	0	536	0.251	
34	Scallop Dredge	OPEN	GEN	MA	all	406	0	406	0.588	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: OCEAN POUT

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	1,508	0	1,508	0.406	
37	Scallop Dredge	OPEN	LIM	NE	all	7,771	0	7,771	0.263	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	11	0	11	0.790	
40	Pots and Traps, Fish	OPEN	all	MA	all	249	249			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	400	400			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	224,443	1,041	223,402	0.161	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: POLLOCK

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	4,832	4,723	109	0.345	
3	Hand Line	OPEN	all	MA	all	400	400	0		P
4	Hand Line	OPEN	all	NE	all	30,273	30,208	65	0.728	
5	Otter Trawl	OPEN	all	MA	sm	20	0	20	0.736	
6	Otter Trawl	OPEN	all	MA	lg	0	0	0		
7	Otter Trawl	OPEN	all	NE	sm	4,085	3,841	244	0.478	
8	Otter Trawl	OPEN	all	NE	lg	7,312,322	7,253,773	58,549	0.151	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	11,936	11,878	58	0.641	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	437,126	430,624	6,502	0.329	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	1,134	0	1,134	0.417	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	20	20	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	24	24	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	15	15			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	3,570,387	3,441,229	129,158	0.125	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	234,819	226,030	8,789	0.216	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: POLLOCK

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0		
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0		
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	1,573	370	1,203	0.391	
40	Pots and Traps, Fish	OPEN	all	MA	all	39	39			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	11,609,006	11,403,174	205,832	0.091	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: REDFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	2,875	2,733	142	0.347	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	119	82	37	0.942	
5	Otter Trawl	OPEN	all	MA	sm	4,392	10	4,382	0.571	
6	Otter Trawl	OPEN	all	MA	lg	0	0	0		
7	Otter Trawl	OPEN	all	NE	sm	37,985	35,080	2,905	0.456	
8	Otter Trawl	OPEN	all	NE	lg	4,011,074	3,754,576	256,498	0.109	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	66,090	66,090	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	202,042	170,136	31,906	0.409	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	28,484	0	28,484	0.459	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	45	45	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	132,822	125,494	7,328	0.177	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	3,766	3,687	79	0.328	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	0	0	0		
33	Scallop Dredge	AA	LIM	NE	all	0	0	0		
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: REDFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0		
37	Scallop Dredge	OPEN	LIM	NE	all	4	0	4	1.037	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	542	50	492	0.717	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	4,490,241	4,157,983	332,258	0.101	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WHITE HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	12,082	9,890	2,192	0.232	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	82	82	0		
5	Otter Trawl	OPEN	all	MA	sm	2,394	1,040	1,354	0.938	
6	Otter Trawl	OPEN	all	MA	lg	1,736	1,187	549	0.707	
7	Otter Trawl	OPEN	all	NE	sm	64,314	55,925	8,389	1.105	
8	Otter Trawl	OPEN	all	NE	lg	2,582,062	2,538,816	43,246	0.149	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	3,437	3,433	4	0.690	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	61,251	59,845	1,406	0.200	
18	Shrimp Trawl	OPEN	all	MA	all	268	268	0		P
19	Shrimp Trawl	OPEN	all	NE	all	90	90	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	454,197	430,826	23,371	0.175	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	45,319	43,389	1,930	0.254	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	44	0	44	0.364	P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	100	0	100	0.585	
33	Scallop Dredge	AA	LIM	NE	all	175	0	175	0.442	
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WHITE HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	3,212	0	3,212	1.448	
37	Scallop Dredge	OPEN	LIM	NE	all	2,771	10	2,761	0.495	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	3,150	3,150			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	196	196			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	3,236,880	3,148,147	88,733	0.147	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WINDOWPANE FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	32	24	8	1.120	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	195,393	9,101	186,292	0.318	
6	Otter Trawl	OPEN	all	MA	lg	506,347	37,040	469,307	0.220	
7	Otter Trawl	OPEN	all	NE	sm	17,689	0	17,689	0.292	
8	Otter Trawl	OPEN	all	NE	lg	413,469	276	413,193	0.098	
9	Scallop Trawl	AA	GEN	MA	all	19	0	19	0.846	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	22,776	0	22,776	0.972	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	2,052	0	2,052	0.991	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	2,127	0	2,127	0.239	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	21,033	0	21,033	0.156	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	6,241	0	6,241	0.686	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	227	133	94	0.679	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	663	208	455	0.490	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	663	620	43	0.816	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	1,844	150	1,694	0.168	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	240	0	240	0.354	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	8	0	8	0.136	P
31	Scallop Dredge	AA	GEN	NE	all	157	0	157	0.315	
32	Scallop Dredge	AA	LIM	MA	all	12,751	0	12,751	0.363	
33	Scallop Dredge	AA	LIM	NE	all	7,995	0	7,995	0.208	
34	Scallop Dredge	OPEN	GEN	MA	all	35,073	0	35,073	0.414	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WINDOWPANE FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	24,210	0	24,210	0.761	
36	Scallop Dredge	OPEN	LIM	MA	all	124,924	0	124,924	0.239	
37	Scallop Dredge	OPEN	LIM	NE	all	279,310	0	279,310	0.199	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	1	0	1	0.857	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	13	0	13	0.429	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	7	7			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	1,675,265	47,559	1,627,706	0.089	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WINTER FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	3,242	3,119	123	0.444	
3	Hand Line	OPEN	all	MA	all	60	60	0		P
4	Hand Line	OPEN	all	NE	all	8	8	0		
5	Otter Trawl	OPEN	all	MA	sm	297,988	2,898	295,090	0.492	
6	Otter Trawl	OPEN	all	MA	lg	196,769	12,313	184,456	0.304	
7	Otter Trawl	OPEN	all	NE	sm	157,589	7,615	149,974	0.318	
8	Otter Trawl	OPEN	all	NE	lg	3,581,933	3,382,764	199,169	0.081	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	16,887	0	16,887	0.667	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	6,145	6,126	19	0.871	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	471	0	471	0.204	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	151,325	144,179	7,146	0.450	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	11,337	0	11,337	0.557	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	50	50	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	168	168	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	59,219	50,336	8,883	0.111	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	4,914	3,062	1,852	0.660	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	257	0	257	0.437	
32	Scallop Dredge	AA	LIM	MA	all	1,558	20	1,538	0.337	
33	Scallop Dredge	AA	LIM	NE	all	12,323	0	12,323	0.224	
34	Scallop Dredge	OPEN	GEN	MA	all	2,768	0	2,768	0.642	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WINTER FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	11,293	7	11,286	0.516	
36	Scallop Dredge	OPEN	LIM	MA	all	15,430	0	15,430	0.283	
37	Scallop Dredge	OPEN	LIM	NE	all	323,989	1,192	322,797	0.179	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	35	0	35	0.429	
40	Pots and Traps, Fish	OPEN	all	MA	all	10	10			P
41	Pots and Traps, Fish	OPEN	all	NE	all	245	245			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	1	1			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	24	24			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	1,810	1,810			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					40	40			
					TOTAL	4,857,891	3,616,047	1,241,844	0.140	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WITCH FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	212,170	25	212,145	0.426	
6	Otter Trawl	OPEN	all	MA	lg	31,671	908	30,763	1.047	
7	Otter Trawl	OPEN	all	NE	sm	27,589	4,034	23,555	0.416	
8	Otter Trawl	OPEN	all	NE	lg	1,559,952	1,436,420	123,532	0.062	
9	Scallop Trawl	AA	GEN	MA	all	29	0	29	0.340	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	50	0	50	1.890	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	652	606	46	0.618	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	26,710	23,325	3,385	0.267	
18	Shrimp Trawl	OPEN	all	MA	all	794,958	0	794,958	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	15,297	50	15,247	0.508	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	3	3	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	9,059	8,294	765	0.103	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	26,122	25,963	159	0.270	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	8	0	8	0.136	P
31	Scallop Dredge	AA	GEN	NE	all	4	0	4	0.917	
32	Scallop Dredge	AA	LIM	MA	all	1,108	0	1,108	0.494	
33	Scallop Dredge	AA	LIM	NE	all	974	0	974	0.407	
34	Scallop Dredge	OPEN	GEN	MA	all	376	0	376	0.674	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: WITCH FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	321	0	321	0.736	
36	Scallop Dredge	OPEN	LIM	MA	all	7,933	0	7,933	0.313	
37	Scallop Dredge	OPEN	LIM	NE	all	11,895	0	11,895	0.306	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	7	0	7	0.386	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	15	15			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					4	4			
					TOTAL	2,726,908	1,499,647	1,227,261	0.079	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: YELLOWTAIL FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	49	49	0		P
2	Longline	OPEN	all	NE	all	1,191	1,157	34	0.594	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	0	0	0		
5	Otter Trawl	OPEN	all	MA	sm	47,559	0	47,559	0.694	
6	Otter Trawl	OPEN	all	MA	lg	94,061	57,778	36,283	0.645	
7	Otter Trawl	OPEN	all	NE	sm	55,455	398	55,057	0.312	
8	Otter Trawl	OPEN	all	NE	lg	2,658,403	2,430,553	227,850	0.088	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	20,550	0	20,550	0.619	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	125	125			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	23,581	22,949	632	0.837	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	3,127	2,569	558	0.295	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	120,468	96,280	24,188	0.170	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	995	0	995	0.996	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	64	64	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	59	19	40	0.763	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	242,257	223,023	19,234	0.099	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	17,574	16,633	941	0.346	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	172	0	172	0.215	
32	Scallop Dredge	AA	LIM	MA	all	2,383	343	2,040	0.483	
33	Scallop Dredge	AA	LIM	NE	all	6,049	892	5,157	0.272	
34	Scallop Dredge	OPEN	GEN	MA	all	4,009	20	3,989	0.269	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: YELLOWTAIL FLOUNDER

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	34,761	16	34,745	0.824	
36	Scallop Dredge	OPEN	LIM	MA	all	62,334	827	61,507	0.332	
37	Scallop Dredge	OPEN	LIM	NE	all	211,889	4,129	207,760	0.207	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	4	0	4	0.559	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	5	5			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	1,767	1,767			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					330	330			
					TOTAL	3,609,221	2,859,926	749,295	0.100	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: OFFSHORE HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	24	24	0		P
2	Longline	OPEN	all	NE	all	5	0	5	0.894	
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	45	45	0		
5	Otter Trawl	OPEN	all	MA	sm	32,878	31,816	1,062	0.483	
6	Otter Trawl	OPEN	all	MA	lg	11,256	1,243	10,013	1.405	
7	Otter Trawl	OPEN	all	NE	sm	157,526	151,547	5,979	0.467	
8	Otter Trawl	OPEN	all	NE	lg	3,756	1,367	2,389	0.372	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0		
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	16	0	16	0.639	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	6	6	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	39	5	34	0.413	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	0	0	0		
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	26	0	26	0.703	
33	Scallop Dredge	AA	LIM	NE	all	59	0	59	0.581	
34	Scallop Dredge	OPEN	GEN	MA	all	64	0	64	0.841	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: OFFSHORE HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	3,925	0	3,925	0.909	
37	Scallop Dredge	OPEN	LIM	NE	all	777	0	777	0.926	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0		
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	210,403	186,053	24,350	0.609	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: RED HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	9,615	12	9,603	0.140	
3	Hand Line	OPEN	all	MA	all	2,485	2,485	0		P
4	Hand Line	OPEN	all	NE	all	13	13	0		
5	Otter Trawl	OPEN	all	MA	sm	1,417,845	571,479	846,366	0.342	
6	Otter Trawl	OPEN	all	MA	lg	48,114	31,927	16,187	0.946	
7	Otter Trawl	OPEN	all	NE	sm	1,820,131	684,643	1,135,488	0.278	
8	Otter Trawl	OPEN	all	NE	lg	119,777	32,815	86,962	0.084	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0	0.340	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	2,195	0	2,195	0.600	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	142	0	142	0.244	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	5,112	0	5,112	0.215	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	36,715	1,300	35,415	0.333	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	350	350	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	5	2	3	0.851	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	3,152	988	2,164	0.079	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	386	245	141	0.328	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	8	0	8	0.381	
32	Scallop Dredge	AA	LIM	MA	all	16,871	0	16,871	0.643	
33	Scallop Dredge	AA	LIM	NE	all	6,212	0	6,212	0.331	
34	Scallop Dredge	OPEN	GEN	MA	all	3,361	0	3,361	0.610	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: RED HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	4,262	0	4,262	1.538	
36	Scallop Dredge	OPEN	LIM	MA	all	25,392	0	25,392	0.232	
37	Scallop Dredge	OPEN	LIM	NE	all	59,591	0	59,591	0.376	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	13	0	13	0.539	
40	Pots and Traps, Fish	OPEN	all	MA	all	2,018	2,018			P
41	Pots and Traps, Fish	OPEN	all	NE	all	72	72			P
42	Pots and Traps, Conch	OPEN	all	MA	all	10	10			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	18,927	18,927			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	5,371	5,371			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	3,608,145	1,352,657	2,255,488	0.191	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: SILVER HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	139	106	33	0.516	
3	Hand Line	OPEN	all	MA	all	5	5	0		P
4	Hand Line	OPEN	all	NE	all	7	7	0		
5	Otter Trawl	OPEN	all	MA	sm	6,293,813	5,224,942	1,068,871	0.329	
6	Otter Trawl	OPEN	all	MA	lg	408,196	219,607	188,589	1.043	
7	Otter Trawl	OPEN	all	NE	sm	11,856,041	9,843,872	2,012,169	0.271	
8	Otter Trawl	OPEN	all	NE	lg	392,247	254,167	138,080	0.084	
9	Scallop Trawl	AA	GEN	MA	all	19	0	19	0.684	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	13,049	4	13,045	0.776	
12	Scallop Trawl	OPEN	LIM	MA	all	186	0	186	0.000	P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	300	300			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	834	230	604	0.594	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	1	0	1	0.430	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	4,758	2	4,756	0.153	
18	Shrimp Trawl	OPEN	all	MA	all	968,524	0	968,524	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	940,398	26,590	913,808	0.469	
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	243	243	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	5	5	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	12	12	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	15,023	7,106	7,917	0.088	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	1,674	815	859	0.231	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	34	0	34	0.259	P
31	Scallop Dredge	AA	GEN	NE	all	27	0	27	0.459	
32	Scallop Dredge	AA	LIM	MA	all	899	0	899	0.241	
33	Scallop Dredge	AA	LIM	NE	all	2,041	0	2,041	0.205	
34	Scallop Dredge	OPEN	GEN	MA	all	10,568	3,000	7,568	0.760	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: SILVER HAKE

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	220	0	220	0.563	
36	Scallop Dredge	OPEN	LIM	MA	all	17,664	0	17,664	0.271	
37	Scallop Dredge	OPEN	LIM	NE	all	44,725	0	44,725	0.217	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	10,548	10,373	175	0.409	
40	Pots and Traps, Fish	OPEN	all	MA	all	57	57			P
41	Pots and Traps, Fish	OPEN	all	NE	all	10,000	10,000			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					40	40			
					TOTAL	20,992,296	15,601,483	5,390,813	0.149	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011 Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC MACKEREL

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	1,462	1,462	0		P
4	Hand Line	OPEN	all	NE	all	1,822	1,822	0		
5	Otter Trawl	OPEN	all	MA	sm	410,346	382,736	27,610	0.448	
6	Otter Trawl	OPEN	all	MA	lg	11,447	7,996	3,451	1.159	
7	Otter Trawl	OPEN	all	NE	sm	308,257	228,221	80,036	0.415	
8	Otter Trawl	OPEN	all	NE	lg	3,049	1,893	1,156	0.234	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0		
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	337	0	337	0.647	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	37	0	37	0.461	
18	Shrimp Trawl	OPEN	all	MA	all	0	0	0		P
19	Shrimp Trawl	OPEN	all	NE	all	638	25	613	0.646	
21	Floating Trap	OPEN	all	NE	all	29,357	29,357			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	5,241	5,241	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	279	279	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	2,913	2,432	481	0.520	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	3,418	1,438	1,980	0.172	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	476	401	75	0.331	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	2	0	2	0.933	
33	Scallop Dredge	AA	LIM	NE	all	22	0	22	0.497	
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011 Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ATLANTIC MACKEREL

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	26	0	26	0.703	
37	Scallop Dredge	OPEN	LIM	NE	all	1	0	1	1.030	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	47,132	47,132	0	1.103	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	412,191	402,103	10,088	0.626	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	1,238,454	1,112,538	125,916	0.288	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011 Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: BUTTERFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	251	251	0		P
4	Hand Line	OPEN	all	NE	all	2	2	0		
5	Otter Trawl	OPEN	all	MA	sm	1,495,697	482,965	1,012,732	0.289	
6	Otter Trawl	OPEN	all	MA	lg	107,474	59,016	48,458	1.277	
7	Otter Trawl	OPEN	all	NE	sm	2,566,142	630,111	1,936,031	0.246	
8	Otter Trawl	OPEN	all	NE	lg	104,096	100,830	3,266	0.142	
9	Scallop Trawl	AA	GEN	MA	all	0	0	0		P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	1,451	3	1,448	0.581	
12	Scallop Trawl	OPEN	LIM	MA	all	19	19	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	0	0			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	4	0	4	0.651	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	126	0	126	0.315	
18	Shrimp Trawl	OPEN	all	MA	all	1,074	1,074	0		P
19	Shrimp Trawl	OPEN	all	NE	all	2,492	1,050	1,442	0.513	
21	Floating Trap	OPEN	all	NE	all	1,208	1,208			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	9,245	9,132	113	0.606	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	110	110	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	127	112	15	0.855	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	109	47	62	0.631	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	76	0	76	0.865	
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	2	0	2	1.193	
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	53	8	45	0.737	
33	Scallop Dredge	AA	LIM	NE	all	153	0	153	0.771	
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011 Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: BUTTERFISH

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	71	0	71	0.522	
37	Scallop Dredge	OPEN	LIM	NE	all	157	0	157	0.594	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	15	0	15	1.103	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	278	220	58	0.440	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	90	90			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	3,670	3,670			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					89	89			
					TOTAL	4,294,282	1,290,007	3,004,275	0.187	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ILLEX SQUID

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	0	0	0		P
4	Hand Line	OPEN	all	NE	all	1	1	0		
5	Otter Trawl	OPEN	all	MA	sm	26,362,878	25,134,844	1,228,034	0.296	
6	Otter Trawl	OPEN	all	MA	lg	4,270	748	3,522	1.405	
7	Otter Trawl	OPEN	all	NE	sm	14,578,134	13,487,820	1,090,314	0.331	
8	Otter Trawl	OPEN	all	NE	lg	265,418	225,381	40,037	0.126	
9	Scallop Trawl	AA	GEN	MA	all	7	0	7	0.809	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	9	0	9	0.756	
12	Scallop Trawl	OPEN	LIM	MA	all	0	0	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	0	0			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	166,500	166,500			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	406	0	406	0.712	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	1,220	0	1,220	0.184	
18	Shrimp Trawl	OPEN	all	MA	all	160,143	25,000	135,143	0.000	P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0		
21	Floating Trap	OPEN	all	NE	all	0	0			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	6	0	6	0.635	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	0	0	0		
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	37	0	37	0.407	
33	Scallop Dredge	AA	LIM	NE	all	24	0	24	0.477	
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0		

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.

Species: ILLEX SQUID

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	831	0	831	0.929	
36	Scallop Dredge	OPEN	LIM	MA	all	1,114	0	1,114	0.562	
37	Scallop Dredge	OPEN	LIM	NE	all	1,000	0	1,000	0.903	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	122	0	122	0.340	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	0	0			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	0	0			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					0	0			
					TOTAL	41,542,119	39,040,294	2,501,825	0.205	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.
Species: LOLIGO SQUID

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
1	Longline	OPEN	all	MA	all	0	0	0		P
2	Longline	OPEN	all	NE	all	0	0	0		
3	Hand Line	OPEN	all	MA	all	13	13	0		P
4	Hand Line	OPEN	all	NE	all	936	936	0		
5	Otter Trawl	OPEN	all	MA	sm	8,844,914	8,752,796	92,118	0.421	
6	Otter Trawl	OPEN	all	MA	lg	550,178	538,919	11,259	0.634	
7	Otter Trawl	OPEN	all	NE	sm	11,980,896	11,714,576	266,320	0.316	
8	Otter Trawl	OPEN	all	NE	lg	224,990	220,500	4,490	0.231	
9	Scallop Trawl	AA	GEN	MA	all	3	0	3	0.772	P
10	Scallop Trawl	AA	LIM	MA	all	0	0			P
11	Scallop Trawl	OPEN	GEN	MA	all	587	520	67	0.792	
12	Scallop Trawl	OPEN	LIM	MA	all	339	339	0		P
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	207	207			P
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	2,000	2,000			P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	24	0	24	0.486	
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0		
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	2,850	2,600	250	0.227	
18	Shrimp Trawl	OPEN	all	MA	all	19,636	19,636	0		P
19	Shrimp Trawl	OPEN	all	NE	all	70,837	70,175	662	0.257	
21	Floating Trap	OPEN	all	NE	all	560	560			P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0		
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0		
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0		
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	0	0			P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	1	0	1	0.958	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	0	0	0		
28	Purse Seine	OPEN	all	MA	all	0	0			P
29	Purse Seine	OPEN	all	NE	all	0	0	0		
30	Scallop Dredge	AA	GEN	MA	all	0	0	0		P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0		
32	Scallop Dredge	AA	LIM	MA	all	7,621	7,200	421	0.254	
33	Scallop Dredge	AA	LIM	NE	all	389	0	389	0.245	
34	Scallop Dredge	OPEN	GEN	MA	all	2,251	2,002	249	0.691	

See supporting text for abbreviations.

Table 4B, continued. Total catch (live pounds), Vessel Trip Report landings (kept; live pounds), estimated discards (live pounds) and associated coefficient of variation (CV) for the 23 individual species that comprise the 14 species groups, by fleet for July 2010 through June 2011. Dark shading indicates fleets with no NEFOP trips in the annual analysis. Light shading indicates that the variance of the discard estimate was not used in the annual sample size analysis. Blank CV indicates either no discards or discards equal 0. "P" indicates fleets with "pilot" designation.
Species: LOLIGO SQUID

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Total	Kept	Discarded	CV	Pilot
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0		
36	Scallop Dredge	OPEN	LIM	MA	all	26,240	21,152	5,088	0.325	
37	Scallop Dredge	OPEN	LIM	NE	all	945	0	945	0.324	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0		
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	9	0	9	0.732	
40	Pots and Traps, Fish	OPEN	all	MA	all	0	0			P
41	Pots and Traps, Fish	OPEN	all	NE	all	367	367			P
42	Pots and Traps, Conch	OPEN	all	MA	all	0	0			P
43	Pots and Traps, Conch	OPEN	all	NE	all	0	0			P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	0	0			P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	0	0			P
47	Pots and Traps, Lobster	OPEN	all	MA	all	0	0			P
48	Pots and Traps, Lobster	OPEN	all	NE	all	0	0			P
49	Pots and Traps, Crab	OPEN	all	MA	all	0	0			P
50	Pots and Traps, Crab	OPEN	all	NE	all	0	0			P
51	Beam Trawl	OPEN	all	MA	all	75,830	75,830			P
52	Beam Trawl	OPEN	all	NE	all	0	0			P
53	Dredge, Other	OPEN	all	MA	all	0	0			P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	0	0			P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	0	0			P
	Other fleets					4,423	4,423			
					TOTAL	21,817,046	21,434,751	382,295	0.243	

See supporting text for abbreviations.

Table 5. The number of sea days needed to achieve a 30% CV of the discard estimate for each the 14 fish and invertebrate species groups, the number of pilot sea days, and the maximum number of sea days needed for each fleet (2012 Sea Days Needed) for fish and invertebrate species groups based on July 2010 through June 2011 data. Red font indicates basis for fleet sea days; species group abbreviation are given in Table 1.

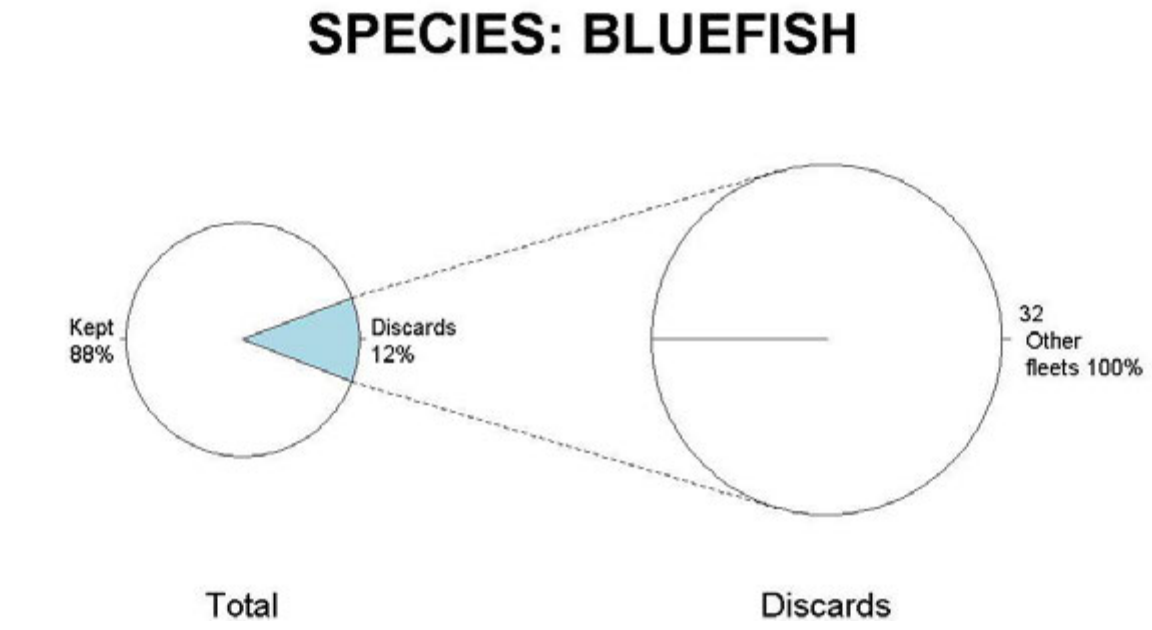
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	BLUE	HERR	SAL	RCRAB	SCAL	SBM	MONK	GFL	GFS	SKATE	DOG	FSB	SCOQ	TILE	Pilot days	2012 Sea Days Needed	Pilot
1	Longline	OPEN	all	MA	all	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	P
2	Longline	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	24	
3	Hand Line	OPEN	all	MA	all	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	P
4	Hand Line	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	62	
5	Otter Trawl	OPEN	all	MA	sm	0	0	0	3,231	0	364	0	497	545	397	325	513	0	0	160	3,231	
6	Otter Trawl	OPEN	all	MA	lg	0	0	0	5,551	0	0	164	141	0	107	333	173	0	0	266	5,551	
7	Otter Trawl	OPEN	all	NE	sm	0	0	0	0	0	411	0	461	451	531	1,151	489	0	0	168	1,151	
8	Otter Trawl	OPEN	all	NE	lg	0	0	0	3,879	0	0	568	76	280	261	229	788	0	0	415	3,879	
9	Scallop Trawl	AA	GEN	MA	all	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	P
10	Scallop Trawl	AA	LIM	MA	all	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	P
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	32	0	0	0	0	25	32	
12	Scallop Trawl	OPEN	LIM	MA	all	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163	P
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	P
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	P
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	59	
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	257	567	0	0	0	100	567	
18	Shrimp Trawl	OPEN	all	MA	all	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	P
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0	0	0	0	0	0	34	0	0	0	0	0	65	34	
20	Floating Trap	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
21	Floating Trap	OPEN	all	NE	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	43	
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0	0	0	0	70	0	0	83	0	0	0	0	61	83	
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	P
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	97	0	0	0	134	97	
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	0	0	0	0	0	0	132	0	0	118	171	0	0	0	94	171	
28	Purse Seine	OPEN	all	MA	all	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	P
29	Purse Seine	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	23	
30	Scallop Dredge	AA	GEN	MA	all	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	P
31	Scallop Dredge	AA	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	
32	Scallop Dredge	AA	LIM	MA	all	0	0	0	0	0	0	282	0	0	0	0	0	0	0	102	282	
33	Scallop Dredge	AA	LIM	NE	all	0	0	0	0	0	0	189	0	0	0	0	0	0	0	121	189	
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	50	0	0	0	0	95	50	
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	87	
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0	0	0	0	312	0	0	164	0	0	0	0	238	312	
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0	0	500	0	234	107	0	163	505	607	0	0	277	607	
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	17	
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	571	0	0	0	43	571	
40	Pots and Traps, Fish	OPEN	all	MA	all	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	P
41	Pots and Traps, Fish	OPEN	all	NE	all	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	P
42	Pots and Traps, Conch	OPEN	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	P
43	Pots and Traps, Conch	OPEN	all	NE	all	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	P
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	P
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	P
47	Pots and Traps, Lobster	OPEN	all	MA	all	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	P
48	Pots and Traps, Lobster	OPEN	all	NE	all	429	429	429	429	429	429	429	429	429	429	429	429	429	429	429	429	P
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	P
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	P
51	Beam Trawl	OPEN	all	MA	all	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	P
52	Beam Trawl	OPEN	all	NE	all	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	P
53	Dredge, Other	OPEN	all	MA	all	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	P
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	P
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	P
					Totals	**1,638**	**1,638**	**1,638**	**14,299**	**2,138**	**2,413**	**3,589**	**2,920**	**2,948**	**3,801**	**5,587**	**4,208**	**1,638**	**1,638**	**4,379**	**18,822**	

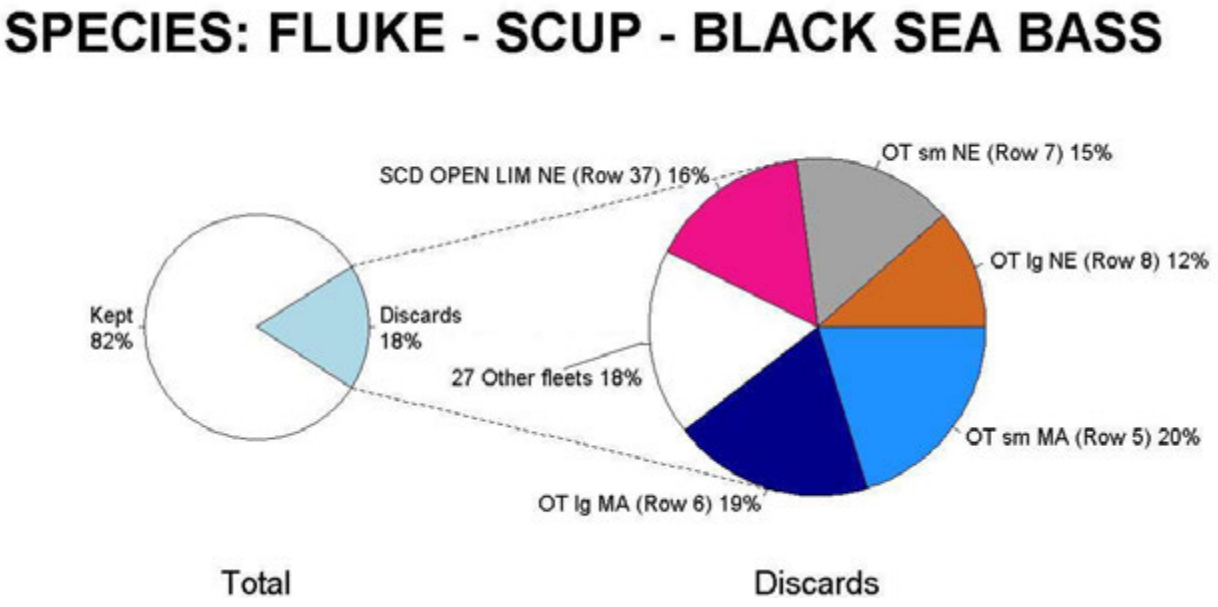
See supporting text for abbreviations; + indicates new fleet in 2012; "P" indicates fleets with "pilot" designation.

Table 6. Number of sea days, trips, and percentage of trips (based upon previous industry activity) needed to achieve a 30% CV of the discard estimate, by fleet and species group, based on July 2010 through June 2011 data. See Table 1 and Appendix Table 3 for species group and fleet abbreviations, respectively.

Row	FLEET	Species Group	Sea Days	Trips	% of Trips
5	OT sm MA	RCRAB	3,231	1,361	40
		GFS	545	230	7
		FSB	513	216	6
		GFL	497	209	6
		SKATE	397	167	5
		SBM	364	154	5
		DOG	325	137	4
6	OT lg MA	RCRAB	5,551	2,612	42
		DOG	333	157	3
		FSB	173	81	1
		MONK	164	77	1
		GFL	141	66	1
		SKATE	107	50	1
7	OT sm NE	DOG	1,151	498	14
		SKATE	531	230	6
		FSB	489	212	6
		GFL	461	199	5
		GFS	451	195	5
		SBM	411	177	5
8	OT lg NE	RCRAB	3,879	1,364	19
		FSB	788	277	4
		MONK	568	200	3
		GFS	280	98	1
		SKATE	261	92	1
		DOG	229	81	1
		GFL	76	27	<1
11	SCT OPEN GEN MA	SKATE	32	17	5
17	OTH lg NE	DOG	567	69	27
		SKATE	257	31	12
19	SHT NE	GFS	34	33	1
24	GN xlg MA	SKATE	83	67	3
		MONK	70	56	2
26	GN lg NE	DOG	97	82	1
27	GN xlg NE	DOG	171	117	4
		MONK	132	90	3
		SKATE	118	81	2
32	SCD AA LIM MA	MONK	282	32	12
33	SCD AA LIM NE	MONK	189	20	12
34	SCD OPEN GEN MA	SKATE	50	36	1
36	SCD OPEN LIM MA	MONK	312	34	3
		SKATE	164	18	1
37	SCD OPEN LIM NE	FSB	607	58	4
		DOG	505	49	4
		SCAL	500	48	4
		MONK	234	23	2
		SKATE	163	16	1
		GFL	107	10	1
39	MWT NE	DOG	571	160	49

Figure 1A. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by fleet (Discards, right pie) for each of the 14 species groups (except Atlantic Salmon) for July 2010 through June 2011. See Appendix Table 3 for fleet abbreviations.





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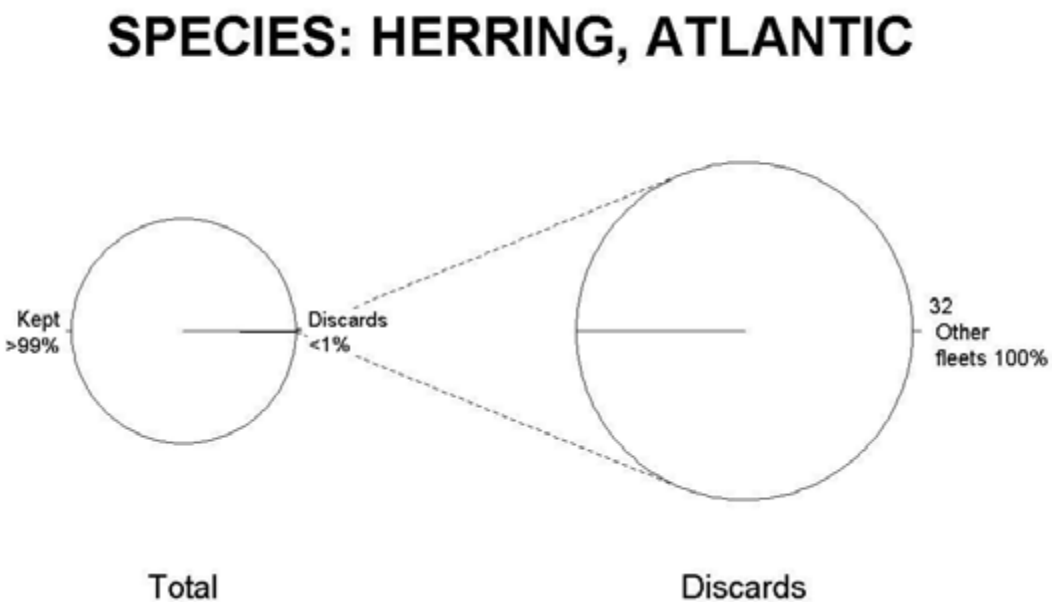

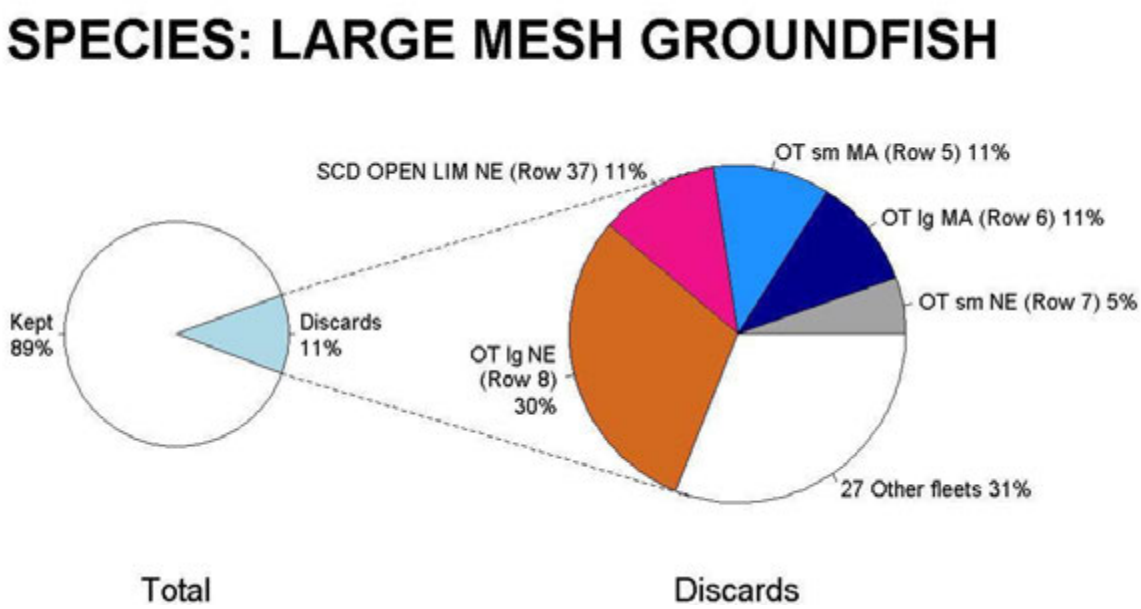

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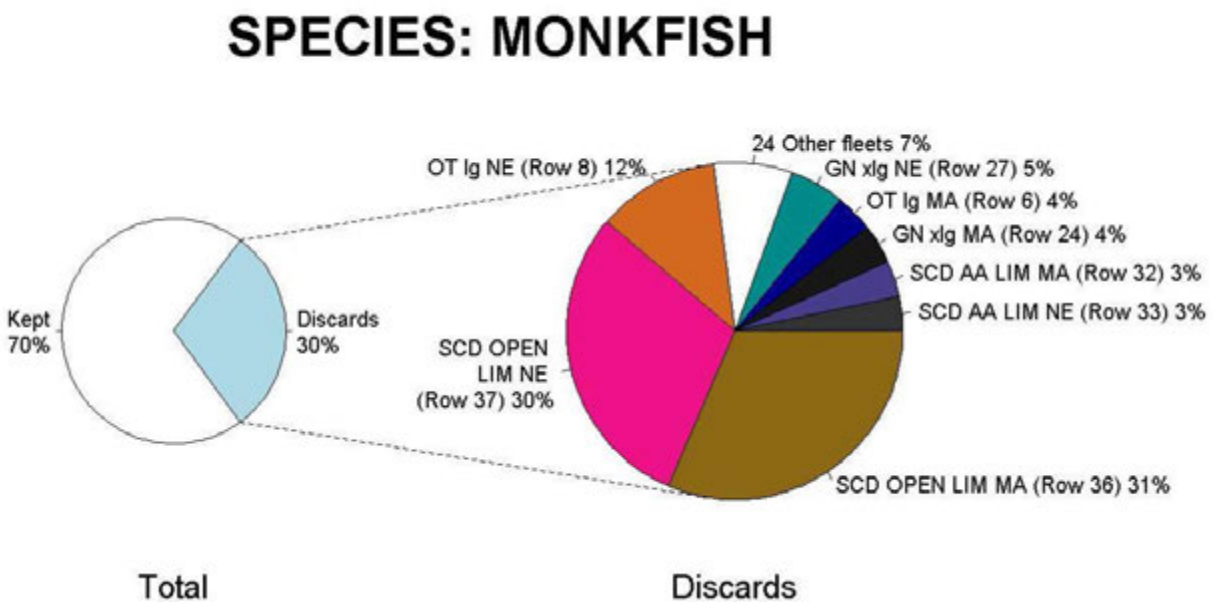

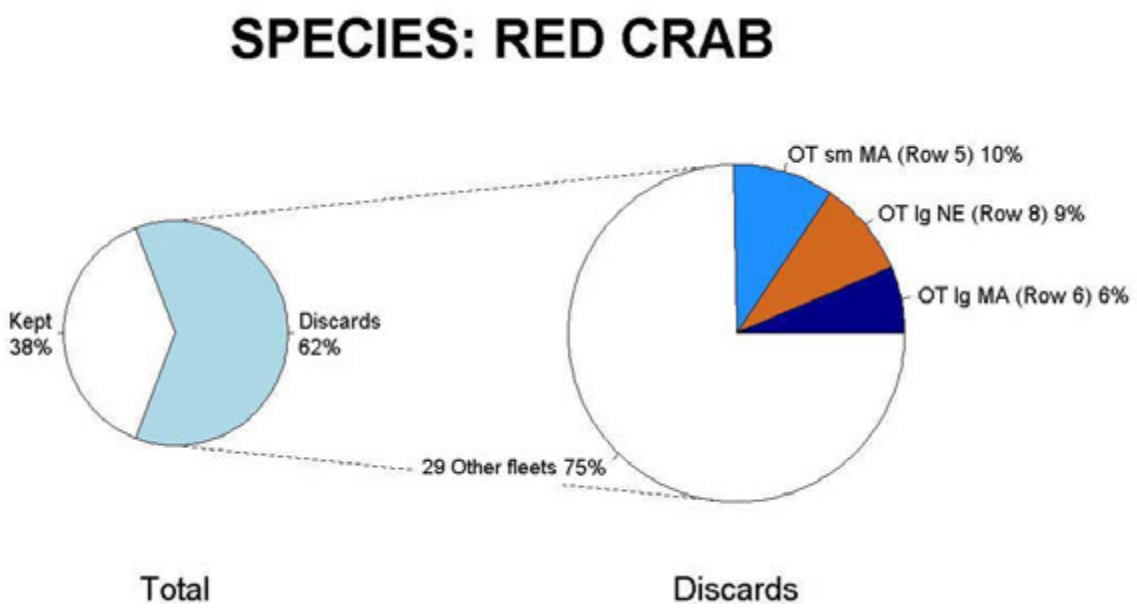

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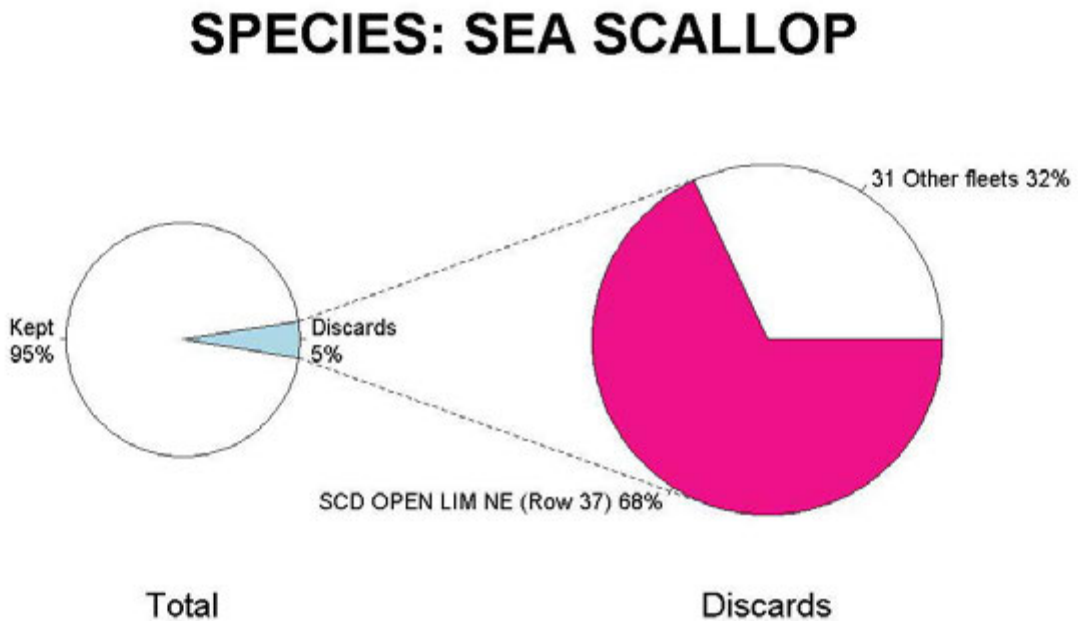

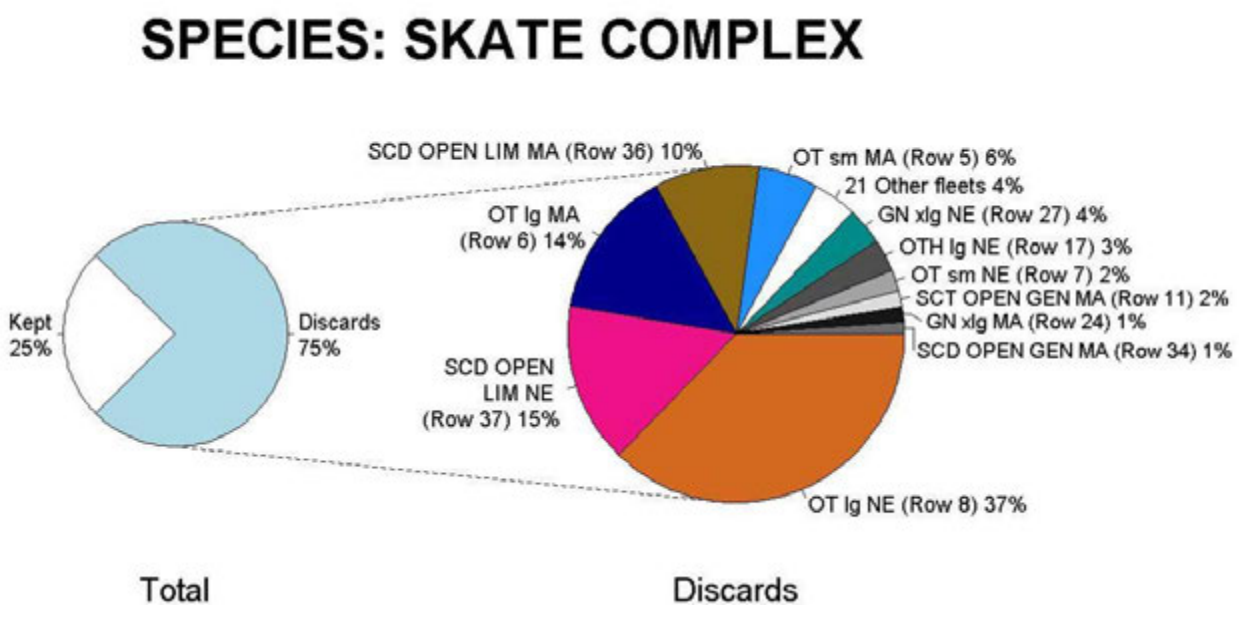

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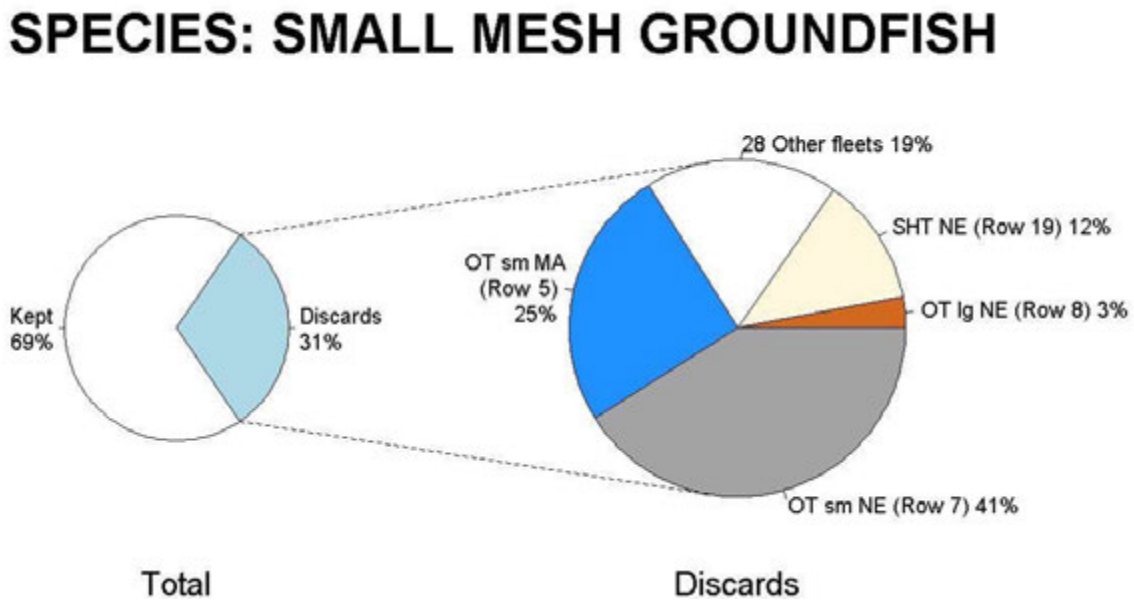

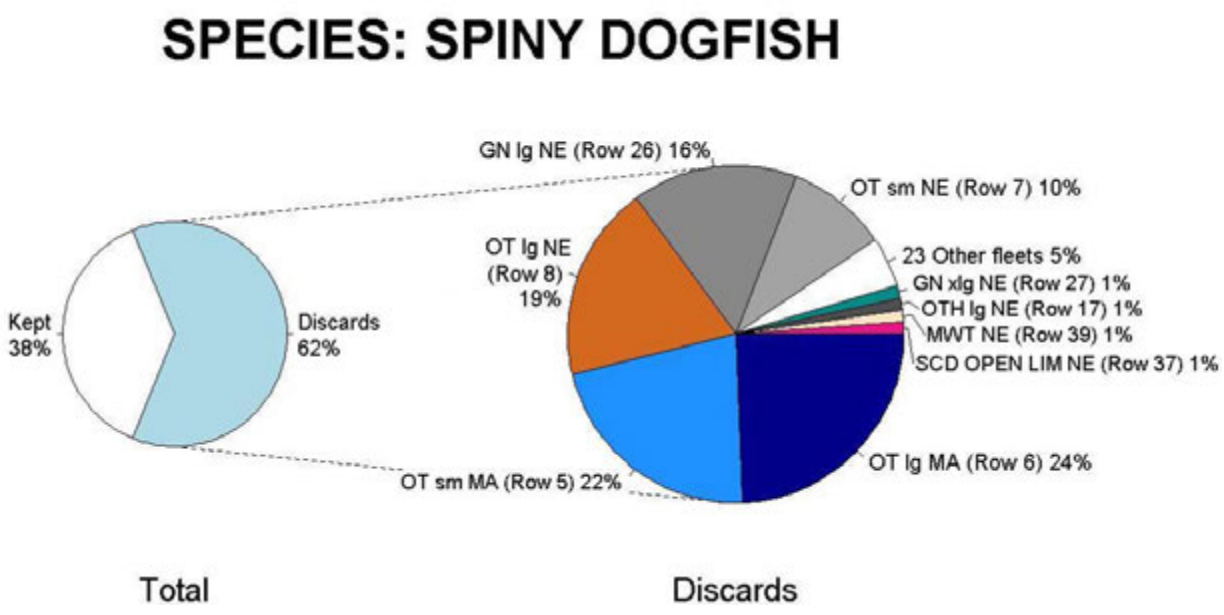

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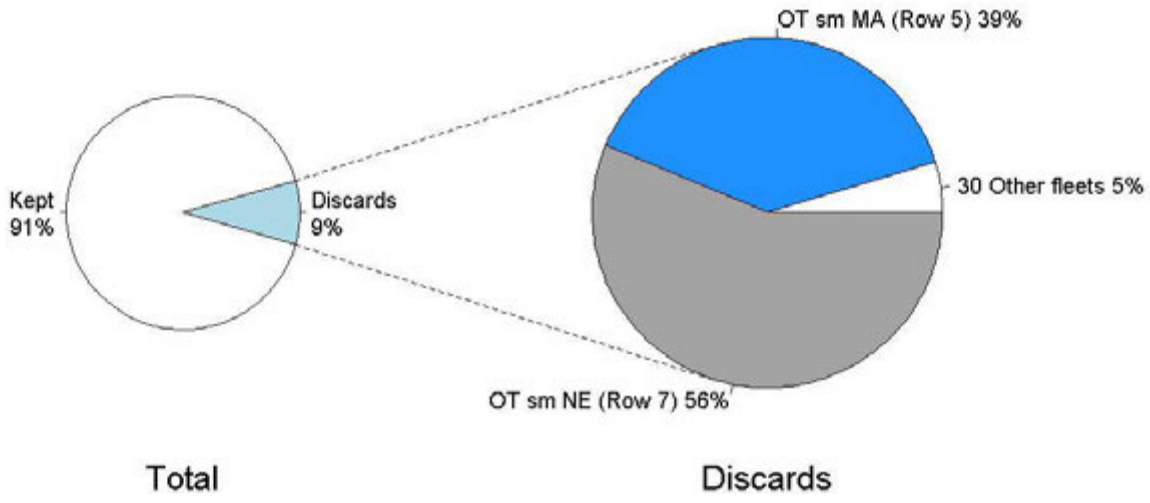
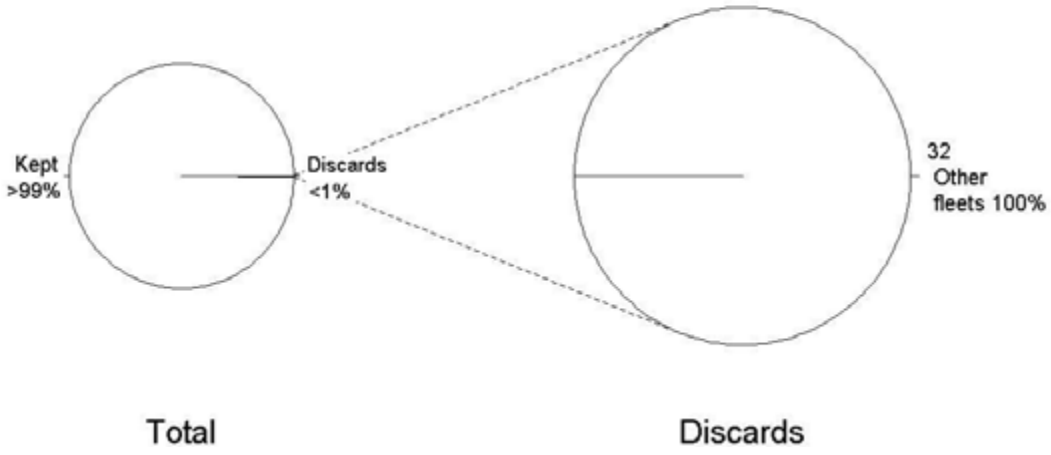
SPECIES: SQUID - BUTTERFISH - MACKEREL



SPECIES: SURFCLAM - OCEAN QUAHOG



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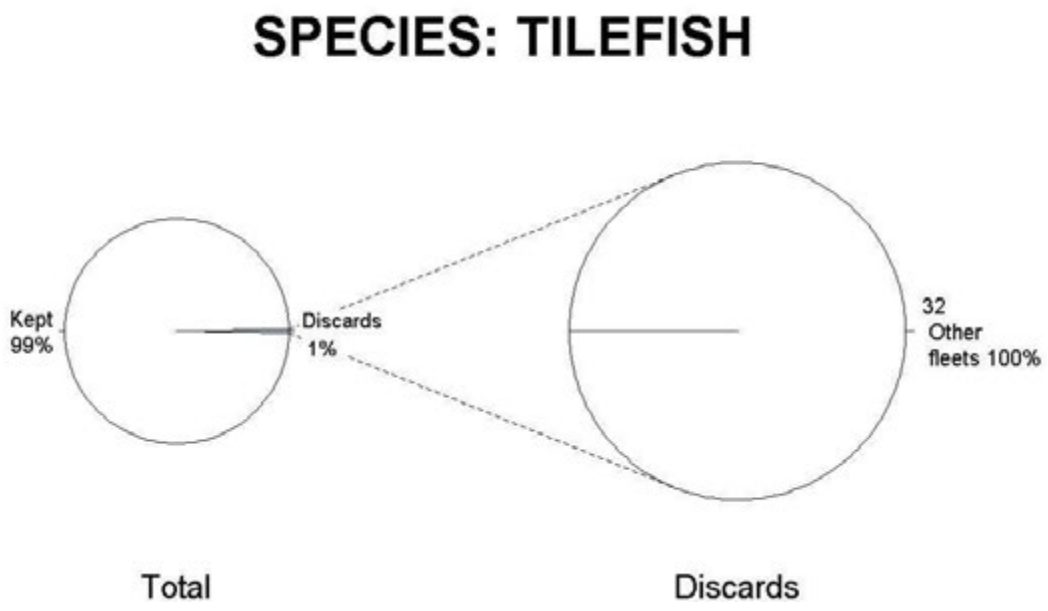
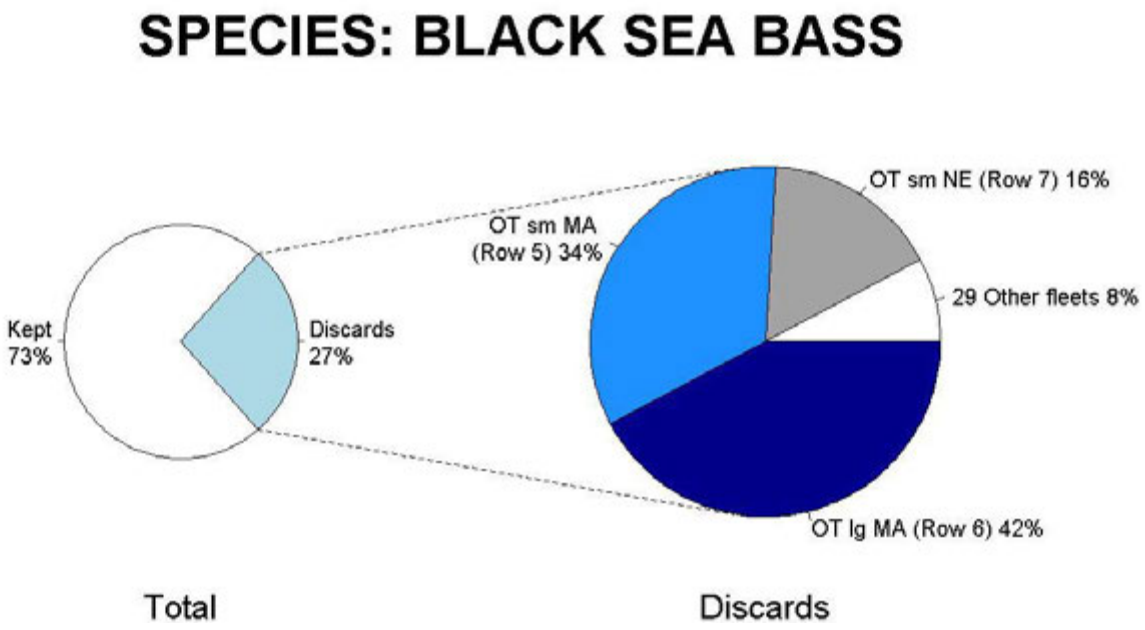
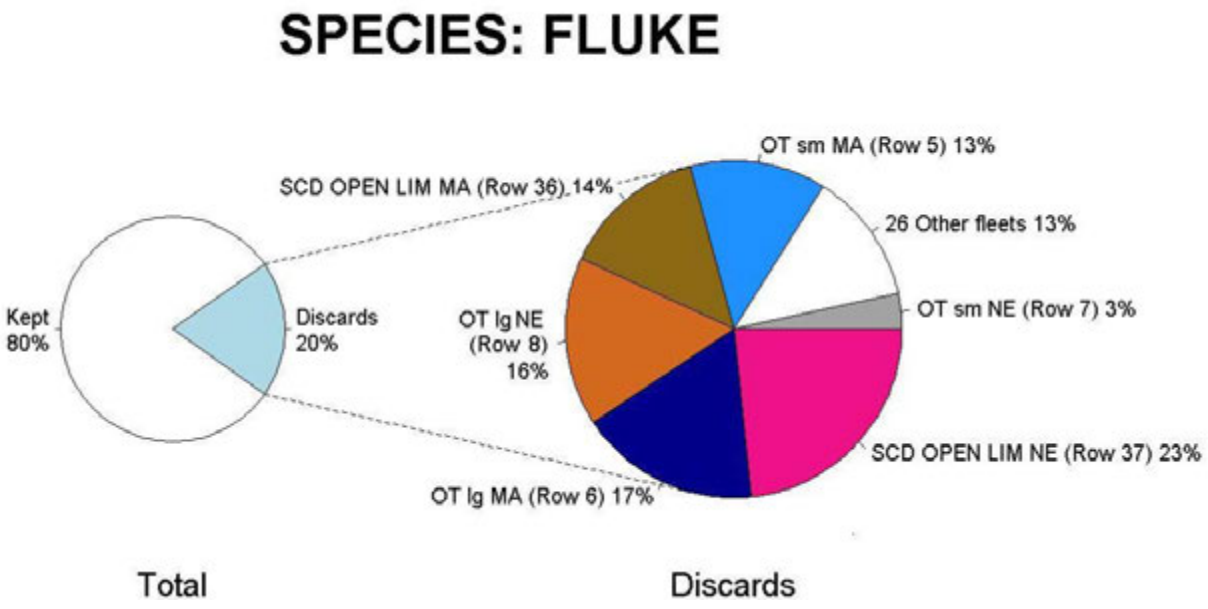


Figure 1B. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by fleet (Discards, right pie) for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011. See Appendix Table 3 for fleet abbreviations.





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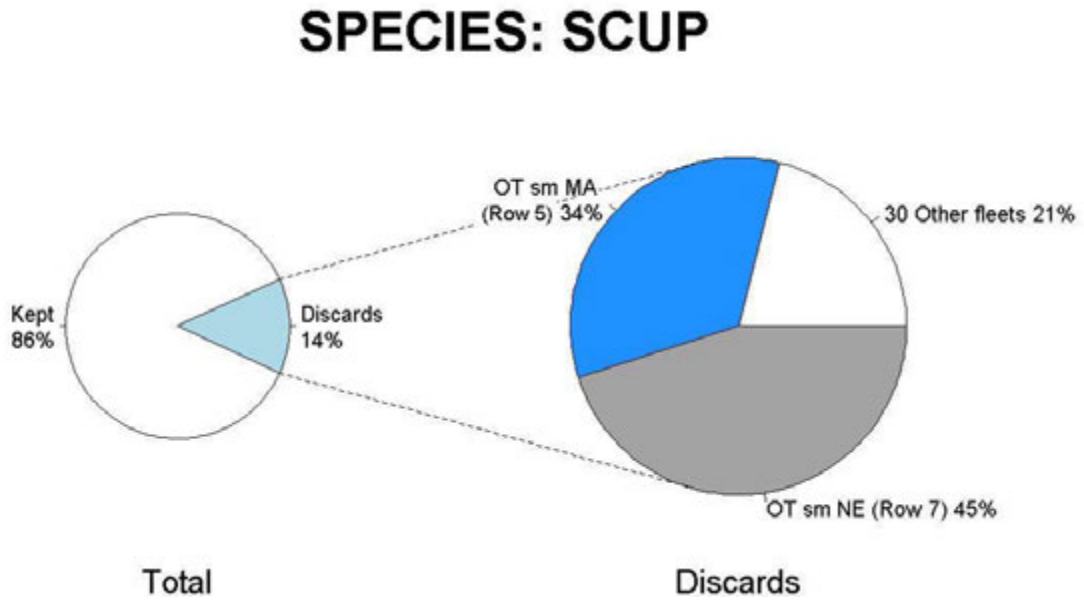

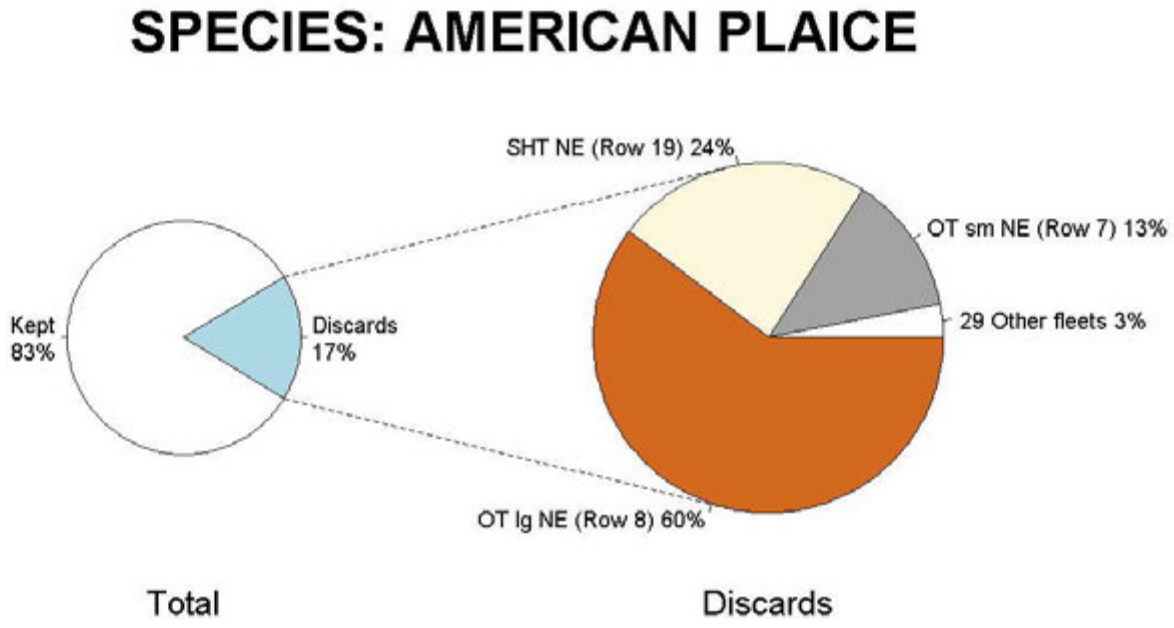

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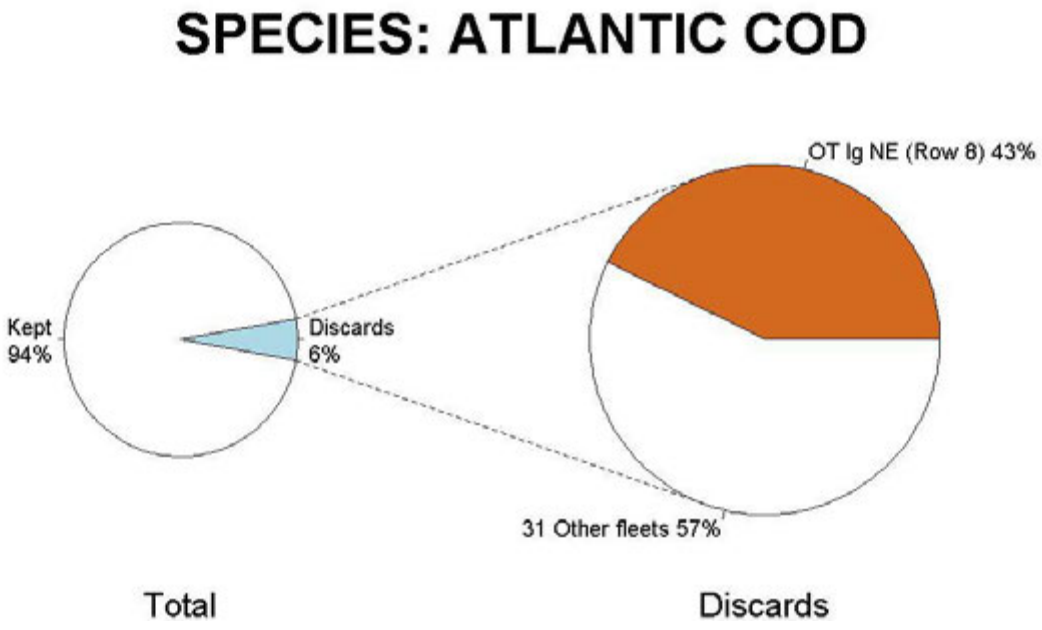

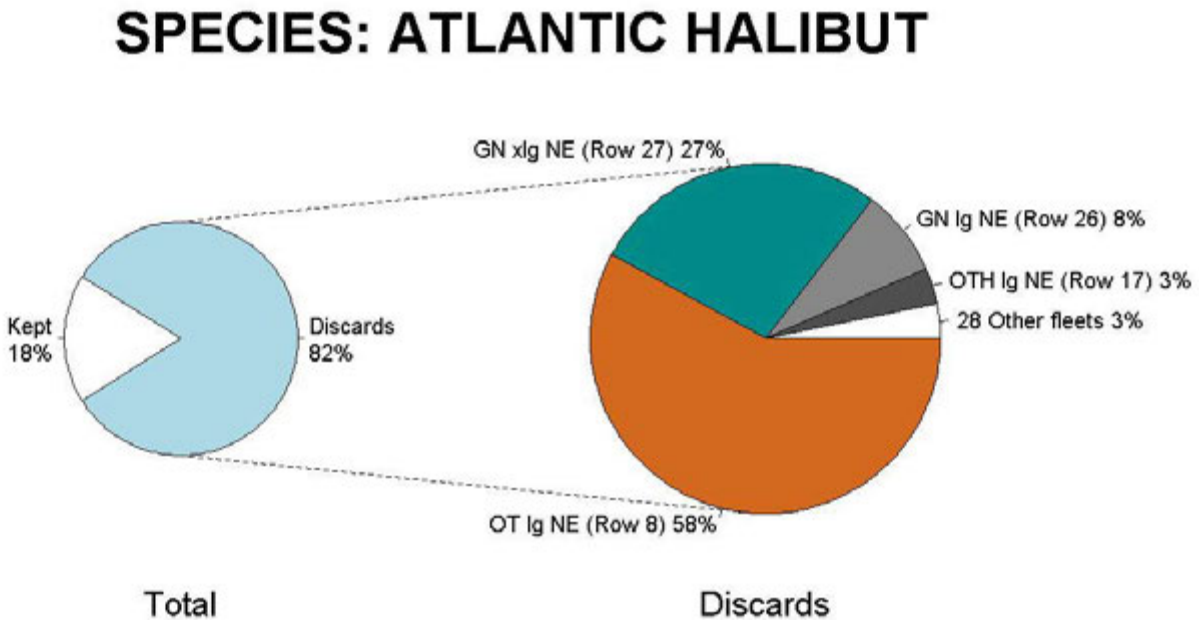

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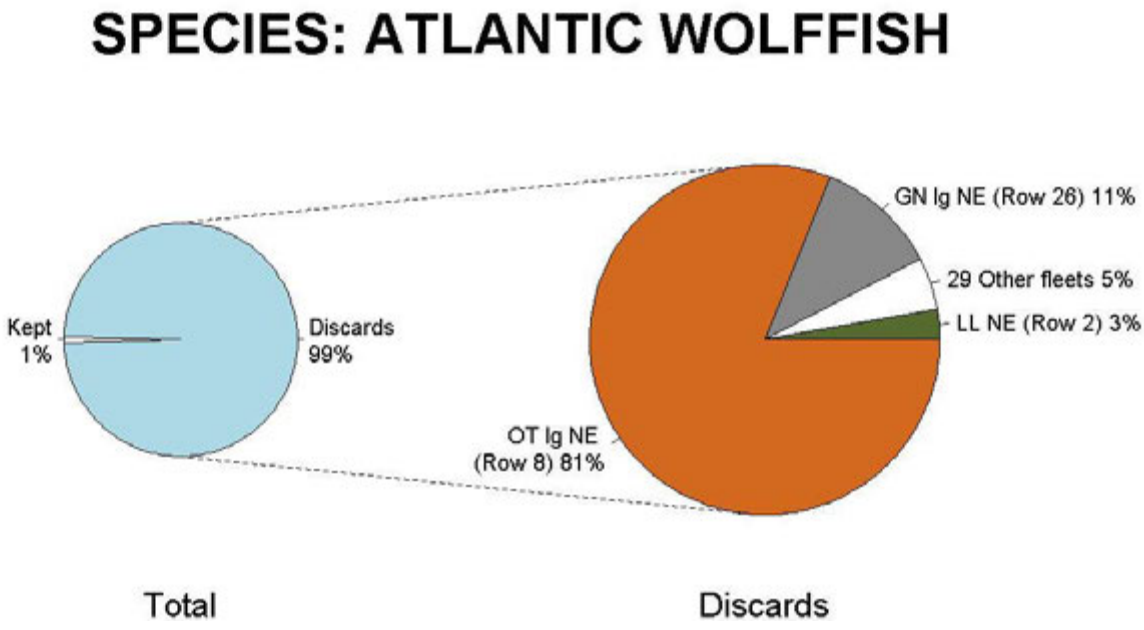

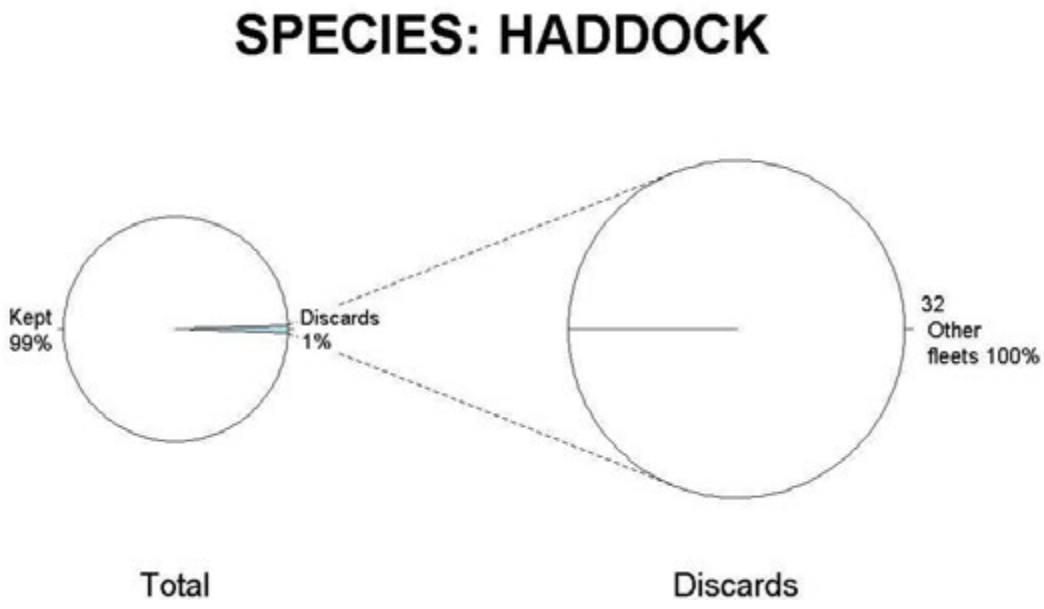

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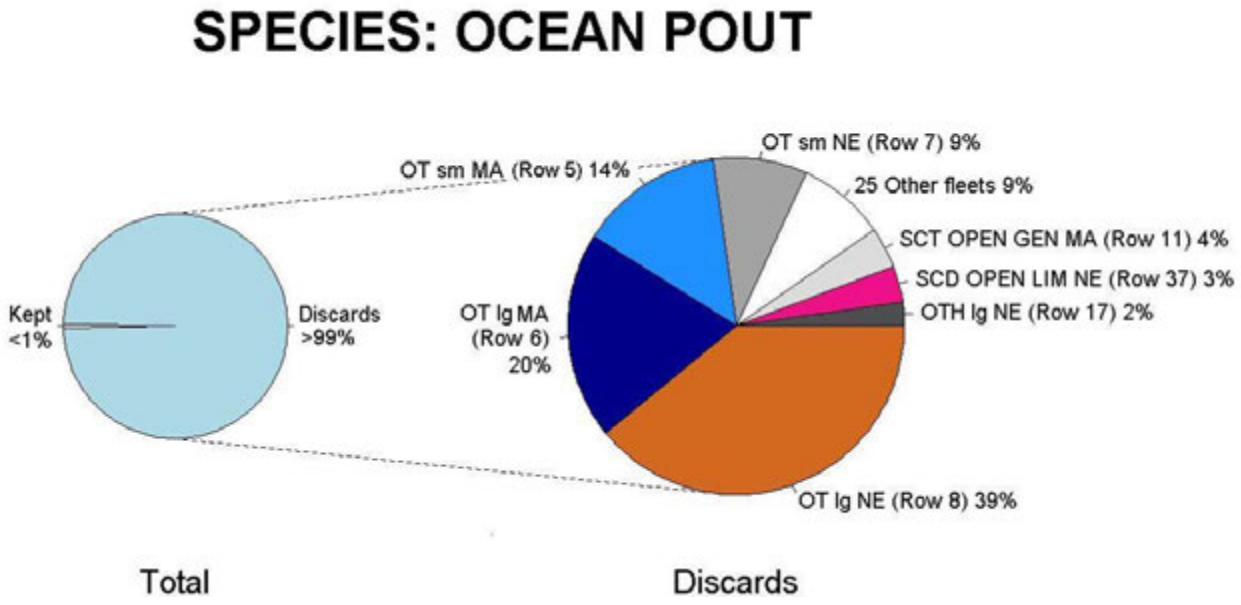

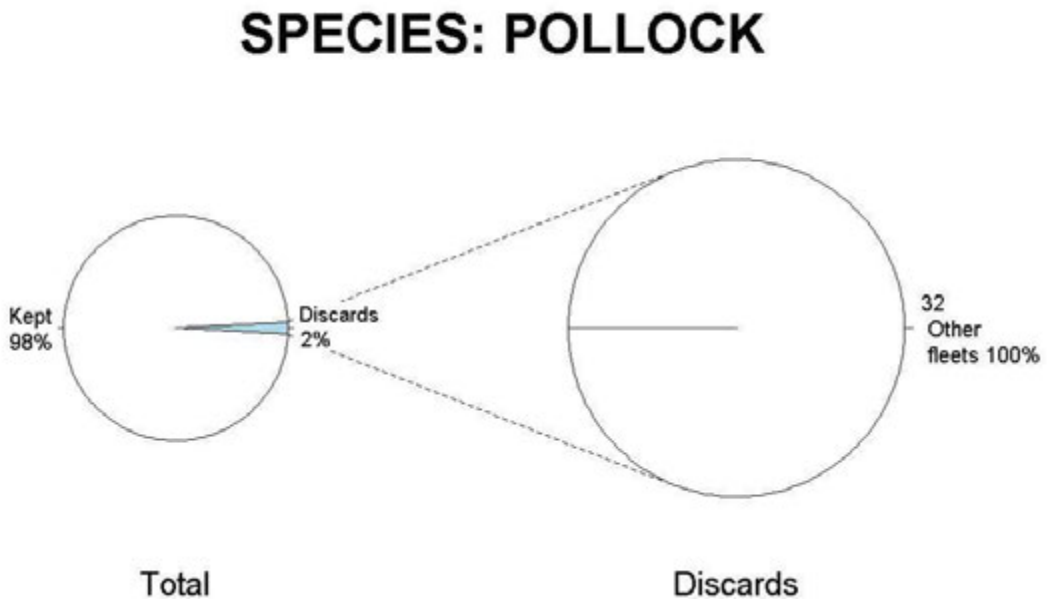

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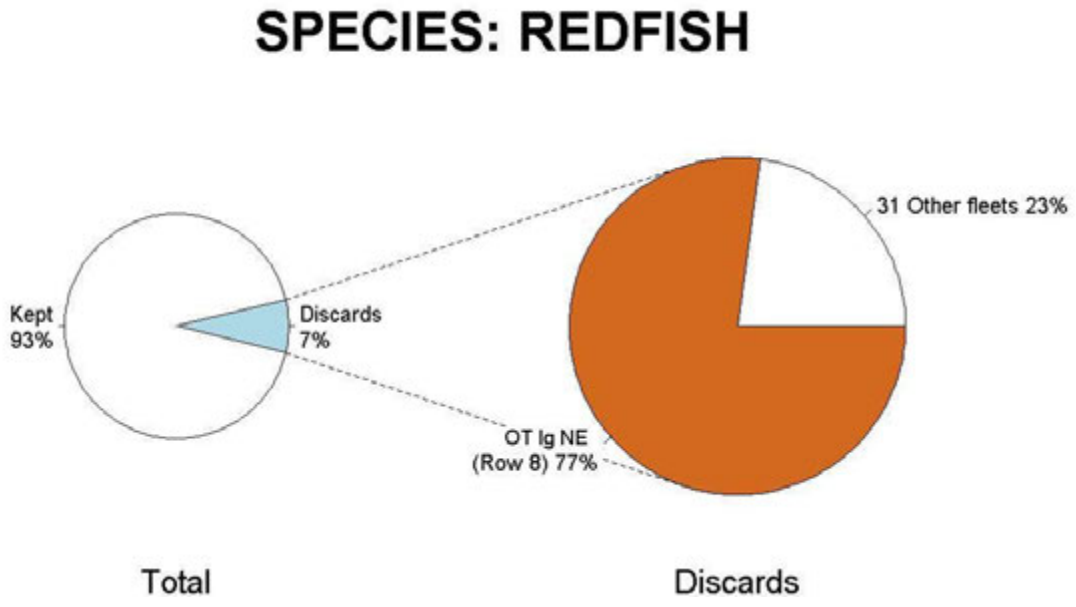

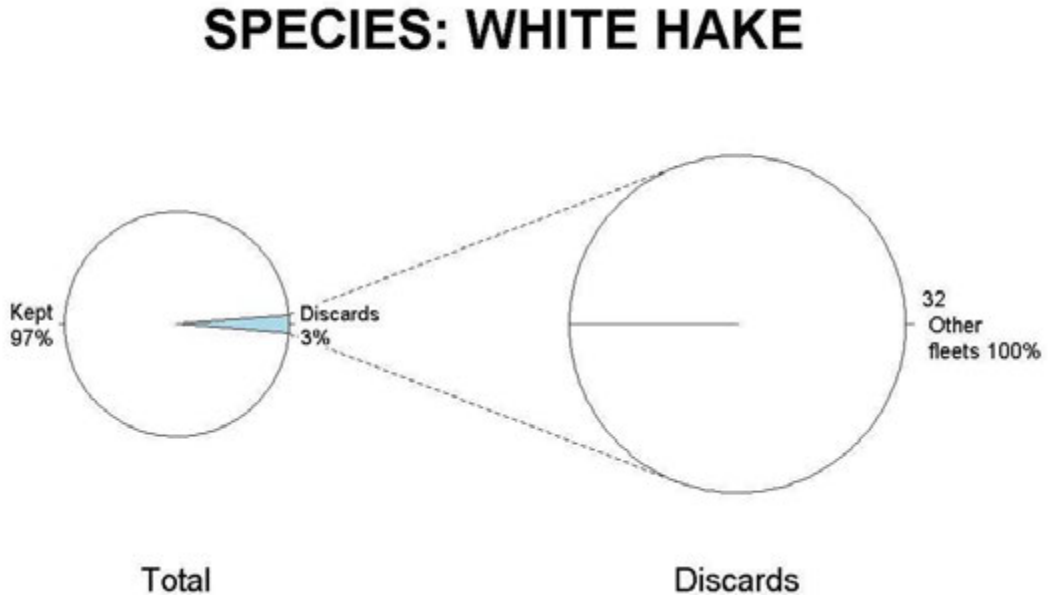

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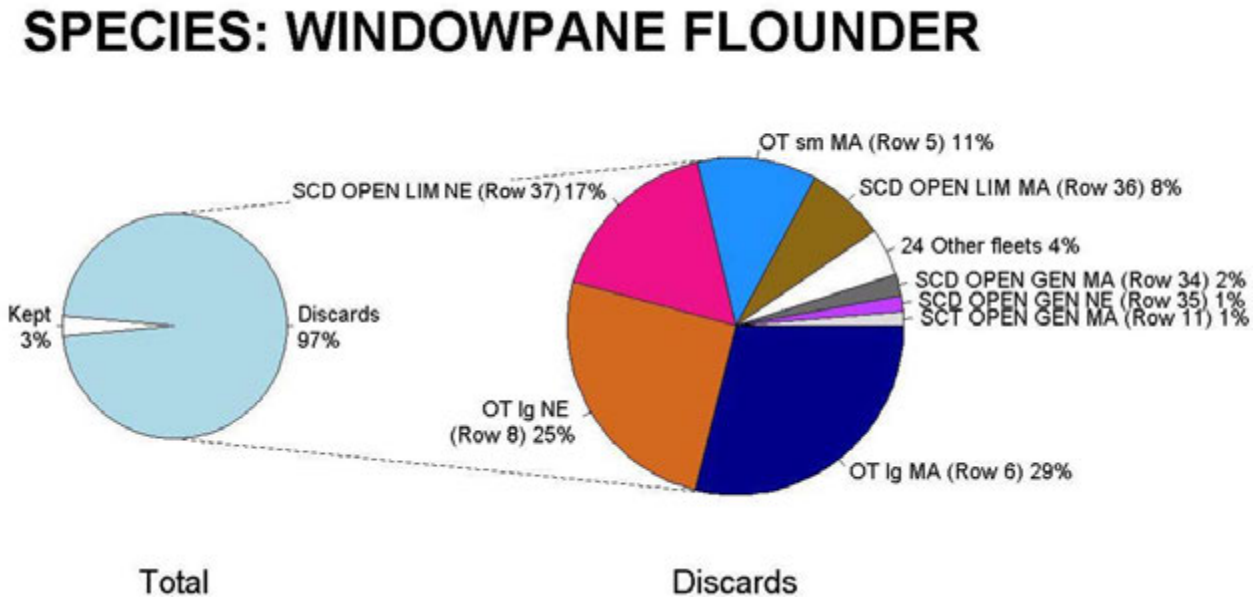

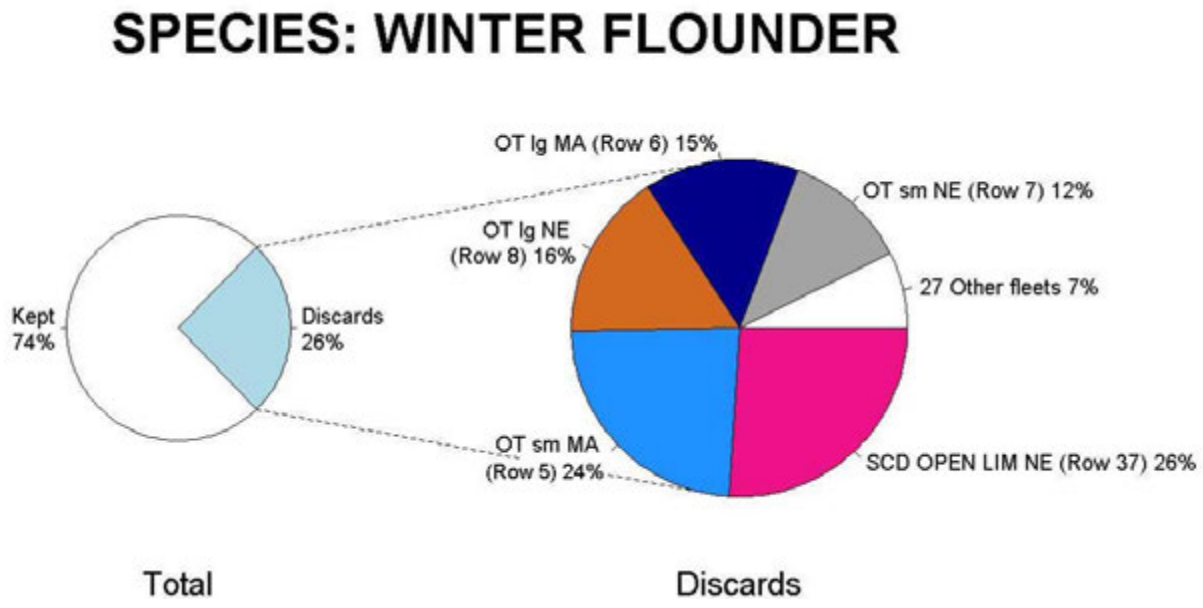

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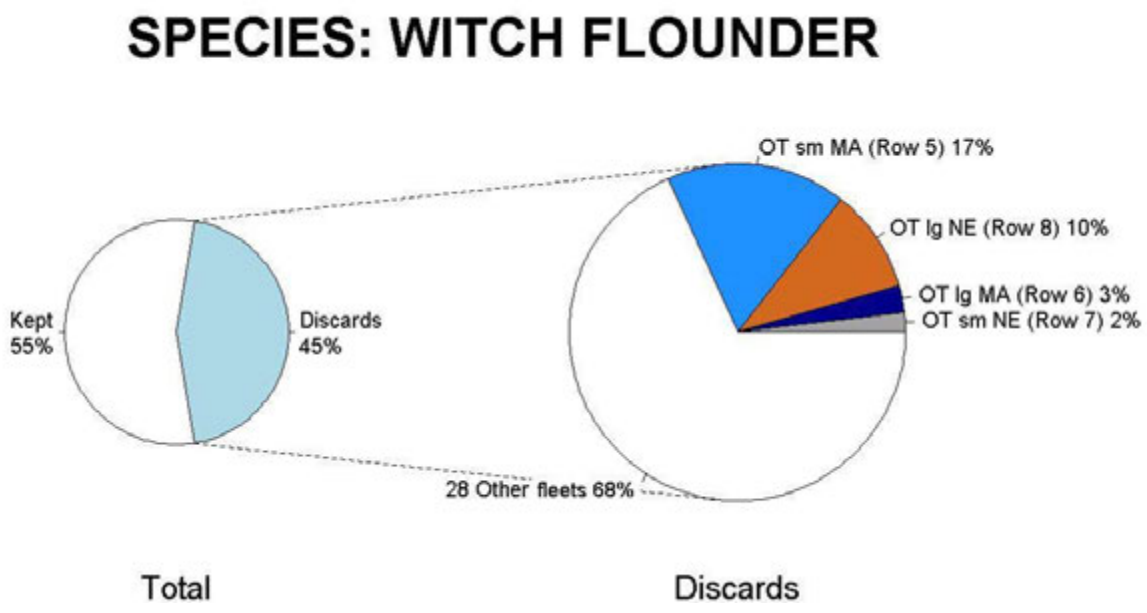

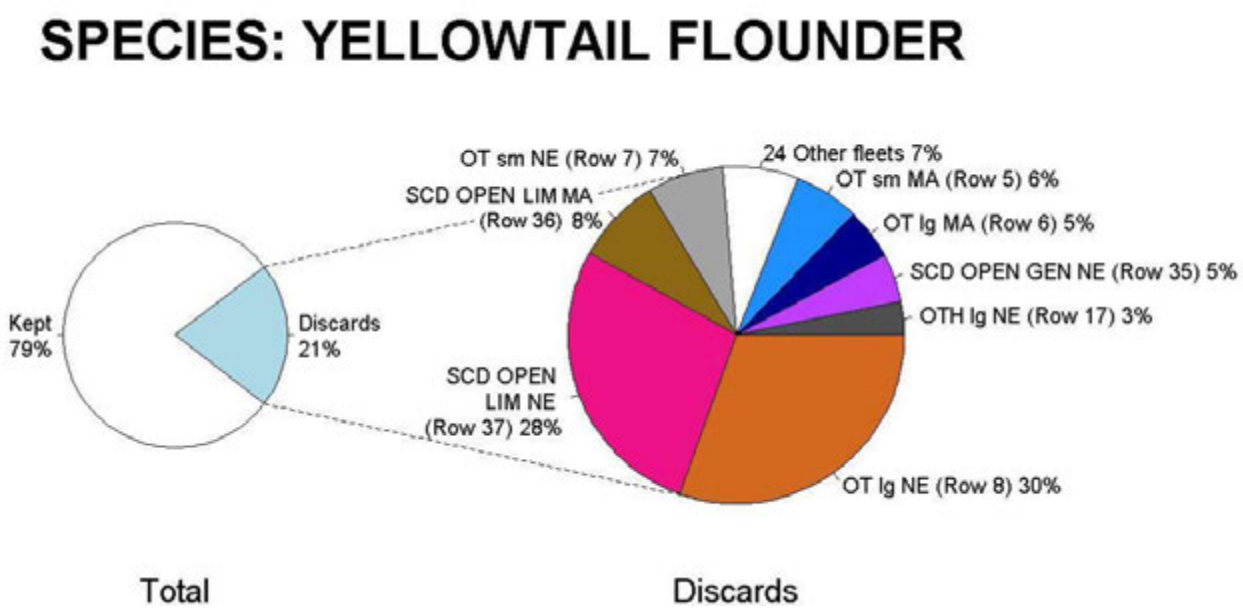

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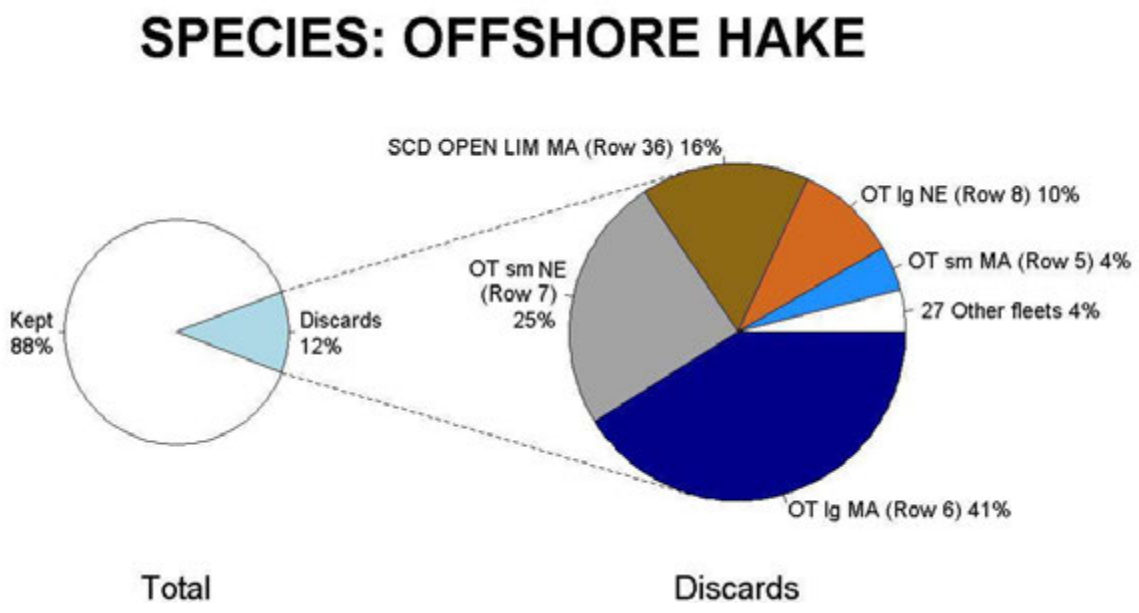

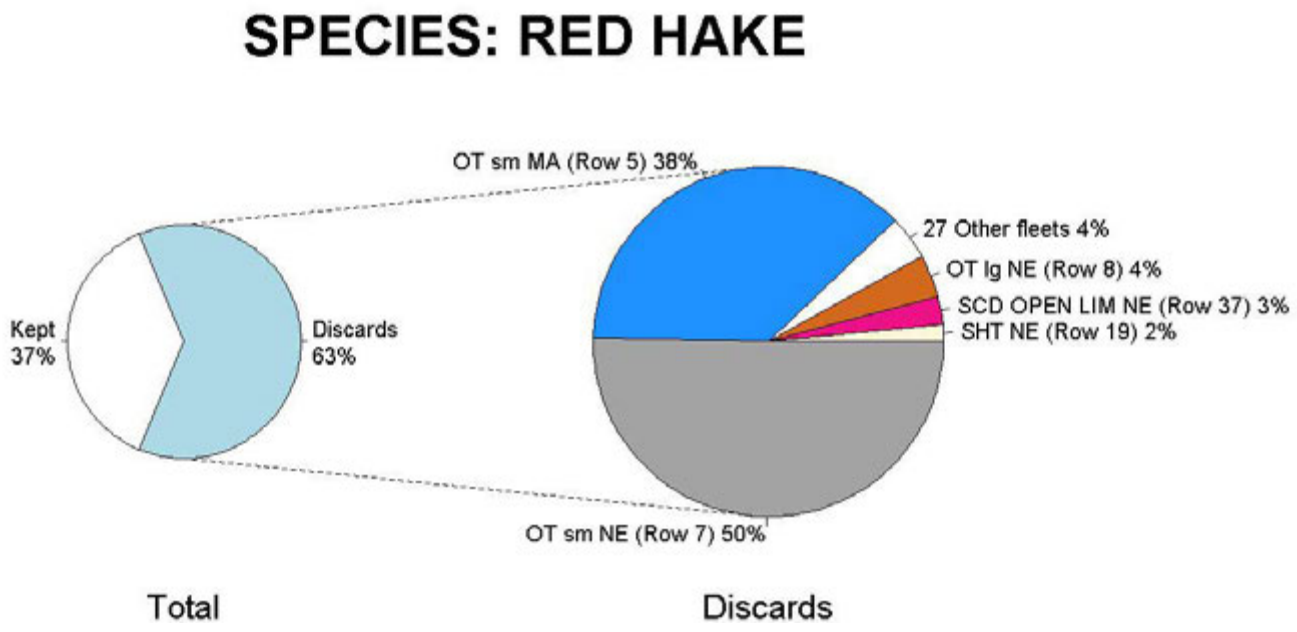

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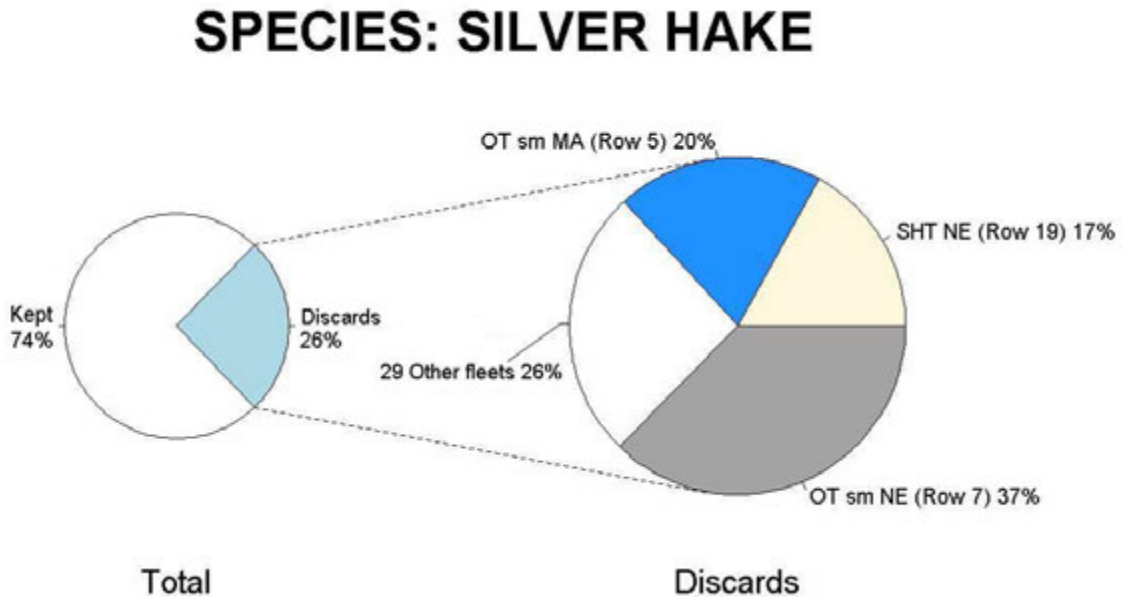

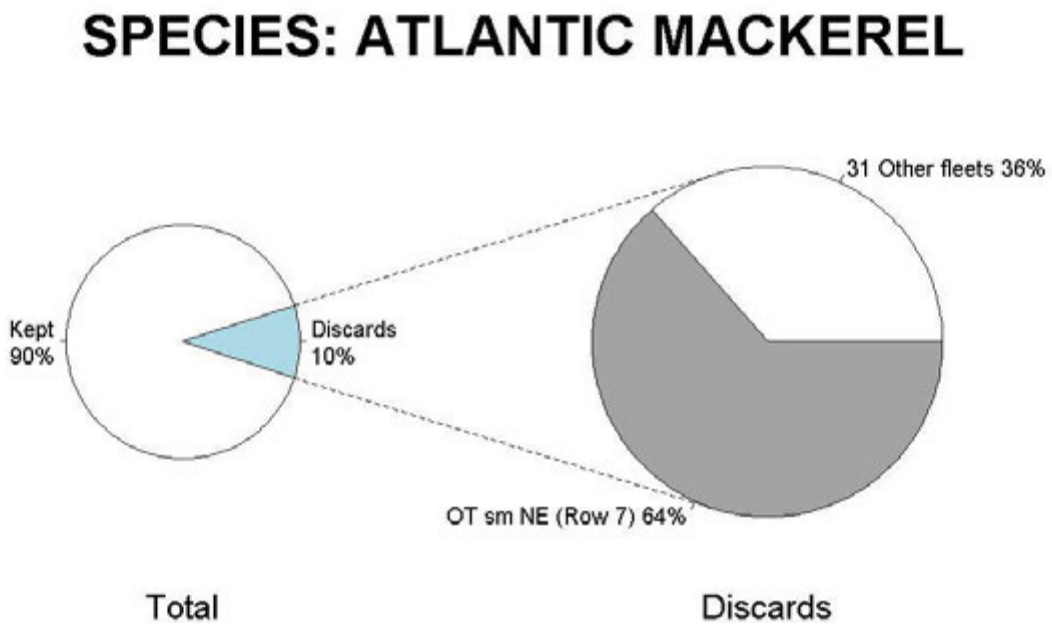

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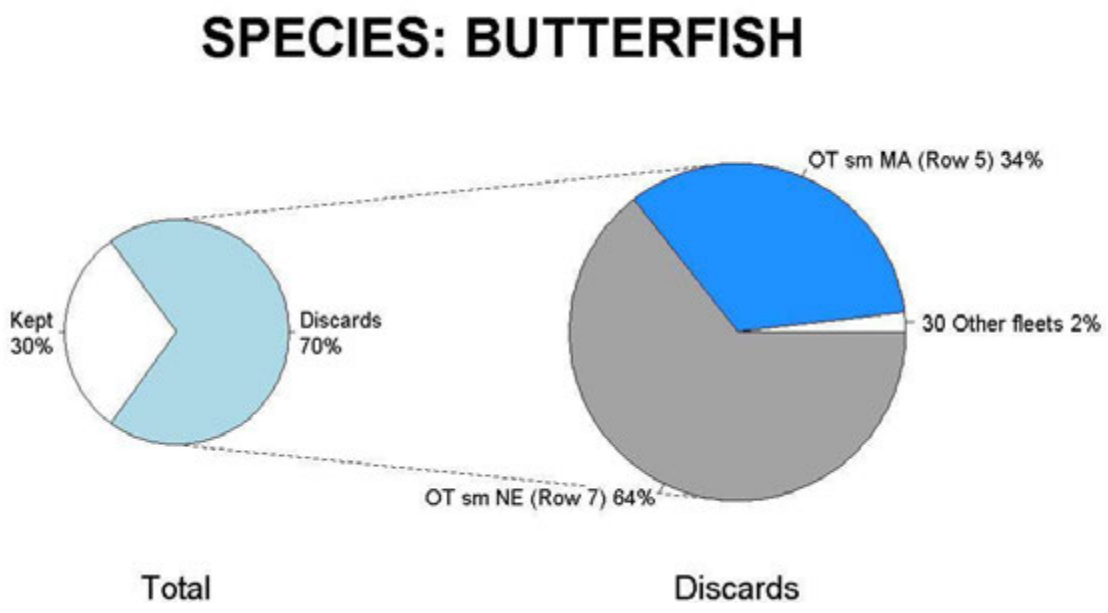

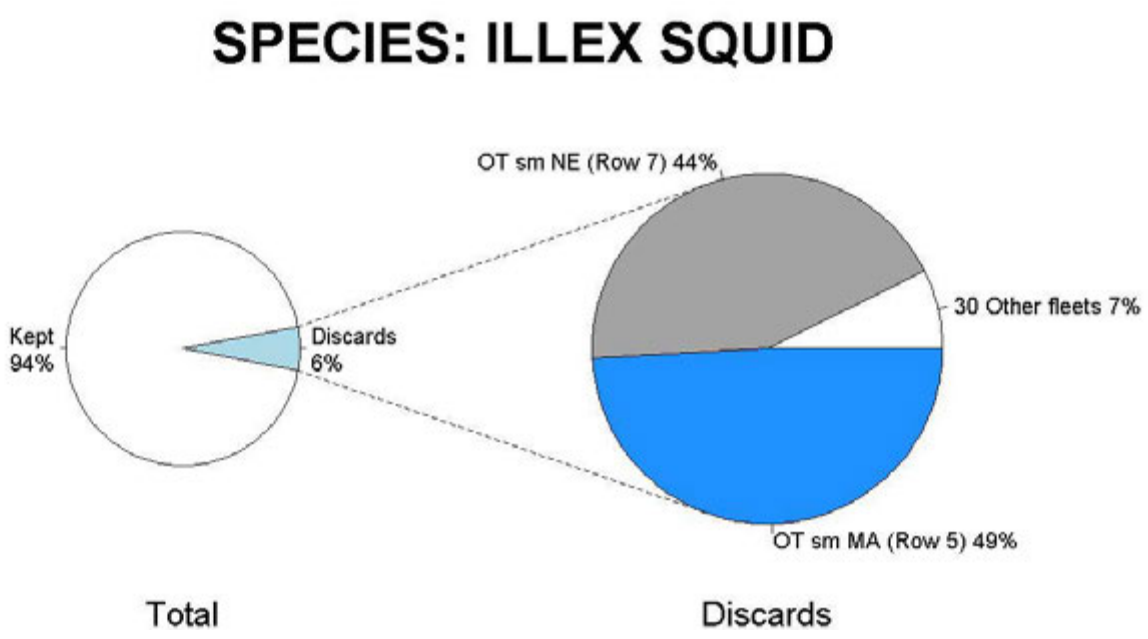

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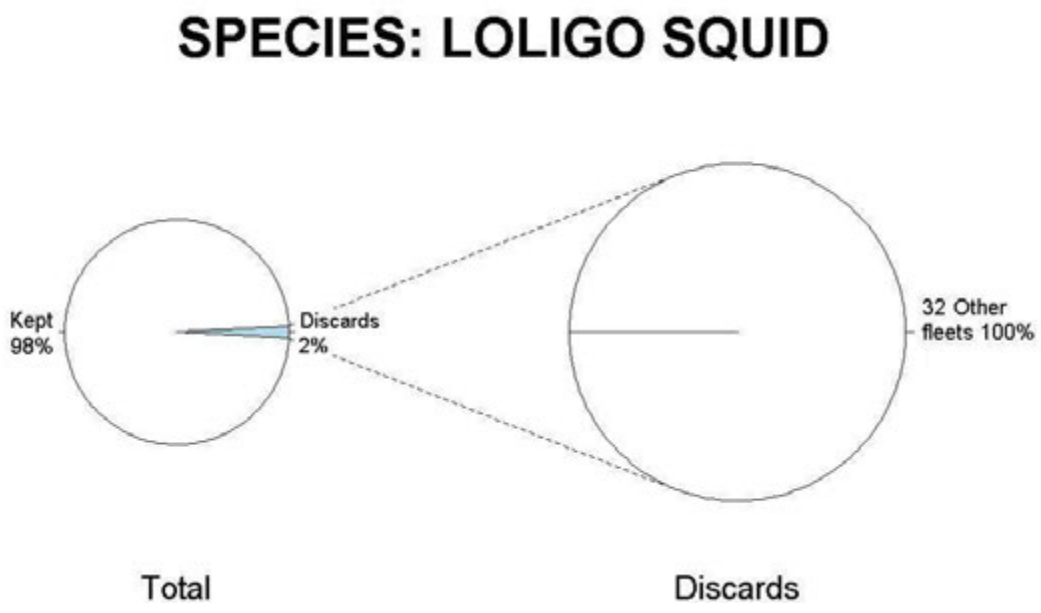
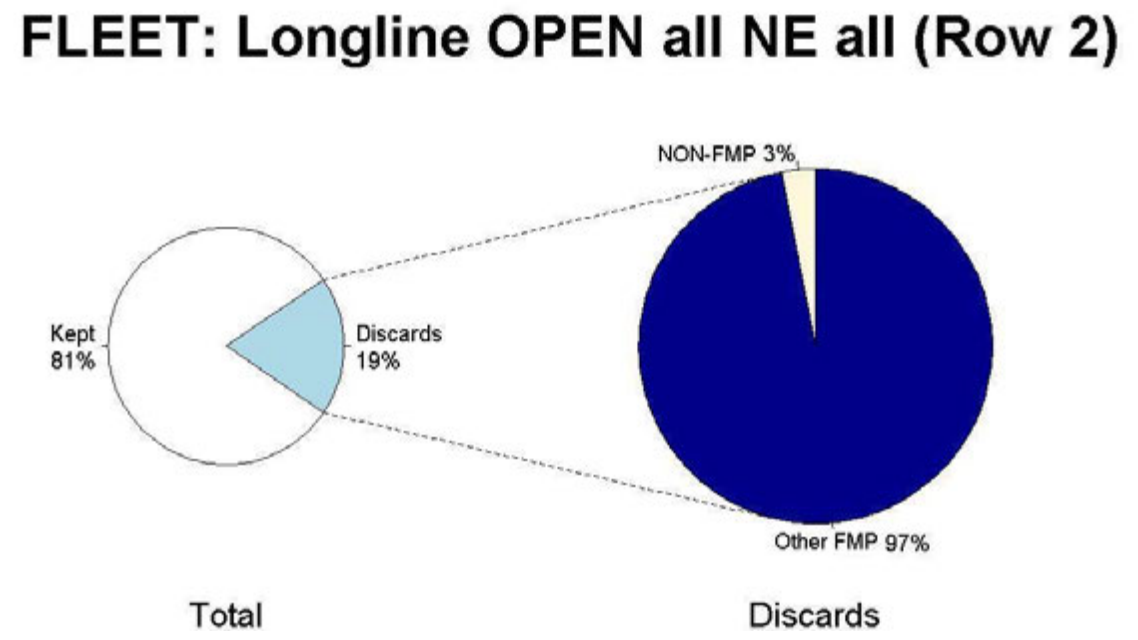
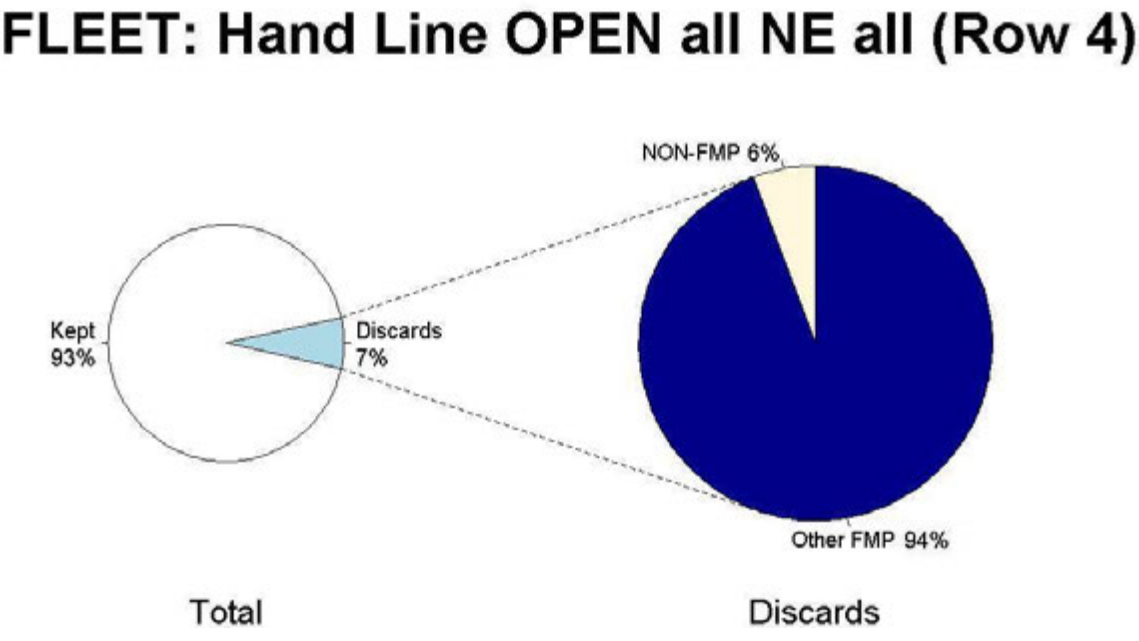


Figure 2. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.





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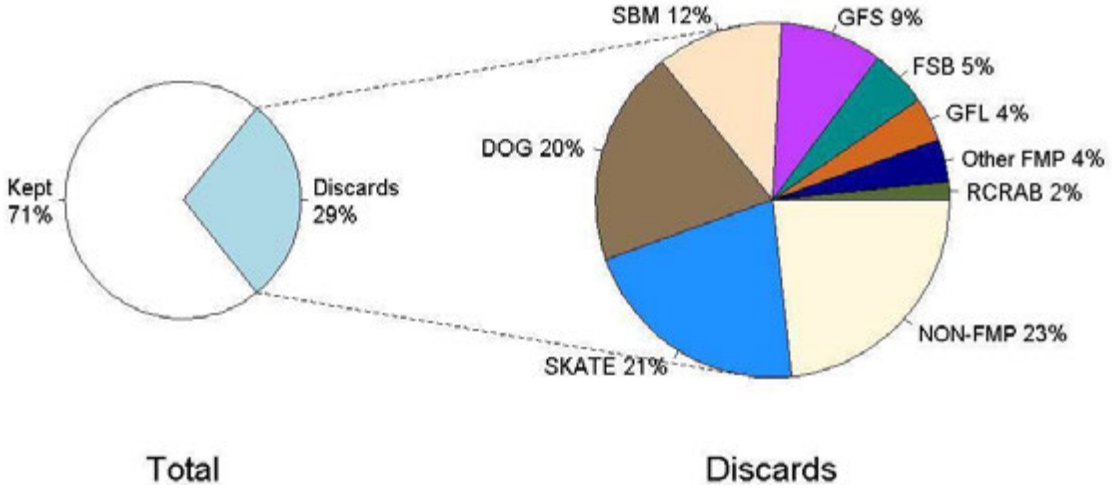
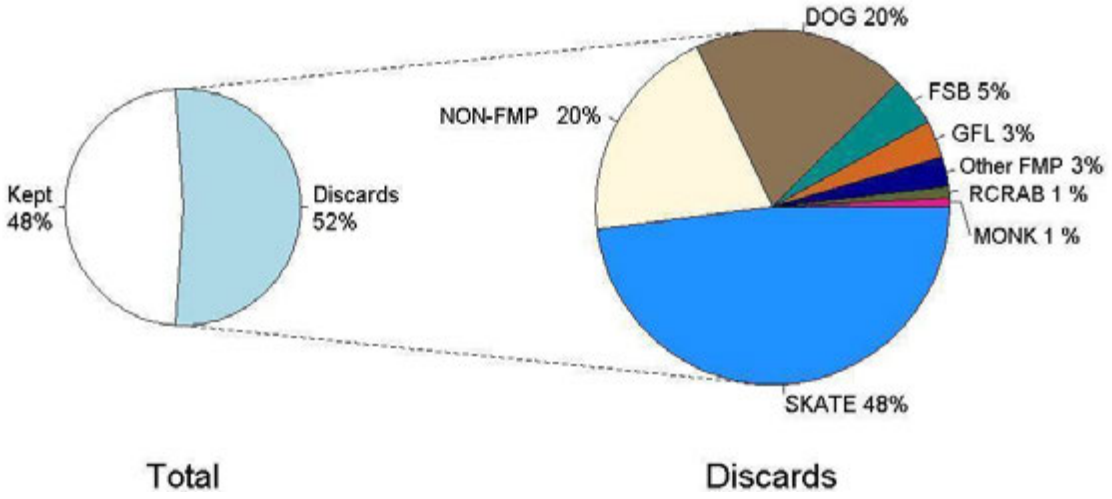
FLEET: Otter Trawl OPEN all MA sm (Row 5)



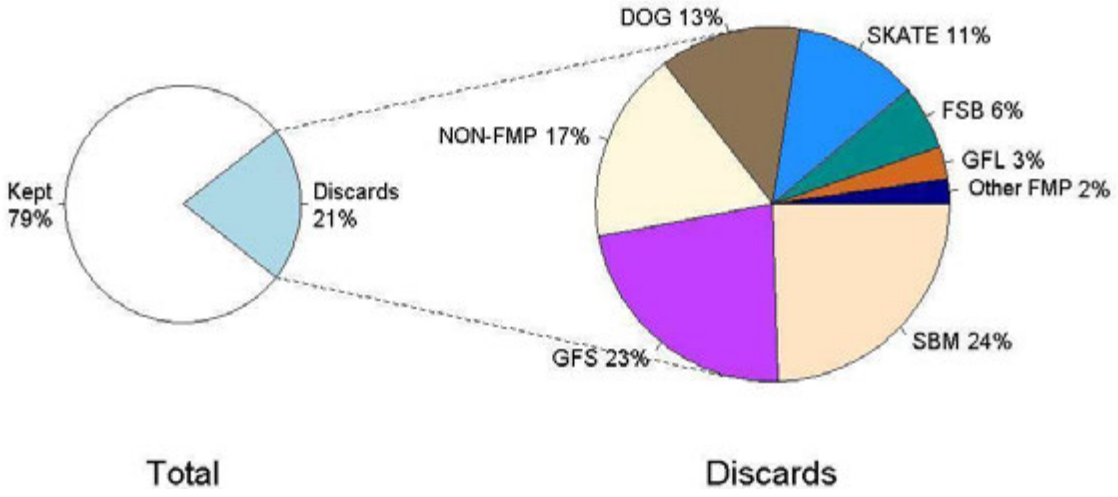
FLEET: Otter Trawl OPEN all MA lg (Row 6)



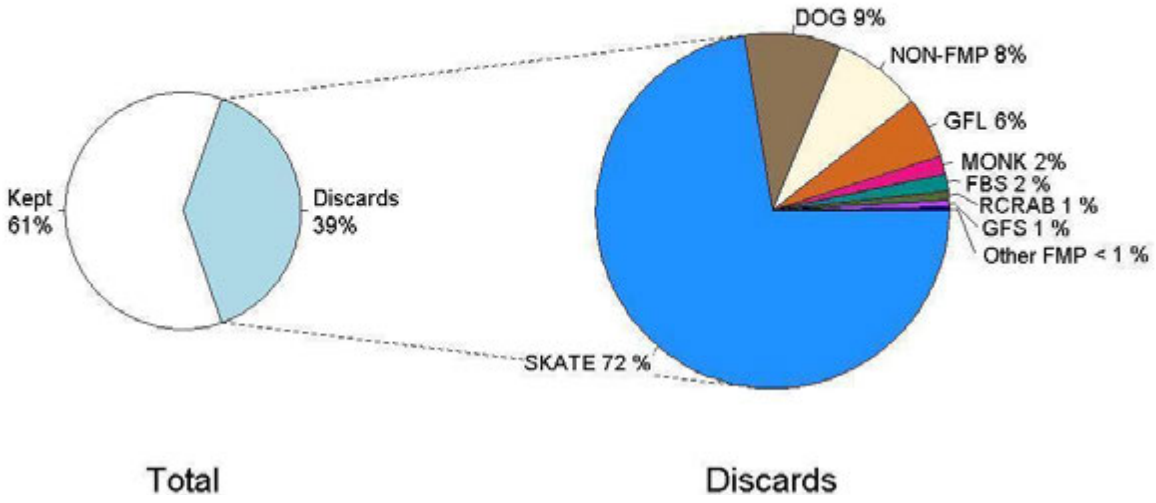
See supporting text for abbreviations.

Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

FLEET: Otter Trawl OPEN all NE sm (Row 7)



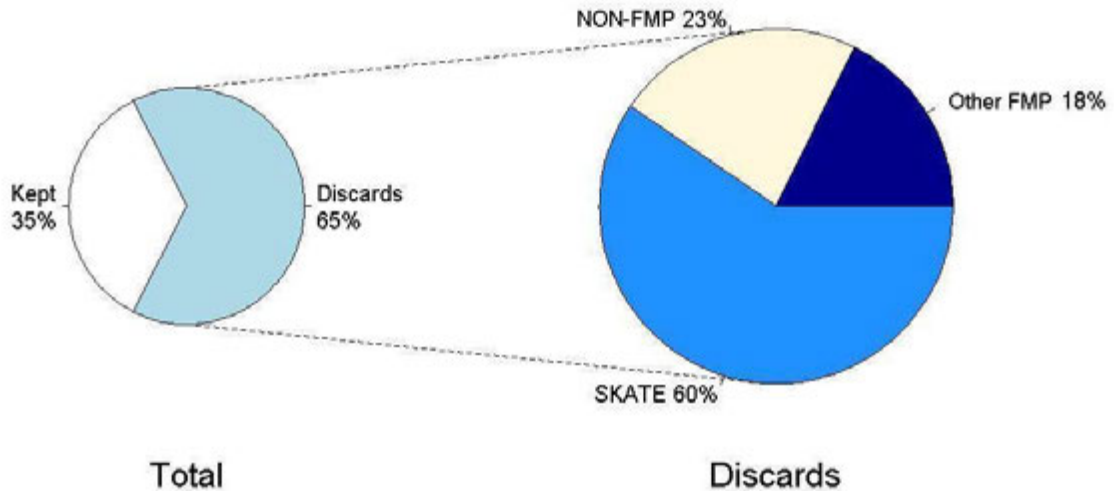
FLEET: Otter Trawl OPEN all NE lg (Row 8)



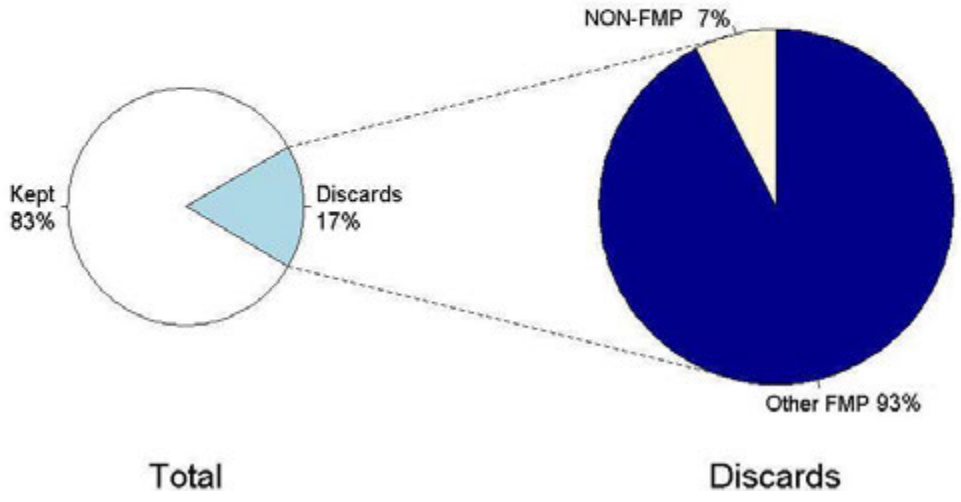
See supporting text for abbreviations.

Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

FLEET: Scallop Trawl OPEN GEN MA all (Row 11)

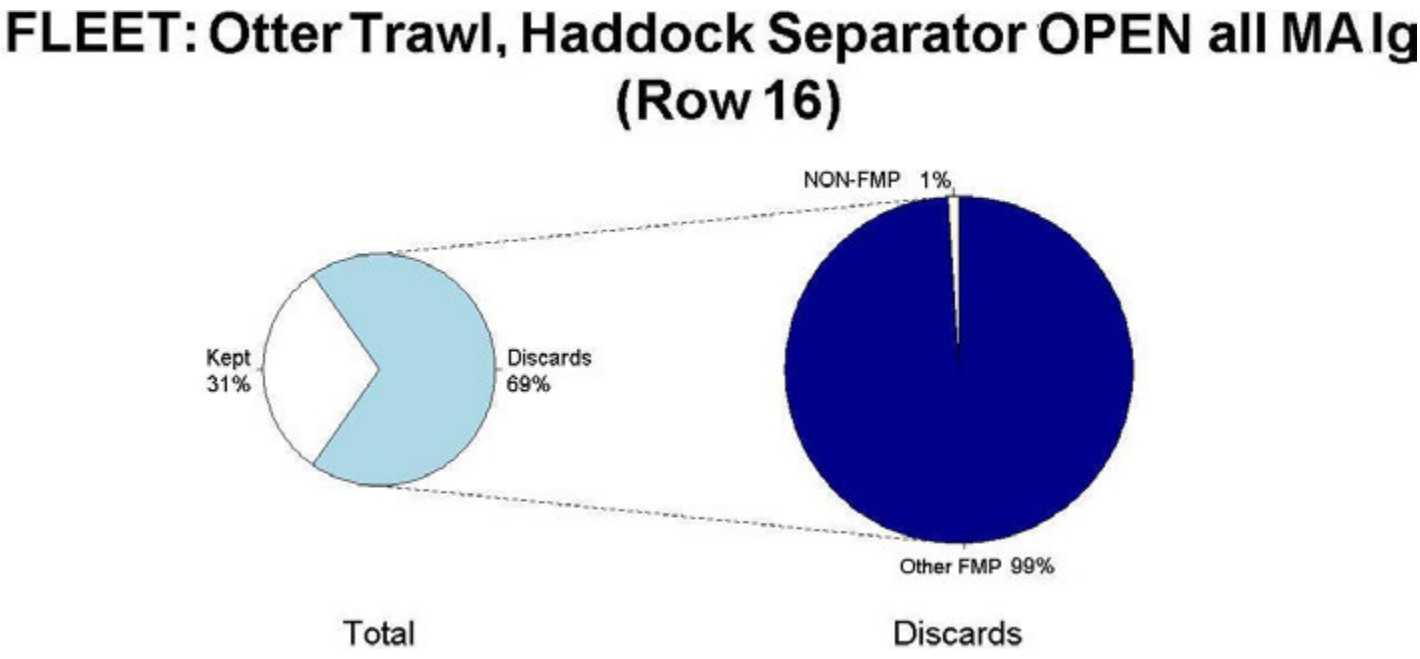


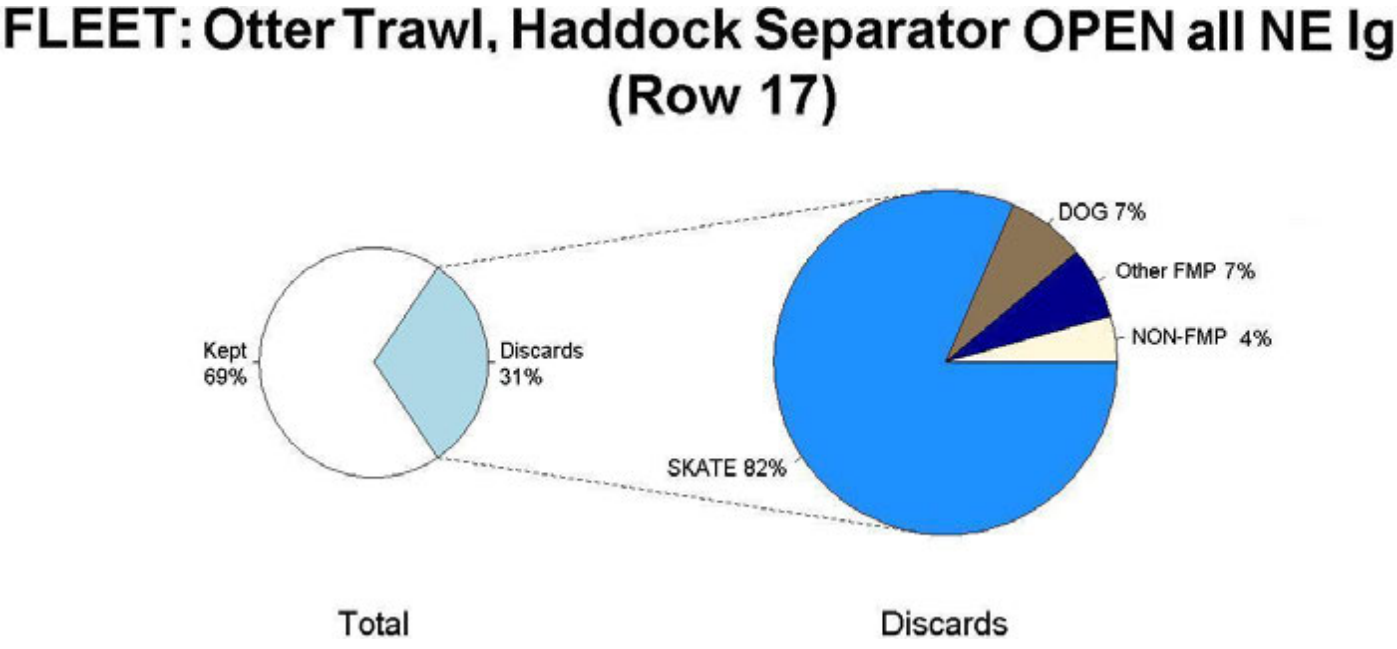
FLEET: Otter Trawl, Ruhle OPEN all NE lg (Row 15)



See supporting text for abbreviations.

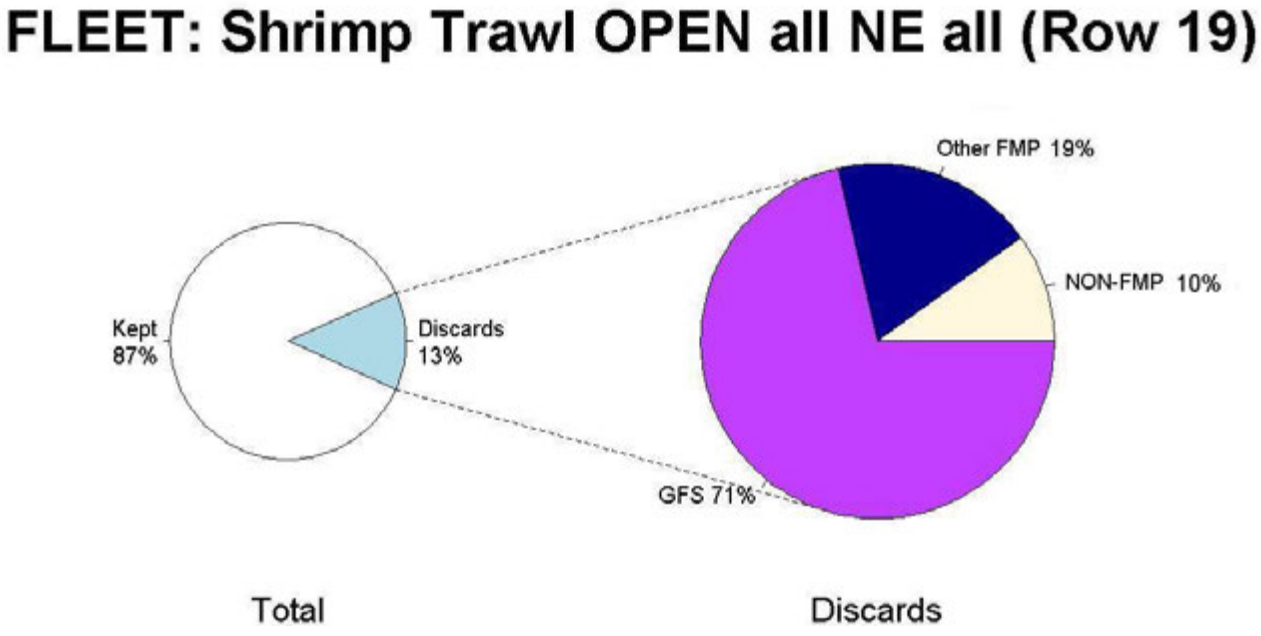
Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

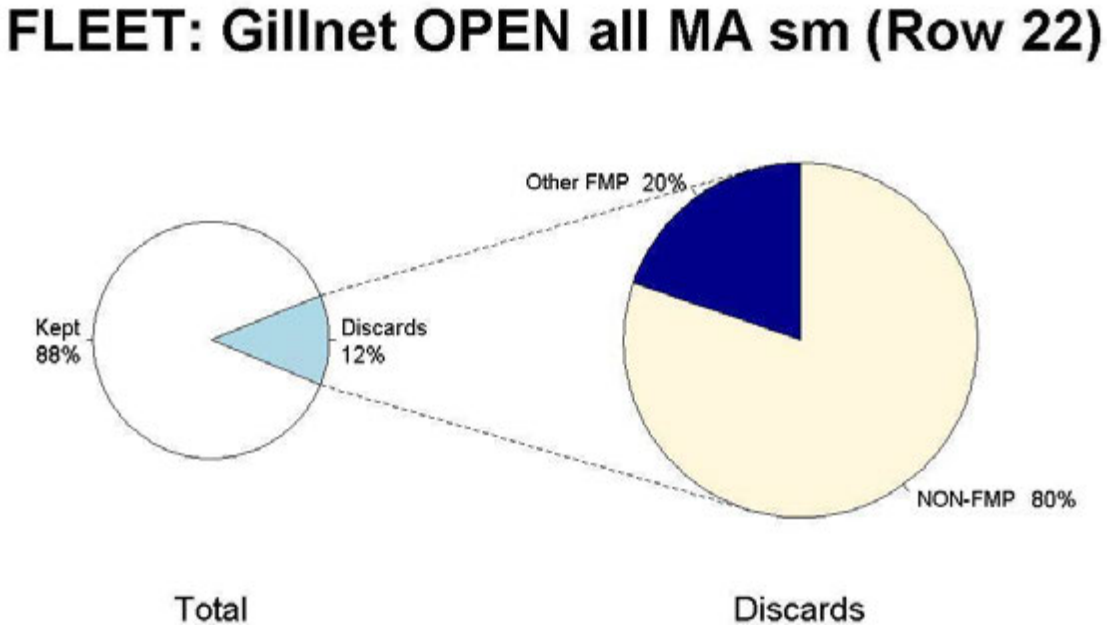




See supporting text for abbreviations.

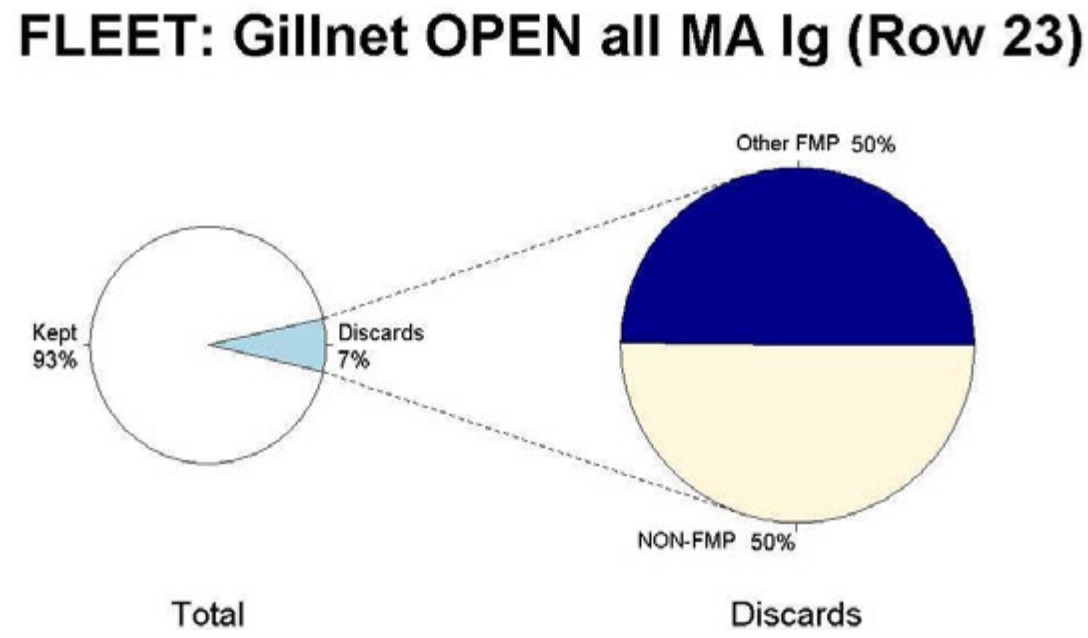
Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

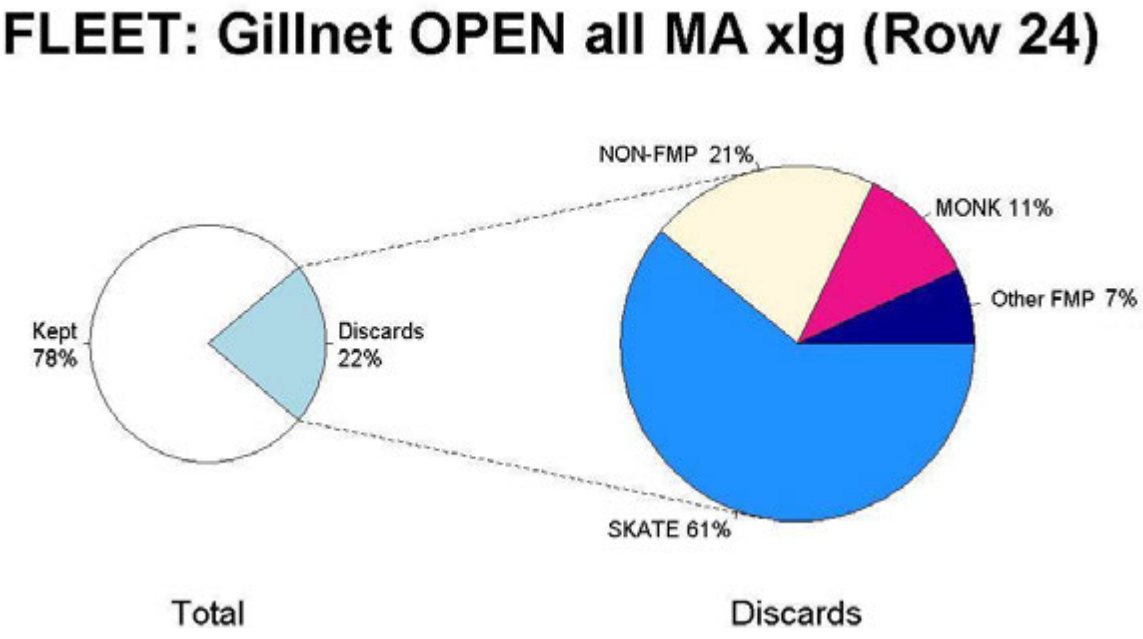




See supporting text for abbreviations.

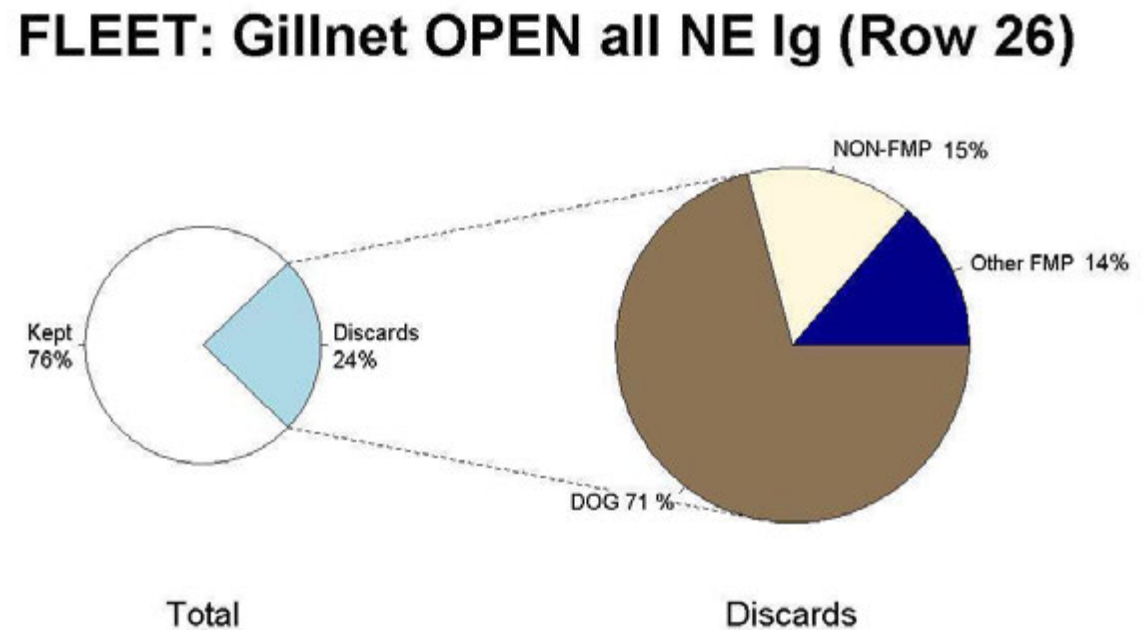
Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

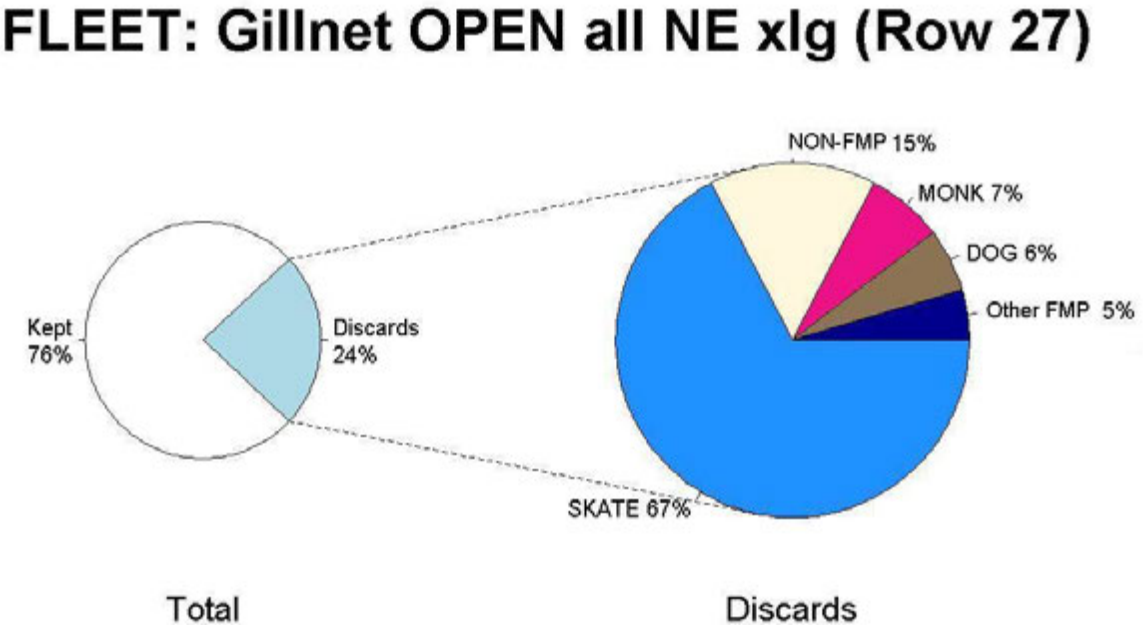




See supporting text for abbreviations.

Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

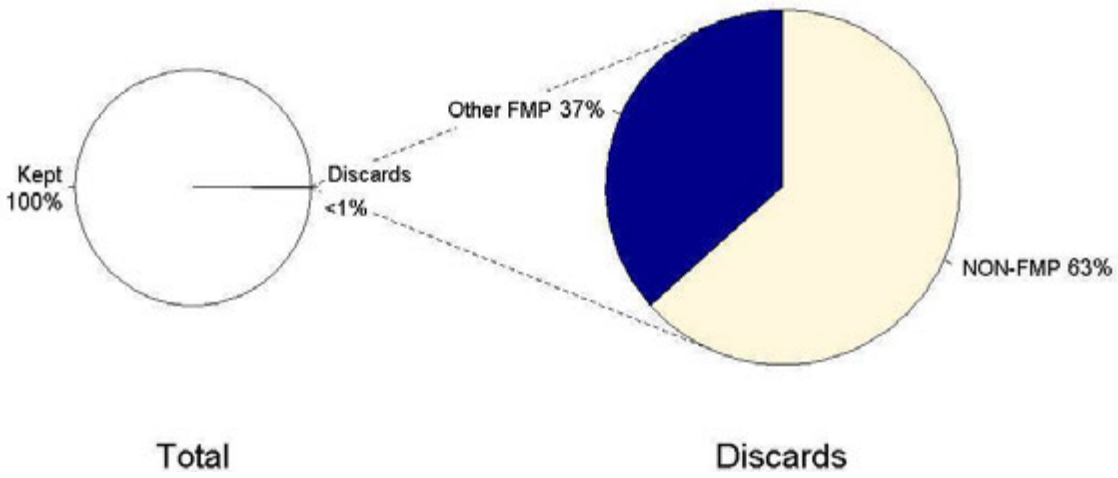




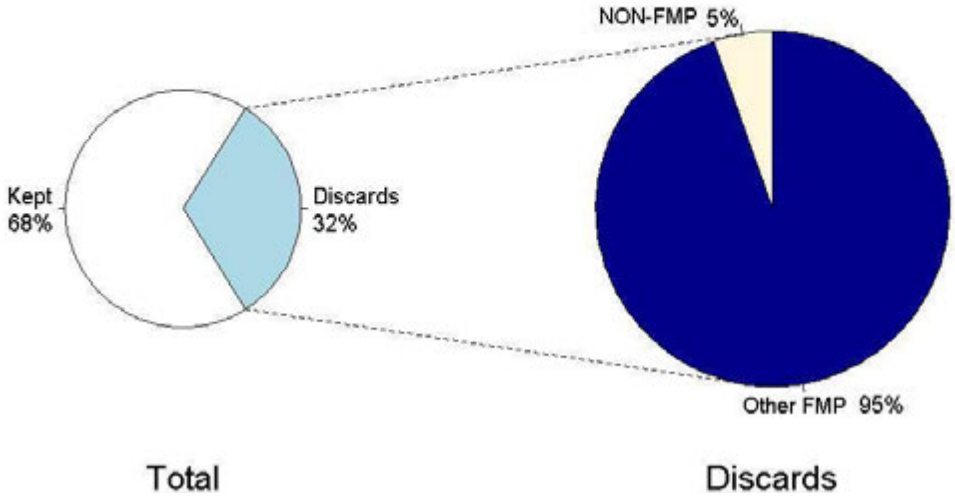
See supporting text for abbreviations.

Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

FLEET: Purse Seine OPEN all NE all (Row 29)

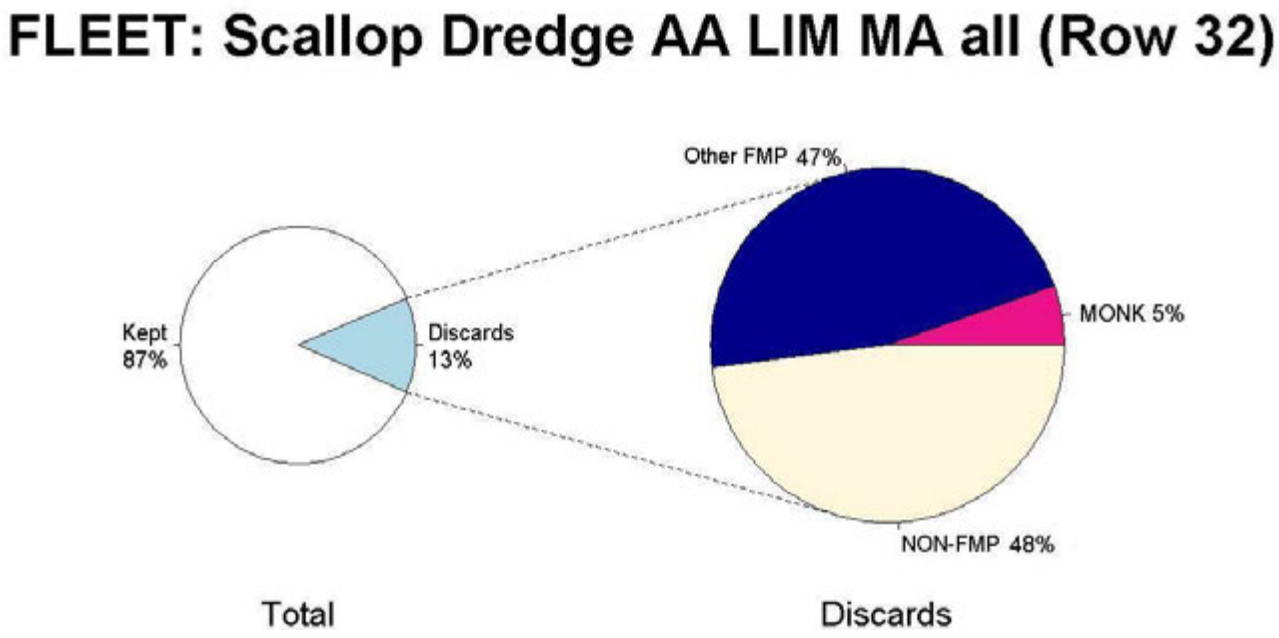


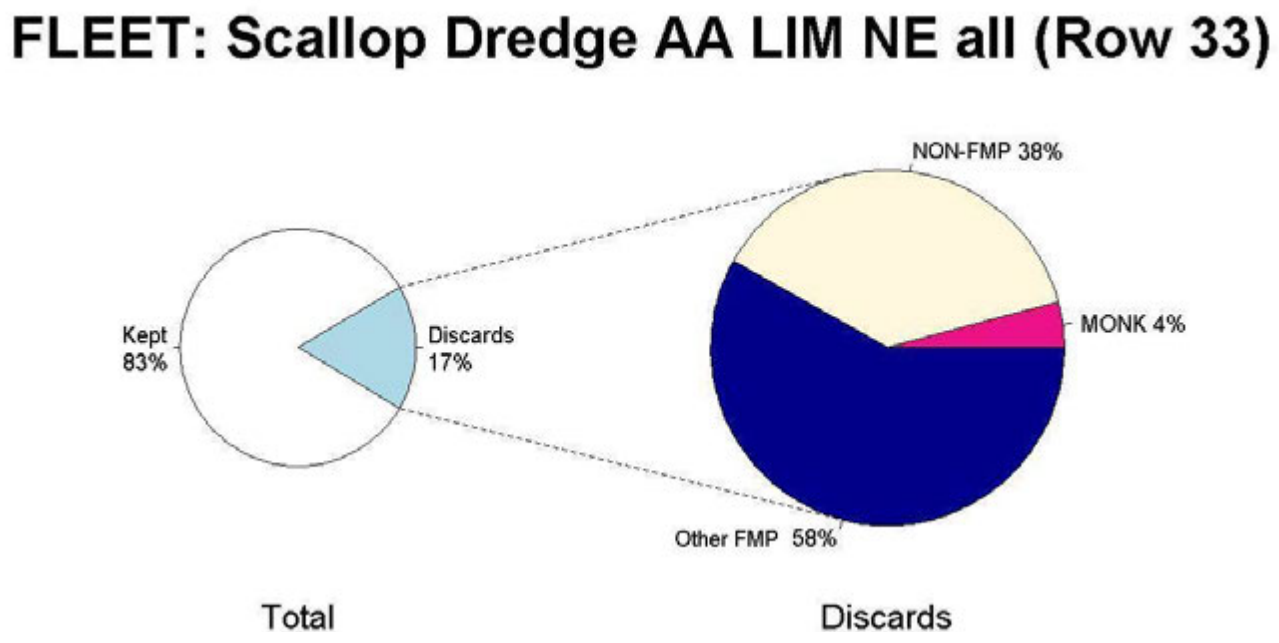
FLEET: Scallop Dredge AA GEN NE all (Row 31)



See supporting text for abbreviations.

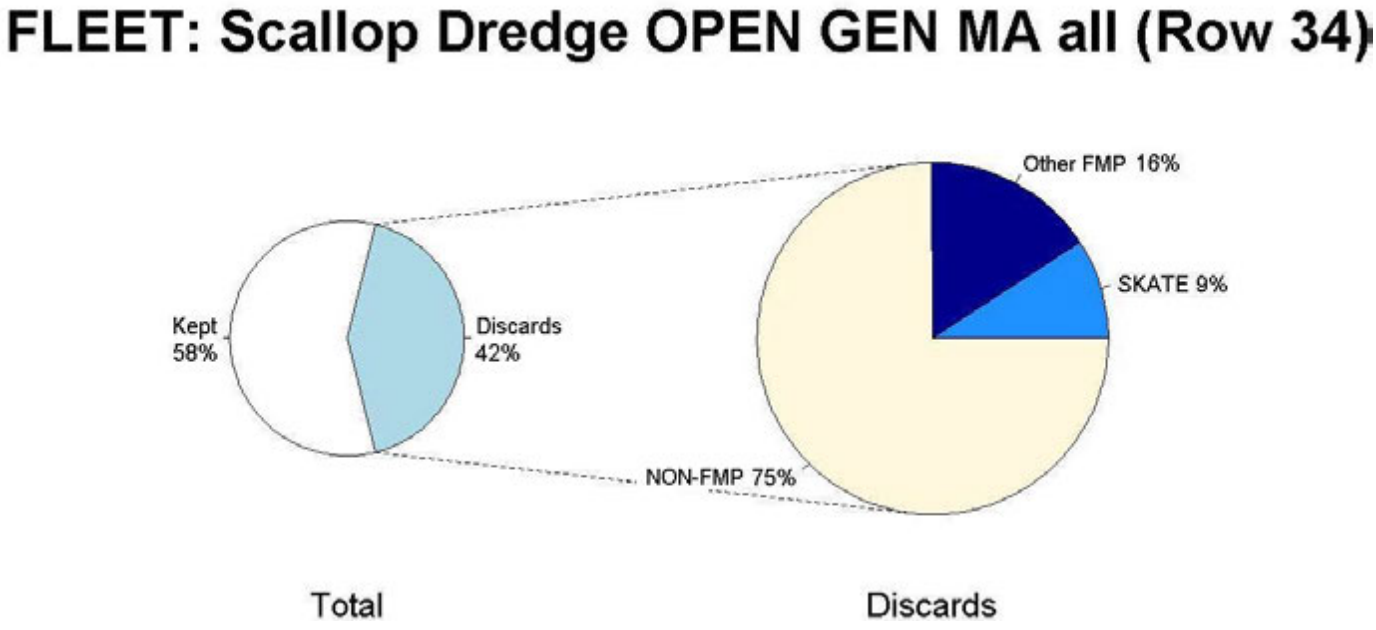
Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

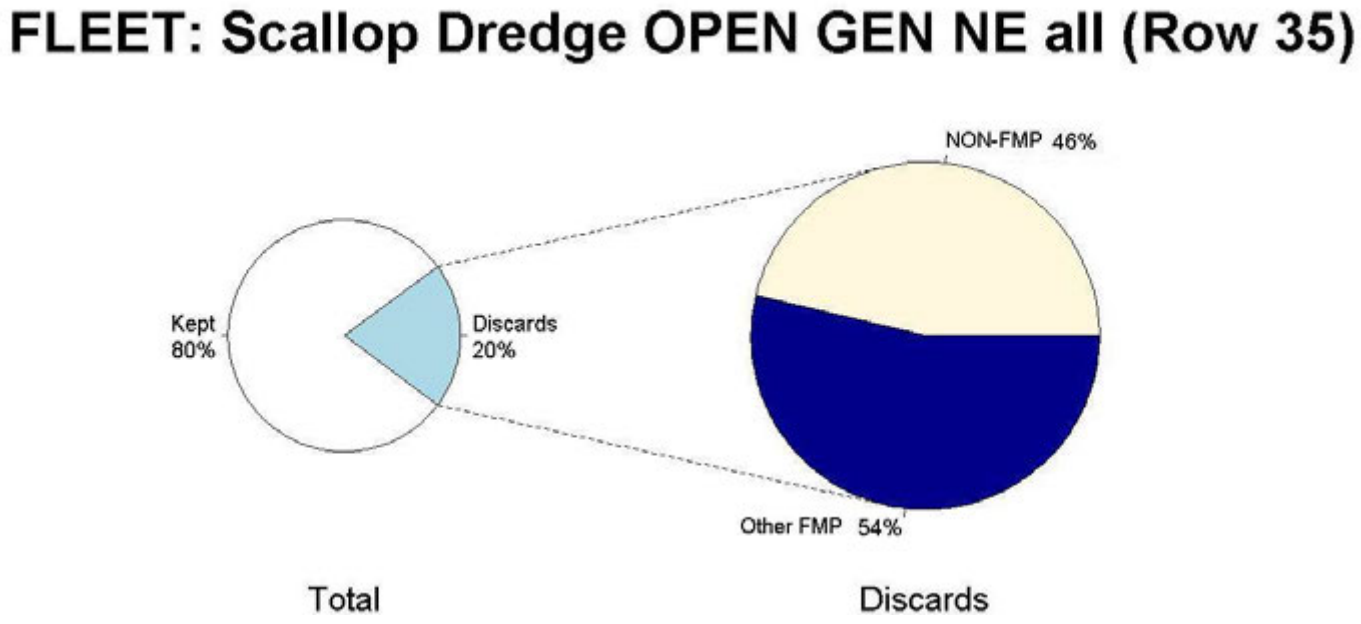




See supporting text for abbreviations.

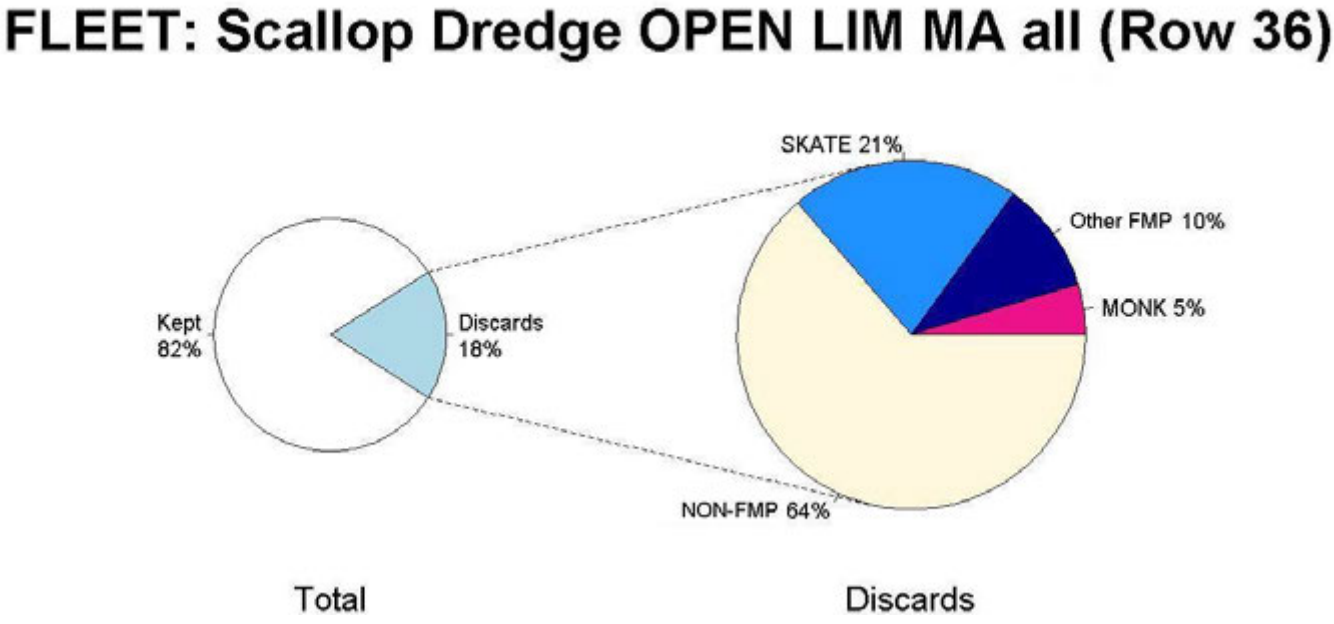
Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

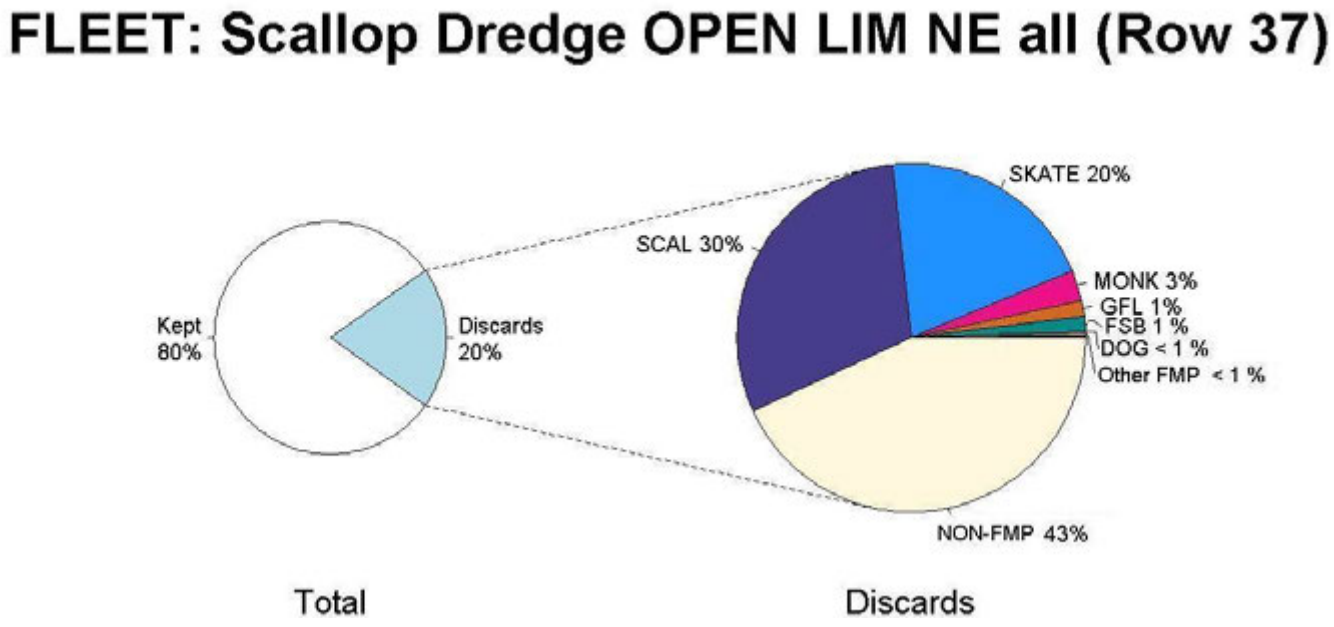




See supporting text for abbreviations.

Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

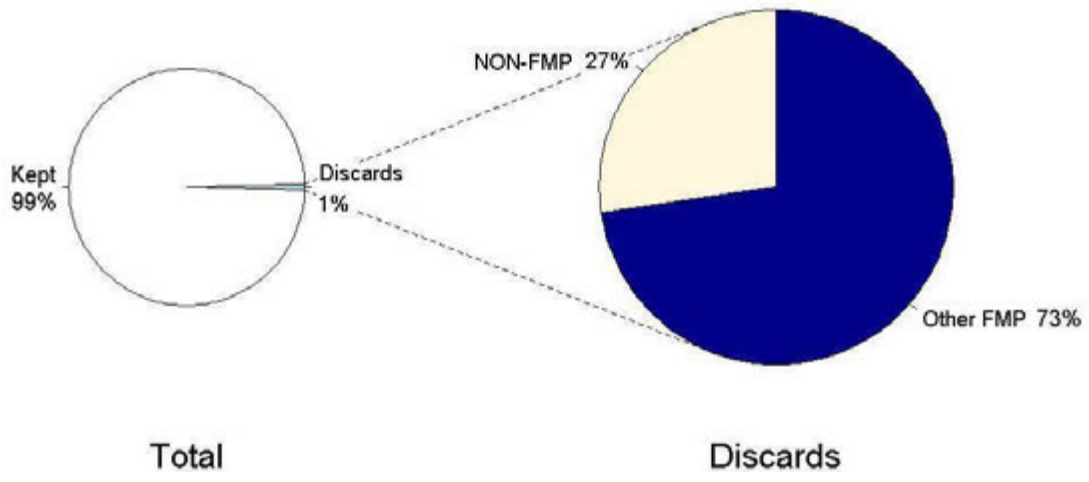




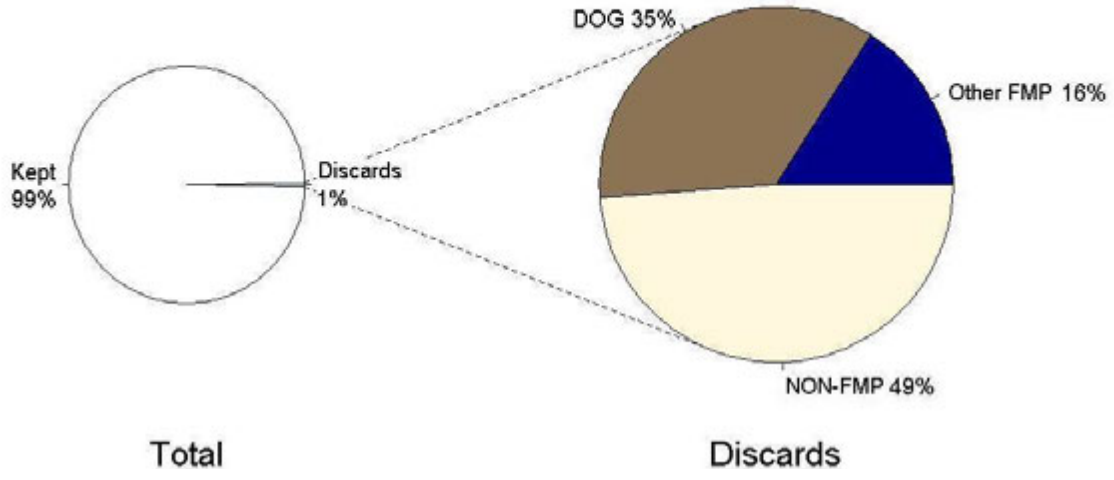
See supporting text for abbreviations.

Figure 2, continued. Percentage of Vessel Trip Report landings (kept) and estimated discards (Total, left pie) and the percentage of estimated discards by FMP and non-FMP species groups (Discards, right pie) for 26 selected fleets for July 2010 through June 2011. See Table 1 for species group abbreviations; FMP species groups that were filtered out through the importance filter have been aggregated and labeled "Other FMP" species groups; non-FMP species have been grouped and labeled "Non-FMP."
Note: Selected fleets include Rows 2, 4-8, 11, 15-17, 19, 22-24, 26-27, 29, and 31-39; these represent fleets where discards were estimated in 2012.

FLEET: Mid-water Trawl OPEN all MA all (Row 38)



FLEET: Mid-water Trawl OPEN all NE all (Row 39)



See supporting text for abbreviations.

Figure 3. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

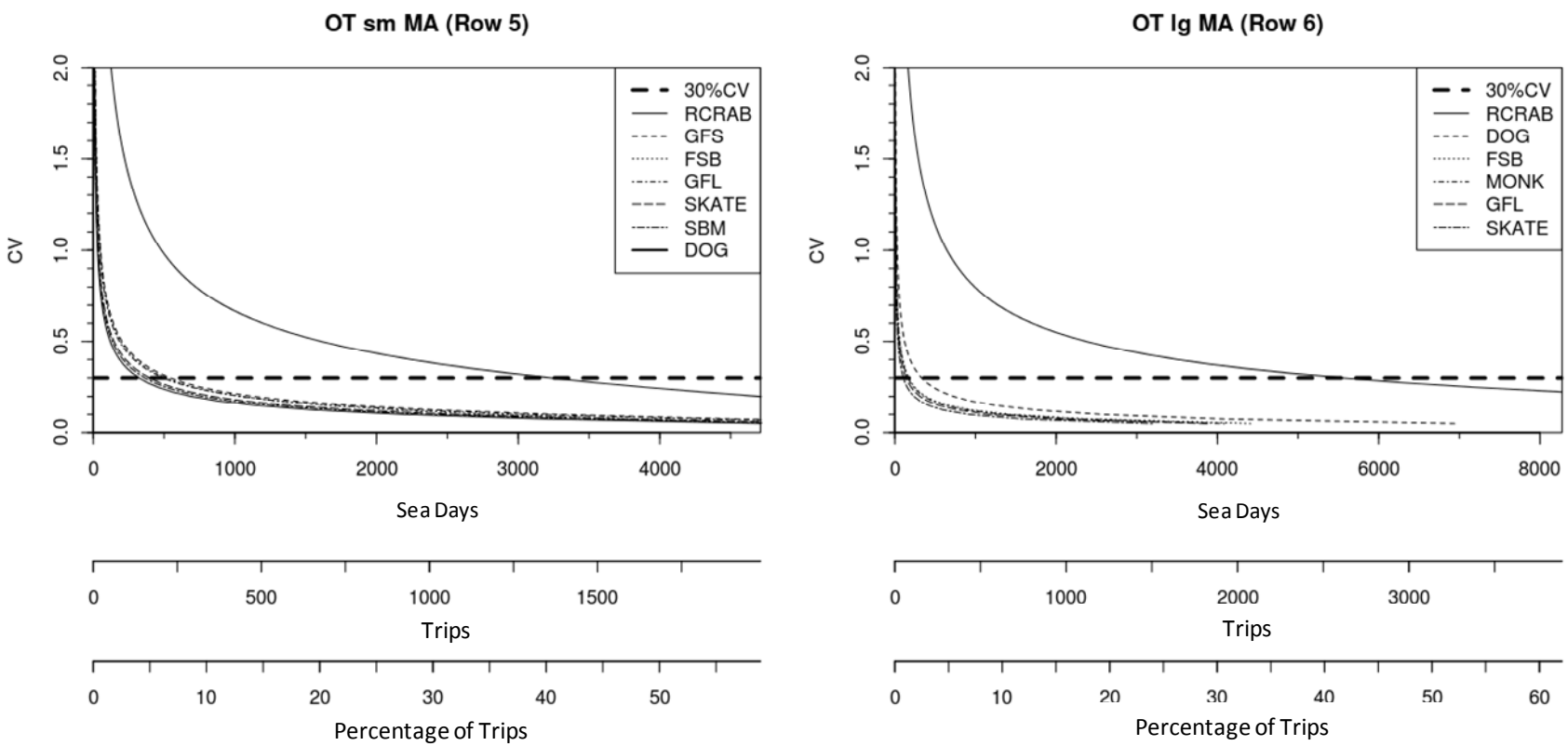


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

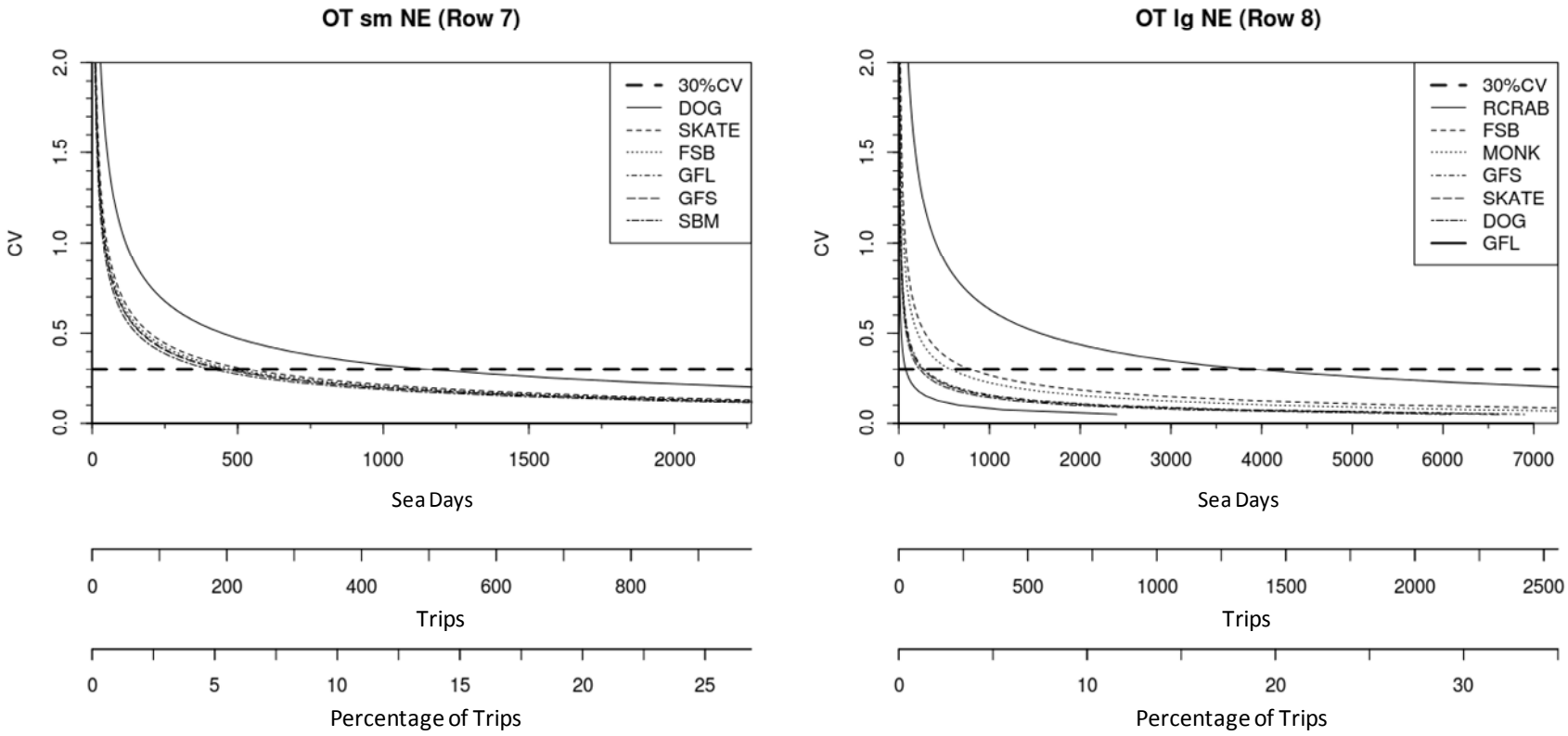


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

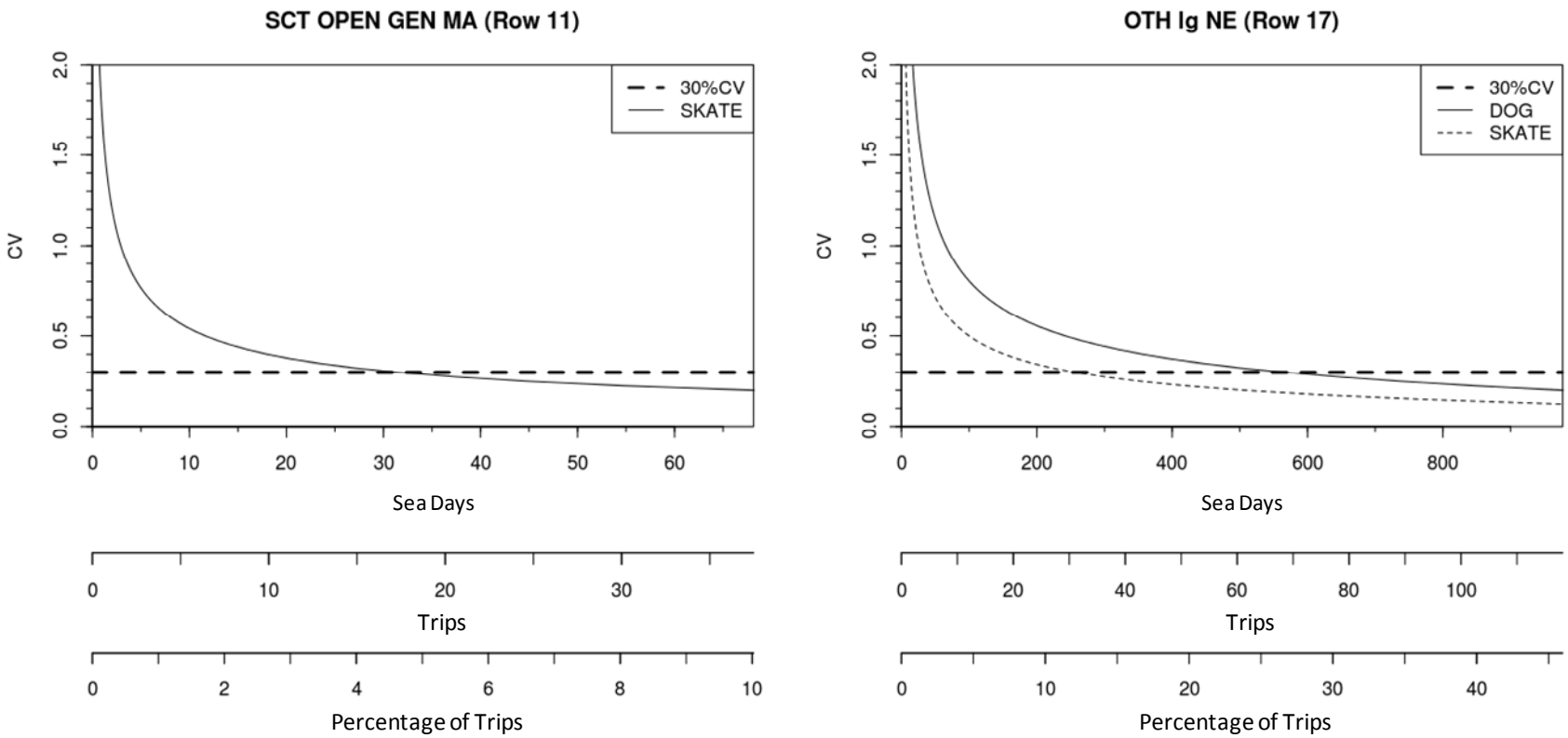


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

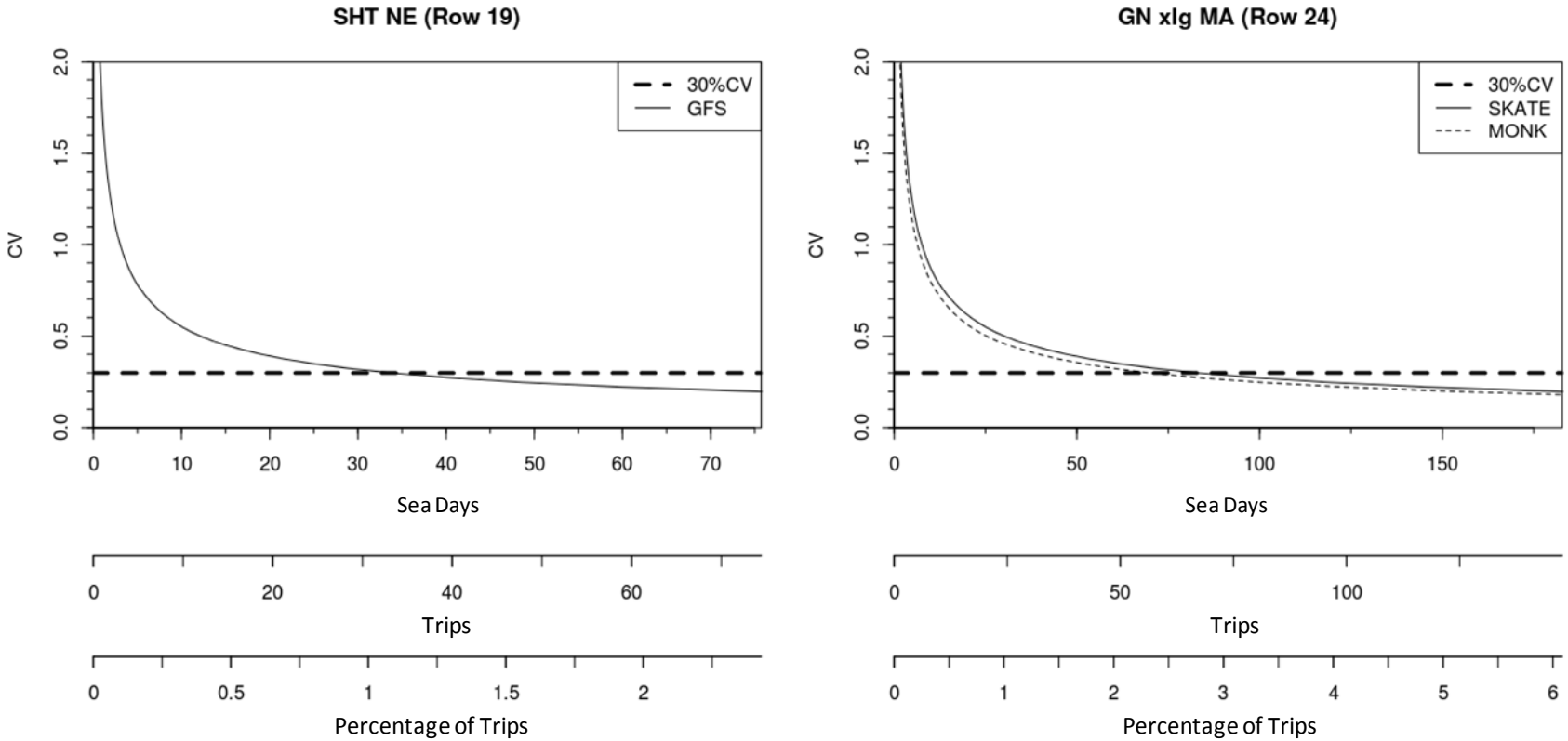


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

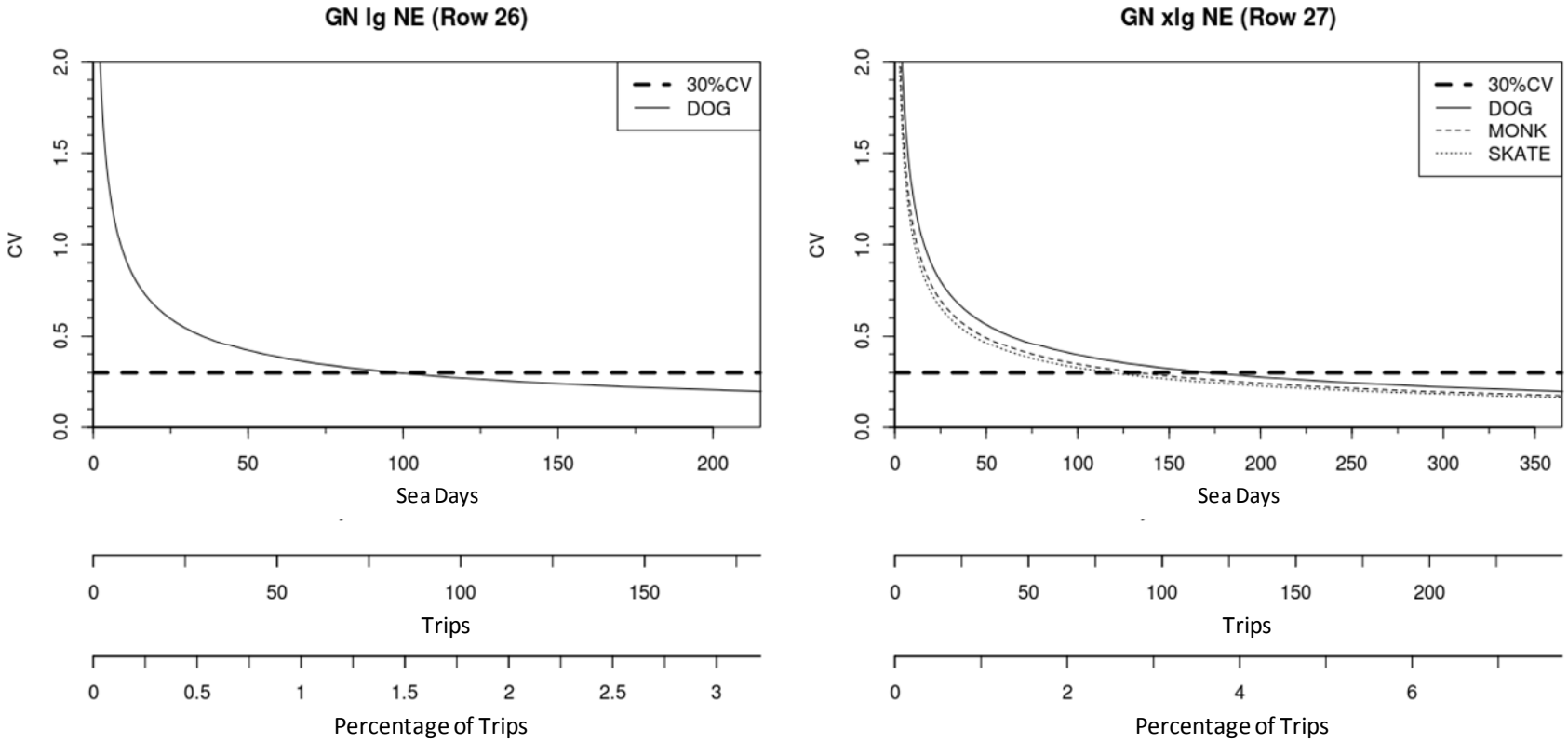


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

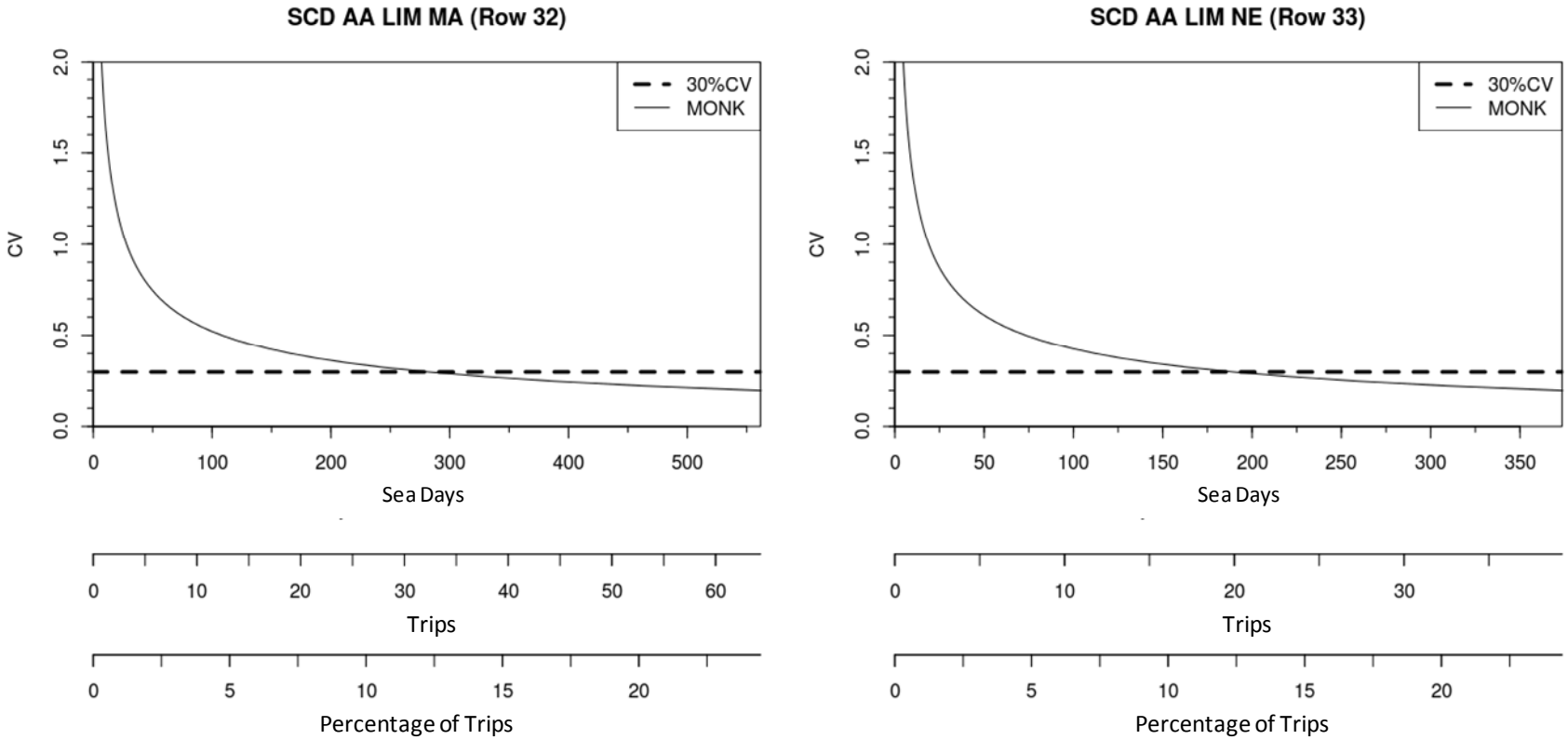


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.

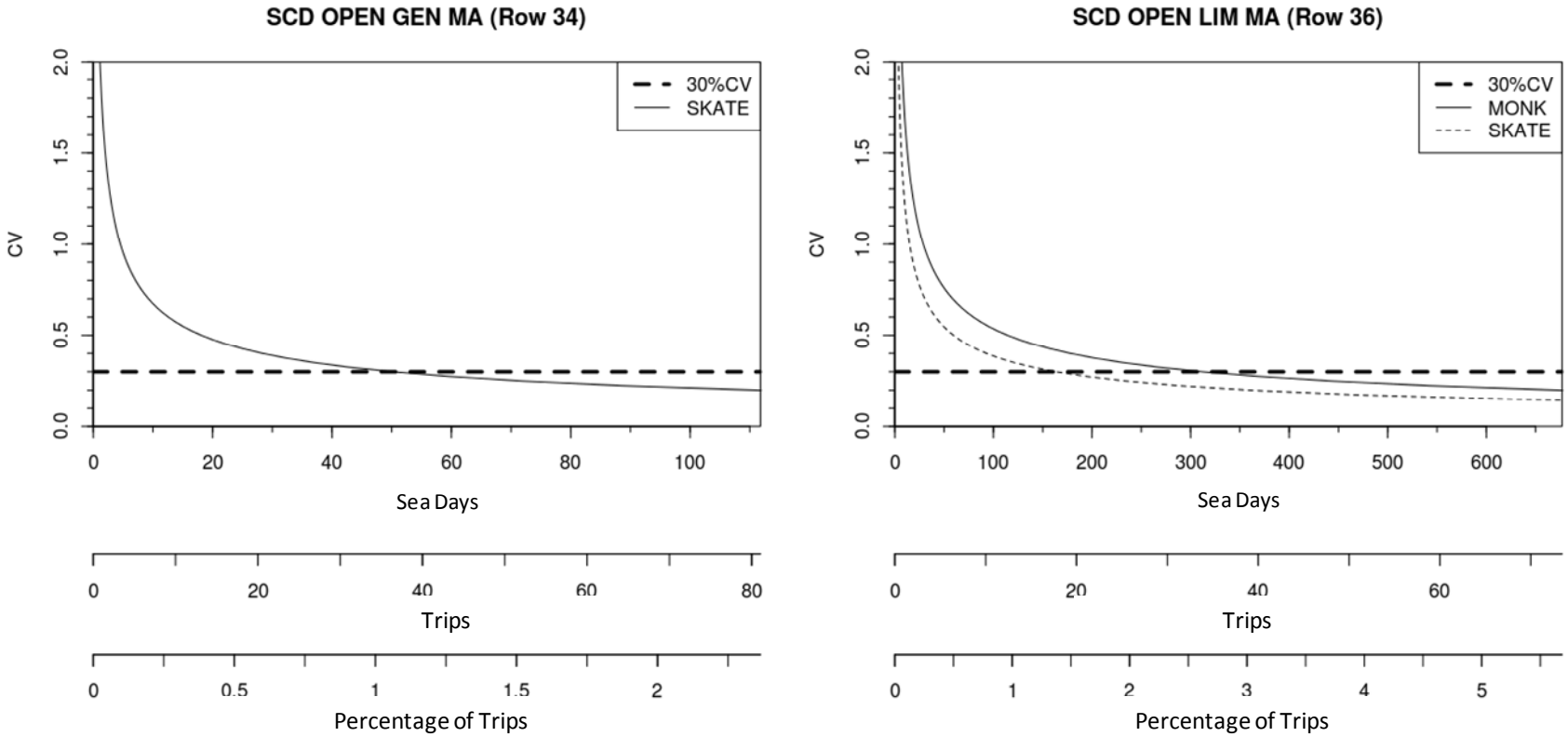
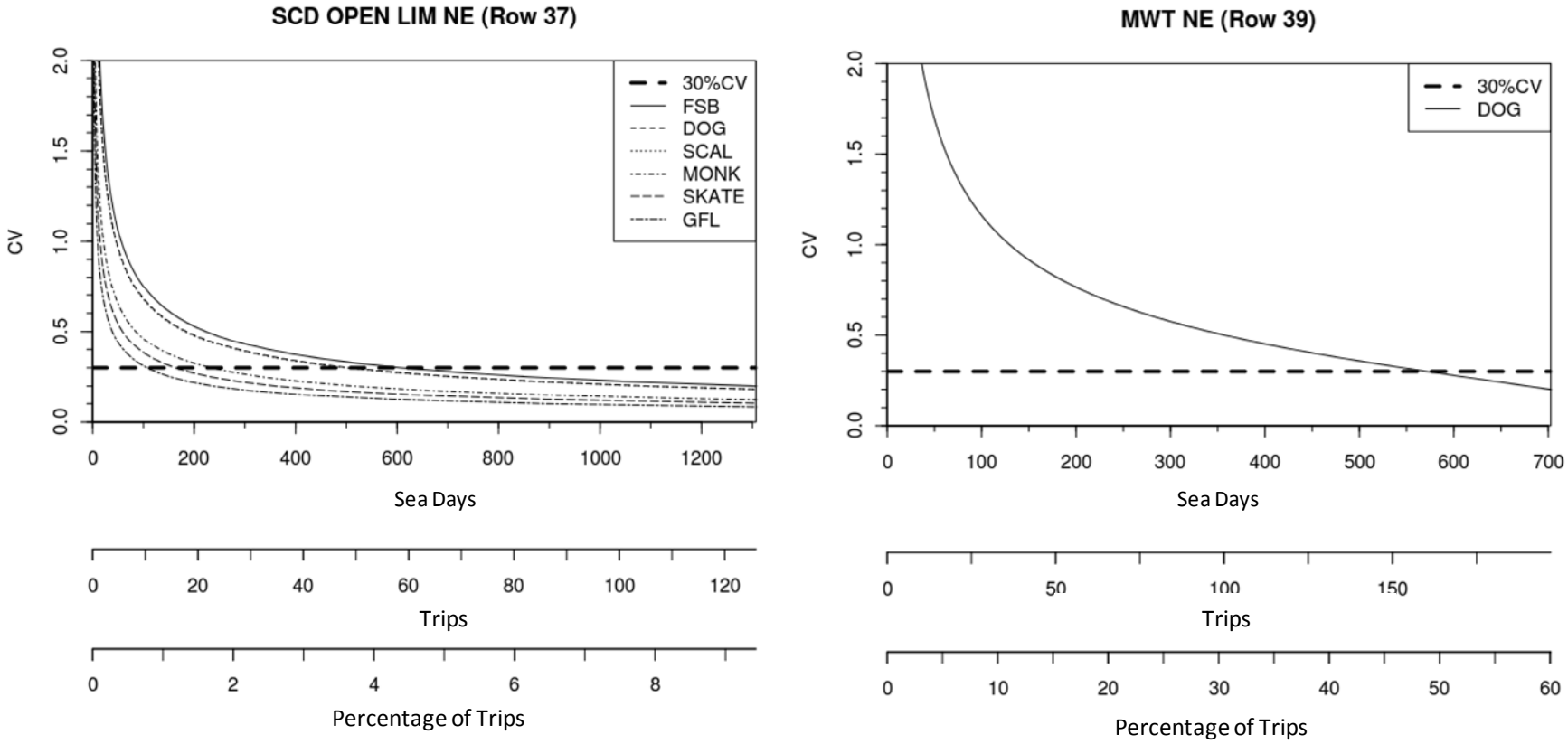


Figure 3, continued. Results from the 2012 sample size analysis conducted for 16 selected fleets. The curves represent the relationship between the coefficient of variance (CV) and the sample size (sea days, trips, and percent of trips) for each of the species groups that were not filtered out. The dash line is the 30% CV. For species group and fleet abbreviations, see Table 1 and Appendix Table 3, respectively.



APPENDIX

Equations used in discard estimation and sample size analysis.

Total discarded pounds for species *j* is defined as:

$$(1)\quad \hat{D}_j = \sum_{h=1}^{Q} K_h r_{c,j}$$

where

$$(2)\quad r_{c,j} = \frac{\sum_{h=1}^{Q} N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^{Q} N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}}$$

Where $\hat{D}_j$ is total discarded pounds for species *j*; K_h is VTR total kept pounds in stratum *h*; $r_{c,j}$ is the combined ratio of species *j*; d_{jih} is discards of species *j* from trip *i* in stratum *h*; k_{ih} is kept pounds of all species on trip *i* in stratum *h*; N_h is the number of VTR trips in stratum *h*; n_h is the number of observed trips in stratum *h*. In Eq. 2 the summation over strata *h* = 1 to *Q* is over calendar quarters and the other strata values are held constant. Equation 3 (below) requires a more explicit definition of the stratum designation since the summation over quarter relies on an annual average ratio defined in Eq. 2.

Variance of $\hat{D}_j$ for species *j* is defined as:

$$(3)\quad V(\hat{D}_j) = \sum_{q=1}^{4} K_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(d_{jiqh}^2 + (r_{c,j})^2 k_{iqh}^2 - 2 r_{c,j}\, d_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right]$$

where $\hat{D}_j$ is total discarded pounds for species *j*; K_{qh} is VTR total kept pounds in quarter *q* and stratum *h*; $r_{c,j}$ is the combined ratio of species *j* ; d_{jiqh} is discards of species *j* from trip *i* in quarter *q* and stratum *h*; k_{iqh} is kept pounds of all species on trip *i* in quarter *q* and stratum *h*; N_{qh} is the number of VTR trips in quarter *q* and stratum *h*; n_{qh} is the number of observed trips in quarter *q* and stratum *h*.

Coefficient of variation (CV) of $\hat{D}_j$ is defined as:

$$(4)\quad CV(\hat{D}_j) = \frac{\sqrt{V(\hat{D}_j)}}{\hat{D}_j}$$

The number of sea days and trips needed to achieve a 30% CV are derived based on the variance of the total discards using the combined ratio method and the d/k discard ratio (Eq. 3).

From Eq. 3, let

$$(5)\quad \hat{S}^2_{jqh} = \left[\frac{\sum_{i=1}^{n_{qh}} \left(d^2_{jiqh} + \left(r_{c,jh}\right)^2 k^2_{iqh} - 2r_{c,j}\ d_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right] \quad \text{and}$$

$$(6)\quad \delta_{qh} = \frac{n_{qh}}{\sum_{q=1}^{4} n_{qh}}$$

where δ_{qh} is the fraction of the trips in quarter *q* in stratum *h*; $r_{c,jh}$ is the combined annual ratio of species *j* in stratum *h*; d_{jiqh} is discards of species *j* from trip *i* in stratum *h* in quarter *q*; k_{iqh} is kept pounds of all species on trip *i* in stratum *h* in quarter *q*; and n_{qh} is the number of observed trips in stratum *h* in quarter *q*. The $r_{c,jh}$ in Eq. 5 is defined in Eq. 2 where the summation is over quarters within a given strata defined by gear, region, access area, trip type and so forth.

The number of trips necessary to achieve a 30% CV based on the variance of the composite annual total discards for species group *j* in stratum *h* is defined as

$$(7)\quad \hat{T}D_{30\,jh} = \frac{\sum_{q=1}^{4} \left(\frac{K^2_{qh}}{\bar{k}^2_{qh}} \hat{S}^2_{jqh} \frac{1}{\delta_{qh}} \right)}{(0.09)\hat{D}_{jh}{}^2 + \frac{\sum_{q=1}^{4} \frac{K^2_{qh}}{\bar{k}^2_{qh}} \hat{S}^2_{jqh}}{N_h}}$$

where $0.09 = 0.30^2$, the square of the 30%CV, the given target precision level.

The number of sea days necessary to achieve a 30% CV based on the variance of the composite annual total discards for species group *j* in stratum *h* is defined as

$$(8)\quad \hat{S}D_{30\,jh} = \hat{T}D_{30\,jh} * \overline{DA_h}$$

where $\overline{DA}_h$ is the weighted average trip length of VTR trips in stratum *h* (weighted by the number of VTR trips in each quarter) .

When total discards could not be estimated due to little or no observer coverage (no data) or when total discards are zero (no variance), sample size was determined by pilot cover, where 2% of the quarterly VTR trips for a fleet were multiplied by the quarterly mean VTR trip length.

(9) $\hat{S}_{30,jhq} = \hat{T}_{hq} * \overline{DA_{hq}}$

where $\hat{T}_{hq}$ is 2% of the VTR trips in stratum *h* and quarter *q*, and 3 <= $\hat{T}_{hq}$ <= 100 trips; $\overline{DA}_{hq}$ is the average trip length of VTR trips in stratum *h* and quarter *q*. The quarterly trips and sea days were then summed for annual number of trips and sea days.

The achieved precision resulting from the number of funded sea days can be derived by converting funded sea days into funded trips. The number of funded trips, $\hat{T}F_h$ for stratum *h* is defined as:

(10) $\hat{T}F_h = \hat{S}F_h / \overline{DA_h}$

where $\hat{S}F_h$ is the number of funded sea days in stratum *h* and $\overline{DA}_h$ is the weighted average trip length of VTR trips in stratum *h* (weighted by the number of VTR trips in each quarter).

The achieved coefficient of variation (CV) of $\hat{D}_j$ is based on the variance of the composite annual total discards for species group *j* in stratum *h* and the number of funded trips in stratum *h* and re-writing Eq. 7.

From Eq. 7, let

(11) $$CV(\hat{D}_{jh}) = \sqrt{\frac{\sum_{q=1}^{4}\left(\frac{K_{qh}^2}{\bar{k}_{qh}^2}\hat{S}_{jqh}^2\frac{1}{\delta_{qh}}\right) - \hat{T}F_h\left[\frac{\sum_{q=1}^{4}\left(\frac{K_{qh}^2}{\bar{k}_{qh}^2}\hat{S}_{jqh}^2\right)}{N_h}\right]}{\hat{T}F_h * \hat{D}_{jh}^{\ 2}}}$$

Appendix Table 1. Discard reason categories used in Appendix Tables 2A and 2B.

Discard Reason Category	FISH DISPOSITION Code[9]	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
Poor Quality	031	POOR QUALITY, REASON NOT SPECIFIED
	032	POOR QUALITY, SANDFLEA DAMAGE
	033	POOR QUALITY, SEAL DAMAGE
	034	POOR QUALITY, SHARK DAMAGE
	035	POOR QUALITY, CETACEAN DAMAGE
	036	POOR QUALITY, HAGFISH DAMAGE
	037	POOR QUALITY, SHALL DISEASE
	038	POOR QUALITY, GEAR DAMAGE
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)	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.
Other	000	DISCARDED GENERAL, UNKNOWN DISCARD REASON
	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.
	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.
	099	OTHER, DISCARDED

[9] Fish disposition code "039" = POOR QUALITY, PREVIOUSLY DISCARDED has been excluded from this report.

Appendix Table 2A. Estimated discards (live pounds) and percentage by discard reason category for the 14 species for July 2010 through June 2011. Note: Salmon is not presented due to no discards.

Species Group: BLUEFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					375,371	44.3	0.9	17.3	21.0	5.8	10.7	100.0

Species Group: FLUKE - SCUP - BLACK SEA BASS

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	1,088,895	4.6	71.2	20.6	0.7	0.0	2.7	100.0
6	Otter Trawl	OPEN	all	MA	lg	1,041,621	2.1	63.5	31.4	0.0	0.0	3.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	832,098	10.9	62.6	22.2	0.8	0.1	3.4	100.0
8	Otter Trawl	OPEN	all	NE	lg	625,775	3.0	8.1	78.6	1.7	0.6	7.9	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	838,800	74.5	0.0	24.5	0.9	0.1	0.0	100.0
	27 Other fleets filtered out					965,046	49.0	6.9	39.5	1.0	2.6	1.2	100.0

Species Group: HERRING, ATLANTIC

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					387,511	77.6	0.0	4.4	0.0	0.5	17.6	100.0

Species Group: LARGE MESH GROUNDFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	824,043	31.1	3.4	64.4	1.1	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	779,536	29.1	3.1	56.4	11.4	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	400,400	10.7	3.2	85.9	0.1	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	2,214,486	6.4	62.7	29.7	0.0	0.8	0.4	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	841,986	76.5	0.6	22.8	0.1	0.0	0.0	100.0
	27 Other fleets filtered out					2,277,083	13.7	24.3	53.5	1.2	6.2	1.1	100.0

See supporting text for abbreviations.

Appendix Table 2A, continued. Estimated discards (live pounds) and percentage by discard reason category for the 14 species groups for July 2010 through June 2011. Note: Salmon is not presented due to no discards.

Species Group: MONKFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
6	Otter Trawl	OPEN	all	MA	lg	201,027	27.3	54.6	18.0	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	634,066	1.5	75.0	16.2	0.0	0.1	7.2	100.0
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	199,762	0.4	7.0	3.1	0.0	89.5	0.0	100.0
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	283,601	1.0	6.3	2.0	0.0	87.2	3.5	100.0
32	Scallop Dredge	AA	LIM	MA	all	188,197	76.6	18.5	3.2	0.0	0.0	1.6	100.0
33	Scallop Dredge	AA	LIM	NE	all	178,549	75.7	22.6	0.2	0.0	0.2	1.4	100.0
36	Scallop Dredge	OPEN	LIM	MA	all	1,697,549	79.5	12.1	7.2	0.0	0.0	1.1	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	1,607,216	68.9	30.3	0.0	0.1	0.0	0.7	100.0
24 Other fleets filtered out						403,389	26.6	53.3	17.0	1.8	0.5	0.7	100.0

Species Group: RED CRAB

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	335,300	100.0	0.0	0.0	0.0	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	222,747	100.0	0.0	0.0	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	318,214	100.0	0.0	0.0	0.0	0.0	0.0	100.0
29 Other fleets filtered out						2,586,192	100.0	0.0	0.0	0.0	0.0	0.0	100.0

Species Group: SEA SCALLOP

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
37	Scallop Dredge	OPEN	LIM	NE	all	17,327,809	87.0	0.0	0.0	0.0	3.1	9.8	100.0
31 Other fleets filtered out						8,115,737	70.2	0.4	13.7	0.6	4.3	10.8	100.0

Appendix Table 2A, continued. Estimated discards (live pounds) and percentage by discard reason category for the 14 species groups for July 2010 through June 2011. Note: Salmon is not presented due to no discards.

Species Group: SKATE COMPLEX

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	4,366,912	95.1	0.0	4.8	0.1	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	11,047,681	88.2	0.0	10.0	0.0	0.0	1.7	100.0
7	Otter Trawl	OPEN	all	NE	sm	1,585,782	64.9	0.0	35.0	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	28,539,292	71.0	0.1	25.7	0.0	0.0	3.1	100.0
11	Scallop Trawl	OPEN	GEN	MA	all	1,190,509	99.8	0.0	0.0	0.0	0.2	0.0	100.0
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	2,373,349	74.5	0.1	22.8	0.0	0.0	2.6	100.0
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	1,100,411	18.1	0.1	73.6	0.0	2.9	5.4	100.0
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	2,735,262	20.3	0.4	52.4	0.1	16.1	10.6	100.0
34	Scallop Dredge	OPEN	GEN	MA	all	858,165	100.0	0.0	0.0	0.0	0.0	0.0	100.0
36	Scallop Dredge	OPEN	LIM	MA	all	7,701,133	99.9	0.0	0.0	0.0	0.0	0.1	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	11,746,489	99.6	0.0	0.4	0.0	0.0	0.0	100.0
21 Other fleets filtered out						3,252,659	94.4	0.0	5.0	0.0	0.0	0.5	100.0

Species Group: SMALL MESH GROUNDFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	1,916,300	98.9	0.3	0.0	0.0	0.7	0.1	100.0
7	Otter Trawl	OPEN	all	NE	sm	3,153,636	95.4	0.3	3.4	0.0	0.9	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	227,432	97.8	0.9	0.9	0.0	0.2	0.1	100.0
19	Shrimp Trawl	OPEN	all	NE	all	949,223	52.5	0.0	47.5	0.0	0.0	0.0	100.0
28 Other fleets filtered out						1,424,060	98.1	0.0	0.0	0.0	1.8	0.0	100.0

Appendix Table 2A, continued. Estimated discards (live pounds) and percentage by discard reason category for the 14 species groups for July 2010 through June 2011. Note: Salmon is not presented due to no discards.

Species Group: SPINY DOGFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	4,037,129	79.6	0.0	19.7	0.6	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	4,505,364	55.2	0.2	40.1	1.6	0.0	2.9	100.0
7	Otter Trawl	OPEN	all	NE	sm	1,789,471	43.7	0.0	56.1	0.2	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	3,467,413	60.8	0.0	38.5	0.5	0.0	0.1	100.0
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	213,880	91.9	0.0	8.1	0.0	0.0	0.0	100.0
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	2,942,511	56.7	0.5	40.3	0.0	1.6	0.9	100.0
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	233,724	45.9	0.1	46.1	0.0	7.6	0.3	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	211,272	93.1	0.0	6.9	0.0	0.0	0.0	100.0
39	Mid-water paired & single Trawl	OPEN	all	NE	all	211,974	94.2	0.0	5.8	0.0	0.0	0.0	100.0
	23 Other fleets filtered out					885,034	63.1	0.2	25.9	0.4	5.4	5.1	100.0

Species Group: SQUID - BUTTERFISH – MACKEREL

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	2,360,495	90.2	0.4	5.0	0.0	1.2	3.2	100.0
7	Otter Trawl	OPEN	all	NE	sm	3,403,902	76.9	0.2	9.4	0.4	2.1	11.1	100.0
	30 Other fleets filtered out					281,226	99.1	0.3	0.4	0.0	0.1	0.1	100.0

Species Group: SURFCLAM - OCEAN QUAHOG

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					56,151	99.4	0.0	0.6	0.0	0.0	0.0	100.0

Species Group: TILEFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					10,405	58.9	9.6	7.8	0.0	23.7	0.0	100.0

Appendix Table 2B. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: BLACK SEA BASS

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	145,771	1.9	56.5	35.5	0.1	0.0	6.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	182,277	1.5	76.8	18.7	0.0	0.0	3.1	100.0
7	Otter Trawl	OPEN	all	NE	sm	70,151	12.5	54.0	32.5	0.0	0.0	1.0	100.0
29 Other fleets filtered out						33,609	70.4	0.5	28.8	0.2	0.0	0.0	100.0

Species Group: FLUKE

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	461,091	7.4	45.6	40.1	1.9	0.0	4.9	100.0
6	Otter Trawl	OPEN	all	MA	lg	613,835	1.0	64.4	30.7	0.0	0.0	3.9	100.0
7	Otter Trawl	OPEN	all	NE	sm	120,949	15.3	20.0	55.4	4.5	0.4	4.4	100.0
8	Otter Trawl	OPEN	all	NE	lg	574,365	2.8	5.2	81.9	1.3	0.7	8.2	100.0
36	Scallop Dredge	OPEN	LIM	MA	all	493,483	64.5	8.7	25.4	1.1	0.0	0.2	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	824,905	73.9	0.0	25.0	0.9	0.1	0.0	100.0
26 Other fleets filtered out						449,289	29.9	5.2	56.3	0.9	5.5	2.2	100.0

Species Group: SCUP

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	482,034	3.2	96.1	0.7	0.0	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	640,999	9.9	72.0	14.5	0.2	0.1	3.4	100.0
30 Other fleets filtered out						299,477	8.6	49.4	39.7	1.2	0.0	1.1	100.0

See supporting text for abbreviations.

Appendix Table 2B, continued. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: AMERICAN PLAICE

							Discard by Reason Category [%]						
Row	**Gear Type**	**Access Area**	**Trip Category**	**Region**	**Mesh Group**	**Discarded**	**No Market**	**Regulation (Size)**	**Regulation (Quota)**	**Regulation (Other)**	**Poor Quality**	**Other**	**Total %**
7	Otter Trawl	OPEN	all	NE	sm	75,890	1.2	4.9	93.9	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	357,353	0.1	98.7	0.0	0.0	1.1	0.0	100.0
19	Shrimp Trawl	OPEN	all	NE	all	139,598	8.5	0.0	91.5	0.0	0.0	0.0	100.0
	29 Other fleets filtered out					18,543	15.2	77.3	5.5	0.2	1.5	0.4	100.0

Species Group: ATLANTIC COD

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
8	Otter Trawl	OPEN	all	NE	lg	322,226	0.0	93.5	6.0	0.0	0.4	0.1	100.0
	31 Other fleets filtered out					432,368	2.3	79.0	5.8	0.1	9.7	3.2	100.0

Species Group: ATLANTIC HALIBUT

							Discard by Reason Category [%]						
Row	**Gear Type**	**Access Area**	**Trip Category**	**Region**	**Mesh Group**	**Discarded**	**No Market**	**Regulation (Size)**	**Regulation (Quota)**	**Regulation (Other)**	**Poor Quality**	**Other**	**Total %**
8	Otter Trawl	OPEN	all	NE	lg	30,511	0.4	90.7	7.2	0.5	0.0	1.2	100.0
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	1,736	0.0	97.9	2.1	0.0	0.0	0.0	100.0
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	4,281	0.9	92.2	3.7	1.1	1.4	0.8	100.0
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	14,382	0.0	45.7	48.0	0.5	5.8	0.0	100.0
	28 Other fleets filtered out					1,687	16.0	78.7	5.3	0.0	0.0	0.0	100.0

Species Group: ATLANTIC WOLFFISH

							Discard by Reason Category [%]						
Row	**Gear Type**	**Access Area**	**Trip Category**	**Region**	**Mesh Group**	**Discarded**	**No Market**	**Regulation (Size)**	**Regulation (Quota)**	**Regulation (Other)**	**Poor Quality**	**Other**	**Total %**
2	Longline	OPEN	all	NE	all	1,773	0.0	0.0	98.5	0.0	0.0	1.5	100.0
8	Otter Trawl	OPEN	all	NE	lg	51,913	0.7	0.0	99.3	0.0	0.0	0.0	100.0
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	7,235	0.5	0.0	98.5	0.0	0.3	0.7	100.0
	29 Other fleets filtered out					3,107	2.2	0.0	97.8	0.0	0.0	0.0	100.0

Appendix Table 2B, continued. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: HADDOCK

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					178,602	2.7	52.7	33.5	0.0	8.9	2.2	100.0

Species Group: OCEAN POUT

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	30,880	97.1	0.0	2.9	0.0	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	44,303	33.6	0.0	66.4	0.0	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	20,276	48.5	0.0	51.5	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	87,324	40.2	0.0	59.7	0.0	0.0	0.1	100.0
11	Scallop Trawl	OPEN	GEN	MA	all	8,671	41.9	0.0	58.1	0.0	0.0	0.0	100.0
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	5,106	29.9	0.0	70.1	0.0	0.0	0.0	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	7,771	58.7	0.0	41.3	0.0	0.0	0.0	100.0
	25 Other fleets filtered out					19,069	14.2	0.0	85.6	0.0	0.0	0.2	100.0

Species Group: POLLOCK

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					205,832	0.6	66.8	0.8	0.0	30.8	1.0	100.0

Species Group: REDFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
8	Otter Trawl	OPEN	all	NE	lg	256,498	3.7	95.4	0.0	0.0	0.5	0.4	100.0
	31 Other fleets filtered out					75,759	30.1	48.1	21.1	0.0	0.4	0.3	100.0

Appendix Table 2B, continued. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: WHITE HAKE

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
	32 Other fleets filtered out					88,733	68.9	1.6	1.2	0.0	25.0	3.3	100.0

Species Group: WINDOWPANE FLOUNDER

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	186,292	67.2	1.1	27.2	4.3	0.0	0.2	100.0
6	Otter Trawl	OPEN	all	MA	lg	469,307	33.1	0.0	49.8	17.1	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	413,193	13.3	0.2	86.2	0.0	0.0	0.3	100.0
11	Scallop Trawl	OPEN	GEN	MA	all	22,776	76.4	0.0	19.8	3.8	0.0	0.0	100.0
34	Scallop Dredge	OPEN	GEN	MA	all	35,073	65.7	0.0	33.8	0.5	0.0	0.0	100.0
35	Scallop Dredge	OPEN	GEN	NE	all	24,210	47.1	0.0	52.9	0.0	0.0	0.0	100.0
36	Scallop Dredge	OPEN	LIM	MA	all	124,924	63.9	0.0	33.1	3.0	0.0	0.0	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	279,310	83.7	0.0	16.3	0.0	0.0	0.0	100.0
	24 Other fleets filtered out					72,620	44.0	0.0	55.8	0.1	0.0	0.0	100.0

Species Group: WINTER FLOUNDER

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	295,090	3.8	0.0	96.2	0.0	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	184,456	14.5	0.0	80.0	5.5	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	149,974	1.9	0.3	97.4	0.4	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	199,169	0.4	13.4	83.7	0.0	1.4	1.0	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	322,797	71.8	0.2	28.0	0.0	0.0	0.0	100.0
	27 Other fleets filtered out					90,357	28.9	2.2	62.4	6.1	0.4	0.0	100.0

Appendix Table 2B, continued. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: WITCH FLOUNDER

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	212,145	35.3	0.2	64.4	0.0	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	30,763	94.8	0.1	5.1	0.0	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	23,555	20.4	18.2	61.4	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	123,532	0.4	96.8	2.0	0.5	0.3	0.0	100.0
28 Other fleets filtered out						837,266	2.8	0.5	96.7	0.0	0.0	0.0	100.0

Species Group: YELLOWTAIL FLOUNDER

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	47,559	0.1	0.4	96.2	3.3	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	36,283	0.0	16.8	83.2	0.0	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	55,057	12.0	5.1	82.9	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	227,850	0.7	93.1	4.1	0.0	1.0	1.1	100.0
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	24,188	0.2	85.7	0.1	0.0	2.5	11.4	100.0
35	Scallop Dredge	OPEN	GEN	NE	all	34,745	10.3	0.5	40.0	49.2	0.0	0.0	100.0
36	Scallop Dredge	OPEN	LIM	MA	all	61,507	80.7	0.7	18.5	0.0	0.0	0.0	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	207,760	74.6	1.5	23.7	0.2	0.0	0.0	100.0
24 Other fleets filtered out						54,346	17.7	39.7	42.0	0.0	0.6	0.0	100.0

Species Group: OFFSHORE HAKE

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	1,062	100.0	0.0	0.0	0.0	0.0	0.0	100.0
6	Otter Trawl	OPEN	all	MA	lg	10,013	0.0	0.0	0.0	0.0	100.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	5,979	97.7	0.0	2.3	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	2,389	97.2	0.0	0.0	0.0	2.8	0.0	100.0
36	Scallop Dredge	OPEN	LIM	MA	all	3,925	100.0	0.0	0.0	0.0	0.0	0.0	100.0
27 Other fleets filtered out						981	99.6	0.0	0.0	0.0	0.4	0.0	100.0

Appendix Table 2B, continued. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: RED HAKE

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	846,366	100.0	0.0	0.0	0.0	0.0	0.0	100.0
7	Otter Trawl	OPEN	all	NE	sm	1,135,488	99.5	0.0	0.5	0.0	0.0	0.0	100.0
8	Otter Trawl	OPEN	all	NE	lg	86,962	97.0	1.7	1.2	0.0	0.0	0.1	100.0
19	Shrimp Trawl	OPEN	all	NE	all	35,415	100.0	0.0	0.0	0.0	0.0	0.0	100.0
37	Scallop Dredge	OPEN	LIM	NE	all	59,591	99.0	0.0	1.0	0.0	0.0	0.0	100.0
	27 Other fleets filtered out					91,666	99.4	0.1	0.0	0.0	0.1	0.4	100.0

Species Group: SILVER HAKE

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	1,068,871	98.0	0.5	0.0	0.0	1.3	0.2	100.0
7	Otter Trawl	OPEN	all	NE	sm	2,012,169	93.0	0.4	5.1	0.0	1.5	0.0	100.0
19	Shrimp Trawl	OPEN	all	NE	all	913,808	50.7	0.0	49.3	0.0	0.0	0.0	100.0
	29 Other fleets filtered out					1,395,964	98.6	0.1	0.1	0.0	1.3	0.0	100.0

Species Group: ATLANTIC MACKEREL

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
7	Otter Trawl	OPEN	all	NE	sm	80,036	99.9	0.0	0.0	0.0	0.1	0.0	100.0
	31 Other fleets filtered out					45,880	97.3	0.0	0.1	0.0	2.0	0.6	100.0

Species Group: BUTTERFISH

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	1,012,732	83.5	1.1	12.9	0.0	2.2	0.3	100.0
7	Otter Trawl	OPEN	all	NE	sm	1,936,031	76.8	0.3	16.4	0.7	0.0	5.9	100.0
	30 Other fleets filtered out					55,511	98.2	1.5	0.0	0.0	0.2	0.1	100.0

Appendix Table 2B, continued. Estimated discards (live pounds) and percentage by discard reason category for the 23 individual species that comprise the 14 species groups for July 2010 through June 2011.

Species Group: ILLEX SQUID

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
5	Otter Trawl	OPEN	all	MA	sm	1,228,034	98.0	0.0	0.0	0.0	0.3	1.6	100.0
7	Otter Trawl	OPEN	all	NE	sm	1,090,314	72.6	0.0	0.3	0.0	3.2	23.9	100.0
30 Other fleets filtered out						183,477	99.5	0.0	0.5	0.0	0.0	0.0	100.0

Species Group: LOLIGO SQUID

							Discard by Reason Category [%]						
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Discarded	No Market	Regulation (Size)	Regulation (Quota)	Regulation (Other)	Poor Quality	Other	Total %
32 Other fleets filtered out						382,295	84.1	0.1	0.2	0.0	3.5	12.1	100.0

Appendix Table 3. Fleet abbreviations used in Table 6 and Figures 1A, 1B, and 3. Fleets that were filtered out through the importance filter and fleets designated as in need of pilot coverage have been aggregated into "Other fleets."

Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	Fleet Abbreviation
1	Longline	OPEN	all	MA	all	LL MA
2	Longline	OPEN	all	NE	all	LL NE
3	Hand Line	OPEN	all	MA	all	HND MA
4	Hand Line	OPEN	all	NE	all	HND NE
5	Otter Trawl	OPEN	all	MA	sm	OT sm MA
6	Otter Trawl	OPEN	all	MA	lg	OT lg MA
7	Otter Trawl	OPEN	all	NE	sm	OT sm NE
8	Otter Trawl	OPEN	all	NE	lg	OT lg NE
9	Scallop Trawl	AA	GEN	MA	all	SCT AA GEN MA
10	Scallop Trawl	AA	LIM	MA	all	SCT AA LIM MA
11	Scallop Trawl	OPEN	GEN	MA	all	SCT OPEN GEN MA
12	Scallop Trawl	OPEN	LIM	MA	all	SCT OPEN LIM MA
13	Otter Trawl, Ruhle	OPEN	all	MA	lg	OTR lg MA
14	Otter Trawl, Ruhle	OPEN	all	NE	sm	OTR sm NE
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	OTR lg NE
16	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	OTH lg MA
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	OTH lg NE
18	Shrimp Trawl	OPEN	all	MA	all	SHT MA
19	Shrimp Trawl	OPEN	all	NE	all	SHT NE
20	Floating Trap	OPEN	all	MA	all	FT MA
21	Floating Trap	OPEN	all	NE	all	FT NE
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	GN sm MA
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	GN lg MA
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	GN xlg MA
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	GN sm NE
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	GN lg NE
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	GN xlg NE
28	Purse Seine	OPEN	all	MA	all	PS MA
29	Purse Seine	OPEN	all	NE	all	PS NE
30	Scallop Dredge	AA	GEN	MA	all	SCD AA GEN MA
31	Scallop Dredge	AA	GEN	NE	all	SCD AA GEN NE
32	Scallop Dredge	AA	LIM	MA	all	SCD AA LIM MA
33	Scallop Dredge	AA	LIM	NE	all	SCD AA LIM NE
34	Scallop Dredge	OPEN	GEN	MA	all	SCD OPEN GEN MA
35	Scallop Dredge	OPEN	GEN	NE	all	SCD OPEN GEN NE
36	Scallop Dredge	OPEN	LIM	MA	all	SCD OPEN LIM MA
37	Scallop Dredge	OPEN	LIM	NE	all	SCD OPEN LIM NE
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	MWT MA
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	MWT NE
40	Pots and Traps, Fish	OPEN	all	MA	all	FPT MA
41	Pots and Traps, Fish	OPEN	all	NE	all	FPT NE
42	Pots and Traps, Conch	OPEN	all	MA	all	CPT MA
43	Pots and Traps, Conch	OPEN	all	NE	all	CPT NE
44	Pots and Traps, Hagfish	OPEN	all	MA	all	HPT MA
45	Pots and Traps, Hagfish	OPEN	all	NE	all	HPT NE
46	Pots and Traps, Shrimp	OPEN	all	NE	all	SPT NE
47	Pots and Traps, Lobster	OPEN	all	MA	all	LPT MA
48	Pots and Traps, Lobster	OPEN	all	NE	all	LPT NE
49	Pots and Traps, Crab	OPEN	all	MA	all	CRPT MA
50	Pots and Traps, Crab	OPEN	all	NE	all	CRPT NE
51	Beam Trawl	OPEN	all	MA	all	BT MA
52	Beam Trawl	OPEN	all	NE	all	BT NE
53	Dredge, Other	OPEN	all	MA	all	DRO MA
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	CD MA
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	CD NE
	Other fleets aggregated together					Other Fleets

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Appendix H
Prioritization Process Illustrative Examples

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2012 Illustrative Examples for SBRM Omnibus Amendment (June 4, 2013 version)

Background

Illustrative examples of the two prioritization approaches proposed by the Standardized Bycatch Reporting Methodology (SBRM) Fishery Management Action Team (FMAT) are presented. The illustrative examples apply the 2012 Northeast Fisheries Science Center's (NEFSC) sea day budget to the proposed SBRM and non-SBRM funding classifications. The sea days within the SBRM funding classification are then assigned to fleets[1] according to two proposed prioritizations approaches: proportional approach and penultimate approach. These illustrative examples were requested by the Councils and it is anticipated that the examples will be included in the SBRM Amendment appendices.

Number of Sea Day Needed

Sample size analyses were conducted to estimate the numbers of sea days needed to monitor 14 federally managed fish and invertebrate species groups and one species of sea turtles (Table 1). For fish/invertebrate species groups, the numbers of sea days needed to achieve a 30% coefficient of variation (CV) of total discards of each species groups were estimated for 55 fleets using data collected during June 2010 through July 2011 utilizing estimation methods described by Wigley et al. (2012). A total of 18,641 sea days are needed for the 14 fish and invertebrate species groups (Table 2).

For loggerhead turtles, the numbers of sea days needed to achieve a 30% CV of turtle discards was estimated by fishery, defined as a managed fish or invertebrate species landed on vessels using bottom otter trawl, sink gillnet, or scallop dredge gear in the Mid-Atlantic region (see Murray 2012). The maximum amount of projected coverage across all the fisheries was considered the desired level of sampling to monitor turtle discards for that gear type. Roughly 4,800 days are needed across bottom trawl fisheries. Roughly 1,400 days are needed across sink gillnet fisheries. Lastly, approximately 1,300 days are needed in the scallop dredge fishery, based on loggerhead bycatch precision levels after chain mats were implemented in the fishery.

[1] "fleet" is synonymous with "fishing mode." See Appendix Table 1 for fleet abbreviations.

The numbers of sea days needed to achieve a 30% CV associated with the Mid-Atlantic[2] turtle gear types and fish/invertebrate fleets are given in Table 3. The numbers of sea days needed for the combined fish/invertebrates and turtle species groups are derived as follows:

- If the sum of the sea days needed for fish/invertebrates species groups of the corresponding fish fleets exceeds the sea days needed for the turtle gear type, then the sea days needed for fish/invertebrate sea day are used.

- If the number of sea days needed for turtles for the gear type exceeds the sum of the sea days needed for fish/invertebrates of the corresponding fish fleets, then the sea days needed for turtles are distributed according to the proportion of sea days needed for fish/invertebrates of the corresponding fish fleets.

A total of 20,590 sea days are needed for fish/invertebrates and loggerhead turtles (COMBINED; Table 4) during the April 2012 through March 2013 period.

Funding available for the April 2012 to March 2013 period

Based upon the March 13, 2012 NEFSC's Northeast Fisheries Observer Program (NEFOP) budget, there was agency funding for 8,786 days. Based upon an initial observer set-aside compensation rate analysis, there was industry funding for 3,606 days. There was a total of 12,392 days available for observer coverage.

Below is a summary of the two funding source categories: agency-funded and industry-funded. Within the agency-funded category, there are six sub-categories.

<u>Agency Funding Source</u>
Based upon the March 13, 2012 budget, the NEFSC has funds for 8,786 sea days. The funding sources for these sea days include: Atlantic Coast Observers (484 days), New England Groundfish (2,448 days), At-Sea Monitoring (ASM, partially funded by National Observer Program [NOP]; 5,255 days), Reducing Bycatch - Observers (49 days), NOP (276 days), and Marine Mammal Protection Act (MMPA; 274 days).
Based upon the proposed SBRM Amendment, four of the six agency-funded sub-categories would be used to fund observer coverage under SBRM and would be used to determine if a shortfall in funds exists. The four sub-categories are: (1) Northeast Groundfish (to be referred to as "NEFOP for SBRM" in the future); (2) Atlantic Coast Observers; (3) National Observer Program; and (4) Reducing Bycatch – Observers. The other two 2012 funding sub-categories (MMPA and ASM) would be allocated to fleets according to other priorities and would not necessarily be allocated according to the SBRM process.

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

Using the 2012 budget, there would have been 3,257 (484 + 2448 + 49 + 276) days available to the SBRM process; the remaining 5,529 (5,255 + 274) days would not be available to the SBRM process (non-SBRM). In 2012, 37% of the agency-funded sea days would have been applicable to the SBRM process.

While the 5,529 days are not subject to the SBRM allocation process, it is important to note that the 5,255 days associated with ASM would support observed trips that employ a "complete" sampling protocol[3] and hence these sea days would support the monitoring of *all* species, including the 15 SBRM species groups. Observed trips that were funded by the 274 MMPA days would have either "limited" or "complete" sampling protocols. All of the MMPA days would support marine mammal and turtle monitoring; however, any trip employing a "limited" sampling protocol would not support the monitoring of the 14 SBRM fish/invertebrate species groups.

Industry Funding Source

The number of industry-funded sea days available depends upon the total expected budget from the Research Set Aside (RSA) program and the increase in landings allowed for vessels carrying observers (i.e., the compensation rate). Based upon projected landings and expected prices, the RSA program generates funds in support of discard monitoring of the scallop fleets. A compensation rate analysis was undertaken to support observer coverage of the nine industry-funded scallop fleets. The sea days for the nine industry-funded fleets are presented in Rows 9, 10, 12, 30, 31, 32, 33, 36, and 37 (Table 4).

Based upon the initial compensation rate analysis, a total of 3,606 sea days were funded: 1,713 days for Open areas, 240 days for Delmarva Access Area (DMV), 720 days for Hudson Canyon Access Area (HC), 240 days for Closed Area I (CAI), 453 days for Closed Area II (CAII), and 240 days in the Nantucket Lightship Access Area (NLAA).

- The industry-funded schedule runs March 1 through February, a 12-month period that is shifted one month from the NEFOP sea day schedule of April to March.

- A description of the set-aside compensation rate calculations is available on-line at: http://www.nero.noaa.gov/nero/regs/infodocs/FY12ObsCompRateCalculationSum.pdf

Limited Access General Category (LAGC) open area fleets were not industry-funded fleets (Rows 11, 34, and 35; Table 4) in 2012.

[3] For most gear types, observers use a "complete" sampling protocol that includes obtaining species weights for both kept and discarded portions of all species in the catch on every haul. In addition to the "complete" sampling protocol, there is a "limited" sampling protocol that is used on some gillnet trips where specific information for marine mammals is collected. In a "limited" sampling scenario, only kept species weights are obtained (no discard weights) since the observer must watch the gillnet gear during haul-back to observe if marine mammals roll out of the gear before the gear returns to the deck.

While the 3,606 industry-funded days are not subject to the SBRM prioritization process, it is important to note that the observed trips funded by these sea days would employ the "complete" sampling protocol and hence these sea days would support the monitoring of the 15 SBRM species groups.

SBRM Prioritization Trigger

Over all fleets, a funding shortfall of 8,198 days (20,590 – 12,392) would have been expected. Within the agency-funded fleets, a funding shortfall of 9,515 days (18,301 – 8,786) would have been expected. Within the agency-funded fleets and SBRM-applicable funding, a funding shortfall of 15,044 days (18,301 – 3,257; Table 4) would have been expected. This shortfall would have triggered the SBRM prioritization process.

In 2012, SBRM-applicable funding (3,257 days) exceeded the number of sea days needed to obtain the minimum pilot coverage across all agency-funded fleets (1,225 days; Table 4), hence either one of the prioritization alternatives could have been employed.

The following describes the steps taken to determine whether or not the SBRM prioritization trigger would have been met (Table 4). Steps 1 – 10 are independent of the prioritization approach.

Step 1. Derive minimum pilot coverage (MPC) for each fleet. Minimum pilot coverage is the minimum number of sea days needed to monitor the fleet and is calculated as three trips multiplied by the Vessel Trip Report (VTR) mean trip length in a calendar quarter, summed over all quarters with VTR activity. Three trips per quarter is the minimum sample size identified in *Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs* (NMFS 2004; Table 6, page 77)

A total of 2,008 days is needed of minimum pilot coverage across all fleets (Table 4).

Step 2. Derive the number of sea days needed for the 14 fish species groups (see Wigley et al. 2012).

Step 3. Derive the number of sea days needed for sea turtles (see Murray 2012).

Step 4. To support the proposed prioritization approaches, derive the number of sea days needed for loggerhead turtles for each of the fish fleets associated with the turtle gear type group.

a. Derive the percentage of days for each fish fleet within a turtle gear type group. For each fleet associated with a turtle gear type, divide the sea days needed for fish by the sum of the sea days needed for the gear type group.

b. Derive the number of sea days needed for loggerhead turtles by fish fleet. Multiply the number of turtle sea days needed for the gear type by the percentage of days needed for each fish fleet.

Step 5. Derive the number of sea days needed for fish and turtles COMBINED; select the largest of the two sea days (i.e., sea days needed for the 14 fish species groups and sea days needed for loggerhead turtles) within the fleet.

A total of 20,590 days were needed to achieve a 30% CV on the discards of the 15 species groups in 2012 (Table 4).

Step 6. Partition fleets into funding source categories and sum the number of sea days needed, by funding source for: (a) minimum pilot sea days needed, and (b) COMBINED sea days needed.

In 2012, there were nine industry-funded fleets (see NEFSC and NERO 2012).

There were 1,225 days and 783 days needed for minimum pilot coverage for agency-funded and industry-funded fleets, respectively (Table 4).

There were 18,301 days and 2,289 days needed to achieve a 30% CV for the 15 species groups for agency-funded and industry-funded fleets, respectively (Table 4).

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

There are 3,257 agency-funded days applicable to the SBRM process. There are 5,529 agency-funded days that are not applicable to the SBRM process (non-SBRM) and 3,606 industry-funded days.

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

If the SBRM prioritization trigger was not reached (no shortfall for SBRM) – STOP [4] Assign sea days to fleets according to Step 4.

If SBRM prioritization trigger was reached (shortfall exists), then determine if SBRM-applicable funded sea days exceed the sea days needed for minimum pilot coverage.

If YES, apply the prioritization approach when SBRM-applicable funded sea days are greater than minimum pilot coverage days.

If NO, apply the prioritization approach when SBRM-applicable funded sea days are less than minimum pilot coverage days.

[4] When there are surplus sea days within a funding category, the surplus sea days may be allocated at the discretion of the agency as SBRM sea days are a minimum requirement, not a ceiling.

Note: if the SBRM-applicable funded sea days equal minimum pilot coverage days then assign funded sea days according to the minimum pilot coverage days (Step 1).

For SBRM-applicable funds, there was a shortfall of 15,044 days. There were sufficient agency-funded days to support the use of prioritization approaches since funded sea days exceed the sea days needed for minimum pilot coverage (3,257 > 1,225). The two proposed prioritization approaches are described in the following next two sections.

For complete accounting of all sea days in 2012, the illustrative examples include the sea days that would have been subjected to SBRM prioritizations, as well as the other funded sea days that would not have been subject to the SBRM prioritization but would have supported bycatch monitoring of the 15 SBRM species groups (sea days with "complete" sampling protocols). The allocation of the non-SBRM sea days and the industry-funded sea days are independent of the SBRM prioritization alternative and are tracked separately in the illustrative examples; these are described below.

Step 9. Allocation of agency-funded non-SBRM sea days: ASM and MMPA days.

The 5,255 ASM sea days would have been assigned to trips via the Pre-Trip Notification System (PTNS). This means that the observer coverage within each of these fleets would depend upon industry activity during the April 2012 through March 2013 period. The 5,255 ASM sea days have been proportionally allocated based on the previous year's industry activity, and thus the allocation would have been considered provisional (Tables 5 and 6).

The 274 MMPA sea days, all assumed to have limited sampling protocols, would have been allocated to a row designated as "MMPA coverage" (Tables 5 and 6).

There would have been a total of 5,529 non-SBRM sea days (5,255 + 274).

Step 10. The sea days for the nine industry-funded fleets would have been assigned via the call-in system. Similar to the non-SBRM sea days, the sea day coverage for industry-funded fleets would depend on industry activity during the April 2012 through March 2013 period and would be capped as described above. These 3,606 industry-funded sea days have not been allocated to individual fish fleets, but rather to groups of fish fleets that correspond to the stratification used in compensation rate analysis: Mid-Atlantic access area fleets (Rows 9, 10, 30, and 32; Tables 5 and 6); Open areas fleets (Rows 12, 36, and 37; Tables 5 and 6); and New England access area fleets (Rows 31 and 33; Tables 5 and 6). The allocated sea days represent the maximum coverage (i.e., caps).

Step 11. The sea days allocated for the April 2012 – March 2013 (TOTAL) is the sum of the SBRM prioritized days, non-SBRM days, and industry-funded days, a total of 12,392 days (3,257 + 5,529 + 3,606).

Prioritization Alternatives when SBRM-applicable funded sea days are greater than MPC days

If SBRM prioritization trigger was reached (shortfall exists) and SBRM-applicable funded sea days are greater than the sea days needed for minimum pilot coverage, then prioritization among fleets are needed.

Proportional Approach

As described in the draft SBRM Amendment, the number of agency-funded sea days applicable to the SBRM prioritization was assigned to each fleet (fishing mode) based on the shortfall ratio (funded days/ needed days) after the number of sea days needed for minimum pilot coverage had been removed.

The following describes the steps taken to assign the agency-funded sea days applicable to the SBRM prioritization process using the proportional approach applied to the 2012 budget (Table 5). Steps P1 to P4 are associated with prioritization approaches and should not be confused with Steps 1 to 11.

Step P1. Derive the "COMBINED MPC Adjusted" days for each agency-funded fleet by subtracting the "Min. Pilot Coverage" days (Step 1) from the "COMBINED" days (Step 5).

Step P2. Derive the "Proportional Shortfall". Over all agency-funded fleets, subtract the sum of the "Min. Pilot Coverage" days (Step 1) from the sum of the SBRM prioritized "COMBINED" days (Step 5) and divide by the sum of the "COMBINED MPC Adjusted" (Step P1).

There were 3,257 agency-funded days available for SBRM prioritization. Of these, 1,225 days would have been assigned to all fleets to meet the minimum pilot days. The remaining 2,032 days (3,257 – 1,225) would have been available to proportionally allocate among the agency-funded fleets (Table 5). The sum of the COMBINED MPC Adjusted sea days would have been 17,076. The proportional shortfall would have been 0.12 (2,032 / 17,076).

Step P3. Derive the "COMBINED MPC Adjusted Rescaled" days for each agency-funded fleet by multiplying the "COMBINED MPC Adjusted" days (Step P1) by the "Proportional Shortfall" (Step P2).

Step P4. Derive the "SBRM PRIORITIZED" days for each agency-funded fleet by adding the "Min Pilot Coverage" days (Step 1) to the "COMBINED MPC Adjusted Rescaled" days (Step P3).

The SBRM prioritized sea days would have then been added to the non-SBRM days (Step 9) and the industry-funded days (Step 10) to obtain the sea days allocated for April 2102 – March 2013 (TOTAL; Step 11).

Using the proportional prioritization approach, the 3,257 SBRM prioritized sea days would have provided observer coverage to all 55 fleets (Table 5). There would have been 22 fleets with no reduction in the number of sea days needed – the fleets that would have needed only minimum

pilot coverage. There would have been 24 fleets with a reduction in the sea days needed. There would have been 28 species groups and fleets combinations for which the expected CV would be greater than 30%. While the decrease in total sea days occurs proportionally across fleets, the resulting increase in CV at the cell (species groups/fleets) level would have varied within and across fleets.

Penultimate Approach

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

The following describes the steps taken to assign the agency-funded sea days applicable to the SBRM prioritization process using the penultimate approach applied to the 2012 budget (Table 6). Steps P1 to P4 are associated with prioritization approaches and should not be confused with Steps 1 to 11.

Step P1. For each agency-funded fleet, list the sea days needed for the SBRM species groups (fish/invertebrates Table 2; loggerhead turtle Table 4) in descending order within a fleet. Use the minimum pilot days as the minimum sea days needed for the fleet.

Step P2. Calculate the differences in sea days between adjacent species groups within each agency-funded fleet.

Step P3. Within the resulting matrix of differences (Step P2), identify the largest difference and remove the sea days associated with the species group accounting for this difference.

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

The 2012 sea day shortfall would have been 15,044 days. The 3,879 sea days (RCRAB in Row 8) associated with the largest sea day difference (3,091) between adjacent species groups would have been removed first (Table 6). Given the penultimate fleet constraint (i.e., cannot remove the sea days of a species group unless all species groups with greater numbers of sea days have been removed within the fleet), the 5,551 sea days (RCRAB in Row 6) associated with the next largest sea day difference (2,599) between adjacent species groups would have been removed next. The 2,952 sea days (TURS in Row 6) associated with the next largest sea days difference (2,619), given the penultimate fleet constraint, would have been removed next, etc. In 2012, the 97 sea days associated with the last species group that would have been removed (DOG in Row 26) would have removed more sea days than would have been needed to reach the shortfall amount of 15,044 day (Table 6). Thus, only 23 of the 83 sea day difference between adjacent species groups (or in this case between species group and minimum pilot coverage) would have

been used (Table 6). The prioritized sea days for this fleet (Row 26) would have been 74 (97 - 23).

Step P4. After the removal of sea days within a fleet (Step P3), the remaining highest sea days (i.e., the penultimate or the left-hand-most value in Step P1) would have become the "SBRM PRIORITIZED" sea days required for that fleet.

The SBRM prioritized sea days would have then been added to the non-SBRM days (Step 9) and the industry-funded days (Step 10) to obtain the sea days allocated for April 2102 – March 2013 (TOTAL; Step 11).

Using the penultimate prioritization approach, the 3,257 SBRM prioritized sea days would have provided observer coverage to all 55 fleets. There would have been 44 fleets with no reduction in sea days required. There would have been 17 cells (species group and fleet combinations) where the number of sea days assigned would have been less than the sea days needed to achieve a 30% CV. These 17 cells occurred in 11 fleets (Rows 5, 6, 7, 8, 17, 22, 23, 24, 26, 39, and 48; Table 6).

Changes in Precision Resulting from Prioritization Approaches (when SBRM-applicable funded sea days are greater than MPC days)

The relationships between the coefficient of variation and the sample size are given in Figures 1 and 2 for fish/invertebrates and loggerhead turtles, respectively. The sea days (sample size) corresponding to those prioritized to the fleet via the two prioritization approaches are given and the difference in expected CV can be determined for each species group.

For the penultimate approach, the expected precision of the discard estimates of the 17 cells would be greater than 30% CV and vary by species group and fleet. The penultimate approach adjusts the CV upward on the fewest number of cells (species groups/fleets). The proportional approach adjusts the CV upward for all species groups in the fleet for all agency-funded fleets that require more than minimum pilot coverage. Hence, for all fleets for which prioritized sea days are less than the number of sea days needed, the expected precision for some species group may exceed a 30% CV. However, it does not necessarily mean that the expected precision for *all* species will exceed 30%. For example, in the MA extra large mesh gillnet fleet (Row 24), the prioritized days yield an expected CV that is less than 30% for skates and monkfish (Figure 1) but not for loggerhead turtles (Figure 2). The MA extra large gillnet fleet (Row 24) is associated with the loggerhead turtle MA gillnet gear type and the loggerhead turtle species group is the species group with the largest number of sea days needed. This situation may occur for any of the fish fleets associated with the turtle gear types when the sea days needed for the fish fleets are "driven" by sea turtles.

It is important to note that other funding sources (agency-funded non-SBRM prioritized days such as ASM or MMPA and industry-funded days) support the monitoring of the 15 SBRM species groups. When the days from other funding sources are added to the fleet, the precision will increase (the CV decrease) and more species groups will achieve a 30% CV or less. For example, NE large mesh otter trawl (Row 8) would have either 280 or 489 days allocated via the

penultimate or proportional approaches, respectively; however, with the additional 1,981 ASM days, all fish species groups would be expected to achieve a 30% CV. Another example would occur in the Mid-Atlantic scallop dredge turtle gear group; three of the four fish fleets that comprise the turtle gear group are industry-funded fleets (Figure 2 refers to, but does not include, industry-funded days).

Prioritization Alternatives when SBRM-applicable funded sea days are less than MPC days

If the SBRM prioritization trigger was reached (shortfall exists) and SBRM-applicable funded sea days are less than the sea days needed for minimum pilot coverage, then prioritization among fleets are needed. These alternatives remove sea day coverage completely from some fleets.

While there was a shortfall in SBRM-applicable funded sea days in 2012 budget, there was not a shortfall with regard in minimum pilot coverage day (3,257 > 1,225). Hence, the following two examples have used a hypothetical number of 1,000 agency-funded sea days applicable to the SBRM process.

<u>Option 1: Penultimate MPC Approach</u>

As described in the draft SBRM Amendment, the number of agency-funded sea days applicable to the SBRM prioritization process was assigned to each fleet (fishing mode) by sequentially eliminating coverage in fleets that have the highest minimum pilot coverage days until the shortfall in MPC days is removed.

The following describes the steps taken to assign the agency-funded sea days applicable to the SBRM prioritization process using the penultimate MPC (option 1) approach applied to the 2012 budget (Table 7). Steps P1 to P4 are associated with the prioritization approach and should not be confused with Steps 1 to 11.

Step P1. Derive the minimum pilot coverage shortfall. Subtract the SBRM-applicable funded sea days (Step 6b) from the sum of minimum pilot coverage sea days for agency-funded fleets (Step 6a).

Using the hypothetical example of 1,000 SBRM-applicable days, there would have been a minimum pilot coverage shortfall of 225 days (1,000 - 1,225).

Step P2. Within the agency-funded fleets, rank the minimum pilot days (Step 1) in descending order.

Step P3. Using the ranking in Step P2, identify the fleet and the minimum pilot days with highest number of minimum pilot coverage days (rank = 1). Repeat this process for the next highest number of minimum pilot coverage days until the cumulative reduction in sea days is equal to, or than greater, the MPC shortfall.

Step P4. Derive the “SBRM PRIORITIZED Option 1” by using the MPC days (Step 1) and removing the sea days for the fleets identified in Step P3.

In this example, 294 days were removed from three fleets. The 294 days exceeds the number of days needed to reduce the MPC shortfall by 69 days (294 – 225). The 69 "remaining" days would be proportionally allocated among the fleets that have sea days assigned. In this example, there are 52 fleets with MPC days assigned. Note: the 69 days distributed proportionally among the fleets is not shown in Table 7).

Option 2: Penultimate MPC Ratio Approach

As described in the draft SBRM Amendment, the number of agency-funded sea days applicable to the SBRM prioritization process was assigned to each fleet (fishing mode) by sequentially eliminating coverage in fleets that had the highest ratio of minimum pilot coverage days to actual days absent from port reported in the Vessel Trip Report in the previous year until the shortfall in MPC days is removed.

The following describes the steps taken to assign the agency-funded sea days applicable to the SBRM prioritization process using the penultimate MPC ratio (option 2) approach applied to the 2012 budget (Table 8). Steps P1 to P6 are associated with the prioritization approach and should not be confused with Steps 1 to 11.

Step P1. Derive the minimum pilot coverage shortfall. Subtract the SBRM-applicable days (Step 6b) from the sum of minimum pilot coverage for agency-funded fleets (Step 6a).

Using the hypothetical example of 1,000 SBRM-applicable days, there would have been a minimum pilot coverage shortfall of 225 days (1,000 - 1,225).

Step P2. For each fleet, derived the number of days absent from port in the VTR using the previous year's data (see Wigley et al. 2012, Table 3).

Step P3. Derive the ratio of MPC days to VTR days. For each agency-funded fleet, divide the minimum pilot coverage days (Step 1) by the VTR days absent (Step P2).

Step P4. Rank the ratio (MPC/VTR) derived in Step P3 in descending order.

Step P5. Using the ranking in Step P4, identify the fleet and the minimum pilot days with highest ratio (rank = 1). Repeat this process for the next highest ratio until the cumulative reduction in sea days is equal to, or than greater, the MPC shortfall.

Fleets with low ratios indicate fleets with high numbers of days absent from port. Note: the MPC/VTR ratio can be greater than 1 for fleets with very low numbers of trips. Because the sea day allocations are for coverage in the upcoming year, it is assumed that a minimum of three trips would occur in each quarter of the year for which there was industry activity in the previous year. Table 2 in Wigley et al. 2012 reveals that there are some fleet and quarter combinations where industry activity occurred but less than three trips.

Step P6. Derive the "SBRM PRIORITIZED Option 2" by using the MPC days (Step 1) and removing the sea days for the fleets identified in Step P5.

In this example, 238 days were removed from eight fleets. The 238 days exceeds the number of days needed to reduce the MPC shortfall by 13 days (238 – 225). The 13 "remaining" days would be proportionally allocated among the fleets that have sea days assigned. In this example, there are 47 fleets with MPC days assigned. Note: the 13 days distributed proportionally among the fleets is not shown in Table 8).

Changes in Coverage and Precision Resulting from Prioritization Approaches (when SBRM-applicable funded sea days are less than MPC days)

Both of these Options remove coverage from fleets. Option 1 would eliminate coverage in fleets with longest average trip length. For example a fleet that required 60 days for minimum pilot coverage would be eliminated before a fleet requiring 15 days of coverage. Option 1 would impact the fewest fleets. Option 2 would eliminate coverage from fleets with low numbers of days absent. The expected precision for species groups in fleets with the minimum pilot days would vary among fleets and species groups and would be exceed a 30% CV for all fleets that require more sea days than minimum pilot coverage days. Figures 1 and 2 may be used to determine the expected precision of species groups in fleets with prioritized sea days derived from these two prioritization approaches.

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Table 1. List of the 14 fish and invertebrate species groups and one species of sea turtles (in bold), with species group abbreviations in parentheses, and the species comprising these groups, corresponding to the 13 federal fishery management plans in the Northeast region.

ATLANTIC SALMON (SAL)
BLUEFISH (BLUE)
FLUKE - SCUP - BLACK SEA BASS (FSB)
Black Sea Bass
Fluke
Scup
HERRING, ATLANTIC (HERR)
LARGE MESH GROUNDFISH (GFL)
American Plaice
Atlantic Cod
Atlantic Halibut
Atlantic Wolffish
Haddock
Ocean Pout
Pollock
Redfish
White Hake
Windowpane Flounder
Winter Flounder
Witch Flounder
Yellowtail Flounder
MONKFISH (MONK)
RED CRAB (RCRAB)
SEA SCALLOP (SCAL)
SKATE COMPLEX (SKATE)
Barndoor Skate
Clearnose Skate
Little Skate
Rosette Skate
Smooth Skate
Thorny Skate
Winter Skate
SMALL MESH GROUNDFISH (GFS)
Offshore Hake
Red Hake
Silver Hake
SPINY DOGFISH (DOG)
SQUID - BUTTERFISH - MACKEREL (SBM)
Atlantic Mackerel
Butterfish
Illex Squid
Loligo Squid
SURFCLAM - OCEAN QUAHOG (SCOQ)
Surfclam
Ocean Quahog
TILEFISH (TILE)
LOGGERHEAD TURTLE (TURS)

Table 2. The number of sea days needed to achieve a 30% CV based on the variance of the discard estimate for each the fish/invertebrate species groups, the number of pilot sea days, minimum pilot sea days, and 2012 sea days (the maximum number of sea days needed for each fleet) based on July 2010 through June 2011 data. Red font indicates basis for fleet sea days; species group and fleet abbreviations are given in Table 1 and Appendix Table 1 respectively. *[This is modified version of Wigley et al 2012 Table 5 – this version includes minimum pilot sea days]*

Row	Gear Type	Access Area	Trip Category	Region	Mesh	BLUE	HERR	SAL	RCRAB	SCAL	SBM	MONK	GFL	GFS	SKATE	DOG	FSB	SCOQ	TILE	Pilot days	Min Pilot days	2012 Sea Days Needed for FISH
1	Longline	OPEN	all	MA	all	67	67	67	67	67	67	67	67	67	67	67	67	67	67	**67**	67	67
2	Longline	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	**16**	16
3	Hand Line	OPEN	all	MA	all	81	81	81	81	81	81	81	81	81	81	81	81	81	81	**81**	13	81
4	Hand Line	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	**16**	16
5	Otter Trawl	OPEN	all	MA	sm	0	0	0	**3,231**	0	364	0	497	545	397	325	513	0	0	160	30	3,231
6	Otter Trawl	OPEN	all	MA	lg	0	0	0	**5,551**	0	0	164	141	0	107	333	173	0	0	266	27	5,551
7	Otter Trawl	OPEN	all	NE	sm	0	0	0	0	0	411	0	461	451	531	**1,151**	489	0	0	168	29	1,151
8	Otter Trawl	OPEN	all	NE	lg	0	0	0	**3,879**	0	0	568	76	280	261	229	788	0	0	415	35	3,879
9	Scallop Trawl	AA	GEN	MA	all	21	21	21	21	21	21	21	21	21	21	21	21	21	21	**21**	21	21
10	Scallop Trawl	AA	LIM	MA	all	98	98	98	98	98	98	98	98	98	98	98	98	98	98	**98**	98	98
11	Scallop Trawl	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	**32**	0	0	0	0	25	22	32
12	Scallop Trawl	OPEN	LIM	MA	all	163	163	163	163	163	163	163	163	163	163	163	163	163	163	**163**	163	163
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9	9	9	9	9	9	9	9	9	9	9	9	9	**9**	9	9
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27	27	27	27	27	27	27	27	27	27	27	27	27	**27**	27	27
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	**59**	59
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	**8**	8
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	257	**567**	0	0	0	100	100	567
18	Shrimp Trawl	OPEN	all	MA	all	131	131	131	131	131	131	131	131	131	131	131	131	131	131	**131**	120	131
19	Shrimp Trawl	OPEN	all	NE	all	0	0	0	0	0	0	0	0	**34**	0	0	0	0	0	65	13	34
20	Floating Trap	OPEN	all	MA	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	**6**	6	6
21	Floating Trap	OPEN	all	NE	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	**6**	6	6
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	**13**	13
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	**13**	13
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	0	0	0	0	0	0	70	0	0	**83**	0	0	0	0	61	15	83
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41	41	41	41	41	41	41	41	41	41	41	41	41	**41**	41	41
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	0	0	0	0	0	0	0	0	0	0	**97**	0	0	0	134	14	97
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	0	0	0	0	0	0	132	0	0	118	**171**	0	0	0	94	19	171
28	Purse Seine	OPEN	all	MA	all	15	15	15	15	15	15	15	15	15	15	15	15	15	15	**15**	15	15
29	Purse Seine	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	**23**	23
30	Scallop Dredge	AA	GEN	MA	all	31	31	31	31	31	31	31	31	31	31	31	31	31	31	**31**	31	31
31	Scallop Dredge	AA	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	**14**	14
32	Scallop Dredge	AA	LIM	MA	all	0	0	0	0	0	0	**282**	0	0	0	0	0	0	0	102	102	282
33	Scallop Dredge	AA	LIM	NE	all	0	0	0	0	0	0	**189**	0	0	0	0	0	0	0	121	121	189
34	Scallop Dredge	OPEN	GEN	MA	all	0	0	0	0	0	0	0	0	0	**50**	0	0	0	0	95	17	50
35	Scallop Dredge	OPEN	GEN	NE	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	**17**	17
36	Scallop Dredge	OPEN	LIM	MA	all	0	0	0	0	0	0	**312**	0	0	164	0	0	0	0	238	109	312
37	Scallop Dredge	OPEN	LIM	NE	all	0	0	0	0	500	0	234	107	0	163	505	**607**	0	0	277	124	607
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	**17**	17
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	0	0	0	0	0	0	0	0	0	0	**571**	0	0	0	43	43	571
40	Pots and Traps, Fish	OPEN	all	MA	all	25	25	25	25	25	25	25	25	25	25	25	25	25	25	**25**	13	25
41	Pots and Traps, Fish	OPEN	all	NE	all	15	15	15	15	15	15	15	15	15	15	15	15	15	15	**15**	9	15
42	Pots and Traps, Conch	OPEN	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27	27	27	**27**	12	27
43	Pots and Traps, Conch	OPEN	all	NE	all	26	26	26	26	26	26	26	26	26	26	26	26	26	26	**26**	18	26
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**3**	3	3
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74	74	74	74	74	74	74	74	74	74	74	74	74	**74**	74	74
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6	6	6	6	6	6	6	6	6	6	6	6	6	**6**	6	6
47	Pots and Traps, Lobster	OPEN	all	MA	all	65	65	65	65	65	65	65	65	65	65	65	65	65	65	**65**	16	65
48	Pots and Traps, Lobster	OPEN	all	NE	all	429	429	429	429	429	429	429	429	429	429	429	429	429	429	**429**	17	429
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12	12	12	**12**	12	12
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67	67	67	67	67	67	67	67	67	67	67	67	67	**67**	67	67
51	Beam Trawl	OPEN	all	MA	all	31	31	31	31	31	31	31	31	31	31	31	31	31	31	**31**	31	31
52	Beam Trawl	OPEN	all	NE	all	16	16	16	16	16	16	16	16	16	16	16	16	16	16	**16**	16	16
53	Dredge, Other	OPEN	all	MA	all	41	41	41	41	41	41	41	41	41	41	41	41	41	41	**41**	41	41
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	67	67	67	67	67	67	67	67	67	67	67	67	67	67	**67**	24	67
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	38	38	38	38	38	38	38	38	38	38	38	38	38	38	**38**	16	38
					Total	1,638	1,638	1,638	14,299	2,138	2,413	3,589	2,920	2,948	3,801	5,587	4,208	1,638	1,638	4,379	2,008	18,641

Table 3. The numbers of sea days needed to achieve a 30% CV associated with the Mid-Atlantic turtle gear types and fish/invertebrate fleets. *[Loggerhead turtle days taken from Murray 2012]*

Turtle Gear Types and Fish Fleets	**Sea Days Needed**	
	Loggerhead Turtles	**Fish/Invertebrates Species Groups**
MA Otter Trawl and Scallop Trawl Rows 5, 6, 9, 10, 11, and 12	4,838	9,096
MA Gillnet Rows 22, 23, and 24	1,440	109
MA Scallop Dredge Rows 30, 32, 34, and 36	1,293	675

Table 4. The number of sea days used in the determination of the SBRM trigger (Steps 1 through 8) using the 2012 budget.

Row	Gear Type	Access Area	Trip Category	Region	Mesh	Step 1 2012 Sea Days for Min Pilot Coverage (MPC)	Step 2 2012 Sea Days Needed for FISH	Step 3 2012 Sea Days Needed for TURS	Step 4a % by FISH fleet	Step 4b TURS Sea Days by fish fleet	Step 5 2012 Sea Days Needed COMBINED
1	Longline	OPEN	all	MA	all	67	67				67
2	Longline	OPEN	all	NE	all	16	16				16
3	Hand Line	OPEN	all	MA	all	13	81				81
4	Hand Line	OPEN	all	NE	all	16	16				16
5	Otter Trawl	OPEN	all	MA	sm	30	3,231	4,838	0.355	1,719	3,231
6	Otter Trawl	OPEN	all	MA	lg	27	5,551		0.610	2,952	5,551
7	Otter Trawl	OPEN	all	NE	sm	29	1,151				1,151
8	Otter Trawl	OPEN	all	NE	lg	35	3,879				3,879
9	Scallop Trawl	AA	GEN	MA	all	21	21		0.002	11	21
10	Scallop Trawl	AA	LIM	MA	all	98	98		0.011	52	98
11	Scallop Trawl	OPEN	GEN	MA	all	22	32		0.004	17	32
12	Scallop Trawl	OPEN	LIM	MA	all	163	163		0.018	87	163
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9				9
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27				27
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	59	59				59
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	8	8				8
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	567				567
18	Shrimp Trawl	OPEN	all	MA	all	120	131				131
19	Shrimp Trawl	OPEN	all	NE	all	13	34				34
20	Floating Trap	OPEN	all	MA	all	6	6				6
21	Floating Trap	OPEN	all	NE	all	6	6				6
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	13	13	1,440	0.119	172	172
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	13	13		0.119	172	172
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	15	83		0.761	1,096	1,096
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41				41
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	14	97				97
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	19	171				171
28	Purse Seine	OPEN	all	MA	all	15	15				15
29	Purse Seine	OPEN	all	NE	all	23	23				23
30	Scallop Dredge	AA	GEN	MA	all	31	31		0.046	59	59
31	Scallop Dredge	AA	GEN	NE	all	14	14				14
32	Scallop Dredge	AA	LIM	MA	all	102	282	1,293	0.418	540	540
33	Scallop Dredge	AA	LIM	NE	all	121	189				189
34	Scallop Dredge	OPEN	GEN	MA	all	17	50		0.074	96	96
35	Scallop Dredge	OPEN	GEN	NE	all	17	17				17
36	Scallop Dredge	OPEN	LIM	MA	all	109	312		0.462	598	598
37	Scallop Dredge	OPEN	LIM	NE	all	124	607				607
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	17	17				17
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	43	571				571
40	Pots and Traps, Fish	OPEN	all	MA	all	13	25				25
41	Pots and Traps, Fish	OPEN	all	NE	all	9	15				15
42	Pots and Traps, Conch	OPEN	all	MA	all	12	27				27
43	Pots and Traps, Conch	OPEN	all	NE	all	18	26				26
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3				3
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74				74
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6				6
47	Pots and Traps, Lobster	OPEN	all	MA	all	16	65				65
48	Pots and Traps, Lobster	OPEN	all	NE	all	17	429				429
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12				12
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67				67
51	Beam Trawl	OPEN	all	MA	all	31	31				31
52	Beam Trawl	OPEN	all	NE	all	16	16				16
53	Dredge, Other	OPEN	all	MA	all	41	41				41
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	24	67				67
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	16	38				38
					Total	2,008	**18,641**				**20,590**

Step 6a	Agency Fleets (Min Pilot Sea Days Needed)	**1,225**		
	Industry Fleets (Min Pilot Sea Days Needed)	**783**		
Step 6b	Agency Fleets (Sea Days Needed)			**18,301**
	Industry Fleets (Sea Days Needed)			**2,289**
Step 7	Agency Fleets (Sea Days Funded)		SBRM prioritized	**3,257**
	Agency Fleets (Sea Days Funded)		non-SBRM prioritized	**5,529**
	Industry Fleets (Sea Days Funded)			**3,606**
Step 8	Agency Fleet Difference		SHORTFALL	**-15,044**
	Industry Fleet Difference		SURPLUS	**1,317**
	Is SBRM prioritization needed? Are there sufficient funds to apply the priori		YES	YES

Turtle Gear Types			
MA OT	**9,096**	4,838	9,096
MA GN	109	**1,440**	1,440
MA SD	675	**1,293**	1,293

KEY: AF = Agency funded fleets	IF = Industry funded fleets
Steps independent of SBRM prioritization approach	
Prioritization Steps	Fleets with reduction in sea days

Table 5. Sea day allocation using the proportional prioritization approach for the SBRM-applicable sea days in the 2012 budget.

						Step 1	Step 5	PROPORTIONAL APPROACH Step P1	Step P3	Step P4	Step 9	Step 10	Step 11
Row	Gear Type	Access Area	Trip Category	Region	Mesh	2012 Sea Days for Min Pilot Coverage (MPC)	2012 Sea Days Needed COMBINED	2012 Sea Days Needed COMBINED MPC Adjusted	2012 Sea Days Needed COMBINED MPC Adjusted Rescaled	2012 Sea Days SBRM PRIORITIZED (Proportional)	2012 Sea Days non-SBRM (Catch share, MMPA, Discovery)	2012 Industry-funded Sea Days	Sea Days Allocated for April 2012 - March 2013 (TOTAL)
1	Longline	OPEN	all	MA	all	67	67	0	0	67			67
2	Longline	OPEN	all	NE	all	16	16	0	0	16	*106*		122
3	Hand Line	OPEN	all	MA	all	13	81	68	8	21			21
4	Hand Line	OPEN	all	NE	all	16	16	0	0	16	*280*		296
5	Otter Trawl	OPEN	all	MA	sm	30	3,231	3,201	381	411			411
6	Otter Trawl	OPEN	all	MA	lg	27	5,551	5,524	657	684	*1,271*		1,955
7	Otter Trawl	OPEN	all	NE	sm	29	1,151	1,122	134	163			163
8	Otter Trawl	OPEN	all	NE	lg	35	3,879	3,844	457	492	*1,981*		2,473
9	Scallop Trawl	AA	GEN	MA	all	21	21						
10	Scallop Trawl	AA	LIM	MA	all	98	98						
11	Scallop Trawl	OPEN	GEN	MA	all	22	32	10	1	23			23
12	Scallop Trawl	OPEN	LIM	MA	all	163	163						
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9	0	0	9			9
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27	0	0	27			27
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	59	59	0	0	59	*37*		96
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	8	8	0	0	8	*0*		8
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	567	467	56	156	*203*		359
18	Shrimp Trawl	OPEN	all	MA	all	120	131	11	1	121			121
19	Shrimp Trawl	OPEN	all	NE	all	13	34	21	2	15			15
20	Floating Trap	OPEN	all	MA	all	6	6	0	0	6			6
21	Floating Trap	OPEN	all	NE	all	6	6	0	0	6			6
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	13	172	159	19	32			32
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	13	172	159	19	32			32
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	15	1,096	1,081	129	144	*287*		431
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41	0	0	41			41
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	14	97	83	10	24	*640*		664
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	19	171	152	18	37	*450*		487
28	Purse Seine	OPEN	all	MA	all	15	15	0	0	15			15
29	Purse Seine	OPEN	all	NE	all	23	23	0	0	23			23
30	Scallop Dredge	AA	GEN	MA	all	31	59						
31	Scallop Dredge	AA	GEN	NE	all	14	14						
32	Scallop Dredge	AA	LIM	MA	all	102	540					1,200	1,200
33	Scallop Dredge	AA	LIM	NE	all	121	189					693	693
34	Scallop Dredge	OPEN	GEN	MA	all	17	96	79	9	26			26
35	Scallop Dredge	OPEN	GEN	NE	all	17	17	0	0	17			17
36	Scallop Dredge	OPEN	LIM	MA	all	109	598					1,713	1,713
37	Scallop Dredge	OPEN	LIM	NE	all	124	607						0
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	17	17	0	0	17			17
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	43	571	528	63	106			106
40	Pots and Traps, Fish	OPEN	all	MA	all	13	25	12	1	14			14
41	Pots and Traps, Fish	OPEN	all	NE	all	9	15	6	1	10			10
42	Pots and Traps, Conch	OPEN	all	MA	all	12	27	15	2	14			14
43	Pots and Traps, Conch	OPEN	all	NE	all	18	26	8	1	19			19
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3	0	0	3			3
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74	0	0	74			74
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6	0	0	6			6
47	Pots and Traps, Lobster	OPEN	all	MA	all	16	65	49	6	22			22
48	Pots and Traps, Lobster	OPEN	all	NE	all	17	429	412	49	66			66
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12	0	0	12			12
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67	0	0	67			67
51	Beam Trawl	OPEN	all	MA	all	31	31	0	0	31			31
52	Beam Trawl	OPEN	all	NE	all	16	16	0	0	16			16
53	Dredge, Other	OPEN	all	MA	all	41	41	0	0	41			41
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	24	67	43	5	29			29
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	16	38	22	3	19			19
	MMPA coverage										*274*		274
					Total	2,008	**20,590**	**17,076**	**2,032**	**3,257**	**5,529**	**3,606**	**12,392**

Step 6a	Agency Fleets (Min Pilot Sea Days Needed)	**1,225**	
	Industry Fleets (Min Pilot Sea Days Needed)	**783**	
Step 6b	Agency Fleets (Sea Days Needed)		**18,301**
	Industry Fleets (Sea Days Needed)		**2,289**
Step 7	Agency Fleets (Sea Days Funded)		**3,257**
	Agency Fleets (Sea Days Funded)		**5,529**
	Industry Fleets (Sea Days Funded)		**3,606**
Step 8	Agency Fleet Difference		**-15,044**
	Industry Fleet Difference		**1,317**
	Is SBRM prioritization needed? Are there sufficient funds to apply		**YES**
	Turtle Gear Types	MA OT	9,096
		MA GN	1,440
		MA SD	1,293

2,032

Step P2	
Agency proportion shortfall	**0.12**

1,118
208
26

KEY: AF = Agency funded fleets	IF = Industry funded fleets
Steps independent of SBRM prioritization approach	
Prioritization Steps	Fleets with reduction in sea days

Table 6. Sea day allocation using the penultimate prioritization approach for the SBRM-applicable sea days in the 2012 budget.

PENULTIMATE APPROACH

Row	Gear Type	Access Area	Trip Category	Region	Mesh	Step 1: 2012 Sea Days for Min Pilot Coverage (MPC)	Step 5: 2012 Sea Days Needed COMBINED
1	Longline	OPEN	all	MA	all	67	67
2	Longline	OPEN	all	NE	all	16	16
3	Hand Line	OPEN	all	MA	all	13	81
4	Hand Line	OPEN	all	NE	all	16	16
5	Otter Trawl	OPEN	all	MA	sm	30	3,231
6	Otter Trawl	OPEN	all	MA	lg	27	5,551
7	Otter Trawl	OPEN	all	NE	sm	29	1,151
8	Otter Trawl	OPEN	all	NE	lg	35	3,879
9	Scallop Trawl	AA	GEN	MA	all	21	21
10	Scallop Trawl	AA	LIM	MA	all	98	98
11	Scallop Trawl	OPEN	GEN	MA	all	22	32
12	Scallop Trawl	OPEN	LIM	MA	all	163	163
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	59	59
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	8	8
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	567
18	Shrimp Trawl	OPEN	all	MA	all	120	131
19	Shrimp Trawl	OPEN	all	NE	all	13	34
20	Floating Trap	OPEN	all	MA	all	6	6
21	Floating Trap	OPEN	all	NE	all	6	6
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	13	172
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	13	172
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	15	1,096
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	14	97
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	19	171
28	Purse Seine	OPEN	all	MA	all	15	15
29	Purse Seine	OPEN	all	NE	all	23	23
30	Scallop Dredge	AA	GEN	MA	all	31	59
31	Scallop Dredge	AA	GEN	NE	all	14	14
32	Scallop Dredge	AA	LIM	MA	all	102	540
33	Scallop Dredge	AA	LIM	NE	all	121	189
34	Scallop Dredge	OPEN	GEN	MA	all	17	96
35	Scallop Dredge	OPEN	GEN	NE	all	17	17
36	Scallop Dredge	OPEN	LIM	MA	all	109	598
37	Scallop Dredge	OPEN	LIM	NE	all	124	607
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	17	17
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	43	571
40	Pots and Traps, Fish	OPEN	all	MA	all	13	25
41	Pots and Traps, Fish	OPEN	all	NE	all	9	15
42	Pots and Traps, Conch	OPEN	all	MA	all	12	27
43	Pots and Traps, Conch	OPEN	all	NE	all	18	26
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6
47	Pots and Traps, Lobster	OPEN	all	MA	all	16	65
48	Pots and Traps, Lobster	OPEN	all	NE	all	17	429
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67
51	Beam Trawl	OPEN	all	MA	all	31	31
52	Beam Trawl	OPEN	all	NE	all	16	16
53	Dredge, Other	OPEN	all	MA	all	41	41
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	24	67
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	16	38
	MMPA coverage						
					Total	2,008	**20,590**

Step P1: Penultimate sea days needed for the 15 species groups, in descending order with MPC as minimum for fleet								Step P2: Sea day differences between adjacent species groups within a row (red font indicated values used in Step P3)							
67								0							
16								0							
13								68							
16								0							
1,719	545	513	497	397	364	325	30	1,512	1,174	32	16	100	33	39	295
2,952	333	173	164	141	107	27		2,599	2,619	160	9	23	34	27	
531	489	461	451	411	29			620	42	28	10	40	382		
788	568	280	261	229	76	35		3,091	220	288	19	32	153	41	
22								10							
9								0							
27								0							
59								0							
8								0							
257	100							310	157						
120								11							
13								21							
6								0							
6								0							
13								159							
13								159							
83	70	15						1,013	13	55					
41								0							
14								83							
132	118	19						39	14	99					
15								0							
23								0							
50	17							46	33						
17								0							
17								0							
43								528							
13								12							
9								6							
13								14							
18								8							
3								0							
74								0							
6								0							
16								49							
17								412							
12								0							
67								0							
31								0							
16								0							
41								0							
24								43							
16								22							

Step P3: Sea day differences, in descending order with fleet constraint	Cumulative reduction of sea days
3,091	3,091
2,599	5,690
2,619	8,309
1,512	9,821
1,174	10,834
1,013	12,008
620	12,628
528	13,156
412	13,568
310	13,878
220	14,098
288	14,386
160	14,545
159	14,704
159	14,864
157	15,021
23	15,044

Step P4: 2012 Sea Days SBRM PRIORITIZED (Penultimate)	Step 9: 2012 Sea Days non-SBRM (Catch share, MMPA, Discovery)	Step 10: 2012 Industry-funded Sea Days	Step 11: Sea Days Allocated for April 2012 - March 2013 (TOTAL)
67			67
16	*106*		122
81			81
16	*280*		296
545			545
173	*1,271*		1,444
531			531
280	*1,981*		2,261
32			32
9			9
27			27
59	*37*		96
8	*0*		8
100	*203*		303
131			131
34			34
6			6
6			6
13			13
13			13
83	*287*		370
41			41
74	*640*		714
171	*450*		621
15			15
23			23
		1,200	1,200
		693	693
96			96
17			17
		1,713	1,713
17			17
43			43
25			25
15			15
27			27
26			26
3			3
74			74
6			6
65			65
17			17
12			12
67			67
31			31
16			16
41			41
67			67
38			38
	274		274
3,257	**5,529**	**3,606**	**12,392**

Step 6a	Agency Fleets (Min Pilot Sea Days Needed)	**1,225**
	Industry Fleets (Min Pilot Sea Days Needed)	**783**
Step 6b	Agency Fleets (Sea Days Needed)	**18,301**
	Industry Fleets (Sea Days Needed)	**2,289**
Step 7	Agency Fleets (Sea Days Funded)	**3,257**
	Agency Fleets (Sea Days Funded)	**5,529**
	Industry Fleets (Sea Days Funded)	**3,606**
Step 8	Agency Fleet Difference	**-15,044**
	Industry Fleet Difference	**1,317**
	Is SBRM prioritization needed? Are there sufficient funds to apply t	**YES**

Turtle Gear Types		
	MA OT	9,096
	MA GN	1,440
	MA SD	1,293

SBRM prioritized	**750**
non-SBRM prioritized	109
	96

KEY: AF = Agency funded fleets	IF = Industry funded fleets
Steps independent of SBRM prioritization approach	
Prioritization Steps	Fleets with reduction in sea days

Table 7. Sea day allocation using the penultimate MPC prioritization (Option 1) approach for 1,000 SBRM-applicable sea days in the 2012 budget.

SBRM-applicable days < MPC Days OPTION 1

Row	Gear Type	Access Area	Trip Category	Region	Mesh	Step 1: 2012 Sea Days for Min Pilot Coverage (MPC)	Step 2: 2012 Sea Days Needed for FISH	Step 3: 2012 Sea Days Needed for TURS	Step 5: 2012 Sea Days Needed COMBINED	Step P2: MPC Rank (Desc)	Step P3: MPC Rank	Step P3: Fleet (Row)	Step P3: MPC days	Step P3: Cumulative reduction of sea days	Step P4: 2012 Sea Days SBRM PRIORITIZED (SBRM < MPC **Option 1**)	Step 9: 2012 Sea Days non-SBRM (Catch share, MMPA, Discovery)	Step 10: 2012 Industry-funded Sea Days	Step 11: Sea Days Allocated for April 2012 - March 2013 (TOTAL)
1	Longline	OPEN	all	MA	all	67	67		67	4	1	18	120	120	67			67
2	Longline	OPEN	all	NE	all	16	16		16	25	2	17	100	220	16	*106*		122
3	Hand Line	OPEN	all	MA	all	13	81		81	33	3	45	74	294	13			13
4	Hand Line	OPEN	all	NE	all	16	16		16	25					16	*280*		296
5	Otter Trawl	OPEN	all	MA	sm	30	3,231	4,838	3,231	12					30			30
6	Otter Trawl	OPEN	all	MA	lg	27	5,551		5,551	14					27	*1,271*		1,298
7	Otter Trawl	OPEN	all	NE	sm	29	1,151		1,151	13					29			29
8	Otter Trawl	OPEN	all	NE	lg	35	3,879		3,879	10					35	*1,981*		2,016
9	Scallop Trawl	AA	GEN	MA	all	21	21		21									
10	Scallop Trawl	AA	LIM	MA	all	98	98		98									
11	Scallop Trawl	OPEN	GEN	MA	all	22	32		32	18					22			22
12	Scallop Trawl	OPEN	LIM	MA	all	163	163		163									
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9		9	40					9			9
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27		27	14					27			27
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	59	59		59	6					59	*37*		96
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	8	8		8	42					8			8
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	567		567	2					0	*203*		203
18	Shrimp Trawl	OPEN	all	MA	all	120	131		131	1					0			0
19	Shrimp Trawl	OPEN	all	NE	all	13	34		34	33					13			13
20	Floating Trap	OPEN	all	MA	all	6	6		6	43					6			6
21	Floating Trap	OPEN	all	NE	all	6	6		6	43					6			6
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	13	13	1,440	172	33					13			13
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	13	13		172	33					13			13
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	15	83		1,096	30					15	*287*		302
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41		41	8					41			41
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	14	97		97	32					14	*640*		654
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	19	171		171	19					19	*450*		469
28	Purse Seine	OPEN	all	MA	all	15	15		15	30					15			15
29	Purse Seine	OPEN	all	NE	all	23	23		23	17					23			23
30	Scallop Dredge	AA	GEN	MA	all	31	31		59									
31	Scallop Dredge	AA	GEN	NE	all	14	14		14									
32	Scallop Dredge	AA	LIM	MA	all	102	282	1,293	540								1,200	1,200
33	Scallop Dredge	AA	LIM	NE	all	121	189		189								693	693
34	Scallop Dredge	OPEN	GEN	MA	all	17	50		96	21					17			17
35	Scallop Dredge	OPEN	GEN	NE	all	17	17		17	21					17			17
36	Scallop Dredge	OPEN	LIM	MA	all	109	312		598								1,713	1,713
37	Scallop Dredge	OPEN	LIM	NE	all	124	607		607									
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	17	17		17	21					17			17
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	43	571		571	7					43			43
40	Pots and Traps, Fish	OPEN	all	MA	all	13	25		25	33					13			13
41	Pots and Traps, Fish	OPEN	all	NE	all	9	15		15	40					9			9
42	Pots and Traps, Conch	OPEN	all	MA	all	12	27		27	38					12			12
43	Pots and Traps, Conch	OPEN	all	NE	all	18	26		26	20					18			18
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3		3	46					3			3
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74		74	3					0			0
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6		6	43					6			6
47	Pots and Traps, Lobster	OPEN	all	MA	all	16	65		65	25					16			16
48	Pots and Traps, Lobster	OPEN	all	NE	all	17	429		429	21					17			17
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12		12	38					12			12
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67		67	4					67			67
51	Beam Trawl	OPEN	all	MA	all	31	31		31	11					31			31
52	Beam Trawl	OPEN	all	NE	all	16	16		16	25					16			16
53	Dredge, Other	OPEN	all	MA	all	41	41		41	8					41			41
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	24	67		67	16					24			24
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	16	38		38	25					16			16
	MMPA coverage															*274*		274
														Remaining Days	69			69
					Total	2,008	**18,641**		**20,590**						**1,000**	**5,529**	**3,606**	**10,135**

Step 6a	Agency Fleets (Min Pilot Sea Days Needed)	**1,225**		
	Industry Fleets (Min Pilot Sea Days Needed)	**783**		
Step 6b	Agency Fleets (Sea Days Needed)			**18,301**
	Industry Fleets (Sea Days Needed)			**2,289**
Step 7	Agency Fleets (Sea Days Funded)		SBRM prioritized	**1,000**
	Agency Fleets (Sea Days Funded)		non-SBRM prioritized	**5,529**
	Industry Fleets (Sea Days Funded)			**3,606**
Step 8	Agency Fleet Difference		SHORTFALL	**-17,301**
	Industry Fleet Difference		SURPLUS	**1,317**
	Is SBRM prioritization needed? Are there sufficient funds to apply the priori			**YES** / **NO**

Turtle Gear Types			
MA OT	**9,096**	4,838	9,096
MA GN	109	**1,440**	1,440
MA SD	675	**1,293**	1,293

Step P1	
225	MPC Shortfall

KEY: AF = Agency funded fleets	IF = Industry funded fleets
Steps independent of SBRM prioritization approach	
Prioritization Steps	Fleets with reduction in sea days

Table 8. Sea day allocation using the penultimate MPC Ratio prioritization (Option 2) approach for 1,000 SBRM-applicable sea days in the 2012 budget.

SBRM-applicable days < MPC Days OPTION 2

Row	Gear Type	Access Area	Trip Category	Region	Mesh	Step 1: 2012 Sea Days for Min Pilot Coverage (MPC)	Step 2: 2012 Sea Days Needed for FISH	Step 3: 2012 Sea Days Needed for TURS	Step 5: 2012 Sea Days Needed COMBINED	Step P2: TOTAL VTR DAYS	Step P3: Ratio (MPC/VTR)	Step P4: Ratio Rank (Desc)	Step P5: Ratio Rank	Step P5: Fleet (Row)	Step P5: MPC days	Step P5: Cumulative reduction of sea days	Step P6: 2012 Sea Days SBRM PRIORITIZED (SBRM < MPC **Option 2**)	Step 9: 2012 Sea Days non-SBRM (Catch share, MMPA, Discovery)	Step 10: 2012 Industry-funded Sea Days	Step 11: Sea Days Allocated for April 2012 - March 2013 (TOTAL)
1	Longline	OPEN	all	MA	all	67	67		67	885	0.07571	16	1	25	41	41	67			67
2	Longline	OPEN	all	NE	all	16	16		16	1,113	0.01438	26	2	13	9	50	16	*106*		122
3	Hand Line	OPEN	all	MA	all	13	81		81	3,997	0.00325	42	3	14	27	77	13			13
4	Hand Line	OPEN	all	NE	all	16	16		16	2,932	0.00546	33	4	44	3	80	16	*280*		296
5	Otter Trawl	OPEN	all	MA	sm	30	3,231	4,838	3,231	7,994	0.00375	39	5	16	8	88	30			30
6	Otter Trawl	OPEN	all	MA	lg	27	5,551		5,551	13,321	0.00203	44	6	38	17	105	27	*1,271*		1,298
7	Otter Trawl	OPEN	all	NE	sm	29	1,151		1,151	8,421	0.00344	41	7	45	74	179	29			29
8	Otter Trawl	OPEN	all	NE	lg	35	3,879		3,879	20,759	0.00169	45	8	15	59	238	35	*1,981*		2,016
9	Scallop Trawl	AA	GEN	MA	all	21	21		21	133										
10	Scallop Trawl	AA	LIM	MA	all	98	98		98	68										
11	Scallop Trawl	OPEN	GEN	MA	all	22	32		32	680	0.03235	23					22			22
12	Scallop Trawl	OPEN	LIM	MA	all	163	163		163	268										
13 +	Otter Trawl, Ruhle	OPEN	all	MA	lg	9	9		9	7	1.28571	2					0			0
14 +	Otter Trawl, Ruhle	OPEN	all	NE	sm	27	27		27	25	1.08000	3					0			0
15	Otter Trawl, Ruhle	OPEN	all	NE	lg	59	59		59	389	0.15167	8					0	*37*		37
16 +	Otter Trawl, Haddock Separator	OPEN	all	MA	lg	8	8		8	12	0.66667	5					0			0
17	Otter Trawl, Haddock Separator	OPEN	all	NE	lg	100	567		567	2,125	0.04706	19					100	*203*		303
18	Shrimp Trawl	OPEN	all	MA	all	120	131		131	2,361	0.05083	18					120			120
19	Shrimp Trawl	OPEN	all	NE	all	13	34		34	3,118	0.00417	36					13			13
20	Floating Trap	OPEN	all	MA	all	6	6		6	63	0.09524	13					6			6
21	Floating Trap	OPEN	all	NE	all	6	6		6	75	0.08000	14					6			6
22	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	13	13	1,440	172	1,980	0.00657	31					13			13
23	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	13	13		172	2,166	0.00600	32					13			13
24	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	15	83		1,096	3,004	0.00499	34					15	*287*		302
25	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	41	41		41	28	1.46429	1					0			0
26	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	14	97		97	6,705	0.00209	43					14	*640*		654
27	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	19	171		171	4,715	0.00403	37					19	*450*		469
28	Purse Seine	OPEN	all	MA	all	15	15		15	253	0.05929	17					15			15
29	Purse Seine	OPEN	all	NE	all	23	23		23	581	0.03959	20					23			23
30	Scallop Dredge	AA	GEN	MA	all	31	31		59	110										
31	Scallop Dredge	AA	GEN	NE	all	14	14		14	115										
32	Scallop Dredge	AA	LIM	MA	all	102	282	1,293	540	2,296									1,200	1,200
33	Scallop Dredge	AA	LIM	NE	all	121	189		189	1,530									693	693
34	Scallop Dredge	OPEN	GEN	MA	all	17	50		96	4,727	0.00360	40					17			17
35	Scallop Dredge	OPEN	GEN	NE	all	17	17		17	4,337	0.00392	38					17			17
36	Scallop Dredge	OPEN	LIM	MA	all	109	312		598	11,906									1,713	1,713
37	Scallop Dredge	OPEN	LIM	NE	all	124	607		607	13,858										
38	Mid-water Paired & Single Trawl	OPEN	all	MA	all	17	17		17	40	0.42500	6					0			0
39	Mid-water Paired & Single Trawl	OPEN	all	NE	all	43	571		571	1,170	0.03675	22					43			43
40	Pots and Traps, Fish	OPEN	all	MA	all	13	25		25	1,120	0.01161	27					13			13
41	Pots and Traps, Fish	OPEN	all	NE	all	9	15		15	619	0.01454	25					9			9
42	Pots and Traps, Conch	OPEN	all	MA	all	12	27		27	1,200	0.01000	28					12			12
43	Pots and Traps, Conch	OPEN	all	NE	all	18	26		26	854	0.02108	24					18			18
44	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3		3	3	1.00000	4					0			0
45	Pots and Traps, Hagfish	OPEN	all	NE	all	74	74		74	369	0.20054	7					0			0
46	Pots and Traps, Shrimp	OPEN	all	NE	all	6	6		6	154	0.03896	21					6			6
47	Pots and Traps, Lobster	OPEN	all	MA	all	16	65		65	3,242	0.00494	35					16			16
48	Pots and Traps, Lobster	OPEN	all	NE	all	17	429		429	37,456	0.00045	46					17			17
49	Pots and Traps, Crab	OPEN	all	MA	all	12	12		12	83	0.14458	9					12			12
50	Pots and Traps, Crab	OPEN	all	NE	all	67	67		67	630	0.10635	12					67			67
51	Beam Trawl	OPEN	all	MA	all	31	31		31	391	0.07928	15					31			31
52	Beam Trawl	OPEN	all	NE	all	16	16		16	145	0.11034	11					16			16
53	Dredge, Other	OPEN	all	MA	all	41	41		41	347	0.11816	10					41			41
54	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all	24	67		67	3,371	0.00712	30					24			24
55	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all	16	38		38	1,717	0.00932	29					16			16
	MMPA coverage																	*274*		274
																Remaining Days	13			13
					Total	2,008	**18,641**		**20,590**	**179,968**							**1,000**	**5,529**	**3,606**	**10,135**

Step 6a	Agency Fleets (Min Pilot Sea Days Needed)	**1,225**		
	Industry Fleets (Min Pilot Sea Days Needed)	**783**		
Step 6b	Agency Fleets (Sea Days Needed)			**18,301**
	Industry Fleets (Sea Days Needed)			**2,289**
Step 7	Agency Fleets (Sea Days Funded)		SBRM prioritized	**1,000**
	Agency Fleets (Sea Days Funded)		non-SBRM prioritized	**5,529**
	Industry Fleets (Sea Days Funded)			**3,606**
Step 8	Agency Fleet Difference		SHORTFALL	**-17,301**
	Industry Fleet Difference		SURPLUS	**1,317**
	Is SBRM prioritization needed? Are there sufficient funds to apply the priori		YES	NO
	Turtle Gear Types	MA OT	**9,096** 4,838	9,096
		MA GN	109 **1,440**	1,440
		MA SD	675 **1,293**	1,293

Step P1	
225	MPC Shortfall

KEY: AF = Agency funded fleets	IF = Industry funded fleets
Steps independent of SBRM prioritization approach	
Prioritization Steps	Fleets with reduction in sea days

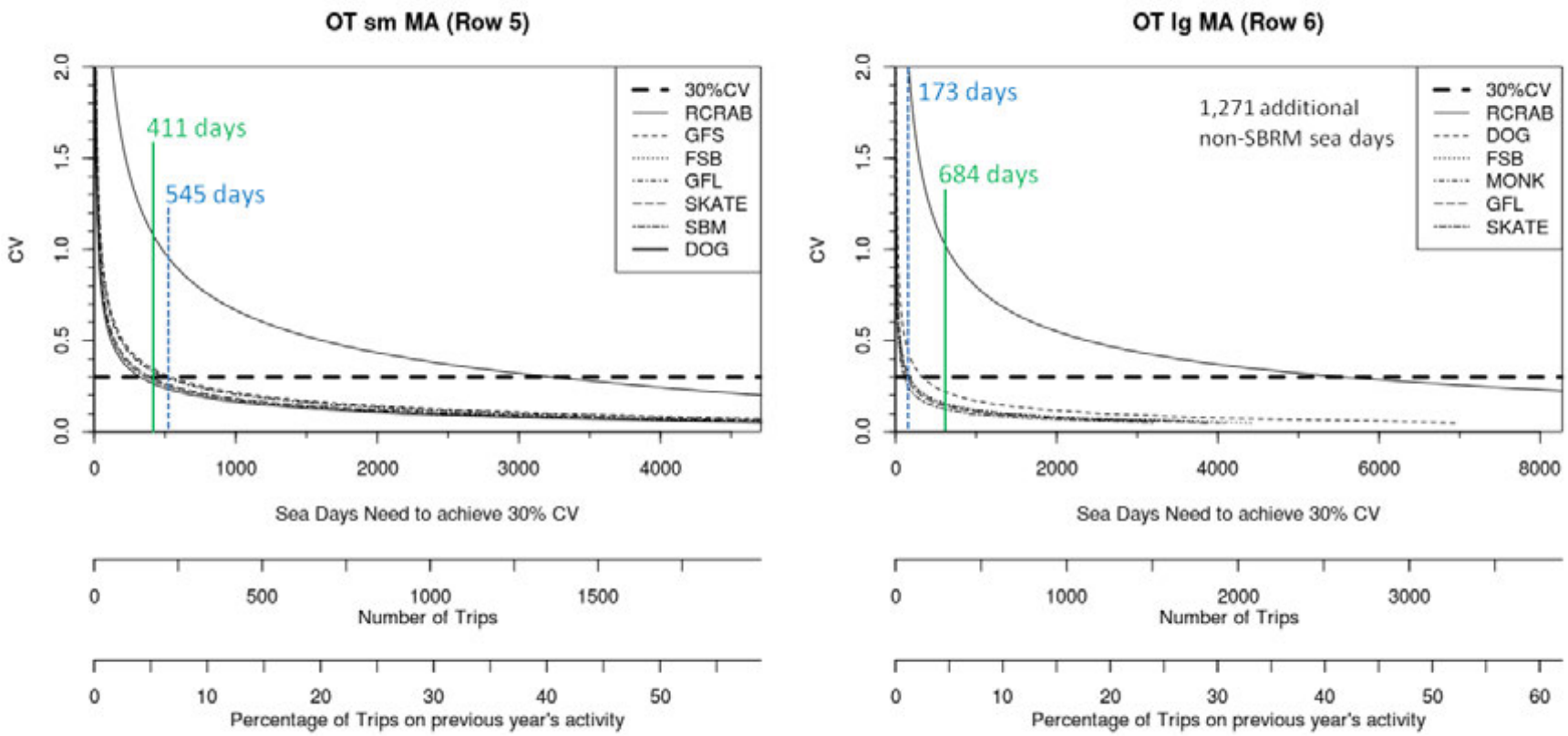

Figure 1. Results from the 2012 sample size analysis conducted by Wigley et al. (2012). The curves represent the relationship between the coefficient of variation (CV) and the sample size (in terms of sea days, trips, and percentage of trips) for each of the fish/invertebrate species groups that were not filtered out by the importance filter, for agency-funded fleets where discards could be estimated. To illustrate the difference in expected CV, two sample sizes are indicated by the colored lines: the green solid line indicates the number of sea days allocated via the proportional approach, and the blue dashed line indicates the number of sea days allocated via the penultimate approach. See Figure 2 for loggerhead turtle graphs. *[This figure is a modified version of Figure 3 in Wigley et al. 2012.]*

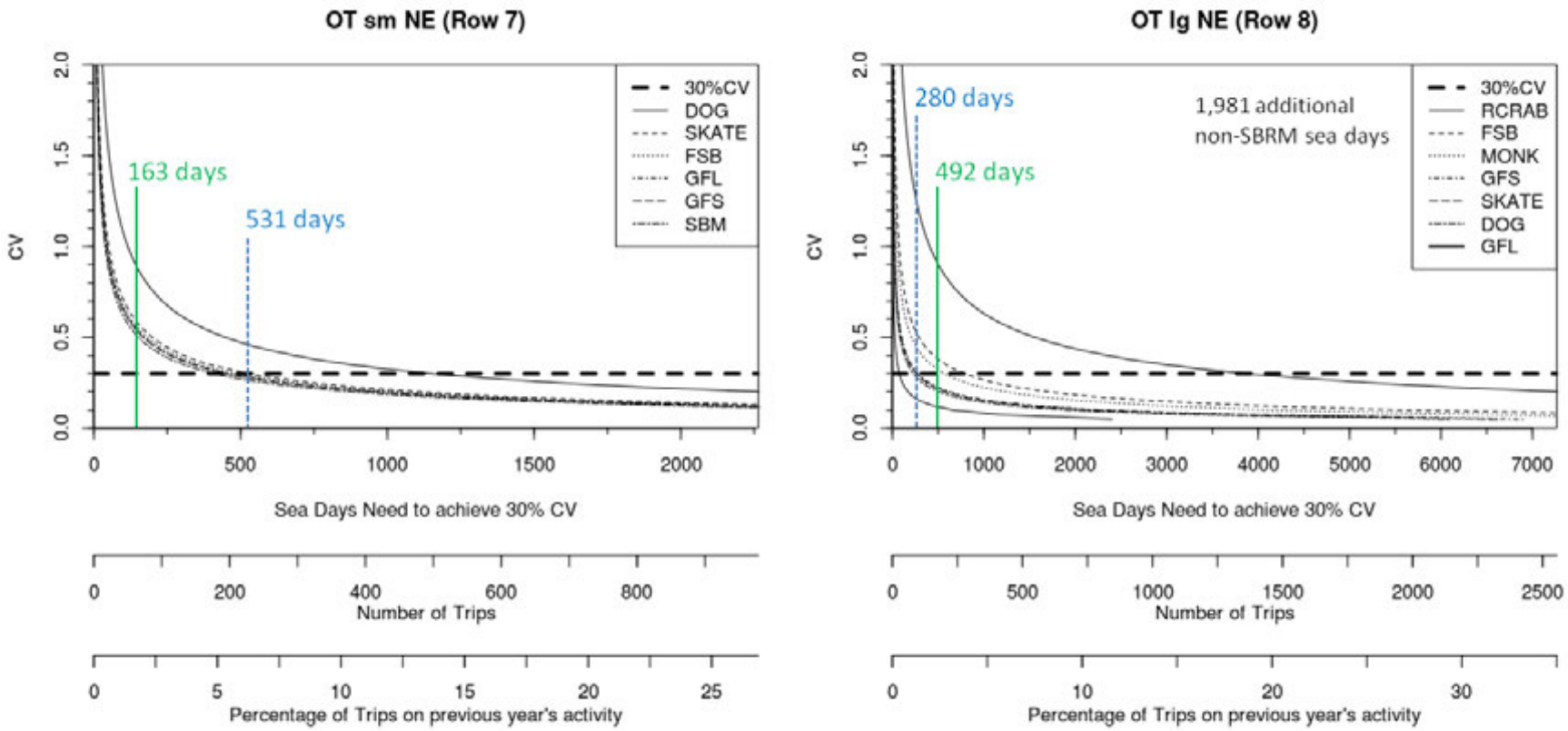

Figure 1, continued. Results from the 2012 sample size analysis conducted by Wigley et al. (2012). The curves represent the relationship between the coefficient of variation (CV) and the sample size (in terms of sea days, trips, and percentage of trips) for each of the fish/invertebrate species groups that were not filtered out by the importance filter, for agency-funded fleets where discards could be estimated. To illustrate the difference in expected CV, two sample sizes are indicated by the colored lines: the green solid line indicates the number of sea days allocated via the proportional approach, and the blue dashed line indicates the number of sea days allocated via the penultimate approach. See Figure 2 for loggerhead turtle graphs. *[This figure is a modified version of Figure 3 in Wigley et al. 2012.]*

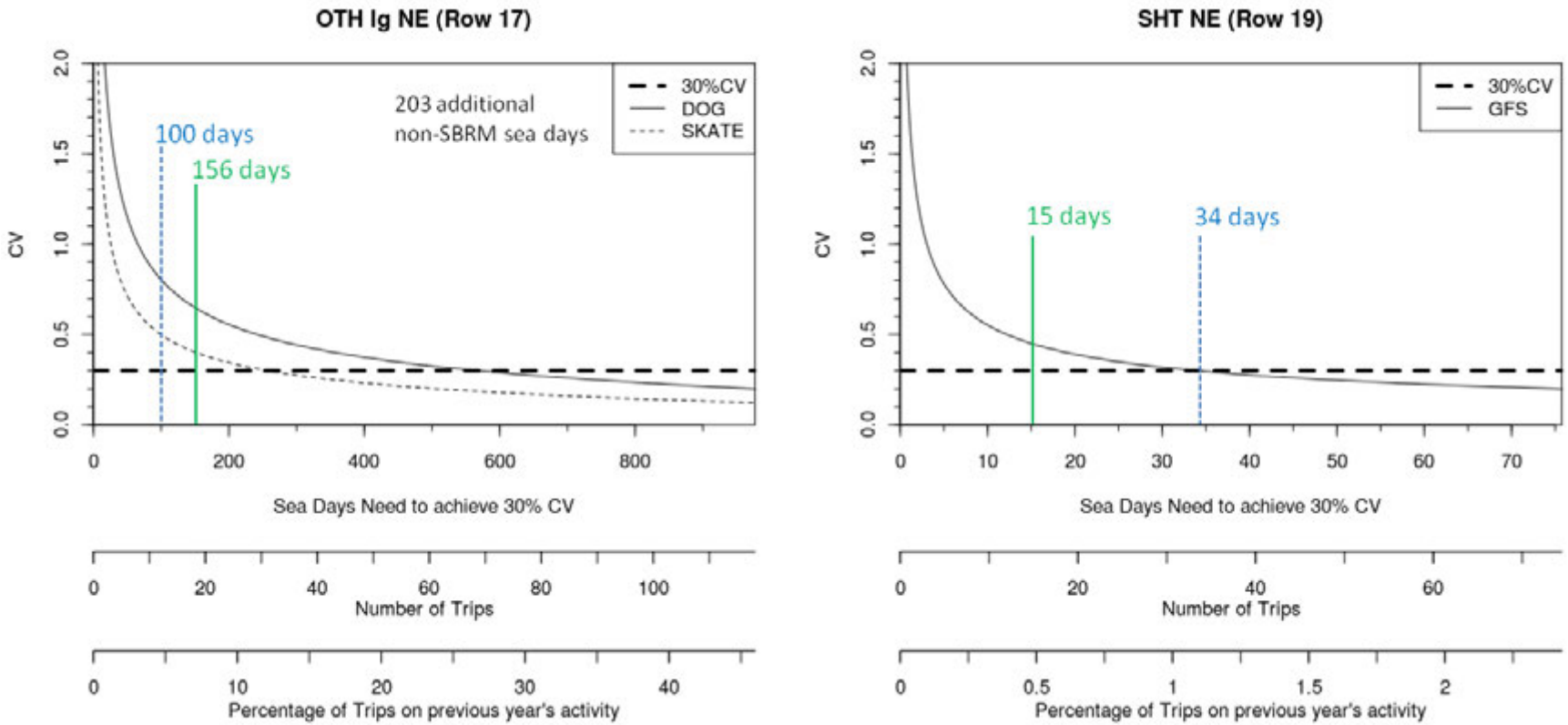

Figure 1, continued. Results from the 2012 sample size analysis conducted by Wigley et al. (2012). The curves represent the relationship between the coefficient of variation (CV) and the sample size (in terms of sea days, trips, and percentage of trips) for each of the fish/invertebrate species groups that were not filtered out by the importance filter, for agency-funded fleets where discards could be estimated. To illustrate the difference in expected CV, two sample sizes are indicated by the colored lines: the green solid line indicates the number of sea days allocated via the proportional approach, and the blue dashed line indicates the number of sea days allocated via the penultimate approach. See Figure 2 for loggerhead turtle graphs. *[This figure is a modified version of Figure 3 in Wigley et al. 2012.]*

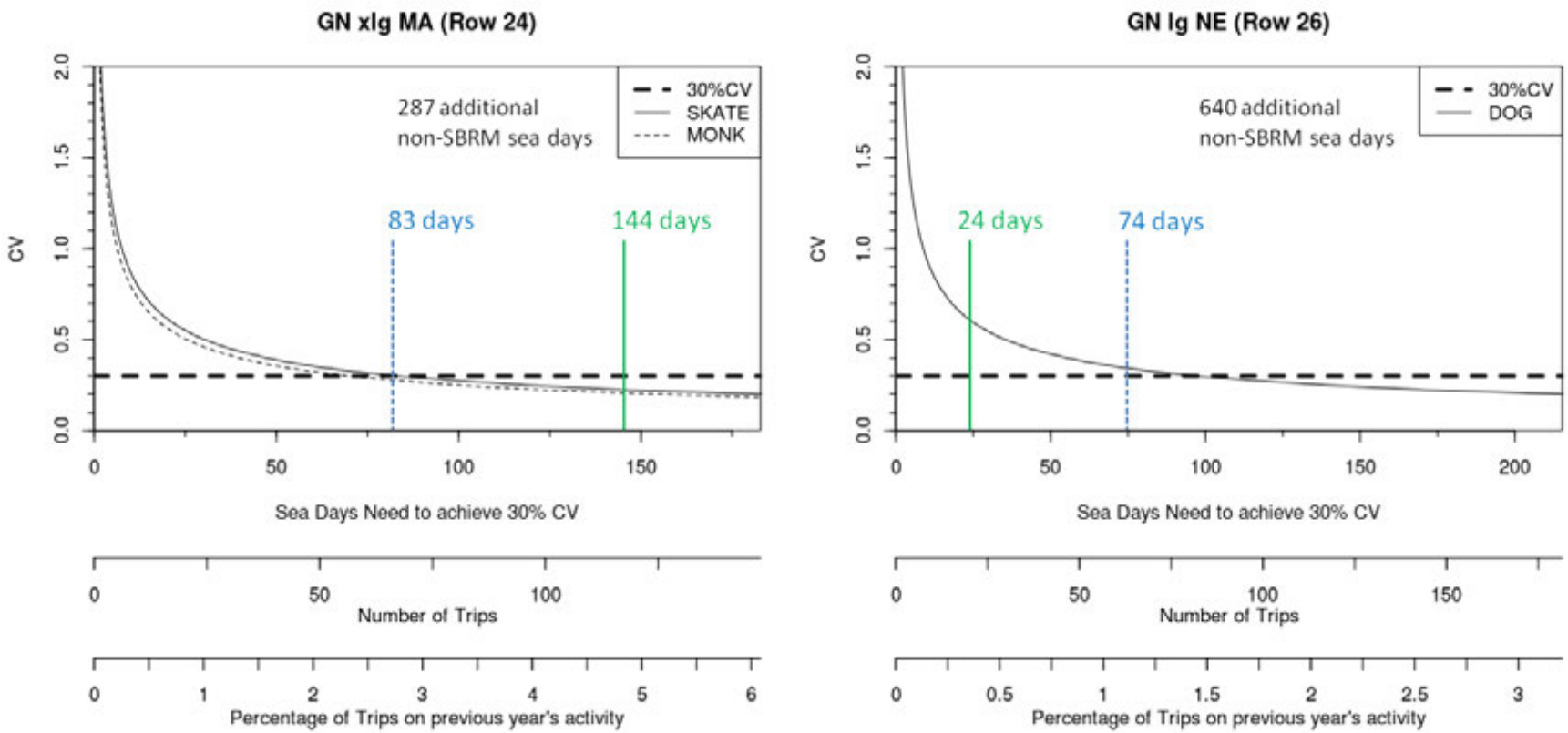

Figure 1, continued. Results from the 2012 sample size analysis conducted by Wigley et al. (2012). The curves represent the relationship between the coefficient of variation (CV) and the sample size (in terms of sea days, trips, and percentage of trips) for each of the fish/invertebrate species groups that were not filtered out by the importance filter, for agency-funded fleets where discards could be estimated. To illustrate the difference in expected CV, two sample sizes are indicated by the colored lines: the green solid line indicates the number of sea days allocated via the proportional approach, and the blue dashed line indicates the number of sea days allocated via the penultimate approach. See Figure 2 for loggerhead turtle graphs. *[This figure is a modified version of Figure 3 in Wigley et al. 2012.]*

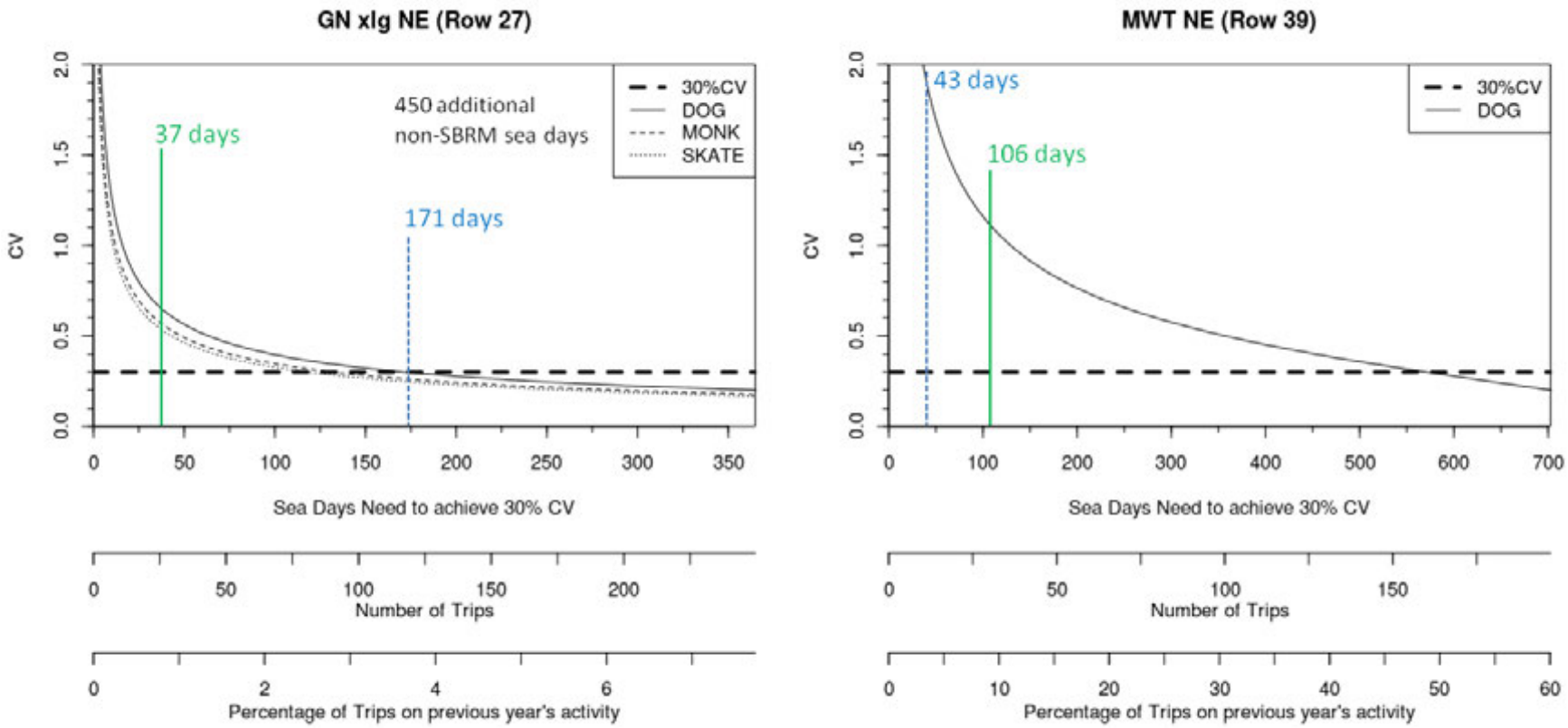

Figure 1, continued. Results from the 2012 sample size analysis conducted by Wigley et al. (2012). The curves represent the relationship between the coefficient of variation (CV) and the sample size (in terms of sea days, trips, and percentage of trips) for each of the fish/invertebrate species groups that were not filtered out by the importance filter, for agency-funded fleets where discards could be estimated. To illustrate the difference in expected CV, two sample sizes are indicated by the colored lines: the green solid line indicates the number of sea days allocated via the proportional approach, and the blue dashed line indicates the number of sea days allocated via the penultimate approach. See Figure 2 for loggerhead turtle graphs. *[This figure is a modified version of Figure 3 in Wigley et al. 2012.]*

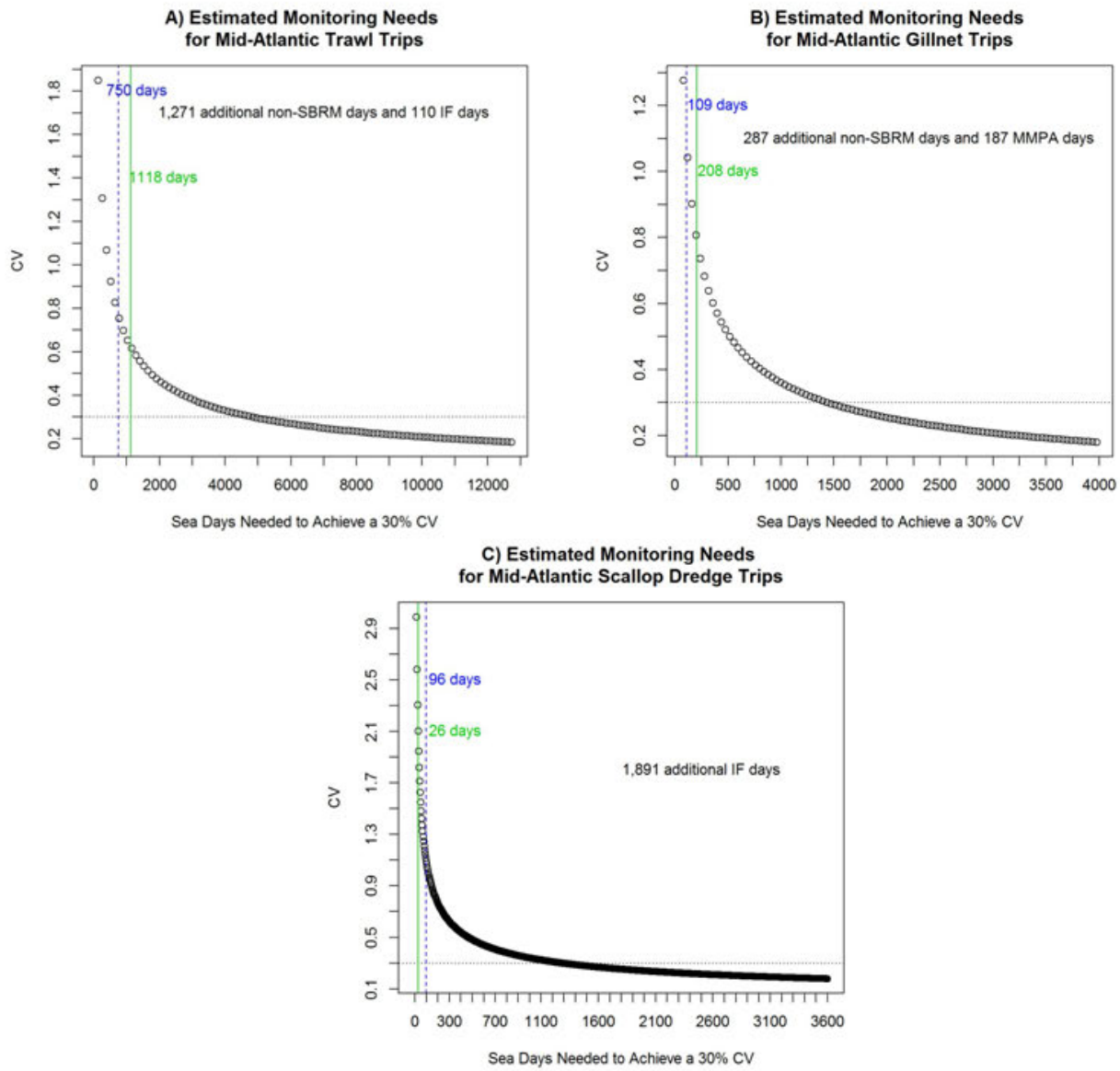

Figure 2. Estimated sea days needed to monitor loggerhead turtle interactions in the Mid-Atlantic in a) otter trawl gear catching NE multispecies; b) sink gillnet gear catching spot; and c) dredge gear catching scallops. These fisheries are the "drivers" for all monitoring in each respective gear type. Reference lines are indicated at the 30% precision goal. To illustrate the difference in expected CV, two sample sizes are indicated by the colored lines: the green solid line indicates the number of sea days allocated via the proportional approach, and the blue dashed line indicates the number of sea days allocated via the penultimate approach. *[This figure is a modified version of Figure 1 in Murray. 2012.]*

Appendix Table 1. Fleet abbreviations used in the tables of this report.

Abbreviation	Definition
MA	Mid-Atlantic ports (CT and southward)
NE	New England ports (RI and northward)
sm	Small mesh (less than 5.5 inches)
lg	Large mesh (5.5 to 7.99 inches)
xlg	Extra large mesh (8 inches and greater)
LIM	Limited access category
GEN	General category
OPEN	Non-access area
AA	Access area

Appendix I
Draft Proposed Regulations

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TITLE 50--Wildlife and Fisheries

CHAPTER VI--FISHERY CONSERVATION AND MANAGEMENT,
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION,
DEPARTMENT OF COMMERCE

PART 648--FISHERIES OF THE NORTHEASTERN UNITED STATES

Subpart A—General Provisions

In § 648.11, revise paragraphs (h) and (i) to read as follows:

(h) Observer service provider approval and responsibilities – (1) General. An entity seeking to provide observer services must apply for and obtain approval from NMFS following submission of a complete application. A list of approved observer service providers shall be distributed to vessel owners and shall be posted on the NMFS/NEFOP website at: www.nefsc.noaa.gov/femad/fsb/.

(2) [Reserved]

(3) Contents of application. An application to become an approved observer service provider shall contain the following:

(i) Identification of the management, organizational structure, and ownership structure of the applicant's business, including identification by name and general function of all controlling management interests in the company, including but not limited to owners, board members, officers, authorized agents, and staff. If the applicant is a corporation, the articles of incorporation must be provided. If the applicant is a partnership, the partnership agreement must be provided.

(ii) The permanent mailing address, phone and fax numbers where the owner(s) can be contacted for official correspondence, and the current physical location, business mailing address, business telephone and fax numbers, and business email address for each office.

(iii) A statement, signed under penalty of perjury, from each owner or owners, board members, and officers, if a corporation, that they are free from a conflict of interest as described under paragraph (h)(6) of this section.

(iv) A statement, signed under penalty of perjury, from each owner or owners, board members, and officers, if a corporation, describing any criminal conviction(s), Federal contract(s) they have had and the performance rating they received on the contracts, and previous decertification action(s) while working as an observer or observer service provider.

(v) A description of any prior experience the applicant may have in placing individuals in remote field and/or marine work environments. This includes, but is not limited to, recruiting, hiring, deployment, and personnel administration.

(vi) A description of the applicant's ability to carry out the responsibilities and duties of a fishery observer services provider as set out under paragraph (h)(5) of this section, and the arrangements to be used.

(vii) Evidence of holding adequate insurance to cover injury, liability, and accidental death for observers during their period of employment (including during training). Workers' Compensation and Maritime Employer's Liability insurance must be provided to cover the observer,

vessel owner, and observer provider. The minimum coverage required is $5 million. Observer service providers shall provide copies of the insurance policies to observers to display to the vessel owner, operator, or vessel manager, when requested.

(viii) Proof that its observers, whether contracted or employed by the service provider, are compensated with salaries that meet or exceed the U.S. Department of Labor (DOL) guidelines for observers. Observers shall be compensated as Fair Labor Standards Act (FLSA) non-exempt employees. Observer providers shall provide any other benefits and personnel services in accordance with the terms of each observer's contract or employment status.

(ix) The names of its fully equipped, NMFS/NEFOP certified, observers on staff or a list of its training candidates (with resumes) and a request for an appropriate NMFS/NEFOP Observer Training class. The NEFOP training has a minimum class size of eight individuals, which may be split among multiple vendors requesting training. Requests for training classes with fewer than eight individuals will be delayed until further requests make up the full training class size.

(x) An Emergency Action Plan (EAP) describing its response to an “at sea” emergency with an observer, including, but not limited to, personal injury, death, harassment, or intimidation.

(4) Application evaluation. (i) NMFS shall review and evaluate each application submitted under paragraph (h)(3) of this section. Issuance of approval as an observer provider shall be based on completeness of the application, and a determination by NMFS of the applicant's ability to perform the duties and responsibilities of a fishery observer service provider, as demonstrated in the application information. A decision to approve or deny an application shall be made by NMFS within 15 business days of receipt of the application by NMFS.

(ii) If NMFS approves the application, the observer service provider's name will be added to the list of approved observer service providers found on the NMFS/NEFOP website specified in paragraph (h)(1) of this section, and in any outreach information to the industry. Approved observer service providers shall be notified in writing and provided with any information pertinent to its participation in the fishery observer program.

(iii) An application shall be denied if NMFS determines that the information provided in the application is not complete or the evaluation criteria are not met. NMFS shall notify the applicant in writing of any deficiencies in the application or information submitted in support of the application. An applicant who receives a denial of his or her application may present additional information to rectify the deficiencies specified in the written denial, provided such information is submitted to NMFS within 30 days of the applicant’s receipt of the denial notification from NMFS. In the absence of additional information, and after 30 days from an applicant’s receipt of a denial, an observer provider is required to resubmit an application containing all of the information required under the application process specified in paragraph (h)(3) of this section to be re-considered for being added to the list of approved observer service providers.

(5) Responsibilities of observer service providers. (i) An observer service provider must provide observers certified by NMFS/NEFOP pursuant to paragraph (i) of this section for deployment in a fishery when contacted and contracted by the owner, operator, or vessel manager of a fishing vessel, unless the observer service provider refuses to deploy an observer on a requesting vessel for any of the reasons specified at paragraph (h)(5)(viii) of this section.

(ii) An observer service provider must provide to each of its observers:

(A) All necessary transportation, including arrangements and logistics, of observers to the initial location of deployment, to all subsequent vessel assignments, and to any debriefing locations, if necessary;

(B) Lodging, per diem, and any other services necessary for observers assigned to a fishing vessel or to attend an appropriate NMFS/NEFOP observer training class;

(C) The required observer equipment, in accordance with equipment requirements listed on the NMFS/NEFOP website specified in paragraph (h)(1) of this section, prior to any deployment and/or prior to NMFS observer certification training; and

(D) Individually assigned communication equipment, in working order, such as a mobile phone, for all necessary communication. An observer service provider may alternatively compensate observers for the use of the observer's personal mobile phone, or other device, for communications made in support of, or necessary for, the observer's duties.

(iii) Observer deployment logistics. Each approved observer service provider must assign an available certified observer to a vessel upon request. Each approved observer service provider must be accessible 24 hours per day, 7 days per week, to enable an owner, operator, or manager of a vessel to secure observer coverage when requested. The telephone system must be monitored a minimum of four times daily to ensure rapid response to industry requests. Observer service providers approved under paragraph (h) of this section are required to report observer deployments to NMFS daily for the purpose of determining whether the predetermined coverage levels are being achieved in the appropriate fishery.

(iv) Observer deployment limitations. (A) A candidate observer's first four deployments and the resulting data shall be immediately edited and approved after each trip by NMFS/NEFOP prior to any further deployments by that observer. If data quality is considered acceptable, the observer would be certified.

(B) Unless alternative arrangements are approved by NMFS, an observer provider must not deploy any observer on the same vessel for more than two consecutive multi-day trips, and not more than twice in any given month for multi-day deployments.

(v) Communications with observers. An observer service provider must have an employee responsible for observer activities on call 24 hours a day to handle emergencies involving observers or problems concerning observer logistics, whenever observers are at sea, stationed shoreside, in transit, or in port awaiting vessel assignment.

(vi) Observer training requirements. The following information must be submitted to NMFS/NEFOP at least 7 days prior to the beginning of the proposed training class: A list of observer candidates; observer candidate resumes; and a statement signed by the candidate, under penalty of perjury, that discloses the candidate's criminal convictions, if any. All observer trainees must complete a basic cardiopulmonary resuscitation/first aid course prior to the end of a NMFS/NEFOP Observer Training class. NMFS may reject a candidate for training if the candidate does not meet the minimum qualification requirements as outlined by NMFS/NEFOP minimum eligibility standards for observers as described on the NMFS/NEFOP website.

(vii) Reports. (A) Observer deployment reports. The observer service provider must report to NMFS/NEFOP when, where, to whom, and to what fishery (including Open Area or Access Area for sea scallop trips) an observer has been deployed, within 24 hours of the observer's departure. The observer service provider must ensure that the observer reports back to NMFS its Observer Contract (OBSCON) data, as described in the certified observer training, within 24 hours of landing.

OBSCON data are to be submitted electronically or by other means specified by NMFS. The observer service provider shall provide the raw (unedited) data collected by the observer to NMFS within 4 business days of the trip landing.

(B) Safety refusals. The observer service provider must report to NMFS any trip that has been refused due to safety issues, e.g., failure to hold a valid USCG Commercial Fishing Vessel Safety Examination Decal or to meet the safety requirements of the observer's pre-trip vessel safety checklist, within 24 hours of the refusal.

(C) Biological samples. The observer service provider must ensure that biological samples, including whole marine mammals, sea turtles, and sea birds, are stored/handled properly and transported to NMFS within 7 days of landing.

(D) Observer debriefing. The observer service provider must ensure that the observer remains available to NMFS, either in-person or via phone, at NMFS' discretion, including NMFS Office for Law Enforcement, for debriefing for at least 2 weeks following any observed trip. If requested by NMFS, an observer that is at sea during the 2-week period must contact NMFS upon his or her return.

(E) Observer availability report. The observer service provider must report to NMFS any occurrence of inability to respond to an industry request for observer coverage due to the lack of available observers by 5 p.m., Eastern Time, of any day on which the provider is unable to respond to an industry request for observer coverage.

(F) Other reports. The observer service provider must report possible observer harassment, discrimination, concerns about vessel safety or marine casualty, or observer illness or injury; and any information, allegations, or reports regarding observer conflict of interest or breach of the standards of behavior, to NMFS/NEFOP within 24 hours of the event or within 24 hours of learning of the event.

(G) Observer status report. The observer service provider must provide NMFS/NEFOP with an updated list of contact information for all observers that includes the observer identification number, observer's name, mailing address, email address, phone numbers, homeports or fisheries/trip types assigned, and must include whether or not the observer is “in service,” indicating when the observer has requested leave and/or is not currently working for an industry funded program.

(H) Vessel contract. The observer service provider must submit to NMFS/NEFOP, if requested, a copy of each type of signed and valid contract (including all attachments, appendices, addendums, and exhibits incorporated into the contract) between the observer provider and those entities requiring observer services.

(I) Observer contract. The observer service provider must submit to NMFS/NEFOP, if requested, a copy of each type of signed and valid contract (including all attachments, appendices, addendums, and exhibits incorporated into the contract) between the observer provider and specific observers.

(J) Additional information. The observer service provider must submit to NMFS/NEFOP, if requested, copies of any information developed and/or used by the observer provider and distributed to vessels, such as informational pamphlets, payment notification, description of observer duties, etc.

(viii) Refusal to deploy an observer. (A) An observer service provider may refuse to deploy an observer on a requesting fishing vessel if the observer service provider does not have an available observer within 48 hours of receiving a request for an observer from a vessel.

(B) An observer service provider may refuse to deploy an observer on a requesting fishing vessel if the observer service provider has determined that the requesting vessel is inadequate or unsafe pursuant to the reasons described at § 600.746.

(C) The observer service provider may refuse to deploy an observer on a fishing vessel that is otherwise eligible to carry an observer for any other reason, including failure to pay for previous observer deployments, provided the observer service provider has received prior written confirmation from NMFS authorizing such refusal.

(6) Limitations on conflict of interest. An observer service provider:

(i) Must not have a direct or indirect interest in a fishery managed under Federal regulations, including, but not limited to, a fishing vessel, fish dealer, fishery advocacy group, and/or fishery research;

(ii) Must assign observers without regard to any preference by representatives of vessels other than when an observer will be deployed; and

(iii) Must not solicit or accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from anyone who conducts fishing or fishing related activities that are regulated by NMFS, or who has interests that may be substantially affected by the performance or nonperformance of the official duties of observer providers.

(7) Removal of observer service provider from the list of approved observer service providers. An observer service provider that fails to meet the requirements, conditions, and responsibilities specified in paragraphs (h)(5) and (h)(6) of this section shall be notified by NMFS, in writing, that it is subject to removal from the list of approved observer service providers. Such notification shall specify the reasons for the pending removal. An observer service provider that has received notification that it is subject to removal from the list of approved observer service providers may submit written information to rebut the reasons for removal from the list. Such rebuttal must be submitted within 30 days of notification received by the observer service provider that the observer service provider is subject to removal and must be accompanied by written evidence rebutting the basis for removal. NMFS shall review information rebutting the pending removal and shall notify the observer service provider within 15 days of receipt of the rebuttal whether or not the removal is warranted. If no response to a pending removal is received by NMFS, the observer service provider shall be automatically removed from the list of approved observer service providers. The decision to remove the observer service provider from the list, either after reviewing a rebuttal, or if no rebuttal is submitted, shall be the final decision of NMFS and the Department of Commerce. Removal from the list of approved observer service providers does not necessarily prevent such observer service provider from obtaining an approval in the future if a new application is submitted that demonstrates that the reasons for removal are remedied. Certified observers under contract with an observer service provider that has been removed from the list of approved service providers must complete their assigned duties for any fishing trips on which the observers are deployed at the time the observer service provider is removed from the list of approved observer service providers. An observer service provider removed from the list of approved observer service providers is responsible for providing NMFS with the information required in paragraph (h)(5)(vii) of this section following completion of the trip. NMFS may

consider, but is not limited to, the following in determining if an observer service provider may remain on the list of approved observer service providers:

(i) Failure to meet the requirements, conditions, and responsibilities of observer service providers specified in paragraphs (h)(5) and (h)(6) of this section;

(ii) Evidence of conflict of interest as defined under paragraph (h)(6) of this section;

(iii) Evidence of criminal convictions related to:

(A) Embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; or

(B) The commission of any other crimes of dishonesty, as defined by state law or Federal law, that would seriously and directly affect the fitness of an applicant in providing observer services under this section;

(iv) Unsatisfactory performance ratings on any Federal contracts held by the applicant; and

(v) Evidence of any history of decertification as either an observer or observer provider.

(i) Observer certification. (1) To be certified, employees or sub-contractors operating as observers for observer service providers approved under paragraph (h) of this section must meet NMFS National Minimum Eligibility Standards for observers. NMFS National Minimum Eligibility Standards are available at the National Observer Program website: www.nmfs.noaa.gov/op/pds/categories/science_and_technology.html.

(2) Observer training. In order to be deployed on any fishing vessel, a candidate observer must have passed an appropriate NMFS/NEFOP Observer Training course. If a candidate fails training, the candidate shall be notified in writing on or before the last day of training. The notification will indicate the reasons the candidate failed the training. Observer training shall include an observer training trip, as part of the observer's training, aboard a fishing vessel with a trainer. A candidate observer's first four deployments and the resulting data shall be immediately edited and approved after each trip by NMFS/NEFOP, prior to any further deployments by that observer. If data quality is considered acceptable, the observer would be certified.

(3) Observer requirements. All observers must:

(i) Have a valid NMFS/NEFOP fisheries observer certification pursuant to paragraph (i)(1) of this section;

(ii) Be physically and mentally capable of carrying out the responsibilities of an observer on board fishing vessels, pursuant to standards established by NMFS. Such standards are available from NMFS/NEFOP website specified in paragraph (h)(1) of this section and shall be provided to each approved observer service provider;

(iii) Have successfully completed all NMFS-required training and briefings for observers before deployment, pursuant to paragraph (i)(2) of this section; and

(iv) Hold a current Red Cross (or equivalence) CPR/First Aid certification.

(v) Accurately record their sampling data, write complete reports, and report accurately any observations relevant to conservation of marine resources or their environment.

(4) Probation and decertification. NMFS may review observer certifications and issue observer certification probation and/or decertification as described in NMFS policy found on the NMFS/NEFOP website specified in paragraph (h)(1) of this section.

(5) Issuance of decertification. Upon determination that decertification is warranted under paragraph (i)(4) of this section, NMFS shall issue a written decision to decertify the observer to the observer and approved observer service providers via certified mail at the observer's most current address provided to NMFS. The decision shall identify whether a certification is revoked and shall identify the specific reasons for the action taken. Decertification is effective immediately as of the date of issuance, unless the decertification official notes a compelling reason for maintaining certification for a specified period and under specified conditions. Decertification is the final decision of NMFS and the Department of Commerce and may not be appealed.

* * * * *

Add § 648.18 to subpart A to read as follows:

§ 648.18 Standardized bycatch reporting methodology.

NMFS shall comply with the Standardized Bycatch Reporting Methodology (SBRM) provisions established in the following fishery management plans by the SBRM Omnibus Amendment, which is incorporated by reference: Atlantic Bluefish; Atlantic Mackerel, Squid, and Butterfish; Atlantic Sea Scallop; Atlantic Surfclam and Ocean Quahog; Atlantic Herring; Atlantic Salmon; Deep-Sea Red Crab; Monkfish; Northeast Multispecies; Northeast Skate Complex; Spiny Dogfish; Summer Flounder, Scup, and Black Sea Bass; and Tilefish.

Subpart B—Management Measures for the Atlantic Mackerel, Squid, and Butterfish Fisheries

In § 648.22, add paragraph (c)(13) to read as follows:

§ 648.22 Atlantic mackerel, squid, and butterfish specifications.

* * * * *

(c) * * *

(13) Changes, as appropriate, to the SBRM, including the coefficient of variation (CV) based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

In § 648.25, revise paragraph (a)(1) to read as follows:

§ 648.25 Atlantic mackerel, squid, and butterfish framework adjustments to management measures.

(a) * * *

(1) Adjustment process. The MAFMC shall develop and analyze appropriate management actions over the span of at least two MAFMC meetings. The MAFMC must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting and prior to and at the second MAFMC meeting. The MAFMC's recommendations on adjustments or additions to management measures must come from one or more of the following categories: Adjustments within existing ABC control rule levels; adjustments to the existing MAFMC risk policy; introduction of new AMs, including sub-ACTs; minimum fish size; maximum fish size; gear restrictions; gear requirements or prohibitions; permitting restrictions; recreational possession limit; recreational seasons; closed areas; commercial seasons; commercial trip limits; commercial quota system, including commercial quota allocation procedure and possible quota set-asides to mitigate bycatch; recreational harvest limit; annual specification quota setting process;

FMP Monitoring Committee composition and process; description and identification of EFH (and fishing gear management measures that impact EFH); description and identification of habitat areas of particular concern; overfishing definition and related thresholds and targets; regional gear restrictions; regional season restrictions (including option to split seasons); restrictions on vessel size (LOA and GRT) or shaft horsepower; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; any other management measures currently included in the FMP; set aside quota for scientific research; regional management; process for inseason adjustment to the annual specification; mortality caps for river herring and shad species; time/area management for river herring and shad species; and provisions for river herring and shad incidental catch avoidance program, including adjustments to the mechanism and process for tracking fleet activity, reporting incidental catch events, compiling data, and notifying the fleet of changes to the area(s); the definition/duration of `test tows,' if test tows would be utilized to determine the extent of river herring incidental catch in a particular area(s); the threshold for river herring incidental catch that would trigger the need for vessels to be alerted and move out of the area(s); the distance that vessels would be required to move from the area(s); and the time that vessels would be required to remain out of the area(s). Measures contained within this list that require significant departures from previously contemplated measures or that are otherwise introducing new concepts may require amendment of the FMP instead of a framework adjustment.

* * * * *

Subpart C—Management Measures for Atlantic Salmon

In § 648.41, revise paragraph (a) to read as follows:

§ 648.41 Framework specifications.

(a) Within season management action. The New England Fishery Management Council (NEFMC) may, at any time, initiate action to implement, add to or adjust Atlantic salmon management measures to:

(1) Allow for Atlantic salmon aquaculture projects in the EEZ, provided such an action is consistent with the goals and objectives of the Atlantic Salmon FMP; and

(2) Make changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

Subpart D—Management Measures for the Atlantic Sea Scallop Fishery

In § 648.55, revise paragraphs (f)(39) and (40), and add paragraph (f)(41) to read as follows:

§ 648.55 Framework adjustments to management measures.

* * * * *

(f) * * *

(39) Adjusting EFH closed area management boundaries or other associated measures;

(40) Changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set-aside programs; and

(41) Any other management measures currently included in the FMP.

* * * * *

Subpart E—Management Measures for the Atlantic Surf Clam and Ocean Quahog Fisheries

In § 648.79, revise paragraph (a)(1) to read as follows:

§ 648.79 Surfclam and ocean quahog framework adjustments to management measures.

(a) * * *

(1) Adjustment process. The MAFMC shall develop and analyze appropriate management actions over the span of at least two MAFMC meetings. The MAFMC must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting, and prior to and at the second MAFMC meeting. The MAFMC's recommendations on adjustments or additions to management measures must come from one or more of the following categories: Adjustments within existing ABC control rule levels; adjustments to the existing MAFMC risk policy; introduction of new AMs, including sub-ACTs; the overfishing definition (both the threshold and target levels); description and identification of EFH (and fishing gear management measures that impact EFH); habitat areas of particular concern; set-aside quota for scientific research; VMS; OY range; suspension or adjustment of the surfclam minimum size limit; and changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs. Issues that require significant departures from previously contemplated measures or that are otherwise introducing new concepts may require an amendment of the FMP instead of a framework adjustment.

* * * * *

Subpart F—Management Measures for the NE Multispecies and Monkfish Fisheries

In § 648.90, revise paragraphs (a)(2)(i), (a)(2)(iii), (b)(1)(ii), (c)(1)(i), and (c)(1)(ii) to read as follows:

§ 648.90 NE multispecies assessment, framework procedures and specifications, and flexible area action system.

* * * * *

(a) * * *

(2) Biennial review. (i) The NE multispecies PDT shall meet on or before September 30 every other year, unless otherwise specified in paragraph (a)(3) of this section, under the conditions specified in that paragraph, to perform a review of the fishery, using the most current scientific information available provided primarily from the NEFSC. Data provided by states, ASMFC, the USCG, and other sources may also be considered by the PDT. Based on this review, the PDT will develop ACLs for the upcoming fishing year(s) as described in paragraph (a)(4) of this section and develop options for consideration by the Council if necessary, on any changes, adjustments, or

additions to DAS allocations, closed areas, or other measures necessary to rebuild overfished stocks and achieve the FMP goals and objectives, including changes to the SBRM.

* * * * *

(iii) Based on this review, the PDT shall recommend ACLs and develop options necessary to achieve the FMP goals and objectives, which may include a preferred option. The PDT must demonstrate through analyses and documentation that the options they develop are expected to meet the FMP goals and objectives. The PDT may review the performance of different user groups or fleet sectors in developing options. The range of options developed by the PDT may include any of the management measures in the FMP, including, but not limited to: ACLs, which must be based on the projected fishing mortality levels required to meet the goals and objectives outlined in the FMP for the 12 regulated species and ocean pout if able to be determined; identifying and distributing ACLs and other sub-components of the ACLs among various segments of the fishery; AMs; DAS changes; possession limits; gear restrictions; closed areas; permitting restrictions; minimum fish sizes; recreational fishing measures; describing and identifying EFH; fishing gear management measures to protect EFH; designating habitat areas of particular concern within EFH; and changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs. In addition, the following conditions and measures may be adjusted through future framework adjustments: Revisions to DAS measures, including DAS allocations (such as the distribution of DAS among the four categories of DAS), future uses for Category C DAS, and DAS baselines, adjustments for steaming time, etc.; modifications to capacity measures, such as changes to the DAS transfer or DAS leasing measures; calculation of area-specific ACLs, area management boundaries, and adoption of area-specific management measures; sector allocation requirements and specifications, including the establishment of a new sector, the disapproval of an existing sector, the allowable percent of ACL available to a sector through a sector allocation, and the calculation of PSCs; sector administration provisions, including at-sea and dockside monitoring measures; sector reporting requirements; state-operated permit bank administrative provisions; measures to implement the U.S./Canada Resource Sharing Understanding, including any specified TACs (hard or target); changes to administrative measures; additional uses for Regular B DAS; reporting requirements; the GOM Inshore Conservation and Management Stewardship Plan; adjustments to the Handgear A or B permits; gear requirements to improve selectivity, reduce bycatch, and/or reduce impacts of the fishery on EFH; SAP modifications; revisions to the ABC control rule and status determination criteria, including, but not limited to, changes in the target fishing mortality rates, minimum biomass thresholds, numerical estimates of parameter values, and the use of a proxy for biomass may be made either through a biennial adjustment or framework adjustment; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; and any other measures currently included in the FMP.

* * * * *

(b) * * *

(1) * * *

(ii) The Whiting PDT, after reviewing the available information on the status of the stock and the fishery, may recommend to the Council any measures necessary to assure that the specifications will not be exceeded; changes to the SBRM, including the CV-based performance

standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; as well as changes to the appropriate specifications.

* * * * *

(c) * * *

(1) * * *

(i) After a management action has been initiated, the Council shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Council shall provide the public with advance notice of the availability of both the proposals and the analyses and opportunity to comment on them prior to and at the second Council meeting. The Council's recommendation on adjustments or additions to management measures, other than to address gear conflicts, must come from one or more of the following categories: DAS changes; effort monitoring; data reporting; possession limits; gear restrictions; closed areas; permitting restrictions; crew limits; minimum fish sizes; onboard observers; minimum hook size and hook style; the use of crucifer in the hook-gear fishery; sector requirements; recreational fishing measures; area closures and other appropriate measures to mitigate marine mammal entanglements and interactions; description and identification of EFH; fishing gear management measures to protect EFH; designation of habitat areas of particular concern within EFH; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; and any other management measures currently included in the FMP.

(ii) The Council's recommendation on adjustments or additions to management measures pertaining to small-mesh NE multispecies, other than to address gear conflicts, must come from one or more of the following categories: Quotas and appropriate seasonal adjustments for vessels fishing in experimental or exempted fisheries that use small mesh in combination with a separator trawl/grate (if applicable); modifications to separator grate (if applicable) and mesh configurations for fishing for small-mesh NE multispecies; adjustments to whiting stock boundaries for management purposes; adjustments for fisheries exempted from minimum mesh requirements to fish for small-mesh NE multispecies (if applicable); season adjustments; declarations; participation requirements for any of the Gulf of Maine/Georges Bank small-mesh multispecies exemption areas; OFL and ABC values; ACL, TAL, or TAL allocations, including the proportions used to allocate by season or area; small-mesh multispecies possession limits, including in-season AM possession limits; changes to reporting requirements and methods to monitor the fishery; and biological reference points, including selected reference time series, survey strata used to calculate biomass, and the selected survey for status determination; and changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

In § 648.96, revise paragraph (a)(3)(ii) to read as follows:

§ 648.96 <u>FMP review, specification, and framework adjustment process</u>.

(a) * * *

(3) * * *

(ii) The range of options developed by the Councils may include any of the management measures in the Monkfish FMP, including, but not limited to: ACTs; closed seasons or closed areas; minimum size limits; mesh size limits; net limits; liver-to-monkfish landings ratios; annual monkfish DAS allocations and monitoring; trip or possession limits; blocks of time out of the fishery; gear restrictions; transferability of permits and permit rights or administration of vessel upgrades, vessel replacement, or permit assignment; measures to minimize the impact of the monkfish fishery on protected species; gear requirements or restrictions that minimize bycatch or bycatch mortality; transferable DAS programs; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; changes to the Monkfish Research Set-Aside Program; and other frameworkable measures included in §§ 648.55 and 648.90.

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Subpart G—Management Measures for the Summer Flounder Fisheries

In § 648.102, add paragraph (a)(10) to read as follows:

§ 648.102 Summer flounder specifications.

(a) * * *

(10) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

In § 648.110, revise paragraph (a)(1) to read as follows:

§ 648.110 Summer flounder framework adjustments to management measures.

(a) * * *

(1) Adjustment process. The MAFMC shall develop and analyze appropriate management actions over the span of at least two MAFMC meetings. The MAFMC must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting and prior to and at the second MAFMC meeting. The MAFMC's recommendations on adjustments or additions to management measures must come from one or more of the following categories: Adjustments within existing ABC control rule levels; adjustments to the existing MAFMC risk policy; introduction of new AMs, including sub-ACTs; minimum fish size; maximum fish size; gear restrictions; gear requirements or prohibitions; permitting restrictions; recreational possession limit; recreational seasons; closed areas; commercial seasons; commercial trip limits; commercial quota system including commercial quota allocation procedure and possible quota set asides to mitigate bycatch; recreational harvest limit; specification quota setting process; FMP Monitoring Committee composition and process; description and identification of essential fish habitat (and fishing gear management measures that impact EFH); description and identification of habitat areas of particular concern; regional gear restrictions; regional season restrictions (including option to split seasons); restrictions on vessel size (LOA and GRT) or shaft horsepower; operator permits; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; any other

commercial or recreational management measures; any other management measures currently included in the FMP; and set aside quota for scientific research. Issues that require significant departures from previously contemplated measures or that are otherwise introducing new concepts may require an amendment of the FMP instead of a framework adjustment.

* * * * *

Subpart H—Management Measures for the Scup Fishery

In § 648.122, add paragraph (a)(13) to read as follows:

§ 648.122 Scup specifications.

(a) * * *

(13) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

In § 648.130, revise paragraph (a)(1) to read as follows:

§ 648.130 Scup framework adjustments to management measures.

(a) * * *

(1) Adjustment process. The MAFMC shall develop and analyze appropriate management actions over the span of at least two MAFMC meetings. The MAFMC must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting and prior to and at the second MAFMC meeting. The MAFMC's recommendations on adjustments or additions to management measures must come from one or more of the following categories: Adjustments within existing ABC control rules; adjustments to the existing MAFMC risk policy; introduction of new AMs, including sub-ACTs; minimum fish size; maximum fish size; gear restrictions; gear restricted areas; gear requirements or prohibitions; permitting restrictions; recreational possession limits; recreational seasons; closed areas; commercial seasons; commercial trip limits; commercial quota system including commercial quota allocation procedure and possible quota set asides to mitigate bycatch; recreational harvest limits; annual specification quota setting process; FMP Monitoring Committee composition and process; description and identification of EFH (and fishing gear management measures that impact EFH); description and identification of habitat areas of particular concern; regional gear restrictions; regional season restrictions (including option to split seasons); restrictions on vessel size (LOA and GRT) or shaft horsepower; operator permits; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; any other commercial or recreational management measures; any other management measures currently included in the FMP; and set aside quota for scientific research.

* * * * *

Subpart I—Management Measures for the Black Sea Bass Fishery

In § 648.142, add paragraph (a)(12) to read as follows:

§ 648.142 Black sea bass specifications.

(a) * * *

(12) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

Subpart J—Management Measures for the Atlantic Bluefish Fishery

In § 648.162, add paragraph (a)(9) to read as follows:

§ 648.162 Bluefish specifications.

(a) * * *

(9) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; and

* * * * *

In § 648.167, revise paragraph (a)(1) to read as follows:

§ 648.167 Bluefish framework adjustment to management measures.

(a) * * *

(1) Adjustment process. After a management action has been initiated, the MAFMC shall develop and analyze appropriate management actions over the span of at least two MAFMC meetings. The MAFMC shall provide the public with advance notice of the availability of both the proposals and the analysis and the opportunity to comment on them prior to and at the second MAFMC meeting. The MAFMC's recommendation on adjustments or additions to management measures must come from one or more of the following categories: Adjustments within existing ABC control rule levels; adjustments to the existing MAFMC risk policy; introduction of new AMs, including sub-ACTs; minimum fish size; maximum fish size; gear restrictions; gear requirements or prohibitions; permitting restrictions; recreational possession limit; recreational season; closed areas; commercial season; description and identification of EFH; fishing gear management measures to protect EFH; designation of habitat areas of particular concern within EFH; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; and any other management measures currently included in the FMP. Measures that require significant departures from previously contemplated measures or that are otherwise introducing new concepts may require an amendment of the FMP instead of a framework adjustment.

* * * * *

Subpart K—Management Measures for the Atlantic Herring Fishery

In § 648.200, revise the introductory text of paragraph (b) to read as follows:

§ 648.200 Specifications.

* * * * *

(b) Guidelines. As the basis for its recommendations under paragraph (a) of this section, the PDT shall review available data pertaining to: Commercial and recreational catch data; current estimates of fishing mortality; discards; stock status; recent estimates of recruitment; virtual population analysis results and other estimates of stock size; sea sampling and trawl survey data or, if sea sampling data are unavailable, length frequency information from trawl surveys; impact of other fisheries on herring mortality; and any other relevant information. The specifications recommended pursuant to paragraph (a) of this section must be consistent with the following:

* * * * *

In § 648.206, add paragraph (b)(29) to read as follows:

§ 648.206 Framework provisions.

* * * * *

(b) * * *

(29) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs;

* * * * *

Subpart L—Management Measures for the Spiny Dogfish Fishery

In § 648.232, add paragraph (a)(6) to read as follows:

§ 648.232 Spiny dogfish specifications.

(a) * * *

(6) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs;

* * * * *

In § 648.239, revise paragraph (a)(1) to read as follows:

§ 648.239 Spiny dogfish framework adjustments to management measures.

(a) * * *

(1) Adjustment process. After the Councils initiate a management action, they shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Councils shall provide the public with advance notice of the availability of both the proposals and the analysis for comment prior to, and at, the second Council meeting. The Councils' recommendation on adjustments or additions to management measures must come from one or more of the following categories: Adjustments within existing ABC control rule levels; adjustments to the existing MAFMC risk policy; introduction of new AMs, including sub-ACTs; minimum fish size; maximum fish size; gear requirements, restrictions, or prohibitions (including, but not limited to, mesh size restrictions and net limits); regional gear restrictions; permitting restrictions, and reporting requirements; recreational fishery measures (including possession and size limits and season and area restrictions); commercial season and area restrictions; commercial trip or possession limits; fin weight to spiny dogfish landing weight restrictions; onboard observer requirements;

commercial quota system (including commercial quota allocation procedures and possible quota set-asides to mitigate bycatch, conduct scientific research, or for other purposes); recreational harvest limit; annual quota specification process; FMP Monitoring Committee composition and process; description and identification of essential fish habitat; description and identification of habitat areas of particular concern; overfishing definition and related thresholds and targets; regional season restrictions (including option to split seasons); restrictions on vessel size (length and GRT) or shaft horsepower; target quotas; measures to mitigate marine mammal entanglements and interactions; regional management; changes to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs; any other management measures currently included in the Spiny Dogfish FMP; and measures to regulate aquaculture projects. Measures that require significant departures from previously contemplated measures or that are otherwise introducing new concepts may require an amendment of the FMP instead of a framework adjustment.

* * * * *

Subpart M—Management Measures for the Atlantic Deep-Sea Red Crab Fishery

In § 648.260, revise paragraph (a)(1) to read as follows:

§ 648.260 Specifications.

(a) * * *

(1) The Red Crab PDT shall meet at least once annually during the intervening years between Stock Assessment and Fishery Evaluation (SAFE) Reports, described in paragraph (b) of this section, to review the status of the stock and the fishery. Based on such review, the PDT shall provide a report to the Council on any changes or new information about the red crab stock and/or fishery, and it shall recommend whether the specifications for the upcoming year(s) need to be modified. At a minimum, this review shall include a review of at least the following data, if available: Commercial catch data; current estimates of fishing mortality and catch-per-unit-effort (CPUE); discards; stock status; recent estimates of recruitment; virtual population analysis results and other estimates of stock size; sea sampling, port sampling, and survey data or, if sea sampling data are unavailable, length frequency information from port sampling and/or surveys; impact of other fisheries on the mortality of red crabs; and any other relevant information.

* * * * *

In § 648.261, revise paragraph (a)(1) to read as follows:

§ 648.261 Framework adjustment process.

(a) * * *

(1) In response to an annual review of the status of the fishery or the resource by the Red Crab PDT, or at any other time, the Council may recommend adjustments to any of the measures proposed by the Red Crab FMP, including the SBRM. The Red Crab Oversight Committee may request that the Council initiate a framework adjustment. Framework adjustments shall require one initial meeting (the agenda must include notification of the impending proposal for a framework adjustment) and one final Council meeting. After a management action has been initiated, the Council shall develop and analyze appropriate management actions within the scope identified below. The Council may refer the proposed adjustments to the Red Crab Committee for further deliberation and review. Upon receiving the recommendations of the Oversight Committee, the Council shall publish notice of its intent to take action and provide the public with any relevant

analyses and opportunity to comment on any possible actions. After receiving public comment, the Council must take action (to approve, modify, disapprove, or table) on the recommendation at the Council meeting following the meeting at which it first received the recommendations. Documentation and analyses for the framework adjustment shall be available at least 2 weeks before the final meeting.

* * * * *

Subpart N—Management Measures for the Tilefish Fishery

In 648.292, revise paragraph (a) to read as follows:

§ 648.292 Tilefish specifications.

* * * * *

(a) Annual specification process. The Tilefish Monitoring Committee shall review the ABC recommendation of the SSC, tilefish landings and discards information, and any other relevant available data to determine if the ACL, ACT, or total allowable landings (TAL) requires modification to respond to any changes to the stock's biological reference points or to ensure that the rebuilding schedule is maintained. The Monitoring Committee will consider whether any additional management measures or revisions to existing measures are necessary to ensure that the TAL will not be exceeded, including changes, as appropriate, to the SBRM. Based on that review, the Monitoring Committee will recommend ACL, ACT, and TAL to the Tilefish Committee of the MAFMC. Based on these recommendations and any public comment received, the Tilefish Committee shall recommend to the MAFMC the appropriate ACL, ACT, TAL, and other management measures for a single fishing year or up to 3 years. The MAFMC shall review these recommendations and any public comments received, and recommend to the Regional Administrator, at least 120 days prior to the beginning of the next fishing year, the appropriate ACL, ACT, TAL, the percentage of TAL allocated to research quota, and any management measures to ensure that the TAL will not be exceeded, for the next fishing year, or up to 3 fishing years. The MAFMC's recommendations must include supporting documentation, as appropriate, concerning the environmental and economic impacts of the recommendations. The Regional Administrator shall review these recommendations, and after such review, NMFS will publish a proposed rule in the Federal Register specifying the annual ACL, ACT, TAL and any management measures to ensure that the TAL will not be exceeded for the upcoming fishing year or years. After considering public comments, NMFS will publish a final rule in the Federal Register to implement the ACL, ACT, TAL and any management measures. The previous year's specifications will remain effective unless revised through the specification process and/or the research quota process described in paragraph (e) of this section. NMFS will issue notification in the Federal Register if the previous year's specifications will not be changed.

* * * * *

In § 648.299, add paragraph (a)(1)(xviii) to read as follows:

§ 648.299 Tilefish framework specifications.

(a) * * *

(1) * * *

(xviii) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for

prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs;

* * * * *

Subpart O—Management Measures for the NE Skate Complex Fisheries

In 648.320, revise paragraphs (a)(5)(ii) and (iii), and add paragraph (a)(5)(iv) to read as follows:

§ 648.320 Skate FMP review and monitoring.

(a) * * *

(5) * * *

(ii) In-season possession limit triggers for the wing and/or bait fisheries;

(iii) Required adjustments to in-season possession limit trigger percentages or the ACL-ACT buffer, based on the accountability measures specified at § 648.323; and

(iv) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

* * * * *

In § 648.321, revise paragraphs (b)(22) and (b)(23), and add paragraph (b)(24) to read as follows:

§ 648.321 Framework adjustment process.

* * * * *

(b) * * *

(22) Reduction of the baseline 25-percent ACL-ACT buffer to less than 25 percent;

(23) Changes to catch monitoring procedures; and

(24) Changes, as appropriate, to the SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, the process for prioritizing observer sea-day allocations, reports, and/or industry-funded observers or observer set aside programs.

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MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

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